

# SCons API Docs

version 4.0

**SCons Project**

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# SCons Project API Documentation

This is the internal API Documentation for SCons. The Documentation is generated using the Sphinx tool. The target audience is developers working on SCons itself, so it does not clearly delineate what is “Public API” - interfaces for use in your SCons configuration scripts which have a consistency guarantee, and what is internal, so always keep the SCons manual page around for helping with such determinations.

## SCons package

### *Module contents*

### *Subpackages*

### *SCons.Node package*

### *Submodules*

### *SCons.Node.Alias module*

scons.Node.Alias

Alias nodes.

This creates a hash of global Aliases (dummy targets).

```
class SCons.Node.Alias.Alias (name)
```

```
  Bases: SCons.Node.Node
```

```
  class Attrs
```

```
    Bases: object
```

```
    shared
```

```
  BuildInfo
```

```
    alias of AliasBuildInfo
```

```
  Decider (function)
```

```
  GetTag (key)
```

```
    Return a user-defined tag.
```

```
  NodeInfo
```

```
    alias of AliasNodeInfo
```

```
  Tag (key, value)
```

```
    Add a user-defined tag.
```

```
  _add_child (collection, set, child)
```

```
    Adds 'child' to 'collection', first checking 'set' to see if it's already present.
```

```
  _children_get ()
```

```
  _children_reset ()
```

```
  _func_exists
```

```
  _func_get_contents
```

`_func_is_derived`

`_func_rexists`

`_func_target_from_source`

`_get_scanner (env, initial_scanner, root_node_scanner, kw)`

`_memo`

`_specific_sources`

`_tags`

`add_dependency (depend)`  
Adds dependencies.

`add_ignore (depend)`  
Adds dependencies to ignore.

`add_prerequisite (prerequisite)`  
Adds prerequisites

`add_source (source)`  
Adds sources.

`add_to_implicit (deps)`

`add_to_waiting_parents (node)`  
Returns the number of nodes added to our waiting parents list: 1 if we add a unique waiting parent, 0 if not. (Note that the returned values are intended to be used to increment a reference count, so don't think you can "clean up" this function by using True and False instead...)

`add_to_waiting_s_e (node)`

`add_wkid (wkid)`  
Add a node to the list of kids waiting to be evaluated

`all_children (scan=1)`  
Return a list of all the node's direct children.

`alter_targets ()`  
Return a list of alternate targets for this Node.

`always_build`

`attributes`

`binfo`

`build ()`  
A "builder" for aliases.

`builder`

`builder_set (builder)`

`built ()`  
Called just after this node is successfully built.

`cached`

**changed (node=None, allowcache=False)**

Returns if the node is up-to-date with respect to the BuildInfo stored last time it was built. The default behavior is to compare it against our own previously stored BuildInfo, but the stored BuildInfo from another Node (typically one in a Repository) can be used instead.

Note that we now *always* check every dependency. We used to short-circuit the check by returning as soon as we detected any difference, but we now rely on checking every dependency to make sure that any necessary Node information (for example, the content signature of an #included .h file) is updated.

The allowcache option was added for supporting the early release of the executor/builder structures, right after a File target was built. When set to true, the return value of this changed method gets cached for File nodes. Like this, the executor isn't needed any longer for subsequent calls to changed().

@see: FS.File.changed(), FS.File.release\_target\_info()

**changed\_since\_last\_build****children (scan=1)**

Return a list of the node's direct children, minus those that are ignored by this node.

**children\_are\_up\_to\_date ()**

Alternate check for whether the Node is current: If all of our children were up-to-date, then this Node was up-to-date, too.

The SCons.Node.Alias and SCons.Node.Python.Value subclasses rebind their current() method to this method.

**clear ()**

Completely clear a Node of all its cached state (so that it can be re-evaluated by interfaces that do continuous integration builds).

**clear\_memoized\_values ()****convert ()****del\_binfo ()**

Delete the build info from this node.

**depends****depends\_set****disambiguate (must\_exist=None)****env****env\_set (env, safe=0)****executor****executor\_cleanup ()**

Let the executor clean up any cached information.

**exists ()**

Does this node exist?

**explain ()****for\_signature ()**

Return a string representation of the Node that will always be the same for this particular Node, no matter what. This is by contrast to the \_\_str\_\_() method, which might, for instance, return a relative path for a file Node. The purpose of this method is to generate a value to be used in signature calculation for the command line used to build a target, and we use this method instead of str() to avoid unnecessary rebuilds. This method does not need to return something that would actually work in a command line; it can return any kind of nonsense, so long as it does not change.

**get\_abspath ()**

Return an absolute path to the Node. This will return simply `str(Node)` by default, but for Node types that have a concept of relative path, this might return something different.

**get\_binfo ()**

Fetch a node's build information.

node - the node whose sources will be collected  
 cache - alternate node to use for the signature cache returns - the build signature

This no longer handles the recursive descent of the node's children's signatures. We expect that they're already built and updated by someone else, if that's what's wanted.

**get\_build\_env ()**

Fetch the appropriate Environment to build this node.

**get\_build\_scanner\_path (scanner)**

Fetch the appropriate scanner path for this node.

**get\_builder (default\_builder=None)**

Return the set builder, or a specified default value

**get\_cachedir\_csig ()****get\_contents ()**

The contents of an alias is the concatenation of the content signatures of all its sources.

**get\_csig ()**

Generate a node's content signature, the digested signature of its content.

node - the node  
 cache - alternate node to use for the signature cache returns - the content signature

**get\_env ()****get\_env\_scanner (env, kw={})****get\_executor (create=1)**

Fetch the action executor for this node. Create one if there isn't already one, and requested to do so.

**get\_found\_includes (env, scanner, path)**

Return the scanned include lines (implicit dependencies) found in this node.

The default is no implicit dependencies. We expect this method to be overridden by any subclass that can be scanned for implicit dependencies.

**get\_implicit\_deps (env, initial\_scanner, path\_func, kw={})**

Return a list of implicit dependencies for this node.

This method exists to handle recursive invocation of the scanner on the implicit dependencies returned by the scanner, if the scanner's recursive flag says that we should.

**get\_ninfo ()****get\_source\_scanner (node)**

Fetch the source scanner for the specified node

NOTE: "self" is the target being built, "node" is the source file for which we want to fetch the scanner.

Implies `self.has_builder()` is true; again, expect to only be called from locations where this is already verified.

This function may be called very often; it attempts to cache the scanner found to improve performance.

**get\_state ()****get\_stored\_implicit ()**

Fetch the stored implicit dependencies

**get\_stored\_info ()**

**get\_string (for\_signature)**

This is a convenience function designed primarily to be used in command generators (i.e., `CommandGeneratorActions` or Environment variables that are callable), which are called with a `for_signature` argument that is nonzero if the command generator is being called to generate a signature for the command line, which determines if we should rebuild or not.

Such command generators should use this method in preference to `str(Node)` when converting a `Node` to a string, passing in the `for_signature` parameter, such that we will call `Node.for_signature()` or `str(Node)` properly, depending on whether we are calculating a signature or actually constructing a command line.

**get\_subst\_proxy ()**

This method is expected to return an object that will function exactly like this `Node`, except that it implements any additional special features that we would like to be in effect for Environment variable substitution. The principle use is that some `Nodes` would like to implement a `__getattr__()` method, but putting that in the `Node` type itself has a tendency to kill performance. We instead put it in a proxy and return it from this method. It is legal for this method to return self if no new functionality is needed for Environment substitution.

**get\_suffix ()****get\_target\_scanner ()****has\_builder ()**

Return whether this `Node` has a builder or not.

In Boolean tests, this turns out to be a *lot* more efficient than simply examining the builder attribute directly (“if `node.builder: ...`”). When the builder attribute is examined directly, it ends up calling `__getattr__` for both the `__len__` and `__nonzero__` attributes on instances of our Builder Proxy class(es), generating a bazillion extra calls and slowing things down immensely.

**has\_explicit\_builder ()**

Return whether this `Node` has an explicit builder

This allows an internal Builder created by SCons to be marked non-explicit, so that it can be overridden by an explicit builder that the user supplies (the canonical example being directories).

**ignore****ignore\_set****implicit****implicit\_set****includes****is\_derived ()**

Returns true if this node is derived (i.e. built).

This should return true only for nodes whose path should be in the variant directory when `duplicate=0` and should contribute their build signatures when they are used as source files to other derived files. For example: source with source builders are not derived in this sense, and hence should not return true.

**is\_explicit****is\_literal ()**

Always pass the string representation of a `Node` to the command interpreter literally.

**is\_sconscript ()**

Returns true if this node is an sconscript

**is\_under (dir)****is\_up\_to\_date ()**

Alternate check for whether the `Node` is current: If all of our children were up-to-date, then this `Node` was up-to-date, too.

The `SCons.Node.Alias` and `SCons.Node.Python.Value` subclasses rebind their `current()` method to this method.

`linked`

`make_ready ()`

Get a Node ready for evaluation.

This is called before the Taskmaster decides if the Node is up-to-date or not. Overriding this method allows for a Node subclass to be disambiguated if necessary, or for an implicit source builder to be attached.

`missing ()`

`multiple_side_effect_has_builder ()`

Return whether this Node has a builder or not.

In Boolean tests, this turns out to be a *lot* more efficient than simply examining the builder attribute directly (“if node.builder: ...”). When the builder attribute is examined directly, it ends up calling `__getattr__` for both the `__len__` and `__nonzero__` attributes on instances of our Builder Proxy class(es), generating a bazillion extra calls and slowing things down immensely.

`new_binfo ()`

`new_ninfo ()`

`ninfo`

`nocache`

`noclean`

`postprocess ()`

Clean up anything we don't need to hang onto after we've been built.

`precious`

`prepare ()`

Prepare for this Node to be built.

This is called after the Taskmaster has decided that the Node is out-of-date and must be rebuilt, but before actually calling the method to build the Node.

This default implementation checks that explicit or implicit dependencies either exist or are derived, and initializes the BuildInfo structure that will hold the information about how this node is, uh, built.

(The existence of source files is checked separately by the Executor, which aggregates checks for all of the targets built by a specific action.)

Overriding this method allows for for a Node subclass to remove the underlying file from the file system. Note that subclass methods should call this base class method to get the child check and the BuildInfo structure.

`prerequisites`

`pseudo`

`push_to_cache ()`

Try to push a node into a cache

`really_build (**kw)`

Actually build the node.

This is called by the Taskmaster after it's decided that the Node is out-of-date and must be rebuilt, and after the `prepare()` method has gotten everything, uh, prepared.

This method is called from multiple threads in a parallel build, so only do thread safe stuff here. Do thread unsafe stuff in `built()`.

`ref_count`

`release_target_info ()`

Called just after this node has been marked up-to-date or was built completely.

This is where we try to release as many target node infos as possible for clean builds and update runs, in order to minimize the overall memory consumption.

By purging attributes that aren't needed any longer after a Node (=File) got built, we don't have to care that much how many KBytes a Node actually requires...as long as we free the memory shortly afterwards.

@see: `built()` and `File.release_target_info()`

**`remove ()`**

Remove this Node: no-op by default.

**`render_include_tree ()`**

Return a text representation, suitable for displaying to the user, of the include tree for the sources of this node.

**`reset_executor ()`**

Remove cached executor; forces recompute when needed.

**`retrieve_from_cache ()`**

Try to retrieve the node's content from a cache

This method is called from multiple threads in a parallel build, so only do thread safe stuff here. Do thread unsafe stuff in `built()`.

Returns true if the node was successfully retrieved.

**`reexists ()`**

Does this node exist locally or in a repository?

**`scan ()`**

Scan this node's dependents for implicit dependencies.

**`scanner_key ()`**

**`sconsign ()`**

An Alias is not recorded in `.sconsign` files

**`select_scanner (scanner)`**

Selects a scanner for this Node.

This is a separate method so it can be overridden by Node subclasses (specifically, `Node.FS.Dir`) that *must* use their own `Scanner` and don't select one the `Scanner.Selector` that's configured for the target.

**`set_always_build (always_build=1)`**

Set the Node's `always_build` value.

**`set_executor (executor)`**

Set the action executor for this node.

**`set_explicit (is_explicit)`**

**`set_nocache (nocache=1)`**

Set the Node's `nocache` value.

**`set_noclean (noclean=1)`**

Set the Node's `noclean` value.

**`set_precious (precious=1)`**

Set the Node's `precious` value.

**`set_pseudo (pseudo=True)`**

Set the Node's `precious` value.

**`set_specific_source (source)`**

**`set_state (state)`**

`side_effect``side_effects``sources``sources_set``state``store_info``str_for_display()``target_peers``visited()`

Called just after this node has been visited (with or without a build).

`waiting_parents``waiting_s_e``wkids`

```
class SCons.Node.Alias.AliasBuildInfo
```

```
  Bases: SCons.Node.BuildInfoBase
```

`bact``bactsig``bdepends``bdependsigs``bimplicit``bimplicitSIGs``bsources``bsourcesigs``current_version_id = 2``merge(other)`

Merge the fields of another object into this object. Already existing information is overwritten by the other instance's data. WARNING: If a `'__dict__'` slot is added, it should be updated instead of replaced.

```
class SCons.Node.Alias.AliasNameSpace (**kwargs)
```

```
  Bases: collections.UserDict
```

`Alias(name, **kw)``__MutableMapping__marker = <object object>``__abc_impl = <_abc_data object>``clear()` → None. Remove all items from D.

**copy ()**

**classmethod fromkeys (iterable, value=None)**

**get (k[, d])** → D[k] if k in D, else d. d defaults to None.

**items ()** → a set-like object providing a view on D's items

**keys ()** → a set-like object providing a view on D's keys

**lookup (name, \*\*kw)**

**pop (k[, d])** → v, remove specified key and return the corresponding value.  
If key is not found, d is returned if given, otherwise KeyError is raised.

**popitem ()** → (k, v), remove and return some (key, value) pair  
as a 2-tuple; but raise KeyError if D is empty.

**setdefault (k[, d])** → D.get(k,d), also set D[k]=d if k not in D

**update ([, E], \*\*F)** → None. Update D from mapping/iterable E and F.  
If E present and has a .keys() method, does: for k in E: D[k] = E[k] If E present and lacks .keys() method, does:  
for (k, v) in E: D[k] = v In either case, this is followed by: for k, v in F.items(): D[k] = v

**values ()** → an object providing a view on D's values

**class SCons.Node.Alias.AliasNodeInfo**

Bases: **SCons.Node.NodeInfoBase**

**convert (node, val)**

**csig**

**current\_version\_id = 2**

**field\_list = ['csig']**

**format (field\_list=None, names=0)**

**merge (other)**

Merge the fields of another object into this object. Already existing information is overwritten by the other instance's data. WARNING: If a '\_\_dict\_\_' slot is added, it should be updated instead of replaced.

**str\_to\_node (s)**

**update (node)**

## **SCons.Node.FS module**

scons.Node.FS

File system nodes.

These Nodes represent the canonical external objects that people think of when they think of building software: files and directories.

This holds a "default\_fs" variable that should be initialized with an FS that can be used by scripts or modules looking for the canonical default.

**class SCons.Node.FS.Base (name, directory, fs)**

Bases: **SCons.Node.Node**

A generic class for file system entries. This class is for when we don't know yet whether the entry being looked up is a file or a directory. Instances of this class can morph into either Dir or File objects by a later, more precise lookup.

Note: this class does not define `__cmp__` and `__hash__` for efficiency reasons. SCons does a lot of comparing of `Node.FS.{Base,Entry,File,Dir}` objects, so those operations must be as fast as possible, which means we want to use Python's built-in object identity comparisons.

`class Attrs`

Bases: `object`

`shared`

`BuildInfo`

alias of `SCons.Node.BuildInfoBase`

`Decider` (function)

`GetTag` (key)

Return a user-defined tag.

`NodeInfo`

alias of `SCons.Node.NodeInfoBase`

`RDirs` (pathlist)

Search for a list of directories in the Repository list.

`Rfindalldirs` (pathlist)

Return all of the directories for a given path list, including corresponding "backing" directories in any repositories. The Node lookups are relative to this Node (typically a directory), so memoizing result saves cycles from looking up the same path for each target in a given directory.

`Tag` (key, value)

Add a user-defined tag.

`_Rfindalldirs_key` (pathlist)

`_abspath`

`_add_child` (collection, set, child)

Adds 'child' to 'collection', first checking 'set' to see if it's already present.

`_children_get` ()

`_children_reset` ()

`_func_exists`

`_func_get_contents`

`_func_is_derived`

`_func_rexists`

`_func_sconsign`

`_func_target_from_source`

`_get_scanner` (env, initial\_scanner, root\_node\_scanner, kw)

`_get_str` ()

**`_globl (pattern, ondisk=True, source=False, strings=False)`**

**`_labspath`**

**`_local`**

**`_memo`**

**`_path`**

**`_path_elements`**

**`_proxy`**

**`_save_str ()`**

**`_specific_sources`**

**`_tags`**

**`_tpath`**

**`add_dependency (depend)`**

Adds dependencies.

**`add_ignore (depend)`**

Adds dependencies to ignore.

**`add_prerequisite (prerequisite)`**

Adds prerequisites

**`add_source (source)`**

Adds sources.

**`add_to_implicit (deps)`**

**`add_to_waiting_parents (node)`**

Returns the number of nodes added to our waiting parents list: 1 if we add a unique waiting parent, 0 if not. (Note that the returned values are intended to be used to increment a reference count, so don't think you can "clean up" this function by using True and False instead...)

**`add_to_waiting_s_e (node)`**

**`add_wkid (wkid)`**

Add a node to the list of kids waiting to be evaluated

**`all_children (scan=1)`**

Return a list of all the node's direct children.

**`alter_targets ()`**

Return a list of alternate targets for this Node.

**`always_build`**

**`attributes`**

**`binfo`**

**`build (**kw)`**

Actually build the node.

This is called by the Taskmaster after it's decided that the Node is out-of-date and must be rebuilt, and after the `prepare()` method has gotten everything, uh, prepared.

This method is called from multiple threads in a parallel build, so only do thread safe stuff here. Do thread unsafe stuff in `built()`.

**builder**

**builder\_set** (*builder*)

**built ()**

Called just after this node is successfully built.

**cached**

**changed** (*node=None, allowcache=False*)

Returns if the node is up-to-date with respect to the BuildInfo stored last time it was built. The default behavior is to compare it against our own previously stored BuildInfo, but the stored BuildInfo from another Node (typically one in a Repository) can be used instead.

Note that we now *always* check every dependency. We used to short-circuit the check by returning as soon as we detected any difference, but we now rely on checking every dependency to make sure that any necessary Node information (for example, the content signature of an `#included .h` file) is updated.

The `allowcache` option was added for supporting the early release of the executor/builder structures, right after a File target was built. When set to true, the return value of this `changed` method gets cached for File nodes. Like this, the executor isn't needed any longer for subsequent calls to `changed()`.

@see: `FS.File.changed()`, `FS.File.release_target_info()`

**changed\_since\_last\_build**

**children** (*scan=1*)

Return a list of the node's direct children, minus those that are ignored by this node.

**children\_are\_up\_to\_date ()**

Alternate check for whether the Node is current: If all of our children were up-to-date, then this Node was up-to-date, too.

The `SCons.Node.Alias` and `SCons.Node.Python.Value` subclasses rebind their `current()` method to this method.

**clear ()**

Completely clear a Node of all its cached state (so that it can be re-evaluated by interfaces that do continuous integration builds).

**clear\_memoized\_values ()**

**cwd**

**del\_binfo ()**

Delete the build info from this node.

**depends**

**depends\_set**

**dir**

**disambiguate** (*must\_exist=None*)

**duplicate**

**env**

**env\_set** (*env, safe=0*)

**executor**

**executor\_cleanup ()**

Let the executor clean up any cached information.

**exists ()**

Does this node exists?

**explain ()**

**for\_signature ()**

Return a string representation of the Node that will always be the same for this particular Node, no matter what. This is by contrast to the `__str__()` method, which might, for instance, return a relative path for a file Node. The purpose of this method is to generate a value to be used in signature calculation for the command line used to build a target, and we use this method instead of `str()` to avoid unnecessary rebuilds. This method does not need to return something that would actually work in a command line; it can return any kind of nonsense, so long as it does not change.

**fs**

Reference to parent Node.FS object

**get\_abspath ()**

Get the absolute path of the file.

**get\_binfo ()**

Fetch a node's build information.

node - the node whose sources will be collected cache - alternate node to use for the signature cache returns - the build signature

This no longer handles the recursive descent of the node's children's signatures. We expect that they're already built and updated by someone else, if that's what's wanted.

**get\_build\_env ()**

Fetch the appropriate Environment to build this node.

**get\_build\_scanner\_path (scanner)**

Fetch the appropriate scanner path for this node.

**get\_builder (default\_builder=None)**

Return the set builder, or a specified default value

**get\_cachedir\_csig ()**

**get\_contents ()**

Fetch the contents of the entry.

**get\_csig ()**

**get\_dir ()**

**get\_env ()**

**get\_env\_scanner (env, kw={})**

**get\_executor (create=1)**

Fetch the action executor for this node. Create one if there isn't already one, and requested to do so.

**get\_found\_includes (env, scanner, path)**

Return the scanned include lines (implicit dependencies) found in this node.

The default is no implicit dependencies. We expect this method to be overridden by any subclass that can be scanned for implicit dependencies.

**get\_implicit\_deps** (env, initial\_scanner, path\_func, kw={})

Return a list of implicit dependencies for this node.

This method exists to handle recursive invocation of the scanner on the implicit dependencies returned by the scanner, if the scanner's recursive flag says that we should.

**get\_internal\_path** ()

**get\_labspath** ()

Get the absolute path of the file.

**get\_ninfo** ()

**get\_path** (dir=None)

Return path relative to the current working directory of the Node.FS.Base object that owns us.

**get\_path\_elements** ()

**get\_source\_scanner** (node)

Fetch the source scanner for the specified node

NOTE: "self" is the target being built, "node" is the source file for which we want to fetch the scanner.

Implies self.has\_builder() is true; again, expect to only be called from locations where this is already verified.

This function may be called very often; it attempts to cache the scanner found to improve performance.

**get\_state** ()

**get\_stored\_implicit** ()

Fetch the stored implicit dependencies

**get\_stored\_info** ()

**get\_string** (for\_signature)

This is a convenience function designed primarily to be used in command generators (i.e., CommandGeneratorActions or Environment variables that are callable), which are called with a for\_signature argument that is nonzero if the command generator is being called to generate a signature for the command line, which determines if we should rebuild or not.

Such command generators should use this method in preference to str(Node) when converting a Node to a string, passing in the for\_signature parameter, such that we will call Node.for\_signature() or str(Node) properly, depending on whether we are calculating a signature or actually constructing a command line.

**get\_subst\_proxy** ()

This method is expected to return an object that will function exactly like this Node, except that it implements any additional special features that we would like to be in effect for Environment variable substitution. The principle use is that some Nodes would like to implement a \_\_getattr\_\_() method, but putting that in the Node type itself has a tendency to kill performance. We instead put it in a proxy and return it from this method. It is legal for this method to return self if no new functionality is needed for Environment substitution.

**get\_suffix** ()

**get\_target\_scanner** ()

**get\_tpath** ()

**getmtime** ()

**getsize** ()

**has\_builder** ()

Return whether this Node has a builder or not.

In Boolean tests, this turns out to be a *lot* more efficient than simply examining the builder attribute directly ("if node.builder: ..."). When the builder attribute is examined directly, it ends up calling \_\_getattr\_\_ for both the

`__len__` and `__nonzero__` attributes on instances of our Builder Proxy class(es), generating a bazillion extra calls and slowing things down immensely.

#### `has_explicit_builder ()`

Return whether this Node has an explicit builder

This allows an internal Builder created by SCons to be marked non-explicit, so that it can be overridden by an explicit builder that the user supplies (the canonical example being directories).

`ignore`

`ignore_set`

`implicit`

`implicit_set`

`includes`

#### `is_derived ()`

Returns true if this node is derived (i.e. built).

This should return true only for nodes whose path should be in the variant directory when `duplicate=0` and should contribute their build signatures when they are used as source files to other derived files. For example: source with source builders are not derived in this sense, and hence should not return true.

`is_explicit`

#### `is_literal ()`

Always pass the string representation of a Node to the command interpreter literally.

#### `is_sconscript ()`

Returns true if this node is an sconscript

#### `is_under (dir)`

#### `is_up_to_date ()`

Default check for whether the Node is current: unknown Node subtypes are always out of date, so they will always get built.

`isdir ()`

`isfile ()`

`islink ()`

`linked`

`lstat ()`

#### `make_ready ()`

Get a Node ready for evaluation.

This is called before the Taskmaster decides if the Node is up-to-date or not. Overriding this method allows for a Node subclass to be disambiguated if necessary, or for an implicit source builder to be attached.

#### `missing ()`

#### `multiple_side_effect_has_builder ()`

Return whether this Node has a builder or not.

In Boolean tests, this turns out to be a *lot* more efficient than simply examining the builder attribute directly (“if `node.builder: ...`”). When the builder attribute is examined directly, it ends up calling `__getattr__` for both the `__len__` and `__nonzero__` attributes on instances of our Builder Proxy class(es), generating a bazillion extra calls and slowing things down immensely.

**must\_be\_same (klass)**

This node, which already existed, is being looked up as the specified klass. Raise an exception if it isn't.

**name****new\_binfo ()****new\_ninfo ()****ninfo****nocache****noclean****postprocess ()**

Clean up anything we don't need to hang onto after we've been built.

**precious****prepare ()**

Prepare for this Node to be built.

This is called after the Taskmaster has decided that the Node is out-of-date and must be rebuilt, but before actually calling the method to build the Node.

This default implementation checks that explicit or implicit dependencies either exist or are derived, and initializes the BuildInfo structure that will hold the information about how this node is, uh, built.

(The existence of source files is checked separately by the Executor, which aggregates checks for all of the targets built by a specific action.)

Overriding this method allows for for a Node subclass to remove the underlying file from the file system. Note that subclass methods should call this base class method to get the child check and the BuildInfo structure.

**prerequisites****pseudo****push\_to\_cache ()**

Try to push a node into a cache

**ref\_count****release\_target\_info ()**

Called just after this node has been marked up-to-date or was built completely.

This is where we try to release as many target node infos as possible for clean builds and update runs, in order to minimize the overall memory consumption.

By purging attributes that aren't needed any longer after a Node (=File) got built, we don't have to care that much how many KBytes a Node actually requires...as long as we free the memory shortly afterwards.

@see: built() and File.release\_target\_info()

**remove ()**

Remove this Node: no-op by default.

**render\_include\_tree ()**

Return a text representation, suitable for displaying to the user, of the include tree for the sources of this node.

**reentry ()****reset\_executor ()**

Remove cached executor; forces recompute when needed.

**retrieve\_from\_cache ()**

Try to retrieve the node's content from a cache

This method is called from multiple threads in a parallel build, so only do thread safe stuff here. Do thread unsafe stuff in `built()`.

Returns true if the node was successfully retrieved.

#### **`rexists ()`**

Does this node exist locally or in a repository?

#### **`rfile ()`**

#### **`rstr ()`**

A `Node.FS.Base` object's string representation is its path name.

#### **`sbuilder`**

#### **`scan ()`**

Scan this node's dependents for implicit dependencies.

#### **`scanner_key ()`**

#### **`select_scanner (scanner)`**

Selects a scanner for this Node.

This is a separate method so it can be overridden by Node subclasses (specifically, `Node.FS.Dir`) that *must* use their own `Scanner` and don't select one the `Scanner.Selector` that's configured for the target.

#### **`set_always_build (always_build=1)`**

Set the Node's `always_build` value.

#### **`set_executor (executor)`**

Set the action executor for this node.

#### **`set_explicit (is_explicit)`**

#### **`set_local ()`**

#### **`set_nocache (nocache=1)`**

Set the Node's `nocache` value.

#### **`set_noclean (noclean=1)`**

Set the Node's `noclean` value.

#### **`set_precious (precious=1)`**

Set the Node's `precious` value.

#### **`set_pseudo (pseudo=True)`**

Set the Node's `precious` value.

#### **`set_specific_source (source)`**

#### **`set_src_builder (builder)`**

Set the source code builder for this node.

#### **`set_state (state)`**

#### **`side_effect`**

#### **`side_effects`**

#### **`sources`**

#### **`sources_set`**

**src\_builder ()**

Fetch the source code builder for this node.

If there isn't one, we cache the source code builder specified for the directory (which in turn will cache the value from its parent directory, and so on up to the file system root).

**srcnode ()**

If this node is in a build path, return the node corresponding to its source file. Otherwise, return ourself.

**stat ()****state****store\_info****str\_for\_display ()****target\_from\_source (prefix, suffix, splitext=<function splitext>)**

Generates a target entry that corresponds to this entry (usually a source file) with the specified prefix and suffix.

Note that this method can be overridden dynamically for generated files that need different behavior. See Tool/swig.py for an example.

**target\_peers****visited ()**

Called just after this node has been visited (with or without a build).

**waiting\_parents****waiting\_s\_e****wkids**

*class* SCons.Node.FS.Dir (name, directory, fs)

Bases: SCons.Node.FS.Base

A class for directories in a file system.

*class* Attrs

Bases: object

shared

BuildInfo

alias of DirBuildInfo

Decider (function)

Dir (name, create=True)

Looks up or creates a directory node named 'name' relative to this directory.

Entry (name)

Looks up or creates an entry node named 'name' relative to this directory.

File (name)

Looks up or creates a file node named 'name' relative to this directory.

GetTag (key)

Return a user-defined tag.

NodeInfo

alias of DirNodeInfo

**RDirs (pathlist)**

Search for a list of directories in the Repository list.

**Rfindalldirs (pathlist)**

Return all of the directories for a given path list, including corresponding “backing” directories in any repositories. The Node lookups are relative to this Node (typically a directory), so memoizing result saves cycles from looking up the same path for each target in a given directory.

**Tag (key, value)**

Add a user-defined tag.

**\_Dir\_\_clearRepositoryCache (duplicate=None)**

Called when we change the repository(ies) for a directory. This clears any cached information that is invalidated by changing the repository.

**\_Dir\_\_resetDuplicate (node)****\_Rfindalldirs\_key (pathlist)****\_abspath****\_add\_child (collection, set, child)**

Adds ‘child’ to ‘collection’, first checking ‘set’ to see if it’s already present.

**\_children\_get ()****\_children\_reset ()****\_create ()**

Create this directory, silently and without worrying about whether the builder is the default or not.

**\_func\_exists****\_func\_get\_contents****\_func\_is\_derived****\_func\_rexists****\_func\_sconsign****\_func\_target\_from\_source****\_get\_scanner (env, initial\_scanner, root\_node\_scanner, kw)****\_get\_str ()****\_glob1 (pattern, ondisk=True, source=False, strings=False)**

Globs for and returns a list of entry names matching a single pattern in this directory.

This searches any repositories and source directories for corresponding entries and returns a Node (or string) relative to the current directory if an entry is found anywhere.

TODO: handle pattern with no wildcard

**\_labspath****\_local****\_memo****\_morph ()**

Turn a file system Node (either a freshly initialized directory object or a separate Entry object) into a proper directory object.

Set up this directory's entries and hook it into the file system tree. Specify that directories (this Node) don't use signatures for calculating whether they're current.

`_path`

`_path_elements`

`_proxy`

`_rel_path_key (other)`

`_save_str ()`

`_sconsign`

`_specific_sources`

`_srcdir_find_file_key (filename)`

`_tags`

`_tpath`

`addRepository (dir)`

`add_dependency (depend)`

Adds dependencies.

`add_ignore (depend)`

Adds dependencies to ignore.

`add_prerequisite (prerequisite)`

Adds prerequisites

`add_source (source)`

Adds sources.

`add_to_implicit (deps)`

`add_to_waiting_parents (node)`

Returns the number of nodes added to our waiting parents list: 1 if we add a unique waiting parent, 0 if not. (Note that the returned values are intended to be used to increment a reference count, so don't think you can "clean up" this function by using True and False instead...)

`add_to_waiting_s_e (node)`

`add_wkid (wkid)`

Add a node to the list of kids waiting to be evaluated

`all_children (scan=1)`

Return a list of all the node's direct children.

`alter_targets ()`

Return any corresponding targets in a variant directory.

`always_build`

`attributes`

**binfo****build (\*\*kw)**

A null “builder” for directories.

**builder****builder\_set (builder)****built ()**

Called just after this node is successfully built.

**cached****cachedir\_csig****cachesig****changed (node=None, allowcache=False)**

Returns if the node is up-to-date with respect to the BuildInfo stored last time it was built. The default behavior is to compare it against our own previously stored BuildInfo, but the stored BuildInfo from another Node (typically one in a Repository) can be used instead.

Note that we now *always* check every dependency. We used to short-circuit the check by returning as soon as we detected any difference, but we now rely on checking every dependency to make sure that any necessary Node information (for example, the content signature of an #included .h file) is updated.

The allowcache option was added for supporting the early release of the executor/builder structures, right after a File target was built. When set to true, the return value of this changed method gets cached for File nodes. Like this, the executor isn’t needed any longer for subsequent calls to changed().

@see: FS.File.changed(), FS.File.release\_target\_info()

**changed\_since\_last\_build****children (scan=1)**

Return a list of the node’s direct children, minus those that are ignored by this node.

**children\_are\_up\_to\_date ()**

Alternate check for whether the Node is current: If all of our children were up-to-date, then this Node was up-to-date, too.

The SCons.Node.Alias and SCons.Node.Python.Value subclasses rebind their current() method to this method.

**clear ()**

Completely clear a Node of all its cached state (so that it can be re-evaluated by interfaces that do continuous integration builds).

**clear\_memoized\_values ()****contentsig****cwd****del\_binfo ()**

Delete the build info from this node.

**depends****depends\_set****dir****dir\_on\_disk (name)**

**dirname****disambiguate** (*must\_exist=None*)**diskcheck\_match** ()**do\_duplicate** (*src*)**duplicate****entries****entry\_abspath** (*name*)**entry\_exists\_on\_disk** (*name*)

Searches through the file/dir entries of the current directory, and returns True if a physical entry with the given name could be found.

@see `reentry_exists_on_disk`

**entry\_labspath** (*name*)**entry\_path** (*name*)**entry\_tpath** (*name*)**env****env\_set** (*env, safe=0*)**executor****executor\_cleanup** ()

Let the executor clean up any cached information.

**exists** ()

Does this node exists?

**explain** ()**file\_on\_disk** (*name*)**for\_signature** ()

Return a string representation of the Node that will always be the same for this particular Node, no matter what. This is by contrast to the `__str__()` method, which might, for instance, return a relative path for a file Node. The purpose of this method is to generate a value to be used in signature calculation for the command line used to build a target, and we use this method instead of `str()` to avoid unnecessary rebuilds. This method does not need to return something that would actually work in a command line; it can return any kind of nonsense, so long as it does not change.

**fs****getRepositories** ()

Returns a list of repositories for this directory.

**get\_abspath** ()

Get the absolute path of the file.

**get\_all\_rdirs** ()**get\_binfo** ()

Fetch a node's build information.

node - the node whose sources will be collected cache - alternate node to use for the signature cache returns - the build signature

This no longer handles the recursive descent of the node's children's signatures. We expect that they're already built and updated by someone else, if that's what's wanted.

#### **get\_build\_env ()**

Fetch the appropriate Environment to build this node.

#### **get\_build\_scanner\_path (scanner)**

Fetch the appropriate scanner path for this node.

#### **get\_builder (default\_builder=None)**

Return the set builder, or a specified default value

#### **get\_cachedir\_csig ()**

#### **get\_contents ()**

Return content signatures and names of all our children separated by new-lines. Ensure that the nodes are sorted.

#### **get\_csig ()**

Compute the content signature for Directory nodes. In general, this is not needed and the content signature is not stored in the DirNodeInfo. However, if get\_contents on a Dir node is called which has a child directory, the child directory should return the hash of its contents.

#### **get\_dir ()**

#### **get\_env ()**

#### **get\_env\_scanner (env, kw={})**

#### **get\_executor (create=1)**

Fetch the action executor for this node. Create one if there isn't already one, and requested to do so.

#### **get\_found\_includes (env, scanner, path)**

Return this directory's implicit dependencies.

We don't bother caching the results because the scan typically shouldn't be requested more than once (as opposed to scanning .h file contents, which can be requested as many times as the files is #included by other files).

#### **get\_implicit\_deps (env, initial\_scanner, path\_func, kw={})**

Return a list of implicit dependencies for this node.

This method exists to handle recursive invocation of the scanner on the implicit dependencies returned by the scanner, if the scanner's recursive flag says that we should.

#### **get\_internal\_path ()**

#### **get\_labspath ()**

Get the absolute path of the file.

#### **get\_ninfo ()**

#### **get\_path (dir=None)**

Return path relative to the current working directory of the Node.FS.Base object that owns us.

#### **get\_path\_elements ()**

#### **get\_source\_scanner (node)**

Fetch the source scanner for the specified node

NOTE: "self" is the target being built, "node" is the source file for which we want to fetch the scanner.

Implies self.has\_builder() is true; again, expect to only be called from locations where this is already verified.

This function may be called very often; it attempts to cache the scanner found to improve performance.

**get\_state ()**

**get\_stored\_implicit ()**

Fetch the stored implicit dependencies

**get\_stored\_info ()**

**get\_string (for\_signature)**

This is a convenience function designed primarily to be used in command generators (i.e., CommandGeneratorActions or Environment variables that are callable), which are called with a `for_signature` argument that is nonzero if the command generator is being called to generate a signature for the command line, which determines if we should rebuild or not.

Such command generators should use this method in preference to `str(Node)` when converting a Node to a string, passing in the `for_signature` parameter, such that we will call `Node.for_signature()` or `str(Node)` properly, depending on whether we are calculating a signature or actually constructing a command line.

**get\_subst\_proxy ()**

This method is expected to return an object that will function exactly like this Node, except that it implements any additional special features that we would like to be in effect for Environment variable substitution. The principle use is that some Nodes would like to implement a `__getattr__()` method, but putting that in the Node type itself has a tendency to kill performance. We instead put it in a proxy and return it from this method. It is legal for this method to return self if no new functionality is needed for Environment substitution.

**get\_suffix ()**

**get\_target\_scanner ()**

**get\_text\_contents ()**

We already emit things in text, so just return the binary version.

**get\_timestamp ()**

Return the latest timestamp from among our children

**get\_tpath ()**

**getmtime ()**

**getsize ()**

**glob (pathname, ondisk=True, source=False, strings=False, exclude=None)**

Returns a list of Nodes (or strings) matching a specified pathname pattern.

Pathname patterns follow UNIX shell semantics: `*` matches any-length strings of any characters, `?` matches any character, and `[]` can enclose lists or ranges of characters. Matches do not span directory separators.

The matches take into account Repositories, returning local Nodes if a corresponding entry exists in a Repository (either an in-memory Node or something on disk).

By default, the `glob()` function matches entries that exist on-disk, in addition to in-memory Nodes. Setting the “`ondisk`” argument to `False` (or some other non-true value) causes the `glob()` function to only match in-memory Nodes. The default behavior is to return both the on-disk and in-memory Nodes.

The “`source`” argument, when true, specifies that corresponding source Nodes must be returned if you’re globbing in a build directory (initialized with `VariantDir()`). The default behavior is to return Nodes local to the `VariantDir()`.

The “`strings`” argument, when true, returns the matches as strings, not Nodes. The strings are path names relative to this directory.

The “`exclude`” argument, if not `None`, must be a pattern or a list of patterns following the same UNIX shell semantics. Elements matching a least one pattern of this list will be excluded from the result.

The underlying algorithm is adapted from the `glob.glob()` function in the Python library (but heavily modified), and uses `fnmatch()` under the covers.

**has\_builder ()**

Return whether this Node has a builder or not.

In Boolean tests, this turns out to be a *lot* more efficient than simply examining the builder attribute directly (“if node.builder: ...”). When the builder attribute is examined directly, it ends up calling `__getattr__` for both the `__len__` and `__nonzero__` attributes on instances of our Builder Proxy class(es), generating a bazillion extra calls and slowing things down immensely.

#### `has_explicit_builder ()`

Return whether this Node has an explicit builder

This allows an internal Builder created by SCons to be marked non-explicit, so that it can be overridden by an explicit builder that the user supplies (the canonical example being directories).

`ignore`

`ignore_set`

`implicit`

`implicit_set`

`includes`

#### `is_derived ()`

Returns true if this node is derived (i.e. built).

This should return true only for nodes whose path should be in the variant directory when `duplicate=0` and should contribute their build signatures when they are used as source files to other derived files. For example: source with source builders are not derived in this sense, and hence should not return true.

`is_explicit`

#### `is_literal ()`

Always pass the string representation of a Node to the command interpreter literally.

#### `is_sconscript ()`

Returns true if this node is an sconscript

`is_under (dir)`

#### `is_up_to_date ()`

If any child is not up-to-date, then this directory isn't, either.

`isdir ()`

`isfile ()`

`islink ()`

`link (srcdir, duplicate)`

Set this directory as the variant directory for the supplied source directory.

`linked`

`lstat ()`

#### `make_ready ()`

Get a Node ready for evaluation.

This is called before the Taskmaster decides if the Node is up-to-date or not. Overriding this method allows for a Node subclass to be disambiguated if necessary, or for an implicit source builder to be attached.

`missing ()`

`multiple_side_effect_has_builder ()`

Return whether this Node has a builder or not.

In Boolean tests, this turns out to be a *lot* more efficient than simply examining the builder attribute directly (“if node.builder: ...”). When the builder attribute is examined directly, it ends up calling `__getattr__` for both the `__len__` and `__nonzero__` attributes on instances of our Builder Proxy class(es), generating a bazillion extra calls and slowing things down immensely.

**must\_be\_same** (klass)

This node, which already existed, is being looked up as the specified klass. Raise an exception if it isn't.

**name**

**new\_binfo** ()

**new\_ninfo** ()

**ninfo**

**nocache**

**noclean**

**on\_disk\_entries**

**postprocess** ()

Clean up anything we don't need to hang onto after we've been built.

**precious**

**prepare** ()

Prepare for this Node to be built.

This is called after the Taskmaster has decided that the Node is out-of-date and must be rebuilt, but before actually calling the method to build the Node.

This default implementation checks that explicit or implicit dependencies either exist or are derived, and initializes the BuildInfo structure that will hold the information about how this node is, uh, built.

(The existence of source files is checked separately by the Executor, which aggregates checks for all of the targets built by a specific action.)

Overriding this method allows for for a Node subclass to remove the underlying file from the file system. Note that subclass methods should call this base class method to get the child check and the BuildInfo structure.

**prerequisites**

**pseudo**

**push\_to\_cache** ()

Try to push a node into a cache

**rdir** ()

**ref\_count**

**rel\_path** (other)

Return a path to “other” relative to this directory.

**release\_target\_info** ()

Called just after this node has been marked up-to-date or was built completely.

This is where we try to release as many target node infos as possible for clean builds and update runs, in order to minimize the overall memory consumption.

By purging attributes that aren't needed any longer after a Node (=File) got built, we don't have to care that much how many KBytes a Node actually requires...as long as we free the memory shortly afterwards.

@see: `built()` and `File.release_target_info()`

**released\_target\_info**

**remove ()**

Remove this Node: no-op by default.

**render\_include\_tree ()**

Return a text representation, suitable for displaying to the user, of the include tree for the sources of this node.

**reentry ()**

**reentry\_exists\_on\_disk (name)**

Searches through the file/dir entries of the current *and* all its remote directories (repos), and returns True if a physical entry with the given name could be found. The local directory (self) gets searched first, so repositories take a lower precedence regarding the searching order.

@see entry\_exists\_on\_disk

**repositories**

**reset\_executor ()**

Remove cached executor; forces recompute when needed.

**retrieve\_from\_cache ()**

Try to retrieve the node's content from a cache

This method is called from multiple threads in a parallel build, so only do thread safe stuff here. Do thread unsafe stuff in built().

Returns true if the node was successfully retrieved.

**rexists ()**

Does this node exist locally or in a repository?

**rfile ()**

**root**

**rstr ()**

A Node.FS.Base object's string representation is its path name.

**sbuilder**

**scan ()**

Scan this node's dependents for implicit dependencies.

**scanner\_key ()**

A directory does not get scanned.

**scanner\_paths**

**sconsign ()**

Return the .sconsign file info for this directory.

**searched**

**select\_scanner (scanner)**

Selects a scanner for this Node.

This is a separate method so it can be overridden by Node subclasses (specifically, Node.FS.Dir) that *must* use their own Scanner and don't select one the Scanner.Selector that's configured for the target.

**set\_always\_build (always\_build=1)**

Set the Node's always\_build value.

**set\_executor (executor)**

Set the action executor for this node.

**set\_explicit** (*is\_explicit*)

**set\_local** ()

**set\_nocache** (*nocache=1*)

Set the Node's nocache value.

**set\_noclean** (*noclean=1*)

Set the Node's noclean value.

**set\_precious** (*precious=1*)

Set the Node's precious value.

**set\_pseudo** (*pseudo=True*)

Set the Node's precious value.

**set\_specific\_source** (*source*)

**set\_src\_builder** (*builder*)

Set the source code builder for this node.

**set\_state** (*state*)

**side\_effect**

**side\_effects**

**sources**

**sources\_set**

**src\_builder** ()

Fetch the source code builder for this node.

If there isn't one, we cache the source code builder specified for the directory (which in turn will cache the value from its parent directory, and so on up to the file system root).

**srcdir**

**srcdir\_duplicate** (*name*)

**srcdir\_find\_file** (*filename*)

**srcdir\_list** ()

**srcnode** ()

Dir has a special need for srcnode()...if we have a srcdir attribute set, then that *is* our srcnode.

**stat** ()

**state**

**store\_info**

**str\_for\_display** ()

**target\_from\_source** (*prefix, suffix, splitext=<function splitext>*)

Generates a target entry that corresponds to this entry (usually a source file) with the specified prefix and suffix. Note that this method can be overridden dynamically for generated files that need different behavior. See Tool/swig.py for an example.

**target\_peers****up ()****variant\_dirs****visited ()**

Called just after this node has been visited (with or without a build).

**waiting\_parents****waiting\_s\_e****walk (func, arg)**

Walk this directory tree by calling the specified function for each directory in the tree.

This behaves like the `os.path.walk()` function, but for in-memory `Node.FS.Dir` objects. The function takes the same arguments as the functions passed to `os.path.walk()`:

`func(arg, dirname, fnames)`

Except that “dirname” will actually be the directory *Node*, not the string. The ‘.’ and ‘..’ entries are excluded from fnames. The fnames list may be modified in-place to filter the subdirectories visited or otherwise impose a specific order. The “arg” argument is always passed to `func()` and may be used in any way (or ignored, passing `None` is common).

**wkids**

**class SCons.Node.FS.DirBuildInfo**  
**Bases: SCons.Node.BuildInfoBase**

**bact****bactsig****bdepends****bdependsigns****bimplicit****bimplicitsigns****bsources****bsourcesigns****current\_version\_id = 2****merge (other)**

Merge the fields of another object into this object. Already existing information is overwritten by the other instance’s data. WARNING: If a ‘\_\_dict\_\_’ slot is added, it should be updated instead of replaced.

**class SCons.Node.FS.DirNodeInfo**  
**Bases: SCons.Node.NodeInfoBase**

**convert (node, val)****current\_version\_id = 2****format (field\_list=None, names=0)****fs = None**

**merge** (other)

Merge the fields of another object into this object. Already existing information is overwritten by the other instance's data. WARNING: If a `'__dict__'` slot is added, it should be updated instead of replaced.

**str\_to\_node** (s)**update** (node)

*class* `SCons.Node.FS.DiskChecker` (type, do, ignore)

Bases: `object`

**set** (list)

*class* `SCons.Node.FS.Entry` (name, directory, fs)

Bases: `SCons.Node.FS.Base`

This is the class for generic Node.FS entries—that is, things that could be a File or a Dir, but we're just not sure yet. Consequently, the methods in this class really exist just to transform their associated object into the right class when the time comes, and then call the same-named method in the transformed class.

*class* `Attrs`

Bases: `object`

`shared`

`BuildInfo`

alias of `SCons.Node.BuildInfoBase`

`Decider` (function)

`GetTag` (key)

Return a user-defined tag.

`NodeInfo`

alias of `SCons.Node.NodeInfoBase`

`RDirs` (pathlist)

Search for a list of directories in the Repository list.

`Rfindalldirs` (pathlist)

Return all of the directories for a given path list, including corresponding "backing" directories in any repositories. The Node lookups are relative to this Node (typically a directory), so memoizing result saves cycles from looking up the same path for each target in a given directory.

`Tag` (key, value)

Add a user-defined tag.

`_Rfindalldirs_key` (pathlist)

`_abspath`

`_add_child` (collection, set, child)

Adds 'child' to 'collection', first checking 'set' to see if it's already present.

`_children_get` ()

`_children_reset` ()

`_func_exists`

`_func_get_contents`

```

_func_is_derived
_func_rexists
_func_sconsign
_func_target_from_source
_get_scanner (env, initial_scanner, root_node_scanner, kw)
_get_str ()
_globl (pattern, ondisk=True, source=False, strings=False)
_labspath
_local
_memo
_path
_path_elements
_proxy
_save_str ()
_sconsign
_specific_sources
_tags
_tpath

add_dependency (depend)
    Adds dependencies.

add_ignore (depend)
    Adds dependencies to ignore.

add_prerequisite (prerequisite)
    Adds prerequisites

add_source (source)
    Adds sources.

add_to_implicit (deps)

add_to_waiting_parents (node)
    Returns the number of nodes added to our waiting parents list: 1 if we add a unique waiting parent, 0 if not.
    (Note that the returned values are intended to be used to increment a reference count, so don't think you can
    "clean up" this function by using True and False instead...)

add_to_waiting_s_e (node)

add_wkid (wkid)
    Add a node to the list of kids waiting to be evaluated

all_children (scan=1)

```

Return a list of all the node's direct children.

#### **alter\_targets ()**

Return a list of alternate targets for this Node.

#### **always\_build**

#### **attributes**

#### **binfo**

#### **build (\*\*kw)**

Actually build the node.

This is called by the Taskmaster after it's decided that the Node is out-of-date and must be rebuilt, and after the prepare() method has gotten everything, uh, prepared.

This method is called from multiple threads in a parallel build, so only do thread safe stuff here. Do thread unsafe stuff in built().

#### **builder**

#### **builder\_set (builder)**

#### **built ()**

Called just after this node is successfully built.

#### **cached**

#### **cachedir\_csig**

#### **cachesig**

#### **changed (node=None, allowcache=False)**

Returns if the node is up-to-date with respect to the BuildInfo stored last time it was built. The default behavior is to compare it against our own previously stored BuildInfo, but the stored BuildInfo from another Node (typically one in a Repository) can be used instead.

Note that we now *always* check every dependency. We used to short-circuit the check by returning as soon as we detected any difference, but we now rely on checking every dependency to make sure that any necessary Node information (for example, the content signature of an #included .h file) is updated.

The allowcache option was added for supporting the early release of the executor/builder structures, right after a File target was built. When set to true, the return value of this changed method gets cached for File nodes. Like this, the executor isn't needed any longer for subsequent calls to changed().

@see: FS.File.changed(), FS.File.release\_target\_info()

#### **changed\_since\_last\_build**

#### **children (scan=1)**

Return a list of the node's direct children, minus those that are ignored by this node.

#### **children\_are\_up\_to\_date ()**

Alternate check for whether the Node is current: If all of our children were up-to-date, then this Node was up-to-date, too.

The SCons.Node.Alias and SCons.Node.Python.Value subclasses rebind their current() method to this method.

#### **clear ()**

Completely clear a Node of all its cached state (so that it can be re-evaluated by interfaces that do continuous integration builds).

#### **clear\_memoized\_values ()**

#### **contentsig**

`cwd`

`del_binfo ()`

Delete the build info from this node.

`depends`

`depends_set`

`dir`

`dirname`

`disambiguate (must_exist=None)`

`diskcheck_match ()`

`duplicate`

`entries`

`env`

`env_set (env, safe=0)`

`executor`

`executor_cleanup ()`

Let the executor clean up any cached information.

`exists ()`

Does this node exists?

`explain ()`

`for_signature ()`

Return a string representation of the Node that will always be the same for this particular Node, no matter what. This is by contrast to the `__str__()` method, which might, for instance, return a relative path for a file Node. The purpose of this method is to generate a value to be used in signature calculation for the command line used to build a target, and we use this method instead of `str()` to avoid unnecessary rebuilds. This method does not need to return something that would actually work in a command line; it can return any kind of nonsense, so long as it does not change.

`fs`

`get_abspath ()`

Get the absolute path of the file.

`get_binfo ()`

Fetch a node's build information.

`node` - the node whose sources will be collected  
`cache` - alternate node to use for the signature cache returns - the build signature

This no longer handles the recursive descent of the node's children's signatures. We expect that they're already built and updated by someone else, if that's what's wanted.

`get_build_env ()`

Fetch the appropriate Environment to build this node.

`get_build_scanner_path (scanner)`

Fetch the appropriate scanner path for this node.

**get\_builder** (default\_builder=None)

Return the set builder, or a specified default value

**get\_cachedir\_csig** ()

**get\_contents** ()

Fetch the contents of the entry. Returns the exact binary contents of the file.

**get\_csig** ()

**get\_dir** ()

**get\_env** ()

**get\_env\_scanner** (env, kw={})

**get\_executor** (create=1)

Fetch the action executor for this node. Create one if there isn't already one, and requested to do so.

**get\_found\_includes** (env, scanner, path)

Return the scanned include lines (implicit dependencies) found in this node.

The default is no implicit dependencies. We expect this method to be overridden by any subclass that can be scanned for implicit dependencies.

**get\_implicit\_deps** (env, initial\_scanner, path\_func, kw={})

Return a list of implicit dependencies for this node.

This method exists to handle recursive invocation of the scanner on the implicit dependencies returned by the scanner, if the scanner's recursive flag says that we should.

**get\_internal\_path** ()

**get\_labspath** ()

Get the absolute path of the file.

**get\_ninfo** ()

**get\_path** (dir=None)

Return path relative to the current working directory of the Node.FS.Base object that owns us.

**get\_path\_elements** ()

**get\_source\_scanner** (node)

Fetch the source scanner for the specified node

NOTE: "self" is the target being built, "node" is the source file for which we want to fetch the scanner.

Implies self.has\_builder() is true; again, expect to only be called from locations where this is already verified.

This function may be called very often; it attempts to cache the scanner found to improve performance.

**get\_state** ()

**get\_stored\_implicit** ()

Fetch the stored implicit dependencies

**get\_stored\_info** ()

**get\_string** (for\_signature)

This is a convenience function designed primarily to be used in command generators (i.e., CommandGeneratorActions or Environment variables that are callable), which are called with a for\_signature argument that is nonzero if the command generator is being called to generate a signature for the command line, which determines if we should rebuild or not.

Such command generators should use this method in preference to `str(Node)` when converting a `Node` to a string, passing in the `for_signature` parameter, such that we will call `Node.for_signature()` or `str(Node)` properly, depending on whether we are calculating a signature or actually constructing a command line.

#### `get_subst_proxy ()`

This method is expected to return an object that will function exactly like this `Node`, except that it implements any additional special features that we would like to be in effect for Environment variable substitution. The principle use is that some `Nodes` would like to implement a `__getattr__()` method, but putting that in the `Node` type itself has a tendency to kill performance. We instead put it in a proxy and return it from this method. It is legal for this method to return self if no new functionality is needed for Environment substitution.

#### `get_suffix ()`

#### `get_target_scanner ()`

#### `get_text_contents ()`

Fetch the decoded text contents of a Unicode encoded Entry.

Since this should return the text contents from the file system, we check to see into what sort of subclass we should morph this Entry.

#### `get_tpath ()`

#### `getmtime ()`

#### `getsize ()`

#### `has_builder ()`

Return whether this `Node` has a builder or not.

In Boolean tests, this turns out to be a *lot* more efficient than simply examining the builder attribute directly (“if `node.builder: ...`”). When the builder attribute is examined directly, it ends up calling `__getattr__` for both the `__len__` and `__nonzero__` attributes on instances of our Builder Proxy class(es), generating a bazillion extra calls and slowing things down immensely.

#### `has_explicit_builder ()`

Return whether this `Node` has an explicit builder

This allows an internal Builder created by SCons to be marked non-explicit, so that it can be overridden by an explicit builder that the user supplies (the canonical example being directories).

#### `ignore`

#### `ignore_set`

#### `implicit`

#### `implicit_set`

#### `includes`

#### `is_derived ()`

Returns true if this node is derived (i.e. built).

This should return true only for nodes whose path should be in the variant directory when `duplicate=0` and should contribute their build signatures when they are used as source files to other derived files. For example: source with source builders are not derived in this sense, and hence should not return true.

#### `is_explicit`

#### `is_literal ()`

Always pass the string representation of a `Node` to the command interpreter literally.

#### `is_sconscript ()`

Returns true if this node is an sconscript

**is\_under (dir)**

**is\_up\_to\_date ()**

Default check for whether the Node is current: unknown Node subtypes are always out of date, so they will always get built.

**isdir ()**

**isfile ()**

**islink ()**

**linked**

**lstat ()**

**make\_ready ()**

Get a Node ready for evaluation.

This is called before the Taskmaster decides if the Node is up-to-date or not. Overriding this method allows for a Node subclass to be disambiguated if necessary, or for an implicit source builder to be attached.

**missing ()**

**multiple\_side\_effect\_has\_builder ()**

Return whether this Node has a builder or not.

In Boolean tests, this turns out to be a *lot* more efficient than simply examining the builder attribute directly (“if node.builder: ...”). When the builder attribute is examined directly, it ends up calling `__getattr__` for both the `__len__` and `__nonzero__` attributes on instances of our Builder Proxy class(es), generating a bazillion extra calls and slowing things down immensely.

**must\_be\_same (klass)**

Called to make sure a Node is a Dir. Since we’re an Entry, we can morph into one.

**name**

**new\_binfo ()**

**new\_ninfo ()**

**ninfo**

**nocache**

**noclean**

**on\_disk\_entries**

**postprocess ()**

Clean up anything we don’t need to hang onto after we’ve been built.

**precious**

**prepare ()**

Prepare for this Node to be built.

This is called after the Taskmaster has decided that the Node is out-of-date and must be rebuilt, but before actually calling the method to build the Node.

This default implementation checks that explicit or implicit dependencies either exist or are derived, and initializes the BuildInfo structure that will hold the information about how this node is, uh, built.

(The existence of source files is checked separately by the Executor, which aggregates checks for all of the targets built by a specific action.)

Overriding this method allows for for a Node subclass to remove the underlying file from the file system. Note that subclass methods should call this base class method to get the child check and the BuildInfo structure.

**prerequisites**

**pseudo**

**push\_to\_cache ()**

Try to push a node into a cache

**ref\_count**

**rel\_path (other)**

**release\_target\_info ()**

Called just after this node has been marked up-to-date or was built completely.

This is where we try to release as many target node infos as possible for clean builds and update runs, in order to minimize the overall memory consumption.

By purging attributes that aren't needed any longer after a Node (=File) got built, we don't have to care that much how many KBytes a Node actually requires...as long as we free the memory shortly afterwards.

@see: built() and File.release\_target\_info()

**released\_target\_info**

**remove ()**

Remove this Node: no-op by default.

**render\_include\_tree ()**

Return a text representation, suitable for displaying to the user, of the include tree for the sources of this node.

**reentry ()**

**repositories**

**reset\_executor ()**

Remove cached executor; forces recompute when needed.

**retrieve\_from\_cache ()**

Try to retrieve the node's content from a cache

This method is called from multiple threads in a parallel build, so only do thread safe stuff here. Do thread unsafe stuff in built().

Returns true if the node was successfully retrieved.

**rexists ()**

Does this node exist locally or in a repository?

**rfile ()**

We're a generic Entry, but the caller is actually looking for a File at this point, so morph into one.

**root**

**rstr ()**

A Node.FS.Base object's string representation is its path name.

**sbuilder**

**scan ()**

Scan this node's dependents for implicit dependencies.

**scanner\_key ()**

**scanner\_paths****searched****select\_scanner** (*scanner*)

Selects a scanner for this Node.

This is a separate method so it can be overridden by Node subclasses (specifically, Node.FS.Dir) that *must* use their own Scanner and don't select one the Scanner.Selector that's configured for the target.**set\_always\_build** (*always\_build=1*)Set the Node's `always_build` value.**set\_executor** (*executor*)

Set the action executor for this node.

**set\_explicit** (*is\_explicit*)**set\_local** ()**set\_nocache** (*nocache=1*)Set the Node's `nocache` value.**set\_noclean** (*noclean=1*)Set the Node's `noclean` value.**set\_precious** (*precious=1*)Set the Node's `precious` value.**set\_pseudo** (*pseudo=True*)Set the Node's `precious` value.**set\_specific\_source** (*source*)**set\_src\_builder** (*builder*)

Set the source code builder for this node.

**set\_state** (*state*)**side\_effect****side\_effects****sources****sources\_set****src\_builder** ()

Fetch the source code builder for this node.

If there isn't one, we cache the source code builder specified for the directory (which in turn will cache the value from its parent directory, and so on up to the file system root).

**srkdir****srcnode** ()If this node is in a build path, return the node corresponding to its source file. Otherwise, return `self`.**stat** ()**state****store\_info**

`str_for_display ()`

`target_from_source (prefix, suffix, splitext=<function splitext>)`

Generates a target entry that corresponds to this entry (usually a source file) with the specified prefix and suffix. Note that this method can be overridden dynamically for generated files that need different behavior. See `Tool/swig.py` for an example.

`target_peers`

`variant_dirs`

`visited ()`

Called just after this node has been visited (with or without a build).

`waiting_parents`

`waiting_s_e`

`wkids`

`class SCons.Node.FS.EntryProxy (subject)`

Bases: `SCons.Util.Proxy`

`__EntryProxy__get_abspath ()`

`__EntryProxy__get_base_path ()`

Return the file's directory and file name, with the suffix stripped.

`__EntryProxy__get_dir ()`

`__EntryProxy__get_file ()`

`__EntryProxy__get_filebase ()`

`__EntryProxy__get_posix_path ()`

Return the path with / as the path separator, regardless of platform.

`__EntryProxy__get_rsrcdir ()`

Returns the directory containing the source node linked to this node via `VariantDir()`, or the directory of this node if not linked.

`__EntryProxy__get_rsrcnode ()`

`__EntryProxy__get_srcdir ()`

Returns the directory containing the source node linked to this node via `VariantDir()`, or the directory of this node if not linked.

`__EntryProxy__get_srcnode ()`

`__EntryProxy__get_suffix ()`

`__EntryProxy__get_windows_path ()`

Return the path with as the path separator, regardless of platform.

```
dictSpecialAttrs = {'abspath': <function EntryProxy.__get_abspath>, 'base': <function
EntryProxy.__get_base_path>, 'dir': <function EntryProxy.__get_dir>, 'file': <function EntryProxy.__get_file>,
'filebase': <function EntryProxy.__get_filebase>, 'posix': <function EntryProxy.__get_posix_path>, 'rsrcdir':
<function EntryProxy.__get_rsrcdir>, 'srcpath': <function EntryProxy.__get_rsrcnode>, 'srcdir': <function
EntryProxy.__get_srcdir>, 'srcpath': <function EntryProxy.__get_srcnode>, 'suffix': <function
EntryProxy.__get_suffix>, 'win32': <function EntryProxy.__get_windows_path>, 'windows': <function
EntryProxy.__get_windows_path>}
```

**get ()**

Retrieve the entire wrapped object

*exception* `SCons.Node.FS.EntryProxyAttributeError` (`entry_proxy`, `attribute`)

Bases: `AttributeError`

An `AttributeError` subclass for recording and displaying the name of the underlying `Entry` involved in an `AttributeError` exception.

**args****with\_traceback ()**

`Exception.with_traceback(tb)` – set `self.__traceback__` to `tb` and return `self`.

*class* `SCons.Node.FS.FS` (`path=None`)

Bases: `SCons.Node.FS.LocalFS`

**Dir** (`name`, `directory=None`, `create=True`)

Look up or create a `Dir` node with the specified name. If the name is a relative path (begins with `./`, `../`, or a file name), then it is looked up relative to the supplied directory node, or to the top level directory of the FS (supplied at construction time) if no directory is supplied.

This method will raise `TypeError` if a normal file is found at the specified path.

**Entry** (`name`, `directory=None`, `create=1`)

Look up or create a generic `Entry` node with the specified name. If the name is a relative path (begins with `./`, `../`, or a file name), then it is looked up relative to the supplied directory node, or to the top level directory of the FS (supplied at construction time) if no directory is supplied.

**File** (`name`, `directory=None`, `create=1`)

Look up or create a `File` node with the specified name. If the name is a relative path (begins with `./`, `../`, or a file name), then it is looked up relative to the supplied directory node, or to the top level directory of the FS (supplied at construction time) if no directory is supplied.

This method will raise `TypeError` if a directory is found at the specified path.

**Glob** (`pathname`, `ondisk=True`, `source=True`, `strings=False`, `exclude=None`, `cwd=None`)

Globs

This is mainly a shim layer

**PyPackageDir** (`modulename`)

Locate the directory of a given python module name

For example `scons` might resolve to Windows: `C:\Python27\Lib\site-packages\scons-2.5.1` Linux: `/usr/lib/scons`

This can be useful when we want to determine a toolpath based on a python module name

**Repository** (`*dirs`)

Specify `Repository` directories to search.

**VariantDir** (`variant_dir`, `src_dir`, `duplicate=1`)

Link the supplied variant directory to the source directory for purposes of building files.

**\_lookup** (`p`, `directory`, `fsclass`, `create=1`)

The generic entry point for `Node` lookup with user-supplied data.

This translates arbitrary input into a canonical `Node.FS` object of the specified `fsclass`. The general approach for strings is to turn it into a fully normalized absolute path and then call the root directory's `lookup_abs()` method for the heavy lifting.

If the path name begins with `#`, it is unconditionally interpreted relative to the top-level directory of this FS. `#` is treated as a synonym for the top-level `SConstruct` directory, much like `~` is treated as a synonym for the user's home directory in a UNIX shell. So both `#foo` and `~/foo` refer to the `foo` subdirectory underneath the top-level `SConstruct` directory.

If the path name is relative, then the path is looked up relative to the specified directory, or the current directory (`self._cwd`, typically the `SConstruct` directory) if the specified directory is `None`.

**chdir** (`dir`, `change_os_dir=0`)

Change the current working directory for lookups. If `change_os_dir` is true, we will also change the “real” cwd to match.

`chmod (path, mode)`

`copy (src, dst)`

`copy2 (src, dst)`

`exists (path)`

`get_max_drift ()`

`get_root (drive)`

Returns the root directory for the specified drive, creating it if necessary.

`getcwd ()`

`getmtime (path)`

`getsize (path)`

`isdir (path)`

`isfile (path)`

`islink (path)`

`link (src, dst)`

`listdir (path)`

`lstat (path)`

`makedirs (path)`

`mkdir (path)`

`open (path)`

`readlink (file)`

`rename (old, new)`

`set_SConstruct_dir (dir)`

`set_max_drift (max_drift)`

`stat (path)`

`symlink (src, dst)`

`unlink (path)`

`variant_dir_target_climb (orig, dir, tail)`

Create targets in corresponding variant directories

Climb the directory tree, and look up path names relative to any linked variant directories we find.

Even though this loops and walks up the tree, we don't memoize the return value because this is really only used to process the command-line targets.

`class SCons.Node.FS.File (name, directory, fs)`

Bases: `SCons.Node.FS.Base`

A class for files in a file system.

`class Attrs`

Bases: `object`

`shared`

`BuildInfo`

alias of `FileBuildInfo`

`Decider` (function)

`Dir` (name, create=True)

Create a directory node named 'name' relative to the directory of this file.

`Dirs` (pathlist)

Create a list of directories relative to the SConscript directory of this file.

`Entry` (name)

Create an entry node named 'name' relative to the directory of this file.

`File` (name)

Create a file node named 'name' relative to the directory of this file.

`GetTag` (key)

Return a user-defined tag.

`NodeInfo`

alias of `FileNodeInfo`

`RDirs` (pathlist)

Search for a list of directories in the Repository list.

`Rfindalldirs` (pathlist)

Return all of the directories for a given path list, including corresponding "backing" directories in any repositories. The Node lookups are relative to this Node (typically a directory), so memoizing result saves cycles from looking up the same path for each target in a given directory.

`Tag` (key, value)

Add a user-defined tag.

`_File__dmap_cache = {}`

`_File__dmap_sig_cache = {}`

`_Rfindalldirs_key` (pathlist)

`_abspath`

`_add_child` (collection, set, child)

Adds 'child' to 'collection', first checking 'set' to see if it's already present.

`_add_strings_to_dependency_map` (dmap)

In the case comparing node objects isn't sufficient, we'll add the strings for the nodes to the dependency map :return:

`_build_dependency_map` (binfo)

Build mapping from file -> signature

**Parameters:**

- - **self** (*self*) –
- - **buildinfo from node being considered** (*binfo*) –

**Returns:** dictionary of file->signature mappings

`_children_get ()`

`_children_reset ()`

`_createDir ()`

`_func_exists`

`_func_get_contents`

`_func_is_derived`

`_func_rexists`

`_func_sconsign`

`_func_target_from_source`

`_get_found_includes_key (env, scanner, path)`

`_get_previous_signatures (dmap)`

Return a list of corresponding csigs from previous build in order of the node/files in children.

**Parameters:**

- - **self** (*self*) –
- - **Dictionary of file -> csig** (*dmap*) –

**Returns:** List of csigs for provided list of children

`_get_scanner (env, initial_scanner, root_node_scanner, kw)`

`_get_str ()`

`_glob1 (pattern, ondisk=True, source=False, strings=False)`

`_labspath`

`_local`

`_memo`

`_morph ()`

Turn a file system node into a File object.

`_path`

`_path_elements`

`_proxy`

`_rmv_existing ()`

`_save_str ()`

`_sconsign`

**`_specific_sources`**

**`_tags`**

**`_tpath`**

**`add_dependency`** (`depend`)

Adds dependencies.

**`add_ignore`** (`depend`)

Adds dependencies to ignore.

**`add_prerequisite`** (`prerequisite`)

Adds prerequisites

**`add_source`** (`source`)

Adds sources.

**`add_to_implicit`** (`deps`)

**`add_to_waiting_parents`** (`node`)

Returns the number of nodes added to our waiting parents list: 1 if we add a unique waiting parent, 0 if not. (Note that the returned values are intended to be used to increment a reference count, so don't think you can "clean up" this function by using True and False instead...)

**`add_to_waiting_s_e`** (`node`)

**`add_wkid`** (`wkid`)

Add a node to the list of kids waiting to be evaluated

**`all_children`** (`scan=1`)

Return a list of all the node's direct children.

**`alter_targets`** ()

Return any corresponding targets in a variant directory.

**`always_build`**

**`attributes`**

**`binfo`**

**`build`** (\*\*kw)

Actually build the node.

This is called by the Taskmaster after it's decided that the Node is out-of-date and must be rebuilt, and after the `prepare()` method has gotten everything, uh, prepared.

This method is called from multiple threads in a parallel build, so only do thread safe stuff here. Do thread unsafe stuff in `built()`.

**`builder`**

**`builder_set`** (`builder`)

**`built`** ()

Called just after this File node is successfully built.

Just like for 'release\_target\_info' we try to release some more target node attributes in order to minimize the overall memory consumption.

@see: `release_target_info`

**`cached`**

`cachedir_csig``cachesig``changed (node=None, allowcache=False)`

Returns if the node is up-to-date with respect to the BuildInfo stored last time it was built.

For File nodes this is basically a wrapper around Node.changed(), but we allow the return value to get cached after the reference to the Executor got released in release\_target\_info().

@see: Node.changed()

`changed_content (target, prev_ni, repo_node=None)``changed_since_last_build``changed_state (target, prev_ni, repo_node=None)``changed_timestamp_match (target, prev_ni, repo_node=None)`

Return True if the timestamps don't match or if there is no previous timestamp :param target: :param prev\_ni: Information about the node from the previous build :return:

`changed_timestamp_newer (target, prev_ni, repo_node=None)``changed_timestamp_then_content (target, prev_ni, node=None)`

Used when decider for file is Timestamp-MD5

**NOTE: If the timestamp hasn't changed this will skip md5'ing the**

file and just copy the prev\_ni provided. If the prev\_ni is wrong. It will propagate it. See: <https://github.com/SCons/scons/issues/2980>

**Parameters:**

- - **dependency** (*self*) –
- - **target** (*target*) –
- - **The NodeInfo object loaded from previous builds .sconsign** (*prev\_ni*) –
- - **Node instance. Check this node for file existence/timestamp** (*node*) – if specified.

**Returns:** Boolean - Indicates if node(File) has changed.

`children (scan=1)`

Return a list of the node's direct children, minus those that are ignored by this node.

`children_are_up_to_date ()`

Alternate check for whether the Node is current: If all of our children were up-to-date, then this Node was up-to-date, too.

The SCons.Node.Alias and SCons.Node.Python.Value subclasses rebind their current() method to this method.

`clear ()`

Completely clear a Node of all its cached state (so that it can be re-evaluated by interfaces that do continuous integration builds).

`clear_memoized_values ()``contentsig``convert_copy_attrs = ['bsources', 'bimplicit', 'bdepends', 'bact', 'bactsig', 'ninfo']``convert_old_entry (old_entry)``convert_sig_attrs = ['bsourcesigs', 'bimplicitsigs', 'bdependsigs']``cwd`

**del\_binfo ()**

Delete the build info from this node.

**depends**

**depends\_set**

**dir**

**dirname**

**disambiguate (must\_exist=None)**

**diskcheck\_match ()**

**do\_duplicate (src)**

**duplicate**

**entries**

**env**

**env\_set (env, safe=0)**

**executor**

**executor\_cleanup ()**

Let the executor clean up any cached information.

**exists ()**

Does this node exists?

**explain ()**

**find\_repo\_file ()**

For this node, find if there exists a corresponding file in one or more repositories :return: list of corresponding files in repositories

**find\_src\_builder ()**

**for\_signature ()**

Return a string representation of the Node that will always be the same for this particular Node, no matter what. This is by contrast to the `__str__()` method, which might, for instance, return a relative path for a file Node. The purpose of this method is to generate a value to be used in signature calculation for the command line used to build a target, and we use this method instead of `str()` to avoid unnecessary rebuilds. This method does not need to return something that would actually work in a command line; it can return any kind of nonsense, so long as it does not change.

**fs**

**get\_abspath ()**

Get the absolute path of the file.

**get\_binfo ()**

Fetch a node's build information.

node - the node whose sources will be collected cache - alternate node to use for the signature cache returns - the build signature

This no longer handles the recursive descent of the node's children's signatures. We expect that they're already built and updated by someone else, if that's what's wanted.

**get\_build\_env ()**

Fetch the appropriate Environment to build this node.

**get\_build\_scanner\_path (scanner)**

Fetch the appropriate scanner path for this node.

**get\_builder (default\_builder=None)**

Return the set builder, or a specified default value

**get\_cachedir\_bsig ()**

Return the signature for a cached file, including its children.

It adds the path of the cached file to the cache signature, because multiple targets built by the same action will all have the same build signature, and we have to differentiate them somehow.

Signature should normally be string of hex digits.

**get\_cachedir\_csig ()**

Fetch a Node's content signature for purposes of computing another Node's cachesig.

This is a wrapper around the normal `get_csig()` method that handles the somewhat obscure case of using `CacheDir` with the `-n` option. Any files that don't exist would normally be "built" by fetching them from the cache, but the normal `get_csig()` method will try to open up the local file, which doesn't exist because the `-n` option meant we didn't actually pull the file from `cachedir`. But since the file *does* actually exist in the `cachedir`, we can use its contents for the `csig`.

**get\_content\_hash ()**

Compute and return the MD5 hash for this file.

**get\_contents ()**

Fetch the contents of the entry.

**get\_contents\_sig ()**

A helper method for `get_cachedir_bsig`.

It computes and returns the signature for this node's contents.

**get\_csig ()**

Generate a node's content signature, the digested signature of its content.

node - the node cache - alternate node to use for the signature cache returns - the content signature

**get\_dir ()****get\_env ()****get\_env\_scanner (env, kw={})****get\_executor (create=1)**

Fetch the action executor for this node. Create one if there isn't already one, and requested to do so.

**get\_found\_includes (env, scanner, path)**

Return the included implicit dependencies in this file. Cache results so we only scan the file once per path regardless of how many times this information is requested.

**get\_implicit\_deps (env, initial\_scanner, path\_func, kw={})**

Return a list of implicit dependencies for this node.

This method exists to handle recursive invocation of the scanner on the implicit dependencies returned by the scanner, if the scanner's recursive flag says that we should.

**get\_internal\_path ()****get\_labspath ()**

Get the absolute path of the file.

**get\_max\_drift\_csig ()**

Returns the content signature currently stored for this node if it's been unmodified longer than the `max_drift` value, or the `max_drift` value is 0. Returns `None` otherwise.

**`get_ninfo ()`**

**`get_path (dir=None)`**

Return path relative to the current working directory of the `Node.FS.Base` object that owns us.

**`get_path_elements ()`**

**`get_size ()`**

**`get_source_scanner (node)`**

Fetch the source scanner for the specified node

NOTE: "self" is the target being built, "node" is the source file for which we want to fetch the scanner.

Implies `self.has_builder()` is true; again, expect to only be called from locations where this is already verified.

This function may be called very often; it attempts to cache the scanner found to improve performance.

**`get_state ()`**

**`get_stored_implicit ()`**

Fetch the stored implicit dependencies

**`get_stored_info ()`**

**`get_string (for_signature)`**

This is a convenience function designed primarily to be used in command generators (i.e., `CommandGeneratorActions` or Environment variables that are callable), which are called with a `for_signature` argument that is nonzero if the command generator is being called to generate a signature for the command line, which determines if we should rebuild or not.

Such command generators should use this method in preference to `str(Node)` when converting a `Node` to a string, passing in the `for_signature` parameter, such that we will call `Node.for_signature()` or `str(Node)` properly, depending on whether we are calculating a signature or actually constructing a command line.

**`get_subst_proxy ()`**

This method is expected to return an object that will function exactly like this `Node`, except that it implements any additional special features that we would like to be in effect for Environment variable substitution. The principle use is that some `Nodes` would like to implement a `__getattr__()` method, but putting that in the `Node` type itself has a tendency to kill performance. We instead put it in a proxy and return it from this method. It is legal for this method to return `self` if no new functionality is needed for Environment substitution.

**`get_suffix ()`**

**`get_target_scanner ()`**

**`get_text_contents ()`**

This attempts to figure out what the encoding of the text is based upon the BOM bytes, and then decodes the contents so that it's a valid python string.

**`get_timestamp ()`**

**`get_tpath ()`**

**`getmtime ()`**

**`getsize ()`**

**`has_builder ()`**

Return whether this `Node` has a builder or not.

In Boolean tests, this turns out to be a *lot* more efficient than simply examining the builder attribute directly ("if `node.builder: ...`"). When the builder attribute is examined directly, it ends up calling `__getattr__` for both the

`__len__` and `__nonzero__` attributes on instances of our Builder Proxy class(es), generating a bazillion extra calls and slowing things down immensely.

#### `has_explicit_builder ()`

Return whether this Node has an explicit builder

This allows an internal Builder created by SCons to be marked non-explicit, so that it can be overridden by an explicit builder that the user supplies (the canonical example being directories).

#### `has_src_builder ()`

Return whether this Node has a source builder or not.

If this Node doesn't have an explicit source code builder, this is where we figure out, on the fly, if there's a transparent source code builder for it.

Note that if we found a source builder, we also set the `self.builder` attribute, so that all of the methods that actually *build* this file don't have to do anything different.

`ignore`

`ignore_set`

`implicit`

`implicit_set`

`includes`

#### `is_derived ()`

Returns true if this node is derived (i.e. built).

This should return true only for nodes whose path should be in the variant directory when `duplicate=0` and should contribute their build signatures when they are used as source files to other derived files. For example: source with source builders are not derived in this sense, and hence should not return true.

`is_explicit`

#### `is_literal ()`

Always pass the string representation of a Node to the command interpreter literally.

#### `is_sconscript ()`

Returns true if this node is an sconscript

`is_under (dir)`

#### `is_up_to_date ()`

Check for whether the Node is current In all cases `self` is the target we're checking to see if it's up to date

`isdir ()`

`isfile ()`

`islink ()`

`linked`

`lstat ()`

#### `make_ready ()`

Get a Node ready for evaluation.

This is called before the Taskmaster decides if the Node is up-to-date or not. Overriding this method allows for a Node subclass to be disambiguated if necessary, or for an implicit source builder to be attached.

`md5_chunksize = 64`

**missing ()****multiple\_side\_effect\_has\_builder ()**

Return whether this Node has a builder or not.

In Boolean tests, this turns out to be a *lot* more efficient than simply examining the builder attribute directly (“if node.builder: ...”). When the builder attribute is examined directly, it ends up calling `__getattr__` for both the `__len__` and `__nonzero__` attributes on instances of our Builder Proxy class(es), generating a bazillion extra calls and slowing things down immensely.

**must\_be\_same (klass)**

This node, which already existed, is being looked up as the specified klass. Raise an exception if it isn't.

**name****new\_binfo ()****new\_ninfo ()****ninfo****nocache****noclean****on\_disk\_entries****postprocess ()**

Clean up anything we don't need to hang onto after we've been built.

**precious****prepare ()**

Prepare for this file to be created.

**prerequisites****pseudo****push\_to\_cache ()**

Try to push the node into a cache

**ref\_count****rel\_path (other)****release\_target\_info ()**

Called just after this node has been marked up-to-date or was built completely.

This is where we try to release as many target node infos as possible for clean builds and update runs, in order to minimize the overall memory consumption.

We'd like to remove a lot more attributes like `self.sources` and `self.sources_set`, but they might get used in a next build step. For example, during configuration the source files for a built `E{*}.o` file are used to figure out which linker to use for the resulting Program (`gcc` vs. `g++`)! That's why we check for the 'keep\_targetinfo' attribute, config Nodes and the Interactive mode just don't allow an early release of most variables.

In the same manner, we can't simply remove the `self.attributes` here. The smart linking relies on the shared flag, and some parts of the java Tool use it to transport information about nodes...

@see: `built()` and `Node.release_target_info()`

**released\_target\_info****remove ()**

Remove this file.

**render\_include\_tree ()**

Return a text representation, suitable for displaying to the user, of the include tree for the sources of this node.

**reentry ()**

**repositories**

**reset\_executor ()**

Remove cached executor; forces recompute when needed.

**retrieve\_from\_cache ()**

Try to retrieve the node's content from a cache

This method is called from multiple threads in a parallel build, so only do thread safe stuff here. Do thread unsafe stuff in built().

Returns true if the node was successfully retrieved.

**rexists ()**

Does this node exist locally or in a repository?

**rfile ()**

**root**

**rstr ()**

A Node.FS.Base object's string representation is its path name.

**sbuilder**

**scan ()**

Scan this node's dependents for implicit dependencies.

**scanner\_key ()**

**scanner\_paths**

**searched**

**select\_scanner (scanner)**

Selects a scanner for this Node.

This is a separate method so it can be overridden by Node subclasses (specifically, Node.FS.Dir) that *must* use their own Scanner and don't select one the Scanner.Selector that's configured for the target.

**set\_always\_build (always\_build=1)**

Set the Node's always\_build value.

**set\_executor (executor)**

Set the action executor for this node.

**set\_explicit (is\_explicit)**

**set\_local ()**

**set\_nocache (nocache=1)**

Set the Node's nocache value.

**set\_noclean (noclean=1)**

Set the Node's noclean value.

**set\_precious (precious=1)**

Set the Node's precious value.

**set\_pseudo** (pseudo=True)

Set the Node's precious value.

**set\_specific\_source** (source)

**set\_src\_builder** (builder)

Set the source code builder for this node.

**set\_state** (state)

**side\_effect**

**side\_effects**

**sources**

**sources\_set**

**src\_builder** ()

Fetch the source code builder for this node.

If there isn't one, we cache the source code builder specified for the directory (which in turn will cache the value from its parent directory, and so on up to the file system root).

**srcdir**

**srcnode** ()

If this node is in a build path, return the node corresponding to its source file. Otherwise, return ourself.

**stat** ()

**state**

**store\_info**

**str\_for\_display** ()

**target\_from\_source** (prefix, suffix, splitext=<function splitext>)

Generates a target entry that corresponds to this entry (usually a source file) with the specified prefix and suffix.

Note that this method can be overridden dynamically for generated files that need different behavior. See Tool/swig.py for an example.

**target\_peers**

**variant\_dirs**

**visited** ()

Called just after this node has been visited (with or without a build).

**waiting\_parents**

**waiting\_s\_e**

**wkids**

**class** SCons.Node.FS.FileBuildInfo

Bases: SCons.Node.BuildInfoBase

This is info loaded from sconsign.

**Attributes unique to FileBuildInfo:**

**dependency\_map** : Caches file->csig mapping

for all dependencies. Currently this is only used when using MD5-timestamp decider. It's used to ensure that we copy the correct csig from the previous build to be written to .sconsign when current build is done. Previously the matching of csig to file was strictly by order they appeared in bdepends, bsources, or bimplicit, and so a change in order or count of any of these could yield writing wrong csig, and then false positive rebuilds

**bact**

**bactsig**

**bdepends**

**bdependssigs**

**bimplicit**

**bimplicitssigs**

**bsources**

**bsourcesigs**

**convert\_from\_sconsign**(dir, name)

Converts a newly-read FileBuildInfo object for in-SCons use

For normal up-to-date checking, we don't have any conversion to perform—but we're leaving this method here to make that clear.

**convert\_to\_sconsign**()

Converts this FileBuildInfo object for writing to a .sconsign file

This replaces each Node in our various dependency lists with its usual string representation: relative to the top-level SConstruct directory, or an absolute path if it's outside.

**current\_version\_id** = 2

**dependency\_map**

**format**(names=0)

**merge**(other)

Merge the fields of another object into this object. Already existing information is overwritten by the other instance's data. WARNING: If a '\_\_\_dict\_\_\_' slot is added, it should be updated instead of replaced.

**prepare\_dependencies**()

Prepares a FileBuildInfo object for explaining what changed

The bsources, bdepends and bimplicit lists have all been stored on disk as paths relative to the top-level SConstruct directory. Convert the strings to actual Nodes (for use by the `-debug=explain` code and `-implicit-cache`).

*exception* SCons.Node.FS.FileBuildInfoFileToCsigMappingError

Bases: **Exception**

**args**

**with\_traceback**()

Exception.with\_traceback(tb) – set self.\_\_traceback\_\_ to tb and return self.

*class* SCons.Node.FS.FileFinder

Bases: **object**

**\_find\_file\_key**(filename, paths, verbose=None)

**filedir\_lookup** (p, fd=None)

A helper method for `find_file()` that looks up a directory for a file we're trying to find. This only creates the Dir Node if it exists on-disk, since if the directory doesn't exist we know we won't find any files in it... :-)

It would be more compact to just use this as a nested function with a default keyword argument (see the commented-out version below), but that doesn't work unless you have nested scopes, so we define it here just so this work under Python 1.5.2.

**find\_file** (filename, paths, verbose=None)

Find a node corresponding to either a derived file or a file that exists already.

Only the first file found is returned, and none is returned if no file is found.

filename: A filename to find paths: A list of directory path *nodes* to search in. Can be represented as a list, a tuple, or a callable that is called with no arguments and returns the list or tuple.

returns The node created from the found file.

**class SCons.Node.FS.FileNodeInfo**

Bases: **SCons.Node.NodeInfoBase**

**convert** (node, val)

**csig**

**current\_version\_id** = 2

**field\_list** = ['csig', 'timestamp', 'size']

**format** (field\_list=None, names=0)

**fs** = None

**merge** (other)

Merge the fields of another object into this object. Already existing information is overwritten by the other instance's data. WARNING: If a `'__dict__'` slot is added, it should be updated instead of replaced.

**size**

**str\_to\_node** (s)

**timestamp**

**update** (node)

**SCons.Node.FS.LinkFunc** (target, source, env)

Relative paths cause problems with symbolic links, so we use absolute paths, which may be a problem for people who want to move their soft-linked src-trees around. Those people should use the 'hard-copy' mode, softlinks cannot be used for that; at least I have no idea how ...

**class SCons.Node.FS.LocalFS**

Bases: **object**

This class implements an abstraction layer for operations involving a local file system. Essentially, this wraps any function in the `os`, `os.path` or `shutil` modules that we use to actually go do anything with or to the local file system.

Note that there's a very good chance we'll refactor this part of the architecture in some way as we really implement the interface(s) for remote file system Nodes. For example, the right architecture might be to have this be a subclass instead of a base class. Nevertheless, we're using this as a first step in that direction.

We're not using `chdir()` yet because the calling subclass method needs to use `os.chdir()` directly to avoid recursion. Will we really need this one?

**chmod** (path, mode)

**copy** (src, dst)

**copy2** (src, dst)

**exists** (path)**getmtime** (path)**getsize** (path)**isdir** (path)**isfile** (path)**islink** (path)**link** (src, dst)**listdir** (path)**lstat** (path)**makedirs** (path)**mkdir** (path)**open** (path)**readlink** (file)**rename** (old, new)**stat** (path)**symlink** (src, dst)**unlink** (path)**SCons.Node.FS.LocalString** (target, source, env)**SCons.Node.FS.MkdirFunc** (target, source, env)**class SCons.Node.FS.RootDir** (drive, fs)Bases: **SCons.Node.FS.Dir**

A class for the root directory of a file system.

This is the same as a Dir class, except that the path separator ('/' or "\") is actually part of the name, so we don't need to add a separator when creating the path names of entries within this directory.

**class Attrs**Bases: **object****shared****BuildInfo**alias of **DirBuildInfo****Decider** (function)**Dir** (name, create=True)

Looks up or creates a directory node named 'name' relative to this directory.

**Entry** (name)

Looks up or creates an entry node named 'name' relative to this directory.

**File** (name)

Looks up or creates a file node named 'name' relative to this directory.

**GetTag (key)**

Return a user-defined tag.

**NodeInfo**

alias of **DirNodeInfo**

**RDirs (pathlist)**

Search for a list of directories in the Repository list.

**Rfindalldirs (pathlist)**

Return all of the directories for a given path list, including corresponding “backing” directories in any repositories. The Node lookups are relative to this Node (typically a directory), so memoizing result saves cycles from looking up the same path for each target in a given directory.

**Tag (key, value)**

Add a user-defined tag.

**\_Dir\_\_clearRepositoryCache (duplicate=None)**

Called when we change the repository(ies) for a directory. This clears any cached information that is invalidated by changing the repository.

**\_Dir\_\_resetDuplicate (node)****\_Rfindalldirs\_key (pathlist)****\_abspath****\_add\_child (collection, set, child)**

Adds ‘child’ to ‘collection’, first checking ‘set’ to see if it’s already present.

**\_children\_get ()****\_children\_reset ()****\_create ()**

Create this directory, silently and without worrying about whether the builder is the default or not.

**\_func\_exists****\_func\_get\_contents****\_func\_is\_derived****\_func\_rexists****\_func\_sconsign****\_func\_target\_from\_source****\_get\_scanner (env, initial\_scanner, root\_node\_scanner, kw)****\_get\_str ()****\_glob1 (pattern, ondisk=True, source=False, strings=False)**

Globs for and returns a list of entry names matching a single pattern in this directory.

This searches any repositories and source directories for corresponding entries and returns a Node (or string) relative to the current directory if an entry is found anywhere.

TODO: handle pattern with no wildcard

**\_labspath**

`_local``_lookupDict``_lookup_abs (p, klass, create=1)`

Fast (?) lookup of a *normalized* absolute path.

This method is intended for use by internal lookups with already-normalized path data. For general-purpose lookups, use the `FS.Entry()`, `FS.Dir()` or `FS.File()` methods.

The caller is responsible for making sure we're passed a normalized absolute path; we merely let Python's dictionary look up and return the One True Node.FS object for the path.

If a Node for the specified "p" doesn't already exist, and "create" is specified, the Node may be created after recursive invocation to find or create the parent directory or directories.

`_memo``_morph ()`

Turn a file system Node (either a freshly initialized directory object or a separate Entry object) into a proper directory object.

Set up this directory's entries and hook it into the file system tree. Specify that directories (this Node) don't use signatures for calculating whether they're current.

`_path``_path_elements``_proxy``_rel_path_key (other)``_save_str ()``_sconsign``_specific_sources``_srcdir_find_file_key (filename)``_tags``_tpath``abspath``addRepository (dir)``add_dependency (depend)`

Adds dependencies.

`add_ignore (depend)`

Adds dependencies to ignore.

`add_prerequisite (prerequisite)`

Adds prerequisites

`add_source (source)`

Adds sources.

`add_to_implicit (deps)``add_to_waiting_parents (node)`

Returns the number of nodes added to our waiting parents list: 1 if we add a unique waiting parent, 0 if not. (Note that the returned values are intended to be used to increment a reference count, so don't think you can "clean up" this function by using True and False instead...)

**add\_to\_waiting\_s\_e** (node)

**add\_wkid** (wkid)

Add a node to the list of kids waiting to be evaluated

**all\_children** (scan=1)

Return a list of all the node's direct children.

**alter\_targets** ()

Return any corresponding targets in a variant directory.

**always\_build**

**attributes**

**binfo**

**build** (\*\*kw)

A null "builder" for directories.

**builder**

**builder\_set** (builder)

**built** ()

Called just after this node is successfully built.

**cached**

**cachedir\_csig**

**cachesig**

**changed** (node=None, allowcache=False)

Returns if the node is up-to-date with respect to the BuildInfo stored last time it was built. The default behavior is to compare it against our own previously stored BuildInfo, but the stored BuildInfo from another Node (typically one in a Repository) can be used instead.

Note that we now *always* check every dependency. We used to short-circuit the check by returning as soon as we detected any difference, but we now rely on checking every dependency to make sure that any necessary Node information (for example, the content signature of an #included .h file) is updated.

The allowcache option was added for supporting the early release of the executor/builder structures, right after a File target was built. When set to true, the return value of this changed method gets cached for File nodes. Like this, the executor isn't needed any longer for subsequent calls to changed().

@see: FS.File.changed(), FS.File.release\_target\_info()

**changed\_since\_last\_build**

**children** (scan=1)

Return a list of the node's direct children, minus those that are ignored by this node.

**children\_are\_up\_to\_date** ()

Alternate check for whether the Node is current: If all of our children were up-to-date, then this Node was up-to-date, too.

The SCons.Node.Alias and SCons.Node.Python.Value subclasses rebind their current() method to this method.

**clear** ()

Completely clear a Node of all its cached state (so that it can be re-evaluated by interfaces that do continuous integration builds).

**clear\_memoized\_values ()**

**contentsig**

**cwd**

**del\_binfo ()**

Delete the build info from this node.

**depends**

**depends\_set**

**dir**

**dir\_on\_disk (name)**

**dirname**

**disambiguate (must\_exist=None)**

**diskcheck\_match ()**

**do\_duplicate (src)**

**duplicate**

**entries**

**entry\_abspath (name)**

**entry\_exists\_on\_disk (name)**

Searches through the file/dir entries of the current directory, and returns True if a physical entry with the given name could be found.

@see reentry\_exists\_on\_disk

**entry\_labspath (name)**

**entry\_path (name)**

**entry\_tpath (name)**

**env**

**env\_set (env, safe=0)**

**executor**

**executor\_cleanup ()**

Let the executor clean up any cached information.

**exists ()**

Does this node exists?

**explain ()**

**file\_on\_disk (name)**

**for\_signature ()**

Return a string representation of the Node that will always be the same for this particular Node, no matter what. This is by contrast to the `__str__()` method, which might, for instance, return a relative path for a file Node. The purpose of this method is to generate a value to be used in signature calculation for the command line used to build a target, and we use this method instead of `str()` to avoid unnecessary rebuilds. This method does not need to return something that would actually work in a command line; it can return any kind of nonsense, so long as it does not change.

**fs**

Reference to parent Node.FS object

**get\_repositories ()**

Returns a list of repositories for this directory.

**get\_abspath ()**

Get the absolute path of the file.

**get\_all\_rdirs ()****get\_binfo ()**

Fetch a node's build information.

node - the node whose sources will be collected  
cache - alternate node to use for the signature cache returns - the build signature

This no longer handles the recursive descent of the node's children's signatures. We expect that they're already built and updated by someone else, if that's what's wanted.

**get\_build\_env ()**

Fetch the appropriate Environment to build this node.

**get\_build\_scanner\_path (scanner)**

Fetch the appropriate scanner path for this node.

**get\_builder (default\_builder=None)**

Return the set builder, or a specified default value

**get\_cachedir\_csig ()****get\_contents ()**

Return content signatures and names of all our children separated by new-lines. Ensure that the nodes are sorted.

**get\_csig ()**

Compute the content signature for Directory nodes. In general, this is not needed and the content signature is not stored in the DirNodeInfo. However, if `get_contents` on a Dir node is called which has a child directory, the child directory should return the hash of its contents.

**get\_dir ()****get\_env ()****get\_env\_scanner (env, kw={})****get\_executor (create=1)**

Fetch the action executor for this node. Create one if there isn't already one, and requested to do so.

**get\_found\_includes (env, scanner, path)**

Return this directory's implicit dependencies.

We don't bother caching the results because the scan typically shouldn't be requested more than once (as opposed to scanning .h file contents, which can be requested as many times as the files is #included by other files).

**get\_implicit\_deps** (env, initial\_scanner, path\_func, kw={})

Return a list of implicit dependencies for this node.

This method exists to handle recursive invocation of the scanner on the implicit dependencies returned by the scanner, if the scanner's recursive flag says that we should.

**get\_internal\_path** ()

**get\_labspath** ()

Get the absolute path of the file.

**get\_ninfo** ()

**get\_path** (dir=None)

Return path relative to the current working directory of the Node.FS.Base object that owns us.

**get\_path\_elements** ()

**get\_source\_scanner** (node)

Fetch the source scanner for the specified node

NOTE: "self" is the target being built, "node" is the source file for which we want to fetch the scanner.

Implies self.has\_builder() is true; again, expect to only be called from locations where this is already verified.

This function may be called very often; it attempts to cache the scanner found to improve performance.

**get\_state** ()

**get\_stored\_implicit** ()

Fetch the stored implicit dependencies

**get\_stored\_info** ()

**get\_string** (for\_signature)

This is a convenience function designed primarily to be used in command generators (i.e., CommandGeneratorActions or Environment variables that are callable), which are called with a for\_signature argument that is nonzero if the command generator is being called to generate a signature for the command line, which determines if we should rebuild or not.

Such command generators should use this method in preference to str(Node) when converting a Node to a string, passing in the for\_signature parameter, such that we will call Node.for\_signature() or str(Node) properly, depending on whether we are calculating a signature or actually constructing a command line.

**get\_subst\_proxy** ()

This method is expected to return an object that will function exactly like this Node, except that it implements any additional special features that we would like to be in effect for Environment variable substitution. The principle use is that some Nodes would like to implement a \_\_getattr\_\_() method, but putting that in the Node type itself has a tendency to kill performance. We instead put it in a proxy and return it from this method. It is legal for this method to return self if no new functionality is needed for Environment substitution.

**get\_suffix** ()

**get\_target\_scanner** ()

**get\_text\_contents** ()

We already emit things in text, so just return the binary version.

**get\_timestamp** ()

Return the latest timestamp from among our children

**get\_tpath** ()

**getmtime** ()

**getsize** ()

**glob** (pathname, ondisk=True, source=False, strings=False, exclude=None)

Returns a list of Nodes (or strings) matching a specified pathname pattern.

Pathname patterns follow UNIX shell semantics: \* matches any-length strings of any characters, ? matches any character, and [] can enclose lists or ranges of characters. Matches do not span directory separators.

The matches take into account Repositories, returning local Nodes if a corresponding entry exists in a Repository (either an in-memory Node or something on disk).

By default, the glob() function matches entries that exist on-disk, in addition to in-memory Nodes. Setting the “ondisk” argument to False (or some other non-true value) causes the glob() function to only match in-memory Nodes. The default behavior is to return both the on-disk and in-memory Nodes.

The “source” argument, when true, specifies that corresponding source Nodes must be returned if you’re globbing in a build directory (initialized with VariantDir()). The default behavior is to return Nodes local to the VariantDir().

The “strings” argument, when true, returns the matches as strings, not Nodes. The strings are path names relative to this directory.

The “exclude” argument, if not None, must be a pattern or a list of patterns following the same UNIX shell semantics. Elements matching a least one pattern of this list will be excluded from the result.

The underlying algorithm is adapted from the glob.glob() function in the Python library (but heavily modified), and uses fnmatch() under the covers.

**has\_builder ()**

Return whether this Node has a builder or not.

In Boolean tests, this turns out to be a *lot* more efficient than simply examining the builder attribute directly (“if node.builder: ...”). When the builder attribute is examined directly, it ends up calling `__getattr__` for both the `__len__` and `__nonzero__` attributes on instances of our Builder Proxy class(es), generating a bazillion extra calls and slowing things down immensely.

**has\_explicit\_builder ()**

Return whether this Node has an explicit builder

This allows an internal Builder created by SCons to be marked non-explicit, so that it can be overridden by an explicit builder that the user supplies (the canonical example being directories).

**ignore**

**ignore\_set**

**implicit**

**implicit\_set**

**includes**

**is\_derived ()**

Returns true if this node is derived (i.e. built).

This should return true only for nodes whose path should be in the variant directory when duplicate=0 and should contribute their build signatures when they are used as source files to other derived files. For example: source with source builders are not derived in this sense, and hence should not return true.

**is\_explicit**

**is\_literal ()**

Always pass the string representation of a Node to the command interpreter literally.

**is\_sconscript ()**

Returns true if this node is an sconscript

**is\_under (dir)**

**is\_up\_to\_date ()**

If any child is not up-to-date, then this directory isn’t, either.

**isdir ()**

**isfile ()****islink ()****link (srcdir, duplicate)**

Set this directory as the variant directory for the supplied source directory.

**linked****lstat ()****make\_ready ()**

Get a Node ready for evaluation.

This is called before the Taskmaster decides if the Node is up-to-date or not. Overriding this method allows for a Node subclass to be disambiguated if necessary, or for an implicit source builder to be attached.

**missing ()****multiple\_side\_effect\_has\_builder ()**

Return whether this Node has a builder or not.

In Boolean tests, this turns out to be a *lot* more efficient than simply examining the builder attribute directly (“if node.builder: ...”). When the builder attribute is examined directly, it ends up calling `__getattr__` for both the `__len__` and `__nonzero__` attributes on instances of our Builder Proxy class(es), generating a bazillion extra calls and slowing things down immensely.**must\_be\_same (klass)**

This node, which already existed, is being looked up as the specified klass. Raise an exception if it isn't.

**name****new\_binfo ()****new\_ninfo ()****ninfo****nocache****noclean****on\_disk\_entries****path****postprocess ()**

Clean up anything we don't need to hang onto after we've been built.

**precious****prepare ()**

Prepare for this Node to be built.

This is called after the Taskmaster has decided that the Node is out-of-date and must be rebuilt, but before actually calling the method to build the Node.

This default implementation checks that explicit or implicit dependencies either exist or are derived, and initializes the BuildInfo structure that will hold the information about how this node is, uh, built.

(The existence of source files is checked separately by the Executor, which aggregates checks for all of the targets built by a specific action.)

Overriding this method allows for for a Node subclass to remove the underlying file from the file system. Note that subclass methods should call this base class method to get the child check and the BuildInfo structure.

**prerequisites**

**pseudo**

**push\_to\_cache ()**

Try to push a node into a cache

**rdir ()**

**ref\_count**

**rel\_path (other)**

Return a path to "other" relative to this directory.

**release\_target\_info ()**

Called just after this node has been marked up-to-date or was built completely.

This is where we try to release as many target node infos as possible for clean builds and update runs, in order to minimize the overall memory consumption.

By purging attributes that aren't needed any longer after a Node (=File) got built, we don't have to care that much how many KBytes a Node actually requires...as long as we free the memory shortly afterwards.

@see: built() and File.release\_target\_info()

**released\_target\_info**

**remove ()**

Remove this Node: no-op by default.

**render\_include\_tree ()**

Return a text representation, suitable for displaying to the user, of the include tree for the sources of this node.

**reentry ()**

**reentry\_exists\_on\_disk (name)**

Searches through the file/dir entries of the current *and* all its remote directories (repos), and returns True if a physical entry with the given name could be found. The local directory (self) gets searched first, so repositories take a lower precedence regarding the searching order.

@see entry\_exists\_on\_disk

**repositories**

**reset\_executor ()**

Remove cached executor; forces recompute when needed.

**retrieve\_from\_cache ()**

Try to retrieve the node's content from a cache

This method is called from multiple threads in a parallel build, so only do thread safe stuff here. Do thread unsafe stuff in built().

Returns true if the node was successfully retrieved.

**rexists ()**

Does this node exist locally or in a repository?

**rfile ()**

**root**

**rstr ()**

A Node.FS.Base object's string representation is its path name.

**sbuilder**

**scan ()**

Scan this node's dependents for implicit dependencies.

**scanner\_key ()**

A directory does not get scanned.

**scanner\_paths**

**sconsign ()**

Return the .sconsign file info for this directory.

**searched**

**select\_scanner (scanner)**

Selects a scanner for this Node.

This is a separate method so it can be overridden by Node subclasses (specifically, Node.FS.Dir) that *must* use their own Scanner and don't select one the Scanner.Selector that's configured for the target.

**set\_always\_build (always\_build=1)**

Set the Node's always\_build value.

**set\_executor (executor)**

Set the action executor for this node.

**set\_explicit (is\_explicit)**

**set\_local ()**

**set\_nocache (nocache=1)**

Set the Node's nocache value.

**set\_noclean (noclean=1)**

Set the Node's noclean value.

**set\_precious (precious=1)**

Set the Node's precious value.

**set\_pseudo (pseudo=True)**

Set the Node's precious value.

**set\_specific\_source (source)**

**set\_src\_builder (builder)**

Set the source code builder for this node.

**set\_state (state)**

**side\_effect**

**side\_effects**

**sources**

**sources\_set**

**src\_builder ()**

Fetch the source code builder for this node.

If there isn't one, we cache the source code builder specified for the directory (which in turn will cache the value from its parent directory, and so on up to the file system root).

**srcdir**

**srcdir\_duplicate (name)**

**srcdir\_find\_file** (filename)**srcdir\_list** ()**srcnode** ()Dir has a special need for srcnode()...if we have a srcdir attribute set, then that *is* our srcnode.**stat** ()**state****store\_info****str\_for\_display** ()**target\_from\_source** (prefix, suffix, splitext=<function splitext>)

Generates a target entry that corresponds to this entry (usually a source file) with the specified prefix and suffix.

Note that this method can be overridden dynamically for generated files that need different behavior. See Tool/swig.py for an example.

**target\_peers****up** ()**variant\_dirs****visited** ()

Called just after this node has been visited (with or without a build).

**waiting\_parents****waiting\_s\_e****walk** (func, arg)

Walk this directory tree by calling the specified function for each directory in the tree.

This behaves like the `os.path.walk()` function, but for in-memory `Node.FS.Dir` objects. The function takes the same arguments as the functions passed to `os.path.walk()`:

func(arg, dirname, fnames)

Except that “dirname” will actually be the directory *Node*, not the string. The ‘.’ and ‘..’ entries are excluded from fnames. The fnames list may be modified in-place to filter the subdirectories visited or otherwise impose a specific order. The “arg” argument is always passed to func() and may be used in any way (or ignored, passing None is common).**wkids**`SCons.Node.FS.UnlinkFunc` (target, source, env)`class SCons.Node.FS._Null`Bases: `object``SCons.Node.FS._classEntry`alias of `SCons.Node.FS.Entry``SCons.Node.FS._copy_func` (fs, src, dest)`SCons.Node.FS._hardlink_func` (fs, src, dst)`SCons.Node.FS._my_normcase` (x)`SCons.Node.FS._my_splitdrive` (p)`SCons.Node.FS._softlink_func` (fs, src, dst)`SCons.Node.FS.diskcheck_types` ()

`SCons.Node.FS.do_diskcheck_match` (node, predicate, errorfmt)

`SCons.Node.FS.find_file` (filename, paths, verbose=None)

Find a node corresponding to either a derived file or a file that exists already.

Only the first file found is returned, and none is returned if no file is found.

filename: A filename to find paths: A list of directory path *nodes* to search in. Can be represented as a list, a tuple, or a callable that is called with no arguments and returns the list or tuple.

returns The node created from the found file.

`SCons.Node.FS.get_MkdirBuilder` ()

`SCons.Node.FS.get_default_fs` ()

`SCons.Node.FS.has_glob_magic` (s)

`SCons.Node.FS.ignore_diskcheck_match` (node, predicate, errorfmt)

`SCons.Node.FS.initialize_do_splitdrive` ()

`SCons.Node.FS.invalidate_node_memos` (targets)

Invalidate the memoized values of all Nodes (files or directories) that are associated with the given entries. Has been added to clear the cache of nodes affected by a direct execution of an action (e.g. Delete/Copy/Chmod).

Existing Node caches become inconsistent if the action is run through Execute(). The argument *targets* can be a single Node object or filename, or a sequence of Nodes/filenames.

`SCons.Node.FS.needs_normpath_match` ()

Matches zero or more characters at the beginning of the string.

`SCons.Node.FS.save_strings` (val)

`SCons.Node.FS.sconsign_dir` (node)

Return the .sconsign file info for this directory, creating it first if necessary.

`SCons.Node.FS.sconsign_none` (node)

`SCons.Node.FS.set_diskcheck` (list)

`SCons.Node.FS.set_duplicate` (duplicate)

## ***SCons.Node.Python module***

`scons.Node.Python`

Python nodes.

`class SCons.Node.Python.Value` (value, built\_value=None, name=None)

Bases: `SCons.Node.Node`

A class for Python variables, typically passed on the command line or generated by a script, but not from a file or some other source.

`class Attrs`

Bases: `object`

`shared`

`BuildInfo`

alias of `ValueBuildInfo`

`Decider` (function)

`GetTag` (key)

Return a user-defined tag.

`NodeInfo`

alias of `ValueNodeInfo`

`Tag` (key, value)

Add a user-defined tag.

**`_add_child (collection, set, child)`**  
 Adds 'child' to 'collection', first checking 'set' to see if it's already present.

**`_children_get ()`**

**`_children_reset ()`**

**`_func_exists`**

**`_func_get_contents`**

**`_func_is_derived`**

**`_func_rexists`**

**`_func_target_from_source`**

**`_get_scanner (env, initial_scanner, root_node_scanner, kw)`**

**`_memo`**

**`_specific_sources`**

**`_tags`**

**`add_dependency (depend)`**  
 Adds dependencies.

**`add_ignore (depend)`**  
 Adds dependencies to ignore.

**`add_prerequisite (prerequisite)`**  
 Adds prerequisites

**`add_source (source)`**  
 Adds sources.

**`add_to_implicit (deps)`**

**`add_to_waiting_parents (node)`**  
 Returns the number of nodes added to our waiting parents list: 1 if we add a unique waiting parent, 0 if not.  
 (Note that the returned values are intended to be used to increment a reference count, so don't think you can  
 "clean up" this function by using True and False instead...)

**`add_to_waiting_s_e (node)`**

**`add_wkid (wkid)`**  
 Add a node to the list of kids waiting to be evaluated

**`all_children (scan=1)`**  
 Return a list of all the node's direct children.

**`alter_targets ()`**  
 Return a list of alternate targets for this Node.

**`always_build`**

**`attributes`**

**`binfo`**

**build (\*\*kw)**

Actually build the node.

This is called by the Taskmaster after it's decided that the Node is out-of-date and must be rebuilt, and after the `prepare()` method has gotten everything, uh, prepared.

This method is called from multiple threads in a parallel build, so only do thread safe stuff here. Do thread unsafe stuff in `built()`.

**builder****builder\_set (builder)****built ()**

Called just after this node is successfully built.

**cached****changed (node=None, allowcache=False)**

Returns if the node is up-to-date with respect to the BuildInfo stored last time it was built. The default behavior is to compare it against our own previously stored BuildInfo, but the stored BuildInfo from another Node (typically one in a Repository) can be used instead.

Note that we now *always* check every dependency. We used to short-circuit the check by returning as soon as we detected any difference, but we now rely on checking every dependency to make sure that any necessary Node information (for example, the content signature of an `#included .h` file) is updated.

The `allowcache` option was added for supporting the early release of the executor/builder structures, right after a File target was built. When set to true, the return value of this `changed` method gets cached for File nodes. Like this, the executor isn't needed any longer for subsequent calls to `changed()`.

@see: `FS.File.changed()`, `FS.File.release_target_info()`

**changed\_since\_last\_build****children (scan=1)**

Return a list of the node's direct children, minus those that are ignored by this node.

**children\_are\_up\_to\_date ()**

Alternate check for whether the Node is current: If all of our children were up-to-date, then this Node was up-to-date, too.

The `SCons.Node.Alias` and `SCons.Node.Python.Value` subclasses rebind their `current()` method to this method.

**clear ()**

Completely clear a Node of all its cached state (so that it can be re-evaluated by interfaces that do continuous integration builds).

**clear\_memoized\_values ()****del\_binfo ()**

Delete the build info from this node.

**depends****depends\_set****disambiguate (must\_exist=None)****env****env\_set (env, safe=0)****executor****executor\_cleanup ()**

Let the executor clean up any cached information.

**exists ()**

Does this node exists?

**explain ()****for\_signature ()**

Return a string representation of the Node that will always be the same for this particular Node, no matter what. This is by contrast to the `__str__()` method, which might, for instance, return a relative path for a file Node. The purpose of this method is to generate a value to be used in signature calculation for the command line used to build a target, and we use this method instead of `str()` to avoid unnecessary rebuilds. This method does not need to return something that would actually work in a command line; it can return any kind of nonsense, so long as it does not change.

**get\_abspath ()**

Return an absolute path to the Node. This will return simply `str(Node)` by default, but for Node types that have a concept of relative path, this might return something different.

**get\_binfo ()**

Fetch a node's build information.

node - the node whose sources will be collected  
cache - alternate node to use for the signature cache  
returns - the build signature

This no longer handles the recursive descent of the node's children's signatures. We expect that they're already built and updated by someone else, if that's what's wanted.

**get\_build\_env ()**

Fetch the appropriate Environment to build this node.

**get\_build\_scanner\_path (scanner)**

Fetch the appropriate scanner path for this node.

**get\_builder (default\_builder=None)**

Return the set builder, or a specified default value

**get\_cachedir\_csig ()****get\_contents ()**

Get contents for signature calculations. :return: bytes

**get\_csig (calc=None)**

Because we're a Python value node and don't have a real timestamp, we get to ignore the calculator and just use the value contents.

Returns string. Ideally string of hex digits. (Not bytes)

**get\_env ()****get\_env\_scanner (env, kw={})****get\_executor (create=1)**

Fetch the action executor for this node. Create one if there isn't already one, and requested to do so.

**get\_found\_includes (env, scanner, path)**

Return the scanned include lines (implicit dependencies) found in this node.

The default is no implicit dependencies. We expect this method to be overridden by any subclass that can be scanned for implicit dependencies.

**get\_implicit\_deps (env, initial\_scanner, path\_func, kw={})**

Return a list of implicit dependencies for this node.

This method exists to handle recursive invocation of the scanner on the implicit dependencies returned by the scanner, if the scanner's recursive flag says that we should.

**get\_ninfo ()**

**get\_source\_scanner (node)**

Fetch the source scanner for the specified node

NOTE: “self” is the target being built, “node” is the source file for which we want to fetch the scanner.

Implies self.has\_builder() is true; again, expect to only be called from locations where this is already verified.

This function may be called very often; it attempts to cache the scanner found to improve performance.

**get\_state ()****get\_stored\_implicit ()**

Fetch the stored implicit dependencies

**get\_stored\_info ()****get\_string (for\_signature)**

This is a convenience function designed primarily to be used in command generators (i.e., CommandGeneratorActions or Environment variables that are callable), which are called with a for\_signature argument that is nonzero if the command generator is being called to generate a signature for the command line, which determines if we should rebuild or not.

Such command generators should use this method in preference to str(Node) when converting a Node to a string, passing in the for\_signature parameter, such that we will call Node.for\_signature() or str(Node) properly, depending on whether we are calculating a signature or actually constructing a command line.

**get\_subst\_proxy ()**

This method is expected to return an object that will function exactly like this Node, except that it implements any additional special features that we would like to be in effect for Environment variable substitution. The principle use is that some Nodes would like to implement a \_\_getattr\_\_() method, but putting that in the Node type itself has a tendency to kill performance. We instead put it in a proxy and return it from this method. It is legal for this method to return self if no new functionality is needed for Environment substitution.

**get\_suffix ()****get\_target\_scanner ()****get\_text\_contents ()**

By the assumption that the node.built\_value is a deterministic product of the sources, the contents of a Value are the concatenation of all the contents of its sources. As the value need not be built when get\_contents() is called, we cannot use the actual node.built\_value.

**has\_builder ()**

Return whether this Node has a builder or not.

In Boolean tests, this turns out to be a *lot* more efficient than simply examining the builder attribute directly (“if node.builder: ...”). When the builder attribute is examined directly, it ends up calling \_\_getattr\_\_ for both the \_\_len\_\_ and \_\_nonzero\_\_ attributes on instances of our Builder Proxy class(es), generating a bazillion extra calls and slowing things down immensely.

**has\_explicit\_builder ()**

Return whether this Node has an explicit builder

This allows an internal Builder created by SCons to be marked non-explicit, so that it can be overridden by an explicit builder that the user supplies (the canonical example being directories).

**ignore****ignore\_set****implicit****implicit\_set****includes****is\_derived ()**

Returns true if this node is derived (i.e. built).

This should return true only for nodes whose path should be in the variant directory when `duplicate=0` and should contribute their build signatures when they are used as source files to other derived files. For example: source with source builders are not derived in this sense, and hence should not return true.

**is\_explicit**

**is\_literal ()**

Always pass the string representation of a Node to the command interpreter literally.

**is\_sconscript ()**

Returns true if this node is an sconscript

**is\_under (dir)**

**is\_up\_to\_date ()**

Alternate check for whether the Node is current: If all of our children were up-to-date, then this Node was up-to-date, too.

The `SCons.Node.Alias` and `SCons.Node.Python.Value` subclasses rebind their `current()` method to this method.

**linked**

**make\_ready ()**

Get a Node ready for evaluation.

This is called before the Taskmaster decides if the Node is up-to-date or not. Overriding this method allows for a Node subclass to be disambiguated if necessary, or for an implicit source builder to be attached.

**missing ()**

**multiple\_side\_effect\_has\_builder ()**

Return whether this Node has a builder or not.

In Boolean tests, this turns out to be a *lot* more efficient than simply examining the builder attribute directly (“if `node.builder: ...`”). When the builder attribute is examined directly, it ends up calling `__getattr__` for both the `__len__` and `__nonzero__` attributes on instances of our Builder Proxy class(es), generating a bazillion extra calls and slowing things down immensely.

**new\_binfo ()**

**new\_ninfo ()**

**ninfo**

**nocache**

**noclean**

**postprocess ()**

Clean up anything we don't need to hang onto after we've been built.

**precious**

**prepare ()**

Prepare for this Node to be built.

This is called after the Taskmaster has decided that the Node is out-of-date and must be rebuilt, but before actually calling the method to build the Node.

This default implementation checks that explicit or implicit dependencies either exist or are derived, and initializes the `BuildInfo` structure that will hold the information about how this node is, uh, built.

(The existence of source files is checked separately by the Executor, which aggregates checks for all of the targets built by a specific action.)

Overriding this method allows for for a Node subclass to remove the underlying file from the file system. Note that subclass methods should call this base class method to get the child check and the `BuildInfo` structure.

**prerequisites**

**pseudo**

**push\_to\_cache ()**

Try to push a node into a cache

**read ()**

Return the value. If necessary, the value is built.

**ref\_count**

**release\_target\_info ()**

Called just after this node has been marked up-to-date or was built completely.

This is where we try to release as many target node infos as possible for clean builds and update runs, in order to minimize the overall memory consumption.

By purging attributes that aren't needed any longer after a Node (=File) got built, we don't have to care that much how many KBytes a Node actually requires...as long as we free the memory shortly afterwards.

@see: built() and File.release\_target\_info()

**remove ()**

Remove this Node: no-op by default.

**render\_include\_tree ()**

Return a text representation, suitable for displaying to the user, of the include tree for the sources of this node.

**reset\_executor ()**

Remove cached executor; forces recompute when needed.

**retrieve\_from\_cache ()**

Try to retrieve the node's content from a cache

This method is called from multiple threads in a parallel build, so only do thread safe stuff here. Do thread unsafe stuff in built().

Returns true if the node was successfully retrieved.

**rexists ()**

Does this node exist locally or in a repository?

**scan ()**

Scan this node's dependents for implicit dependencies.

**scanner\_key ()**

**select\_scanner (scanner)**

Selects a scanner for this Node.

This is a separate method so it can be overridden by Node subclasses (specifically, Node.FS.Dir) that *must* use their own Scanner and don't select one the Scanner.Selector that's configured for the target.

**set\_always\_build (always\_build=1)**

Set the Node's always\_build value.

**set\_executor (executor)**

Set the action executor for this node.

**set\_explicit (is\_explicit)**

**set\_nocache (nocache=1)**

Set the Node's nocache value.

**set\_noclean (noclean=1)**

Set the Node's noclean value.

**set\_precious** (precious=1)  
Set the Node's precious value.

**set\_pseudo** (pseudo=True)  
Set the Node's precious value.

**set\_specific\_source** (source)

**set\_state** (state)

**side\_effect**

**side\_effects**

**sources**

**sources\_set**

**state**

**store\_info**

**str\_for\_display** ()

**target\_peers**

**visited** ()  
Called just after this node has been visited (with or without a build).

**waiting\_parents**

**waiting\_s\_e**

**wkids**

**write** (built\_value)  
Set the value of the node.

**class** SCons.Node.Python.ValueBuildInfo  
Bases: SCons.Node.BuildInfoBase

**bact**

**bactsig**

**bdepends**

**bdependsigs**

**bimplicit**

**bimplicitSIGs**

**bsources**

**bsourcesigs**

**current\_version\_id** = 2

**merge** (other)

Merge the fields of another object into this object. Already existing information is overwritten by the other instance's data. WARNING: If a `'__dict__'` slot is added, it should be updated instead of replaced.

```
class SCons.Node.Python.ValueNodeInfo
```

```
  Bases: SCons.Node.NodeInfoBase
```

```
  convert (node, val)
```

```
  csig
```

```
  current_version_id = 2
```

```
  field_list = ['csig']
```

```
  format (field_list=None, names=0)
```

```
  merge (other)
```

Merge the fields of another object into this object. Already existing information is overwritten by the other instance's data. WARNING: If a `'__dict__'` slot is added, it should be updated instead of replaced.

```
  str_to_node (s)
```

```
  update (node)
```

```
SCons.Node.Python.ValueWithMemo (value, built_value=None, name=None)
```

```
  Memoized Value() node factory.
```

## Module contents

SCons.Node

The Node package for the SCons software construction utility.

This is, in many ways, the heart of SCons.

A Node is where we encapsulate all of the dependency information about any thing that SCons can build, or about any thing which SCons can use to build some other thing. The canonical "thing," of course, is a file, but a Node can also represent something remote (like a web page) or something completely abstract (like an Alias).

Each specific type of "thing" is specifically represented by a subclass of the Node base class: `Node.FS.File` for files, `Node.Alias` for aliases, etc. Dependency information is kept here in the base class, and information specific to files/aliases/etc. is in the subclass. The goal, if we've done this correctly, is that any type of "thing" should be able to depend on any other type of "thing."

```
SCons.Node.Annotate (node)
```

```
class SCons.Node.BuildInfoBase
```

```
  Bases: object
```

The generic base class for build information for a Node.

This is what gets stored in a `.sconsign` file for each target file. It contains a `NodeInfo` instance for this node (signature information that's specific to the type of Node) and direct attributes for the generic build stuff we have to track: sources, explicit dependencies, implicit dependencies, and action information.

```
  bact
```

```
  bactsig
```

```
  bdepends
```

```
  bdependsigs
```

```
  bimplicit
```

```
  bimplicitSIGs
```

**bsources****bsourcesigs****current\_version\_id** = 2**merge** (other)

Merge the fields of another object into this object. Already existing information is overwritten by the other instance's data. WARNING: If a `'__dict__'` slot is added, it should be updated instead of replaced.

*class* SCons.Node.NodeBases: **object**

The base Node class, for entities that we know how to build, or use to build other Nodes.

*class* AttrsBases: **object****shared****BuildInfo**alias of **BuildInfoBase****Decider** (function)**GetTag** (key)

Return a user-defined tag.

**NodeInfo**alias of **NodeInfoBase****Tag** (key, value)

Add a user-defined tag.

**\_add\_child** (collection, set, child)

Adds 'child' to 'collection', first checking 'set' to see if it's already present.

**\_children\_get** ()**\_children\_reset** ()**\_func\_exists****\_func\_get\_contents****\_func\_is\_derived****\_func\_rexists****\_func\_target\_from\_source****\_get\_scanner** (env, initial\_scanner, root\_node\_scanner, kw)**\_memo****\_specific\_sources****\_tags****add\_dependency** (depend)

Adds dependencies.

**add\_ignore (depend)**

Adds dependencies to ignore.

**add\_prerequisite (prerequisite)**

Adds prerequisites

**add\_source (source)**

Adds sources.

**add\_to\_implicit (deps)****add\_to\_waiting\_parents (node)**

Returns the number of nodes added to our waiting parents list: 1 if we add a unique waiting parent, 0 if not. (Note that the returned values are intended to be used to increment a reference count, so don't think you can "clean up" this function by using True and False instead...)

**add\_to\_waiting\_s\_e (node)****add\_wkid (wkid)**

Add a node to the list of kids waiting to be evaluated

**all\_children (scan=1)**

Return a list of all the node's direct children.

**alter\_targets ()**

Return a list of alternate targets for this Node.

**always\_build****attributes****binfo****build (\*\*kw)**

Actually build the node.

This is called by the Taskmaster after it's decided that the Node is out-of-date and must be rebuilt, and after the prepare() method has gotten everything, uh, prepared.

This method is called from multiple threads in a parallel build, so only do thread safe stuff here. Do thread unsafe stuff in built().

**builder****builder\_set (builder)****built ()**

Called just after this node is successfully built.

**cached****changed (node=None, allowcache=False)**

Returns if the node is up-to-date with respect to the BuildInfo stored last time it was built. The default behavior is to compare it against our own previously stored BuildInfo, but the stored BuildInfo from another Node (typically one in a Repository) can be used instead.

Note that we now *always* check every dependency. We used to short-circuit the check by returning as soon as we detected any difference, but we now rely on checking every dependency to make sure that any necessary Node information (for example, the content signature of an #included .h file) is updated.

The allowcache option was added for supporting the early release of the executor/builder structures, right after a File target was built. When set to true, the return value of this changed method gets cached for File nodes. Like this, the executor isn't needed any longer for subsequent calls to changed().

@see: FS.File.changed(), FS.File.release\_target\_info()

**changed\_since\_last\_build**

**children** (*scan=1*)

Return a list of the node's direct children, minus those that are ignored by this node.

**children\_are\_up\_to\_date** ()

Alternate check for whether the Node is current: If all of our children were up-to-date, then this Node was up-to-date, too.

The SCons.Node.Alias and SCons.Node.Python.Value subclasses rebind their current() method to this method.

**clear** ()

Completely clear a Node of all its cached state (so that it can be re-evaluated by interfaces that do continuous integration builds).

**clear\_memoized\_values** ()

**del\_binfo** ()

Delete the build info from this node.

**depends**

**depends\_set**

**disambiguate** (*must\_exist=None*)

**env**

**env\_set** (*env, safe=0*)

**executor**

**executor\_cleanup** ()

Let the executor clean up any cached information.

**exists** ()

Does this node exist?

**explain** ()

**for\_signature** ()

Return a string representation of the Node that will always be the same for this particular Node, no matter what. This is by contrast to the `__str__()` method, which might, for instance, return a relative path for a file Node. The purpose of this method is to generate a value to be used in signature calculation for the command line used to build a target, and we use this method instead of `str()` to avoid unnecessary rebuilds. This method does not need to return something that would actually work in a command line; it can return any kind of nonsense, so long as it does not change.

**get\_abspath** ()

Return an absolute path to the Node. This will return simply `str(Node)` by default, but for Node types that have a concept of relative path, this might return something different.

**get\_binfo** ()

Fetch a node's build information.

*node* - the node whose sources will be collected  
*cache* - alternate node to use for the signature cache returns - the build signature

This no longer handles the recursive descent of the node's children's signatures. We expect that they're already built and updated by someone else, if that's what's wanted.

**get\_build\_env** ()

Fetch the appropriate Environment to build this node.

**get\_build\_scanner\_path(scanner)**

Fetch the appropriate scanner path for this node.

**get\_builder(default\_builder=None)**

Return the set builder, or a specified default value

**get\_cachedir\_csig()**

**get\_contents()**

Fetch the contents of the entry.

**get\_csig()**

**get\_env()**

**get\_env\_scanner(env, kw={})**

**get\_executor(create=1)**

Fetch the action executor for this node. Create one if there isn't already one, and requested to do so.

**get\_found\_includes(env, scanner, path)**

Return the scanned include lines (implicit dependencies) found in this node.

The default is no implicit dependencies. We expect this method to be overridden by any subclass that can be scanned for implicit dependencies.

**get\_implicit\_deps(env, initial\_scanner, path\_func, kw={})**

Return a list of implicit dependencies for this node.

This method exists to handle recursive invocation of the scanner on the implicit dependencies returned by the scanner, if the scanner's recursive flag says that we should.

**get\_ninfo()**

**get\_source\_scanner(node)**

Fetch the source scanner for the specified node

NOTE: "self" is the target being built, "node" is the source file for which we want to fetch the scanner.

Implies self.has\_builder() is true; again, expect to only be called from locations where this is already verified.

This function may be called very often; it attempts to cache the scanner found to improve performance.

**get\_state()**

**get\_stored\_implicit()**

Fetch the stored implicit dependencies

**get\_stored\_info()**

**get\_string(for\_signature)**

This is a convenience function designed primarily to be used in command generators (i.e., CommandGeneratorActions or Environment variables that are callable), which are called with a for\_signature argument that is nonzero if the command generator is being called to generate a signature for the command line, which determines if we should rebuild or not.

Such command generators should use this method in preference to str(Node) when converting a Node to a string, passing in the for\_signature parameter, such that we will call Node.for\_signature() or str(Node) properly, depending on whether we are calculating a signature or actually constructing a command line.

**get\_subst\_proxy()**

This method is expected to return an object that will function exactly like this Node, except that it implements any additional special features that we would like to be in effect for Environment variable substitution. The principle use is that some Nodes would like to implement a \_\_getattr\_\_() method, but putting that in the Node type itself has a tendency to kill performance. We instead put it in a proxy and return it from this method. It is legal for this method to return self if no new functionality is needed for Environment substitution.

**get\_suffix ()****get\_target\_scanner ()****has\_builder ()**

Return whether this Node has a builder or not.

In Boolean tests, this turns out to be a *lot* more efficient than simply examining the builder attribute directly (“if node.builder: ...”). When the builder attribute is examined directly, it ends up calling `__getattr__` for both the `__len__` and `__nonzero__` attributes on instances of our Builder Proxy class(es), generating a bazillion extra calls and slowing things down immensely.

**has\_explicit\_builder ()**

Return whether this Node has an explicit builder

This allows an internal Builder created by SCons to be marked non-explicit, so that it can be overridden by an explicit builder that the user supplies (the canonical example being directories).

**ignore****ignore\_set****implicit****implicit\_set****includes****is\_derived ()**

Returns true if this node is derived (i.e. built).

This should return true only for nodes whose path should be in the variant directory when `duplicate=0` and should contribute their build signatures when they are used as source files to other derived files. For example: source with source builders are not derived in this sense, and hence should not return true.

**is\_explicit****is\_literal ()**

Always pass the string representation of a Node to the command interpreter literally.

**is\_sconscript ()**

Returns true if this node is an sconscript

**is\_up\_to\_date ()**

Default check for whether the Node is current: unknown Node subtypes are always out of date, so they will always get built.

**linked****make\_ready ()**

Get a Node ready for evaluation.

This is called before the Taskmaster decides if the Node is up-to-date or not. Overriding this method allows for a Node subclass to be disambiguated if necessary, or for an implicit source builder to be attached.

**missing ()****multiple\_side\_effect\_has\_builder ()**

Return whether this Node has a builder or not.

In Boolean tests, this turns out to be a *lot* more efficient than simply examining the builder attribute directly (“if node.builder: ...”). When the builder attribute is examined directly, it ends up calling `__getattr__` for both the `__len__` and `__nonzero__` attributes on instances of our Builder Proxy class(es), generating a bazillion extra calls and slowing things down immensely.

**new\_bininfo ()**

**new\_ninfo ()****ninfo****nocache****noclean****postprocess ()**

Clean up anything we don't need to hang onto after we've been built.

**precious****prepare ()**

Prepare for this Node to be built.

This is called after the Taskmaster has decided that the Node is out-of-date and must be rebuilt, but before actually calling the method to build the Node.

This default implementation checks that explicit or implicit dependencies either exist or are derived, and initializes the BuildInfo structure that will hold the information about how this node is, uh, built.

(The existence of source files is checked separately by the Executor, which aggregates checks for all of the targets built by a specific action.)

Overriding this method allows for for a Node subclass to remove the underlying file from the file system. Note that subclass methods should call this base class method to get the child check and the BuildInfo structure.

**prerequisites****pseudo****push\_to\_cache ()**

Try to push a node into a cache

**ref\_count****release\_target\_info ()**

Called just after this node has been marked up-to-date or was built completely.

This is where we try to release as many target node infos as possible for clean builds and update runs, in order to minimize the overall memory consumption.

By purging attributes that aren't needed any longer after a Node (=File) got built, we don't have to care that much how many KBytes a Node actually requires...as long as we free the memory shortly afterwards.

@see: built() and File.release\_target\_info()

**remove ()**

Remove this Node: no-op by default.

**render\_include\_tree ()**

Return a text representation, suitable for displaying to the user, of the include tree for the sources of this node.

**reset\_executor ()**

Remove cached executor; forces recompute when needed.

**retrieve\_from\_cache ()**

Try to retrieve the node's content from a cache

This method is called from multiple threads in a parallel build, so only do thread safe stuff here. Do thread unsafe stuff in built().

Returns true if the node was successfully retrieved.

**rexists ()**

Does this node exist locally or in a repository?

**scan ()**

Scan this node's dependents for implicit dependencies.

**scanner\_key ()**

**select\_scanner (scanner)**

Selects a scanner for this Node.

This is a separate method so it can be overridden by Node subclasses (specifically, Node.FS.Dir) that *must* use their own Scanner and don't select one the Scanner.Selector that's configured for the target.

**set\_always\_build (always\_build=1)**

Set the Node's always\_build value.

**set\_executor (executor)**

Set the action executor for this node.

**set\_explicit (is\_explicit)**

**set\_nocache (nocache=1)**

Set the Node's nocache value.

**set\_noclean (noclean=1)**

Set the Node's noclean value.

**set\_precious (precious=1)**

Set the Node's precious value.

**set\_pseudo (pseudo=True)**

Set the Node's precious value.

**set\_specific\_source (source)**

**set\_state (state)**

**side\_effect**

**side\_effects**

**sources**

**sources\_set**

**state**

**store\_info**

**target\_peers**

**visited ()**

Called just after this node has been visited (with or without a build).

**waiting\_parents**

**waiting\_s\_e**

**wkids**

**class SCons.Node.NodeInfoBase**

Bases: **object**

The generic base class for signature information for a Node.

Node subclasses should subclass NodeInfoBase to provide their own logic for dealing with their own Node-specific signature information.

**convert (node, val)**

`current_version_id = 2`

`format (field_list=None, names=0)`

`merge (other)`

Merge the fields of another object into this object. Already existing information is overwritten by the other instance's data. WARNING: If a `'__dict__'` slot is added, it should be updated instead of replaced.

`update (node)`

`class SCons.Node.NodeList (initlist=None)`

Bases: `collections.UserList`

`__UserList__cast (other)`

`__abc_impl = <_abc_data object>`

`append (item)`

`S.append(value)` – append value to the end of the sequence

`clear ()` → None -- remove all items from S

`copy ()`

`count (value)` → integer -- return number of occurrences of value

`extend (other)`

`S.extend(iterable)` – extend sequence by appending elements from the iterable

`index (value[, start[, stop]])` → integer -- return first index of value.

Raises `ValueError` if the value is not present.

Supporting start and stop arguments is optional, but recommended.

`insert (i, item)`

`S.insert(index, value)` – insert value before index

`pop ([, index])` → item -- remove and return item at index (default last).

Raise `IndexError` if list is empty or index is out of range.

`remove (item)`

`S.remove(value)` – remove first occurrence of value. Raise `ValueError` if the value is not present.

`reverse ()`

`S.reverse()` – reverse *IN PLACE*

`sort (*args, **kws)`

`class SCons.Node.Walker (node, kids_func=<function get_children>, cycle_func=<function ignore_cycle>, eval_func=<function do_nothing>)`

Bases: `object`

An iterator for walking a Node tree.

This is depth-first, children are visited before the parent. The Walker object can be initialized with any node, and returns the next node on the descent with each `get_next()` call. get the children of a node instead of calling `'children'`. `'cycle_func'` is an optional function that will be called when a cycle is detected.

This class does not get caught in node cycles caused, for example, by C header file include loops.

`get_next ()`

Return the next node for this walk of the tree.

This function is intentionally iterative, not recursive, to sidestep any issues of stack size limitations.

`is_done ()`

`SCons.Node.changed_since_last_build_alias` (node, target, prev\_ni, repo\_node=None)

`SCons.Node.changed_since_last_build_entry` (node, target, prev\_ni, repo\_node=None)

`SCons.Node.changed_since_last_build_node` (node, target, prev\_ni, repo\_node=None)

Must be overridden in a specific subclass to return True if this Node (a dependency) has changed since the last time it was used to build the specified target. `prev_ni` is this Node's state (for example, its file timestamp, length, maybe content signature) as of the last time the target was built.

Note that this method is called through the dependency, not the target, because a dependency Node must be able to use its own logic to decide if it changed. For example, File Nodes need to obey if we're configured to use timestamps, but Python Value Nodes never use timestamps and always use the content. If this method were called through the target, then each Node's implementation of this method would have to have more complicated logic to handle all the different Node types on which it might depend.

`SCons.Node.changed_since_last_build_python` (node, target, prev\_ni, repo\_node=None)

`SCons.Node.changed_since_last_build_state_changed` (node, target, prev\_ni, repo\_node=None)

`SCons.Node.classname` (obj)

`SCons.Node.decide_source` (node, target, prev\_ni, repo\_node=None)

`SCons.Node.decide_target` (node, target, prev\_ni, repo\_node=None)

`SCons.Node.do_nothing` (node, parent)

`SCons.Node.do_nothing_node` (node)

`SCons.Node.exists_always` (node)

`SCons.Node.exists_base` (node)

`SCons.Node.exists_entry` (node)

Return if the Entry exists. Check the file system to see what we should turn into first. Assume a file if there's no directory.

`SCons.Node.exists_file` (node)

`SCons.Node.exists_none` (node)

`SCons.Node.get_children` (node, parent)

`SCons.Node.get_contents_dir` (node)

Return content signatures and names of all our children separated by new-lines. Ensure that the nodes are sorted.

`SCons.Node.get_contents_entry` (node)

Fetch the contents of the entry. Returns the exact binary contents of the file.

`SCons.Node.get_contents_file` (node)

`SCons.Node.get_contents_none` (node)

`SCons.Node.ignore_cycle` (node, stack)

`SCons.Node.is_derived_node` (node)

Returns true if this node is derived (i.e. built).

`SCons.Node.is_derived_none` (node)

`SCons.Node.rexists_base` (node)

`SCons.Node.rexists_node` (node)

`SCons.Node.rexists_none` (node)

`SCons.Node.store_info_file` (node)

`SCons.Node.store_info_pass` (node)

`SCons.Node.target_from_source_base` (node, prefix, suffix, splitext)

`SCons.Node.target_from_source_none` (node, prefix, suffix, splitext)

## ***SCons.Platform package***

### ***Submodules***

#### ***SCons.Platform.aix module***

SCons.Platform.aix

Platform-specific initialization for IBM AIX systems.

There normally shouldn't be any need to import this module directly. It will usually be imported through the generic SCons.Platform.Platform() selection method.

SCons.Platform.aix.**generate** (env)

SCons.Platform.aix.**get\_xlc** (env, xlc=None, packages=[ ])

#### ***SCons.Platform.cygwin module***

SCons.Platform.cygwin

Platform-specific initialization for Cygwin systems.

There normally shouldn't be any need to import this module directly. It will usually be imported through the generic SCons.Platform.Platform() selection method.

SCons.Platform.cygwin.**generate** (env)

#### ***SCons.Platform.darwin module***

SCons.Platform.darwin

Platform-specific initialization for Mac OS X systems.

There normally shouldn't be any need to import this module directly. It will usually be imported through the generic SCons.Platform.Platform() selection method.

SCons.Platform.darwin.**generate** (env)

#### ***SCons.Platform.hpux module***

SCons.Platform.hpux

Platform-specific initialization for HP-UX systems.

There normally shouldn't be any need to import this module directly. It will usually be imported through the generic SCons.Platform.Platform() selection method.

SCons.Platform.hpux.**generate** (env)

#### ***SCons.Platform.irix module***

SCons.Platform.irix

Platform-specific initialization for SGI IRIX systems.

There normally shouldn't be any need to import this module directly. It will usually be imported through the generic SCons.Platform.Platform() selection method.

SCons.Platform.irix.**generate** (env)

#### ***SCons.Platform.mingw module***

SCons.Platform.mingw

Platform-specific initialization for the MinGW system.

***SCons.Platform.os2 module***

SCons.Platform.os2

Platform-specific initialization for OS/2 systems.

There normally shouldn't be any need to import this module directly. It will usually be imported through the generic SCons.Platform.Platform() selection method.

SCons.Platform.os2.**generate** (env)***SCons.Platform.posix module***

SCons.Platform.posix

Platform-specific initialization for POSIX (Linux, UNIX, etc.) systems.

There normally shouldn't be any need to import this module directly. It will usually be imported through the generic SCons.Platform.Platform() selection method.

SCons.Platform.posix.**escape** (arg)  
escape shell special characters

SCons.Platform.posix.**exec\_popen3** (l, env, stdout, stderr)SCons.Platform.posix.**exec\_subprocess** (l, env)SCons.Platform.posix.**generate** (env)SCons.Platform.posix.**piped\_env\_spawn** (sh, escape, cmd, args, env, stdout, stderr)SCons.Platform.posix.**subprocess\_spawn** (sh, escape, cmd, args, env)***SCons.Platform.sunos module***

SCons.Platform.sunos

Platform-specific initialization for Sun systems.

There normally shouldn't be any need to import this module directly. It will usually be imported through the generic SCons.Platform.Platform() selection method.

SCons.Platform.sunos.**generate** (env)***SCons.Platform.virtualenv module***

SCons.Platform.virtualenv

Support for virtualenv.

SCons.Platform.virtualenv.**ImportVirtualenv** (env)  
Copies virtualenv-related environment variables from OS environment to env[ 'ENV' ] and prepends virtualenv's PATH to env[ 'ENV' ][ 'PATH' ].

SCons.Platform.virtualenv.**IsInVirtualenv** (path)  
Returns True, if **path** is under virtualenv's home directory. If not, or if we don't use virtualenv, returns False.

SCons.Platform.virtualenv.**Virtualenv** ()  
Returns path to the virtualenv home if scons is executing within a virtualenv or None, if not.

SCons.Platform.virtualenv.**\_\_enable\_virtualenv\_default** ()SCons.Platform.virtualenv.**\_\_ignore\_virtualenv\_default** ()

SCons.Platform.virtualenv.**\_\_inject\_venv\_path** (env, path\_list=None)  
Modify environment such that SCons will take into account its virtualenv when running external tools.

SCons.Platform.virtualenv.**\_\_inject\_venv\_variables** (env)

SCons.Platform.virtualenv.**\_\_is\_path\_in** (path, base)  
Returns true, if **path** is located under the **base** directory.

SCons.Platform.virtualenv.**\_\_running\_in\_virtualenv** ()

Returns True, if scons is executed within a virtualenv

`SCons.Platform.virtualenv.select_paths_in_venv(path_list)`

Returns a list of paths from **path\_list** which are under virtualenv's home directory.

### ***SCons.Platform.win32 module***

`SCons.Platform.win32`

Platform-specific initialization for Win32 systems.

There normally shouldn't be any need to import this module directly. It will usually be imported through the generic `SCons.Platform.Platform()` selection method.

```
class SCons.Platform.win32.ArchDefinition (arch, synonyms=[ ])
```

Bases: **object**

Determine which windows CPU were running on. A class for defining architecture-specific settings and logic.

`SCons.Platform.win32.escape(x)`

`SCons.Platform.win32.exec_spawn(l, env)`

`SCons.Platform.win32.generate(env)`

`SCons.Platform.win32.get_architecture(arch=None)`

Returns the definition for the specified architecture string.

If no string is specified, the system default is returned (as defined by the `PROCESSOR_ARCHITECTURE` or `PROCESSOR_ARCHITECTURE` environment variables).

`SCons.Platform.win32.get_program_files_dir()`

Get the location of the program files directory

`SCons.Platform.win32.get_system_root()`

`SCons.Platform.win32.piped_spawn(sh, escape, cmd, args, env, stdout, stderr)`

`SCons.Platform.win32.spawn(sh, escape, cmd, args, env)`

`SCons.Platform.win32.spawnve(mode, file, args, env)`

### ***Module contents***

`SCons.Platform`

SCons platform selection.

This looks for modules that define a callable object that can modify a construction environment as appropriate for a given platform.

Note that we take a more simplistic view of "platform" than Python does. We're looking for a single string that determines a set of tool-independent variables with which to initialize a construction environment. Consequently, we'll examine both `sys.platform` and `os.name` (and anything else that might come in to play) in order to return some specification which is unique enough for our purposes.

Note that because this subsystem just *selects* a callable that can modify a construction environment, it's possible for people to define their own "platform specification" in an arbitrary callable function. No one needs to use or tie in to this subsystem in order to roll their own platform definition.

`SCons.Platform.DefaultToolList(platform, env)`

Select a default tool list for the specified platform.

`SCons.Platform.Platform(name='darwin')`

Select a canned Platform specification.

```
class SCons.Platform.PlatformSpec (name, generate)
```

Bases: **object**

```
class SCons.Platform.TempFileMunge (cmd, cmdstr=None)
```

Bases: **object**

Convert long command lines to use a temporary file.

You can set an Environment variable (usually `TEMPFILE`) to this, then call it with a string argument, and it will perform temporary file substitution on it. This is used to circumvent limitations on the length of command lines. Example:

```
env["TEMPFILE"] = TempFileMunge
env["LINKCOM"] = "$ {TEMPFILE('$LINK $TARGET $SOURCES', '$LINKCOMSTR')} "
```

By default, the name of the temporary file used begins with a prefix of '@'. This may be configured for other tool chains by setting the `TEMPFILEPREFIX` variable. Example:

```
env["TEMPFILEPREFIX"] = '-@'           # diab compiler
env["TEMPFILEPREFIX"] = '-via'        # arm tool chain
env["TEMPFILEPREFIX"] = ''           # (the empty string) PC Lint
```

You can configure the extension of the temporary file through the `TEMPFILESUFFIX` variable, which defaults to '.lnk' (see comments in the code below). Example:

```
env["TEMPFILESUFFIX"] = '.lnk'       # PC Lint
```

Entries in the temporary file are separated by the value of the `TEMPFILEARGJOIN` variable, which defaults to an OS-appropriate value.

```
_print_cmd_str(target, source, env, cmdstr)
```

```
SCons.Platform.platform_default ()
```

Return the platform string for our execution environment.

The returned value should map to one of the `SCons/Platform/*.py` files. Since `scons` is architecture independent, though, we don't care about the machine architecture.

```
SCons.Platform.platform_module (name='darwin')
```

Return the imported module for the platform.

This looks for a module name that matches the specified argument. If the name is unspecified, we fetch the appropriate default for our execution environment.

## ***SCons.Scanner package***

### ***Submodules***

#### ***SCons.Scanner.C module***

```
SCons.Scanner.C
```

This module implements the dependency scanner for C/C++ code.

```
SCons.Scanner.C.CConditionalScanner ()
```

Return an advanced conditional Scanner instance for scanning source files

Interprets C/C++ Preprocessor conditional syntax (`#ifdef`, `#if`, `defined`, `#else`, `#elif`, etc.).

```
SCons.Scanner.C.CScanner ()
```

Return a prototype Scanner instance for scanning source files that use the C pre-processor

```
class SCons.Scanner.C.SConsCPPConditionalScanner (*args, **kw)
```

Bases: **`SCons.cpp.PreProcessor`**

SCons-specific subclass of the `cpp.py` module's processing.

We subclass this so that: 1) we can deal with files represented by Nodes, not strings; 2) we can keep track of the files that are missing.

```
_do_if_else_condition(condition)
```

Common logic for evaluating the conditions on `#if`, `#ifdef` and `#ifndef` lines.

```
_match_tuples(tuples)
```

```
_parse_tuples(contents)
```

**`_process_tuples (tuples, file=None)`**

**`all_include (t)`**

**`do_define (t)`**

Default handling of a #define line.

**`do_elif (t)`**

Default handling of a #elif line.

**`do_else (t)`**

Default handling of a #else line.

**`do_endif (t)`**

Default handling of a #endif line.

**`do_if (t)`**

Default handling of a #if line.

**`do_ifdef (t)`**

Default handling of a #ifdef line.

**`do_ifndef (t)`**

Default handling of a #ifndef line.

**`do_import (t)`**

Default handling of a #import line.

**`do_include (t)`**

Default handling of a #include line.

**`do_include_next (t)`**

Default handling of a #include line.

**`do_nothing (t)`**

Null method for when we explicitly want the action for a specific preprocessor directive to do nothing.

**`do_undef (t)`**

Default handling of a #undef line.

**`eval_expression (t)`**

Evaluates a C preprocessor expression.

This is done by converting it to a Python equivalent and eval()ing it in the C preprocessor namespace we use to track #define values.

**`finalize_result (fname)`**

**`find_include_file (t)`**

Finds the #include file for a given preprocessor tuple.

**`initialize_result (fname)`**

**`process_contents (contents)`**

Pre-processes a file contents.

Is used by tests

**`process_file (file)`**

Pre-processes a file.

This is the main internal entry point.

**`read_file (file)`**

**resolve\_include (t)**

Resolve a tuple-ized #include line.

This handles recursive expansion of values without "" or <> surrounding the name until an initial " or < is found, to handle #include FILE where FILE is a #define somewhere else.

**restore ()**

Pops the previous dispatch table off the stack and makes it the current one.

**save ()**

Pushes the current dispatch table on the stack and re-initializes the current dispatch table to the default.

**scons\_current\_file (t)****start\_handling\_includes (t=None)**

Causes the PreProcessor object to start processing #import, #include and #include\_next lines.

This method will be called when a #if, #ifdef, #ifndef or #elif evaluates True, or when we reach the #else in a #if, #ifdef, #ifndef or #elif block where a condition already evaluated False.

**stop\_handling\_includes (t=None)**

Causes the PreProcessor object to stop processing #import, #include and #include\_next lines.

This method will be called when a #if, #ifdef, #ifndef or #elif evaluates False, or when we reach the #else in a #if, #ifdef, #ifndef or #elif block where a condition already evaluated True.

**tupleize (contents)**

Turns the contents of a file into a list of easily-processed tuples describing the CPP lines in the file.

The first element of each tuple is the line's preprocessor directive (#if, #include, #define, etc., minus the initial '#'). The remaining elements are specific to the type of directive, as pulled apart by the regular expression.

*class* SCons.Scanner.C.SConsCPPConditionalScannerWrapper (name, variable)

Bases: **object**

The SCons wrapper around a cpp.py scanner.

This is the actual glue between the calling conventions of generic SCons scanners, and the (subclass of) cpp.py class that knows how to look for #include lines with reasonably real C-preprocessor-like evaluation of #if/#ifdef/#else/#elif lines.

**recurse\_nodes (nodes)****select (node)**

*class* SCons.Scanner.C.SConsCPPScanner (\*args, \*\*kw)

Bases: **SCons.cpp.PreProcessor**

SCons-specific subclass of the cpp.py module's processing.

We subclass this so that: 1) we can deal with files represented by Nodes, not strings; 2) we can keep track of the files that are missing.

**\_do\_if\_else\_condition (condition)**

Common logic for evaluating the conditions on #if, #ifdef and #ifndef lines.

**\_match\_tuples (tuples)****\_parse\_tuples (contents)****\_process\_tuples (tuples, file=None)****all\_include (t)****do\_define (t)**

Default handling of a #define line.

**do\_elif (t)**

Default handling of a #elif line.

**do\_else (t)**

Default handling of a #else line.

**do\_endif (t)**

Default handling of a #endif line.

**do\_if (t)**

Default handling of a #if line.

**do\_ifdef (t)**

Default handling of a #ifdef line.

**do\_ifndef (t)**

Default handling of a #ifndef line.

**do\_import (t)**

Default handling of a #import line.

**do\_include (t)**

Default handling of a #include line.

**do\_include\_next (t)**

Default handling of a #include line.

**do\_nothing (t)**

Null method for when we explicitly want the action for a specific preprocessor directive to do nothing.

**do\_undef (t)**

Default handling of a #undef line.

**eval\_expression (t)**

Evaluates a C preprocessor expression.

This is done by converting it to a Python equivalent and eval()ing it in the C preprocessor namespace we use to track #define values.

**finalize\_result (fname)**

**find\_include\_file (t)**

Finds the #include file for a given preprocessor tuple.

**initialize\_result (fname)**

**process\_contents (contents)**

Pre-processes a file contents.

Is used by tests

**process\_file (file)**

Pre-processes a file.

This is the main internal entry point.

**read\_file (file)**

**resolve\_include (t)**

Resolve a tuple-ized #include line.

This handles recursive expansion of values without "" or <> surrounding the name until an initial " or < is found, to handle #include FILE where FILE is a #define somewhere else.

**restore ()**

Pops the previous dispatch table off the stack and makes it the current one.

**save ()**

Pushes the current dispatch table on the stack and re-initializes the current dispatch table to the default.

**scons\_current\_file** (t)

**start\_handling\_includes** (t=None)

Causes the PreProcessor object to start processing #import, #include and #include\_next lines.

This method will be called when a #if, #ifdef, #ifndef or #elif evaluates True, or when we reach the #else in a #if, #ifdef, #ifndef or #elif block where a condition already evaluated False.

**stop\_handling\_includes** (t=None)

Causes the PreProcessor object to stop processing #import, #include and #include\_next lines.

This method will be called when a #if, #ifdef, #ifndef or #elif evaluates False, or when we reach the #else in a #if, #ifdef, #ifndef or #elif block where a condition already evaluated True.

**tupleize** (contents)

Turns the contents of a file into a list of easily-processed tuples describing the CPP lines in the file.

The first element of each tuple is the line's preprocessor directive (#if, #include, #define, etc., minus the initial '#'). The remaining elements are specific to the type of directive, as pulled apart by the regular expression.

*class* SCons.Scanner.C.SConsCPPScannerWrapper (name, variable)

Bases: **object**

The SCons wrapper around a cpp.py scanner.

This is the actual glue between the calling conventions of generic SCons scanners, and the (subclass of) cpp.py class that knows how to look for #include lines with reasonably real C-preprocessor-like evaluation of #if/#ifdef/#else/#elif lines.

**recurse\_nodes** (nodes)

**select** (node)

SCons.Scanner.C.dictify\_CPPDEFINES (env)

## **SCons.Scanner.D module**

SCons.Scanner.D

Scanner for the Digital Mars "D" programming language.

Coded by Andy Friesen 17 Nov 2003

*class* SCons.Scanner.D.D

Bases: **SCons.Scanner.Classic**

**\_recurse\_all\_nodes** (nodes)

**\_recurse\_no\_nodes** (nodes)

**add\_scanner** (skey, scanner)

**add\_skey** (skey)

Add a skey to the list of skeys

**find\_include** (include, source\_dir, path)

**find\_include\_names** (node)

**get\_skeys** (env=None)

**path** (env, dir=None, target=None, source=None)

**scan** (node, path=())

**select** (node)

**sort\_key** (include)

`SCons.Scanner.D.DScanner ()`

Return a prototype Scanner instance for scanning D source files

### ***SCons.Scanner.Dir module***

`SCons.Scanner.Dir.DirEntryScanner (**kw)`

Return a prototype Scanner instance for “scanning” directory Nodes for their in-memory entries

`SCons.Scanner.Dir.DirScanner (**kw)`

Return a prototype Scanner instance for scanning directories for on-disk files

`SCons.Scanner.Dir.do_not_scan (k)`

`SCons.Scanner.Dir.only_dirs (nodes)`

`SCons.Scanner.Dir.scan_in_memory (node, env, path=())`

“Scans” a Node.FS.Dir for its in-memory entries.

`SCons.Scanner.Dir.scan_on_disk (node, env, path=())`

Scans a directory for on-disk files and directories therein.

Looking up the entries will add these to the in-memory Node tree representation of the file system, so all we have to do is just that and then call the in-memory scanning function.

### ***SCons.Scanner.Fortran module***

`SCons.Scanner.Fortran`

This module implements the dependency scanner for Fortran code.

`class SCons.Scanner.Fortran.F90Scanner (name, suffixes, path_variable, use_regex, incl_regex, def_regex, *args, **kw)`

Bases: `SCons.Scanner.Classic`

A Classic Scanner subclass for Fortran source files which takes into account both USE and INCLUDE statements. This scanner will work for both F77 and F90 (and beyond) compilers.

Currently, this scanner assumes that the include files do not contain USE statements. To enable the ability to deal with USE statements in include files, add logic right after the module names are found to loop over each include file, search for and locate each USE statement, and append each module name to the list of dependencies. Caching the search results in a common dictionary somewhere so that the same include file is not searched multiple times would be a smart thing to do.

`_recurse_all_nodes (nodes)`

`_recurse_no_nodes (nodes)`

`add_scanner (skey, scanner)`

`add_skey (skey)`

Add a skey to the list of skeys

`find_include (include, source_dir, path)`

`find_include_names (node)`

`get_skeys (env=None)`

`path (env, dir=None, target=None, source=None)`

`scan (node, env, path=())`

`select (node)`

**sort\_key** (include)

SCons.Scanner.Fortran.**FortranScan** (path\_variable='FORTRANPATH')

Return a prototype Scanner instance for scanning source files for Fortran USE & INCLUDE statements

### **SCons.Scanner.IDL module**

SCons.Scanner.IDL

This module implements the dependency scanner for IDL (Interface Definition Language) files.

SCons.Scanner.IDL.**IDLScan** ()

Return a prototype Scanner instance for scanning IDL source files

### **SCons.Scanner.LaTeX module**

SCons.Scanner.LaTeX

This module implements the dependency scanner for LaTeX code.

*class* SCons.Scanner.LaTeX.**FindENVPATHDirs** (variable)

Bases: **object**

A class to bind a specific E{\*}PATH variable name to a function that will return all of the E{\*}path directories.

*class* SCons.Scanner.LaTeX.**LaTeX** (name, suffixes, graphics\_extensions, \*args, \*\*kw)

Bases: **SCons.Scanner.Base**

Class for scanning LaTeX files for included files.

Unlike most scanners, which use regular expressions that just return the included file name, this returns a tuple consisting of the keyword for the inclusion (“include”, “includegraphics”, “input”, or “bibliography”), and then the file name itself. Based on a quick look at LaTeX documentation, it seems that we should append .tex suffix for the “include” keywords, append .tex if there is no extension for the “input” keyword, and need to add .bib for the “bibliography” keyword that does not accept extensions by itself.

Finally, if there is no extension for an “includegraphics” keyword latex will append .ps or .eps to find the file, while pdftex may use .pdf, .jpg, .tif, .mps, or .png.

The actual subset and search order may be altered by DeclareGraphicsExtensions command. This complication is ignored. The default order corresponds to experimentation with teTeX:

```
$ latex --version
pdfTeX 3.141592-1.21a-2.2 (Web2C 7.5.4)
kpathsea version 3.5.4
```

**The order is:**

['.eps', '.ps'] for latex ['.png', '.pdf', '.jpg', '.tif'].

Another difference is that the search path is determined by the type of the file being searched: env['TEXINPUTS'] for “input” and “include” keywords env['TEXINPUTS'] for “includegraphics” keyword env['TEXINPUTS'] for “lstinutlisting” keyword env['BIBINPUTS'] for “bibliography” keyword env['BSTINPUTS'] for “bibliographystyle” keyword env['INDEXSTYLE'] for “makeindex” keyword, no scanning support needed just allows user to set it if needed.

FIXME: also look for the class or style in document[class|style]{} FIXME: also look for the argument of bibliographystyle{}

**\_latex\_names** (include\_type, filename)

**\_recurse\_all\_nodes** (nodes)

**\_recurse\_no\_nodes** (nodes)

**add\_scanner** (skey, scanner)

**add\_skey** (skey)

Add a key to the list of skeys

**canonical\_text** (text)

Standardize an input TeX-file contents.

**Currently:**

- removes comments, unwrapping comment-wrapped lines.

```
env_variables = ['TEXINPUTS', 'BIBINPUTS', 'BSTINPUTS', 'INDEXSTYLE']
```

```
find_include(include, source_dir, path)
```

```
get_skeys(env=None)
```

```
keyword_paths = {'addbibresource': 'BIBINPUTS', 'addglobalbib': 'BIBINPUTS', 'addsectionbib': 'BIBINPUTS',
'bibliography': 'BIBINPUTS', 'bibliographystyle': 'BSTINPUTS', 'include': 'TEXINPUTS', 'includegraphics':
'TEXINPUTS', 'input': 'TEXINPUTS', 'lstininputlisting': 'TEXINPUTS', 'makeindex': 'INDEXSTYLE', 'usepackage':
'TEXINPUTS'}
```

```
path(env, dir=None, target=None, source=None)
```

```
scan(node, subdir='.')
```

```
scan_recurse(node, path=())
```

do a recursive scan of the top level target file This lets us search for included files based on the directory of the main file just as latex does

```
select(node)
```

```
sort_key(include)
```

```
two_arg_commands = ['import', 'subimport', 'includefrom', 'subincludefrom', 'inputfrom', 'subinputfrom']
```

```
SCons.Scanner.LaTeX.LaTeXScanner()
```

Return a prototype Scanner instance for scanning LaTeX source files when built with latex.

```
SCons.Scanner.LaTeX.PDFLaTeXScanner()
```

Return a prototype Scanner instance for scanning LaTeX source files when built with pdflatex.

```
class SCons.Scanner.LaTeX._Null
```

Bases: **object**

```
SCons.Scanner.LaTeX._null
```

alias of **SCons.Scanner.LaTeX.\_Null**

```
SCons.Scanner.LaTeX.modify_env_var(env, var, abspath)
```

### **SCons.Scanner.Prog module**

```
SCons.Scanner.Prog.ProgramScanner(**kw)
```

Return a prototype Scanner instance for scanning executable files for static-lib dependencies

```
SCons.Scanner.Prog._subst_libs(env, libs)
```

Substitute environment variables and split into list.

```
SCons.Scanner.Prog.scan(node, env, libpath=())
```

This scanner scans program files for static-library dependencies. It will search the LIBPATH environment variable for libraries specified in the LIBS variable, returning any files it finds as dependencies.

### **SCons.Scanner.RC module**

```
SCons.Scanner.RC
```

This module implements the dependency scanner for RC (Interface Definition Language) files.

```
SCons.Scanner.RC.RCScan()
```

Return a prototype Scanner instance for scanning RC source files

`SCons.Scanner.RC.no_tlb` (nodes)  
 Filter out .tlb files as they are binary and shouldn't be scanned

### ***SCons.Scanner.SWIG module***

`SCons.Scanner.SWIG`

This module implements the dependency scanner for SWIG code.

`SCons.Scanner.SWIG.SWIGScanner` ()

### ***Module contents***

`SCons.Scanner`

The Scanner package for the SCons software construction utility.

```
class SCons.Scanner.Base (function, name='NONE', argument=<class 'SCons.Scanner._Null'>,
skeys=<class 'SCons.Scanner._Null'>, path_function=None, node_class=<class
'SCons.Node.FS.Base'>, node_factory=None, scan_check=None, recursive=None)
```

Bases: **object**

The base class for dependency scanners. This implements straightforward, single-pass scanning of a single file.

`_recurse_all_nodes` (nodes)

`_recurse_no_nodes` (nodes)

`add_scanner` (skey, scanner)

`add_skey` (skey)

Add a skey to the list of skeys

`get_skeys` (env=None)

`path` (env, dir=None, target=None, source=None)

`select` (node)

```
class SCons.Scanner.Classic (name, suffixes, path_variable, regex, *args, **kw)
```

Bases: **SCons.Scanner.Current**

A Scanner subclass to contain the common logic for classic CPP-style include scanning, but which can be customized to use different regular expressions to find the includes.

Note that in order for this to work “out of the box” (without overriding the `find_include()` and `sort_key()` methods), the regular expression passed to the constructor must return the name of the include file in group 0.

`_recurse_all_nodes` (nodes)

`_recurse_no_nodes` (nodes)

`add_scanner` (skey, scanner)

`add_skey` (skey)

Add a skey to the list of skeys

`find_include` (include, source\_dir, path)

`find_include_names` (node)

`get_skeys` (env=None)

`path` (env, dir=None, target=None, source=None)

**scan** (node, path=())

**select** (node)

**sort\_key** (include)

*class* SCons.Scanner.**ClassicCPP** (name, suffixes, path\_variable, regex, \*args, \*\*kw)

Bases: SCons.Scanner.**Classic**

A Classic Scanner subclass which takes into account the type of bracketing used to include the file, and uses classic CPP rules for searching for the files based on the bracketing.

Note that in order for this to work, the regular expression passed to the constructor must return the leading bracket in group 0, and the contained filename in group 1.

**\_recurse\_all\_nodes** (nodes)

**\_recurse\_no\_nodes** (nodes)

**add\_scanner** (skey, scanner)

**add\_skey** (skey)

Add a skey to the list of skeys

**find\_include** (include, source\_dir, path)

**find\_include\_names** (node)

**get\_skeys** (env=None)

**path** (env, dir=None, target=None, source=None)

**scan** (node, path=())

**select** (node)

**sort\_key** (include)

*class* SCons.Scanner.**Current** (\*args, \*\*kw)

Bases: SCons.Scanner.**Base**

A class for scanning files that are source files (have no builder) or are derived files and are current (which implies that they exist, either locally or in a repository).

**\_recurse\_all\_nodes** (nodes)

**\_recurse\_no\_nodes** (nodes)

**add\_scanner** (skey, scanner)

**add\_skey** (skey)

Add a skey to the list of skeys

**get\_skeys** (env=None)

**path** (env, dir=None, target=None, source=None)

**select** (node)

*class* SCons.Scanner.**FindPathDirs** (variable)

Bases: **object**

A class to bind a specific E{\*}PATH variable name to a function that will return all of the E{\*}path directories.

SCons.Scanner.**Scanner** (function, \*args, \*\*kw)

Public interface factory function for creating different types of Scanners based on the different types of “functions” that may be supplied.

TODO: Deprecate this some day. We’ve moved the functionality inside the Base class and really don’t need this factory function any more. It was, however, used by some of our Tool modules, so the call probably ended up in various people’s custom modules patterned on SCons code.

```
class SCons.Scanner.Selector (dict, *args, **kw)
```

Bases: **SCons.Scanner.Base**

A class for selecting a more specific scanner based on the scanner\_key() (suffix) for a specific Node.

TODO: This functionality has been moved into the inner workings of the Base class, and this class will be deprecated at some point. (It was never exposed directly as part of the public interface, although it is used by the Scanner() factory function that was used by various Tool modules and therefore was likely a template for custom modules that may be out there.)

```
_recurse_all_nodes (nodes)
```

```
_recurse_no_nodes (nodes)
```

```
add_scanner (skey, scanner)
```

```
add_skey (skey)
```

Add a key to the list of skeys

```
get_skeys (env=None)
```

```
path (env, dir=None, target=None, source=None)
```

```
select (node)
```

```
class SCons.Scanner._Null
```

Bases: **object**

```
SCons.Scanner._null
```

alias of **SCons.Scanner.\_Null**

## ***SCons.Script package***

### ***Submodules***

#### ***SCons.Script.Interactive module***

SCons interactive mode

```
class SCons.Script.Interactive.SConsInteractiveCmd (**kw)
```

Bases: **cmd.Cmd**

build [TARGETS] Build the specified TARGETS and their dependencies. ‘b’ is a synonym. clean [TARGETS] Clean (remove) the specified TARGETS and their dependencies. ‘c’ is a synonym. exit Exit SCons interactive mode. help [COMMAND] Prints help for the specified COMMAND. ‘h’ and ‘?’ are synonyms. shell [COMMANDLINE] Execute COMMANDLINE in a subshell. ‘sh’ and ‘!’ are synonyms. version Prints SCons version information.

```
_do_one_help (arg)
```

```
_doc_to_help (obj)
```

```
_strip_initial_spaces (s)
```

```
cmdloop (intro=None)
```

Repeatedly issue a prompt, accept input, parse an initial prefix off the received input, and dispatch to action methods, passing them the remainder of the line as argument.

**columnize** (list, displaywidth=80)

Display a list of strings as a compact set of columns.

Each column is only as wide as necessary. Columns are separated by two spaces (one was not legible enough).

**complete** (text, state)

Return the next possible completion for 'text'.

If a command has not been entered, then complete against command list. Otherwise try to call complete\_<command> to get list of completions.

**complete\_help** (\*args)

**completedefault** (\*ignored)

Method called to complete an input line when no command-specific complete\_\*() method is available.

By default, it returns an empty list.

**completenames** (text, \*ignored)

**default** (argv)

Called on an input line when the command prefix is not recognized.

If this method is not overridden, it prints an error message and returns.

**do\_EOF** (argv)

**do\_build** (argv)

build [TARGETS] Build the specified TARGETS and their dependencies. 'b' is a synonym.

**do\_clean** (argv)

clean [TARGETS] Clean (remove) the specified TARGETS and their dependencies. 'c' is a synonym.

**do\_exit** (argv)

exit Exit SCons interactive mode.

**do\_help** (argv)

help [COMMAND] Prints help for the specified COMMAND. 'h' and '?' are synonyms.

**do\_shell** (argv)

shell [COMMANDLINE] Execute COMMANDLINE in a subshell. 'sh' and '!' are synonyms.

**do\_version** (argv)

version Prints SCons version information.

**doc\_header** = *'Documented commands (type help <topic>):'*

**doc\_leader** = "

**emptyline** ()

Called when an empty line is entered in response to the prompt.

If this method is not overridden, it repeats the last nonempty command entered.

**get\_names** ()

**identchars** = *'abcdefghijklmnopqrstuvwxyABCDEFGHIJKLMNOPQRSTUVWXYZ0123456789\_'*

**intro** = *None*

**lastcmd** = "

**misc\_header** = *'Miscellaneous help topics:'*

**nohelp** = *'''' No help on %s'*

**onecmd (line)**

Interpret the argument as though it had been typed in response to the prompt.

This may be overridden, but should not normally need to be; see the `precmd()` and `postcmd()` methods for useful execution hooks. The return value is a flag indicating whether interpretation of commands by the interpreter should stop.

**parseline (line)**

Parse the line into a command name and a string containing the arguments. Returns a tuple containing (command, args, line). 'command' and 'args' may be None if the line couldn't be parsed.

**postcmd (stop, line)**

Hook method executed just after a command dispatch is finished.

**postloop ()**

Hook method executed once when the `cmdloop()` method is about to return.

**precmd (line)**

Hook method executed just before the command line is interpreted, but after the input prompt is generated and issued.

**preloop ()**

Hook method executed once when the `cmdloop()` method is called.

**print\_topics (header, cmds, cmdlen, maxcol)**

`prompt = '(Cmd) '`

`ruler = '='`

`synonyms = {'b': 'build', 'c': 'clean', 'h': 'help', 'scons': 'build', 'sh': 'shell'}`

`undoc_header = 'Undocumented commands:'`

`use_rawinput = 1`

`SCons.Script.Interactive.interact (fs, parser, options, targets, target_top)`

## ***SCons.Script.Main module***

`SCons.Script`

This file implements the `main()` function used by the `scons` script.

Architecturally, this *is* the `scons` script, and will likely only be called from the external “`scons`” wrapper. Consequently, anything here should not be, or be considered, part of the build engine. If it's something that we expect other software to want to use, it should go in some other module. If it's specific to the “`scons`” script invocation, it goes here.

`SCons.Script.Main.AddOption (*args, **kw)`

`class SCons.Script.Main.BuildTask (tm, targets, top, node)`

Bases: `SCons.Taskmaster.OutOfDateTask`

An SCons build task.

`_abc_impl = <_abc_data object>`

`_exception_raise ()`

Raises a pending exception that was recorded while getting a Task ready for execution.

`_no_exception_to_raise ()`

`display (message)`

Hook to allow the calling interface to display a message.

This hook gets called as part of preparing a task for execution (that is, a Node to be built). As part of figuring out what Node should be built next, the actual target list may be altered, along with a message describing the alteration. The calling interface can subclass Task and provide a concrete implementation of this method to see those messages.

**do\_failed (status=2)**

**exc\_clear ()**

Clears any recorded exception.

This also changes the “exception\_raise” attribute to point to the appropriate do-nothing method.

**exc\_info ()**

Returns info about a recorded exception.

**exception\_set (exception=None)**

Records an exception to be raised at the appropriate time.

This also changes the “exception\_raise” attribute to point to the method that will, in fact

**execute ()**

Called to execute the task.

This method is called from multiple threads in a parallel build, so only do thread safe stuff here. Do thread unsafe stuff in prepare(), executed() or failed().

**executed ()**

Called when the task has been successfully executed and the Taskmaster instance wants to call the Node’s callback methods.

This may have been a do-nothing operation (to preserve build order), so we must check the node’s state before deciding whether it was “built”, in which case we call the appropriate Node method. In any event, we always call “visited()”, which will handle any post-visit actions that must take place regardless of whether or not the target was an actual built target or a source Node.

**executed\_with\_callbacks ()**

Called when the task has been successfully executed and the Taskmaster instance wants to call the Node’s callback methods.

This may have been a do-nothing operation (to preserve build order), so we must check the node’s state before deciding whether it was “built”, in which case we call the appropriate Node method. In any event, we always call “visited()”, which will handle any post-visit actions that must take place regardless of whether or not the target was an actual built target or a source Node.

**executed\_without\_callbacks ()**

Called when the task has been successfully executed and the Taskmaster instance doesn’t want to call the Node’s callback methods.

**fail\_continue ()**

Explicit continue-the-build failure.

This sets failure status on the target nodes and all of their dependent parent nodes.

Note: Although this function is normally invoked on nodes in the executing state, it might also be invoked on up-to-date nodes when using Configure().

**fail\_stop ()**

Explicit stop-the-build failure.

This sets failure status on the target nodes and all of their dependent parent nodes.

Note: Although this function is normally invoked on nodes in the executing state, it might also be invoked on up-to-date nodes when using Configure().

**failed ()**

Default action when a task fails: stop the build.

Note: Although this function is normally invoked on nodes in the executing state, it might also be invoked on up-to-date nodes when using Configure().

**get\_target ()**

Fetch the target being built or updated by this task.

#### **make\_ready ()**

Make a task ready for execution

#### **make\_ready\_all ()**

Marks all targets in a task ready for execution.

This is used when the interface needs every target Node to be visited—the canonical example being the “scons -c” option.

#### **make\_ready\_current ()**

Marks all targets in a task ready for execution if any target is not current.

This is the default behavior for building only what’s necessary.

#### **needs\_execute ()**

Returns True (indicating this Task should be executed) if this Task’s target state indicates it needs executing, which has already been determined by an earlier up-to-date check.

#### **postprocess ()**

Post-processes a task after it’s been executed.

This examines all the targets just built (or not, we don’t care if the build was successful, or even if there was no build because everything was up-to-date) to see if they have any waiting parent Nodes, or Nodes waiting on a common side effect, that can be put back on the candidates list.

#### **prepare ()**

Called just before the task is executed.

This is mainly intended to give the target Nodes a chance to unlink underlying files and make all necessary directories before the Action is actually called to build the targets.

#### **trace\_message (method, node, description='node')**

```
class SCons.Script.Main.CleanTask (tm, targets, top, node)
```

Bases: **SCons.Taskmaster.AlwaysTask**

An SCons clean task.

```
_abc_impl = <_abc_data object>
```

```
_clean_targets (remove=True)
```

```
_exception_raise ()
```

Raises a pending exception that was recorded while getting a Task ready for execution.

```
_get_files_to_clean ()
```

```
_no_exception_to_raise ()
```

```
display (message)
```

Hook to allow the calling interface to display a message.

This hook gets called as part of preparing a task for execution (that is, a Node to be built). As part of figuring out what Node should be built next, the actual target list may be altered, along with a message describing the alteration. The calling interface can subclass Task and provide a concrete implementation of this method to see those messages.

```
exc_clear ()
```

Clears any recorded exception.

This also changes the “exception\_raise” attribute to point to the appropriate do-nothing method.

```
exc_info ()
```

Returns info about a recorded exception.

```
exception_set (exception=None)
```

Records an exception to be raised at the appropriate time.

This also changes the “exception\_raise” attribute to point to the method that will, in fact

#### **execute ()**

#### **executed ()**

Called when the task has been successfully executed and the Taskmaster instance doesn't want to call the Node's callback methods.

#### **executed\_with\_callbacks ()**

Called when the task has been successfully executed and the Taskmaster instance wants to call the Node's callback methods.

This may have been a do-nothing operation (to preserve build order), so we must check the node's state before deciding whether it was “built”, in which case we call the appropriate Node method. In any event, we always call “visited()”, which will handle any post-visit actions that must take place regardless of whether or not the target was an actual built target or a source Node.

#### **executed\_without\_callbacks ()**

Called when the task has been successfully executed and the Taskmaster instance doesn't want to call the Node's callback methods.

#### **fail\_continue ()**

Explicit continue-the-build failure.

This sets failure status on the target nodes and all of their dependent parent nodes.

Note: Although this function is normally invoked on nodes in the executing state, it might also be invoked on up-to-date nodes when using Configure().

#### **fail\_stop ()**

Explicit stop-the-build failure.

This sets failure status on the target nodes and all of their dependent parent nodes.

Note: Although this function is normally invoked on nodes in the executing state, it might also be invoked on up-to-date nodes when using Configure().

#### **failed ()**

Default action when a task fails: stop the build.

Note: Although this function is normally invoked on nodes in the executing state, it might also be invoked on up-to-date nodes when using Configure().

#### **fs\_delete (path, pathstr, remove=True)**

#### **get\_target ()**

Fetch the target being built or updated by this task.

#### **make\_ready ()**

Marks all targets in a task ready for execution.

This is used when the interface needs every target Node to be visited—the canonical example being the “scons -c” option.

#### **make\_ready\_all ()**

Marks all targets in a task ready for execution.

This is used when the interface needs every target Node to be visited—the canonical example being the “scons -c” option.

#### **make\_ready\_current ()**

Marks all targets in a task ready for execution if any target is not current.

This is the default behavior for building only what's necessary.

#### **needs\_execute ()**

Always returns True (indicating this Task should always be executed).

Subclasses that need this behavior (as opposed to the default of only executing Nodes that are out of date w.r.t. their dependencies) can use this as follows:

**class MyTaskSubclass(SCons.Taskmaster.Task):**

needs\_execute = SCons.Taskmaster.AlwaysTask.needs\_execute

**postprocess ()**

Post-processes a task after it's been executed.

This examines all the targets just built (or not, we don't care if the build was successful, or even if there was no build because everything was up-to-date) to see if they have any waiting parent Nodes, or Nodes waiting on a common side effect, that can be put back on the candidates list.

**prepare ()**

Called just before the task is executed.

This is mainly intended to give the target Nodes a chance to unlink underlying files and make all necessary directories before the Action is actually called to build the targets.

**remove ()****show ()**

**trace\_message** (method, node, description='node')

**class SCons.Script.Main.CountStats**

Bases: **SCons.Script.Main.Stats**

**do\_append** (label)

**do\_nothing** (\*args, \*\*kw)

**do\_print** ()

**enable** (outfp)

**class SCons.Script.Main.FakeOptionParser**

Bases: **object**

A do-nothing option parser, used for the initial OptionsParser variable.

During normal SCons operation, the OptionsParser is created right away by the main() function. Certain tests scripts however, can introspect on different Tool modules, the initialization of which can try to add a new, local option to an otherwise uninitialized OptionsParser object. This allows that introspection to happen without blowing up.

**class FakeOptionValues**

Bases: **object**

**add\_local\_option** (\*args, \*\*kw)

**values** = <SCons.Script.Main.FakeOptionParser.FakeOptionValues object>

SCons.Script.Main.**GetBuildFailures** ()

SCons.Script.Main.**GetOption** (name)

**class SCons.Script.Main.MemStats**

Bases: **SCons.Script.Main.Stats**

**do\_append** (label)

**do\_nothing** (\*args, \*\*kw)

**do\_print** ()

**enable** (outfp)

SCons.Script.Main.**PrintHelp** (file=None)

```
SCons.Script.Main.Progress (*args, **kw)
```

```
class SCons.Script.Main.Progressor (obj, interval=1, file=None, overwrite=False)
```

```
Bases: object
```

```
count = 0
```

```
erase_previous ()
```

```
prev = "
```

```
replace_string (node)
```

```
spinner (node)
```

```
string (node)
```

```
target_string = '$TARGET'
```

```
write (s)
```

```
class SCons.Script.Main.QuestionTask (tm, targets, top, node)
```

```
Bases: SCons.Taskmaster.AlwaysTask
```

```
An SCons task for the -q (question) option.
```

```
_abc_impl = <_abc_data object>
```

```
_exception_raise ()
```

```
Raises a pending exception that was recorded while getting a Task ready for execution.
```

```
_no_exception_to_raise ()
```

```
display (message)
```

```
Hook to allow the calling interface to display a message.
```

This hook gets called as part of preparing a task for execution (that is, a Node to be built). As part of figuring out what Node should be built next, the actual target list may be altered, along with a message describing the alteration. The calling interface can subclass Task and provide a concrete implementation of this method to see those messages.

```
exc_clear ()
```

```
Clears any recorded exception.
```

This also changes the "exception\_raise" attribute to point to the appropriate do-nothing method.

```
exc_info ()
```

```
Returns info about a recorded exception.
```

```
exception_set (exception=None)
```

```
Records an exception to be raised at the appropriate time.
```

This also changes the "exception\_raise" attribute to point to the method that will, in fact

```
execute ()
```

```
Called to execute the task.
```

This method is called from multiple threads in a parallel build, so only do thread safe stuff here. Do thread unsafe stuff in prepare(), executed() or failed().

```
executed ()
```

Called when the task has been successfully executed and the Taskmaster instance wants to call the Node's callback methods.

This may have been a do-nothing operation (to preserve build order), so we must check the node's state before deciding whether it was "built", in which case we call the appropriate Node method. In any event, we always call

“visited()”, which will handle any post-visit actions that must take place regardless of whether or not the target was an actual built target or a source Node.

#### **executed\_with\_callbacks ()**

Called when the task has been successfully executed and the Taskmaster instance wants to call the Node’s callback methods.

This may have been a do-nothing operation (to preserve build order), so we must check the node’s state before deciding whether it was “built”, in which case we call the appropriate Node method. In any event, we always call “visited()”, which will handle any post-visit actions that must take place regardless of whether or not the target was an actual built target or a source Node.

#### **executed\_without\_callbacks ()**

Called when the task has been successfully executed and the Taskmaster instance doesn’t want to call the Node’s callback methods.

#### **fail\_continue ()**

Explicit continue-the-build failure.

This sets failure status on the target nodes and all of their dependent parent nodes.

Note: Although this function is normally invoked on nodes in the executing state, it might also be invoked on up-to-date nodes when using Configure().

#### **fail\_stop ()**

Explicit stop-the-build failure.

This sets failure status on the target nodes and all of their dependent parent nodes.

Note: Although this function is normally invoked on nodes in the executing state, it might also be invoked on up-to-date nodes when using Configure().

#### **failed ()**

Default action when a task fails: stop the build.

Note: Although this function is normally invoked on nodes in the executing state, it might also be invoked on up-to-date nodes when using Configure().

#### **get\_target ()**

Fetch the target being built or updated by this task.

#### **make\_ready ()**

Marks all targets in a task ready for execution if any target is not current.

This is the default behavior for building only what’s necessary.

#### **make\_ready\_all ()**

Marks all targets in a task ready for execution.

This is used when the interface needs every target Node to be visited—the canonical example being the “scons -c” option.

#### **make\_ready\_current ()**

Marks all targets in a task ready for execution if any target is not current.

This is the default behavior for building only what’s necessary.

#### **needs\_execute ()**

Always returns True (indicating this Task should always be executed).

Subclasses that need this behavior (as opposed to the default of only executing Nodes that are out of date w.r.t. their dependencies) can use this as follows:

```
class MyTaskSubclass(SCons.Taskmaster.Task):
```

```
    needs_execute = SCons.Taskmaster.AlwaysTask.needs_execute
```

#### **postprocess ()**

Post-processes a task after it’s been executed.

This examines all the targets just built (or not, we don’t care if the build was successful, or even if there was no build because everything was up-to-date) to see if they have any waiting parent Nodes, or Nodes waiting on a common side effect, that can be put back on the candidates list.

**prepare ()**

Called just before the task is executed.

This is mainly intended to give the target Nodes a chance to unlink underlying files and make all necessary directories before the Action is actually called to build the targets.

**trace\_message** (method, node, description='node')

*exception* SCons.Script.Main.SConsPrintHelpException

Bases: **Exception**

**args**

**with\_traceback ()**

Exception.with\_traceback(tb) – set self.\_\_traceback\_\_ to tb and return self.

SCons.Script.Main.**SetOption** (name, value)

*class* SCons.Script.Main.**Stats**

Bases: **object**

**do\_nothing** (\*args, \*\*kw)

**enable** (outfp)

*class* SCons.Script.Main.**TreePrinter** (derived=False, prune=False, status=False, sLineDraw=False)

Bases: **object**

**display** (t)

**get\_all\_children** (node)

**get\_derived\_children** (node)

SCons.Script.Main.**\_SConstruct\_exists** (dirname='', repositories=[], filelist=None)

This function checks that an SConstruct file exists in a directory. If so, it returns the path of the file. By default, it checks the current directory.

SCons.Script.Main.**\_build\_targets** (fs, options, targets, target\_top)

SCons.Script.Main.**\_create\_path** (plist)

SCons.Script.Main.**\_exec\_main** (parser, values)

SCons.Script.Main.**\_load\_all\_site\_scons\_dirs** (topdir, verbose=None)

Load all of the predefined site\_scons dir. Order is significant; we load them in order from most generic (machine-wide) to most specific (topdir). The verbose argument is only for testing.

SCons.Script.Main.**\_load\_site\_scons\_dir** (topdir, site\_dir\_name=None)

Load the site directory under topdir.

If a site dir name is supplied use it, else use default “site\_scons” Prepend site dir to sys.path. If a “site\_tools” subdir exists, prepend to toolpath. Import “site\_init.py” from site dir if it exists.

SCons.Script.Main.**\_main** (parser)

SCons.Script.Main.**\_scons\_internal\_error** ()

Handle all errors but user errors. Print out a message telling the user what to do in this case and print a normal trace.

SCons.Script.Main.**\_scons\_internal\_warning** (e)

Slightly different from \_scons\_user\_warning in that we use the *current call stack* rather than sys.exc\_info() to get our stack trace. This is used by the warnings framework to print warnings.

SCons.Script.Main.**\_scons\_syntax\_error** (e)

Handle syntax errors. Print out a message and show where the error occurred.

SCons.Script.Main.**\_scons\_user\_error** (e)

Handle user errors. Print out a message and a description of the error, along with the line number and routine where it occurred. The file and line number will be the deepest stack frame that is not part of SCons itself.

`SCons.Script.Main._scons_user_warning (e)`

Handle user warnings. Print out a message and a description of the warning, along with the line number and routine where it occurred. The file and line number will be the deepest stack frame that is not part of SCons itself.

`SCons.Script.Main._set_debug_values (options)`

`SCons.Script.Main.fetch_win32_parallel_msg ()`

`SCons.Script.Main.find_deepest_user_frame (tb)`

Find the deepest stack frame that is not part of SCons.

Input is a “pre-processed” stack trace in the form returned by `traceback.extract_tb()` or `traceback.extract_stack()`

`SCons.Script.Main.main ()`

`SCons.Script.Main.path_string (label, module)`

`SCons.Script.Main.python_version_deprecated (version=sys.version_info(major=3, minor=7, micro=8, releaselevel='final', serial=0))`

`SCons.Script.Main.python_version_string ()`

`SCons.Script.Main.python_version_unsupported (version=sys.version_info(major=3, minor=7, micro=8, releaselevel='final', serial=0))`

`SCons.Script.Main.revert_io ()`

`SCons.Script.Main.test_load_all_site_scons_dirs (d)`

`SCons.Script.Main.version_string (label, module)`

### ***SCons.Script.SConsOptions module***

`SCons.Script.SConsOptions.Parser (version)`

Returns an options parser object initialized with the standard SCons options.

`class SCons.Script.SConsOptions.SConsIndentedHelpFormatter (indent_increment=2, max_help_position=24, width=None, short_first=1)`

Bases: `optparse.IndentedHelpFormatter`

`NO_DEFAULT_VALUE = 'none'`

`_format_text (text)`

Format a paragraph of free-form text for inclusion in the help output at the current indentation level.

`dedent ()`

`expand_default (option)`

`format_description (description)`

`format_epilog (epilog)`

`format_heading (heading)`

This translates any heading of “options” or “Options” into “SCons Options.” Unfortunately, we have to do this here, because those titles are hard-coded in the `optparse` calls.

`format_option (option)`

A copy of the normal `optparse.IndentedHelpFormatter.format_option()` method. This has been snarfed so we can modify text wrapping to out liking:

- **add our own regular expression that doesn't break on hyphens**  
(so things like `–no-print-directory` don't get broken);
- **wrap the list of options themselves when it's too long**

(the `wrapper.fill(opts)` call below);  
 – set the `subsequent_indent` when wrapping the `help_text`.

**format\_option\_strings** (*option*)  
 Return a comma-separated list of option strings & metavariables.

**format\_usage** (*usage*)

**indent** ()

**set\_long\_opt\_delimiter** (*delim*)

**set\_parser** (*parser*)

**set\_short\_opt\_delimiter** (*delim*)

**store\_option\_strings** (*parser*)

*class* `SCons.Script.SConsOptions.SConsOption` (\**opts*, \*\**attrs*)

Bases: `optparse.Option`

**ACTIONS** = ('store', 'store\_const', 'store\_true', 'store\_false', 'append', 'append\_const', 'count', 'callback', 'help', 'version')

**ALWAYS\_TYPED\_ACTIONS** = ('store', 'append')

**ATTRS** = ['action', 'type', 'dest', 'default', 'nargs', 'const', 'choices', 'callback', 'callback\_args', 'callback\_kwargs', 'help', 'metavar']

**CHECK\_METHODS** = [*<function Option.\_check\_action>*, *<function Option.\_check\_type>*, *<function Option.\_check\_choice>*, *<function Option.\_check\_dest>*, *<function Option.\_check\_const>*, *<function Option.\_check\_nargs>*, *<function Option.\_check\_callback>*, *<function SConsOption.\_check\_nargs\_optional>*]

**CONST\_ACTIONS** = ('store\_const', 'append\_const', 'store', 'append', 'callback')

**STORE\_ACTIONS** = ('store', 'store\_const', 'store\_true', 'store\_false', 'append', 'append\_const', 'count')

**TYPED\_ACTIONS** = ('store', 'append', 'callback')

**TYPES** = ('string', 'int', 'long', 'float', 'complex', 'choice')

**TYPE\_CHECKER** = {'choice': *<function check\_choice>*, 'complex': *<function check\_builtin>*, 'float': *<function check\_builtin>*, 'int': *<function check\_builtin>*, 'long': *<function check\_builtin>*}

**\_check\_action** ()

**\_check\_callback** ()

**\_check\_choice** ()

**\_check\_const** ()

**\_check\_dest** ()

**\_check\_nargs** ()

**\_check\_nargs\_optional** ()

**\_check\_opt\_strings** (*opts*)

```

_check_type ()
_set_attrs (attrs)
_set_opt_strings (opts)
check_value (opt, value)
convert_value (opt, value)
get_opt_string ()
process (opt, value, values, parser)
take_action (action, dest, opt, value, values, parser)
takes_value ()

```

```
class SCons.Script.SConsOptions.SConsOptionGroup (parser, title, description=None)
```

```
Bases: optparse.OptionGroup
```

A subclass for SCons-specific option groups.

The only difference between this and the base class is that we print the group's help text flush left, underneath their own title but lined up with the normal "SCons Options".

```

_check_conflict (option)
_create_option_list ()
_create_option_mappings ()
_share_option_mappings (parser)
add_option (Option)
    add_option(opt_str, ..., kwarg=val, ...)
add_options (option_list)
destroy ()
    see OptionParser.destroy().
format_description (formatter)
format_help (formatter)
    Format an option group's help text, outdenting the title so it's flush with the "SCons Options" title we print at the top.
format_option_help (formatter)
get_description ()
get_option (opt_str)
has_option (opt_str)
remove_option (opt_str)
set_conflict_handler (handler)
set_description (description)
set_title (title)

```

```
class SCons.Script.SConsOptions.SConsOptionParser (usage=None, option_list=None,
option_class=<class 'optparse.Option'>, version=None, conflict_handler='error',
description=None, formatter=None, add_help_option=True, prog=None, epilog=None)
```

Bases: `optparse.OptionParser`

`_add_help_option ()`

`_add_version_option ()`

`_check_conflict (option)`

`_create_option_list ()`

`_create_option_mappings ()`

`_get_all_options ()`

`_get_args (args)`

`_init_parsing_state ()`

`_match_long_opt (opt : string) → string`

Determine which long option string 'opt' matches, ie. which one it is an unambiguous abbreviation for. Raises `BadOptionError` if 'opt' doesn't unambiguously match any long option string.

`_populate_option_list (option_list, add_help=True)`

`_process_args (largs, rargs, values)`

`_process_args(largs : [string],`

`rargs : [string], values : Values)`

Process command-line arguments and populate 'values', consuming options and arguments from 'rargs'. If 'allow\_interspersed\_args' is false, stop at the first non-option argument. If true, accumulate any interspersed non-option arguments in 'largs'.

`_process_long_opt (rargs, values)`

SCons-specific processing of long options.

This is copied directly from the normal `optparse._process_long_opt()` method, except that, if configured to do so, we catch the exception thrown when an unknown option is encountered and just stick it back on the "leftover" arguments for later (re-)processing.

`_process_short_opts (rargs, values)`

`_share_option_mappings (parser)`

`add_local_option (*args, **kw)`

Adds a local option to the parser.

This is initiated by a `SetOption()` call to add a user-defined command-line option. We add the option to a separate option group for the local options, creating the group if necessary.

`add_option (Option)`

`add_option(opt_str, ..., kwarg=val, ...)`

`add_option_group (*args, **kwargs)`

`add_options (option_list)`

`check_values (values : Values, args : [string])`

`-> (values : Values, args : [string])`

Check that the supplied option values and leftover arguments are valid. Returns the option values and leftover arguments (possibly adjusted, possibly completely new – whatever you like). Default implementation just returns the passed-in values; subclasses may override as desired.

#### **destroy ()**

Declare that you are done with this OptionParser. This cleans up reference cycles so the OptionParser (and all objects referenced by it) can be garbage-collected promptly. After calling `destroy()`, the OptionParser is unusable.

#### **disable\_interspersed\_args ()**

Set parsing to stop on the first non-option. Use this if you have a command processor which runs another command that has options of its own and you want to make sure these options don't get confused.

#### **enable\_interspersed\_args ()**

Set parsing to not stop on the first non-option, allowing interspersing switches with command arguments. This is the default behavior. See also `disable_interspersed_args()` and the class documentation description of the attribute `allow_interspersed_args`.

#### **error (msg : string)**

Print a usage message incorporating 'msg' to stderr and exit. If you override this in a subclass, it should not return – it should either exit or raise an exception.

#### **exit (status=0, msg=None)**

#### **expand\_prog\_name (s)**

#### **format\_description (formatter)**

#### **format\_epilog (formatter)**

#### **format\_help (formatter=None)**

#### **format\_option\_help (formatter=None)**

#### **get\_default\_values ()**

#### **get\_description ()**

#### **get\_option (opt\_str)**

#### **get\_option\_group (opt\_str)**

#### **get\_prog\_name ()**

#### **get\_usage ()**

#### **get\_version ()**

#### **has\_option (opt\_str)**

#### **parse\_args (args=None, values=None)**

**parse\_args**(args : [string] = sys.argv[1:],

values : Values = None)

-> (values : Values, args : [string])

Parse the command-line options found in 'args' (default: `sys.argv[1:]`). Any errors result in a call to `'error()'`, which by default prints the usage message to stderr and calls `sys.exit()` with an error message. On success returns a pair (values, args) where 'values' is a Values instance (with all your option values) and 'args' is the list of arguments left over after parsing options.

#### **preserve\_unknown\_options = False**

**print\_help**(file : file = stdout)

Print an extended help message, listing all options and any help text provided with them, to 'file' (default stdout).

**print\_usage**(file : file = stdout)

Print the usage message for the current program (self.usage) to 'file' (default stdout). Any occurrence of the string "%prog" in self.usage is replaced with the name of the current program (basename of sys.argv[0]). Does nothing if self.usage is empty or not defined.

**print\_version**(file : file = stdout)

Print the version message for this program (self.version) to 'file' (default stdout). As with print\_usage(), any occurrence of "%prog" in self.version is replaced by the current program's name. Does nothing if self.version is empty or undefined.

**remove\_option**(opt\_str)

**reparse\_local\_options**()

Re-parse the leftover command-line options.

Parse options stored in *self.largs*, so that any value overridden on the command line is immediately available if the user turns around and does a **GetOption()** right away.

We mimic the processing of the single args in the original OptionParser **\_process\_args()**, but here we allow exact matches for long-opts only (no partial argument names!). Otherwise there could be problems in **add\_local\_option()** below. When called from there, we try to reparse the command-line arguments that

1. haven't been processed so far (*self.largs*), but

2. are possibly not added to the list of options yet.

So, when we only have a value for "--myargument" so far, a command-line argument of "--myarg=test" would set it, per the behaviour of **match\_long\_opt()**, which allows for partial matches of the option name, as long as the common prefix appears to be unique. This would lead to further confusion, because we might want to add another option "--myarg" later on (see issue #2929).

**set\_conflict\_handler**(handler)

**set\_default**(dest, value)

**set\_defaults**(\*\*kwargs)

**set\_description**(description)

**set\_process\_default\_values**(process)

**set\_usage**(usage)

**standard\_option\_list** = []

**class** SCons.Script.SConsOptions.SConsValues (defaults)

Bases: **optparse.Values**

Holder class for uniform access to SCons options, regardless of whether or not they can be set on the command line or in the SConscript files (using the SetOption() function).

A SCons option value can originate three different ways:

1. set on the command line;

2. set in an SConscript file;

3. the default setting (from the the op.add\_option() calls in the Parser() function, below).

The command line always overrides a value set in a SConscript file, which in turn always overrides default settings. Because we want to support user-specified options in the SConscript file itself, though, we may not know about all of the options when the command line is first parsed, so we can't make all the necessary precedence decisions at the time the option is configured.

The solution implemented in this class is to keep these different sets of settings separate (command line, SConscript file, and default) and to override the **\_\_getattr\_\_()** method to check them in turn. This should allow the

rest of the code to just fetch values as attributes of an instance of this class, without having to worry about where they came from.

Note that not all command line options are settable from SConscript files, and the ones that are must be explicitly added to the “settable” list in this class, and optionally validated and coerced in the `set_option()` method.

`_update (dict, mode)`

`_update_careful (dict)`

Update the option values from an arbitrary dictionary, but only use keys from dict that already have a corresponding attribute in self. Any keys in dict without a corresponding attribute are silently ignored.

`_update_loose (dict)`

Update the option values from an arbitrary dictionary, using all keys from the dictionary regardless of whether they have a corresponding attribute in self or not.

`ensure_value (attr, value)`

`read_file (filename, mode='careful')`

`read_module (modname, mode='careful')`

`set_option (name, value)`

Sets an option from an SConscript file.

`settable = ['clean', 'diskcheck', 'duplicate', 'help', 'implicit_cache', 'max_drift', 'md5_chunksize', 'no_exec', 'num_jobs', 'random', 'stack_size', 'warn', 'silent', 'no_progress']`

`SCons.Script.SConsOptions.diskcheck_convert (value)`

## ***SCons.Script.SConscript module***

`SCons.Script.SConscript`

This module defines the Python API provided to SConscript and SConstruct files.

`SCons.Script.SConscript.BuildDefaultGlobals ()`

Create a dictionary containing all the default globals for SConstruct and SConscript files.

`SCons.Script.SConscript.Configure (*args, **kw)`

`class SCons.Script.SConscript.DefaultEnvironmentCall (method_name, subst=0)`

Bases: `object`

A class that implements “global function” calls of Environment methods by fetching the specified method from the DefaultEnvironment’s class. Note that this uses an intermediate proxy class instead of calling the DefaultEnvironment method directly so that the proxy can override the `subst()` method and thereby prevent expansion of construction variables (since from the user’s point of view this was called as a global function, with no associated construction environment).

`class SCons.Script.SConscript.Frame (fs, exports, sconscript)`

Bases: `object`

A frame on the SConstruct/SConscript call stack

`SCons.Script.SConscript.Return (*vars, **kw)`

`class SCons.Script.SConscript.SConsEnvironment (platform=None, tools=None, toolpath=None, variables=None, parse_flags=None, **kw)`

Bases: `SCons.Environment.Base`

An Environment subclass that contains all of the methods that are particular to the wrapper SCons interface and which aren’t (or shouldn’t be) part of the build engine itself.

Note that not all of the methods of this class have corresponding global functions, there are some private methods.

`Action (*args, **kw)`

**AddMethod** (function, name=None)

Adds the specified function as a method of this construction environment with the specified name. If the name is omitted, the default name is the name of the function itself.

**AddPostAction** (files, action)**AddPreAction** (files, action)**Alias** (target, source=[], action=None, \*\*kw)**AlwaysBuild** (\*targets)**Append** (\*\*kw)

Append values to existing construction variables in an Environment.

**AppendENVPPath** (name, newpath, envname='ENV', sep=':', delete\_existing=0)

Append path elements to the path 'name' in the 'ENV' dictionary for this environment. Will only add any particular path once, and will normpath and normcase all paths to help assure this. This can also handle the case where the env variable is a list instead of a string.

If delete\_existing is 0, a newpath which is already in the path will not be moved to the end (it will be left where it is).

**AppendUnique** (delete\_existing=0, \*\*kw)

Append values to existing construction variables in an Environment, if they're not already there. If delete\_existing is 1, removes existing values first, so values move to end.

**Builder** (\*\*kw)**CacheDir** (path)**Clean** (targets, files)**Clone** (tools=[], toolpath=None, parse\_flags=None, \*\*kw)

Return a copy of a construction Environment. The copy is like a Python "deep copy"—that is, independent copies are made recursively of each objects—except that a reference is copied when an object is not deep-copyable (like a function). There are no references to any mutable objects in the original Environment.

**Command** (target, source, action, \*\*kw)

Builds the supplied target files from the supplied source files using the supplied action. Action may be any type that the Builder constructor will accept for an action.

**Configure** (\*args, \*\*kw)**Decider** (function)**Default** (\*targets)**Depends** (target, dependency)

Explicitly specify that 'target's depend on 'dependency'.

**Detect** (progs)

Return the first available program in progs.

**Parameters:** **progs** (*str or list*) – one or more command names to check for

**Returns str:** first name from progs that can be found.

**Dictionary** (\*args)

Return construction variables from an environment.

**Parameters:** **\*args** (*optional*) – variable names to look up

**Returns:** If *args* omitted, the dictionary of all construction variables. If one arg, the corresponding value is returned. If more than one arg, a list of values is returned.

**Raises:** **KeyError** – if any of *args* is not in the construction environment.

**Dir** (name, \*args, \*\*kw)

**Dump** (key=None, format='pretty')

Return construction variables serialized to a string.

**Parameters:**

- **key** (*optional*) – if None, format the whole dict of variables. Else format the value of *key* (Default value = None)
- **format** (*optional*) – specify the format to serialize to. “pretty” generates a pretty-printed string, “json” a JSON-formatted string. (Default value = None, equivalent to “pretty”)

**EnsurePythonVersion** (major, minor)

Exit abnormally if the Python version is not late enough.

**EnsureSConsVersion** (major, minor, revision=0)

Exit abnormally if the SCons version is not late enough.

**Entry** (name, \*args, \*\*kw)

**Environment** (\*\*kw)

**Execute** (action, \*args, \*\*kw)

Directly execute an action through an Environment

**Exit** (value=0)

**Export** (\*vars, \*\*kw)

**File** (name, \*args, \*\*kw)

**FindFile** (file, dirs)

**FindInstalledFiles** ()

returns the list of all targets of the Install and InstallAs Builder.

**FindIdxes** (paths, prefix, suffix)

Search a list of paths for something that matches the prefix and suffix.

**Parameters:**

- **paths** – the list of paths or nodes.
- **prefix** – construction variable for the prefix.
- **suffix** – construction variable for the suffix.

Returns: the matched path or None

**FindSourceFiles** (node='.') )

returns a list of all source files.

**Flatten** (sequence)

**GetBuildPath** (files)

**GetLaunchDir** ()

**GetOption** (name)

**Glob** (pattern, ondisk=True, source=False, strings=False, exclude=None)

**Help** (text, append=False)

**Ignore** (target, dependency)  
Ignore a dependency.

**Import** (\*vars)

**Literal** (string)

**Local** (\*targets)

**MergeFlags** (args, unique=1, dict=None)

Merge the dict in args into the construction variables of this env, or the passed-in dict. If args is not a dict, it is converted into a dict using ParseFlags. If unique is not set, the flags are appended rather than merged.

**NoCache** (\*targets)

Tags a target so that it will not be cached

**NoClean** (\*targets)

Tags a target so that it will not be cleaned by -c

**Override** (overrides)

Produce a modified environment whose variables are overridden by the overrides dictionaries. "overrides" is a dictionary that will override the variables of this environment.

This function is much more efficient than Clone() or creating a new Environment because it doesn't copy the construction environment dictionary, it just wraps the underlying construction environment, and doesn't even create a wrapper object if there are no overrides.

**ParseConfig** (command, function=None, unique=1)

Use the specified function to parse the output of the command in order to modify the current environment. The 'command' can be a string or a list of strings representing a command and its arguments. 'Function' is an optional argument that takes the environment, the output of the command, and the unique flag. If no function is specified, MergeFlags, which treats the output as the result of a typical 'X-config' command (i.e. gtk-config), will merge the output into the appropriate variables.

**ParseDepends** (filename, must\_exist=None, only\_one=0)

Parse a mkdep-style file for explicit dependencies. This is completely abusable, and should be unnecessary in the "normal" case of proper SCons configuration, but it may help make the transition from a Make hierarchy easier for some people to swallow. It can also be genuinely useful when using a tool that can write a .d file, but for which writing a scanner would be too complicated.

**ParseFlags** (\*flags)

Parse the set of flags and return a dict with the flags placed in the appropriate entry. The flags are treated as a typical set of command-line flags for a GNU-like toolchain and used to populate the entries in the dict immediately below. If one of the flag strings begins with a bang (exclamation mark), it is assumed to be a command and the rest of the string is executed; the result of that evaluation is then added to the dict.

**Platform** (platform)

**Precious** (\*targets)

**Prepend** (\*\*kw)

Prepend values to existing construction variables in an Environment.

**PrependENVPPath** (name, newpath, envname='ENV', sep=':', delete\_existing=1)

Prepend path elements to the path 'name' in the 'ENV' dictionary for this environment. Will only add any particular path once, and will normpath and normcase all paths to help assure this. This can also handle the case where the env variable is a list instead of a string.

If `delete_existing` is 0, a newpath which is already in the path will not be moved to the front (it will be left where it is).

**PrependUnique** (`delete_existing=0, **kw`)

Prepend values to existing construction variables in an Environment, if they're not already there. If `delete_existing` is 1, removes existing values first, so values move to front.

**Pseudo** (`*targets`)

**PyPackageDir** (`modulename`)

**RemoveMethod** (`function`)

Removes the specified function's MethodWrapper from the `added_methods` list, so we don't re-bind it when making a clone.

**Replace** (`**kw`)

Replace existing construction variables in an Environment with new construction variables and/or values.

**ReplaceIxes** (`path, old_prefix, old_suffix, new_prefix, new_suffix`)

Replace `old_prefix` with `new_prefix` and `old_suffix` with `new_suffix`.

`env` - Environment used to interpolate variables. `path` - the path that will be modified. `old_prefix` - construction variable for the old prefix. `old_suffix` - construction variable for the old suffix. `new_prefix` - construction variable for the new prefix. `new_suffix` - construction variable for the new suffix.

**Repository** (`*dirs, **kw`)

**Requires** (`target, prerequisite`)

Specify that 'prerequisite' must be built before 'target', (but 'target' does not actually depend on 'prerequisite' and need not be rebuilt if it changes).

**SConscript** (`*ls, **kw`)

Execute SCons configuration files.

**Parameters:** `*ls` (*str or list*) – configuration file(s) to execute.

**Keyword**

**Arguments:**

- **dirs** (*list*) – execute SConscript in each listed directory.
- **name** (*str*) – execute script 'name' (used only with 'dirs').
- **exports** (*list or dict*) – locally export variables the called script(s) can import.
- **variant\_dir** (*str*) – mirror sources needed for the build in a variant directory to allow building in it.
- **duplicate** (*bool*) – physically duplicate sources instead of just adjusting paths of derived files (used only with 'variant\_dir') (default is True).
- **must\_exist** (*bool*) – fail if a requested script is missing (default is False, default is deprecated).

**Returns:** list of variables returned by the called script

**Raises:** **UserError** – a script is not found and such exceptions are enabled.

**SConscriptChdir** (`flag`)

**SConsignFile** (`name='.sconsign', dbm_module=None`)

**Scanner** (`*args, **kw`)

**SetDefault** (`**kw`)

**SetOption** (`name, value`)

**SideEffect** (`side_effect, target`)

Tell scons that `side_effects` are built as side effects of building targets.

### `split (arg)`

This function converts a string or list into a list of strings or Nodes. This makes things easier for users by allowing files to be specified as a white-space separated list to be split.

#### The input rules are:

- A single string containing names separated by spaces. These will be split apart at the spaces.
  - A single Node instance
  - A list containing either strings or Node instances. Any strings in the list are not split at spaces.
- In all cases, the function returns a list of Nodes and strings.

### `Tool (tool, toolpath=None, **kw)`

### `Value (value, built_value=None, name=None)`

### `VariantDir (variant_dir, src_dir, duplicate=1)`

### `WhereIs (prog, path=None, pathext=None, reject=[ ])`

Find prog in the path.

### `_canonicalize (path)`

### `_changed_build (dependency, target, prev_ni, repo_node=None)`

### `_changed_content (dependency, target, prev_ni, repo_node=None)`

### `_changed_source (dependency, target, prev_ni, repo_node=None)`

### `_changed_timestamp_match (dependency, target, prev_ni, repo_node=None)`

### `_changed_timestamp_newer (dependency, target, prev_ni, repo_node=None)`

### `_changed_timestamp_then_content (dependency, target, prev_ni, repo_node=None)`

### `_copy2_from_cache (src, dst)`

### `_copy_from_cache (src, dst)`

### `_exceeds_version (major, minor, v_major, v_minor)`

Return 1 if 'major' and 'minor' are greater than the version in 'v\_major' and 'v\_minor', and 0 otherwise.

### `_find_toolpath_dir (tp)`

### `_get_SConscript_filenames (ls, kw)`

Convert the parameters passed to `SConscript()` calls into a list of files and export variables. If the parameters are invalid, throws `SCons.Errors.UserError`. Returns a tuple (l, e) where l is a list of `SConscript` filenames and e is a list of exports.

### `_get_major_minor_revision (version_string)`

Split a version string into major, minor and (optionally) revision parts.

This is complicated by the fact that a version string can be something like 3.2b1.

### `_gsm ()`

### `_init_special ()`

Initial the dispatch tables for special handling of special construction variables.

### `_update (dict)`

Update an environment's values directly, bypassing the normal checks that occur when users try to set items.

**arg2nodes** (args, node\_factory=<class 'SCons.Environment.\_Null'>, lookup\_list=<class 'SCons.Environment.\_Null'>, \*\*kw)

**backtick** (command)

**get** (key, default=None)

Emulates the get() method of dictionaries.

**get\_CacheDir** ()

**get\_builder** (name)

Fetch the builder with the specified name from the environment.

**get\_factory** (factory, default='File')

Return a factory function for creating Nodes for this construction environment.

**get\_scanner** (skey)

Find the appropriate scanner given a key (usually a file suffix).

**get\_src\_sig\_type** ()

**get\_tgt\_sig\_type** ()

**gvars** ()

**has\_key** (key)

Emulates the has\_key() method of dictionaries.

**items** ()

Emulates the items() method of dictionaries.

**keys** ()

Emulates the keys() method of dictionaries.

**lvars** ()

**scanner\_map\_delete** (kw=None)

Delete the cached scanner map (if we need to).

**subst** (string, raw=0, target=None, source=None, conv=None, executor=None)

Recursively interpolates construction variables from the Environment into the specified string, returning the expanded result. Construction variables are specified by a \$ prefix in the string and begin with an initial underscore or alphabetic character followed by any number of underscores or alphanumeric characters. The construction variable names may be surrounded by curly braces to separate the name from trailing characters.

**subst\_kw** (kw, raw=0, target=None, source=None)

**subst\_list** (string, raw=0, target=None, source=None, conv=None, executor=None)

Calls through to SCons.Subst.scons\_subst\_list(). See the documentation for that function.

**subst\_path** (path, target=None, source=None)

Substitute a path list, turning EntryProxies into Nodes and leaving Nodes (and other objects) as-is.

**subst\_target\_source** (string, raw=0, target=None, source=None, conv=None, executor=None)

Recursively interpolates construction variables from the Environment into the specified string, returning the expanded result. Construction variables are specified by a \$ prefix in the string and begin with an initial underscore or alphabetic character followed by any number of underscores or alphanumeric characters. The construction variable names may be surrounded by curly braces to separate the name from trailing characters.

**values ()**

Emulates the values() method of dictionaries.

*exception* `SCons.Script.SConscript.SConscriptReturn`

Bases: `Exception`

**args****with\_traceback ()**

`Exception.with_traceback(tb)` – set `self.__traceback__` to `tb` and return `self`.

`SCons.Script.SConscript.SConscript_exception (file=<_io.TextIOWrapper name='<stderr>' mode='w' encoding='utf-8'>)`

Print an exception stack trace just for the SConscript file(s). This will show users who have Python errors where the problem is, without cluttering the output with all of the internal calls leading up to where we exec the SConscript.

`SCons.Script.SConscript._SConscript (fs, *files, **kw)`

`SCons.Script.SConscript.annotate (node)`

Annotate a node with the stack frame describing the SConscript file and line number that created it.

`SCons.Script.SConscript.compute_exports (exports)`

Compute a dictionary of exports given one of the parameters to the `Export()` function or the `exports` argument to `SConscript()`.

`SCons.Script.SConscript.get_DefaultEnvironmentProxy ()`

`SCons.Script.SConscript.get_calling_namespaces ()`

Return the locals and globals for the function that called into this module in the current call stack.

`SCons.Script.SConscript.handle_missing_SConscript (f, must_exist=None)`

Take appropriate action on missing file in `SConscript()` call.

Print a warning or raise an exception on missing file. On first warning, print a deprecation message.

**Parameters:**

- `f (str)` – path of missing configuration file
- `must_exist (bool)` – raise exception if file does not exist

**Raises:** `UserError` if `'must_exist'` is `True` or if `global` – `SCons.Script._no_missing_sconscript` is `True`.

**Module contents**

`SCons.Script`

This file implements the `main()` function used by the `scons` script.

Architecturally, this *is* the `scons` script, and will likely only be called from the external “`scons`” wrapper. Consequently, anything here should not be, or be considered, part of the build engine. If it’s something that we expect other software to want to use, it should go in some other module. If it’s specific to the “`scons`” script invocation, it goes here.

`SCons.Script.HelpFunction (text, append=False)`

`class SCons.Script.TargetList (initlist=None)`

Bases: `collections.UserList`

`__UserList__cast (other)`

`__abc_impl = <_abc_data object>`

`__add_Default (list)`

`__clear ()`

`__do_nothing (*args, **kw)`

**append (item)**

S.append(value) – append value to the end of the sequence

**clear ()** → None -- remove all items from S

**copy ()**

**count (value)** → integer -- return number of occurrences of value

**extend (other)**

S.extend(iterable) – extend sequence by appending elements from the iterable

**index (value[, start[, stop]])** → integer -- return first index of value.

Raises ValueError if the value is not present.

Supporting start and stop arguments is optional, but recommended.

**insert (i, item)**

S.insert(index, value) – insert value before index

**pop ([, index])** → item -- remove and return item at index (default last).

Raise IndexError if list is empty or index is out of range.

**remove (item)**

S.remove(value) – remove first occurrence of value. Raise ValueError if the value is not present.

**reverse ()**

S.reverse() – reverse *IN PLACE*

**sort (\*args, \*\*kwds)**

SCons.Script.**Variables** (files=None, args={})

SCons.Script.**\_Add\_Arguments** (alist)

SCons.Script.**\_Add\_Targets** (tlist)

SCons.Script.**\_Get\_Default\_Targets** (d, fs)

SCons.Script.**\_Set\_Default\_Targets** (env, tlist)

SCons.Script.**\_Set\_Default\_Targets\_Has\_Been\_Called** (d, fs)

SCons.Script.**\_Set\_Default\_Targets\_Has\_Not\_Been\_Called** (d, fs)

SCons.Script.**set\_missing\_sconscript\_error** (flag=1)

Set behavior on missing file in SConscript() call. Returns previous value

## ***SCons.Tool package***

### ***Module contents***

SCons.Tool

SCons tool selection.

This looks for modules that define a callable object that can modify a construction environment as appropriate for a given tool (or tool chain).

Note that because this subsystem just *selects* a callable that can modify a construction environment, it's possible for people to define their own "tool specification" in an arbitrary callable function. No one needs to use or tie in to this subsystem in order to roll their own tool definition.

SCons.Tool.**CreateJarBuilder** (env)

The Jar builder expects a list of class files which it can package into a jar file.

The jar tool provides an interface for passing other types of java files such as .java, directories or swig interfaces and will build them to class files in which it can package into the jar.

`SCons.Tool.CreateJavaClassDirBuilder` (*env*)

`SCons.Tool.CreateJavaClassFileBuilder` (*env*)

`SCons.Tool.CreateJavaFileBuilder` (*env*)

`SCons.Tool.CreateJavaHBuilder` (*env*)

`SCons.Tool.CreateLibSymlinks` (*env*, *symlinks*)

Physically creates symlinks. The *symlinks* argument must be a list in form [ (*link*, *linktarget*), ... ], where *link* and *linktarget* are SCons nodes.

`SCons.Tool.EmitLibSymlinks` (*env*, *symlinks*, *libnode*, *\*\*kw*)

Used by emitters to handle (shared/versioned) library symlinks

`SCons.Tool.FindAllTools` (*tools*, *env*)

`SCons.Tool.FindTool` (*tools*, *env*)

`SCons.Tool.Initializers` (*env*)

`SCons.Tool.LibSymlinksActionFunction` (*target*, *source*, *env*)

`SCons.Tool.LibSymlinksStrFun` (*target*, *source*, *env*, *\*args*)

`SCons.Tool.StringizeLibSymlinks` (*symlinks*)

Converts list with pairs of nodes to list with pairs of node paths (strings). Used mainly for debugging.

`class SCons.Tool.Tool` (*name*, *toolpath=None*, *\*\*kw*)

Bases: `object`

`_load_dotted_module_py2` (*short\_name*, *full\_name*, *searchpaths=None*)

`_tool_module` ()

`class SCons.Tool.ToolInitializer` (*env*, *tools*, *names*)

Bases: `object`

A class for delayed initialization of Tools modules.

Instances of this class associate a list of Tool modules with a list of Builder method names that will be added by those Tool modules. As part of instantiating this object for a particular construction environment, we also add the appropriate `ToolInitializerMethod` objects for the various Builder methods that we want to use to delay Tool searches until necessary.

`apply_tools` (*env*)

Searches the list of associated Tool modules for one that exists, and applies that to the construction environment.

`remove_methods` (*env*)

Removes the methods that were added by the tool initialization so we no longer copy and re-bind them when the construction environment gets cloned.

`class SCons.Tool.ToolInitializerMethod` (*name*, *initializer*)

Bases: `object`

This is added to a construction environment in place of a method(s) normally called for a Builder (`env.Object`, `env.StaticObject`, etc.). When called, it has its associated `ToolInitializer` object search the specified list of tools and apply the first one that exists to the construction environment. It then calls whatever builder was (presumably) added to the construction environment in place of this particular instance.

`get_builder` (*env*)

Returns the appropriate real Builder for this method name after having the associated `ToolInitializer` object apply the appropriate Tool module.

`class SCons.Tool._ImpLibInfoSupport`

Bases: `object`

`get_lib_noverisionsymlinks` (*env*, *\*args*, *\*\*kw*)

```
get_lib_prefix (env, *args, **kw)
```

```
get_lib_suffix (env, *args, **kw)
```

```
get_lib_version (env, *args, **kw)
```

**property** libtype

```
class SCons.Tool._LdModInfoSupport
```

Bases: **object**

```
get_lib_noversionssymlinks (env, *args, **kw)
```

```
get_lib_prefix (env, *args, **kw)
```

```
get_lib_suffix (env, *args, **kw)
```

```
get_lib_version (env, *args, **kw)
```

**property** libtype

```
class SCons.Tool._LibInfoGeneratorBase (libtype, infoname)
```

Bases: **object**

Generator base class for library-related info such as suffixes for versioned libraries, symlink maps, sonames etc. It handles commonities of SharedLibrary and LoadableModule

```
_support_classes = {'ImpLib': <class 'SCons.Tool._ImpLibInfoSupport'>, 'LdMod': <class 'SCons.Tool._LdModInfoSupport'>, 'ShLib': <class 'SCons.Tool._ShLibInfoSupport'>}
```

```
generate_versioned_lib_info (env, args, result=None, **kw)
```

```
get_lib_noversionssymlinks (env, *args, **kw)
```

```
get_lib_prefix (env, *args, **kw)
```

```
get_lib_suffix (env, *args, **kw)
```

```
get_lib_version (env, *args, **kw)
```

```
get_versioned_lib_info_generator (**kw)
```

**property** libtype

```
class SCons.Tool._LibNameGenerator (libtype)
```

Bases: **SCons.Tool.\_LibInfoGeneratorBase**

Generates “unmangled” library name from a library file node.

Generally, it’s thought to revert modifications done by prefix/suffix generators (`_LibPrefixGenerator/_LibSuffixGenerator`) used by a library builder. For example, on `gnulink` the suffix generator used by `SharedLibrary` builder appends `$SHLIBVERSION` to `$SHLIBSUFFIX` producing node name which ends with `“$SHLIBSUFFIX.$SHLIBVERSION”`. Correspondingly, the implementation of `_LibNameGenerator` replaces `“$SHLIBSUFFIX.$SHLIBVERSION”` with `“$SHLIBSUFFIX”` in the node’s basename. So that, if `$SHLIBSUFFIX` is `“.so”`, `$SHLIBVERSION` is `“0.1.2”` and the node path is `“/foo/bar/libfoo.so.0.1.2”`, the `_LibNameGenerator` shall return `“libfoo.so”`. Other link tools may implement it’s own way of library name unmangling.

```
_support_classes = {'ImpLib': <class 'SCons.Tool._ImpLibInfoSupport'>, 'LdMod': <class 'SCons.Tool._LdModInfoSupport'>, 'ShLib': <class 'SCons.Tool._ShLibInfoSupport'>}
```

```
generate_versioned_lib_info (env, args, result=None, **kw)
```

```
get_lib_noversionssymlinks (env, *args, **kw)
```

```

get_lib_prefix (env, *args, **kw)

get_lib_suffix (env, *args, **kw)

get_lib_version (env, *args, **kw)

get_versioned_lib_info_generator (**kw)

```

**property** libtype

```
class SCons.Tool._LibPrefixGenerator (libtype)
```

Bases: **SCons.Tool.\_LibInfoGeneratorBase**

Library prefix generator, used as target\_prefix in SharedLibrary and LoadableModule builders

```

_support_classes = {'ImpLib': <class 'SCons.Tool._ImpLibInfoSupport'>, 'LdMod': <class
'SCons.Tool._LdModInfoSupport'>, 'ShLib': <class 'SCons.Tool._ShLibInfoSupport'>}

```

```
generate_versioned_lib_info (env, args, result=None, **kw)
```

```
get_lib_noversion_symlinks (env, *args, **kw)
```

```
get_lib_prefix (env, *args, **kw)
```

```
get_lib_suffix (env, *args, **kw)
```

```
get_lib_version (env, *args, **kw)
```

```
get_versioned_lib_info_generator (**kw)
```

**property** libtype

```
class SCons.Tool._LibSonameGenerator (libtype)
```

Bases: **SCons.Tool.\_LibInfoGeneratorBase**

Library soname generator. Returns library soname (e.g. libfoo.so.0) for a given node (e.g. /foo/bar/libfoo.so.0.1.2)

```

_support_classes = {'ImpLib': <class 'SCons.Tool._ImpLibInfoSupport'>, 'LdMod': <class
'SCons.Tool._LdModInfoSupport'>, 'ShLib': <class 'SCons.Tool._ShLibInfoSupport'>}

```

```
generate_versioned_lib_info (env, args, result=None, **kw)
```

```
get_lib_noversion_symlinks (env, *args, **kw)
```

```
get_lib_prefix (env, *args, **kw)
```

```
get_lib_suffix (env, *args, **kw)
```

```
get_lib_version (env, *args, **kw)
```

```
get_versioned_lib_info_generator (**kw)
```

**property** libtype

```
class SCons.Tool._LibSuffixGenerator (libtype)
```

Bases: **SCons.Tool.\_LibInfoGeneratorBase**

Library suffix generator, used as target\_suffix in SharedLibrary and LoadableModule builders

```

_support_classes = {'ImpLib': <class 'SCons.Tool._ImpLibInfoSupport'>, 'LdMod': <class
'SCons.Tool._LdModInfoSupport'>, 'ShLib': <class 'SCons.Tool._ShLibInfoSupport'>}

```

```
generate_versioned_lib_info (env, args, result=None, **kw)
```

```
get_lib_noversionsymlinks (env, *args, **kw)
```

```
get_lib_prefix (env, *args, **kw)
```

```
get_lib_suffix (env, *args, **kw)
```

```
get_lib_version (env, *args, **kw)
```

```
get_versioned_lib_info_generator (**kw)
```

**property** libtype

```
class SCons.Tool._LibSymlinkGenerator (libtype)
```

Bases: **SCons.Tool.\_LibInfoGeneratorBase**

Library symlink map generator. It generates a list of symlinks that should be created by SharedLibrary or LoadableModule builders

```
_support_classes = {'ImpLib': <class 'SCons.Tool._ImpLibInfoSupport'>, 'LdMod': <class 'SCons.Tool._LdModInfoSupport'>, 'ShLib': <class 'SCons.Tool._ShLibInfoSupport'>}
```

```
generate_versioned_lib_info (env, args, result=None, **kw)
```

```
get_lib_noversionsymlinks (env, *args, **kw)
```

```
get_lib_prefix (env, *args, **kw)
```

```
get_lib_suffix (env, *args, **kw)
```

```
get_lib_version (env, *args, **kw)
```

```
get_versioned_lib_info_generator (**kw)
```

**property** libtype

```
class SCons.Tool._ShLibInfoSupport
```

Bases: **object**

```
get_lib_noversionsymlinks (env, *args, **kw)
```

```
get_lib_prefix (env, *args, **kw)
```

```
get_lib_suffix (env, *args, **kw)
```

```
get_lib_version (env, *args, **kw)
```

**property** libtype

```
SCons.Tool._call_env_subst (env, string, *args, **kw)
```

```
SCons.Tool._call_linker_cb (env, callback, args, result=None)
```

Returns the result of `env['LINKCALLBACKS'][callback](args)` if `env['LINKCALLBACKS']` is a dictionary and `env['LINKCALLBACKS'][callback]` is callable. If these conditions are not met, return the value provided as the `*result` argument. This function is mainly used for generating library info such as versioned suffixes, symlink maps, sonames etc. by delegating the core job to callbacks configured by current linker tool

```
SCons.Tool.createCFileBuilders (env)
```

This is a utility function that creates the CFile/CXXFile Builders in an Environment if they are not there already. If they are there already, we return the existing ones.

This is a separate function because soooo many Tools use this functionality.

The return is a 2-tuple of (CFile, CXXFile)

```
SCons.Tool.createLoadableModuleBuilder (env)
```

This is a utility function that creates the LoadableModule Builder in an Environment if it is not there already.

If it is already there, we return the existing one.

`SCons.Tool.createObjBuilders` (*env*)

This is a utility function that creates the StaticObject and SharedObject Builders in an Environment if they are not there already.

If they are there already, we return the existing ones.

This is a separate function because soooo many Tools use this functionality.

The return is a 2-tuple of (StaticObject, SharedObject)

`SCons.Tool.createProgBuilder` (*env*)

This is a utility function that creates the Program Builder in an Environment if it is not there already.

If it is already there, we return the existing one.

`SCons.Tool.createSharedLibBuilder` (*env*)

This is a utility function that creates the SharedLibrary Builder in an Environment if it is not there already.

If it is already there, we return the existing one.

`SCons.Tool.createStaticLibBuilder` (*env*)

This is a utility function that creates the StaticLibrary Builder in an Environment if it is not there already.

If it is already there, we return the existing one.

`SCons.Tool.find_program_path` (*env*, *key\_program*, *default\_paths=None*)

Find the location of a tool using various means.

Mainly for windows where tools aren't all installed in /usr/bin, etc.

**Parameters:**

- **env** – Current Construction Environment.
- **key\_program** – Tool to locate.
- **default\_paths** – List of additional paths this tool might be found in.

`SCons.Tool.tool_list` (*platform*, *env*)

## *SCons.Variables package*

### *Submodules*

#### *SCons.Variables.BoolVariable module*

`SCons.Variables.BoolVariable`

This file defines the option type for SCons implementing true/false values.

Usage example:

```
opts = Variables()
opts.Add(BoolVariable('embedded', 'build for an embedded system', 0))
...
if env['embedded'] == 1:
...
```

`SCons.Variables.BoolVariable.BoolVariable` (*key*, *help*, *default*)

The input parameters describe a boolean option, thus they are returned with the correct converter and validator appended. The 'help' text will be appended by '(yes|no)' to show the valid values. The result is usable for input to `opts.Add()`.

#### *SCons.Variables.EnumVariable module*

`SCons.Variables.EnumVariable`

This file defines the option type for SCons allowing only specified input-values.

Usage example:

```
opts = Variables()
opts.Add(EnumVariable('debug', 'debug output and symbols', 'no',
```

```

        allowed_values=('yes', 'no', 'full'),
        map={}, ignorecase=2))
...
if env['debug'] == 'full':
...

```

`SCons.Variables.EnumVariable.EnumVariable` (key, help, default, allowed\_values, map={}, ignorecase=0)

The input parameters describe an option with only certain values allowed. They are returned with an appropriate converter and validator appended. The result is usable for input to `Variables.Add()`.

'key' and 'default' are the values to be passed on to `Variables.Add()`.

'help' will be appended by the allowed values automatically

'allowed\_values' is a list of strings, which are allowed as values for this option.

The 'map'-dictionary may be used for converting the input value into canonical values (e.g. for aliases).

'ignorecase' defines the behaviour of the validator:

If `ignorecase == 0`, the validator/converter are case-sensitive. If `ignorecase == 1`, the validator/converter are case-insensitive. If `ignorecase == 2`, the validator/converter is case-insensitive and the converted value will always be lower-case.

The 'validator' tests whether the value is in the list of allowed values. The 'converter' converts input values according to the given 'map'-dictionary (unmapped input values are returned unchanged).

### *SCons.Variables.ListVariable module*

`SCons.Variables.ListVariable`

This file defines the option type for SCons implementing 'lists'.

A 'list' option may either be 'all', 'none' or a list of names separated by comma. After the option has been processed, the option value holds either the named list elements, all list elements or no list elements at all.

Usage example:

```

list_of_libs = Split('x11 gl qt ical')

opts = Variables()
opts.Add(ListVariable('shared',
                    'libraries to build as shared libraries',
                    'all',
                    elems = list_of_libs))

...
for lib in list_of_libs:
    if lib in env['shared']:
        env.SharedObject(...)
    else:
        env.Object(...)

```

`SCons.Variables.ListVariable.ListVariable` (key, help, default, names, map={})

The input parameters describe a 'package list' option, thus they are returned with the correct converter and validator appended. The result is usable for input to `opts.Add()`.

A 'package list' option may either be 'all', 'none' or a list of package names (separated by space).

### *SCons.Variables.PackageVariable module*

`SCons.Variables.PackageVariable`

This file defines the option type for SCons implementing 'package activation'.

To be used whenever a 'package' may be enabled/disabled and the package path may be specified.

Usage example:

**Examples:**

x11=no (disables X11 support) x11=yes (will search for the package installation dir) x11=/usr/local/X11 (will check this path for existence)

To replace autoconf's `--with-xxx=yyy`

```

opts = Variables()
opts.Add(PackageVariable('x11',
                        'use X11 installed here (yes = search some places',
                        'yes'))
...
if env['x11'] == True:
    dir = ... search X11 in some standard places ...
    env['x11'] = dir
if env['x11']:
    ... build with x11 ...

```

`SCons.Variables.PackageVariable`. **PackageVariable** (key, help, default, searchfunc=None)

The input parameters describe a 'package list' option, thus they are returned with the correct converter and validator appended. The result is usable for input to `opts.Add()`.

A 'package list' option may either be 'all', 'none' or a list of package names (separated by space).

### ***SCons.Variables.PathVariable module***

`SCons.Variables.PathVariable`

This file defines an option type for SCons implementing path settings.

To be used whenever a user-specified path override should be allowed.

#### **Arguments to PathVariable are:**

option-name = name of this option on the command line (e.g. "prefix")  
option-help = help string for option  
option-dflt = default value for this option  
validator = [optional] validator for option value. Predefined validators are:

`PathAccept` – accepts any path setting; no validation  
`PathIsDir` – path must be an existing directory  
`PathIsDirCreate` – path must be a dir; will create  
`PathIsFile` – path must be a file  
`PathExists` – path must exist (any type) [default]

The validator is a function that is called and which should return True or False to indicate if the path is valid. The arguments to the validator function are: (key, val, env). The key is the name of the option, the val is the path specified for the option, and the env is the env to which the Options have been added.

Usage example:

```

Examples:
  prefix=/usr/local

opts = Variables()

opts = Variables()
opts.Add(PathVariable('qtdir',
                    'where the root of Qt is installed',
                    qtdir, PathIsDir))
opts.Add(PathVariable('qt_includes',
                    'where the Qt includes are installed',
                    '$qtdir/includes', PathIsDirCreate))
opts.Add(PathVariable('qt_libraries',
                    'where the Qt library is installed',
                    '$qtdir/lib'))

```

### ***Module contents***

`SCons.Variables`

This file defines the Variables class that is used to add user-friendly customizable variables to an SCons build.

`class SCons.Variables.Variables (files=None, args=None, is_global=True)`

Bases: **object**

Holds all the options, updates the environment with the variables, and renders the help text.

If `is_global` is True, this is a singleton, create only once.

**Parameters:**

- **files** (*optional*) – List of option configuration files to load (backward compatibility). If a single string is passed it is automatically placed in a file list (Default value = None)
- **args** (*optional*) – dictionary to override values set from *files*. (Default value = None)
- **is\_global** (*optional*) – global instance? (Default value = True)

**Add** (key, help='', default=None, validator=None, converter=None, \*\*kw)

Add an option.

**Parameters:**

- **key** – the name of the variable, or a list or tuple of arguments
- **help** – optional help text for the options (Default value = "")
- **default** – optional default value for option (Default value = None)
- **validator** – optional function called to validate the option's value (Default value = None)
- **converter** – optional function to be called to convert the option's value before putting it in the environment. (Default value = None)
- **\*\*kw** – keyword args, unused.

**AddVariables** (\*optlist)

Add a list of options.

Each list element is a tuple/list of arguments to be passed on to the underlying method for adding options.

Example:

```
opt.AddVariables(
    ('debug', '', 0),
    ('CC', 'The C compiler'),
    ('VALIDATE', 'An option for testing validation', 'notset', validator, None),
)
```

**FormatVariableHelpText** (env, key, help, default, actual, aliases=[])

**GenerateHelpText** (env, sort=None)

Generate the help text for the options.

**env** - an environment that is used to get the current values

of the options.

**cmp** - Either a function as follows: The specific sort function should take two arguments and return -1, 0 or 1

or a boolean to indicate if it should be sorted.

**Save** (filename, env)

Saves all the options in the given file. This file can then be used to load the options next run. This can be used to create an option cache file.

filename - Name of the file to save into env - the environment get the option values from

**UnknownVariables** ()

Returns any options in the specified arguments lists that were not known, declared options in this object.

**Update** (env, args=None)

Update an environment with the option variables.

env - the environment to update.

```
_do_add (key, help= ' ', default=None, validator=None, converter=None)
```

```
format = '\n%s: %s\n default: %s\n actual: %s\n'
```

```
format_ = '\n%s: %s\n default: %s\n actual: %s\n aliases: %s\n'
```

```
instance = None
```

```
keys ()
```

Returns the keywords for the options

## ***SCons.compat package***

### ***Module contents***

SCons compatibility package for old Python versions

This subpackage holds modules that provide backwards-compatible implementations of various things that we'd like to use in SCons but which only show up in later versions of Python than the early, old version(s) we still support.

Other code will not generally reference things in this package through the SCons.compat namespace. The modules included here add things to the builtins namespace or the global module list so that the rest of our code can use the objects and names imported here regardless of Python version.

The rest of the things here will be in individual compatibility modules that are either: 1) suitably modified copies of the future modules that we want to use; or 2) backwards compatible re-implementations of the specific portions of a future module's API that we want to use.

GENERAL WARNINGS: Implementations of functions in the SCons.compat modules are *NOT* guaranteed to be fully compliant with these functions in later versions of Python. We are only concerned with adding functionality that we actually use in SCons, so be wary if you lift this code for other uses. (That said, making these more nearly the same as later, official versions is still a desirable goal, we just don't need to be obsessive about it.)

We name the compatibility modules with an initial `'_scons_'` (for example, `_scons_subprocess.py` is our compatibility module for subprocess) so that we can still try to import the real module name and fall back to our compatibility module if we get an `ImportError`. The `import_as()` function defined below loads the module as the "real" name (without the `'_scons_'`), after which all of the "import {module}" statements in the rest of our code will find our pre-loaded compatibility module.

```
class SCons.compat.NoSlotsPyPy
```

```
    Bases: type
```

```
    Metaclass for PyPy compatibility.
```

```
    PyPy does not work well with __slots__ and __class__ assignment.
```

```
    mro ()
```

Return a type's method resolution order.

```
SCons.compat.rename_module (new, old)
```

```
    Attempt to import the old module and load it under the new name. Used for purely cosmetic name changes in Python 3.x.
```

## ***Submodules***

### ***SCons.Action module***

SCons.Action

This encapsulates information about executing any sort of action that can build one or more target Nodes (typically files) from one or more source Nodes (also typically files) given a specific Environment.

The base class here is `ActionBase`. The base class supplies just a few OO utility methods and some generic methods for displaying information about an Action in response to the various commands that control printing.

A second-level base class is `_ActionAction`. This extends `ActionBase` by providing the methods that can be used to show and perform an action. True Action objects will subclass `_ActionAction`; Action factory class objects will subclass `ActionBase`.

The heavy lifting is handled by subclasses for the different types of actions we might execute:

`CommandAction` `CommandGeneratorAction` `FunctionAction` `ListAction`

The subclasses supply the following public interface methods used by other modules:

#### `__call__()`

THE public interface, "calling" an Action object executes the command or Python function. This also takes care of printing a pre-substitution command for debugging purposes.

#### `get_contents()`

Fetches the "contents" of an Action for signature calculation plus the varlist. This is what gets MD5 checksummed to decide if a target needs to be rebuilt because its action changed.

#### `genstring()`

Returns a string representation of the Action *without* command substitution, but allows a `CommandGeneratorAction` to generate the right action based on the specified target, source and env. This is used by the Signature subsystem (through the Executor) to obtain an (imprecise) representation of the Action operation for informative purposes.

Subclasses also supply the following methods for internal use within this module:

#### `__str__()`

Returns a string approximation of the Action; no variable substitution is performed.

#### `execute()`

The internal method that really, truly, actually handles the execution of a command or Python function. This is used so that the `__call__()` methods can take care of displaying any pre-substitution representations, and *then* execute an action without worrying about the specific Actions involved.

#### `get_presig()`

Fetches the "contents" of a subclass for signature calculation. The varlist is added to this to produce the Action's contents. TODO(?): Change this to always return ascii/bytes and not unicode (or py3 strings)

#### `strfunction()`

Returns a substituted string representation of the Action. This is used by the `_ActionAction.show()` command to display the command/function that will be executed to generate the target(s).

There is a related independent `ActionCaller` class that looks like a regular Action, and which serves as a wrapper for arbitrary functions that we want to let the user specify the arguments to now, but actually execute later (when an out-of-date check determines that it's needed to be executed, for example). Objects of this class are returned by an `ActionFactory` class that provides a `__call__()` method as a convenient way for wrapping up the functions.

`SCons.Action.Action` (act, \*args, \*\*kw)  
A factory for action objects.

`class SCons.Action.ActionBase`

Bases: `object`

Base class for all types of action objects that can be held by other objects (Builders, Executors, etc.) This provides the common methods for manipulating and combining those actions.

`batch_key` (env, target, source)

`genstring` (target, source, env)

`get_contents` (target, source, env)

`get_targets` (env, executor)

Returns the type of targets (`$TARGETS`, `$CHANGED_TARGETS`) used by this action.

`get_varlist` (target, source, env, executor=None)

**no\_batch\_key** (env, target, source)

**presub\_lines** (env)

*class* SCons.Action.ActionCaller (parent, args, kw)

Bases: **object**

A class for delaying calling an Action function with specific (positional and keyword) arguments until the Action is actually executed.

This class looks to the rest of the world like a normal Action object, but what it's really doing is hanging on to the arguments until we have a target, source and env to use for the expansion.

**get\_contents** (target, source, env)

**strfunction** (target, source, env)

**subst** (s, target, source, env)

**subst\_args** (target, source, env)

**subst\_kw** (target, source, env)

*class* SCons.Action.ActionFactory (actfunc, strfunc, convert=<function ActionFactory.<lambda>>)

Bases: **object**

A factory class that will wrap up an arbitrary function as an SCons-executable Action object.

The real heavy lifting here is done by the ActionCaller class. We just collect the (positional and keyword) arguments that we're called with and give them to the ActionCaller object we create, so it can hang onto them until it needs them.

*class* SCons.Action.CommandAction (cmd, \*\*kw)

Bases: **SCons.Action.\_ActionAction**

Class for command-execution actions.

**\_get\_implicit\_deps\_heavyweight** (target, source, env, executor, icd\_int)

Heavyweight dependency scanning involves scanning more than just the first entry in an action string. The exact behavior depends on the value of icd\_int. Only files are taken as implicit dependencies; directories are ignored.

If icd\_int is an integer value, it specifies the number of entries to scan for implicit dependencies. Action strings are also scanned after a &&. So for example, if icd\_int=2 and the action string is "cd <some\_dir> && \$PYTHON \$SCRIPT\_PATH <another\_path>", the implicit dependencies would be the path to the python binary and the path to the script.

If icd\_int is None, all entries are scanned for implicit dependencies.

**\_get\_implicit\_deps\_lightweight** (target, source, env, executor)

Lightweight dependency scanning involves only scanning the first entry in an action string, even if it contains &&.

**batch\_key** (env, target, source)

**execute** (target, source, env, executor=None)

Execute a command action.

This will handle lists of commands as well as individual commands, because construction variable substitution may turn a single "command" into a list. This means that this class can actually handle lists of commands, even though that's not how we use it externally.

**genstring** (target, source, env)

**get\_contents** (target, source, env)

**get\_implicit\_deps** (target, source, env, executor=None)

Return the implicit dependencies of this action's command line.

**get\_presig** (target, source, env, executor=None)

Return the signature contents of this action's command line.

This strips \$(-\$) and everything in between the string, since those parts don't affect signatures.

**get\_targets** (env, executor)

Returns the type of targets (\$TARGETS, \$CHANGED\_TARGETS) used by this action.

**get\_varlist** (target, source, env, executor=None)

**no\_batch\_key** (env, target, source)

**presub\_lines** (env)

**print\_cmd\_line** (s, target, source, env)

In python 3, and in some of our tests, sys.stdout is a String io object, and it takes unicode strings only This code assumes s is a regular string.

**process** (target, source, env, executor=None)

**strfunction** (target, source, env, executor=None)

*class* SCons.Action.CommandGeneratorAction (generator, kw)

Bases: SCons.Action.ActionBase

Class for command-generator actions.

**\_generate** (target, source, env, for\_signature, executor=None)

**batch\_key** (env, target, source)

**genstring** (target, source, env, executor=None)

**get\_contents** (target, source, env)

**get\_implicit\_deps** (target, source, env, executor=None)

**get\_presig** (target, source, env, executor=None)

Return the signature contents of this action's command line.

This strips \$(-\$) and everything in between the string, since those parts don't affect signatures.

**get\_targets** (env, executor)

Returns the type of targets (\$TARGETS, \$CHANGED\_TARGETS) used by this action.

**get\_varlist** (target, source, env, executor=None)

**no\_batch\_key** (env, target, source)

**presub\_lines** (env)

*class* SCons.Action.FunctionAction (execfunction, kw)

Bases: SCons.Action.\_ActionAction

Class for Python function actions.

**batch\_key** (env, target, source)

**execute** (target, source, env, executor=None)

**function\_name** ()

**genstring** (target, source, env)

**get\_contents** (target, source, env)

**get\_implicit\_deps** (target, source, env)

**get\_presig** (target, source, env)

Return the signature contents of this callable action.

**get\_targets** (env, executor)

Returns the type of targets (\$TARGETS, \$CHANGED\_TARGETS) used by this action.

**get\_varlist** (target, source, env, executor=None)

**no\_batch\_key** (env, target, source)

**presub\_lines** (env)

**print\_cmd\_line** (s, target, source, env)

In python 3, and in some of our tests, sys.stdout is a String io object, and it takes unicode strings only This code assumes s is a regular string.

**strfunction** (target, source, env, executor=None)

*class* SCons.Action.LazyAction (var, kw)

Bases: SCons.Action.CommandGeneratorAction, SCons.Action.CommandAction

A LazyAction is a kind of hybrid generator and command action for strings of the form "\$VAR". These strings normally expand to other strings (think "\$CCCOM" to "\$CC -c -o \$TARGET \$SOURCE"), but we also want to be able to replace them with functions in the construction environment. Consequently, we want lazy evaluation and creation of an Action in the case of the function, but that's overkill in the more normal case of expansion to other strings.

So we do this with a subclass that's both a generator *and* a command action. The overridden methods all do a quick check of the construction variable, and if it's a string we just call the corresponding CommandAction method to do the heavy lifting. If not, then we call the same-named CommandGeneratorAction method. The CommandGeneratorAction methods work by using the overridden `_generate()` method, that is, our own way of handling "generation" of an action based on what's in the construction variable.

**\_generate** (target, source, env, for\_signature, executor=None)

**\_generate\_cache** (env)

**\_get\_implicit\_deps\_heavyweight** (target, source, env, executor, icd\_int)

Heavyweight dependency scanning involves scanning more than just the first entry in an action string. The exact behavior depends on the value of `icd_int`. Only files are taken as implicit dependencies; directories are ignored.

If `icd_int` is an integer value, it specifies the number of entries to scan for implicit dependencies. Action strings are also scanned after a `&&`. So for example, if `icd_int=2` and the action string is "cd <some\_dir> && \$PYTHON \$SCRIPT\_PATH <another\_path>", the implicit dependencies would be the path to the python binary and the path to the script.

If `icd_int` is None, all entries are scanned for implicit dependencies.

**\_get\_implicit\_deps\_lightweight** (target, source, env, executor)

Lightweight dependency scanning involves only scanning the first entry in an action string, even if it contains `&&`.

**batch\_key** (env, target, source)

**execute** (target, source, env, executor=None)

Execute a command action.

This will handle lists of commands as well as individual commands, because construction variable substitution may turn a single "command" into a list. This means that this class can actually handle lists of commands, even though that's not how we use it externally.

**genstring** (target, source, env, executor=None)

**get\_contents** (target, source, env)

**get\_implicit\_deps** (target, source, env, executor=None)

**get\_parent\_class** (env)

**get\_presig** (target, source, env)

Return the signature contents of this action's command line.

This strips \$(-\$) and everything in between the string, since those parts don't affect signatures.

**get\_targets** (env, executor)

Returns the type of targets (\$TARGETS, \$CHANGED\_TARGETS) used by this action.

**get\_varlist** (target, source, env, executor=None)

**no\_batch\_key** (env, target, source)

**presub\_lines** (env)

**print\_cmd\_line** (s, target, source, env)

In python 3, and in some of our tests, sys.stdout is a String io object, and it takes unicode strings only This code assumes s is a regular string.

**process** (target, source, env, executor=None)

**strfunction** (target, source, env, executor=None)

*class* SCons.Action.**ListAction** (actionlist)

Bases: SCons.Action.**ActionBase**

Class for lists of other actions.

**batch\_key** (env, target, source)

**genstring** (target, source, env)

**get\_contents** (target, source, env)

**get\_implicit\_deps** (target, source, env)

**get\_presig** (target, source, env)

Return the signature contents of this action list.

Simple concatenation of the signatures of the elements.

**get\_targets** (env, executor)

Returns the type of targets (\$TARGETS, \$CHANGED\_TARGETS) used by this action.

**get\_varlist** (target, source, env, executor=None)

**no\_batch\_key** (env, target, source)

**presub\_lines** (env)

*class* SCons.Action.**\_ActionAction** (cmdstr=<class 'SCons.Action.\_null'>, strfunction=<class 'SCons.Action.\_null'>, varlist=(), presub=<class 'SCons.Action.\_null'>, chdir=None, exitstatfunc=None, batch\_key=None, targets='\$TARGETS', \*\*kw)

Bases: SCons.Action.**ActionBase**

Base class for actions that create output objects.

**batch\_key** (env, target, source)

**genstring** (target, source, env)

**get\_contents** (target, source, env)

**get\_targets** (env, executor)

Returns the type of targets (\$TARGETS, \$CHANGED\_TARGETS) used by this action.

**get\_varlist** (target, source, env, executor=None)

**no\_batch\_key** (env, target, source)

**presub\_lines** (env)

**print\_cmd\_line** (s, target, source, env)

In python 3, and in some of our tests, sys.stdout is a String io object, and it takes unicode strings only This code assumes s is a regular string.

SCons.Action.\_**actionAppend** (act1, act2)

SCons.Action.\_**callable\_contents** (obj)

Return the signature contents of a callable Python object.

SCons.Action.\_**code\_contents** (code, docstring=None)

Return the signature contents of a code object.

By providing direct access to the code object of the function, Python makes this extremely easy. Hooray!

Unfortunately, older versions of Python include line number indications in the compiled byte code. Boo! So we remove the line number byte codes to prevent recompilations from moving a Python function.

**See:**

- <https://docs.python.org/2/library/inspect.html>
- <http://python-reference.readthedocs.io/en/latest/docs/code/index.html>

For info on what each co\_ variable provides

The signature is as follows (should be byte/chars): co\_argcount, len(co\_varnames), len(co\_cellvars), len(co\_freevars), ( comma separated signature for each object in co\_consts ), ( comma separated signature for each object in co\_names ), ( The bytecode with line number bytecodes removed from co\_code )

co\_argcount - Returns the number of positional arguments (including arguments with default values).

co\_varnames - Returns a tuple containing the names of the local variables (starting with the argument names).

co\_cellvars - Returns a tuple containing the names of local variables that are referenced by nested functions.

co\_freevars - Returns a tuple containing the names of free variables. (?) co\_consts - Returns a tuple containing

the literals used by the bytecode. co\_names - Returns a tuple containing the names used by the bytecode.

co\_code - Returns a string representing the sequence of bytecode instructions.

SCons.Action.\_**do\_create\_action** (act, kw)

This is the actual “implementation” for the Action factory method, below. This handles the fact that passing lists to Action() itself has different semantics than passing lists as elements of lists.

The former will create a ListAction, the latter will create a CommandAction by converting the inner list elements to strings.

SCons.Action.\_**do\_create\_keywords** (args, kw)

This converts any arguments after the action argument into their equivalent keywords and adds them to the kw argument.

SCons.Action.\_**do\_create\_list\_action** (act, kw)

A factory for list actions. Convert the input list into Actions and then wrap them in a ListAction.

SCons.Action.\_**function\_contents** (func)

The signature is as follows (should be byte/chars): < \_code\_contents (see above) from func.\_\_code\_\_ > ,( comma separated \_object\_contents for function argument defaults) ,( comma separated \_object\_contents for any closure contents )

**See also:** <https://docs.python.org/3/reference/datamodel.html>

- func.\_\_code\_\_ - The code object representing the compiled function body.
- func.\_\_defaults\_\_ - A tuple containing default argument values for those arguments that have defaults, or None if no arguments have a default value
- func.\_\_closure\_\_ - None or a tuple of cells that contain bindings for the function’s free variables.

**Returns:** Signature contents of a function. (in bytes)

```
class SCons.Action._null
```

```
  Bases: object
```

```
SCons.Action._object_contents (obj)
```

Return the signature contents of any Python object.

We have to handle the case where object contains a code object since it can be pickled directly.

```
SCons.Action._object_instance_content (obj)
```

Returns consistent content for a action class or an instance thereof

**Parameters:**

- *obj* Should be either an action class or an instance thereof

**Returns:** bytearray or bytes representing the obj suitable for generating a signature from.

```
SCons.Action._string_from_cmd_list (cmd_list)
```

Takes a list of command line arguments and returns a pretty representation for printing.

```
SCons.Action._subproc (scons_env, cmd, error='ignore', **kw)
```

Wrapper for subprocess which pulls from construction env.

Use for calls to subprocess which need to interpolate values from an SCons construction environment into the environment passed to subprocess. Adds an error-handling argument. Adds ability to specify `std{in,out,err}` with “devnull” tag.

```
SCons.Action.default_exitstatfunc (s)
```

```
SCons.Action.get_default_ENV (env)
```

A fiddlin’ little function that has an ‘import SCons.Environment’ which can’t be moved to the top level without creating an import loop. Since this import creates a local variable named ‘SCons’, it blocks access to the global variable, so we move it here to prevent complaints about local variables being used uninitialized.

```
SCons.Action.rfile (n)
```

## SCons.Builder module

SCons.Builder

Builder object subsystem.

A Builder object is a callable that encapsulates information about how to execute actions to create a target Node (file) from source Nodes (files), and how to create those dependencies for tracking.

The main entry point here is the Builder() factory method. This provides a procedural interface that creates the right underlying Builder object based on the keyword arguments supplied and the types of the arguments.

The goal is for this external interface to be simple enough that the vast majority of users can create new Builders as necessary to support building new types of files in their configurations, without having to dive any deeper into this subsystem.

The base class here is BuilderBase. This is a concrete base class which does, in fact, represent the Builder objects that we (or users) create.

There is also a proxy that looks like a Builder:

CompositeBuilder

This proxies for a Builder with an action that is actually a dictionary that knows how to map file suffixes to a specific action. This is so that we can invoke different actions (compilers, compile options) for different flavors of source files.

Builders and their proxies have the following public interface methods used by other modules:

- **\_\_call\_\_()**

THE public interface. Calling a Builder object (with the use of internal helper methods) sets up the target and source dependencies, appropriate mapping to a specific action, and the environment manipulation necessary for overridden construction variable. This also takes care of warning about possible mistakes in keyword arguments.

- **add\_emitter()**

Adds an emitter for a specific file suffix, used by some Tool modules to specify that (for example) a yacc invocation on a .y can create a .h *and* a .c file.

- **add\_action()**

Adds an action for a specific file suffix, heavily used by Tool modules to add their specific action(s) for turning a source file into an object file to the global static and shared object file Builders.

There are the following methods for internal use within this module:

- **\_execute()**

The internal method that handles the heavily lifting when a Builder is called. This is used so that the `__call__()` methods can set up warning about possible mistakes in keyword-argument overrides, and *then* execute all of the steps necessary so that the warnings only occur once.

- **get\_name()**

Returns the Builder's name within a specific Environment, primarily used to try to return helpful information in error messages.

- **adjust\_suffix()**

- **get\_prefix()**

- **get\_suffix()**

- **get\_src\_suffix()**

- **set\_src\_suffix()**

Miscellaneous stuff for handling the prefix and suffix manipulation we use in turning source file names into target file names.

`SCons.Builder.Builder` (\*\*kw)  
A factory for builder objects.

```
class SCons.Builder.BuilderBase (action=None, prefix='', suffix='', src_suffix='',
target_factory=None, source_factory=None, target_scanner=None, source_scanner=None,
emitter=None, multi=0, env=None, single_source=0, name=None, chdir=<class
'SCons.Builder._Null'>, is_explicit=1, src_builder=None, ensure_suffix=False, **overrides)
```

Bases: **object**

Base class for Builders, objects that create output nodes (files) from input nodes (files).

```
_adjustixes (files, pre, suf, ensure_suffix=False)
```

```
_create_nodes (env, target=None, source=None)  
Create and return lists of target and source nodes.
```

```
_execute (env, target, source, overwarn={}, executor_kw={})
```

```
_get_sdict (env)
```

Returns a dictionary mapping all of the source suffixes of all `src_builders` of this Builder to the underlying Builder that should be called first.

This dictionary is used for each target specified, so we save a lot of extra computation by memoizing it for each construction environment.

Note that this is re-computed each time, not cached, because there might be changes to one of our source Builders (or one of their source Builders, and so on, and so on...) that we can't "see."

The underlying methods we call cache their computed values, though, so we hope repeatedly aggregating them into a dictionary like this won't be too big a hit. We may need to look for a better way to do this if performance data show this has turned into a significant bottleneck.

```
_get_src_builders_key (env)
```

```
_subst_src_suffixes_key (env)
```

```
add_emitter (suffix, emitter)
```

Add a suffix-emitter mapping to this Builder.

This assumes that emitter has been initialized with an appropriate dictionary type, and will throw a `TypeError` if not, so the caller is responsible for knowing that this is an appropriate method to call for the Builder in question.

**add\_src\_builder** (*builder*)

Add a new Builder to the list of `src_builders`.

This requires wiping out cached values so that the computed lists of source suffixes get re-calculated.

**adjust\_suffix** (*suff*)

**get\_name** (*env*)

Attempts to get the name of the Builder.

Look at the `BUILDERS` variable of *env*, expecting it to be a dictionary containing this Builder, and return the key of the dictionary. If there's no key, then return a directly-configured name (if there is one) or the name of the class (by default).

**get\_prefix** (*env*, *sources*=[ ])

**get\_src\_builders** (*env*)

Returns the list of source Builders for this Builder.

This exists mainly to look up Builders referenced as strings in the 'BUILDER' variable of the construction environment and cache the result.

**get\_src\_suffix** (*env*)

Get the first `src_suffix` in the list of `src_suffixes`.

**get\_suffix** (*env*, *sources*=[ ])

**set\_src\_suffix** (*src\_suffix*)

**set\_suffix** (*suffix*)

**splitext** (*path*, *env*=None)

**src\_builder\_sources** (*env*, *source*, *overwarn*={ })

**src\_suffixes** (*env*)

Returns the list of source suffixes for all `src_builders` of this Builder.

This is essentially a recursive descent of the `src_builder` "tree." (This value isn't cached because there may be changes in a `src_builder` many levels deep that we can't see.)

**subst\_src\_suffixes** (*env*)

The suffix list may contain construction variable expansions, so we have to evaluate the individual strings. To avoid doing this over and over, we memoize the results for each construction environment.

*class* `SCons.Builder.CallableSelector`

Bases: `SCons.Util.Selector`

A callable dictionary that will, in turn, call the value it finds if it can.

**clear** () → None. Remove all items from `od`.

**copy** () → a shallow copy of `od`

**fromkeys** ()

Create a new ordered dictionary with keys from iterable and values set to value.

**get** ()

Return the value for key if key is in the dictionary, else default.

**items** () → a set-like object providing a view on D's items

**keys** () → a set-like object providing a view on D's keys

**move\_to\_end ()**

Move an existing element to the end (or beginning if last is false).  
Raise `KeyError` if the element does not exist.

**pop (k[, d])** → v, remove specified key and return the corresponding value. If key is not found, d is returned if given, otherwise `KeyError` is raised.

**popitem ()**

Remove and return a (key, value) pair from the dictionary.  
Pairs are returned in LIFO order if last is true or FIFO order if false.

**setdefault ()**

Insert key with a value of default if key is not in the dictionary.  
Return the value for key if key is in the dictionary, else default.

**update ([, E], \*\*F)** → None. Update D from dict/iterable E and F.  
If E is present and has a `.keys()` method, then does: for k in E: D[k] = E[k] If E is present and lacks a `.keys()` method, then does: for k, v in E: D[k] = v In either case, this is followed by: for k in F: D[k] = F[k]

**values ()** → an object providing a view on D's values

*class* `SCons.Builder.CompositeBuilder (builder, cmdgen)`

Bases: `SCons.Util.Proxy`

A Builder Proxy whose main purpose is to always have a `DictCmdGenerator` as its action, and to provide access to the `DictCmdGenerator`'s `add_action()` method.

**add\_action (suffix, action)**

**get ()**

Retrieve the entire wrapped object

*class* `SCons.Builder.DictCmdGenerator (dict=None, source_ext_match=1)`

Bases: `SCons.Util.Selector`

This is a callable class that can be used as a command generator function. It holds on to a dictionary mapping file suffixes to Actions. It uses that dictionary to return the proper action based on the file suffix of the source file.

**add\_action (suffix, action)**

Add a suffix-action pair to the mapping.

**clear ()** → None. Remove all items from od.

**copy ()** → a shallow copy of od

**fromkeys ()**

Create a new ordered dictionary with keys from iterable and values set to value.

**get ()**

Return the value for key if key is in the dictionary, else default.

**items ()** → a set-like object providing a view on D's items

**keys ()** → a set-like object providing a view on D's keys

**move\_to\_end ()**

Move an existing element to the end (or beginning if last is false).  
Raise `KeyError` if the element does not exist.

**pop (k[, d])** → v, remove specified key and return the corresponding value. If key is not found, d is returned if given, otherwise `KeyError` is raised.

**popitem ()**

Remove and return a (key, value) pair from the dictionary.  
Pairs are returned in LIFO order if last is true or FIFO order if false.

**setdefault ()**

Insert key with a value of default if key is not in the dictionary.  
Return the value for key if key is in the dictionary, else default.

**src\_suffixes ()**

**update ([, E], \*\*F)** → None. Update D from dict/iterable E and F.

If E is present and has a .keys() method, then does: for k in E: D[k] = E[k] If E is present and lacks a .keys() method, then does: for k, v in E: D[k] = v In either case, this is followed by: for k in F: D[k] = F[k]

**values ()** → an object providing a view on D's values

**class SCons.Builder.DictEmitter**

Bases: **SCons.Util.Selector**

A callable dictionary that maps file suffixes to emitters. When called, it finds the right emitter in its dictionary for the suffix of the first source file, and calls that emitter to get the right lists of targets and sources to return. If there's no emitter for the suffix in its dictionary, the original target and source are returned.

**clear ()** → None. Remove all items from od.

**copy ()** → a shallow copy of od

**fromkeys ()**

Create a new ordered dictionary with keys from iterable and values set to value.

**get ()**

Return the value for key if key is in the dictionary, else default.

**items ()** → a set-like object providing a view on D's items

**keys ()** → a set-like object providing a view on D's keys

**move\_to\_end ()**

Move an existing element to the end (or beginning if last is false).  
Raise KeyError if the element does not exist.

**pop (k[, d])** → v, remove specified key and return the corresponding value. If key is not found, d is returned if given, otherwise KeyError is raised.

**popitem ()**

Remove and return a (key, value) pair from the dictionary.  
Pairs are returned in LIFO order if last is true or FIFO order if false.

**setdefault ()**

Insert key with a value of default if key is not in the dictionary.  
Return the value for key if key is in the dictionary, else default.

**update ([, E], \*\*F)** → None. Update D from dict/iterable E and F.

If E is present and has a .keys() method, then does: for k in E: D[k] = E[k] If E is present and lacks a .keys() method, then does: for k, v in E: D[k] = v In either case, this is followed by: for k in F: D[k] = F[k]

**values ()** → an object providing a view on D's values

**class SCons.Builder.EmitterProxy (var)**

Bases: **object**

This is a callable class that can act as a Builder emitter. It holds on to a string that is a key into an Environment dictionary, and will look there at actual build time to see if it holds a callable. If so, we will call that as the actual emitter.

```
class SCons.Builder.ListEmitter (initlist=None)
```

```
Bases: collections.UserList
```

A callable list of emitters that calls each in sequence, returning the result.

```
_UserList__cast (other)
```

```
_abc_impl = <_abc_data object>
```

```
append (item)
```

S.append(value) – append value to the end of the sequence

```
clear () → None -- remove all items from S
```

```
copy ()
```

```
count (value) → integer -- return number of occurrences of value
```

```
extend (other)
```

S.extend(iterable) – extend sequence by appending elements from the iterable

```
index (value[, start[, stop]]) → integer -- return first index of value.
```

Raises ValueError if the value is not present.

Supporting start and stop arguments is optional, but recommended.

```
insert (i, item)
```

S.insert(index, value) – insert value before index

```
pop ([, index]) → item -- remove and return item at index (default last).
```

Raise IndexError if list is empty or index is out of range.

```
remove (item)
```

S.remove(value) – remove first occurrence of value. Raise ValueError if the value is not present.

```
reverse ()
```

S.reverse() – reverse *IN PLACE*

```
sort (*args, **kwds)
```

```
class SCons.Builder.OverrideWarner (dict)
```

```
Bases: collections.UserDict
```

A class for warning about keyword arguments that we use as overrides in a Builder call.

This class exists to handle the fact that a single Builder call can actually invoke multiple builders. This class only emits the warnings once, no matter how many Builders are invoked.

```
_MutableMapping__marker = <object object>
```

```
_abc_impl = <_abc_data object>
```

```
clear () → None. Remove all items from D.
```

```
copy ()
```

```
classmethod fromkeys (iterable, value=None)
```

```
get (k[, d]) → D[k] if k in D, else d. d defaults to None.
```

```
items () → a set-like object providing a view on D's items
```

```
keys () → a set-like object providing a view on D's keys
```

```
pop (k[, d]) → v, remove specified key and return the corresponding value.
```

If key is not found, d is returned if given, otherwise KeyError is raised.

**popitem ()** → (k, v), remove and return some (key, value) pair as a 2-tuple; but raise KeyError if D is empty.

**setdefault (k[, d])** → D.get(k,d), also set D[k]=d if k not in D

**update ([, E], \*\*F)** → None. Update D from mapping/iterable E and F.

If E present and has a .keys() method, does: for k in E: D[k] = E[k] If E present and lacks .keys() method, does: for (k, v) in E: D[k] = v In either case, this is followed by: for k, v in F.items(): D[k] = v

**values ()** → an object providing a view on D's values

**warn ()**

*class* SCons.Builder.\_Null

Bases: **object**

SCons.Builder.\_node\_errors (builder, env, tlist, slist)

Validate that the lists of target and source nodes are legal for this builder and environment. Raise errors or issue warnings as appropriate.

SCons.Builder.\_null

alias of **SCons.Builder.\_Null**

SCons.Builder.is\_a\_Builder (obj)

“Returns True if the specified obj is one of our Builder classes.

The test is complicated a bit by the fact that CompositeBuilder is a proxy, not a subclass of BuilderBase.

SCons.Builder.match\_splitext (path, suffixes=[ ])

## SCons.CacheDir module

CacheDir support

*class* SCons.CacheDir.CacheDir (path)

Bases: **object**

**CacheDebug** (fmt, target, cachefile)

**\_readconfig** (path)

Read the cache config.

If directory or config file do not exist, create. Take advantage of Py3 capability in os.makedirs() and in file open(): just try the operation and handle failure appropriately.

Omit the check for old cache format, assume that's old enough there will be none of those left to worry about.

**Parameters:** **path** – path to the cache directory

**cachepath** (node)

**property hit\_ratio**

**is\_enabled ()**

**is\_readonly ()**

**property misses**

**push** (node)

**push\_if\_forced** (node)

**retrieve** (node)

This method is called from multiple threads in a parallel build, so only do thread safe stuff here. Do thread unsafe stuff in built().

Note that there's a special trick here with the execute flag (one that's not normally done for other actions). Basically if the user requested a no\_exec (-n) build, then SCons.Action.execute\_actions is set to 0 and when any action is called, it does its showing but then just returns zero instead of actually calling the action execution operation. The problem for caching is that if the file does NOT exist in cache then the CacheRetrieveString won't return anything to show for the task, but the Action.\_\_call\_\_ won't call CacheRetrieveFunc; instead it just returns zero, which makes the code below think that the file was successfully retrieved from the cache, therefore it doesn't do any subsequent building. However, the CacheRetrieveString didn't print anything because it didn't actually exist in the cache, and no more build actions will be performed, so the user just sees nothing. The fix is to tell Action.\_\_call\_\_ to always execute the CacheRetrieveFunc and then have the latter explicitly check SCons.Action.execute\_actions itself.

SCons.CacheDir.**CachePushFunc** (target, source, env)

SCons.CacheDir.**CacheRetrieveFunc** (target, source, env)

SCons.CacheDir.**CacheRetrieveString** (target, source, env)

## SCons.Conftest module

### SCons.Conftest

Autoconf-like configuration support; low level implementation of tests.

SCons.Conftest.**CheckBuilder** (context, text=None, language=None)

Configure check to see if the compiler works. Note that this uses the current value of compiler and linker flags, make sure \$CFLAGS, \$CPPFLAGS and \$LIBS are set correctly. "language" should be "C" or "C++" and is used to select the compiler. Default is "C". "text" may be used to specify the code to be build. Returns an empty string for success, an error message for failure.

SCons.Conftest.**CheckCC** (context)

Configure check for a working C compiler.

This checks whether the C compiler, as defined in the \$CC construction variable, can compile a C source file. It uses the current \$CCCOM value too, so that it can test against non working flags.

SCons.Conftest.**CheckCXX** (context)

Configure check for a working CXX compiler.

This checks whether the CXX compiler, as defined in the \$CXX construction variable, can compile a CXX source file. It uses the current \$CXXCOM value too, so that it can test against non working flags.

SCons.Conftest.**CheckDeclaration** (context, symbol, includes=None, language=None)

Checks whether symbol is declared.

Use the same test as autoconf, that is test whether the symbol is defined as a macro or can be used as an r-value.

**Parameters:**

- **symbol** – str the symbol to check
- **includes** – str Optional "header" can be defined to include a header file.
- **language** – str only C and C++ supported.

**Returns:** bool True if the check failed, False if succeeded.

**Return type:** status

SCons.Conftest.**CheckFunc** (context, function\_name, header=None, language=None)

Configure check for a function "function\_name". "language" should be "C" or "C++" and is used to select the compiler. Default is "C". Optional "header" can be defined to define a function prototype, include a header file or anything else that comes before main(). Sets HAVE\_function\_name in context.havedict according to the result. Note that this uses the current value of compiler and linker flags, make sure \$CFLAGS, \$CPPFLAGS and \$LIBS are set correctly. Returns an empty string for success, an error message for failure.

SCons.Conftest.**CheckHeader** (context, header\_name, header=None, language=None, include\_quotes=None)

Configure check for a C or C++ header file "header\_name". Optional "header" can be defined to do something before including the header file (unusual, supported for consistency). "language" should be "C" or "C++" and is used to select the compiler. Default is "C". Sets HAVE\_header\_name in context.havedict according to the result.

Note that this uses the current value of compiler and linker flags, make sure \$CFLAGS and \$CPPFLAGS are set correctly. Returns an empty string for success, an error message for failure.

`SCons.Conftest.CheckLib(context, libs, func_name=None, header=None, extra_libs=None, call=None, language=None, autoadd=1, append=True)`

Configure check for a C or C++ libraries “libs”. Searches through the list of libraries, until one is found where the test succeeds. Tests if “func\_name” or “call” exists in the library. Note: if it exists in another library the test succeeds anyway! Optional “header” can be defined to include a header file. If not given a default prototype for “func\_name” is added. Optional “extra\_libs” is a list of library names to be added after “lib\_name” in the build command. To be used for libraries that “lib\_name” depends on. Optional “call” replaces the call to “func\_name” in the test code. It must consist of complete C statements, including a trailing “;”. Both “func\_name” and “call” arguments are optional, and in that case, just linking against the libs is tested. “language” should be “C” or “C++” and is used to select the compiler. Default is “C”. Note that this uses the current value of compiler and linker flags, make sure \$CFLAGS, \$CPPFLAGS and \$LIBS are set correctly. Returns an empty string for success, an error message for failure.

`SCons.Conftest.CheckProg(context, prog_name)`

Configure check for a specific program.

Check whether program prog\_name exists in path. If it is found, returns the path for it, otherwise returns None.

`SCons.Conftest.CheckSHCC(context)`

Configure check for a working shared C compiler.

This checks whether the C compiler, as defined in the \$SHCC construction variable, can compile a C source file. It uses the current \$SHCCCOM value too, so that it can test against non working flags.

`SCons.Conftest.CheckSHCXX(context)`

Configure check for a working shared CXX compiler.

This checks whether the CXX compiler, as defined in the \$SHCXX construction variable, can compile a CXX source file. It uses the current \$SHCXXCOM value too, so that it can test against non working flags.

`SCons.Conftest.CheckType(context, type_name, fallback=None, header=None, language=None)`

Configure check for a C or C++ type “type\_name”. Optional “header” can be defined to include a header file. “language” should be “C” or “C++” and is used to select the compiler. Default is “C”. Sets HAVE\_type\_name in context.havedict according to the result. Note that this uses the current value of compiler and linker flags, make sure \$CFLAGS, \$CPPFLAGS and \$LIBS are set correctly. Returns an empty string for success, an error message for failure.

`SCons.Conftest.CheckTypeSize(context, type_name, header=None, language=None, expect=None)`

This check can be used to get the size of a given type, or to check whether the type is of expected size.

#### Parameters:

- **type** (-) – str the type to check
- **includes** (-) – sequence list of headers to include in the test code before testing the type
- **language** (-) – str ‘C’ or ‘C++’
- **expect** (-) – int if given, will test whether the type has the given number of bytes. If not given, will automatically find the size.
- **Returns** – statusint0 if the check failed, or the found size of the type if the check succeeded.

`SCons.Conftest._Have(context, key, have, comment=None)`

Store result of a test in context.havedict and context.headerfilename.

#### Parameters:

- *key* - is a “HAVE\_abc” name. It is turned into all CAPITALS and non-alphanumerics are replaced by an underscore.
- *have* - value as it should appear in the header file, include quotes when desired and escape special characters!
- *comment* is the C comment to add above the line defining the symbol (the comment is automatically put inside a /\* \*/). If None, no comment is added.

**The value of “have” can be:**

- 1 - Feature is defined, add “#define key”.
- 0 - Feature is not defined, add “/\* #undef key \*/”. Adding “undef” is what autoconf does. Not useful for the compiler, but it shows that the test was done.
- number - Feature is defined to this number “#define key have”. Doesn’t work for 0 or 1, use a string then.
- string - Feature is defined to this string “#define key have”.

`SCons.Conftest._LogFailed` (context, text, msg)

Write to the log about a failed program. Add line numbers, so that error messages can be understood.

`SCons.Conftest._YesNoResult` (context, ret, key, text, comment=None)

Handle the result of a test with a “yes” or “no” result.

**Parameters:**

- *ret* is the return value: empty if OK, error message when not.
- *key* is the name of the symbol to be defined (HAVE\_foo).
- *text* is the source code of the program used for testing.
- *comment* is the C comment to add above the line defining the symbol (the comment is automatically put inside a /\* \*/). If None, no comment is added.

`SCons.Conftest._check_empty_program` (context, comp, text, language, use\_shared=False)

Return 0 on success, 1 otherwise.

`SCons.Conftest._lang2suffix` (lang)

Convert a language name to a suffix. When “lang” is empty or None C is assumed. Returns a tuple (lang, suffix, None) when it works. For an unrecognized language returns (None, None, msg).

**Where:**

- lang = the unified language name
- suffix = the suffix, including the leading dot
- msg = an error message

## SCons.Debug module

`SCons.Debug`

Code for debugging SCons internal things. Shouldn’t be needed by most users. Quick shortcuts:

```
from SCons.Debug import caller_trace caller_trace()
```

`SCons.Debug.Trace` (msg, filename=None, mode='w', tstamp=False)

Write a trace message.

Write messages when debugging which do not interfere with stdout. Useful in tests, which monitor stdout and would break with unexpected output. Trace messages can go to the console (which is opened as a file), or to a disk file; the file argument persists across calls unless overridden.

**Parameters:**

- **filename** – file to write trace message to. If omitted, write to the previous trace file (default: console).
- **mode** – file open mode (default: ‘w’)
- **tstamp** – write relative timestamps with trace. Outputs time since scon was started, and time since last trace (default: False)

`SCons.Debug._dump_one_caller` (key, file, level=0)

`SCons.Debug.caller_stack` ()

`SCons.Debug.caller_trace` (back=0)

Trace caller stack and save info into global dicts, which are printed automatically at the end of SCons execution.

`SCons.Debug.countLoggedInstances` (classes, file=<\_io.TextIOWrapper name='<stdout>' mode='w' encoding='utf-8'>)

```

SCons.Debug.dumpLoggedInstances (classes, file=<_io.TextIOWrapper name='<stdout>'
mode='w' encoding='utf-8'>)
SCons.Debug.dump_caller_counts (file=<_io.TextIOWrapper name='<stdout>' mode='w'
encoding='utf-8'>)
SCons.Debug.fetchLoggedInstances (classes='*')
SCons.Debug.func_shorten (func_tuple)
SCons.Debug.listLoggedInstances (classes, file=<_io.TextIOWrapper name='<stdout>'
mode='w' encoding='utf-8'>)
SCons.Debug.logInstanceCreation (instance, name=None)
SCons.Debug.memory ()
SCons.Debug.string_to_classes (s)

```

## SCons.Defaults module

### SCons.Defaults

Builders and other things for the local site. Here's where we'll duplicate the functionality of autoconf until we move it into the installation procedure or use something like qmconf.

The code that reads the registry to find MSVC components was borrowed from `distutils.msvccompiler`.

```

SCons.Defaults.DefaultEnvironment (*args, **kw)
  Initial public entry point for creating the default construction Environment.
  After creating the environment, we overwrite our name (DefaultEnvironment) with the _fetch_DefaultEnvironment()
  function, which more efficiently returns the initialized default construction environment without checking for its
  existence.
  (This function still exists with its _default_check because someone else (cough Script/__init__.py cough) may keep
  a reference to this function. So we can't use the fully functional idiom of having the name originally be a something
  that only creates the construction environment and then overwrites the name.)

```

```

class SCons.Defaults.NullCmdGenerator (cmd)
  Bases: object
  This is a callable class that can be used in place of other command generators if you don't want them to do
  anything.
  The __call__ method for this class simply returns the thing you instantiated it with.
  Example usage: env["DO_NOTHING"] = NullCmdGenerator env["LINKCOM"] = "${DO_NOTHING('$LINK $SOURCES $TARGET')}"

```

```

SCons.Defaults.SharedFlagChecker (source, target, env)
SCons.Defaults.SharedObjectEmitter (target, source, env)
SCons.Defaults.StaticObjectEmitter (target, source, env)

```

```

class SCons.Defaults.Variable_Method_Caller (variable, method)
  Bases: object
  A class for finding a construction variable on the stack and calling one of its methods.
  We use this to support "construction variables" in our string eval()s that actually stand in for methods—specifically,
  use of "RDirs" in call to _concat that should actually execute the "TARGET.RDirs" method. (We used to support
  this by creating a little "build dictionary" that mapped RDirs to the method, but this got in the way of Memoizing
  construction environments, because we had to create new environment objects to hold the variables.)

```

```

SCons.Defaults.__libversionflags (env, version_var, flags_var)
SCons.Defaults._concat (prefix, list, suffix, env, f=<function <lambda>>, target=None,
source=None)
  Creates a new list from 'list' by first interpolating each element in the list using the 'env' dictionary and then calling f
  on the list, and finally calling _concat_ixes to concatenate 'prefix' and 'suffix' onto each element of the list.
SCons.Defaults._concat_ixes (prefix, list, suffix, env)

```

Creates a new list from 'list' by concatenating the 'prefix' and 'suffix' arguments onto each element of the list. A trailing space on 'prefix' or leading space on 'suffix' will cause them to be put into separate list elements rather than being concatenated.

`SCons.Defaults._defines` (prefix, defs, suffix, env, c=<function \_concat\_ixes>)

A wrapper around `_concat_ixes` that turns a list or string into a list of C preprocessor command-line definitions.

`SCons.Defaults._fetch_DefaultEnvironment` (\*args, \*\*kw)

Returns the already-created default construction environment.

`SCons.Defaults._stripixes` (prefix, itms, suffix, stripprefixes, stripsuffixes, env, c=None)

This is a wrapper around `_concat()/_concat_ixes()` that checks for the existence of prefixes or suffixes on list items and strips them where it finds them. This is used by tools (like the GNU linker) that need to turn something like 'libfoo.a' into '-lfoo'.

`SCons.Defaults.chmod_func` (dest, mode)

`SCons.Defaults.chmod_strfunc` (dest, mode)

`SCons.Defaults.copy_func` (dest, src, symlinks=True)

If `symlinks` (is true), then a symbolic link will be shallow copied and recreated as a symbolic link; otherwise, copying a symbolic link will be equivalent to copying the symbolic link's final target regardless of symbolic link depth.

`SCons.Defaults.delete_func` (dest, must\_exist=0)

`SCons.Defaults.delete_strfunc` (dest, must\_exist=0)

`SCons.Defaults.get_paths_str` (dest)

`SCons.Defaults.mkdir_func` (dest)

`SCons.Defaults.move_func` (dest, src)

`SCons.Defaults.processDefines` (defs)

process defines, resolving strings, lists, dictionaries, into a list of strings

`SCons.Defaults.touch_func` (dest)

## SCons.Environment module

`SCons.Environment`

Base class for construction Environments. These are the primary objects used to communicate dependency and construction information to the build engine.

Keyword arguments supplied when the construction Environment is created are construction variables used to initialize the Environment

`class SCons.Environment.Base` (platform=None, tools=None, toolpath=None, variables=None, parse\_flags=None, \*\*kw)

Bases: `SCons.Environment.SubstitutionEnvironment`

Base class for "real" construction Environments. These are the primary objects used to communicate dependency and construction information to the build engine.

Keyword arguments supplied when the construction Environment is created are construction variables used to initialize the Environment.

**Action** (\*args, \*\*kw)

**AddMethod** (function, name=None)

Adds the specified function as a method of this construction environment with the specified name. If the name is omitted, the default name is the name of the function itself.

**AddPostAction** (files, action)

**AddPreAction** (files, action)

**Alias** (target, source=[], action=None, \*\*kw)

**AlwaysBuild** (\*targets)

**Append** (\*\*kw)

Append values to existing construction variables in an Environment.

**AppendENVPPath** (name, newpath, envname='ENV', sep=':', delete\_existing=0)

Append path elements to the path 'name' in the 'ENV' dictionary for this environment. Will only add any particular path once, and will normpath and normcase all paths to help assure this. This can also handle the case where the env variable is a list instead of a string.

If delete\_existing is 0, a newpath which is already in the path will not be moved to the end (it will be left where it is).

**AppendUnique** (delete\_existing=0, \*\*kw)

Append values to existing construction variables in an Environment, if they're not already there. If delete\_existing is 1, removes existing values first, so values move to end.

**Builder** (\*\*kw)

**CacheDir** (path)

**Clean** (targets, files)

**Clone** (tools=[], toolpath=None, parse\_flags=None, \*\*kw)

Return a copy of a construction Environment. The copy is like a Python "deep copy"—that is, independent copies are made recursively of each objects—except that a reference is copied when an object is not deep-copyable (like a function). There are no references to any mutable objects in the original Environment.

**Command** (target, source, action, \*\*kw)

Builds the supplied target files from the supplied source files using the supplied action. Action may be any type that the Builder constructor will accept for an action.

**Configure** (\*args, \*\*kw)

**Decider** (function)

**Depends** (target, dependency)

Explicitly specify that 'target's depend on 'dependency'.

**Detect** (progs)

Return the first available program in progs.

**Parameters:** **progs** (*str or list*) – one or more command names to check for

**Returns str:** first name from progs that can be found.

**Dictionary** (\*args)

Return construction variables from an environment.

**Parameters:** **\*args** (*optional*) – variable names to look up

**Returns:** If *args* omitted, the dictionary of all construction variables. If one arg, the corresponding value is returned. If more than one arg, a list of values is returned.

**Raises:** **KeyError** – if any of *args* is not in the construction environment.

**Dir** (name, \*args, \*\*kw)

**Dump** (key=None, format='pretty')

Return construction variables serialized to a string.

**Parameters:**

- **key** (*optional*) – if None, format the whole dict of variables. Else format the value of key (Default value = None)
- **format** (*optional*) – specify the format to serialize to. “pretty” generates a pretty-printed string, “json” a JSON-formatted string. (Default value = None, equivalent to “pretty”)

**Entry** (name, \*args, \*\*kw)

**Environment** (\*\*kw)

**Execute** (action, \*args, \*\*kw)

Directly execute an action through an Environment

**File** (name, \*args, \*\*kw)

**FindFile** (file, dirs)

**FindInstalledFiles** ()

returns the list of all targets of the Install and InstallAs Builder.

**FindIdxes** (paths, prefix, suffix)

Search a list of paths for something that matches the prefix and suffix.

**Parameters:**

- **paths** – the list of paths or nodes.
- **prefix** – construction variable for the prefix.
- **suffix** – construction variable for the suffix.

Returns: the matched path or None

**FindSourceFiles** (node=' . ')

returns a list of all source files.

**Flatten** (sequence)

**GetBuildPath** (files)

**Glob** (pattern, ondisk=True, source=False, strings=False, exclude=None)

**Ignore** (target, dependency)

Ignore a dependency.

**Literal** (string)

**Local** (\*targets)

**MergeFlags** (args, unique=1, dict=None)

Merge the dict in args into the construction variables of this env, or the passed-in dict. If args is not a dict, it is converted into a dict using ParseFlags. If unique is not set, the flags are appended rather than merged.

**NoCache** (\*targets)

Tags a target so that it will not be cached

**NoClean** (\*targets)

Tags a target so that it will not be cleaned by -c

**Override** (overrides)

Produce a modified environment whose variables are overridden by the overrides dictionaries. “overrides” is a dictionary that will override the variables of this environment.

This function is much more efficient than Clone() or creating a new Environment because it doesn't copy the construction environment dictionary, it just wraps the underlying construction environment, and doesn't even create a wrapper object if there are no overrides.

**ParseConfig** (command, function=None, unique=1)

Use the specified function to parse the output of the command in order to modify the current environment. The 'command' can be a string or a list of strings representing a command and its arguments. 'Function' is an optional argument that takes the environment, the output of the command, and the unique flag. If no function is specified, MergeFlags, which treats the output as the result of a typical 'X-config' command (i.e. gtk-config), will merge the output into the appropriate variables.

**ParseDepends** (filename, must\_exist=None, only\_one=0)

Parse a mkdep-style file for explicit dependencies. This is completely abusable, and should be unnecessary in the "normal" case of proper SCons configuration, but it may help make the transition from a Make hierarchy easier for some people to swallow. It can also be genuinely useful when using a tool that can write a .d file, but for which writing a scanner would be too complicated.

**ParseFlags** (\*flags)

Parse the set of flags and return a dict with the flags placed in the appropriate entry. The flags are treated as a typical set of command-line flags for a GNU-like toolchain and used to populate the entries in the dict immediately below. If one of the flag strings begins with a bang (exclamation mark), it is assumed to be a command and the rest of the string is executed; the result of that evaluation is then added to the dict.

**Platform** (platform)

**Precious** (\*targets)

**Prepend** (\*\*kw)

Prepend values to existing construction variables in an Environment.

**PrependENVPath** (name, newpath, envname='ENV', sep=':', delete\_existing=1)

Prepend path elements to the path 'name' in the 'ENV' dictionary for this environment. Will only add any particular path once, and will normpath and normcase all paths to help assure this. This can also handle the case where the env variable is a list instead of a string.

If delete\_existing is 0, a newpath which is already in the path will not be moved to the front (it will be left where it is).

**PrependUnique** (delete\_existing=0, \*\*kw)

Prepend values to existing construction variables in an Environment, if they're not already there. If delete\_existing is 1, removes existing values first, so values move to front.

**Pseudo** (\*targets)

**PyPackageDir** (modulename)

**RemoveMethod** (function)

Removes the specified function's MethodWrapper from the added\_methods list, so we don't re-bind it when making a clone.

**Replace** (\*\*kw)

Replace existing construction variables in an Environment with new construction variables and/or values.

**ReplaceIxes** (path, old\_prefix, old\_suffix, new\_prefix, new\_suffix)

Replace old\_prefix with new\_prefix and old\_suffix with new\_suffix.

env - Environment used to interpolate variables. path - the path that will be modified. old\_prefix - construction variable for the old prefix. old\_suffix - construction variable for the old suffix. new\_prefix - construction variable for the new prefix. new\_suffix - construction variable for the new suffix.

**Repository** (\*dirs, \*\*kw)

**Requires** (target, prerequisite)

Specify that 'prerequisite' must be built before 'target', (but 'target' does not actually depend on 'prerequisite' and need not be rebuilt if it changes).

**SConsignFile** (name=' .sconsign', dbm\_module=None)

**Scanner** (\*args, \*\*kw)

**SetDefault** (\*\*kw)

**SideEffect** (side\_effect, target)

Tell scons that side\_effects are built as side effects of building targets.

**Split** (arg)

This function converts a string or list into a list of strings or Nodes. This makes things easier for users by allowing files to be specified as a white-space separated list to be split.

**The input rules are:**

- A single string containing names separated by spaces. These will be split apart at the spaces.
  - A single Node instance
  - A list containing either strings or Node instances. Any strings in the list are not split at spaces.
- In all cases, the function returns a list of Nodes and strings.

**Tool** (tool, toolpath=None, \*\*kw)

**Value** (value, built\_value=None, name=None)

**VariantDir** (variant\_dir, src\_dir, duplicate=1)

**WhereIs** (prog, path=None, pathext=None, reject=[ ])

Find prog in the path.

**\_canonicalize** (path)

**\_changed\_build** (dependency, target, prev\_ni, repo\_node=None)

**\_changed\_content** (dependency, target, prev\_ni, repo\_node=None)

**\_changed\_source** (dependency, target, prev\_ni, repo\_node=None)

**\_changed\_timestamp\_match** (dependency, target, prev\_ni, repo\_node=None)

**\_changed\_timestamp\_newer** (dependency, target, prev\_ni, repo\_node=None)

**\_changed\_timestamp\_then\_content** (dependency, target, prev\_ni, repo\_node=None)

**\_copy2\_from\_cache** (src, dst)

**\_copy\_from\_cache** (src, dst)

**\_find\_toolpath\_dir** (tp)

**\_gsm** ()

**\_init\_special** ()

Initial the dispatch tables for special handling of special construction variables.

**\_update** (dict)

Update an environment's values directly, bypassing the normal checks that occur when users try to set items.

**arg2nodes** (args, node\_factory=<class 'SCons.Environment.\_Null'>, lookup\_list=<class 'SCons.Environment.\_Null'>, \*\*kw)

**backtick** (command)

**get** (key, default=None)  
Emulates the get() method of dictionaries.

**get\_CacheDir** ()

**get\_builder** (name)  
Fetch the builder with the specified name from the environment.

**get\_factory** (factory, default='File')  
Return a factory function for creating Nodes for this construction environment.

**get\_scanner** (skey)  
Find the appropriate scanner given a key (usually a file suffix).

**get\_src\_sig\_type** ()

**get\_tgt\_sig\_type** ()

**gvars** ()

**has\_key** (key)  
Emulates the has\_key() method of dictionaries.

**items** ()  
Emulates the items() method of dictionaries.

**keys** ()  
Emulates the keys() method of dictionaries.

**lvars** ()

**scanner\_map\_delete** (kw=None)  
Delete the cached scanner map (if we need to).

**subst** (string, raw=0, target=None, source=None, conv=None, executor=None)  
Recursively interpolates construction variables from the Environment into the specified string, returning the expanded result. Construction variables are specified by a \$ prefix in the string and begin with an initial underscore or alphabetic character followed by any number of underscores or alphanumeric characters. The construction variable names may be surrounded by curly braces to separate the name from trailing characters.

**subst\_kw** (kw, raw=0, target=None, source=None)

**subst\_list** (string, raw=0, target=None, source=None, conv=None, executor=None)  
Calls through to SCons.Subst.scons\_subst\_list(). See the documentation for that function.

**subst\_path** (path, target=None, source=None)  
Substitute a path list, turning EntryProxies into Nodes and leaving Nodes (and other objects) as-is.

**subst\_target\_source** (string, raw=0, target=None, source=None, conv=None, executor=None)  
Recursively interpolates construction variables from the Environment into the specified string, returning the expanded result. Construction variables are specified by a \$ prefix in the string and begin with an initial underscore or alphabetic character followed by any number of underscores or alphanumeric characters. The construction variable names may be surrounded by curly braces to separate the name from trailing characters.

**values** ()  
Emulates the values() method of dictionaries.

`class SCons.Environment.BuilderDict (dict, env)`

Bases: `collections.UserDict`

This is a dictionary-like class used by an Environment to hold the Builders. We need to do this because every time someone changes the Builders in the Environment's BUILDERS dictionary, we must update the Environment's attributes.

`__MutableMapping__marker = <object object>`

`__abc_impl = <_abc_data object>`

`clear ()` → None. Remove all items from D.

`copy ()`

**classmethod** `fromkeys (iterable, value=None)`

`get (k[, d])` → D[k] if k in D, else d. d defaults to None.

`items ()` → a set-like object providing a view on D's items

`keys ()` → a set-like object providing a view on D's keys

`pop (k[, d])` → v, remove specified key and return the corresponding value.  
If key is not found, d is returned if given, otherwise `KeyError` is raised.

`popitem ()` → (k, v), remove and return some (key, value) pair  
as a 2-tuple; but raise `KeyError` if D is empty.

`setdefault (k[, d])` → D.get(k,d), also set D[k]=d if k not in D

`update ([, E], **F)` → None. Update D from mapping/iterable E and F.

If E present and has a `.keys()` method, does: for k in E: D[k] = E[k] If E present and lacks `.keys()` method, does:  
for (k, v) in E: D[k] = v In either case, this is followed by: for k, v in F.items(): D[k] = v

`values ()` → an object providing a view on D's values

`class SCons.Environment.BuilderWrapper (object, method, name=None)`

Bases: `SCons.Environment.MethodWrapper`

A `MethodWrapper` subclass that that associates an environment with a Builder.

This mainly exists to wrap the `__call__()` function so that all calls to Builders can have their argument lists massaged in the same way (treat a lone argument as the source, treat two arguments as target then source, make sure both target and source are lists) without having to have cut-and-paste code to do it.

As a bit of obsessive backwards compatibility, we also intercept attempts to get or set the "env" or "builder" attributes, which were the names we used before we put the common functionality into the `MethodWrapper` base class. We'll keep this around for a while in case people shipped Tool modules that reached into the wrapper (like the `Tool/qt.py` module does, or did). There shouldn't be a lot attribute fetching or setting on these, so a little extra work shouldn't hurt.

`clone (new_object)`

Returns an object that re-binds the underlying "method" to the specified new object.

`class SCons.Environment.MethodWrapper (object, method, name=None)`

Bases: `object`

A generic Wrapper class that associates a method (which can actually be any callable) with an object. As part of creating this `MethodWrapper` object an attribute with the specified (by default, the name of the supplied method) is added to the underlying object. When that new "method" is called, our `__call__()` method adds the object as the first argument, simulating the Python behavior of supplying "self" on method calls.

We hang on to the name by which the method was added to the underlying base class so that we can provide a method to "clone" ourselves onto a new underlying object being copied (without which we wouldn't need to save that info).

**clone** (new\_object)

Returns an object that re-binds the underlying “method” to the specified new object.

`SCons.Environment.NoSubstitutionProxy` (subject)

An entry point for returning a proxy subclass instance that overrides the `subst*()` methods so they don’t actually perform construction variable substitution. This is specifically intended to be the shim layer in between global function calls (which don’t want construction variable substitution) and the `DefaultEnvironment()` (which would substitute variables if left to its own devices).

We have to wrap this in a function that allows us to delay definition of the class until it’s necessary, so that when it subclasses `Environment` it will pick up whatever `Environment` subclass the wrapper interface might have assigned to `SCons.Environment.Environment`.

`class SCons.Environment.OverrideEnvironment` (subject, overrides={})

Bases: `SCons.Environment.Base`

A proxy that overrides variables in a wrapped construction environment by returning values from an overrides dictionary in preference to values from the underlying subject environment.

This is a lightweight (I hope) proxy that passes through most use of attributes to the underlying `Environment.Base` class, but has just enough additional methods defined to act like a real construction environment with overridden values. It can wrap either a `Base` construction environment, or another `OverrideEnvironment`, which can in turn nest arbitrary `OverrideEnvironments`...

Note that we do *not* call the underlying base class (`SubstitutionEnvironment`) initialization, because we get most of those from proxying the attributes of the subject construction environment. But because we subclass `SubstitutionEnvironment`, this class also has inherited `arg2nodes()` and `subst*()` methods; those methods can’t be proxied because they need *this* object’s methods to fetch the values from the overrides dictionary.

**Action** (\*args, \*\*kw)

**AddMethod** (function, name=None)

Adds the specified function as a method of this construction environment with the specified name. If the name is omitted, the default name is the name of the function itself.

**AddPostAction** (files, action)

**AddPreAction** (files, action)

**Alias** (target, source=[], action=None, \*\*kw)

**AlwaysBuild** (\*targets)

**Append** (\*\*kw)

Append values to existing construction variables in an `Environment`.

**AppendENVPPath** (name, newpath, envname='ENV', sep=':', delete\_existing=0)

Append path elements to the path ‘name’ in the ‘ENV’ dictionary for this environment. Will only add any particular path once, and will `normpath` and `normcase` all paths to help assure this. This can also handle the case where the env variable is a list instead of a string.

If `delete_existing` is 0, a `newpath` which is already in the path will not be moved to the end (it will be left where it is).

**AppendUnique** (delete\_existing=0, \*\*kw)

Append values to existing construction variables in an `Environment`, if they’re not already there. If `delete_existing` is 1, removes existing values first, so values move to end.

**Builder** (\*\*kw)

**CacheDir** (path)

**Clean** (targets, files)

**Clone** (tools=[], toolpath=None, parse\_flags=None, \*\*kw)

Return a copy of a construction Environment. The copy is like a Python “deep copy”—that is, independent copies are made recursively of each objects—except that a reference is copied when an object is not deep-copyable (like a function). There are no references to any mutable objects in the original Environment.

**Command** (*target*, *source*, *action*, **\*\*kw**)

Builds the supplied target files from the supplied source files using the supplied action. Action may be any type that the Builder constructor will accept for an action.

**Configure** (**\*args**, **\*\*kw**)

**Decider** (*function*)

**Depends** (*target*, *dependency*)

Explicitly specify that ‘target’s depend on ‘dependency’.

**Detect** (*progs*)

Return the first available program in progs.

**Parameters:** **progs** (*str or list*) – one or more command names to check for

**Returns str:** first name from progs that can be found.

**Dictionary** ()

Return construction variables from an environment.

**Parameters:** **\*args** (*optional*) – variable names to look up

**Returns:** If *args* omitted, the dictionary of all construction variables. If one arg, the corresponding value is returned. If more than one arg, a list of values is returned.

**Raises:** **KeyError** – if any of *args* is not in the construction environment.

**Dir** (*name*, **\*args**, **\*\*kw**)

**Dump** (*key=None*, *format='pretty'*)

Return construction variables serialized to a string.

**Parameters:**

- **key** (*optional*) – if None, format the whole dict of variables. Else format the value of *key* (Default value = None)
- **format** (*optional*) – specify the format to serialize to. “pretty” generates a pretty-printed string, “json” a JSON-formatted string. (Default value = None, equivalent to “pretty”)

**Entry** (*name*, **\*args**, **\*\*kw**)

**Environment** (**\*\*kw**)

**Execute** (*action*, **\*args**, **\*\*kw**)

Directly execute an action through an Environment

**File** (*name*, **\*args**, **\*\*kw**)

**FindFile** (*file*, *dirs*)

**FindInstalledFiles** ()

returns the list of all targets of the Install and InstallAs Builder.

**FindIdxes** (*paths*, *prefix*, *suffix*)

Search a list of paths for something that matches the prefix and suffix.

**Parameters:**

- **paths** – the list of paths or nodes.
- **prefix** – construction variable for the prefix.
- **suffix** – construction variable for the suffix.

Returns: the matched path or None

**FindSourceFiles** (node= '.' )  
returns a list of all source files.

**Flatten** (sequence)

**GetBuildPath** (files)

**Glob** (pattern, ondisk=True, source=False, strings=False, exclude=None)

**Ignore** (target, dependency)  
Ignore a dependency.

**Literal** (string)

**Local** (\*targets)

**MergeFlags** (args, unique=1, dict=None)

Merge the dict in args into the construction variables of this env, or the passed-in dict. If args is not a dict, it is converted into a dict using ParseFlags. If unique is not set, the flags are appended rather than merged.

**NoCache** (\*targets)  
Tags a target so that it will not be cached

**NoClean** (\*targets)  
Tags a target so that it will not be cleaned by -c

**Override** (overrides)  
Produce a modified environment whose variables are overridden by the overrides dictionaries. "overrides" is a dictionary that will override the variables of this environment.  
This function is much more efficient than Clone() or creating a new Environment because it doesn't copy the construction environment dictionary, it just wraps the underlying construction environment, and doesn't even create a wrapper object if there are no overrides.

**ParseConfig** (command, function=None, unique=1)  
Use the specified function to parse the output of the command in order to modify the current environment. The 'command' can be a string or a list of strings representing a command and its arguments. 'Function' is an optional argument that takes the environment, the output of the command, and the unique flag. If no function is specified, MergeFlags, which treats the output as the result of a typical 'X-config' command (i.e. gtk-config), will merge the output into the appropriate variables.

**ParseDepends** (filename, must\_exist=None, only\_one=0)  
Parse a mkdep-style file for explicit dependencies. This is completely abusable, and should be unnecessary in the "normal" case of proper SCons configuration, but it may help make the transition from a Make hierarchy easier for some people to swallow. It can also be genuinely useful when using a tool that can write a .d file, but for which writing a scanner would be too complicated.

**ParseFlags** (\*flags)  
Parse the set of flags and return a dict with the flags placed in the appropriate entry. The flags are treated as a typical set of command-line flags for a GNU-like toolchain and used to populate the entries in the dict immediately below. If one of the flag strings begins with a bang (exclamation mark), it is assumed to be a command and the rest of the string is executed; the result of that evaluation is then added to the dict.

**Platform** (platform)

**Precious** (\*targets)

**Prepend** (\*\*kw)

Prepend values to existing construction variables in an Environment.

**PrependENVPath** (name, newpath, envname='ENV', sep=':', delete\_existing=1)

Prepend path elements to the path 'name' in the 'ENV' dictionary for this environment. Will only add any particular path once, and will normpath and normcase all paths to help assure this. This can also handle the case where the env variable is a list instead of a string.

If delete\_existing is 0, a newpath which is already in the path will not be moved to the front (it will be left where it is).

**PrependUnique** (delete\_existing=0, \*\*kw)

Prepend values to existing construction variables in an Environment, if they're not already there. If delete\_existing is 1, removes existing values first, so values move to front.

**Pseudo** (\*targets)

**PyPackageDir** (modulename)

**RemoveMethod** (function)

Removes the specified function's MethodWrapper from the added\_methods list, so we don't re-bind it when making a clone.

**Replace** (\*\*kw)

Replace existing construction variables in an Environment with new construction variables and/or values.

**ReplaceIxes** (path, old\_prefix, old\_suffix, new\_prefix, new\_suffix)

Replace old\_prefix with new\_prefix and old\_suffix with new\_suffix.

env - Environment used to interpolate variables. path - the path that will be modified. old\_prefix - construction variable for the old prefix. old\_suffix - construction variable for the old suffix. new\_prefix - construction variable for the new prefix. new\_suffix - construction variable for the new suffix.

**Repository** (\*dirs, \*\*kw)

**Requires** (target, prerequisite)

Specify that 'prerequisite' must be built before 'target', (but 'target' does not actually depend on 'prerequisite' and need not be rebuilt if it changes).

**SConsignFile** (name='.sconsign', dbm\_module=None)

**Scanner** (\*args, \*\*kw)

**SetDefault** (\*\*kw)

**SideEffect** (side\_effect, target)

Tell scons that side\_effects are built as side effects of building targets.

**Split** (arg)

This function converts a string or list into a list of strings or Nodes. This makes things easier for users by allowing files to be specified as a white-space separated list to be split.

**The input rules are:**

- A single string containing names separated by spaces. These will be split apart at the spaces.
- A single Node instance
- A list containing either strings or Node instances. Any strings in the list are not split at spaces.

In all cases, the function returns a list of Nodes and strings.

**Tool** (tool, toolpath=None, \*\*kw)

**Value** (value, built\_value=None, name=None)

**VariantDir** (variant\_dir, src\_dir, duplicate=1)

**WhereIs** (prog, path=None, pathext=None, reject=[ ])  
Find prog in the path.

**\_canonicalize** (path)

**\_changed\_build** (dependency, target, prev\_ni, repo\_node=None)

**\_changed\_content** (dependency, target, prev\_ni, repo\_node=None)

**\_changed\_source** (dependency, target, prev\_ni, repo\_node=None)

**\_changed\_timestamp\_match** (dependency, target, prev\_ni, repo\_node=None)

**\_changed\_timestamp\_newer** (dependency, target, prev\_ni, repo\_node=None)

**\_changed\_timestamp\_then\_content** (dependency, target, prev\_ni, repo\_node=None)

**\_copy2\_from\_cache** (src, dst)

**\_copy\_from\_cache** (src, dst)

**\_find\_toolpath\_dir** (tp)

**\_gsm** ()

**\_init\_special** ()

Initial the dispatch tables for special handling of special construction variables.

**\_update** (dict)

Update an environment's values directly, bypassing the normal checks that occur when users try to set items.

**arg2nodes** (args, node\_factory=<class 'SCons.Environment.\_Null'>, lookup\_list=<class 'SCons.Environment.\_Null'>, \*\*kw)

**backtick** (command)

**get** (key, default=None)

Emulates the get() method of dictionaries.

**get\_CacheDir** ()

**get\_builder** (name)

Fetch the builder with the specified name from the environment.

**get\_factory** (factory, default='File')

Return a factory function for creating Nodes for this construction environment.

**get\_scanner** (skey)

Find the appropriate scanner given a key (usually a file suffix).

**get\_src\_sig\_type** ()

**get\_tgt\_sig\_type** ()

**gvars** ()

**has\_key** (key)

Emulates the `has_key()` method of dictionaries.

#### **items ()**

Emulates the `items()` method of dictionaries.

#### **keys ()**

Emulates the `keys()` method of dictionaries.

#### **lvars ()**

#### **scanner\_map\_delete (kw=None)**

Delete the cached scanner map (if we need to).

#### **subst (string, raw=0, target=None, source=None, conv=None, executor=None)**

Recursively interpolates construction variables from the Environment into the specified string, returning the expanded result. Construction variables are specified by a `$` prefix in the string and begin with an initial underscore or alphabetic character followed by any number of underscores or alphanumeric characters. The construction variable names may be surrounded by curly braces to separate the name from trailing characters.

#### **subst\_kw (kw, raw=0, target=None, source=None)**

#### **subst\_list (string, raw=0, target=None, source=None, conv=None, executor=None)**

Calls through to `SCons.Subst.scons_subst_list()`. See the documentation for that function.

#### **subst\_path (path, target=None, source=None)**

Substitute a path list, turning `EntryProxies` into `Nodes` and leaving `Nodes` (and other objects) as-is.

#### **subst\_target\_source (string, raw=0, target=None, source=None, conv=None, executor=None)**

Recursively interpolates construction variables from the Environment into the specified string, returning the expanded result. Construction variables are specified by a `$` prefix in the string and begin with an initial underscore or alphabetic character followed by any number of underscores or alphanumeric characters. The construction variable names may be surrounded by curly braces to separate the name from trailing characters.

#### **values ()**

Emulates the `values()` method of dictionaries.

#### **class SCons.Environment.SubstitutionEnvironment (\*\*kw)**

Bases: **object**

Base class for different flavors of construction environments.

This class contains a minimal set of methods that handle construction variable expansion and conversion of strings to `Nodes`, which may or may not be actually useful as a stand-alone class. Which methods ended up in this class is pretty arbitrary right now. They're basically the ones which we've empirically determined are common to the different construction environment subclasses, and most of the others that use or touch the underlying dictionary of construction variables.

Eventually, this class should contain all the methods that we determine are necessary for a "minimal" interface to the build engine. A full "native Python" SCons environment has gotten pretty heavyweight with all of the methods and Tools and construction variables we've jammed in there, so it would be nice to have a lighter weight alternative for interfaces that don't need all of the bells and whistles. (At some point, we'll also probably rename this class "Base," since that more reflects what we want this class to become, but because we've released comments that tell people to subclass `Environment.Base` to create their own flavors of construction environment, we'll save that for a future refactoring when this class actually becomes useful.)

#### **AddMethod (function, name=None)**

Adds the specified function as a method of this construction environment with the specified name. If the name is omitted, the default name is the name of the function itself.

#### **MergeFlags (args, unique=1, dict=None)**

Merge the dict in `args` into the construction variables of this env, or the passed-in dict. If `args` is not a dict, it is converted into a dict using `ParseFlags`. If `unique` is not set, the flags are appended rather than merged.

#### **Override (overrides)**

Produce a modified environment whose variables are overridden by the overrides dictionaries. “overrides” is a dictionary that will override the variables of this environment.

This function is much more efficient than Clone() or creating a new Environment because it doesn't copy the construction environment dictionary, it just wraps the underlying construction environment, and doesn't even create a wrapper object if there are no overrides.

#### **ParseFlags** (\*flags)

Parse the set of flags and return a dict with the flags placed in the appropriate entry. The flags are treated as a typical set of command-line flags for a GNU-like toolchain and used to populate the entries in the dict immediately below. If one of the flag strings begins with a bang (exclamation mark), it is assumed to be a command and the rest of the string is executed; the result of that evaluation is then added to the dict.

#### **RemoveMethod** (function)

Removes the specified function's MethodWrapper from the added\_methods list, so we don't re-bind it when making a clone.

#### **\_init\_special** ()

Initial the dispatch tables for special handling of special construction variables.

**arg2nodes** (args, node\_factory=<class 'SCons.Environment.\_Null'>, lookup\_list=<class 'SCons.Environment.\_Null'>, \*\*kw)

#### **backtick** (command)

#### **get** (key, default=None)

Emulates the get() method of dictionaries.

#### **gvars** ()

#### **has\_key** (key)

Emulates the has\_key() method of dictionaries.

#### **items** ()

Emulates the items() method of dictionaries.

#### **keys** ()

Emulates the keys() method of dictionaries.

#### **lvars** ()

#### **subst** (string, raw=0, target=None, source=None, conv=None, executor=None)

Recursively interpolates construction variables from the Environment into the specified string, returning the expanded result. Construction variables are specified by a \$ prefix in the string and begin with an initial underscore or alphabetic character followed by any number of underscores or alphanumeric characters. The construction variable names may be surrounded by curly braces to separate the name from trailing characters.

#### **subst\_kw** (kw, raw=0, target=None, source=None)

#### **subst\_list** (string, raw=0, target=None, source=None, conv=None, executor=None)

Calls through to SCons.Subst.scons\_subst\_list(). See the documentation for that function.

#### **subst\_path** (path, target=None, source=None)

Substitute a path list, turning EntryProxies into Nodes and leaving Nodes (and other objects) as-is.

#### **subst\_target\_source** (string, raw=0, target=None, source=None, conv=None, executor=None)

Recursively interpolates construction variables from the Environment into the specified string, returning the expanded result. Construction variables are specified by a \$ prefix in the string and begin with an initial underscore or alphabetic character followed by any number of underscores or alphanumeric characters. The construction variable names may be surrounded by curly braces to separate the name from trailing characters.

#### **values** ()

Emulates the values() method of dictionaries.

```
class SCons.Environment._Null
```

Bases: **object**

```
SCons.Environment._del_SCANNERS (env, key)
```

```
SCons.Environment._delete_duplicates (l, keep_last)
```

Delete duplicates from a sequence, keeping the first or last.

```
SCons.Environment._null
```

alias of **SCons.Environment.\_Null**

```
SCons.Environment._set_BUILDERS (env, key, value)
```

```
SCons.Environment._set_SCANNERS (env, key, value)
```

```
SCons.Environment._set_future_reserved (env, key, value)
```

```
SCons.Environment._set_reserved (env, key, value)
```

```
SCons.Environment.alias_builder (env, target, source)
```

```
SCons.Environment.apply_tools (env, tools, toolpath)
```

```
SCons.Environment.copy_non_reserved_keywords (dict)
```

```
SCons.Environment.default_copy_from_cache (src, dst)
```

```
SCons.Environment.default_decide_source (dependency, target, prev_ni, repo_node=None)
```

```
SCons.Environment.default_decide_target (dependency, target, prev_ni, repo_node=None)
```

```
SCons.Environment.is_valid_construction_var (varstr)
```

Return if the specified string is a legitimate construction variable.

## SCons.Errors module

SCons.Errors

This file contains the exception classes used to handle internal and user errors in SCons.

```
exception SCons.Errors.BuildError (node=None, errstr='Unknown error', status=2, exitstatus=2, filename=None, executor=None, action=None, command=None, exc_info=(None, None, None))
```

Bases: **Exception**

SCons Errors that can occur while building.

**Information about the cause of the build error**

**errstr**

a description of the error message

**status**

the return code of the action that caused the build error. Must be set to a non-zero value even if the build error is not due to an action returning a non-zero returned code.

**exitstatus**

SCons exit status due to this build error. Must be nonzero unless due to an explicit Exit() call. Not always the same as status, since actions return a status code that should be respected, but SCons typically exits with 2 irrespective of the return value of the failed action.

**filename**

The name of the file or directory that caused the build error. Set to None if no files are associated with this error. This might be different from the target being built. For example, failure to create the directory in which the target file will appear. It can be None if the error is not due to a particular filename.

**exc\_info**

Info about exception that caused the build error. Set to (None, None, None) if this build error is not due to an exception.

#### Information about the what caused the build error

##### node

the error occurred while building this target node(s)

##### executor

the executor that caused the build to fail (might be None if the build failures is not due to the executor failing)

##### action

the action that caused the build to fail (might be None if the build failures is not due to the an action failure)

##### command

the command line for the action that caused the build to fail (might be None if the build failures is not due to the an action failure)

##### args

##### with\_traceback ()

Exception.with\_traceback(tb) – set self.\_\_traceback\_\_ to tb and return self.

*exception* SCons.Errors.**ExplicitExit** (node=None, status=None, \*args)

Bases: **Exception**

##### args

##### with\_traceback ()

Exception.with\_traceback(tb) – set self.\_\_traceback\_\_ to tb and return self.

*exception* SCons.Errors.**InternalError**

Bases: **Exception**

##### args

##### with\_traceback ()

Exception.with\_traceback(tb) – set self.\_\_traceback\_\_ to tb and return self.

*exception* SCons.Errors.**MSVCError**

Bases: **OSError**

##### args

##### characters\_written

##### errno

POSIX exception code

##### filename

exception filename

##### filename2

second exception filename

##### strerror

exception strerror

##### with\_traceback ()

Exception.with\_traceback(tb) – set self.\_\_traceback\_\_ to tb and return self.

*exception* `SCons.Errors.SConsEnvironmentError`

Bases: `Exception`

**args**

**with\_traceback ()**

Exception.with\_traceback(tb) – set self.\_\_traceback\_\_ to tb and return self.

*exception* `SCons.Errors.StopError`

Bases: `Exception`

**args**

**with\_traceback ()**

Exception.with\_traceback(tb) – set self.\_\_traceback\_\_ to tb and return self.

*exception* `SCons.Errors.UserError`

Bases: `Exception`

**args**

**with\_traceback ()**

Exception.with\_traceback(tb) – set self.\_\_traceback\_\_ to tb and return self.

`SCons.Errors.convert_to_BuildError (status, exc_info=None)`

Convert a return code to a BuildError Exception.

The *buildError.status* we set here will normally be used as the exit status of the “scons” process.

**Parameters:**

- **status** – can either be a return code or an Exception.
- **exc\_info** (*tuple, optional*) – explicit exception information.

## ***SCons.Executor module***

`SCons.Executor`

A module for executing actions with specific lists of target and source Nodes.

`SCons.Executor.AddBatchExecutor (key, executor)`

*class* `SCons.Executor.Batch (targets=[], sources=[])`

Bases: `object`

Remembers exact association between targets and sources of executor.

**sources**

**targets**

*class* `SCons.Executor.Executor (action, env=None, overridelist=[{}], targets=[], sources=[], builder_kw={})`

Bases: `object`

A class for controlling instances of executing an action.

This largely exists to hold a single association of an action, environment, list of environment override dictionaries, targets and sources for later processing as needed.

**\_changed\_sources\_list**

**\_changed\_targets\_list**

**\_do\_execute**

**\_execute\_str**

```

_get_changed_sources (*args, **kw)
_get_changed_targets (*args, **kw)
_get_changes ()
_get_source (*args, **kw)
_get_sources (*args, **kw)
_get_target (*args, **kw)
_get_targets (*args, **kw)
_get_unchanged_sources (*args, **kw)
_get_unchanged_targets (*args, **kw)
_get_unignored_sources_key (node, ignore=())
_memo
_unchanged_sources_list
_unchanged_targets_list
action_list

```

**add\_batch (targets, sources)**

Add pair of associated target and source to this Executor's list. This is necessary for "batch" Builders that can be called repeatedly to build up a list of matching target and source files that will be used in order to update multiple target files at once from multiple corresponding source files, for tools like MSVC that support it.

**add\_post\_action (action)**

**add\_pre\_action (action)**

**add\_sources (sources)**

Add source files to this Executor's list. This is necessary for "multi" Builders that can be called repeatedly to build up a source file list for a given target.

**batches**

**builder\_kw**

**cleanup ()**

**env**

**get\_action\_list ()**

**get\_action\_side\_effects ()**

Returns all side effects for all batches of this Executor used by the underlying Action.

**get\_action\_targets ()**

**get\_all\_children ()**

Returns all unique children (dependencies) for all batches of this Executor.

The Taskmaster can recognize when it's already evaluated a Node, so we don't have to make this list unique for its intended canonical use case, but we expect there to be a lot of redundancy (long lists of batched .cc files

#including the same .h files over and over), so removing the duplicates once up front should save the Taskmaster a lot of work.

**get\_all\_prerequisites ()**

Returns all unique (order-only) prerequisites for all batches of this Executor.

**get\_all\_sources ()**

Returns all sources for all batches of this Executor.

**get\_all\_targets ()**

Returns all targets for all batches of this Executor.

**get\_build\_env ()**

Fetch or create the appropriate build Environment for this Executor.

**get\_build\_scanner\_path (scanner)**

Fetch the scanner path for this executor's targets and sources.

**get\_contents ()**

Fetch the signature contents. This is the main reason this class exists, so we can compute this once and cache it regardless of how many target or source Nodes there are.

Returns bytes

**get\_implicit\_deps ()**

Return the executor's implicit dependencies, i.e. the nodes of the commands to be executed.

**get\_kw (kw={})**

**get\_lvars ()**

**get\_sources ()**

**get\_timestamp ()**

Fetch a time stamp for this Executor. We don't have one, of course (only files do), but this is the interface used by the timestamp module.

**get\_unignored\_sources (node, ignore=())**

**lvars**

**nullify ()**

**overridelist**

**post\_actions**

**pre\_actions**

**prepare ()**

Preparatory checks for whether this Executor can go ahead and (try to) build its targets.

**scan (scanner, node\_list)**

Scan a list of this Executor's files (targets or sources) for implicit dependencies and update all of the targets with them. This essentially short-circuits an N\*M scan of the sources for each individual target, which is a hell of a lot more efficient.

**scan\_sources (scanner)**

**scan\_targets (scanner)**

**set\_action\_list (action)**

`SCons.Executor.GetBatchExecutor` (key)

`class SCons.Executor.Null` (\*args, \*\*kw)

Bases: `object`

A null Executor, with a null build Environment, that does nothing when the rest of the methods call it.

This might be able to disappear when we refactor things to disassociate Builders from Nodes entirely, so we're not going to worry about unit tests for this—at least for now.

`_changed_sources_list`

`_changed_targets_list`

`_do_execute`

`_execute_str`

`_memo`

`_morph ()`

Morph this Null executor to a real Executor object.

`_unchanged_sources_list`

`_unchanged_targets_list`

`action_list`

`add_post_action (action)`

`add_pre_action (action)`

`batches`

`builder_kw`

`cleanup ()`

`env`

`get_action_list ()`

`get_action_side_effects ()`

`get_action_targets ()`

`get_all_children ()`

`get_all_prerequisites ()`

`get_all_sources ()`

`get_all_targets ()`

`get_build_env ()`

`get_build_scanner_path ()`

`get_contents ()`

`get_unignored_sources (*args, **kw)`

**lvars****overridelist****post\_actions****pre\_actions****prepare ()****set\_action\_list (action)****class SCons.Executor.NullEnvironment (\*args, \*\*kwargs)**Bases: **SCons.Util.Null****scons** = <module 'SCons' from '/Users/bdbaddog/devel/scons/git/as\_scons/SCons/\_\_init\_\_.py'>**\_CacheDir** = <SCons.CacheDir.CacheDir object>**\_CacheDir\_path** = None**get\_CacheDir ()****class SCons.Executor.TSList (func)**Bases: **collections.UserList**

A class that implements \$TARGETS or \$SOURCES expansions by wrapping an executor Method. This class is used in the Executor.lvars() to delay creation of NodeList objects until they're needed.

Note that we subclass collections.UserList purely so that the is\_Sequence() function will identify an object of this class as a list during variable expansion. We're not really using any collections.UserList methods in practice.

**\_UserList\_\_cast (other)****\_abc\_impl** = <\_abc\_data object>**append (item)**

S.append(value) – append value to the end of the sequence

**clear ()** → None -- remove all items from S**copy ()****count (value)** → integer -- return number of occurrences of value**extend (other)**

S.extend(iterable) – extend sequence by appending elements from the iterable

**index (value[, start[, stop]])** → integer -- return first index of value.

Raises ValueError if the value is not present.

Supporting start and stop arguments is optional, but recommended.

**insert (i, item)**

S.insert(index, value) – insert value before index

**pop ([, index])** → item -- remove and return item at index (default last).

Raise IndexError if list is empty or index is out of range.

**remove (item)**

S.remove(value) – remove first occurrence of value. Raise ValueError if the value is not present.

**reverse ()**S.reverse() – reverse *IN PLACE*

**sort** (\*args, \*\*kwargs)

*class* SCons.Executor.TSObject (func)

Bases: **object**

A class that implements \$TARGET or \$SOURCE expansions by wrapping an Executor method.

SCons.Executor.execute\_action\_list (obj, target, kw)

Actually execute the action list.

SCons.Executor.execute\_actions\_str (obj)

SCons.Executor.execute\_nothing (obj, target, kw)

SCons.Executor.execute\_null\_str (obj)

SCons.Executor.get\_NullEnvironment ()

Use singleton pattern for Null Environments.

SCons.Executor.rfile (node)

A function to return the results of a Node's rfile() method, if it exists, and the Node itself otherwise (if it's a Value Node, e.g.).

## SCons.Job module

SCons.Job

This module defines the Serial and Parallel classes that execute tasks to complete a build. The Jobs class provides a higher level interface to start, stop, and wait on jobs.

*class* SCons.Job.InterruptState

Bases: **object**

**set** ()

*class* SCons.Job.Jobs (num, taskmaster)

Bases: **object**

An instance of this class initializes N jobs, and provides methods for starting, stopping, and waiting on all N jobs.

**\_reset\_sig\_handler** ()

Restore the signal handlers to their previous state (before the call to **\_setup\_sig\_handler**()).

**\_setup\_sig\_handler** ()

Setup an interrupt handler so that SCons can shutdown cleanly in various conditions:

- a. SIGINT: Keyboard interrupt
- b. SIGTERM: kill or system shutdown
- c. SIGHUP: Controlling shell exiting

We handle all of these cases by stopping the taskmaster. It turns out that it's very difficult to stop the build process by throwing asynchronously an exception such as KeyboardInterrupt. For example, the python Condition variables (threading.Condition) and queues do not seem to be asynchronous-exception-safe. It would require adding a whole bunch of try/finally block and except KeyboardInterrupt all over the place.

Note also that we have to be careful to handle the case when SCons forks before executing another process. In that case, we want the child to exit immediately.

**run** (postfunc=<function Jobs.<lambda>>)

Run the jobs.

postfunc() will be invoked after the jobs has run. It will be invoked even if the jobs are interrupted by a keyboard interrupt (well, in fact by a signal such as either SIGINT, SIGTERM or SIGHUP). The execution of postfunc() is protected against keyboard interrupts and is guaranteed to run to completion.

**were\_interrupted** ()

Returns whether the jobs were interrupted by a signal.

```
class SCons.Job.Parallel (taskmaster, num, stack_size)
```

Bases: **object**

This class is used to execute tasks in parallel, and is somewhat less efficient than `Serial`, but is appropriate for parallel builds.

This class is thread safe.

**start ()**

Start the job. This will begin pulling tasks from the taskmaster and executing them, and return when there are no more tasks. If a task fails to execute (i.e. `execute()` raises an exception), then the job will stop.

```
class SCons.Job.Serial (taskmaster)
```

Bases: **object**

This class is used to execute tasks in series, and is more efficient than `Parallel`, but is only appropriate for non-parallel builds. Only one instance of this class should be in existence at a time.

This class is not thread safe.

**start ()**

Start the job. This will begin pulling tasks from the taskmaster and executing them, and return when there are no more tasks. If a task fails to execute (i.e. `execute()` raises an exception), then the job will stop.

```
class SCons.Job.ThreadPool (num, stack_size, interrupted)
```

Bases: **object**

This class is responsible for spawning and managing worker threads.

**cleanup ()**

Shuts down the thread pool, giving each worker thread a chance to shut down gracefully.

**get ()**

Remove and return a result tuple from the results queue.

**preparation\_failed (task)**

**put (task)**

Put task into request queue.

```
class SCons.Job.Worker (requestQueue, resultsQueue, interrupted)
```

Bases: **threading.Thread**

A worker thread waits on a task to be posted to its request queue, dequeues the task, executes it, and posts a tuple including the task and a boolean indicating whether the task executed successfully.

**\_bootstrap ()**

**\_bootstrap\_inner ()**

**\_delete ()**

Remove current thread from the dict of currently running threads.

**\_exc\_info ()**

`exc_info() -> (type, value, traceback)`

Return information about the most recent exception caught by an except clause in the current stack frame or in an older stack frame.

**\_initialized = False**

**\_reset\_internal\_locks (is\_alive)**

**\_set\_ident ()**

**\_set\_tstate\_lock ()**

Set a lock object which will be released by the interpreter when the underlying thread state (see `pystate.h`) gets deleted.

**`_stop ()`**

**`_wait_for_tstate_lock (block=True, timeout=-1)`**

***property* `daemon`**

A boolean value indicating whether this thread is a daemon thread.

This must be set before `start()` is called, otherwise `RuntimeError` is raised. Its initial value is inherited from the creating thread; the main thread is not a daemon thread and therefore all threads created in the main thread default to `daemon = False`.

The entire Python program exits when only daemon threads are left.

**`getName ()`**

***property* `ident`**

Thread identifier of this thread or `None` if it has not been started.

This is a nonzero integer. See the `get_ident()` function. Thread identifiers may be recycled when a thread exits and another thread is created. The identifier is available even after the thread has exited.

**`isAlive ()`**

Return whether the thread is alive.

This method is deprecated, use `is_alive()` instead.

**`isDaemon ()`**

**`is_alive ()`**

Return whether the thread is alive.

This method returns `True` just before the `run()` method starts until just after the `run()` method terminates. The module function `enumerate()` returns a list of all alive threads.

**`join (timeout=None)`**

Wait until the thread terminates.

This blocks the calling thread until the thread whose `join()` method is called terminates – either normally or through an unhandled exception or until the optional timeout occurs.

When the timeout argument is present and not `None`, it should be a floating point number specifying a timeout for the operation in seconds (or fractions thereof). As `join()` always returns `None`, you must call `is_alive()` after `join()` to decide whether a timeout happened – if the thread is still alive, the `join()` call timed out.

When the timeout argument is not present or `None`, the operation will block until the thread terminates.

A thread can be `join()`ed many times.

`join()` raises a `RuntimeError` if an attempt is made to join the current thread as that would cause a deadlock. It is also an error to `join()` a thread before it has been started and attempts to do so raises the same exception.

***property* `name`**

A string used for identification purposes only.

It has no semantics. Multiple threads may be given the same name. The initial name is set by the constructor.

**`run ()`**

Method representing the thread's activity.

You may override this method in a subclass. The standard `run()` method invokes the callable object passed to the object's constructor as the target argument, if any, with sequential and keyword arguments taken from the `args` and `kwargs` arguments, respectively.

**`setDaemon (daemonic)`**

**`setName (name)`**

**`start ()`**

Start the thread's activity.

It must be called at most once per thread object. It arranges for the object's `run()` method to be invoked in a separate thread of control.

This method will raise a `RuntimeError` if called more than once on the same thread object.

## *SCons.Memoize module*

### Memoizer

A decorator-based implementation to count hits and misses of the computed values that various methods cache in memory.

Use of this modules assumes that wrapped methods be coded to cache their values in a consistent way. In particular, it requires that the class uses a dictionary named “\_memo” to store the cached values.

Here is an example of wrapping a method that returns a computed value, with no input parameters:

```
@SCons.Memoize.CountMethodCall
def foo(self):

    try:
        return self._memo['foo']
    except KeyError:
        pass

    result = self.compute_foo_value()

    self._memo['foo'] = result

    return result
```

Here is an example of wrapping a method that will return different values based on one or more input arguments:

```
def _bar_key(self, argument):
    return argument

@SCons.Memoize.CountDictCall(_bar_key)
def bar(self, argument):

    memo_key = argument
    try:
        memo_dict = self._memo['bar']
    except KeyError:
        memo_dict = {}
        self._memo['dict'] = memo_dict
    else:
        try:
            return memo_dict[memo_key]
        except KeyError:
            pass

    result = self.compute_bar_value(argument)

    memo_dict[memo_key] = result

    return result
```

Deciding what to cache is tricky, because different configurations can have radically different performance tradeoffs, and because the tradeoffs involved are often so non-obvious. Consequently, deciding whether or not to cache a given method will likely be more of an art than a science, but should still be based on available data from this module. Here are some VERY GENERAL guidelines about deciding whether or not to cache return values from a method that’s being called a lot:

– **The first question to ask is, “Can we change the calling code**

so this method isn’t called so often?” Sometimes this can be done by changing the algorithm. Sometimes the *caller* should be memoized, not the method you’re looking at.

The memoized function should be timed with multiple configurations to make sure it doesn’t inadvertently slow down some other configuration.

**– When memoizing values based on a dictionary key composed of**

input arguments, you don't need to use all of the arguments if some of them don't affect the return values.

```
class SCons.Memoize.CountDict (cls_name, method_name, keymaker)
```

Bases: **SCons.Memoize.Counter**

A counter class for memoized values stored in a dictionary, with keys based on the method's input arguments.

A CountDict object is instantiated in a decorator for each of the class's methods that memoizes its return value in a dictionary, indexed by some key that can be computed from one or more of its input arguments.

```
count (*args, **kw)
```

Counts whether the computed key value is already present in the memoization dictionary (a hit) or not (a miss).

```
display ()
```

```
key ()
```

```
SCons.Memoize.CountDictCall (keyfunc)
```

Decorator for counting memoizer hits/misses while accessing dictionary values with a key-generating function. Like CountMethodCall above, it wraps the given method fn and uses a CountDict object to keep track of the caching statistics. The dict-key function keyfunc has to get passed in the decorator call and gets stored in the CountDict instance. Wrapping gets enabled by calling EnableMemoization().

```
SCons.Memoize.CountMethodCall (fn)
```

Decorator for counting memoizer hits/misses while retrieving a simple value in a class method. It wraps the given method fn and uses a CountValue object to keep track of the caching statistics. Wrapping gets enabled by calling EnableMemoization().

```
class SCons.Memoize.CountValue (cls_name, method_name)
```

Bases: **SCons.Memoize.Counter**

A counter class for simple, atomic memoized values.

A CountValue object should be instantiated in a decorator for each of the class's methods that memoizes its return value by simply storing the return value in its `_memo` dictionary.

```
count (*args, **kw)
```

Counts whether the memoized value has already been set (a hit) or not (a miss).

```
display ()
```

```
key ()
```

```
class SCons.Memoize.Counter (cls_name, method_name)
```

Bases: **object**

Base class for counting memoization hits and misses.

We expect that the initialization in a matching decorator will fill in the correct class name and method name that represents the name of the function being counted.

```
display ()
```

```
key ()
```

```
SCons.Memoize.Dump (title=None)
```

Dump the hit/miss count for all the counters collected so far.

```
SCons.Memoize.EnableMemoization ()
```

## ***SCons.PathList module***

SCons.PathList

A module for handling lists of directory paths (the sort of things that get set as CPPPATH, LIBPATH, etc.) with as much caching of data and efficiency as we can, while still keeping the evaluation delayed so that we Do the Right Thing (almost) regardless of how the variable is specified.

`SCons.PathList.PathList` (pathlist)

Returns the cached `_PathList` object for the specified pathlist, creating and caching a new object as necessary.

`class SCons.PathList._PathList` (pathlist)

Bases: `object`

An actual `PathList` object.

`subst_path` (env, target, source)

Performs construction variable substitution on a pre-digested `PathList` for a specific target and source.

`SCons.PathList.node_conv` (obj)

This is the “string conversion” routine that we have our substitutions use to return `Nodes`, not strings. This relies on the fact that an `EntryProxy` object has a `get()` method that returns the underlying `Node` that it wraps, which is a bit of architectural dependence that we might need to break or modify in the future in response to additional requirements.

## ***SCons.SConf module***

`SCons.SConf`

Autoconf-like configuration support.

In other words, `SConf` allows to run tests on the build machine to detect capabilities of system and do some things based on result: generate config files, header files for C/C++, update variables in environment.

Tests on the build system can detect if compiler sees header files, if libraries are installed, if some command line options are supported etc.

`SCons.SConf.CheckCC` (context)

`SCons.SConf.CheckCHHeader` (context, header, include\_quotes='')

A test for a C header file.

`SCons.SConf.CheckCXX` (context)

`SCons.SConf.CheckCXXHeader` (context, header, include\_quotes='')

A test for a C++ header file.

`class SCons.SConf.CheckContext` (sconf)

Bases: `object`

Provides a context for configure tests. Defines how a test writes to the screen and log file.

A typical test is just a callable with an instance of `CheckContext` as first argument:

```
def CheckCustom(context, ...):
```

```
    context.Message('Checking my weird test ... ') ret = myWeirdTestFunction(...) context.Result(ret)
```

Often, `myWeirdTestFunction` will be one of `context.TryCompile/context.TryLink/context.TryRun`. The results of those are cached, for they are only rebuild, if the dependencies have changed.

`AppendLIBS` (lib\_name\_list)

`BuildProg` (text, ext)

`CompileProg` (text, ext)

`CompileSharedObject` (text, ext)

`Display` (msg)

`Log` (msg)

`Message` (text)

Inform about what we are doing right now, e.g. ‘Checking for SOMETHING ... ‘

`PrependLIBS` (lib\_name\_list)

**Result (res)**

Inform about the result of the test. If res is not a string, displays 'yes' or 'no' depending on whether res is evaluated as true or false. The result is only displayed when self.did\_show\_result is not set.

**RunProg (text, ext)****SetLIBS (val)****TryAction (\*args, \*\*kw)****TryBuild (\*args, \*\*kw)****TryCompile (\*args, \*\*kw)****TryLink (\*args, \*\*kw)****TryRun (\*args, \*\*kw)**

SCons.SConf.**CheckDeclaration** (context, declaration, includes='', language=None)

SCons.SConf.**CheckFunc** (context, function\_name, header=None, language=None)

SCons.SConf.**CheckHeader** (context, header, include\_quotes='<>', language=None)  
A test for a C or C++ header file.

SCons.SConf.**CheckLib** (context, library=None, symbol='main', header=None, language=None, autoadd=1)

A test for a library. See also CheckLibWithHeader. Note that library may also be None to test whether the given symbol compiles without flags.

SCons.SConf.**CheckLibWithHeader** (context, libs, header, language, call=None, autoadd=1)

Another (more sophisticated) test for a library. Checks, if library and header is available for language (may be 'C' or 'CXX'). Call maybe be a valid expression `_with_` a trailing ';'. As in CheckLib, we support library=None, to test if the call compiles without extra link flags.

SCons.SConf.**CheckProg** (context, prog\_name)

Simple check if a program exists in the path. Returns the path for the application, or None if not found.

SCons.SConf.**CheckSHCC** (context)

SCons.SConf.**CheckSHCXX** (context)

SCons.SConf.**CheckType** (context, type\_name, includes='', language=None)

SCons.SConf.**CheckTypeSize** (context, type\_name, includes='', language=None, expect=None)

*exception* SCons.SConf.**ConfigureCacheError** (target)

Bases: **SCons.SConf.SConfError**

Raised when a use explicitly requested the cache feature, but the test is run the first time.

**args**

**with\_traceback ()**

Exception.with\_traceback(tb) – set self.\_\_traceback\_\_ to tb and return self.

*exception* SCons.SConf.**ConfigureDryRunError** (target)

Bases: **SCons.SConf.SConfError**

Raised when a file or directory needs to be updated during a Configure process, but the user requested a dry-run

**args**

**with\_traceback ()**

Exception.with\_traceback(tb) – set self.\_\_traceback\_\_ to tb and return self.

SCons.SConf.**CreateConfigHBuilder** (env)

Called if necessary just before the building targets phase begins.

`SCons.SConf.NeedConfigHBuilder ()`

`SCons.SConf.SConf (*args, **kw)`

`class SCons.SConf.SConfBase (env, custom_tests={}, conf_dir='$CONFIGUREDIR', log_file='$CONFIGURELOG', config_h=None, _depth=0)`

Bases: **object**

This is simply a class to represent a configure context. After creating a SConf object, you can call any tests. After finished with your tests, be sure to call the `Finish()` method, which returns the modified environment. Some words about caching: In most cases, it is not necessary to cache Test results explicitly. Instead, we use the scons dependency checking mechanism. For example, if one wants to compile a test program (`SConf.TryLink`), the compiler is only called, if the program dependencies have changed. However, if the program could not be compiled in a former SConf run, we need to explicitly cache this error.

**AddTest (test\_name, test\_instance)**

Adds `test_class` to this SConf instance. It can be called with `self.test_name(...)`

**AddTests (tests)**

Adds all the tests given in the tests dictionary to this SConf instance

**BuildNodes (nodes)**

Tries to build the given nodes immediately. Returns 1 on success, 0 on error.

**Define (name, value=None, comment=None)**

Define a pre processor symbol name, with the optional given value in the current config header.

If value is None (default), then `#define name` is written. If value is not none, then `#define name value` is written. comment is a string which will be put as a C comment in the header, to explain the meaning of the value (appropriate C comments will be added automatically).

**Finish ()**

Call this method after finished with your tests: `env = sconf.Finish()`

`class TestWrapper (test, sconf)`

Bases: **object**

A wrapper around Tests (to ensure sanity)

**TryAction (action, text=None, extension='')**

Tries to execute the given action with optional source file contents `<text>` and optional source file extension `<extension>`, Returns the status (0 : failed, 1 : ok) and the contents of the output file.

**TryBuild (builder, text=None, extension='')**

Low level TryBuild implementation. Normally you don't need to call that - you can use TryCompile / TryLink / TryRun instead

**TryCompile (text, extension)**

Compiles the program given in text to an `env.Object`, using extension as file extension (e.g. `'.c'`). Returns 1, if compilation was successful, 0 otherwise. The target is saved in `self.lastTarget` (for further processing).

**TryLink (text, extension)**

Compiles the program given in text to an executable `env.Program`, using extension as file extension (e.g. `'.c'`). Returns 1, if compilation was successful, 0 otherwise. The target is saved in `self.lastTarget` (for further processing).

**TryRun (text, extension)**

Compiles and runs the program given in text, using extension as file extension (e.g. `'.c'`). Returns (1, `outputStr`) on success, (0, `"`) otherwise. The target (a file containing the program's stdout) is saved in `self.lastTarget` (for further processing).

**\_createDir (node)**

**\_shutdown ()**

Private method. Reset to non-piped spawn

### **`_startup ()`**

Private method. Set up logstream, and set the environment variables necessary for a piped build

### **`pspawn_wrapper (sh, escape, cmd, args, env)`**

Wrapper function for handling piped spawns.

This looks to the calling interface (in Action.py) like a “normal” spawn, but associates the call with the PSPAWN variable from the construction environment and with the streams to which we want the output logged. This gets slid into the construction environment as the SPAWN variable so Action.py doesn’t have to know or care whether it’s spawning a piped command or not.

### **`class SCons.SConf.SConfBuildInfo`**

Bases: **`SCons.Node.FS.FileBuildInfo`**

Special build info for targets of configure tests. Additional members are result (did the builder succeed last time?) and string, which contains messages of the original build phase.

**`bact`**

**`bactsig`**

**`bdepends`**

**`bdependsigs`**

**`bimplicit`**

**`bimplicitsigs`**

**`bsources`**

**`bsourcesigs`**

### **`convert_from_sconsign (dir, name)`**

Converts a newly-read FileBuildInfo object for in-SCons use

For normal up-to-date checking, we don’t have any conversion to perform—but we’re leaving this method here to make that clear.

### **`convert_to_sconsign ()`**

Converts this FileBuildInfo object for writing to a .sconsign file

This replaces each Node in our various dependency lists with its usual string representation: relative to the top-level SConstruct directory, or an absolute path if it’s outside.

**`current_version_id = 2`**

**`dependency_map`**

**`format (names=0)`**

### **`merge (other)`**

Merge the fields of another object into this object. Already existing information is overwritten by the other instance’s data. WARNING: If a ‘`__dict__`’ slot is added, it should be updated instead of replaced.

### **`prepare_dependencies ()`**

Prepares a FileBuildInfo object for explaining what changed

The bsources, bdepends and bimplicit lists have all been stored on disk as paths relative to the top-level SConstruct directory. Convert the strings to actual Nodes (for use by the `-debug=explain` code and `-implicit-cache`).

**`result`**

**set\_build\_result** (result, string)

**string**

*class* SCons.SConf.SConfBuildTask (tm, targets, top, node)

Bases: SCons.Taskmaster.AlwaysTask

This is almost the same as SCons.Script.BuildTask. Handles SConfErrors correctly and knows about the current cache\_mode.

**\_abc\_impl** = <\_abc\_data object>

**\_exception\_raise** ()

Raises a pending exception that was recorded while getting a Task ready for execution.

**\_no\_exception\_to\_raise** ()

**collect\_node\_states** ()

**display** (message)

Hook to allow the calling interface to display a message.

This hook gets called as part of preparing a task for execution (that is, a Node to be built). As part of figuring out what Node should be built next, the actual target list may be altered, along with a message describing the alteration. The calling interface can subclass Task and provide a concrete implementation of this method to see those messages.

**display\_cached\_string** (bi)

Logs the original builder messages, given the SConfBuildInfo instance bi.

**exc\_clear** ()

Clears any recorded exception.

This also changes the "exception\_raise" attribute to point to the appropriate do-nothing method.

**exc\_info** ()

Returns info about a recorded exception.

**exception\_set** (exception=None)

Records an exception to be raised at the appropriate time.

This also changes the "exception\_raise" attribute to point to the method that will, in fact

**execute** ()

Called to execute the task.

This method is called from multiple threads in a parallel build, so only do thread safe stuff here. Do thread unsafe stuff in prepare(), executed() or failed().

**executed** ()

Called when the task has been successfully executed and the Taskmaster instance wants to call the Node's callback methods.

This may have been a do-nothing operation (to preserve build order), so we must check the node's state before deciding whether it was "built", in which case we call the appropriate Node method. In any event, we always call "visited()", which will handle any post-visit actions that must take place regardless of whether or not the target was an actual built target or a source Node.

**executed\_with\_callbacks** ()

Called when the task has been successfully executed and the Taskmaster instance wants to call the Node's callback methods.

This may have been a do-nothing operation (to preserve build order), so we must check the node's state before deciding whether it was "built", in which case we call the appropriate Node method. In any event, we always call "visited()", which will handle any post-visit actions that must take place regardless of whether or not the target was an actual built target or a source Node.

**executed\_without\_callbacks** ()

Called when the task has been successfully executed and the Taskmaster instance doesn't want to call the Node's callback methods.

### **fail\_continue ()**

Explicit continue-the-build failure.

This sets failure status on the target nodes and all of their dependent parent nodes.

Note: Although this function is normally invoked on nodes in the executing state, it might also be invoked on up-to-date nodes when using Configure().

### **fail\_stop ()**

Explicit stop-the-build failure.

This sets failure status on the target nodes and all of their dependent parent nodes.

Note: Although this function is normally invoked on nodes in the executing state, it might also be invoked on up-to-date nodes when using Configure().

### **failed ()**

Default action when a task fails: stop the build.

Note: Although this function is normally invoked on nodes in the executing state, it might also be invoked on up-to-date nodes when using Configure().

### **get\_target ()**

Fetch the target being built or updated by this task.

### **make\_ready ()**

Marks all targets in a task ready for execution if any target is not current.

This is the default behavior for building only what's necessary.

### **make\_ready\_all ()**

Marks all targets in a task ready for execution.

This is used when the interface needs every target Node to be visited—the canonical example being the “scons -c” option.

### **make\_ready\_current ()**

Marks all targets in a task ready for execution if any target is not current.

This is the default behavior for building only what's necessary.

### **needs\_execute ()**

Always returns True (indicating this Task should always be executed).

Subclasses that need this behavior (as opposed to the default of only executing Nodes that are out of date w.r.t. their dependencies) can use this as follows:

```
class MyTaskSubclass(SCons.Taskmaster.Task):
```

```
    needs_execute = SCons.Taskmaster.AlwaysTask.needs_execute
```

### **postprocess ()**

Post-processes a task after it's been executed.

This examines all the targets just built (or not, we don't care if the build was successful, or even if there was no build because everything was up-to-date) to see if they have any waiting parent Nodes, or Nodes waiting on a common side effect, that can be put back on the candidates list.

### **prepare ()**

Called just before the task is executed.

This is mainly intended to give the target Nodes a chance to unlink underlying files and make all necessary directories before the Action is actually called to build the targets.

```
trace_message (method, node, description='node')
```

*exception* `SCons.SConf.SConfError` (msg)

Bases: `SCons.Errors.UserError`

**args**

**with\_traceback ()**

Exception.with\_traceback(tb) – set self.\_\_traceback\_\_ to tb and return self.

exception `SCons.SConf.SConfWarning`

Bases: `SCons.Warnings.Warning`

**args**

**with\_traceback ()**

Exception.with\_traceback(tb) – set self.\_\_traceback\_\_ to tb and return self.

`SCons.SConf.SetBuildType` (buildtype)

`SCons.SConf.SetCacheMode` (mode)

Set the Configure cache mode. mode must be one of “auto”, “force”, or “cache”.

`SCons.SConf.SetProgressDisplay` (display)

Set the progress display to use (called from `SCons.Script`)

class `SCons.SConf.Streamer` (orig)

Bases: `object`

‘Sniffer’ for a file-like writable object. Similar to the unix tool tee.

**flush ()**

**getvalue ()**

Return everything written to orig since the Streamer was created.

**write (str)**

**writelines (lines)**

`SCons.SConf._createConfigH` (target, source, env)

`SCons.SConf._createSource` (target, source, env)

`SCons.SConf._stringConfigH` (target, source, env)

`SCons.SConf._stringSource` (target, source, env)

`SCons.SConf.createIncludesFromHeaders` (headers, leaveLast, include\_quotes='')

## ***SCons.SConsign module***

`SCons.SConsign`

Writing and reading information to the .sconsign file or files.

class `SCons.SConsign.Base`

Bases: `object`

This is the controlling class for the signatures for the collection of entries associated with a specific directory. The actual directory association will be maintained by a subclass that is specific to the underlying storage method. This class provides a common set of methods for fetching and storing the individual bits of information that make up signature entry.

**do\_not\_set\_entry** (filename, obj)

**do\_not\_store\_info** (filename, node)

**get\_entry** (filename)

Fetch the specified entry attribute.

**merge ()**

**set\_entry** (filename, obj)

Set the entry.

```
store_info (filename, node)
```

```
class SCons.SConsign.DB (dir)
```

Bases: **SCons.SConsign.Base**

A Base subclass that reads and writes signature information from a global .sconsign.db\* file—the actual file suffix is determined by the database module.

```
do_not_set_entry (filename, obj)
```

```
do_not_store_info (filename, node)
```

```
get_entry (filename)
```

Fetch the specified entry attribute.

```
merge ()
```

```
set_entry (filename, obj)
```

Set the entry.

```
store_info (filename, node)
```

```
write (sync=1)
```

```
class SCons.SConsign.Dir (fp=None, dir=None)
```

Bases: **SCons.SConsign.Base**

```
do_not_set_entry (filename, obj)
```

```
do_not_store_info (filename, node)
```

```
get_entry (filename)
```

Fetch the specified entry attribute.

```
merge ()
```

```
set_entry (filename, obj)
```

Set the entry.

```
store_info (filename, node)
```

```
class SCons.SConsign.DirFile (dir)
```

Bases: **SCons.SConsign.Dir**

Encapsulates reading and writing a per-directory .sconsign file.

```
do_not_set_entry (filename, obj)
```

```
do_not_store_info (filename, node)
```

```
get_entry (filename)
```

Fetch the specified entry attribute.

```
merge ()
```

```
set_entry (filename, obj)
```

Set the entry.

```
store_info (filename, node)
```

```
write (sync=1)
```

Write the `.sconsign` file to disk.

Try to write to a temporary file first, and rename it if we succeed. If we can't write to the temporary file, it's probably because the directory isn't writable (and if so, how did we build anything in this directory, anyway?), so try to write directly to the `.sconsign` file as a backup. If we can't rename, try to copy the temporary contents back to the `.sconsign` file. Either way, always try to remove the temporary file at the end.

`SCons.SConsign.File` (name, dbm\_module=None)

Arrange for all signatures to be stored in a global `.sconsign.db*` file.

`SCons.SConsign.ForDirectory`

alias of `SCons.SConsign.DB`

`SCons.SConsign.GetDataBase` (dir)

`SCons.SConsign.Reset` ()

Reset global state. Used by unit tests that end up using `SConsign` multiple times to get a clean slate for each test.

`class SCons.SConsign.SConsignEntry`

Bases: `object`

Wrapper class for the generic entry in a `.sconsign` file. The `Node` subclass populates it with attributes as it pleases. XXX As coded below, we do expect a `'binfo'` attribute to be added, but we'll probably generalize this in the next refactorings.

`binfo`

`convert_from_sconsign` (dir, name)

`convert_to_sconsign` ()

`current_version_id` = 2

`ninfo`

`SCons.SConsign.corrupt_dblite_warning` (filename)

`SCons.SConsign.write` ()

## ***SCons.Subst module***

`SCons.Subst`

`SCons` string substitution.

`class SCons.Subst.CmdStringHolder` (cmd, literal=None)

Bases: `collections.UserString`

This is a special class used to hold strings generated by `scons_subst()` and `scons_subst_list()`. It defines a special method `escape()`. When passed a function with an escape algorithm for a particular platform, it will return the contained string with the proper escape sequences inserted.

`_abc_impl` = `<_abc_data object>`

`capitalize` ()

`casefold` ()

`center` (width, \*args)

`count` (value) → integer -- return number of occurrences of value

`encode` (encoding=None, errors=None)

`endswith` (suffix, start=0, end=9223372036854775807)

**escape** (escape\_func, quote\_func=<function quote\_spaces>)

Escape the string with the supplied function. The function is expected to take an arbitrary string, then return it with all special characters escaped and ready for passing to the command interpreter.

After calling this function, the next call to `str()` will return the escaped string.

**expandtabs** (tabsize=8)

**find** (sub, start=0, end=9223372036854775807)

**format** (\*args, \*\*kwds)

**format\_map** (mapping)

**index** (value[, start[, stop]]) → integer -- return first index of value.

Raises `ValueError` if the value is not present.

Supporting start and stop arguments is optional, but recommended.

**is\_literal** ()

**isalnum** ()

**isalpha** ()

**isascii** ()

**isdecimal** ()

**isdigit** ()

**isidentifier** ()

**islower** ()

**isnumeric** ()

**isprintable** ()

**isspace** ()

**istitle** ()

**isupper** ()

**join** (seq)

**ljust** (width, \*args)

**lower** ()

**rstrip** (chars=None)

**maketrans** ()

Return a translation table usable for `str.translate()`.

If there is only one argument, it must be a dictionary mapping Unicode ordinals (integers) or characters to Unicode ordinals, strings or None. Character keys will be then converted to ordinals. If there are two arguments, they must be strings of equal length, and in the resulting dictionary, each character in x will be mapped to the character at the same position in y. If there is a third argument, it must be a string, whose characters will be mapped to None in the result.

**partition** (sep)

```

replace (old, new, maxsplit=-1)
rfind (sub, start=0, end=9223372036854775807)
rindex (sub, start=0, end=9223372036854775807)
rjust (width, *args)
rpartition (sep)
rsplit (sep=None, maxsplit=-1)
rstrip (chars=None)
split (sep=None, maxsplit=-1)
splitlines (keepends=False)
startswith (prefix, start=0, end=9223372036854775807)
strip (chars=None)
swapcase ()
title ()
translate (*args)
upper ()
zfill (width)

```

```
class SCons.Subst.ListSubber (env, mode, conv, gvars)
```

Bases: **collections.UserList**

A class to construct the results of a `scons_subst_list()` call.

Like `StringSubber`, this class binds a specific construction environment, mode, target and source with two methods (`substitute()` and `expand()`) that handle the expansion.

In addition, however, this class is used to track the state of the result(s) we're gathering so we can do the appropriate thing whenever we have to append another word to the result—start a new line, start a new word, append to the current word, etc. We do this by setting the “append” attribute to the right method so that our wrapper methods only need ever call `ListSubber.append()`, and the rest of the object takes care of doing the right thing internally.

```
__UserList__cast (other)
```

```
__abc_impl = <_abc_data object>
```

```
add_new_word (x)
```

```
add_to_current_word (x)
```

Append the string `x` to the end of the current last word in the result. If that is not possible, then just add it as a new word. Make sure the entire concatenated string inherits the object attributes of `x` (in particular, the escape function) by wrapping it as `CmdStringHolder`.

```
append (item)
```

`S.append(value)` – append value to the end of the sequence

```
clear () → None -- remove all items from S
```

```
close_strip (x)
```

Handle the “close strip” `$)` token.

**copy ()**

**count (value)** → integer -- return number of occurrences of value

**expand (s, lvars, within\_list)**

Expand a single “token” as necessary, appending the expansion to the current result.

This handles expanding different types of things (strings, lists, callables) appropriately. It calls the wrapper `substitute()` method to re-expand things as necessary, so that the results of expansions of side-by-side strings still get re-evaluated separately, not smushed together.

**expanded (s)**

Determines if the string `s` requires further expansion.

Due to the implementation of `ListSubber` `expand` will call itself 2 additional times for an already expanded string.

This method is used to determine if a string is already fully expanded and if so exit the loop early to prevent these recursive calls.

**extend (other)**

`S.extend(iterable)` – extend sequence by appending elements from the iterable

**index (value[, start[, stop]])** → integer -- return first index of value.

Raises `ValueError` if the value is not present.

Supporting `start` and `stop` arguments is optional, but recommended.

**insert (i, item)**

`S.insert(index, value)` – insert value before index

**literal (x)**

**next\_line ()**

Arrange for the next word to start a new line. This is like starting a new word, except that we have to append another line to the result.

**next\_word ()**

Arrange for the next word to start a new word.

**open\_strip (x)**

Handle the “open strip” `$(` token.

**pop ([, index])** → item -- remove and return item at index (default last).

Raise `IndexError` if list is empty or index is out of range.

**remove (item)**

`S.remove(value)` – remove first occurrence of value. Raise `ValueError` if the value is not present.

**reverse ()**

`S.reverse()` – reverse *IN PLACE*

**sort (\*args, \*\*kws)**

**substitute (args, lvars, within\_list)**

Substitute expansions in an argument or list of arguments.

This serves as a wrapper for splitting up a string into separate tokens.

**this\_word ()**

Arrange for the next word to append to the end of the current last word in the result.

`class SCons.Subst.Literal (lstr)`

Bases: `object`

A wrapper for a string. If you use this object wrapped around a string, then it will be interpreted as literal. When passed to the command interpreter, all special characters will be escaped.

**escape** (escape\_func)

**for\_signature** ()

**is\_literal** ()

*class* SCons.Subst.NLWrapper (list, func)

Bases: **object**

A wrapper class that delays turning a list of sources or targets into a NodeList until it's needed. The specified function supplied when the object is initialized is responsible for turning raw nodes into proxies that implement the special attributes like .abspath, .source, etc. This way, we avoid creating those proxies just "in case" someone is going to use \$TARGET or the like, and only go through the trouble if we really have to.

In practice, this might be a wash performance-wise, but it's a little cleaner conceptually...

**\_create\_nodelist** ()

**\_gen\_nodelist** ()

**\_return\_nodelist** ()

*class* SCons.Subst.NullNodeList (\*args, \*\*kwargs)

Bases: **SCons.Util.NullSeq**

**\_instance**

SCons.Subst.NullNodesList

SCons.Subst.SetAllowableExceptions (\*excepts)

*class* SCons.Subst.SpecialAttrWrapper (lstr, for\_signature=None)

Bases: **object**

This is a wrapper for what we call a 'Node special attribute.' This is any of the attributes of a Node that we can reference from Environment variable substitution, such as \$TARGET.abspath or \$SOURCES[1].filebase. We implement the same methods as Literal so we can handle special characters, plus a for\_signature method, such that we can return some canonical string during signature calculation to avoid unnecessary rebuilds.

**escape** (escape\_func)

**for\_signature** ()

**is\_literal** ()

*class* SCons.Subst.StringSubber (env, mode, conv, gvars)

Bases: **object**

A class to construct the results of a sconsubst() call.

This binds a specific construction environment, mode, target and source with two methods (substitute() and expand()) that handle the expansion.

**expand** (s, lvars)

Expand a single "token" as necessary, returning an appropriate string containing the expansion.

This handles expanding different types of things (strings, lists, callables) appropriately. It calls the wrapper substitute() method to re-expand things as necessary, so that the results of expansions of side-by-side strings still get re-evaluated separately, not smushed together.

**substitute** (args, lvars)

Substitute expansions in an argument or list of arguments.

This serves as a wrapper for splitting up a string into separate tokens.

*class* SCons.Subst.Target\_or\_Source (nl)

Bases: **object**

A class that implements \$TARGET or \$SOURCE expansions by in turn wrapping a NLWrapper. This class handles the different methods used to access an individual proxy Node, calling the NLWrapper to create a proxy on demand.

```
class SCons.Subst.Targets_or_Sources (nl)
```

Bases: `collections.UserList`

A class that implements \$TARGETS or \$SOURCES expansions by in turn wrapping a NLWrapper. This class handles the different methods used to access the list, calling the NLWrapper to create proxies on demand.

Note that we subclass `collections.UserList` purely so that the `is_Sequence()` function will identify an object of this class as a list during variable expansion. We're not really using any `collections.UserList` methods in practice.

```
_UserList__cast (other)
```

```
_abc_impl = <_abc_data object>
```

```
append (item)
```

S.append(value) – append value to the end of the sequence

```
clear () → None -- remove all items from S
```

```
copy ()
```

```
count (value) → integer -- return number of occurrences of value
```

```
extend (other)
```

S.extend(iterable) – extend sequence by appending elements from the iterable

```
index (value[, start[, stop]]) → integer -- return first index of value.
```

Raises `ValueError` if the value is not present.

Supporting start and stop arguments is optional, but recommended.

```
insert (i, item)
```

S.insert(index, value) – insert value before index

```
pop ([, index]) → item -- remove and return item at index (default last).
```

Raise `IndexError` if list is empty or index is out of range.

```
remove (item)
```

S.remove(value) – remove first occurrence of value. Raise `ValueError` if the value is not present.

```
reverse ()
```

S.reverse() – reverse *IN PLACE*

```
sort (*args, **kws)
```

```
SCons.Subst._remove_list (list)
```

```
SCons.Subst._rm_list (list)
```

```
SCons.Subst.escape_list (mylist, escape_func)
```

Escape a list of arguments by running the specified `escape_func` on every object in the list that has an `escape()` method.

```
SCons.Subst.quote_spaces (arg)
```

Generic function for putting double quotes around any string that has white space in it.

```
SCons.Subst.raise_exception (exception, target, s)
```

```
SCons.Subst.scons_subst (strSubst, env, mode=1, target=None, source=None, gvars={}, lvars={}, conv=None)
```

Expand a string or list containing construction variable substitutions.

This is the work-horse function for substitutions in file names and the like. The companion `scons_subst_list()` function (below) handles separating command lines into lists of arguments, so see that function if that's what you're looking for.

```
SCons.Subst.scons_subst_list (strSubst, env, mode=1, target=None, source=None, gvars={},
lvars={}, conv=None)
```

Substitute construction variables in a string (or list or other object) and separate the arguments into a command list.

The companion `scons_subst()` function (above) handles basic substitutions within strings, so see that function instead if that's what you're looking for.

```
SCons.Subst.scons_subst_once (strSubst, env, key)
```

Perform single (non-recursive) substitution of a single construction variable keyword.

This is used when setting a variable when copying or overriding values in an Environment. We want to capture (expand) the old value before we override it, so people can do things like:

```
env2 = env.Clone(CCFLAGS = '$CCFLAGS -g')
```

We do this with some straightforward, brute-force code here...

```
SCons.Subst.subst_dict (target, source)
```

Create a dictionary for substitution of special construction variables.

This translates the following special arguments:

**target - the target (object or array of objects),**

used to generate the TARGET and TARGETS construction variables

**source - the source (object or array of objects),**

used to generate the SOURCES and SOURCE construction variables

## ***SCons.Taskmaster module***

### ***Generic Taskmaster module for the SCons build engine.***

This module contains the primary interface(s) between a wrapping user interface and the SCons build engine. There are two key classes here:

#### ***Taskmaster***

This is the main engine for walking the dependency graph and calling things to decide what does or doesn't need to be built.

#### ***Task***

This is the base class for allowing a wrapping interface to decide what does or doesn't actually need to be done. The intention is for a wrapping interface to subclass this as appropriate for different types of behavior it may need.

The canonical example is the SCons native Python interface, which has Task subclasses that handle its specific behavior, like printing "'foo' is up to date" when a top-level target doesn't need to be built, and handling the -c option by removing targets as its "build" action. There is also a separate subclass for suppressing this output when the -q option is used.

The Taskmaster instantiates a Task object for each (set of) target(s) that it decides need to be evaluated and/or built.

```
class SCons.Taskmaster.AlwaysTask (tm, targets, top, node)
```

```
  Bases: SCons.Taskmaster.Task
```

```
  _abc_impl = <_abc_data object>
```

```
  _exception_raise ()
```

Raises a pending exception that was recorded while getting a Task ready for execution.

```
  _no_exception_to_raise ()
```

```
  display (message)
```

Hook to allow the calling interface to display a message.

This hook gets called as part of preparing a task for execution (that is, a Node to be built). As part of figuring out what Node should be built next, the actual target list may be altered, along with a message describing the alteration. The calling interface can subclass Task and provide a concrete implementation of this method to see those messages.

#### **exc\_clear ()**

Clears any recorded exception.

This also changes the “exception\_raise” attribute to point to the appropriate do-nothing method.

#### **exc\_info ()**

Returns info about a recorded exception.

#### **exception\_set (exception=None)**

Records an exception to be raised at the appropriate time.

This also changes the “exception\_raise” attribute to point to the method that will, in fact

#### **execute ()**

Called to execute the task.

This method is called from multiple threads in a parallel build, so only do thread safe stuff here. Do thread unsafe stuff in prepare(), executed() or failed().

#### **executed ()**

Called when the task has been successfully executed and the Taskmaster instance wants to call the Node’s callback methods.

This may have been a do-nothing operation (to preserve build order), so we must check the node’s state before deciding whether it was “built”, in which case we call the appropriate Node method. In any event, we always call “visited()”, which will handle any post-visit actions that must take place regardless of whether or not the target was an actual built target or a source Node.

#### **executed\_with\_callbacks ()**

Called when the task has been successfully executed and the Taskmaster instance wants to call the Node’s callback methods.

This may have been a do-nothing operation (to preserve build order), so we must check the node’s state before deciding whether it was “built”, in which case we call the appropriate Node method. In any event, we always call “visited()”, which will handle any post-visit actions that must take place regardless of whether or not the target was an actual built target or a source Node.

#### **executed\_without\_callbacks ()**

Called when the task has been successfully executed and the Taskmaster instance doesn’t want to call the Node’s callback methods.

#### **fail\_continue ()**

Explicit continue-the-build failure.

This sets failure status on the target nodes and all of their dependent parent nodes.

Note: Although this function is normally invoked on nodes in the executing state, it might also be invoked on up-to-date nodes when using Configure().

#### **fail\_stop ()**

Explicit stop-the-build failure.

This sets failure status on the target nodes and all of their dependent parent nodes.

Note: Although this function is normally invoked on nodes in the executing state, it might also be invoked on up-to-date nodes when using Configure().

#### **failed ()**

Default action when a task fails: stop the build.

Note: Although this function is normally invoked on nodes in the executing state, it might also be invoked on up-to-date nodes when using Configure().

#### **get\_target ()**

Fetch the target being built or updated by this task.

**make\_ready ()**

Marks all targets in a task ready for execution if any target is not current.  
This is the default behavior for building only what's necessary.

**make\_ready\_all ()**

Marks all targets in a task ready for execution.  
This is used when the interface needs every target Node to be visited—the canonical example being the “scons -c” option.

**make\_ready\_current ()**

Marks all targets in a task ready for execution if any target is not current.  
This is the default behavior for building only what's necessary.

**needs\_execute ()**

Always returns True (indicating this Task should always be executed).  
Subclasses that need this behavior (as opposed to the default of only executing Nodes that are out of date w.r.t. their dependencies) can use this as follows:

```
class MyTaskSubclass(SCons.Taskmaster.Task):
```

```
    needs_execute = SCons.Taskmaster.AlwaysTask.needs_execute
```

**postprocess ()**

Post-processes a task after it's been executed.  
This examines all the targets just built (or not, we don't care if the build was successful, or even if there was no build because everything was up-to-date) to see if they have any waiting parent Nodes, or Nodes waiting on a common side effect, that can be put back on the candidates list.

**prepare ()**

Called just before the task is executed.  
This is mainly intended to give the target Nodes a chance to unlink underlying files and make all necessary directories before the Action is actually called to build the targets.

**trace\_message (method, node, description='node')**

```
class SCons.Taskmaster.OutOfDateTask (tm, targets, top, node)
```

```
    Bases: SCons.Taskmaster.Task
```

```
    _abc_impl = <_abc_data object>
```

**\_exception\_raise ()**

Raises a pending exception that was recorded while getting a Task ready for execution.

**\_no\_exception\_to\_raise ()****display (message)**

Hook to allow the calling interface to display a message.  
This hook gets called as part of preparing a task for execution (that is, a Node to be built). As part of figuring out what Node should be built next, the actual target list may be altered, along with a message describing the alteration. The calling interface can subclass Task and provide a concrete implementation of this method to see those messages.

**exc\_clear ()**

Clears any recorded exception.  
This also changes the “exception\_raise” attribute to point to the appropriate do-nothing method.

**exc\_info ()**

Returns info about a recorded exception.

**exception\_set (exception=None)**

Records an exception to be raised at the appropriate time.  
This also changes the “exception\_raise” attribute to point to the method that will, in fact

**execute ()**

Called to execute the task.

This method is called from multiple threads in a parallel build, so only do thread safe stuff here. Do thread unsafe stuff in `prepare()`, `executed()` or `failed()`.

**executed ()**

Called when the task has been successfully executed and the Taskmaster instance wants to call the Node's callback methods.

This may have been a do-nothing operation (to preserve build order), so we must check the node's state before deciding whether it was "built", in which case we call the appropriate Node method. In any event, we always call "visited()", which will handle any post-visit actions that must take place regardless of whether or not the target was an actual built target or a source Node.

**executed\_with\_callbacks ()**

Called when the task has been successfully executed and the Taskmaster instance wants to call the Node's callback methods.

This may have been a do-nothing operation (to preserve build order), so we must check the node's state before deciding whether it was "built", in which case we call the appropriate Node method. In any event, we always call "visited()", which will handle any post-visit actions that must take place regardless of whether or not the target was an actual built target or a source Node.

**executed\_without\_callbacks ()**

Called when the task has been successfully executed and the Taskmaster instance doesn't want to call the Node's callback methods.

**fail\_continue ()**

Explicit continue-the-build failure.

This sets failure status on the target nodes and all of their dependent parent nodes.

Note: Although this function is normally invoked on nodes in the executing state, it might also be invoked on up-to-date nodes when using `Configure()`.

**fail\_stop ()**

Explicit stop-the-build failure.

This sets failure status on the target nodes and all of their dependent parent nodes.

Note: Although this function is normally invoked on nodes in the executing state, it might also be invoked on up-to-date nodes when using `Configure()`.

**failed ()**

Default action when a task fails: stop the build.

Note: Although this function is normally invoked on nodes in the executing state, it might also be invoked on up-to-date nodes when using `Configure()`.

**get\_target ()**

Fetch the target being built or updated by this task.

**make\_ready ()**

Marks all targets in a task ready for execution if any target is not current.

This is the default behavior for building only what's necessary.

**make\_ready\_all ()**

Marks all targets in a task ready for execution.

This is used when the interface needs every target Node to be visited—the canonical example being the "scons -c" option.

**make\_ready\_current ()**

Marks all targets in a task ready for execution if any target is not current.

This is the default behavior for building only what's necessary.

**needs\_execute ()**

Returns True (indicating this Task should be executed) if this Task's target state indicates it needs executing, which has already been determined by an earlier up-to-date check.

**postprocess ()**

Post-processes a task after it's been executed.

This examines all the targets just built (or not, we don't care if the build was successful, or even if there was no build because everything was up-to-date) to see if they have any waiting parent Nodes, or Nodes waiting on a common side effect, that can be put back on the candidates list.

**prepare ()**

Called just before the task is executed.

This is mainly intended to give the target Nodes a chance to unlink underlying files and make all necessary directories before the Action is actually called to build the targets.

**trace\_message (method, node, description='node')****class SCons.Taskmaster.Stats**

Bases: **object**

A simple class for holding statistics about the disposition of a Node by the Taskmaster. If we're collecting statistics, each Node processed by the Taskmaster gets one of these attached, in which case the Taskmaster records its decision each time it processes the Node. (Ideally, that's just once per Node.)

**class SCons.Taskmaster.Task (tm, targets, top, node)**

Bases: **abc.ABC**

SCons build engine abstract task class.

This controls the interaction of the actual building of node and the rest of the engine.

This is expected to handle all of the normally-customizable aspects of controlling a build, so any given application *should* be able to do what it wants by sub-classing this class and overriding methods as appropriate. If an application needs to customize something by sub-classing Taskmaster (or some other build engine class), we should first try to migrate that functionality into this class.

Note that it's generally a good idea for sub-classes to call these methods explicitly to update state, etc., rather than roll their own interaction with Taskmaster from scratch.

**\_abc\_impl** = *<\_abc\_data object>*

**\_exception\_raise ()**

Raises a pending exception that was recorded while getting a Task ready for execution.

**\_no\_exception\_to\_raise ()****display (message)**

Hook to allow the calling interface to display a message.

This hook gets called as part of preparing a task for execution (that is, a Node to be built). As part of figuring out what Node should be built next, the actual target list may be altered, along with a message describing the alteration. The calling interface can subclass Task and provide a concrete implementation of this method to see those messages.

**exc\_clear ()**

Clears any recorded exception.

This also changes the "exception\_raise" attribute to point to the appropriate do-nothing method.

**exc\_info ()**

Returns info about a recorded exception.

**exception\_set (exception=None)**

Records an exception to be raised at the appropriate time.

This also changes the "exception\_raise" attribute to point to the method that will, in fact

**execute ()**

Called to execute the task.

This method is called from multiple threads in a parallel build, so only do thread safe stuff here. Do thread unsafe stuff in prepare(), executed() or failed().

**executed ()**

Called when the task has been successfully executed and the Taskmaster instance wants to call the Node's callback methods.

This may have been a do-nothing operation (to preserve build order), so we must check the node's state before deciding whether it was "built", in which case we call the appropriate Node method. In any event, we always call "visited()", which will handle any post-visit actions that must take place regardless of whether or not the target was an actual built target or a source Node.

#### **executed\_with\_callbacks ()**

Called when the task has been successfully executed and the Taskmaster instance wants to call the Node's callback methods.

This may have been a do-nothing operation (to preserve build order), so we must check the node's state before deciding whether it was "built", in which case we call the appropriate Node method. In any event, we always call "visited()", which will handle any post-visit actions that must take place regardless of whether or not the target was an actual built target or a source Node.

#### **executed\_without\_callbacks ()**

Called when the task has been successfully executed and the Taskmaster instance doesn't want to call the Node's callback methods.

#### **fail\_continue ()**

Explicit continue-the-build failure.

This sets failure status on the target nodes and all of their dependent parent nodes.

Note: Although this function is normally invoked on nodes in the executing state, it might also be invoked on up-to-date nodes when using Configure().

#### **fail\_stop ()**

Explicit stop-the-build failure.

This sets failure status on the target nodes and all of their dependent parent nodes.

Note: Although this function is normally invoked on nodes in the executing state, it might also be invoked on up-to-date nodes when using Configure().

#### **failed ()**

Default action when a task fails: stop the build.

Note: Although this function is normally invoked on nodes in the executing state, it might also be invoked on up-to-date nodes when using Configure().

#### **get\_target ()**

Fetch the target being built or updated by this task.

#### **make\_ready ()**

Marks all targets in a task ready for execution if any target is not current.

This is the default behavior for building only what's necessary.

#### **make\_ready\_all ()**

Marks all targets in a task ready for execution.

This is used when the interface needs every target Node to be visited—the canonical example being the "scons -c" option.

#### **make\_ready\_current ()**

Marks all targets in a task ready for execution if any target is not current.

This is the default behavior for building only what's necessary.

#### **abstract\_needs\_execute ()**

#### **postprocess ()**

Post-processes a task after it's been executed.

This examines all the targets just built (or not, we don't care if the build was successful, or even if there was no build because everything was up-to-date) to see if they have any waiting parent Nodes, or Nodes waiting on a common side effect, that can be put back on the candidates list.

#### **prepare ()**

Called just before the task is executed.

This is mainly intended to give the target Nodes a chance to unlink underlying files and make all necessary directories before the Action is actually called to build the targets.

```
trace_message (method, node, description='node')
```

```
class SCons.Taskmaster.Taskmaster (targets=[ ], tasker=None, order=None, trace=None)
```

Bases: **object**

The Taskmaster for walking the dependency DAG.

```
_find_next_ready_node ()
```

Finds the next node that is ready to be built.

This is *the* main guts of the DAG walk. We loop through the list of candidates, looking for something that has no un-built children (i.e., that is a leaf Node or has dependencies that are all leaf Nodes or up-to-date). Candidate Nodes are re-scanned (both the target Node itself and its sources, which are always scanned in the context of a given target) to discover implicit dependencies. A Node that must wait for some children to be built will be put back on the candidates list after the children have finished building. A Node that has been put back on the candidates list in this way may have itself (or its sources) re-scanned, in order to handle generated header files (e.g.) and the implicit dependencies therein.

Note that this method does not do any signature calculation or up-to-date check itself. All of that is handled by the Task class. This is purely concerned with the dependency graph walk.

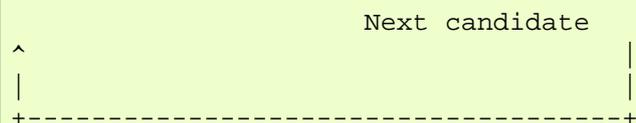
```
_validate_pending_children ()
```

Validate the content of the pending\_children set. Assert if an internal error is found.

This function is used strictly for debugging the taskmaster by checking that no invariants are violated. It is not used in normal operation.

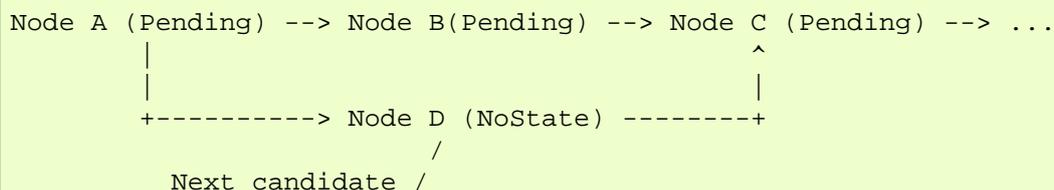
The pending\_children set is used to detect cycles in the dependency graph. We call a “pending child” a child that is found in the “pending” state when checking the dependencies of its parent node.

A pending child can occur when the Taskmaster completes a loop through a cycle. For example, let’s imagine a graph made of three nodes (A, B and C) making a cycle. The evaluation starts at node A. The Taskmaster first considers whether node A’s child B is up-to-date. Then, recursively, node B needs to check whether node C is up-to-date. This leaves us with a dependency graph looking like:



Now, when the Taskmaster examines the Node C’s child Node A, it finds that Node A is in the “pending” state. Therefore, Node A is a pending child of node C.

Pending children indicate that the Taskmaster has potentially loop back through a cycle. We say potentially because it could also occur when a DAG is evaluated in parallel. For example, consider the following graph:



The Taskmaster first evaluates the nodes A, B, and C and starts building some children of node C. Assuming, that the maximum parallel level has not been reached, the Taskmaster will examine Node D. It will find that Node C is a pending child of Node D.

In summary, evaluating a graph with a cycle will always involve a pending child at one point. A pending child might indicate either a cycle or a diamond-shaped DAG. Only a fraction of the nodes ends-up being a “pending child” of another node. This keeps the pending\_children set small in practice.

We can differentiate between the two cases if we wait until the end of the build. At this point, all the pending children nodes due to a diamond-shaped DAG will have been properly built (or will have failed to build). But, the pending children involved in a cycle will still be in the pending state.

The taskmaster removes nodes from the pending\_children set as soon as a pending\_children node moves out of the pending state. This also helps to keep the pending\_children set small.

**cleanup ()**

Check for dependency cycles.

**find\_next\_candidate ()**

Returns the next candidate Node for (potential) evaluation.

The candidate list (really a stack) initially consists of all of the top-level (command line) targets provided when the Taskmaster was initialized. While we walk the DAG, visiting Nodes, all the children that haven't finished processing get pushed on to the candidate list. Each child can then be popped and examined in turn for whether *their* children are all up-to-date, in which case a Task will be created for their actual evaluation and potential building.

Here is where we also allow candidate Nodes to alter the list of Nodes that should be examined. This is used, for example, when invoking SCons in a source directory. A source directory Node can return its corresponding build directory Node, essentially saying, "Hey, you really need to build this thing over here instead."

**next\_task ()**

Returns the next task to be executed.

This simply asks for the next Node to be evaluated, and then wraps it in the specific Task subclass with which we were initialized.

**no\_next\_candidate ()**

Stops Taskmaster processing by not returning a next candidate.

Note that we have to clean-up the Taskmaster candidate list because the cycle detection depends on the fact all nodes have been processed somehow.

**stop ()**

Stops the current build completely.

**trace\_message (message)****trace\_node (node)****will\_not\_build (nodes, node\_func=<function Taskmaster.<lambda>>)**

Perform clean-up about nodes that will never be built. Invokes a user defined function on all of these nodes (including all of their parents).

SCons.Taskmaster.**dump\_stats ()**

SCons.Taskmaster.**find\_cycle (stack, visited)**

## SCons.Util module

### SCons.Util

Various utility functions go here.

SCons.Util.**AddMethod (obj, function, name=None)**

Adds either a bound method to an instance or the function itself (or an unbound method in Python 2) to a class. If name is omitted the name of the specified function is used by default.

Example:

```
a = A()
def f(self, x, y):
    self.z = x + y
AddMethod(f, A, "add")
a.add(2, 4)
print(a.z)
AddMethod(lambda self, i: self.l[i], a, "listIndex")
print(a.listIndex(5))
```

SCons.Util.**AddPathIfNotExists (env\_dict, key, path, sep=':')**

This function will take 'key' out of the dictionary 'env\_dict', then add the path 'path' to that key if it is not already there. This treats the value of env\_dict[key] as if it has a similar format to the PATH variable...a list of paths separated by tokens. The 'path' will get added to the list if it is not already there.

`SCons.Util.AppendPath` (oldpath, newpath, sep=':', delete\_existing=1, canonicalize=None)

This appends new path elements to the given old path. Will only add any particular path once (leaving the last one it encounters and ignoring the rest, to preserve path order), and will use `os.path.normpath` and `os.path.normcase` on all paths to help assure this. This can also handle the case where the given old path variable is a list instead of a string, in which case a list will be returned instead of a string.

#### Example

Old Path: `"/foo/bar:/foo"` New Path: `"/biz/boom:/foo"` Result: `"/foo/bar:/biz/boom:/foo"`

If `delete_existing` is 0, then adding a path that exists will not move it to the end; it will stay where it is in the list.

If `canonicalize` is not None, it is applied to each element of `newpath` before use.

`class SCons.Util.CLVar` (seq=[])

Bases: `collections.UserList`

A class for command-line construction variables.

This is a list that uses `Split()` to split an initial string along white-space arguments, and similarly to split any strings that get added. This allows us to Do the Right Thing with `Append()` and `Prepend()` (as well as straight Python `foo = env['VAR'] + 'arg1 arg2'`) regardless of whether a user adds a list or a string to a command-line construction variable.

`__UserList__cast` (other)

`__abc_impl` = `<_abc_data object>`

`append` (item)

`S.append(value)` – append value to the end of the sequence

`clear` () → None -- remove all items from S

`copy` ()

`count` (value) → integer -- return number of occurrences of value

`extend` (other)

`S.extend(iterable)` – extend sequence by appending elements from the iterable

`index` (value[, start[, stop]]) → integer -- return first index of value.

Raises `ValueError` if the value is not present.

Supporting `start` and `stop` arguments is optional, but recommended.

`insert` (i, item)

`S.insert(index, value)` – insert value before index

`pop` ([, index]) → item -- remove and return item at index (default last).

Raise `IndexError` if list is empty or index is out of range.

`remove` (item)

`S.remove(value)` – remove first occurrence of value. Raise `ValueError` if the value is not present.

`reverse` ()

`S.reverse()` – reverse *IN PLACE*

`sort` (\*args, \*\*kwargs)

`class SCons.Util.Delegate` (attribute)

Bases: `object`

A Python Descriptor class that delegates attribute fetches to an underlying wrapped subject of a Proxy. Typical use:

```
class Foo(Proxy):
```

```
    __str__ = Delegate('__str__')
```

```
class SCons.Util.DisplayEngine
```

```
Bases: object
```

```
print_it = True
```

```
set_mode(mode)
```

```
SCons.Util.IDX (N)
```

```
class SCons.Util.LogicalLines (fileobj)
```

```
Bases: object
```

```
Wrapper class for the logical_lines method.
```

```
Allows us to read all "logical" lines at once from a given file object.
```

```
readlines ()
```

```
SCons.Util.MD5collect (signatures)
```

```
Collects a list of signatures into an aggregate signature.
```

```
signatures - a list of signatures returns - the aggregate signature
```

```
SCons.Util.MD5filesignature (fname, chunksize=65536)
```

```
Generate the md5 signature of a file
```

**Parameters:**

- **fname** – file to hash
- **chunksize** – chunk size to read

**Returns:** String of Hex digits representing the signature

```
SCons.Util.MD5signature (s)
```

```
Generate md5 signature of a string
```

**Parameters:** **s** – either string or bytes. Normally should be bytes

**Returns:** String of hex digits representing the signature

```
class SCons.Util.NodeList (initlist=None)
```

```
Bases: collections.UserList
```

This class is almost exactly like a regular list of Nodes (actually it can hold any object), with one important difference. If you try to get an attribute from this list, it will return that attribute from every item in the list. For example:

```
>>> someList = NodeList([ ' foo ', ' bar ' ])
>>> someList.strip()
[ 'foo', 'bar' ]
```

```
__UserList__cast (other)
```

```
__abc_impl = <_abc_data object>
```

```
append (item)
```

```
S.append(value) – append value to the end of the sequence
```

```
clear () → None -- remove all items from S
```

```
copy ()
```

```
count (value) → integer -- return number of occurrences of value
```

```
extend (other)
```

```
S.extend(iterable) – extend sequence by appending elements from the iterable
```

```
index (value[, start[, stop]]) → integer -- return first index of value.
```

```
Raises ValueError if the value is not present.
```

Supporting start and stop arguments is optional, but recommended.

**insert** (i, item)

S.insert(index, value) – insert value before index

**pop** ([, index]) → item -- remove and return item at index (default last).

Raise IndexError if list is empty or index is out of range.

**remove** (item)

S.remove(value) – remove first occurrence of value. Raise ValueError if the value is not present.

**reverse** ()

S.reverse() – reverse *IN PLACE*

**sort** (\*args, \*\*kwargs)

class SCons.Util.Null (\*args, \*\*kwargs)

Bases: **object**

Null objects always and reliably “do nothing.”

class SCons.Util.NullSeq (\*args, \*\*kwargs)

Bases: **SCons.Util.Null**

A Null object that can also be iterated over.

exception SCons.Util.PlainWindowsError

Bases: **OSError**

**args**

**characters\_written**

**errno**

POSIX exception code

**filename**

exception filename

**filename2**

second exception filename

**strerror**

exception strerror

**with\_traceback** ()

Exception.with\_traceback(tb) – set self.\_\_traceback\_\_ to tb and return self.

SCons.Util.PrependingPath (oldpath, newpath, sep=':', delete\_existing=1, canonicalize=None)

This prepends newpath elements to the given oldpath. Will only add any particular path once (leaving the first one it encounters and ignoring the rest, to preserve path order), and will os.path.normpath and os.path.normcase all paths to help assure this. This can also handle the case where the given old path variable is a list instead of a string, in which case a list will be returned instead of a string.

#### Example

Old Path: “/foo/bar:/foo” New Path: “/biz/boom:/foo” Result: “/biz/boom:/foo:/foo/bar”

If delete\_existing is 0, then adding a path that exists will not move it to the beginning; it will stay where it is in the list.

If canonicalize is not None, it is applied to each element of newpath before use.

class SCons.Util.Proxy (subject)

Bases: **object**

A simple generic Proxy class, forwarding all calls to subject. So, for the benefit of the python newbie, what does this really mean? Well, it means that you can take an object, let's call it 'objA', and wrap it in this Proxy class, with a statement like this

```
proxyObj = Proxy(objA),
```

Then, if in the future, you do something like this

```
x = proxyObj.var1,
```

since Proxy does not have a 'var1' attribute (but presumably objA does), the request actually is equivalent to saying

```
x = objA.var1
```

Inherit from this class to create a Proxy.

Note that, with new-style classes, this does *not* work transparently for Proxy subclasses that use special `.*__()` method names, because those names are now bound to the class, not the individual instances. You now need to know in advance which `.*__()` method names you want to pass on to the underlying Proxy object, and specifically delegate their calls like this:

```
class Foo(Proxy):
```

```
    __str__ = Delegate('__str__')
```

```
get ()
```

Retrieve the entire wrapped object

`SCons.Util.RegError`

alias of `SCons.Util._NoError`

`SCons.Util.RegGetValue (root, key)`

`SCons.Util.RegOpenKeyEx (root, key)`

`SCons.Util.RenameFunction (function, name)`

Returns a function identical to the specified function, but with the specified name.

`class SCons.Util.Selector`

Bases: `collections.OrderedDict`

A callable ordered dictionary that maps file suffixes to dictionary values. We preserve the order in which items are added so that `get_suffix()` calls always return the first suffix added.

`clear ()` → None. Remove all items from od.

`copy ()` → a shallow copy of od

`fromkeys ()`

Create a new ordered dictionary with keys from iterable and values set to value.

`get ()`

Return the value for key if key is in the dictionary, else default.

`items ()` → a set-like object providing a view on D's items

`keys ()` → a set-like object providing a view on D's keys

`move_to_end ()`

Move an existing element to the end (or beginning if last is false).

Raise `KeyError` if the element does not exist.

`pop (k[, d])` → v, remove specified key and return the corresponding

value. If key is not found, d is returned if given, otherwise `KeyError` is raised.

`popitem ()`

Remove and return a (key, value) pair from the dictionary.

Pairs are returned in LIFO order if last is true or FIFO order if false.

**setdefault ()**

Insert key with a value of default if key is not in the dictionary.  
Return the value for key if key is in the dictionary, else default.

**update ([, E], \*\*F)** → None. Update D from dict/iterable E and F.

If E is present and has a .keys() method, then does: for k in E: D[k] = E[k] If E is present and lacks a .keys() method, then does: for k, v in E: D[k] = v In either case, this is followed by: for k in F: D[k] = F[k]

**values ()** → an object providing a view on D's values

SCons.Util.**Split** (arg)

class SCons.Util.**Unbuffered** (file)

Bases: **object**

A proxy class that wraps a file object, flushing after every write, and delegating everything else to the wrapped object.

**write** (arg)

class SCons.Util.**UniqueList** (seq=[ ])

Bases: **collections.UserList**

**\_UniqueList\_\_make\_unique ()**

**\_UserList\_\_cast** (other)

**\_abc\_impl** = <\_abc\_data object>

**append** (item)

S.append(value) – append value to the end of the sequence

**clear ()** → None -- remove all items from S

**copy ()**

**count** (value) → integer -- return number of occurrences of value

**extend** (other)

S.extend(iterable) – extend sequence by appending elements from the iterable

**index** (value[, start[, stop]]) → integer -- return first index of value.

Raises ValueError if the value is not present.

Supporting start and stop arguments is optional, but recommended.

**insert** (i)

S.insert(index, value) – insert value before index

**pop** ([, index]) → item -- remove and return item at index (default last).

Raise IndexError if list is empty or index is out of range.

**remove** (item)

S.remove(value) – remove first occurrence of value. Raise ValueError if the value is not present.

**reverse ()**

S.reverse() – reverse *IN PLACE*

**sort** (\*args, \*\*kwds)

SCons.Util.**WhereIs** (file, path=None, pathext=None, reject=[ ])

SCons.Util.**WinError**

alias of **SCons.Util.PlainWindowsError**

*exception* `SCons.Util._NoError`

Bases: `Exception`

**args**

**with\_traceback()**

Exception.with\_traceback(tb) – set self.\_\_traceback\_\_ to tb and return self.

`SCons.Util._semi_deepcopy_list(x)`

`SCons.Util._semi_deepcopy_tuple(x)`

`SCons.Util.adjustixes(fname, pre, suf, ensure_suffix=False)`

`SCons.Util.case_sensitive_suffixes(s1, s2)`

`SCons.Util.cmp(a, b)`

Define cmp because it's no longer available in python3 Works under python 2 as well

`SCons.Util.containsAll(str, set)`

Check whether sequence str contains ALL of the items in set.

`SCons.Util.containsAny(str, set)`

Check whether sequence str contains ANY of the items in set.

`SCons.Util.containsOnly(str, set)`

Check whether sequence str contains ONLY items in set.

`SCons.Util.dictify(keys, values, result={})`

`SCons.Util.do_flatten(sequence, result, isinstance=<built-in function isinstance>, StringTypes=(<class 'str'>, <class 'collections.UserString'>), SequenceTypes=(<class 'list'>, <class 'tuple'>, <class 'collections.UserList'>, <class 'collections.abc.MappingView'>))`

`SCons.Util.flatten(obj, isinstance=<built-in function isinstance>, StringTypes=(<class 'str'>, <class 'collections.UserString'>), SequenceTypes=(<class 'list'>, <class 'tuple'>, <class 'collections.UserList'>, <class 'collections.abc.MappingView'>), do_flatten=<function do_flatten>)`

Flatten a sequence to a non-nested list.

Flatten() converts either a single scalar or a nested sequence to a non-nested list. Note that flatten() considers strings to be scalars instead of sequences like Python would.

`SCons.Util.flatten_sequence(sequence, isinstance=<built-in function isinstance>, StringTypes=(<class 'str'>, <class 'collections.UserString'>), SequenceTypes=(<class 'list'>, <class 'tuple'>, <class 'collections.UserList'>, <class 'collections.abc.MappingView'>), do_flatten=<function do_flatten>)`

Flatten a sequence to a non-nested list.

Same as flatten(), but it does not handle the single scalar case. This is slightly more efficient when one knows that the sequence to flatten can not be a scalar.

`SCons.Util.get_env_bool(env, name, default=False)`

Convert a construction variable to bool.

If the value of *name* in *env* is 'true', 'yes', 'y', 'on' (case insensitive) or anything convertible to int that yields non-zero then return True; if 'false', 'no', 'n', 'off' (case insensitive) or a number that converts to integer zero return False. Otherwise, return *default*.

**Parameters:**

- **env** – construction environment, or any dict-like object
- **name** – name of the variable
- **default** – value to return if *name* not in *env* or cannot be converted (default: False)

**Returns:** the “truthiness” of *name*

**Return type:** bool

`SCons.Util.get_environment_var(varstr)`

Given a string, first determine if it looks like a reference to a single environment variable, like “\$FOO” or “\${FOO}”. If so, return that variable with no decorations (“FOO”). If not, return None.

`SCons.Util.get_native_path` (path)

Transforms an absolute path into a native path for the system. Non-Cygwin version, just leave the path alone.

`SCons.Util.get_os_env_bool` (name, default=False)

Convert an environment variable to bool.

Conversion is the same as for `get_env_bool()`.

`SCons.Util.is_Dict` (obj, isinstance=<built-in function isinstance>, DictTypes=(<class 'dict'>, <class 'collections.UserDict'>))

`SCons.Util.is_List` (obj, isinstance=<built-in function isinstance>, ListTypes=(<class 'list'>, <class 'collections.UserList'>))

`SCons.Util.is_Scalar` (obj, isinstance=<built-in function isinstance>, StringType=(<class 'str'>, <class 'collections.UserString'>), SequenceTypes=(<class 'list'>, <class 'tuple'>, <class 'collections.UserList'>, <class 'collections.abc.MappingView'>))

`SCons.Util.is_Sequence` (obj, isinstance=<built-in function isinstance>, SequenceTypes=(<class 'list'>, <class 'tuple'>, <class 'collections.UserList'>, <class 'collections.abc.MappingView'>))

`SCons.Util.is_String` (obj, isinstance=<built-in function isinstance>, StringType=(<class 'str'>, <class 'collections.UserString'>))

`SCons.Util.is_Tuple` (obj, isinstance=<built-in function isinstance>, tuple=<class 'tuple'>)

`SCons.Util.logical_lines` (physical\_lines, joiner=<built-in method join of str object>)

`SCons.Util.make_path_relative` (path)

makes an absolute path name to a relative pathname.

`SCons.Util.print_tree` (root, child\_func, prune=0, showtags=0, margin=[0], visited=None, lastChild=False, singleLineDraw=False)

Print a tree of nodes. This is like `render_tree`, except it prints lines directly instead of creating a string representation in memory, so that huge trees can be printed.

**Parameters:**

- *root* - the root node of the tree
- *child\_func* - the function called to get the children of a node
- *prune* - don't visit the same node twice
- *showtags* - print status information to the left of each node line
- *margin* - the format of the left margin to use for children of root. 1 results in a pipe, and 0 results in no pipe.
- *visited* - a dictionary of visited nodes in the current branch if not prune, or in the whole tree if prune.
- *singleLineDraw* - use line-drawing characters rather than ASCII.

`SCons.Util.render_tree` (root, child\_func, prune=0, margin=[0], visited=None)

Render a tree of nodes into an ASCII tree view.

**Parameters:**

- *root*: the root node of the tree
- *child\_func*: the function called to get the children of a node
- *prune*: don't visit the same node twice
- *margin*: the format of the left margin to use for children of root. 1 results in a pipe, and 0 results in no pipe.
- *visited*: a dictionary of visited nodes in the current branch if not prune, or in the whole tree if prune.

`SCons.Util.rightmost_separator` (path, sep)

`SCons.Util.semi_deepcopy` (x)

`SCons.Util.semi_deepcopy_dict` (x, exclude=[])

`SCons.Util.silent_intern` (x)

Perform `sys.intern()` on the passed argument and return the result. If the input is ineligible the original argument is returned and no exception is thrown.

`SCons.Util.splittext` (path)

Same as `os.path.splittext()` but faster.

`SCons.Util.to_String` (s, isinstance=<built-in function isinstance>, str=<class 'str'>, UserString=<class 'collections.UserString'>, BaseStringTypes=<class 'str'>)

`SCons.Util.to_String_for_signature` (obj, to\_String\_for\_subst=<function to\_String\_for\_subst>, AttributeError=<class 'AttributeError'>)

`SCons.Util.to_String_for_subst` (s, isinstance=<built-in function isinstance>, str=<class 'str'>, to\_String=<function to\_String>, BaseStringTypes=<class 'str'>, SequenceTypes=(<class 'list'>, <class 'tuple'>, <class 'collections.UserList'>, <class 'collections.abc.MappingView'>), UserString=<class 'collections.UserString'>)

`SCons.Util.to_bytes` (s)

`SCons.Util.to_str` (s)

`SCons.Util.unique` (s)

Return a list of the elements in s, but without duplicates.

For example, `unique([1,2,3,1,2,3])` is some permutation of [1,2,3], `unique("abcabc")` some permutation of ["a", "b", "c"], and `unique([[1, 2], [2, 3], [1, 2]])` some permutation of [[2, 3], [1, 2]].

For best speed, all sequence elements should be hashable. Then `unique()` will usually work in linear time.

If not possible, the sequence elements should enjoy a total ordering, and if `list(s).sort()` doesn't raise `TypeError` it's assumed that they do enjoy a total ordering. Then `unique()` will usually work in  $O(N \log_2(N))$  time.

If that's not possible either, the sequence elements must support equality-testing. Then `unique()` will usually work in quadratic time.

`SCons.Util.uniquer` (seq, idfun=None)

`SCons.Util.uniquer_hashables` (seq)

`SCons.Util.updrive` (path)

Make the drive letter (if any) upper case. This is useful because Windows is inconsistent on the case of the drive letter, which can cause inconsistencies when calculating command signatures.

## SCons.Warnings module

`SCons.Warnings`

This file implements the warnings framework for SCons.

*exception* `SCons.Warnings.CacheVersionWarning`

Bases: `SCons.Warnings.WarningOnByDefault`

**args**

**with\_traceback ()**

Exception.with\_traceback(tb) – set self.\_\_traceback\_\_ to tb and return self.

*exception* `SCons.Warnings.CacheWriteErrorWarning`

Bases: `SCons.Warnings.Warning`

**args**

**with\_traceback ()**

Exception.with\_traceback(tb) – set self.\_\_traceback\_\_ to tb and return self.

*exception* `SCons.Warnings.CorruptSConsignWarning`

Bases: `SCons.Warnings.WarningOnByDefault`

**args**

**with\_traceback ()**

Exception.with\_traceback(tb) – set self.\_\_traceback\_\_ to tb and return self.

*exception* SCons.Warnings.DependencyWarning

Bases: SCons.Warnings.Warning

**args**

**with\_traceback ()**

Exception.with\_traceback(tb) – set self.\_\_traceback\_\_ to tb and return self.

*exception* SCons.Warnings.DeprecatedDebugOptionsWarning

Bases: SCons.Warnings.MandatoryDeprecatedWarning

**args**

**with\_traceback ()**

Exception.with\_traceback(tb) – set self.\_\_traceback\_\_ to tb and return self.

*exception* SCons.Warnings.DeprecatedMissingSConscriptWarning

Bases: SCons.Warnings.DeprecatedWarning

**args**

**with\_traceback ()**

Exception.with\_traceback(tb) – set self.\_\_traceback\_\_ to tb and return self.

*exception* SCons.Warnings.DeprecatedOptionsWarning

Bases: SCons.Warnings.MandatoryDeprecatedWarning

**args**

**with\_traceback ()**

Exception.with\_traceback(tb) – set self.\_\_traceback\_\_ to tb and return self.

*exception* SCons.Warnings.DeprecatedSourceCodeWarning

Bases: SCons.Warnings.FutureDeprecatedWarning

**args**

**with\_traceback ()**

Exception.with\_traceback(tb) – set self.\_\_traceback\_\_ to tb and return self.

*exception* SCons.Warnings.DeprecatedWarning

Bases: SCons.Warnings.Warning

**args**

**with\_traceback ()**

Exception.with\_traceback(tb) – set self.\_\_traceback\_\_ to tb and return self.

*exception* SCons.Warnings.DevelopmentVersionWarning

Bases: SCons.Warnings.WarningOnByDefault

**args**

**with\_traceback ()**

Exception.with\_traceback(tb) – set self.\_\_traceback\_\_ to tb and return self.

*exception* `SCons.Warnings.DuplicateEnvironmentWarning`

Bases: `SCons.Warnings.WarningOnByDefault`

**args**

**with\_traceback ()**

Exception.with\_traceback(tb) – set self.\_\_traceback\_\_ to tb and return self.

*exception* `SCons.Warnings.FortranCxxMixWarning`

Bases: `SCons.Warnings.LinkWarning`

**args**

**with\_traceback ()**

Exception.with\_traceback(tb) – set self.\_\_traceback\_\_ to tb and return self.

*exception* `SCons.Warnings.FutureDeprecatedWarning`

Bases: `SCons.Warnings.Warning`

**args**

**with\_traceback ()**

Exception.with\_traceback(tb) – set self.\_\_traceback\_\_ to tb and return self.

*exception* `SCons.Warnings.FutureReservedVariableWarning`

Bases: `SCons.Warnings.WarningOnByDefault`

**args**

**with\_traceback ()**

Exception.with\_traceback(tb) – set self.\_\_traceback\_\_ to tb and return self.

*exception* `SCons.Warnings.LinkWarning`

Bases: `SCons.Warnings.WarningOnByDefault`

**args**

**with\_traceback ()**

Exception.with\_traceback(tb) – set self.\_\_traceback\_\_ to tb and return self.

*exception* `SCons.Warnings.MandatoryDeprecatedWarning`

Bases: `SCons.Warnings.DeprecatedWarning`

**args**

**with\_traceback ()**

Exception.with\_traceback(tb) – set self.\_\_traceback\_\_ to tb and return self.

*exception* `SCons.Warnings.MisleadingKeywordsWarning`

Bases: `SCons.Warnings.WarningOnByDefault`

**args**

**with\_traceback ()**

Exception.with\_traceback(tb) – set self.\_\_traceback\_\_ to tb and return self.

*exception* `SCons.Warnings.MissingSConscriptWarning`

Bases: `SCons.Warnings.WarningOnByDefault`

**args**

**with\_traceback ()**

Exception.with\_traceback(tb) – set self.\_\_traceback\_\_ to tb and return self.

*exception* SCons.Warnings.NoObjectCountWarning

Bases: SCons.Warnings.WarningOnByDefault

**args**

**with\_traceback ()**

Exception.with\_traceback(tb) – set self.\_\_traceback\_\_ to tb and return self.

*exception* SCons.Warnings.NoParallelSupportWarning

Bases: SCons.Warnings.WarningOnByDefault

**args**

**with\_traceback ()**

Exception.with\_traceback(tb) – set self.\_\_traceback\_\_ to tb and return self.

*exception* SCons.Warnings.PythonVersionWarning

Bases: SCons.Warnings.DeprecatedWarning

**args**

**with\_traceback ()**

Exception.with\_traceback(tb) – set self.\_\_traceback\_\_ to tb and return self.

*exception* SCons.Warnings.ReservedVariableWarning

Bases: SCons.Warnings.WarningOnByDefault

**args**

**with\_traceback ()**

Exception.with\_traceback(tb) – set self.\_\_traceback\_\_ to tb and return self.

*exception* SCons.Warnings.StackSizeWarning

Bases: SCons.Warnings.WarningOnByDefault

**args**

**with\_traceback ()**

Exception.with\_traceback(tb) – set self.\_\_traceback\_\_ to tb and return self.

*exception* SCons.Warnings.TargetNotBuiltWarning

Bases: SCons.Warnings.Warning

**args**

**with\_traceback ()**

Exception.with\_traceback(tb) – set self.\_\_traceback\_\_ to tb and return self.

*exception* SCons.Warnings.TaskmasterNeedsExecuteWarning

Bases: SCons.Warnings.DeprecatedWarning

**args**

**with\_traceback ()**

Exception.with\_traceback(tb) – set self.\_\_traceback\_\_ to tb and return self.

*exception* SCons.Warnings.VisualCMissingWarning

Bases: SCons.Warnings.WarningOnByDefault

**args****with\_traceback ()**

Exception.with\_traceback(tb) – set self.\_\_traceback\_\_ to tb and return self.

*exception* SCons.Warnings.**VisualStudioMissingWarning**

Bases: SCons.Warnings.Warning

**args****with\_traceback ()**

Exception.with\_traceback(tb) – set self.\_\_traceback\_\_ to tb and return self.

*exception* SCons.Warnings.**VisualVersionMismatch**

Bases: SCons.Warnings.WarningOnByDefault

**args****with\_traceback ()**

Exception.with\_traceback(tb) – set self.\_\_traceback\_\_ to tb and return self.

*exception* SCons.Warnings.**Warning**

Bases: SCons.Errors.UserError

**args****with\_traceback ()**

Exception.with\_traceback(tb) – set self.\_\_traceback\_\_ to tb and return self.

*exception* SCons.Warnings.**WarningOnByDefault**

Bases: SCons.Warnings.Warning

**args****with\_traceback ()**

Exception.with\_traceback(tb) – set self.\_\_traceback\_\_ to tb and return self.

SCons.Warnings.**enableWarningClass** (clazz)

Enables all warnings that are of type clazz or derived from clazz.

SCons.Warnings.**process\_warn\_strings** (arguments)

Process requests to enable/disable warnings.

The requests are strings passed to the `-warn` option or the `SetOption('warn')` function.An argument to this option should be of the form `<warning-class>` or `no-<warning-class>`. The warning class is munged in order to get an actual class name from the classes above, which we need to pass to the `{enable,disable}WarningClass()` functions. The supplied `<warning-class>` is split on hyphens, each element is capitalized, then smushed back together. Then the string "Warning" is appended to get the class name.For example, 'deprecated' will enable the `DeprecatedWarning` class. 'no-dependency' will disable the `DependencyWarning` class.As a special case, `-warn=all` and `-warn=no-all` will enable or disable (respectively) the base `Warning` class of all warnings.SCons.Warnings.**suppressWarningClass** (clazz)

Suppresses all warnings that are of type clazz or derived from clazz.

SCons.Warnings.**warn** (clazz, \*args)SCons.Warnings.**warningAsException** (flag=1)

Turn warnings into exceptions. Returns the old value of the flag.

## SCons.cpp module

SCons C Pre-Processor module

`SCons.cpp.CPP_to_Python` (s)

Converts a C pre-processor expression into an equivalent Python expression that can be evaluated.

`SCons.cpp.CPP_to_Python_Ops_Sub` (m)

`SCons.cpp.Cleanup_CPP_Expressions` (ts)

`class SCons.cpp.DumbPreProcessor` (\*args, \*\*kw)

Bases: `SCons.cpp.PreProcessor`

A preprocessor that ignores all `#if/#elif/#else/#endif` directives and just reports back *all* of the `#include` files (like the classic SCons scanner did).

This is functionally equivalent to using a regular expression to find all of the `#include` lines, only slower. It exists mainly as an example of how the main `PreProcessor` class can be sub-classed to tailor its behavior.

`_do_if_else_condition` (condition)

Common logic for evaluating the conditions on `#if`, `#ifdef` and `#ifndef` lines.

`_match_tuples` (tuples)

`_parse_tuples` (contents)

`_process_tuples` (tuples, file=None)

`all_include` (t)

`do_define` (t)

Default handling of a `#define` line.

`do_elif` (t)

Default handling of a `#elif` line.

`do_else` (t)

Default handling of a `#else` line.

`do_endif` (t)

Default handling of a `#endif` line.

`do_if` (t)

Default handling of a `#if` line.

`do_ifdef` (t)

Default handling of a `#ifdef` line.

`do_ifndef` (t)

Default handling of a `#ifndef` line.

`do_import` (t)

Default handling of a `#import` line.

`do_include` (t)

Default handling of a `#include` line.

`do_include_next` (t)

Default handling of a `#include` line.

`do_nothing` (t)

Null method for when we explicitly want the action for a specific preprocessor directive to do nothing.

`do_undef` (t)

Default handling of a `#undef` line.

`eval_expression` (t)

Evaluates a C preprocessor expression.

This is done by converting it to a Python equivalent and eval()ing it in the C preprocessor namespace we use to track #define values.

**finalize\_result (fname)**

**find\_include\_file (t)**

Finds the #include file for a given preprocessor tuple.

**initialize\_result (fname)**

**process\_contents (contents)**

Pre-processes a file contents.

Is used by tests

**process\_file (file)**

Pre-processes a file.

This is the main internal entry point.

**read\_file (file)**

**resolve\_include (t)**

Resolve a tuple-ized #include line.

This handles recursive expansion of values without "" or <> surrounding the name until an initial " or < is found, to handle #include FILE where FILE is a #define somewhere else.

**restore ()**

Pops the previous dispatch table off the stack and makes it the current one.

**save ()**

Pushes the current dispatch table on the stack and re-initializes the current dispatch table to the default.

**scons\_current\_file (t)**

**start\_handling\_includes (t=None)**

Causes the PreProcessor object to start processing #import, #include and #include\_next lines.

This method will be called when a #if, #ifdef, #ifndef or #elif evaluates True, or when we reach the #else in a #if, #ifdef, #ifndef or #elif block where a condition already evaluated False.

**stop\_handling\_includes (t=None)**

Causes the PreProcessor object to stop processing #import, #include and #include\_next lines.

This method will be called when a #if, #ifdef, #ifndef or #elif evaluates False, or when we reach the #else in a #if, #ifdef, #ifndef or #elif block where a condition already evaluated True.

**tupleize (contents)**

Turns the contents of a file into a list of easily-processed tuples describing the CPP lines in the file.

The first element of each tuple is the line's preprocessor directive (#if, #include, #define, etc., minus the initial '#'). The remaining elements are specific to the type of directive, as pulled apart by the regular expression.

**class SCons.cpp.FunctionEvaluator (name, args, expansion)**

Bases: **object**

Handles delayed evaluation of a #define function call.

**class SCons.cpp.PreProcessor (current='.', cpppath=(), dict={}, all=0, depth=-1)**

Bases: **object**

The main workhorse class for handling C pre-processing.

**\_do\_if\_else\_condition (condition)**

Common logic for evaluating the conditions on #if, #ifdef and #ifndef lines.

**\_match\_tuples (tuples)**

**`_parse_tuples (contents)`**

**`_process_tuples (tuples, file=None)`**

**`all_include (t)`**

**`do_define (t)`**

Default handling of a #define line.

**`do_elif (t)`**

Default handling of a #elif line.

**`do_else (t)`**

Default handling of a #else line.

**`do_endif (t)`**

Default handling of a #endif line.

**`do_if (t)`**

Default handling of a #if line.

**`do_ifdef (t)`**

Default handling of a #ifdef line.

**`do_ifndef (t)`**

Default handling of a #ifndef line.

**`do_import (t)`**

Default handling of a #import line.

**`do_include (t)`**

Default handling of a #include line.

**`do_include_next (t)`**

Default handling of a #include line.

**`do_nothing (t)`**

Null method for when we explicitly want the action for a specific preprocessor directive to do nothing.

**`do_undef (t)`**

Default handling of a #undef line.

**`eval_expression (t)`**

Evaluates a C preprocessor expression.

This is done by converting it to a Python equivalent and eval()ing it in the C preprocessor namespace we use to track #define values.

**`finalize_result (fname)`**

**`find_include_file (t)`**

Finds the #include file for a given preprocessor tuple.

**`initialize_result (fname)`**

**`process_contents (contents)`**

Pre-processes a file contents.

Is used by tests

**`process_file (file)`**

Pre-processes a file.

This is the main internal entry point.

**read\_file** (file)

**resolve\_include** (t)

Resolve a tuple-ized #include line.

This handles recursive expansion of values without "" or <> surrounding the name until an initial " or < is found, to handle #include FILE where FILE is a #define somewhere else.

**restore** ()

Pops the previous dispatch table off the stack and makes it the current one.

**save** ()

Pushes the current dispatch table on the stack and re-initializes the current dispatch table to the default.

**scons\_current\_file** (t)

**start\_handling\_includes** (t=None)

Causes the PreProcessor object to start processing #import, #include and #include\_next lines.

This method will be called when a #if, #ifdef, #ifndef or #elif evaluates True, or when we reach the #else in a #if, #ifdef, #ifndef or #elif block where a condition already evaluated False.

**stop\_handling\_includes** (t=None)

Causes the PreProcessor object to stop processing #import, #include and #include\_next lines.

This method will be called when a #if, #ifdef, #ifndef or #elif evaluates False, or when we reach the #else in a #if, #ifdef, #ifndef or #elif block where a condition already evaluated True.

**tupleize** (contents)

Turns the contents of a file into a list of easily-processed tuples describing the CPP lines in the file.

The first element of each tuple is the line's preprocessor directive (#if, #include, #define, etc., minus the initial '#'). The remaining elements are specific to the type of directive, as pulled apart by the regular expression.

## SCons.dblite module

dblite.py module contributed by Ralf W. Grosse-Kunstleve. Extended for Unicode by Steven Knight.

SCons.dblite.\_exercise ()

class SCons.dblite.dblite (file\_base\_name, flag, mode)

Bases: **object**

Squirrel away references to the functions in various modules that we'll use when our \_\_del\_\_() method calls our sync() method during shutdown. We might get destroyed when Python is in the midst of tearing down the different modules we import in an essentially arbitrary order, and some of the various modules's global attributes may already be wiped out from under us.

**See the discussion at:**

<http://mail.python.org/pipermail/python-bugs-list/2003-March/016877.html>

**\_check\_writable** ()

**\_open** ()

Open file and return a stream. Raise OSError upon failure.

file is either a text or byte string giving the name (and the path if the file isn't in the current working directory) of the file to be opened or an integer file descriptor of the file to be wrapped. (If a file descriptor is given, it is closed when the returned I/O object is closed, unless closefd is set to False.)

mode is an optional string that specifies the mode in which the file is opened. It defaults to 'r' which means open for reading in text mode. Other common values are 'w' for writing (truncating the file if it already exists), 'x' for creating and writing to a new file, and 'a' for appending (which on some Unix systems, means that all writes append to the end of the file regardless of the current seek position). In text mode, if encoding is not specified the encoding used is platform dependent: locale.getpreferredencoding(False) is called to get the current locale encoding. (For reading and writing raw bytes use binary mode and leave encoding unspecified.) The available modes are:

Character	Meaning
'r'	open for reading (default)
'w'	open for writing, truncating the file first
'x'	create a new file and open it for writing
'a'	open for writing, appending to the end of the file if it exists
'b'	binary mode
't'	text mode (default)
'+'	open a disk file for updating (reading and writing)
'U'	universal newline mode (deprecated)

The default mode is 'rt' (open for reading text). For binary random access, the mode 'w+b' opens and truncates the file to 0 bytes, while 'r+b' opens the file without truncation. The 'x' mode implies 'w' and raises an *FileExistsError* if the file already exists.

Python distinguishes between files opened in binary and text modes, even when the underlying operating system doesn't. Files opened in binary mode (appending 'b' to the mode argument) return contents as bytes objects without any decoding. In text mode (the default, or when 't' is appended to the mode argument), the contents of the file are returned as strings, the bytes having been first decoded using a platform-dependent encoding or using the specified encoding if given.

'U' mode is deprecated and will raise an exception in future versions of Python. It has no effect in Python 3. Use `newline` to control universal newlines mode.

`buffering` is an optional integer used to set the buffering policy. Pass 0 to switch buffering off (only allowed in binary mode), 1 to select line buffering (only usable in text mode), and an integer > 1 to indicate the size of a fixed-size chunk buffer. When no buffering argument is given, the default buffering policy works as follows:

- Binary files are buffered in fixed-size chunks; the size of the buffer is chosen using a heuristic trying to determine the underlying device's "block size" and falling back on `io.DEFAULT_BUFFER_SIZE`. On many systems, the buffer will typically be 4096 or 8192 bytes long.
- "Interactive" text files (files for which `isatty()` returns True) use line buffering. Other text files use the policy described above for binary files.

`encoding` is the name of the encoding used to decode or encode the file. This should only be used in text mode. The default encoding is platform dependent, but any encoding supported by Python can be passed. See the `codecs` module for the list of supported encodings.

`errors` is an optional string that specifies how encoding errors are to be handled—this argument should not be used in binary mode. Pass 'strict' to raise a `ValueError` exception if there is an encoding error (the default of None has the same effect), or pass 'ignore' to ignore errors. (Note that ignoring encoding errors can lead to data loss.) See the documentation for `codecs.register` or run `'help(codecs.Codec)'` for a list of the permitted encoding error strings.

`newline` controls how universal newlines works (it only applies to text mode). It can be None, "", 'n', 'r', and 'rn'. It works as follows:

- On input, if `newline` is None, universal newlines mode is enabled. Lines in the input can end in 'n', 'r', or 'rn', and these are translated into 'n' before being returned to the caller. If it is "", universal newline mode is enabled, but line endings are returned to the caller untranslated. If it has any of the other legal values, input lines are only terminated by the given string, and the line ending is returned to the caller untranslated.
- On output, if `newline` is None, any 'n' characters written are translated to the system default line separator, `os.linesep`. If `newline` is "" or 'n', no translation takes place. If `newline` is any of the other legal values, any 'n' characters written are translated to the given string.

If `closefd` is False, the underlying file descriptor will be kept open when the file is closed. This does not work when a file name is given and must be True in that case.

A custom opener can be used by passing a callable as *opener*. The underlying file descriptor for the file object is then obtained by calling *opener* with (*file*, *flags*). *opener* must return an open file descriptor (passing `os.open` as *opener* results in functionality similar to passing None).

`open()` returns a file object whose type depends on the mode, and through which the standard file operations such as reading and writing are performed. When `open()` is used to open a file in a text mode ('w', 'r', 'wt', 'rt', etc.), it returns a `TextIOWrapper`. When used to open a file in a binary mode, the returned class varies: in read binary mode, it returns a `BufferedReader`; in write binary and append binary modes, it returns a `BufferedWriter`, and in read/write mode, it returns a `BufferedRandom`.

It is also possible to use a string or bytearray as a file for both reading and writing. For strings StringIO can be used like a file opened in a text mode, and for bytes a BytesIO can be used like a file opened in a binary mode.

### `_os_chmod ()`

Change the access permissions of a file.

#### **path**

Path to be modified. May always be specified as a str, bytes, or a path-like object. On some platforms, path may also be specified as an open file descriptor. If this functionality is unavailable, using it raises an exception.

#### **mode**

Operating-system mode bitfield.

#### **dir\_fd**

If not None, it should be a file descriptor open to a directory, and path should be relative; path will then be relative to that directory.

#### **follow\_symlinks**

If False, and the last element of the path is a symbolic link, chmod will modify the symbolic link itself instead of the file the link points to.

**It is an error to use dir\_fd or follow\_symlinks when specifying path as an open file descriptor.**

**dir\_fd and follow\_symlinks may not be implemented on your platform.**

If they are unavailable, using them will raise a NotImplementedError.

### `_os_chown ()`

Change the owner and group id of path to the numeric uid and gid.

#### **path**

Path to be examined; can be string, bytes, a path-like object, or open-file-descriptor int.

#### **dir\_fd**

If not None, it should be a file descriptor open to a directory, and path should be relative; path will then be relative to that directory.

#### **follow\_symlinks**

If False, and the last element of the path is a symbolic link, stat will examine the symbolic link itself instead of the file the link points to.

path may always be specified as a string. On some platforms, path may also be specified as an open file descriptor.

If this functionality is unavailable, using it raises an exception.

**If dir\_fd is not None, it should be a file descriptor open to a directory, and path should be relative; path will then be relative to that directory.**

**If follow\_symlinks is False, and the last element of the path is a symbolic link, chown will modify the symbolic link itself instead of the file the link points to.**

**It is an error to use dir\_fd or follow\_symlinks when specifying path as an open file descriptor.**

**dir\_fd and follow\_symlinks may not be implemented on your platform.**

If they are unavailable, using them will raise a NotImplementedError.

### `_os_rename ()`

Rename a file or directory.

**If either src\_dir\_fd or dst\_dir\_fd is not None, it should be a file**

descriptor open to a directory, and the respective path string (src or dst) should be relative; the path will then be relative to that directory.

**src\_dir\_fd and dst\_dir\_fd, may not be implemented on your platform.**

If they are unavailable, using them will raise a NotImplementedError.

**`_os_unlink ()`**

Remove a file (same as `remove()`).

**If `dir_fd` is not `None`, it should be a file descriptor open to a directory,**  
and path should be relative; path will then be relative to that directory.

**`dir_fd` may not be implemented on your platform.**

If it is unavailable, using it will raise a `NotImplementedError`.

**`static _pickle_dump ()`**

Write a pickled representation of `obj` to the open file object file.

This is equivalent to `Pickler(file, protocol).dump(obj)`, but may be more efficient.

The optional `protocol` argument tells the pickler to use the given protocol supported protocols are 0, 1, 2, 3 and 4. The default protocol is 3; a backward-incompatible protocol designed for Python 3.

Specifying a negative protocol version selects the highest protocol version supported. The higher the protocol used, the more recent the version of Python needed to read the pickle produced.

The `file` argument must have a `write()` method that accepts a single bytes argument. It can thus be a file object opened for binary writing, an `io.BytesIO` instance, or any other custom object that meets this interface.

If `fix_imports` is `True` and `protocol` is less than 3, pickle will try to map the new Python 3 names to the old module names used in Python 2, so that the pickle data stream is readable with Python 2.

**`_pickle_protocol = 4`****`_shutil_copyfile (dst, *, follow_symlinks=True)`**

Copy data from `src` to `dst`.

If `follow_symlinks` is not set and `src` is a symbolic link, a new symlink will be created instead of copying the file it points to.

**`_time_time ()`**

`time()` -> floating point number

Return the current time in seconds since the Epoch. Fractions of a second may be present if the system clock provides them.

**`close ()`****`has_key (key)`****`iterkeys ()`****`keys ()`****`sync ()`**

`SCons.dblite.open (file, flag=None, mode=438)`

## ***SCons.exitfuncs module***

`SCons.exitfuncs`

Register functions which are executed when SCons exits for any reason.

**`SCons.exitfuncs._run_exitfuncs ()`**

run any registered exit functions

`_exithandlers` is traversed in reverse order so functions are executed last in, first out.

**`SCons.exitfuncs.register (func, *targs, **kargs)`**

register a function to be executed upon normal program termination

`func` - function to be called at exit `targs` - optional arguments to pass to `func` `kargs` - optional keyword arguments to pass to `func`

## SCons.compat package

### Module contents

SCons compatibility package for old Python versions

This subpackage holds modules that provide backwards-compatible implementations of various things that we'd like to use in SCons but which only show up in later versions of Python than the early, old version(s) we still support.

Other code will not generally reference things in this package through the SCons.compat namespace. The modules included here add things to the builtins namespace or the global module list so that the rest of our code can use the objects and names imported here regardless of Python version.

The rest of the things here will be in individual compatibility modules that are either: 1) suitably modified copies of the future modules that we want to use; or 2) backwards compatible re-implementations of the specific portions of a future module's API that we want to use.

GENERAL WARNINGS: Implementations of functions in the SCons.compat modules are *NOT* guaranteed to be fully compliant with these functions in later versions of Python. We are only concerned with adding functionality that we actually use in SCons, so be wary if you lift this code for other uses. (That said, making these more nearly the same as later, official versions is still a desirable goal, we just don't need to be obsessive about it.)

We name the compatibility modules with an initial `'_scons_'` (for example, `_scons_subprocess.py` is our compatibility module for subprocess) so that we can still try to import the real module name and fall back to our compatibility module if we get an `ImportError`. The `import_as()` function defined below loads the module as the "real" name (without the `'_scons_'`), after which all of the "import {module}" statements in the rest of our code will find our pre-loaded compatibility module.

```
class SCons.compat.NoSlotsPyPy
```

```
    Bases: type
```

```
    Metaclass for PyPy compatibility.
```

```
    PyPy does not work well with __slots__ and __class__ assignment.
```

```
    mro ()
```

```
        Return a type's method resolution order.
```

```
SCons.compat.rename_module (new, old)
```

```
    Attempt to import the old module and load it under the new name. Used for purely cosmetic name changes in Python 3.x.
```

## SCons.Node package

### Submodules

#### SCons.Node.Alias module

scons.Node.Alias

Alias nodes.

This creates a hash of global Aliases (dummy targets).

```
class SCons.Node.Alias.Alias (name)
```

```
    Bases: SCons.Node.Node
```

```
    class Attrs
```

```
        Bases: object
```

```
        shared
```

```
    BuildInfo
```

```
        alias of AliasBuildInfo
```

**Decider** (function)

**GetTag** (key)

Return a user-defined tag.

**NodeInfo**

alias of **AliasNodeInfo**

**Tag** (key, value)

Add a user-defined tag.

**\_add\_child** (collection, set, child)

Adds 'child' to 'collection', first checking 'set' to see if it's already present.

**\_children\_get** ()

**\_children\_reset** ()

**\_func\_exists**

**\_func\_get\_contents**

**\_func\_is\_derived**

**\_func\_rexists**

**\_func\_target\_from\_source**

**\_get\_scanner** (env, initial\_scanner, root\_node\_scanner, kw)

**\_memo**

**\_specific\_sources**

**\_tags**

**add\_dependency** (depend)

Adds dependencies.

**add\_ignore** (depend)

Adds dependencies to ignore.

**add\_prerequisite** (prerequisite)

Adds prerequisites

**add\_source** (source)

Adds sources.

**add\_to\_implicit** (deps)

**add\_to\_waiting\_parents** (node)

Returns the number of nodes added to our waiting parents list: 1 if we add a unique waiting parent, 0 if not. (Note that the returned values are intended to be used to increment a reference count, so don't think you can "clean up" this function by using True and False instead...)

**add\_to\_waiting\_s\_e** (node)

**add\_wkid** (wkid)

Add a node to the list of kids waiting to be evaluated

**all\_children** (scan=1)

Return a list of all the node's direct children.

#### **alter\_targets ()**

Return a list of alternate targets for this Node.

#### **always\_build**

#### **attributes**

#### **binfo**

#### **build ()**

A "builder" for aliases.

#### **builder**

#### **builder\_set (builder)**

#### **built ()**

Called just after this node is successfully built.

#### **cached**

#### **changed (node=None, allowcache=False)**

Returns if the node is up-to-date with respect to the BuildInfo stored last time it was built. The default behavior is to compare it against our own previously stored BuildInfo, but the stored BuildInfo from another Node (typically one in a Repository) can be used instead.

Note that we now *always* check every dependency. We used to short-circuit the check by returning as soon as we detected any difference, but we now rely on checking every dependency to make sure that any necessary Node information (for example, the content signature of an #included .h file) is updated.

The allowcache option was added for supporting the early release of the executor/builder structures, right after a File target was built. When set to true, the return value of this changed method gets cached for File nodes. Like this, the executor isn't needed any longer for subsequent calls to changed().

@see: FS.File.changed(), FS.File.release\_target\_info()

#### **changed\_since\_last\_build**

#### **children (scan=1)**

Return a list of the node's direct children, minus those that are ignored by this node.

#### **children\_are\_up\_to\_date ()**

Alternate check for whether the Node is current: If all of our children were up-to-date, then this Node was up-to-date, too.

The SCons.Node.Alias and SCons.Node.Python.Value subclasses rebind their current() method to this method.

#### **clear ()**

Completely clear a Node of all its cached state (so that it can be re-evaluated by interfaces that do continuous integration builds).

#### **clear\_memoized\_values ()**

#### **convert ()**

#### **del\_binfo ()**

Delete the build info from this node.

#### **depends**

#### **depends\_set**

#### **disambiguate (must\_exist=None)**

**env**

**env\_set** (env, safe=0)

**executor**

**executor\_cleanup** ()

Let the executor clean up any cached information.

**exists** ()

Does this node exists?

**explain** ()

**for\_signature** ()

Return a string representation of the Node that will always be the same for this particular Node, no matter what. This is by contrast to the `__str__()` method, which might, for instance, return a relative path for a file Node. The purpose of this method is to generate a value to be used in signature calculation for the command line used to build a target, and we use this method instead of `str()` to avoid unnecessary rebuilds. This method does not need to return something that would actually work in a command line; it can return any kind of nonsense, so long as it does not change.

**get\_abspath** ()

Return an absolute path to the Node. This will return simply `str(Node)` by default, but for Node types that have a concept of relative path, this might return something different.

**get\_binfo** ()

Fetch a node's build information.

node - the node whose sources will be collected cache - alternate node to use for the signature cache returns - the build signature

This no longer handles the recursive descent of the node's children's signatures. We expect that they're already built and updated by someone else, if that's what's wanted.

**get\_build\_env** ()

Fetch the appropriate Environment to build this node.

**get\_build\_scanner\_path** (scanner)

Fetch the appropriate scanner path for this node.

**get\_builder** (default\_builder=None)

Return the set builder, or a specified default value

**get\_cachedir\_csig** ()

**get\_contents** ()

The contents of an alias is the concatenation of the content signatures of all its sources.

**get\_csig** ()

Generate a node's content signature, the digested signature of its content.

node - the node cache - alternate node to use for the signature cache returns - the content signature

**get\_env** ()

**get\_env\_scanner** (env, kw={})

**get\_executor** (create=1)

Fetch the action executor for this node. Create one if there isn't already one, and requested to do so.

**get\_found\_includes** (env, scanner, path)

Return the scanned include lines (implicit dependencies) found in this node.

The default is no implicit dependencies. We expect this method to be overridden by any subclass that can be scanned for implicit dependencies.

**get\_implicit\_deps** (env, initial\_scanner, path\_func, kw={})

Return a list of implicit dependencies for this node.

This method exists to handle recursive invocation of the scanner on the implicit dependencies returned by the scanner, if the scanner's recursive flag says that we should.

**get\_ninfo** ()

**get\_source\_scanner** (node)

Fetch the source scanner for the specified node

NOTE: "self" is the target being built, "node" is the source file for which we want to fetch the scanner.

Implies self.has\_builder() is true; again, expect to only be called from locations where this is already verified.

This function may be called very often; it attempts to cache the scanner found to improve performance.

**get\_state** ()

**get\_stored\_implicit** ()

Fetch the stored implicit dependencies

**get\_stored\_info** ()

**get\_string** (for\_signature)

This is a convenience function designed primarily to be used in command generators (i.e., CommandGeneratorActions or Environment variables that are callable), which are called with a for\_signature argument that is nonzero if the command generator is being called to generate a signature for the command line, which determines if we should rebuild or not.

Such command generators should use this method in preference to str(Node) when converting a Node to a string, passing in the for\_signature parameter, such that we will call Node.for\_signature() or str(Node) properly, depending on whether we are calculating a signature or actually constructing a command line.

**get\_subst\_proxy** ()

This method is expected to return an object that will function exactly like this Node, except that it implements any additional special features that we would like to be in effect for Environment variable substitution. The principle use is that some Nodes would like to implement a \_\_getattr\_\_() method, but putting that in the Node type itself has a tendency to kill performance. We instead put it in a proxy and return it from this method. It is legal for this method to return self if no new functionality is needed for Environment substitution.

**get\_suffix** ()

**get\_target\_scanner** ()

**has\_builder** ()

Return whether this Node has a builder or not.

In Boolean tests, this turns out to be a *lot* more efficient than simply examining the builder attribute directly ("if node.builder: ..."). When the builder attribute is examined directly, it ends up calling \_\_getattr\_\_ for both the \_\_len\_\_ and \_\_nonzero\_\_ attributes on instances of our Builder Proxy class(es), generating a bazillion extra calls and slowing things down immensely.

**has\_explicit\_builder** ()

Return whether this Node has an explicit builder

This allows an internal Builder created by SCons to be marked non-explicit, so that it can be overridden by an explicit builder that the user supplies (the canonical example being directories).

**ignore**

**ignore\_set**

**implicit**

**implicit\_set**

**includes**

**is\_derived ()**

Returns true if this node is derived (i.e. built).

This should return true only for nodes whose path should be in the variant directory when duplicate=0 and should contribute their build signatures when they are used as source files to other derived files. For example: source with source builders are not derived in this sense, and hence should not return true.

**is\_explicit**

**is\_literal ()**

Always pass the string representation of a Node to the command interpreter literally.

**is\_sconscript ()**

Returns true if this node is an sconscript

**is\_under (dir)**

**is\_up\_to\_date ()**

Alternate check for whether the Node is current: If all of our children were up-to-date, then this Node was up-to-date, too.

The SCons.Node.Alias and SCons.Node.Python.Value subclasses rebind their current() method to this method.

**linked**

**make\_ready ()**

Get a Node ready for evaluation.

This is called before the Taskmaster decides if the Node is up-to-date or not. Overriding this method allows for a Node subclass to be disambiguated if necessary, or for an implicit source builder to be attached.

**missing ()**

**multiple\_side\_effect\_has\_builder ()**

Return whether this Node has a builder or not.

In Boolean tests, this turns out to be a *lot* more efficient than simply examining the builder attribute directly ("if node.builder: ..."). When the builder attribute is examined directly, it ends up calling `__getattr__` for both the `__len__` and `__nonzero__` attributes on instances of our Builder Proxy class(es), generating a bazillion extra calls and slowing things down immensely.

**new\_binfo ()**

**new\_ninfo ()**

**ninfo**

**nocache**

**noclean**

**postprocess ()**

Clean up anything we don't need to hang onto after we've been built.

**precious**

**prepare ()**

Prepare for this Node to be built.

This is called after the Taskmaster has decided that the Node is out-of-date and must be rebuilt, but before actually calling the method to build the Node.

This default implementation checks that explicit or implicit dependencies either exist or are derived, and initializes the BuildInfo structure that will hold the information about how this node is, uh, built.

(The existence of source files is checked separately by the Executor, which aggregates checks for all of the targets built by a specific action.)

Overriding this method allows for for a Node subclass to remove the underlying file from the file system. Note that subclass methods should call this base class method to get the child check and the BuildInfo structure.

**prerequisites**

**pseudo**

**push\_to\_cache ()**

Try to push a node into a cache

**really\_build (\*\*kw)**

Actually build the node.

This is called by the Taskmaster after it's decided that the Node is out-of-date and must be rebuilt, and after the prepare() method has gotten everything, uh, prepared.

This method is called from multiple threads in a parallel build, so only do thread safe stuff here. Do thread unsafe stuff in built().

**ref\_count**

**release\_target\_info ()**

Called just after this node has been marked up-to-date or was built completely.

This is where we try to release as many target node infos as possible for clean builds and update runs, in order to minimize the overall memory consumption.

By purging attributes that aren't needed any longer after a Node (=File) got built, we don't have to care that much how many KBytes a Node actually requires...as long as we free the memory shortly afterwards.

@see: built() and File.release\_target\_info()

**remove ()**

Remove this Node: no-op by default.

**render\_include\_tree ()**

Return a text representation, suitable for displaying to the user, of the include tree for the sources of this node.

**reset\_executor ()**

Remove cached executor; forces recompute when needed.

**retrieve\_from\_cache ()**

Try to retrieve the node's content from a cache

This method is called from multiple threads in a parallel build, so only do thread safe stuff here. Do thread unsafe stuff in built().

Returns true if the node was successfully retrieved.

**rexists ()**

Does this node exist locally or in a repository?

**scan ()**

Scan this node's dependents for implicit dependencies.

**scanner\_key ()**

**sconsign ()**

An Alias is not recorded in .sconsign files

**select\_scanner (scanner)**

Selects a scanner for this Node.

This is a separate method so it can be overridden by Node subclasses (specifically, Node.FS.Dir) that *must* use their own Scanner and don't select one the Scanner.Selector that's configured for the target.

**set\_always\_build** (always\_build=1)

Set the Node's always\_build value.

**set\_executor** (executor)

Set the action executor for this node.

**set\_explicit** (is\_explicit)

**set\_nocache** (nocache=1)

Set the Node's nocache value.

**set\_noclean** (noclean=1)

Set the Node's noclean value.

**set\_precious** (precious=1)

Set the Node's precious value.

**set\_pseudo** (pseudo=True)

Set the Node's precious value.

**set\_specific\_source** (source)

**set\_state** (state)

**side\_effect**

**side\_effects**

**sources**

**sources\_set**

**state**

**store\_info**

**str\_for\_display** ()

**target\_peers**

**visited** ()

Called just after this node has been visited (with or without a build).

**waiting\_parents**

**waiting\_s\_e**

**wkids**

**class** SCons.Node.Alias.AliasBuildInfo

Bases: SCons.Node.BuildInfoBase

**bact**

**bactsig**

**bdepends**

**bdependSIGs**

**bimplicit**

**bimplicitsigs****bsources****bsourcesigs****current\_version\_id = 2****merge (other)**

Merge the fields of another object into this object. Already existing information is overwritten by the other instance's data. WARNING: If a `'__dict__'` slot is added, it should be updated instead of replaced.

```
class SCons.Node.Alias.AliasNameSpace (**kwargs)
```

```
Bases: collections.UserDict
```

```
Alias (name, **kw)
```

```
__MutableMapping__marker = <object object>
```

```
__abc_impl = <_abc_data object>
```

```
clear () → None. Remove all items from D.
```

```
copy ()
```

```
classmethod fromkeys (iterable, value=None)
```

```
get (k[, d]) → D[k] if k in D, else d. d defaults to None.
```

```
items () → a set-like object providing a view on D's items
```

```
keys () → a set-like object providing a view on D's keys
```

```
lookup (name, **kw)
```

```
pop (k[, d]) → v, remove specified key and return the corresponding value.  
If key is not found, d is returned if given, otherwise KeyError is raised.
```

```
popitem () → (k, v), remove and return some (key, value) pair  
as a 2-tuple; but raise KeyError if D is empty.
```

```
setdefault (k[, d]) → D.get(k,d), also set D[k]=d if k not in D
```

```
update ([, E], **F) → None. Update D from mapping/iterable E and F.
```

If E present and has a `.keys()` method, does: for k in E: D[k] = E[k] If E present and lacks `.keys()` method, does: for (k, v) in E: D[k] = v In either case, this is followed by: for k, v in F.items(): D[k] = v

```
values () → an object providing a view on D's values
```

```
class SCons.Node.Alias.AliasNodeInfo
```

```
Bases: SCons.Node.NodeInfoBase
```

```
convert (node, val)
```

```
csig
```

```
current_version_id = 2
```

```
field_list = ['csig']
```

```
format (field_list=None, names=0)
```

**merge** (other)

Merge the fields of another object into this object. Already existing information is overwritten by the other instance's data. WARNING: If a '`__dict__`' slot is added, it should be updated instead of replaced.

**str\_to\_node** (s)**update** (node)**SCons.Node.FS module**

scons.Node.FS

File system nodes.

These Nodes represent the canonical external objects that people think of when they think of building software: files and directories.

This holds a "default\_fs" variable that should be initialized with an FS that can be used by scripts or modules looking for the canonical default.

*class* SCons.Node.FS.Base (name, directory, fs)

Bases: SCons.Node.Node

A generic class for file system entries. This class is for when we don't know yet whether the entry being looked up is a file or a directory. Instances of this class can morph into either Dir or File objects by a later, more precise lookup.

Note: this class does not define `__cmp__` and `__hash__` for efficiency reasons. SCons does a lot of comparing of Node.FS.{Base,Entry,File,Dir} objects, so those operations must be as fast as possible, which means we want to use Python's built-in object identity comparisons.

*class* Attrs

Bases: object

shared

BuildInfo

alias of SCons.Node.BuildInfoBase

Decider (function)

GetTag (key)

Return a user-defined tag.

NodeInfo

alias of SCons.Node.NodeInfoBase

RDirs (pathlist)

Search for a list of directories in the Repository list.

Rfindalldirs (pathlist)

Return all of the directories for a given path list, including corresponding "backing" directories in any repositories. The Node lookups are relative to this Node (typically a directory), so memoizing result saves cycles from looking up the same path for each target in a given directory.

Tag (key, value)

Add a user-defined tag.

`_Rfindalldirs_key` (pathlist)

`_abspath`

`_add_child` (collection, set, child)

Adds 'child' to 'collection', first checking 'set' to see if it's already present.

```

_children_get ()
_children_reset ()
_func_exists
_func_get_contents
_func_is_derived
_func_rexists
_func_sconsign
_func_target_from_source
_get_scanner (env, initial_scanner, root_node_scanner, kw)
_get_str ()
_glob1 (pattern, ondisk=True, source=False, strings=False)
_labspath
_local
_memo
_path
_path_elements
_proxy
_save_str ()
_specific_sources
_tags
_tpath

add_dependency (depend)
    Adds dependencies.

add_ignore (depend)
    Adds dependencies to ignore.

add_prerequisite (prerequisite)
    Adds prerequisites

add_source (source)
    Adds sources.

add_to_implicit (deps)

add_to_waiting_parents (node)
    Returns the number of nodes added to our waiting parents list: 1 if we add a unique waiting parent, 0 if not.
    (Note that the returned values are intended to be used to increment a reference count, so don't think you can
    "clean up" this function by using True and False instead...)

```

**add\_to\_waiting\_s\_e** (node)

**add\_wkid** (wkid)

Add a node to the list of kids waiting to be evaluated

**all\_children** (scan=1)

Return a list of all the node's direct children.

**alter\_targets** ()

Return a list of alternate targets for this Node.

**always\_build**

**attributes**

**binfo**

**build** (\*\*kw)

Actually build the node.

This is called by the Taskmaster after it's decided that the Node is out-of-date and must be rebuilt, and after the `prepare()` method has gotten everything, uh, prepared.

This method is called from multiple threads in a parallel build, so only do thread safe stuff here. Do thread unsafe stuff in `built()`.

**builder**

**builder\_set** (builder)

**built** ()

Called just after this node is successfully built.

**cached**

**changed** (node=None, allowcache=False)

Returns if the node is up-to-date with respect to the BuildInfo stored last time it was built. The default behavior is to compare it against our own previously stored BuildInfo, but the stored BuildInfo from another Node (typically one in a Repository) can be used instead.

Note that we now *always* check every dependency. We used to short-circuit the check by returning as soon as we detected any difference, but we now rely on checking every dependency to make sure that any necessary Node information (for example, the content signature of an `#included .h` file) is updated.

The `allowcache` option was added for supporting the early release of the executor/builder structures, right after a File target was built. When set to true, the return value of this `changed` method gets cached for File nodes. Like this, the executor isn't needed any longer for subsequent calls to `changed()`.

@see: `FS.File.changed()`, `FS.File.release_target_info()`

**changed\_since\_last\_build**

**children** (scan=1)

Return a list of the node's direct children, minus those that are ignored by this node.

**children\_are\_up\_to\_date** ()

Alternate check for whether the Node is current: If all of our children were up-to-date, then this Node was up-to-date, too.

The `SCons.Node.Alias` and `SCons.Node.Python.Value` subclasses rebind their `current()` method to this method.

**clear** ()

Completely clear a Node of all its cached state (so that it can be re-evaluated by interfaces that do continuous integration builds).

**clear\_memoized\_values** ()

`cwd`

`del_binfo ()`

Delete the build info from this node.

`depends`

`depends_set`

`dir`

`disambiguate (must_exist=None)`

`duplicate`

`env`

`env_set (env, safe=0)`

`executor`

`executor_cleanup ()`

Let the executor clean up any cached information.

`exists ()`

Does this node exists?

`explain ()`

`for_signature ()`

Return a string representation of the Node that will always be the same for this particular Node, no matter what. This is by contrast to the `__str__()` method, which might, for instance, return a relative path for a file Node. The purpose of this method is to generate a value to be used in signature calculation for the command line used to build a target, and we use this method instead of `str()` to avoid unnecessary rebuilds. This method does not need to return something that would actually work in a command line; it can return any kind of nonsense, so long as it does not change.

`fs`

Reference to parent Node.FS object

`get_abspath ()`

Get the absolute path of the file.

`get_binfo ()`

Fetch a node's build information.

node - the node whose sources will be collected cache - alternate node to use for the signature cache returns - the build signature

This no longer handles the recursive descent of the node's children's signatures. We expect that they're already built and updated by someone else, if that's what's wanted.

`get_build_env ()`

Fetch the appropriate Environment to build this node.

`get_build_scanner_path (scanner)`

Fetch the appropriate scanner path for this node.

`get_builder (default_builder=None)`

Return the set builder, or a specified default value

`get_cachedir_csig ()`

**get\_contents ()**

Fetch the contents of the entry.

**get\_csig ()****get\_dir ()****get\_env ()****get\_env\_scanner (env, kw={})****get\_executor (create=1)**

Fetch the action executor for this node. Create one if there isn't already one, and requested to do so.

**get\_found\_includes (env, scanner, path)**

Return the scanned include lines (implicit dependencies) found in this node.

The default is no implicit dependencies. We expect this method to be overridden by any subclass that can be scanned for implicit dependencies.

**get\_implicit\_deps (env, initial\_scanner, path\_func, kw={})**

Return a list of implicit dependencies for this node.

This method exists to handle recursive invocation of the scanner on the implicit dependencies returned by the scanner, if the scanner's recursive flag says that we should.

**get\_internal\_path ()****get\_labspath ()**

Get the absolute path of the file.

**get\_ninfo ()****get\_path (dir=None)**

Return path relative to the current working directory of the Node.FS.Base object that owns us.

**get\_path\_elements ()****get\_source\_scanner (node)**

Fetch the source scanner for the specified node

NOTE: "self" is the target being built, "node" is the source file for which we want to fetch the scanner.

Implies self.has\_builder() is true; again, expect to only be called from locations where this is already verified.

This function may be called very often; it attempts to cache the scanner found to improve performance.

**get\_state ()****get\_stored\_implicit ()**

Fetch the stored implicit dependencies

**get\_stored\_info ()****get\_string (for\_signature)**

This is a convenience function designed primarily to be used in command generators (i.e., CommandGeneratorActions or Environment variables that are callable), which are called with a for\_signature argument that is nonzero if the command generator is being called to generate a signature for the command line, which determines if we should rebuild or not.

Such command generators should use this method in preference to str(Node) when converting a Node to a string, passing in the for\_signature parameter, such that we will call Node.for\_signature() or str(Node) properly, depending on whether we are calculating a signature or actually constructing a command line.

**get\_subst\_proxy ()**

This method is expected to return an object that will function exactly like this Node, except that it implements any additional special features that we would like to be in effect for Environment variable substitution. The principle

use is that some Nodes would like to implement a `__getattr__()` method, but putting that in the Node type itself has a tendency to kill performance. We instead put it in a proxy and return it from this method. It is legal for this method to return self if no new functionality is needed for Environment substitution.

`get_suffix ()`

`get_target_scanner ()`

`get_tpath ()`

`getmtime ()`

`getsize ()`

`has_builder ()`

Return whether this Node has a builder or not.

In Boolean tests, this turns out to be a *lot* more efficient than simply examining the builder attribute directly (“if node.builder: ...”). When the builder attribute is examined directly, it ends up calling `__getattr__` for both the `__len__` and `__nonzero__` attributes on instances of our Builder Proxy class(es), generating a bazillion extra calls and slowing things down immensely.

`has_explicit_builder ()`

Return whether this Node has an explicit builder

This allows an internal Builder created by SCons to be marked non-explicit, so that it can be overridden by an explicit builder that the user supplies (the canonical example being directories).

`ignore`

`ignore_set`

`implicit`

`implicit_set`

`includes`

`is_derived ()`

Returns true if this node is derived (i.e. built).

This should return true only for nodes whose path should be in the variant directory when `duplicate=0` and should contribute their build signatures when they are used as source files to other derived files. For example: source with source builders are not derived in this sense, and hence should not return true.

`is_explicit`

`is_literal ()`

Always pass the string representation of a Node to the command interpreter literally.

`is_sconscript ()`

Returns true if this node is an sconscript

`is_under (dir)`

`is_up_to_date ()`

Default check for whether the Node is current: unknown Node subtypes are always out of date, so they will always get built.

`isdir ()`

`isfile ()`

`islink ()`

**linked**

**lstat ()**

**make\_ready ()**

Get a Node ready for evaluation.

This is called before the Taskmaster decides if the Node is up-to-date or not. Overriding this method allows for a Node subclass to be disambiguated if necessary, or for an implicit source builder to be attached.

**missing ()**

**multiple\_side\_effect\_has\_builder ()**

Return whether this Node has a builder or not.

In Boolean tests, this turns out to be a *lot* more efficient than simply examining the builder attribute directly (“if node.builder: ...”). When the builder attribute is examined directly, it ends up calling `__getattr__` for both the `__len__` and `__nonzero__` attributes on instances of our Builder Proxy class(es), generating a bazillion extra calls and slowing things down immensely.

**must\_be\_same (klass)**

This node, which already existed, is being looked up as the specified klass. Raise an exception if it isn't.

**name**

**new\_binfo ()**

**new\_ninfo ()**

**ninfo**

**nocache**

**noclean**

**postprocess ()**

Clean up anything we don't need to hang onto after we've been built.

**precious**

**prepare ()**

Prepare for this Node to be built.

This is called after the Taskmaster has decided that the Node is out-of-date and must be rebuilt, but before actually calling the method to build the Node.

This default implementation checks that explicit or implicit dependencies either exist or are derived, and initializes the BuildInfo structure that will hold the information about how this node is, uh, built.

(The existence of source files is checked separately by the Executor, which aggregates checks for all of the targets built by a specific action.)

Overriding this method allows for for a Node subclass to remove the underlying file from the file system. Note that subclass methods should call this base class method to get the child check and the BuildInfo structure.

**prerequisites**

**pseudo**

**push\_to\_cache ()**

Try to push a node into a cache

**ref\_count**

**release\_target\_info ()**

Called just after this node has been marked up-to-date or was built completely.

This is where we try to release as many target node infos as possible for clean builds and update runs, in order to minimize the overall memory consumption.

By purging attributes that aren't needed any longer after a Node (=File) got built, we don't have to care that much how many KBytes a Node actually requires...as long as we free the memory shortly afterwards.

@see: built() and File.release\_target\_info()

**remove ()**

Remove this Node: no-op by default.

**render\_include\_tree ()**

Return a text representation, suitable for displaying to the user, of the include tree for the sources of this node.

**reentry ()**

**reset\_executor ()**

Remove cached executor; forces recompute when needed.

**retrieve\_from\_cache ()**

Try to retrieve the node's content from a cache

This method is called from multiple threads in a parallel build, so only do thread safe stuff here. Do thread unsafe stuff in built().

Returns true if the node was successfully retrieved.

**reexists ()**

Does this node exist locally or in a repository?

**rfile ()**

**rstr ()**

A Node.FS.Base object's string representation is its path name.

**sbuilder**

**scan ()**

Scan this node's dependents for implicit dependencies.

**scanner\_key ()**

**select\_scanner (scanner)**

Selects a scanner for this Node.

This is a separate method so it can be overridden by Node subclasses (specifically, Node.FS.Dir) that *must* use their own Scanner and don't select one the Scanner.Selector that's configured for the target.

**set\_always\_build (always\_build=1)**

Set the Node's always\_build value.

**set\_executor (executor)**

Set the action executor for this node.

**set\_explicit (is\_explicit)**

**set\_local ()**

**set\_nocache (nocache=1)**

Set the Node's nocache value.

**set\_noclean (noclean=1)**

Set the Node's noclean value.

**set\_precious (precious=1)**

Set the Node's precious value.

**set\_pseudo** (pseudo=True)

Set the Node's precious value.

**set\_specific\_source** (source)

**set\_src\_builder** (builder)

Set the source code builder for this node.

**set\_state** (state)

**side\_effect**

**side\_effects**

**sources**

**sources\_set**

**src\_builder** ()

Fetch the source code builder for this node.

If there isn't one, we cache the source code builder specified for the directory (which in turn will cache the value from its parent directory, and so on up to the file system root).

**srcnode** ()

If this node is in a build path, return the node corresponding to its source file. Otherwise, return ourself.

**stat** ()

**state**

**store\_info**

**str\_for\_display** ()

**target\_from\_source** (prefix, suffix, splittest=<function splittest>)

Generates a target entry that corresponds to this entry (usually a source file) with the specified prefix and suffix.

Note that this method can be overridden dynamically for generated files that need different behavior. See Tool/swig.py for an example.

**target\_peers**

**visited** ()

Called just after this node has been visited (with or without a build).

**waiting\_parents**

**waiting\_s\_e**

**wkids**

**class** SCons.Node.FS.Dir (name, directory, fs)

Bases: SCons.Node.FS.Base

A class for directories in a file system.

**class** Attrs

Bases: object

**shared**

**BuildInfo**

alias of DirBuildInfo

**Decider** (function)

**Dir** (name, create=True)

Looks up or creates a directory node named 'name' relative to this directory.

**Entry** (name)

Looks up or creates an entry node named 'name' relative to this directory.

**File** (name)

Looks up or creates a file node named 'name' relative to this directory.

**GetTag** (key)

Return a user-defined tag.

**NodeInfo**

alias of **DirNodeInfo**

**RDirs** (pathlist)

Search for a list of directories in the Repository list.

**Rfindalldirs** (pathlist)

Return all of the directories for a given path list, including corresponding "backing" directories in any repositories. The Node lookups are relative to this Node (typically a directory), so memoizing result saves cycles from looking up the same path for each target in a given directory.

**Tag** (key, value)

Add a user-defined tag.

**\_Dir\_\_clearRepositoryCache** (duplicate=None)

Called when we change the repository(ies) for a directory. This clears any cached information that is invalidated by changing the repository.

**\_Dir\_\_resetDuplicate** (node)

**\_Rfindalldirs\_key** (pathlist)

**\_abspath**

**\_add\_child** (collection, set, child)

Adds 'child' to 'collection', first checking 'set' to see if it's already present.

**\_children\_get** ()

**\_children\_reset** ()

**\_create** ()

Create this directory, silently and without worrying about whether the builder is the default or not.

**\_func\_exists**

**\_func\_get\_contents**

**\_func\_is\_derived**

**\_func\_rexists**

**\_func\_sconsign**

**\_func\_target\_from\_source**

**\_get\_scanner** (env, initial\_scanner, root\_node\_scanner, kw)

**`_get_str ()`****`_glob1 (pattern, ondisk=True, source=False, strings=False)`**

Globs for and returns a list of entry names matching a single pattern in this directory.

This searches any repositories and source directories for corresponding entries and returns a Node (or string) relative to the current directory if an entry is found anywhere.

TODO: handle pattern with no wildcard

**`_labspath`****`_local`****`_memo`****`_morph ()`**

Turn a file system Node (either a freshly initialized directory object or a separate Entry object) into a proper directory object.

Set up this directory's entries and hook it into the file system tree. Specify that directories (this Node) don't use signatures for calculating whether they're current.

**`_path`****`_path_elements`****`_proxy`****`_rel_path_key (other)`****`_save_str ()`****`_sconsign`****`_specific_sources`****`_srcdir_find_file_key (filename)`****`_tags`****`_tpath`****`addRepository (dir)`****`add_dependency (depend)`**

Adds dependencies.

**`add_ignore (depend)`**

Adds dependencies to ignore.

**`add_prerequisite (prerequisite)`**

Adds prerequisites

**`add_source (source)`**

Adds sources.

**`add_to_implicit (deps)`****`add_to_waiting_parents (node)`**

Returns the number of nodes added to our waiting parents list: 1 if we add a unique waiting parent, 0 if not. (Note that the returned values are intended to be used to increment a reference count, so don't think you can "clean up" this function by using True and False instead...)

**add\_to\_waiting\_s\_e** (node)

**add\_wkid** (wkid)

Add a node to the list of kids waiting to be evaluated

**all\_children** (scan=1)

Return a list of all the node's direct children.

**alter\_targets** ()

Return any corresponding targets in a variant directory.

**always\_build**

**attributes**

**binfo**

**build** (\*\*kw)

A null "builder" for directories.

**builder**

**builder\_set** (builder)

**built** ()

Called just after this node is successfully built.

**cached**

**cachedir\_csig**

**cachesig**

**changed** (node=None, allowcache=False)

Returns if the node is up-to-date with respect to the BuildInfo stored last time it was built. The default behavior is to compare it against our own previously stored BuildInfo, but the stored BuildInfo from another Node (typically one in a Repository) can be used instead.

Note that we now *always* check every dependency. We used to short-circuit the check by returning as soon as we detected any difference, but we now rely on checking every dependency to make sure that any necessary Node information (for example, the content signature of an #included .h file) is updated.

The allowcache option was added for supporting the early release of the executor/builder structures, right after a File target was built. When set to true, the return value of this changed method gets cached for File nodes. Like this, the executor isn't needed any longer for subsequent calls to changed().

@see: FS.File.changed(), FS.File.release\_target\_info()

**changed\_since\_last\_build**

**children** (scan=1)

Return a list of the node's direct children, minus those that are ignored by this node.

**children\_are\_up\_to\_date** ()

Alternate check for whether the Node is current: If all of our children were up-to-date, then this Node was up-to-date, too.

The SCons.Node.Alias and SCons.Node.Python.Value subclasses rebind their current() method to this method.

**clear** ()

Completely clear a Node of all its cached state (so that it can be re-evaluated by interfaces that do continuous integration builds).

**clear\_memoized\_values** ()

**contentsig**

**cwd**

**del\_binfo ()**

Delete the build info from this node.

**depends**

**depends\_set**

**dir**

**dir\_on\_disk (name)**

**dirname**

**disambiguate (must\_exist=None)**

**diskcheck\_match ()**

**do\_duplicate (src)**

**duplicate**

**entries**

**entry\_abspath (name)**

**entry\_exists\_on\_disk (name)**

Searches through the file/dir entries of the current directory, and returns True if a physical entry with the given name could be found.

@see reentry\_exists\_on\_disk

**entry\_labspath (name)**

**entry\_path (name)**

**entry\_tpath (name)**

**env**

**env\_set (env, safe=0)**

**executor**

**executor\_cleanup ()**

Let the executor clean up any cached information.

**exists ()**

Does this node exist?

**explain ()**

**file\_on\_disk (name)**

**for\_signature ()**

Return a string representation of the Node that will always be the same for this particular Node, no matter what. This is by contrast to the `__str__()` method, which might, for instance, return a relative path for a file Node. The purpose of this method is to generate a value to be used in signature calculation for the command line used to build a target, and we use this method instead of `str()` to avoid unnecessary rebuilds. This method does not need

to return something that would actually work in a command line; it can return any kind of nonsense, so long as it does not change.

**fs**

**get\_repositories ()**

Returns a list of repositories for this directory.

**get\_abspath ()**

Get the absolute path of the file.

**get\_all\_rdirs ()**

**get\_binfo ()**

Fetch a node's build information.

node - the node whose sources will be collected cache - alternate node to use for the signature cache returns - the build signature

This no longer handles the recursive descent of the node's children's signatures. We expect that they're already built and updated by someone else, if that's what's wanted.

**get\_build\_env ()**

Fetch the appropriate Environment to build this node.

**get\_build\_scanner\_path (scanner)**

Fetch the appropriate scanner path for this node.

**get\_builder (default\_builder=None)**

Return the set builder, or a specified default value

**get\_cachedir\_csig ()**

**get\_contents ()**

Return content signatures and names of all our children separated by new-lines. Ensure that the nodes are sorted.

**get\_csig ()**

Compute the content signature for Directory nodes. In general, this is not needed and the content signature is not stored in the DirNodeInfo. However, if get\_contents on a Dir node is called which has a child directory, the child directory should return the hash of its contents.

**get\_dir ()**

**get\_env ()**

**get\_env\_scanner (env, kw={})**

**get\_executor (create=1)**

Fetch the action executor for this node. Create one if there isn't already one, and requested to do so.

**get\_found\_includes (env, scanner, path)**

Return this directory's implicit dependencies.

We don't bother caching the results because the scan typically shouldn't be requested more than once (as opposed to scanning .h file contents, which can be requested as many times as the files is #included by other files).

**get\_implicit\_deps (env, initial\_scanner, path\_func, kw={})**

Return a list of implicit dependencies for this node.

This method exists to handle recursive invocation of the scanner on the implicit dependencies returned by the scanner, if the scanner's recursive flag says that we should.

**get\_internal\_path ()**

**get\_labspath ()**

Get the absolute path of the file.

**get\_ninfo ()**

**get\_path (dir=None)**

Return path relative to the current working directory of the Node.FS.Base object that owns us.

**get\_path\_elements ()**

**get\_source\_scanner (node)**

Fetch the source scanner for the specified node

NOTE: "self" is the target being built, "node" is the source file for which we want to fetch the scanner.

Implies self.has\_builder() is true; again, expect to only be called from locations where this is already verified.

This function may be called very often; it attempts to cache the scanner found to improve performance.

**get\_state ()**

**get\_stored\_implicit ()**

Fetch the stored implicit dependencies

**get\_stored\_info ()**

**get\_string (for\_signature)**

This is a convenience function designed primarily to be used in command generators (i.e., CommandGeneratorActions or Environment variables that are callable), which are called with a for\_signature argument that is nonzero if the command generator is being called to generate a signature for the command line, which determines if we should rebuild or not.

Such command generators should use this method in preference to str(Node) when converting a Node to a string, passing in the for\_signature parameter, such that we will call Node.for\_signature() or str(Node) properly, depending on whether we are calculating a signature or actually constructing a command line.

**get\_subst\_proxy ()**

This method is expected to return an object that will function exactly like this Node, except that it implements any additional special features that we would like to be in effect for Environment variable substitution. The principle use is that some Nodes would like to implement a \_\_getattr\_\_() method, but putting that in the Node type itself has a tendency to kill performance. We instead put it in a proxy and return it from this method. It is legal for this method to return self if no new functionality is needed for Environment substitution.

**get\_suffix ()**

**get\_target\_scanner ()**

**get\_text\_contents ()**

We already emit things in text, so just return the binary version.

**get\_timestamp ()**

Return the latest timestamp from among our children

**get\_tpath ()**

**getmtime ()**

**getsize ()**

**glob (pathname, ondisk=True, source=False, strings=False, exclude=None)**

Returns a list of Nodes (or strings) matching a specified pathname pattern.

Pathname patterns follow UNIX shell semantics: \* matches any-length strings of any characters, ? matches any character, and [] can enclose lists or ranges of characters. Matches do not span directory separators.

The matches take into account Repositories, returning local Nodes if a corresponding entry exists in a Repository (either an in-memory Node or something on disk).

By default, the `glob()` function matches entries that exist on-disk, in addition to in-memory Nodes. Setting the “ondisk” argument to `False` (or some other non-true value) causes the `glob()` function to only match in-memory Nodes. The default behavior is to return both the on-disk and in-memory Nodes.

The “source” argument, when `true`, specifies that corresponding source Nodes must be returned if you’re globbing in a build directory (initialized with `VariantDir()`). The default behavior is to return Nodes local to the `VariantDir()`.

The “strings” argument, when `true`, returns the matches as strings, not Nodes. The strings are path names relative to this directory.

The “exclude” argument, if not `None`, must be a pattern or a list of patterns following the same UNIX shell semantics. Elements matching a least one pattern of this list will be excluded from the result.

The underlying algorithm is adapted from the `glob.glob()` function in the Python library (but heavily modified), and uses `fnmatch()` under the covers.

#### **has\_builder ()**

Return whether this Node has a builder or not.

In Boolean tests, this turns out to be a *lot* more efficient than simply examining the builder attribute directly (“if `node.builder: ...`”). When the builder attribute is examined directly, it ends up calling `__getattr__` for both the `__len__` and `__nonzero__` attributes on instances of our Builder Proxy class(es), generating a bazillion extra calls and slowing things down immensely.

#### **has\_explicit\_builder ()**

Return whether this Node has an explicit builder

This allows an internal Builder created by SCons to be marked non-explicit, so that it can be overridden by an explicit builder that the user supplies (the canonical example being directories).

#### **ignore**

#### **ignore\_set**

#### **implicit**

#### **implicit\_set**

#### **includes**

#### **is\_derived ()**

Returns true if this node is derived (i.e. built).

This should return true only for nodes whose path should be in the variant directory when `duplicate=0` and should contribute their build signatures when they are used as source files to other derived files. For example: source with source builders are not derived in this sense, and hence should not return true.

#### **is\_explicit**

#### **is\_literal ()**

Always pass the string representation of a Node to the command interpreter literally.

#### **is\_sconscript ()**

Returns true if this node is an sconscript

#### **is\_under (dir)**

#### **is\_up\_to\_date ()**

If any child is not up-to-date, then this directory isn’t, either.

#### **isdir ()**

#### **isfile ()**

#### **islink ()**

#### **link (srcdir, duplicate)**

Set this directory as the variant directory for the supplied source directory.

**linked**

**lstat ()**

**make\_ready ()**

Get a Node ready for evaluation.

This is called before the Taskmaster decides if the Node is up-to-date or not. Overriding this method allows for a Node subclass to be disambiguated if necessary, or for an implicit source builder to be attached.

**missing ()**

**multiple\_side\_effect\_has\_builder ()**

Return whether this Node has a builder or not.

In Boolean tests, this turns out to be a *lot* more efficient than simply examining the builder attribute directly (“if node.builder: ...”). When the builder attribute is examined directly, it ends up calling `__getattr__` for both the `__len__` and `__nonzero__` attributes on instances of our Builder Proxy class(es), generating a bazillion extra calls and slowing things down immensely.

**must\_be\_same (klass)**

This node, which already existed, is being looked up as the specified klass. Raise an exception if it isn't.

**name**

**new\_binfo ()**

**new\_ninfo ()**

**ninfo**

**nocache**

**noclean**

**on\_disk\_entries**

**postprocess ()**

Clean up anything we don't need to hang onto after we've been built.

**precious**

**prepare ()**

Prepare for this Node to be built.

This is called after the Taskmaster has decided that the Node is out-of-date and must be rebuilt, but before actually calling the method to build the Node.

This default implementation checks that explicit or implicit dependencies either exist or are derived, and initializes the BuildInfo structure that will hold the information about how this node is, uh, built.

(The existence of source files is checked separately by the Executor, which aggregates checks for all of the targets built by a specific action.)

Overriding this method allows for for a Node subclass to remove the underlying file from the file system. Note that subclass methods should call this base class method to get the child check and the BuildInfo structure.

**prerequisites**

**pseudo**

**push\_to\_cache ()**

Try to push a node into a cache

**rdir ()**

**ref\_count**

**rel\_path (other)**

Return a path to “other” relative to this directory.

**release\_target\_info ()**

Called just after this node has been marked up-to-date or was built completely.

This is where we try to release as many target node infos as possible for clean builds and update runs, in order to minimize the overall memory consumption.

By purging attributes that aren't needed any longer after a Node (=File) got built, we don't have to care that much how many KBytes a Node actually requires...as long as we free the memory shortly afterwards.

@see: built() and File.release\_target\_info()

**released\_target\_info**

**remove ()**

Remove this Node: no-op by default.

**render\_include\_tree ()**

Return a text representation, suitable for displaying to the user, of the include tree for the sources of this node.

**reentry ()**

**reentry\_exists\_on\_disk (name)**

Searches through the file/dir entries of the current *and* all its remote directories (repos), and returns True if a physical entry with the given name could be found. The local directory (self) gets searched first, so repositories take a lower precedence regarding the searching order.

@see entry\_exists\_on\_disk

**repositories**

**reset\_executor ()**

Remove cached executor; forces recompute when needed.

**retrieve\_from\_cache ()**

Try to retrieve the node's content from a cache

This method is called from multiple threads in a parallel build, so only do thread safe stuff here. Do thread unsafe stuff in built().

Returns true if the node was successfully retrieved.

**rexists ()**

Does this node exist locally or in a repository?

**rfile ()**

**root**

**rstr ()**

A Node.FS.Base object's string representation is its path name.

**sbuilder**

**scan ()**

Scan this node's dependents for implicit dependencies.

**scanner\_key ()**

A directory does not get scanned.

**scanner\_paths**

**sconsign ()**

Return the .sconsign file info for this directory.

**searched**

**select\_scanner** (*scanner*)

Selects a scanner for this Node.

This is a separate method so it can be overridden by Node subclasses (specifically, Node.FS.Dir) that *must* use their own Scanner and don't select one the Scanner.Selector that's configured for the target.

**set\_always\_build** (*always\_build=1*)

Set the Node's always\_build value.

**set\_executor** (*executor*)

Set the action executor for this node.

**set\_explicit** (*is\_explicit*)

**set\_local** ()

**set\_nocache** (*nocache=1*)

Set the Node's nocache value.

**set\_noclean** (*noclean=1*)

Set the Node's noclean value.

**set\_precious** (*precious=1*)

Set the Node's precious value.

**set\_pseudo** (*pseudo=True*)

Set the Node's precious value.

**set\_specific\_source** (*source*)

**set\_src\_builder** (*builder*)

Set the source code builder for this node.

**set\_state** (*state*)

**side\_effect**

**side\_effects**

**sources**

**sources\_set**

**src\_builder** ()

Fetch the source code builder for this node.

If there isn't one, we cache the source code builder specified for the directory (which in turn will cache the value from its parent directory, and so on up to the file system root).

**srcdir**

**srcdir\_duplicate** (*name*)

**srcdir\_find\_file** (*filename*)

**srcdir\_list** ()

**srcnode** ()

Dir has a special need for srcnode()...if we have a srcdir attribute set, then that *is* our srcnode.

**stat ()****state****store\_info****str\_for\_display ()****target\_from\_source (prefix, suffix, splitext=<function splitext>)**

Generates a target entry that corresponds to this entry (usually a source file) with the specified prefix and suffix. Note that this method can be overridden dynamically for generated files that need different behavior. See Tool/swig.py for an example.

**target\_peers****up ()****variant\_dirs****visited ()**

Called just after this node has been visited (with or without a build).

**waiting\_parents****waiting\_s\_e****walk (func, arg)**

Walk this directory tree by calling the specified function for each directory in the tree.

This behaves like the `os.path.walk()` function, but for in-memory `Node.FS.Dir` objects. The function takes the same arguments as the functions passed to `os.path.walk()`:

`func(arg, dirname, fnames)`

Except that “dirname” will actually be the directory *Node*, not the string. The ‘.’ and ‘..’ entries are excluded from fnames. The fnames list may be modified in-place to filter the subdirectories visited or otherwise impose a specific order. The “arg” argument is always passed to `func()` and may be used in any way (or ignored, passing `None` is common).

**wkids**

**class SCons.Node.FS.DirBuildInfo**  
**Bases: SCons.Node.BuildInfoBase**

**bact****bactsig****bdepends****bdependsigs****bimplicit****bimplicitigs****bsources****bsourcesigs****current\_version\_id = 2****merge (other)**

Merge the fields of another object into this object. Already existing information is overwritten by the other instance's data. WARNING: If a '`__dict__`' slot is added, it should be updated instead of replaced.

```
class SCons.Node.FS.DirNodeInfo
  Bases: SCons.Node.NodeInfoBase
```

```
convert (node, val)
```

```
current_version_id = 2
```

```
format (field_list=None, names=0)
```

```
fs = None
```

```
merge (other)
```

Merge the fields of another object into this object. Already existing information is overwritten by the other instance's data. WARNING: If a '`__dict__`' slot is added, it should be updated instead of replaced.

```
str_to_node (s)
```

```
update (node)
```

```
class SCons.Node.FS.DiskChecker (type, do, ignore)
  Bases: object
```

```
set (list)
```

```
class SCons.Node.FS.Entry (name, directory, fs)
```

```
  Bases: SCons.Node.FS.Base
```

This is the class for generic Node.FS entries—that is, things that could be a File or a Dir, but we're just not sure yet. Consequently, the methods in this class really exist just to transform their associated object into the right class when the time comes, and then call the same-named method in the transformed class.

```
class Attrs
```

```
  Bases: object
```

```
  shared
```

```
BuildInfo
```

```
  alias of SCons.Node.BuildInfoBase
```

```
Decider (function)
```

```
GetTag (key)
```

```
  Return a user-defined tag.
```

```
NodeInfo
```

```
  alias of SCons.Node.NodeInfoBase
```

```
RDirs (pathlist)
```

```
  Search for a list of directories in the Repository list.
```

```
Rfindalldirs (pathlist)
```

Return all of the directories for a given path list, including corresponding "backing" directories in any repositories. The Node lookups are relative to this Node (typically a directory), so memoizing result saves cycles from looking up the same path for each target in a given directory.

```
Tag (key, value)
```

```
  Add a user-defined tag.
```

```
_Rfindalldirs_key (pathlist)
```

`_abspath`

`_add_child (collection, set, child)`  
Adds 'child' to 'collection', first checking 'set' to see if it's already present.

`_children_get ()`

`_children_reset ()`

`_func_exists`

`_func_get_contents`

`_func_is_derived`

`_func_rexists`

`_func_sconsign`

`_func_target_from_source`

`_get_scanner (env, initial_scanner, root_node_scanner, kw)`

`_get_str ()`

`_glob1 (pattern, ondisk=True, source=False, strings=False)`

`_labspath`

`_local`

`_memo`

`_path`

`_path_elements`

`_proxy`

`_save_str ()`

`_sconsign`

`_specific_sources`

`_tags`

`_tpath`

`add_dependency (depend)`  
Adds dependencies.

`add_ignore (depend)`  
Adds dependencies to ignore.

`add_prerequisite (prerequisite)`  
Adds prerequisites

`add_source (source)`  
Adds sources.

**add\_to\_implicit** (deps)

**add\_to\_waiting\_parents** (node)

Returns the number of nodes added to our waiting parents list: 1 if we add a unique waiting parent, 0 if not. (Note that the returned values are intended to be used to increment a reference count, so don't think you can "clean up" this function by using True and False instead...)

**add\_to\_waiting\_s\_e** (node)

**add\_wkid** (wkid)

Add a node to the list of kids waiting to be evaluated

**all\_children** (scan=1)

Return a list of all the node's direct children.

**alter\_targets** ()

Return a list of alternate targets for this Node.

**always\_build**

**attributes**

**binfo**

**build** (\*\*kw)

Actually build the node.

This is called by the Taskmaster after it's decided that the Node is out-of-date and must be rebuilt, and after the prepare() method has gotten everything, uh, prepared.

This method is called from multiple threads in a parallel build, so only do thread safe stuff here. Do thread unsafe stuff in built().

**builder**

**builder\_set** (builder)

**built** ()

Called just after this node is successfully built.

**cached**

**cachedir\_csig**

**cachesig**

**changed** (node=None, allowcache=False)

Returns if the node is up-to-date with respect to the BuildInfo stored last time it was built. The default behavior is to compare it against our own previously stored BuildInfo, but the stored BuildInfo from another Node (typically one in a Repository) can be used instead.

Note that we now *always* check every dependency. We used to short-circuit the check by returning as soon as we detected any difference, but we now rely on checking every dependency to make sure that any necessary Node information (for example, the content signature of an #included .h file) is updated.

The allowcache option was added for supporting the early release of the executor/builder structures, right after a File target was built. When set to true, the return value of this changed method gets cached for File nodes. Like this, the executor isn't needed any longer for subsequent calls to changed().

@see: FS.File.changed(), FS.File.release\_target\_info()

**changed\_since\_last\_build**

**children** (scan=1)

Return a list of the node's direct children, minus those that are ignored by this node.

**children\_are\_up\_to\_date ()**

Alternate check for whether the Node is current: If all of our children were up-to-date, then this Node was up-to-date, too.

The SCons.Node.Alias and SCons.Node.Python.Value subclasses rebind their current() method to this method.

**clear ()**

Completely clear a Node of all its cached state (so that it can be re-evaluated by interfaces that do continuous integration builds).

**clear\_memoized\_values ()****contentsig****cwd****del\_binfo ()**

Delete the build info from this node.

**depends****depends\_set****dir****dirname****disambiguate (must\_exist=None)****diskcheck\_match ()****duplicate****entries****env****env\_set (env, safe=0)****executor****executor\_cleanup ()**

Let the executor clean up any cached information.

**exists ()**

Does this node exist?

**explain ()****for\_signature ()**

Return a string representation of the Node that will always be the same for this particular Node, no matter what. This is by contrast to the `__str__()` method, which might, for instance, return a relative path for a file Node. The purpose of this method is to generate a value to be used in signature calculation for the command line used to build a target, and we use this method instead of `str()` to avoid unnecessary rebuilds. This method does not need to return something that would actually work in a command line; it can return any kind of nonsense, so long as it does not change.

**fs****get\_abspath ()**

Get the absolute path of the file.

**get\_binfo ()**

Fetch a node's build information.

node - the node whose sources will be collected cache - alternate node to use for the signature cache returns - the build signature

This no longer handles the recursive descent of the node's children's signatures. We expect that they're already built and updated by someone else, if that's what's wanted.

**get\_build\_env ()**

Fetch the appropriate Environment to build this node.

**get\_build\_scanner\_path (scanner)**

Fetch the appropriate scanner path for this node.

**get\_builder (default\_builder=None)**

Return the set builder, or a specified default value

**get\_cachedir\_csig ()**

**get\_contents ()**

Fetch the contents of the entry. Returns the exact binary contents of the file.

**get\_csig ()**

**get\_dir ()**

**get\_env ()**

**get\_env\_scanner (env, kw={})**

**get\_executor (create=1)**

Fetch the action executor for this node. Create one if there isn't already one, and requested to do so.

**get\_found\_includes (env, scanner, path)**

Return the scanned include lines (implicit dependencies) found in this node.

The default is no implicit dependencies. We expect this method to be overridden by any subclass that can be scanned for implicit dependencies.

**get\_implicit\_deps (env, initial\_scanner, path\_func, kw={})**

Return a list of implicit dependencies for this node.

This method exists to handle recursive invocation of the scanner on the implicit dependencies returned by the scanner, if the scanner's recursive flag says that we should.

**get\_internal\_path ()**

**get\_labspath ()**

Get the absolute path of the file.

**get\_ninfo ()**

**get\_path (dir=None)**

Return path relative to the current working directory of the Node.FS.Base object that owns us.

**get\_path\_elements ()**

**get\_source\_scanner (node)**

Fetch the source scanner for the specified node

NOTE: "self" is the target being built, "node" is the source file for which we want to fetch the scanner.

Implies self.has\_builder() is true; again, expect to only be called from locations where this is already verified.

This function may be called very often; it attempts to cache the scanner found to improve performance.

**get\_state ()**

**get\_stored\_implicit ()**

Fetch the stored implicit dependencies

**get\_stored\_info ()****get\_string (for\_signature)**

This is a convenience function designed primarily to be used in command generators (i.e., `CommandGeneratorActions` or Environment variables that are callable), which are called with a `for_signature` argument that is nonzero if the command generator is being called to generate a signature for the command line, which determines if we should rebuild or not.

Such command generators should use this method in preference to `str(Node)` when converting a `Node` to a string, passing in the `for_signature` parameter, such that we will call `Node.for_signature()` or `str(Node)` properly, depending on whether we are calculating a signature or actually constructing a command line.

**get\_subst\_proxy ()**

This method is expected to return an object that will function exactly like this `Node`, except that it implements any additional special features that we would like to be in effect for Environment variable substitution. The principle use is that some `Nodes` would like to implement a `__getattr__()` method, but putting that in the `Node` type itself has a tendency to kill performance. We instead put it in a proxy and return it from this method. It is legal for this method to return self if no new functionality is needed for Environment substitution.

**get\_suffix ()****get\_target\_scanner ()****get\_text\_contents ()**

Fetch the decoded text contents of a Unicode encoded Entry.

Since this should return the text contents from the file system, we check to see into what sort of subclass we should morph this Entry.

**get\_tpath ()****getmtime ()****getsize ()****has\_builder ()**

Return whether this `Node` has a builder or not.

In Boolean tests, this turns out to be a *lot* more efficient than simply examining the builder attribute directly (“if `node.builder: ...`”). When the builder attribute is examined directly, it ends up calling `__getattr__` for both the `__len__` and `__nonzero__` attributes on instances of our Builder Proxy class(es), generating a bazillion extra calls and slowing things down immensely.

**has\_explicit\_builder ()**

Return whether this `Node` has an explicit builder

This allows an internal Builder created by SCons to be marked non-explicit, so that it can be overridden by an explicit builder that the user supplies (the canonical example being directories).

**ignore****ignore\_set****implicit****implicit\_set****includes****is\_derived ()**

Returns true if this node is derived (i.e. built).

This should return true only for nodes whose path should be in the variant directory when duplicate=0 and should contribute their build signatures when they are used as source files to other derived files. For example: source with source builders are not derived in this sense, and hence should not return true.

**is\_explicit**

**is\_literal ()**

Always pass the string representation of a Node to the command interpreter literally.

**is\_sconscript ()**

Returns true if this node is an sconscript

**is\_under (dir)**

**is\_up\_to\_date ()**

Default check for whether the Node is current: unknown Node subtypes are always out of date, so they will always get built.

**isdir ()**

**isfile ()**

**islink ()**

**linked**

**lstat ()**

**make\_ready ()**

Get a Node ready for evaluation.

This is called before the Taskmaster decides if the Node is up-to-date or not. Overriding this method allows for a Node subclass to be disambiguated if necessary, or for an implicit source builder to be attached.

**missing ()**

**multiple\_side\_effect\_has\_builder ()**

Return whether this Node has a builder or not.

In Boolean tests, this turns out to be a *lot* more efficient than simply examining the builder attribute directly (“if node.builder: ...”). When the builder attribute is examined directly, it ends up calling `__getattr__` for both the `__len__` and `__nonzero__` attributes on instances of our Builder Proxy class(es), generating a bazillion extra calls and slowing things down immensely.

**must\_be\_same (klass)**

Called to make sure a Node is a Dir. Since we’re an Entry, we can morph into one.

**name**

**new\_binfo ()**

**new\_ninfo ()**

**ninfo**

**nocache**

**noclean**

**on\_disk\_entries**

**postprocess ()**

Clean up anything we don’t need to hang onto after we’ve been built.

**precious**

**prepare ()**

Prepare for this Node to be built.

This is called after the Taskmaster has decided that the Node is out-of-date and must be rebuilt, but before actually calling the method to build the Node.

This default implementation checks that explicit or implicit dependencies either exist or are derived, and initializes the BuildInfo structure that will hold the information about how this node is, uh, built.

(The existence of source files is checked separately by the Executor, which aggregates checks for all of the targets built by a specific action.)

Overriding this method allows for for a Node subclass to remove the underlying file from the file system. Note that subclass methods should call this base class method to get the child check and the BuildInfo structure.

**prerequisites**

**pseudo**

**push\_to\_cache ()**

Try to push a node into a cache

**ref\_count**

**rel\_path (other)**

**release\_target\_info ()**

Called just after this node has been marked up-to-date or was built completely.

This is where we try to release as many target node infos as possible for clean builds and update runs, in order to minimize the overall memory consumption.

By purging attributes that aren't needed any longer after a Node (=File) got built, we don't have to care that much how many KBytes a Node actually requires...as long as we free the memory shortly afterwards.

@see: built() and File.release\_target\_info()

**released\_target\_info**

**remove ()**

Remove this Node: no-op by default.

**render\_include\_tree ()**

Return a text representation, suitable for displaying to the user, of the include tree for the sources of this node.

**reentry ()**

**repositories**

**reset\_executor ()**

Remove cached executor; forces recompute when needed.

**retrieve\_from\_cache ()**

Try to retrieve the node's content from a cache

This method is called from multiple threads in a parallel build, so only do thread safe stuff here. Do thread unsafe stuff in built().

Returns true if the node was successfully retrieved.

**rexists ()**

Does this node exist locally or in a repository?

**rfile ()**

We're a generic Entry, but the caller is actually looking for a File at this point, so morph into one.

**root**

**rstr ()**

A Node.FS.Base object's string representation is its path name.

**sbuilder**

**scan ()**

Scan this node's dependents for implicit dependencies.

**scanner\_key ()**

**scanner\_paths**

**searched**

**select\_scanner (scanner)**

Selects a scanner for this Node.

This is a separate method so it can be overridden by Node subclasses (specifically, Node.FS.Dir) that *must* use their own Scanner and don't select one the Scanner.Selector that's configured for the target.

**set\_always\_build (always\_build=1)**

Set the Node's always\_build value.

**set\_executor (executor)**

Set the action executor for this node.

**set\_explicit (is\_explicit)**

**set\_local ()**

**set\_nocache (nocache=1)**

Set the Node's nocache value.

**set\_noclean (noclean=1)**

Set the Node's noclean value.

**set\_precious (precious=1)**

Set the Node's precious value.

**set\_pseudo (pseudo=True)**

Set the Node's precious value.

**set\_specific\_source (source)**

**set\_src\_builder (builder)**

Set the source code builder for this node.

**set\_state (state)**

**side\_effect**

**side\_effects**

**sources**

**sources\_set**

**src\_builder ()**

Fetch the source code builder for this node.

If there isn't one, we cache the source code builder specified for the directory (which in turn will cache the value from its parent directory, and so on up to the file system root).

`srcdir``srcnode ()`

If this node is in a build path, return the node corresponding to its source file. Otherwise, return `ourselves`.

`stat ()``state``store_info``str_for_display ()``target_from_source (prefix, suffix, splitext=<function splitext>)`

Generates a target entry that corresponds to this entry (usually a source file) with the specified prefix and suffix.

Note that this method can be overridden dynamically for generated files that need different behavior. See `Tool/swig.py` for an example.

`target_peers``variant_dirs``visited ()`

Called just after this node has been visited (with or without a build).

`waiting_parents``waiting_s_e``wkids`

```
class SCons.Node.FS.EntryProxy (subject)
```

```
    Bases: SCons.Util.Proxy
```

```
    _EntryProxy__get_abspath ()
```

```
    _EntryProxy__get_base_path ()
```

Return the file's directory and file name, with the suffix stripped.

```
    _EntryProxy__get_dir ()
```

```
    _EntryProxy__get_file ()
```

```
    _EntryProxy__get_filebase ()
```

```
    _EntryProxy__get_posix_path ()
```

Return the path with `/` as the path separator, regardless of platform.

```
    _EntryProxy__get_rsrcdir ()
```

Returns the directory containing the source node linked to this node via `VariantDir()`, or the directory of this node if not linked.

```
    _EntryProxy__get_rsrcnode ()
```

```
    _EntryProxy__get_srcdir ()
```

Returns the directory containing the source node linked to this node via `VariantDir()`, or the directory of this node if not linked.

```
    _EntryProxy__get_srcnode ()
```

```
    _EntryProxy__get_suffix ()
```

**`__EntryProxy__get_windows_path()`**

Return the path with as the path separator, regardless of platform.

```
dictSpecialAttrs = {'abspath': <function EntryProxy.__get_abspath>, 'base': <function
EntryProxy.__get_base_path>, 'dir': <function EntryProxy.__get_dir>, 'file': <function EntryProxy.__get_file>,
'filebase': <function EntryProxy.__get_filebase>, 'posix': <function EntryProxy.__get_posix_path>, 'rsrkdir':
<function EntryProxy.__get_rsrkdir>, 'srcpath': <function EntryProxy.__get_srcnode>, 'srcdir': <function
EntryProxy.__get_srcdir>, 'srcpath': <function EntryProxy.__get_srcnode>, 'suffix': <function
EntryProxy.__get_suffix>, 'win32': <function EntryProxy.__get_windows_path>, 'windows': <function
EntryProxy.__get_windows_path>}
```

**`get()`**

Retrieve the entire wrapped object

*exception* `SCons.Node.FS.EntryProxyAttributeError` (entry\_proxy, attribute)

Bases: `AttributeError`

An `AttributeError` subclass for recording and displaying the name of the underlying `Entry` involved in an `AttributeError` exception.

**`args`****`with_traceback()`**

`Exception.with_traceback(tb)` – set `self.__traceback__` to `tb` and return `self`.

*class* `SCons.Node.FS.FS` (path=None)

Bases: `SCons.Node.FS.LocalFS`

**`Dir`** (name, directory=None, create=True)

Look up or create a `Dir` node with the specified name. If the name is a relative path (begins with `./`, `../`, or a file name), then it is looked up relative to the supplied directory node, or to the top level directory of the `FS` (supplied at construction time) if no directory is supplied.

This method will raise `TypeError` if a normal file is found at the specified path.

**`Entry`** (name, directory=None, create=1)

Look up or create a generic `Entry` node with the specified name. If the name is a relative path (begins with `./`, `../`, or a file name), then it is looked up relative to the supplied directory node, or to the top level directory of the `FS` (supplied at construction time) if no directory is supplied.

**`File`** (name, directory=None, create=1)

Look up or create a `File` node with the specified name. If the name is a relative path (begins with `./`, `../`, or a file name), then it is looked up relative to the supplied directory node, or to the top level directory of the `FS` (supplied at construction time) if no directory is supplied.

This method will raise `TypeError` if a directory is found at the specified path.

**`Glob`** (pathname, ondisk=True, source=True, strings=False, exclude=None, cwd=None)

Globs

This is mainly a shim layer

**`PyPackageDir`** (modulename)

Locate the directory of a given python module name

For example `scons` might resolve to Windows: `C:\Python27\Lib\site-packages\scons-2.5.1` Linux: `/usr/lib/scons`

This can be useful when we want to determine a toolpath based on a python module name

**`Repository`** (\*dirs)

Specify `Repository` directories to search.

**`VariantDir`** (variant\_dir, src\_dir, duplicate=1)

Link the supplied variant directory to the source directory for purposes of building files.

**`__lookup`** (p, directory, fsclass, create=1)

The generic entry point for `Node` lookup with user-supplied data.

This translates arbitrary input into a canonical Node.FS object of the specified fclass. The general approach for strings is to turn it into a fully normalized absolute path and then call the root directory's `lookup_abs()` method for the heavy lifting.

If the path name begins with '#', it is unconditionally interpreted relative to the top-level directory of this FS. '#' is treated as a synonym for the top-level SConstruct directory, much like '~' is treated as a synonym for the user's home directory in a UNIX shell. So both '#foo' and './foo' refer to the 'foo' subdirectory underneath the top-level SConstruct directory.

If the path name is relative, then the path is looked up relative to the specified directory, or the current directory (`self._cwd`, typically the SConscript directory) if the specified directory is None.

**chdir** (`dir`, `change_os_dir=0`)

Change the current working directory for lookups. If `change_os_dir` is true, we will also change the "real" cwd to match.

**chmod** (`path`, `mode`)

**copy** (`src`, `dst`)

**copy2** (`src`, `dst`)

**exists** (`path`)

**get\_max\_drift** ()

**get\_root** (`drive`)

Returns the root directory for the specified drive, creating it if necessary.

**getcwd** ()

**getmtime** (`path`)

**getsize** (`path`)

**isdir** (`path`)

**isfile** (`path`)

**islink** (`path`)

**link** (`src`, `dst`)

**listdir** (`path`)

**lstat** (`path`)

**makedirs** (`path`)

**mkdir** (`path`)

**open** (`path`)

**readlink** (`file`)

**rename** (`old`, `new`)

**set\_SConstruct\_dir** (`dir`)

**set\_max\_drift** (`max_drift`)

**stat** (`path`)

**symlink** (src, dst)

**unlink** (path)

**variant\_dir\_target\_climb** (orig, dir, tail)

Create targets in corresponding variant directories

Climb the directory tree, and look up path names relative to any linked variant directories we find.

Even though this loops and walks up the tree, we don't memoize the return value because this is really only used to process the command-line targets.

*class* SCons.Node.FS.File (name, directory, fs)

Bases: SCons.Node.FS.Base

A class for files in a file system.

*class* Attrs

Bases: object

shared

**BuildInfo**

alias of FileBuildInfo

**Decider** (function)

**Dir** (name, create=True)

Create a directory node named 'name' relative to the directory of this file.

**Dirs** (pathlist)

Create a list of directories relative to the SConscript directory of this file.

**Entry** (name)

Create an entry node named 'name' relative to the directory of this file.

**File** (name)

Create a file node named 'name' relative to the directory of this file.

**GetTag** (key)

Return a user-defined tag.

**NodeInfo**

alias of FileNodeInfo

**RDirs** (pathlist)

Search for a list of directories in the Repository list.

**Rfindalldirs** (pathlist)

Return all of the directories for a given path list, including corresponding "backing" directories in any repositories.

The Node lookups are relative to this Node (typically a directory), so memoizing result saves cycles from looking up the same path for each target in a given directory.

**Tag** (key, value)

Add a user-defined tag.

**\_File\_\_dmap\_cache** = {}

**\_File\_\_dmap\_sig\_cache** = {}

**\_Rfindalldirs\_key** (pathlist)

**\_abspath**

`_add_child (collection, set, child)`

Adds 'child' to 'collection', first checking 'set' to see if it's already present.

`_add_strings_to_dependency_map (dmap)`

In the case comparing node objects isn't sufficient, we'll add the strings for the nodes to the dependency map  
:return:

`_build_dependency_map (binfo)`

Build mapping from file -> signature

**Parameters:**

- - **self** (*self*) –
- - **buildinfo from node being considered** (*binfo*) –

**Returns:** dictionary of file->signature mappings

`_children_get ()`

`_children_reset ()`

`_createDir ()`

`_func_exists`

`_func_get_contents`

`_func_is_derived`

`_func_rexists`

`_func_sconsign`

`_func_target_from_source`

`_get_found_includes_key (env, scanner, path)`

`_get_previous_signatures (dmap)`

Return a list of corresponding csigs from previous build in order of the node/files in children.

**Parameters:**

- - **self** (*self*) –
- - **Dictionary of file -> csig** (*dmap*) –

**Returns:** List of csigs for provided list of children

`_get_scanner (env, initial_scanner, root_node_scanner, kw)`

`_get_str ()`

`_glob1 (pattern, ondisk=True, source=False, strings=False)`

`_labspath`

`_local`

`_memo`

`_morph ()`

Turn a file system node into a File object.

`_path`

`_path_elements`

**\_proxy****\_rmv\_existing ()****\_save\_str ()****\_sconsign****\_specific\_sources****\_tags****\_tpath****add\_dependency (depend)**

Adds dependencies.

**add\_ignore (depend)**

Adds dependencies to ignore.

**add\_prerequisite (prerequisite)**

Adds prerequisites

**add\_source (source)**

Adds sources.

**add\_to\_implicit (deps)****add\_to\_waiting\_parents (node)**

Returns the number of nodes added to our waiting parents list: 1 if we add a unique waiting parent, 0 if not. (Note that the returned values are intended to be used to increment a reference count, so don't think you can "clean up" this function by using True and False instead...)

**add\_to\_waiting\_s\_e (node)****add\_wkid (wkid)**

Add a node to the list of kids waiting to be evaluated

**all\_children (scan=1)**

Return a list of all the node's direct children.

**alter\_targets ()**

Return any corresponding targets in a variant directory.

**always\_build****attributes****binfo****build (\*\*kw)**

Actually build the node.

This is called by the Taskmaster after it's decided that the Node is out-of-date and must be rebuilt, and after the prepare() method has gotten everything, uh, prepared.

This method is called from multiple threads in a parallel build, so only do thread safe stuff here. Do thread unsafe stuff in built().

**builder****builder\_set (builder)**

**built ()**

Called just after this File node is successfully built.

Just like for 'release\_target\_info' we try to release some more target node attributes in order to minimize the overall memory consumption.

@see: release\_target\_info

**cached****cachedir\_csig****cachesig****changed (node=None, allowcache=False)**

Returns if the node is up-to-date with respect to the BuildInfo stored last time it was built.

For File nodes this is basically a wrapper around Node.changed(), but we allow the return value to get cached after the reference to the Executor got released in release\_target\_info().

@see: Node.changed()

**changed\_content (target, prev\_ni, repo\_node=None)****changed\_since\_last\_build****changed\_state (target, prev\_ni, repo\_node=None)****changed\_timestamp\_match (target, prev\_ni, repo\_node=None)**

Return True if the timestamps don't match or if there is no previous timestamp :param target: :param prev\_ni: Information about the node from the previous build :return:

**changed\_timestamp\_newer (target, prev\_ni, repo\_node=None)****changed\_timestamp\_then\_content (target, prev\_ni, node=None)**

Used when decider for file is Timestamp-MD5

**NOTE: If the timestamp hasn't changed this will skip md5'ing the**

file and just copy the prev\_ni provided. If the prev\_ni is wrong. It will propagate it. See: <https://github.com/SCons/scons/issues/2980>

**Parameters:**

- - **dependency** (*self*) –
- - **target** (*target*) –
- - **The NodeInfo object loaded from previous builds .sconsign** (*prev\_ni*) –
- - **Node instance. Check this node for file existence/timestamp** (*node*) – if specified.

**Returns:** Boolean - Indicates if node(File) has changed.

**children (scan=1)**

Return a list of the node's direct children, minus those that are ignored by this node.

**children\_are\_up\_to\_date ()**

Alternate check for whether the Node is current: If all of our children were up-to-date, then this Node was up-to-date, too.

The SCons.Node.Alias and SCons.Node.Python.Value subclasses rebind their current() method to this method.

**clear ()**

Completely clear a Node of all its cached state (so that it can be re-evaluated by interfaces that do continuous integration builds).

**clear\_memoized\_values ()****contentsig**

```
convert_copy_attrs = ['bsources', 'bimplicit', 'bdepends', 'bact', 'bactsig', 'ninfo']
```

```
convert_old_entry (old_entry)
```

```
convert_sig_attrs = ['bsourcesigs', 'bimplicitsigs', 'bdependssigs']
```

```
cwd
```

```
del_binfo ()
```

Delete the build info from this node.

```
depends
```

```
depends_set
```

```
dir
```

```
dirname
```

```
disambiguate (must_exist=None)
```

```
diskcheck_match ()
```

```
do_duplicate (src)
```

```
duplicate
```

```
entries
```

```
env
```

```
env_set (env, safe=0)
```

```
executor
```

```
executor_cleanup ()
```

Let the executor clean up any cached information.

```
exists ()
```

Does this node exist?

```
explain ()
```

```
find_repo_file ()
```

For this node, find if there exists a corresponding file in one or more repositories :return: list of corresponding files in repositories

```
find_src_builder ()
```

```
for_signature ()
```

Return a string representation of the Node that will always be the same for this particular Node, no matter what. This is by contrast to the `__str__()` method, which might, for instance, return a relative path for a file Node. The purpose of this method is to generate a value to be used in signature calculation for the command line used to build a target, and we use this method instead of `str()` to avoid unnecessary rebuilds. This method does not need to return something that would actually work in a command line; it can return any kind of nonsense, so long as it does not change.

```
fs
```

```
get_abspath ()
```

Get the absolute path of the file.

**get\_binfo ()**

Fetch a node's build information.

node - the node whose sources will be collected cache - alternate node to use for the signature cache returns - the build signature

This no longer handles the recursive descent of the node's children's signatures. We expect that they're already built and updated by someone else, if that's what's wanted.

**get\_build\_env ()**

Fetch the appropriate Environment to build this node.

**get\_build\_scanner\_path (scanner)**

Fetch the appropriate scanner path for this node.

**get\_builder (default\_builder=None)**

Return the set builder, or a specified default value

**get\_cachedir\_bsig ()**

Return the signature for a cached file, including its children.

It adds the path of the cached file to the cache signature, because multiple targets built by the same action will all have the same build signature, and we have to differentiate them somehow.

Signature should normally be string of hex digits.

**get\_cachedir\_csig ()**

Fetch a Node's content signature for purposes of computing another Node's cachesig.

This is a wrapper around the normal get\_csig() method that handles the somewhat obscure case of using CacheDir with the -n option. Any files that don't exist would normally be "built" by fetching them from the cache, but the normal get\_csig() method will try to open up the local file, which doesn't exist because the -n option meant we didn't actually pull the file from cachedir. But since the file *does* actually exist in the cachedir, we can use its contents for the csig.

**get\_content\_hash ()**

Compute and return the MD5 hash for this file.

**get\_contents ()**

Fetch the contents of the entry.

**get\_contents\_sig ()**

A helper method for get\_cachedir\_bsig.

It computes and returns the signature for this node's contents.

**get\_csig ()**

Generate a node's content signature, the digested signature of its content.

node - the node cache - alternate node to use for the signature cache returns - the content signature

**get\_dir ()**

**get\_env ()**

**get\_env\_scanner (env, kw={})**

**get\_executor (create=1)**

Fetch the action executor for this node. Create one if there isn't already one, and requested to do so.

**get\_found\_includes (env, scanner, path)**

Return the included implicit dependencies in this file. Cache results so we only scan the file once per path regardless of how many times this information is requested.

**get\_implicit\_deps (env, initial\_scanner, path\_func, kw={})**

Return a list of implicit dependencies for this node.

This method exists to handle recursive invocation of the scanner on the implicit dependencies returned by the scanner, if the scanner's recursive flag says that we should.

**get\_internal\_path ()****get\_labspath ()**

Get the absolute path of the file.

**get\_max\_drift\_csig ()**

Returns the content signature currently stored for this node if it's been unmodified longer than the max\_drift value, or the max\_drift value is 0. Returns None otherwise.

**get\_ninfo ()****get\_path (dir=None)**

Return path relative to the current working directory of the Node.FS.Base object that owns us.

**get\_path\_elements ()****get\_size ()****get\_source\_scanner (node)**

Fetch the source scanner for the specified node

NOTE: "self" is the target being built, "node" is the source file for which we want to fetch the scanner.

Implies self.has\_builder() is true; again, expect to only be called from locations where this is already verified.

This function may be called very often; it attempts to cache the scanner found to improve performance.

**get\_state ()****get\_stored\_implicit ()**

Fetch the stored implicit dependencies

**get\_stored\_info ()****get\_string (for\_signature)**

This is a convenience function designed primarily to be used in command generators (i.e., CommandGeneratorActions or Environment variables that are callable), which are called with a for\_signature argument that is nonzero if the command generator is being called to generate a signature for the command line, which determines if we should rebuild or not.

Such command generators should use this method in preference to str(Node) when converting a Node to a string, passing in the for\_signature parameter, such that we will call Node.for\_signature() or str(Node) properly, depending on whether we are calculating a signature or actually constructing a command line.

**get\_subst\_proxy ()**

This method is expected to return an object that will function exactly like this Node, except that it implements any additional special features that we would like to be in effect for Environment variable substitution. The principle use is that some Nodes would like to implement a \_\_getattr\_\_() method, but putting that in the Node type itself has a tendency to kill performance. We instead put it in a proxy and return it from this method. It is legal for this method to return self if no new functionality is needed for Environment substitution.

**get\_suffix ()****get\_target\_scanner ()****get\_text\_contents ()**

This attempts to figure out what the encoding of the text is based upon the BOM bytes, and then decodes the contents so that it's a valid python string.

**get\_timestamp ()****get\_tpath ()****getmtime ()**

**getsize ()****has\_builder ()**

Return whether this Node has a builder or not.

In Boolean tests, this turns out to be a *lot* more efficient than simply examining the builder attribute directly (“if node.builder: ...”). When the builder attribute is examined directly, it ends up calling `__getattr__` for both the `__len__` and `__nonzero__` attributes on instances of our Builder Proxy class(es), generating a bazillion extra calls and slowing things down immensely.

**has\_explicit\_builder ()**

Return whether this Node has an explicit builder

This allows an internal Builder created by SCons to be marked non-explicit, so that it can be overridden by an explicit builder that the user supplies (the canonical example being directories).

**has\_src\_builder ()**

Return whether this Node has a source builder or not.

If this Node doesn't have an explicit source code builder, this is where we figure out, on the fly, if there's a transparent source code builder for it.

Note that if we found a source builder, we also set the `self.builder` attribute, so that all of the methods that actually *build* this file don't have to do anything different.

**ignore****ignore\_set****implicit****implicit\_set****includes****is\_derived ()**

Returns true if this node is derived (i.e. built).

This should return true only for nodes whose path should be in the variant directory when `duplicate=0` and should contribute their build signatures when they are used as source files to other derived files. For example: source with source builders are not derived in this sense, and hence should not return true.

**is\_explicit****is\_literal ()**

Always pass the string representation of a Node to the command interpreter literally.

**is\_sconscript ()**

Returns true if this node is an sconscript

**is\_under (dir)****is\_up\_to\_date ()**

Check for whether the Node is current In all cases `self` is the target we're checking to see if it's up to date

**isdir ()****isfile ()****islink ()****linked****lstat ()****make\_ready ()**

Get a Node ready for evaluation.

This is called before the Taskmaster decides if the Node is up-to-date or not. Overriding this method allows for a Node subclass to be disambiguated if necessary, or for an implicit source builder to be attached.

`md5_chunksize = 64`

`missing ()`

`multiple_side_effect_has_builder ()`

Return whether this Node has a builder or not.

In Boolean tests, this turns out to be a *lot* more efficient than simply examining the builder attribute directly (“if node.builder: ...”). When the builder attribute is examined directly, it ends up calling `__getattr__` for both the `__len__` and `__nonzero__` attributes on instances of our Builder Proxy class(es), generating a bazillion extra calls and slowing things down immensely.

`must_be_same (klass)`

This node, which already existed, is being looked up as the specified klass. Raise an exception if it isn't.

`name`

`new_binfo ()`

`new_ninfo ()`

`ninfo`

`nocache`

`noclean`

`on_disk_entries`

`postprocess ()`

Clean up anything we don't need to hang onto after we've been built.

`precious`

`prepare ()`

Prepare for this file to be created.

`prerequisites`

`pseudo`

`push_to_cache ()`

Try to push the node into a cache

`ref_count`

`rel_path (other)`

`release_target_info ()`

Called just after this node has been marked up-to-date or was built completely.

This is where we try to release as many target node infos as possible for clean builds and update runs, in order to minimize the overall memory consumption.

We'd like to remove a lot more attributes like `self.sources` and `self.sources_set`, but they might get used in a next build step. For example, during configuration the source files for a built `E{*}.o` file are used to figure out which linker to use for the resulting Program (`gcc` vs. `g++`)! That's why we check for the 'keep\_targetinfo' attribute, config Nodes and the Interactive mode just don't allow an early release of most variables.

In the same manner, we can't simply remove the `self.attributes` here. The smart linking relies on the shared flag, and some parts of the java Tool use it to transport information about nodes...

@see: `built()` and `Node.release_target_info()`

**released\_target\_info**

**remove ()**

Remove this file.

**render\_include\_tree ()**

Return a text representation, suitable for displaying to the user, of the include tree for the sources of this node.

**reentry ()**

**repositories**

**reset\_executor ()**

Remove cached executor; forces recompute when needed.

**retrieve\_from\_cache ()**

Try to retrieve the node's content from a cache

This method is called from multiple threads in a parallel build, so only do thread safe stuff here. Do thread unsafe stuff in `built()`.

Returns true if the node was successfully retrieved.

**rexists ()**

Does this node exist locally or in a repository?

**rfile ()**

**root**

**rstr ()**

A `Node.FS.Base` object's string representation is its path name.

**sbuilder**

**scan ()**

Scan this node's dependents for implicit dependencies.

**scanner\_key ()**

**scanner\_paths**

**searched**

**select\_scanner (scanner)**

Selects a scanner for this Node.

This is a separate method so it can be overridden by Node subclasses (specifically, `Node.FS.Dir`) that *must* use their own `Scanner` and don't select one the `Scanner.Selector` that's configured for the target.

**set\_always\_build (always\_build=1)**

Set the Node's `always_build` value.

**set\_executor (executor)**

Set the action executor for this node.

**set\_explicit (is\_explicit)**

**set\_local ()**

**set\_nocache (nocache=1)**

Set the Node's `nocache` value.

**set\_noclean** (noclean=1)

Set the Node's noclean value.

**set\_precious** (precious=1)

Set the Node's precious value.

**set\_pseudo** (pseudo=True)

Set the Node's precious value.

**set\_specific\_source** (source)

**set\_src\_builder** (builder)

Set the source code builder for this node.

**set\_state** (state)

**side\_effect**

**side\_effects**

**sources**

**sources\_set**

**src\_builder** ()

Fetch the source code builder for this node.

If there isn't one, we cache the source code builder specified for the directory (which in turn will cache the value from its parent directory, and so on up to the file system root).

**srcdir**

**srcnode** ()

If this node is in a build path, return the node corresponding to its source file. Otherwise, return *ourselves*.

**stat** ()

**state**

**store\_info**

**str\_for\_display** ()

**target\_from\_source** (prefix, suffix, splitext=<function splitext>)

Generates a target entry that corresponds to this entry (usually a source file) with the specified prefix and suffix.

Note that this method can be overridden dynamically for generated files that need different behavior. See `Tool/swig.py` for an example.

**target\_peers**

**variant\_dirs**

**visited** ()

Called just after this node has been visited (with or without a build).

**waiting\_parents**

**waiting\_s\_e**

**wkids**

`class SCons.Node.FS.FileBuildInfo`

Bases: **SCons.Node.BuildInfoBase**

This is info loaded from sconsign.

**Attributes unique to FileBuildInfo:**

**dependency\_map** : *Caches file->csig mapping*

for all dependencies. Currently this is only used when using MD5-timestamp decider. It's used to ensure that we copy the correct csig from the previous build to be written to .sconsign when current build is done. Previously the matching of csig to file was strictly by order they appeared in bdepends, bsources, or bimplicit, and so a change in order or count of any of these could yield writing wrong csig, and then false positive rebuilds

**bact**

**bactsig**

**bdepends**

**bdependssigs**

**bimplicit**

**bimplicitsigs**

**bsources**

**bsourcesigs**

**convert\_from\_sconsign** (dir, name)

Converts a newly-read FileBuildInfo object for in-SCons use

For normal up-to-date checking, we don't have any conversion to perform—but we're leaving this method here to make that clear.

**convert\_to\_sconsign** ()

Converts this FileBuildInfo object for writing to a .sconsign file

This replaces each Node in our various dependency lists with its usual string representation: relative to the top-level SConstruct directory, or an absolute path if it's outside.

**current\_version\_id** = 2

**dependency\_map**

**format** (names=0)

**merge** (other)

Merge the fields of another object into this object. Already existing information is overwritten by the other instance's data. WARNING: If a '\_\_\_dict\_\_\_' slot is added, it should be updated instead of replaced.

**prepare\_dependencies** ()

Prepares a FileBuildInfo object for explaining what changed

The bsources, bdepends and bimplicit lists have all been stored on disk as paths relative to the top-level SConstruct directory. Convert the strings to actual Nodes (for use by the `-debug=explain` code and `-implicit-cache`).

*exception* SCons.Node.FS.**FileBuildInfoFileToCsigMappingError**

Bases: **Exception**

**args**

**with\_traceback** ()

Exception.with\_traceback(tb) – set self.\_\_traceback\_\_ to tb and return self.

```
class SCons.Node.FS.FileFinder
```

```
Bases: object
```

```
_find_file_key(filename, paths, verbose=None)
```

```
filedir_lookup(p, fd=None)
```

A helper method for `find_file()` that looks up a directory for a file we're trying to find. This only creates the Dir Node if it exists on-disk, since if the directory doesn't exist we know we won't find any files in it... :-)

It would be more compact to just use this as a nested function with a default keyword argument (see the commented-out version below), but that doesn't work unless you have nested scopes, so we define it here just so this work under Python 1.5.2.

```
find_file(filename, paths, verbose=None)
```

Find a node corresponding to either a derived file or a file that exists already.

Only the first file found is returned, and none is returned if no file is found.

filename: A filename to find paths: A list of directory path *nodes* to search in. Can be represented as a list, a tuple, or a callable that is called with no arguments and returns the list or tuple.

returns The node created from the found file.

```
class SCons.Node.FS.FileNodeInfo
```

```
Bases: SCons.Node.NodeInfoBase
```

```
convert(node, val)
```

```
csig
```

```
current_version_id = 2
```

```
field_list = ['csig', 'timestamp', 'size']
```

```
format(field_list=None, names=0)
```

```
fs = None
```

```
merge(other)
```

Merge the fields of another object into this object. Already existing information is overwritten by the other instance's data. WARNING: If a `'__dict__'` slot is added, it should be updated instead of replaced.

```
size
```

```
str_to_node(s)
```

```
timestamp
```

```
update(node)
```

```
SCons.Node.FS.LinkFunc(target, source, env)
```

Relative paths cause problems with symbolic links, so we use absolute paths, which may be a problem for people who want to move their soft-linked src-trees around. Those people should use the 'hard-copy' mode, softlinks cannot be used for that; at least I have no idea how ...

```
class SCons.Node.FS.LocalFS
```

```
Bases: object
```

This class implements an abstraction layer for operations involving a local file system. Essentially, this wraps any function in the `os`, `os.path` or `shutil` modules that we use to actually go do anything with or to the local file system.

Note that there's a very good chance we'll refactor this part of the architecture in some way as we really implement the interface(s) for remote file system Nodes. For example, the right architecture might be to have this be a subclass instead of a base class. Nevertheless, we're using this as a first step in that direction.

We're not using `chdir()` yet because the calling subclass method needs to use `os.chdir()` directly to avoid recursion. Will we really need this one?

**chmod** (path, mode)

**copy** (src, dst)

**copy2** (src, dst)

**exists** (path)

**getmtime** (path)

**getsize** (path)

**isdir** (path)

**isfile** (path)

**islink** (path)

**link** (src, dst)

**listdir** (path)

**lstat** (path)

**makedirs** (path)

**mkdir** (path)

**open** (path)

**readlink** (file)

**rename** (old, new)

**stat** (path)

**symlink** (src, dst)

**unlink** (path)

**SCons.Node.FS.LocalString** (target, source, env)

**SCons.Node.FS.MkdirFunc** (target, source, env)

**class SCons.Node.FS.RootDir** (drive, fs)

Bases: **SCons.Node.FS.Dir**

A class for the root directory of a file system.

This is the same as a Dir class, except that the path separator ('/' or '\') is actually part of the name, so we don't need to add a separator when creating the path names of entries within this directory.

**class Attrs**

Bases: **object**

**shared**

**BuildInfo**

alias of **DirBuildInfo**

**Decider** (function)

**Dir** (name, create=True)

Looks up or creates a directory node named 'name' relative to this directory.

**Entry (name)**

Looks up or creates an entry node named 'name' relative to this directory.

**File (name)**

Looks up or creates a file node named 'name' relative to this directory.

**GetTag (key)**

Return a user-defined tag.

**NodeInfo**

alias of **DirNodeInfo**

**RDirs (pathlist)**

Search for a list of directories in the Repository list.

**Rfindalldirs (pathlist)**

Return all of the directories for a given path list, including corresponding "backing" directories in any repositories. The Node lookups are relative to this Node (typically a directory), so memoizing result saves cycles from looking up the same path for each target in a given directory.

**Tag (key, value)**

Add a user-defined tag.

**Dir\_\_clearRepositoryCache (duplicate=None)**

Called when we change the repository(ies) for a directory. This clears any cached information that is invalidated by changing the repository.

**Dir\_\_resetDuplicate (node)**

**Rfindalldirs\_key (pathlist)**

**\_abspath**

**\_add\_child (collection, set, child)**

Adds 'child' to 'collection', first checking 'set' to see if it's already present.

**\_children\_get ()**

**\_children\_reset ()**

**\_create ()**

Create this directory, silently and without worrying about whether the builder is the default or not.

**\_func\_exists**

**\_func\_get\_contents**

**\_func\_is\_derived**

**\_func\_rexists**

**\_func\_sconsign**

**\_func\_target\_from\_source**

**\_get\_scanner (env, initial\_scanner, root\_node\_scanner, kw)**

**\_get\_str ()**

**\_glob1 (pattern, ondisk=True, source=False, strings=False)**

Globs for and returns a list of entry names matching a single pattern in this directory.

This searches any repositories and source directories for corresponding entries and returns a Node (or string) relative to the current directory if an entry is found anywhere.

TODO: handle pattern with no wildcard

`_labspath`

`_local`

`_lookupDict`

`_lookup_abs (p, klass, create=1)`

Fast (?) lookup of a *normalized* absolute path.

This method is intended for use by internal lookups with already-normalized path data. For general-purpose lookups, use the `FS.Entry()`, `FS.Dir()` or `FS.File()` methods.

The caller is responsible for making sure we're passed a normalized absolute path; we merely let Python's dictionary look up and return the One True Node.FS object for the path.

If a Node for the specified "p" doesn't already exist, and "create" is specified, the Node may be created after recursive invocation to find or create the parent directory or directories.

`_memo`

`_morph ()`

Turn a file system Node (either a freshly initialized directory object or a separate Entry object) into a proper directory object.

Set up this directory's entries and hook it into the file system tree. Specify that directories (this Node) don't use signatures for calculating whether they're current.

`_path`

`_path_elements`

`_proxy`

`_rel_path_key (other)`

`_save_str ()`

`_sconsign`

`_specific_sources`

`_srcdir_find_file_key (filename)`

`_tags`

`_tpath`

`abspath`

`addRepository (dir)`

`add_dependency (depend)`

Adds dependencies.

`add_ignore (depend)`

Adds dependencies to ignore.

`add_prerequisite (prerequisite)`

Adds prerequisites

`add_source (source)`

Adds sources.

**add\_to\_implicit** (deps)

**add\_to\_waiting\_parents** (node)

Returns the number of nodes added to our waiting parents list: 1 if we add a unique waiting parent, 0 if not. (Note that the returned values are intended to be used to increment a reference count, so don't think you can "clean up" this function by using True and False instead...)

**add\_to\_waiting\_s\_e** (node)

**add\_wkid** (wkid)

Add a node to the list of kids waiting to be evaluated

**all\_children** (scan=1)

Return a list of all the node's direct children.

**alter\_targets** ()

Return any corresponding targets in a variant directory.

**always\_build**

**attributes**

**binfo**

**build** (\*\*kw)

A null "builder" for directories.

**builder**

**builder\_set** (builder)

**built** ()

Called just after this node is successfully built.

**cached**

**cachedir\_csig**

**cachesig**

**changed** (node=None, allowcache=False)

Returns if the node is up-to-date with respect to the BuildInfo stored last time it was built. The default behavior is to compare it against our own previously stored BuildInfo, but the stored BuildInfo from another Node (typically one in a Repository) can be used instead.

Note that we now *always* check every dependency. We used to short-circuit the check by returning as soon as we detected any difference, but we now rely on checking every dependency to make sure that any necessary Node information (for example, the content signature of an #included .h file) is updated.

The allowcache option was added for supporting the early release of the executor/builder structures, right after a File target was built. When set to true, the return value of this changed method gets cached for File nodes. Like this, the executor isn't needed any longer for subsequent calls to changed().

@see: FS.File.changed(), FS.File.release\_target\_info()

**changed\_since\_last\_build**

**children** (scan=1)

Return a list of the node's direct children, minus those that are ignored by this node.

**children\_are\_up\_to\_date** ()

Alternate check for whether the Node is current: If all of our children were up-to-date, then this Node was up-to-date, too.

The SCons.Node.Alias and SCons.Node.Python.Value subclasses rebind their current() method to this method.

**clear ()**

Completely clear a Node of all its cached state (so that it can be re-evaluated by interfaces that do continuous integration builds).

**clear\_memoized\_values ()**

**contentsig**

**cwd**

**del\_binfo ()**

Delete the build info from this node.

**depends**

**depends\_set**

**dir**

**dir\_on\_disk (name)**

**dirname**

**disambiguate (must\_exist=None)**

**diskcheck\_match ()**

**do\_duplicate (src)**

**duplicate**

**entries**

**entry\_abspath (name)**

**entry\_exists\_on\_disk (name)**

Searches through the file/dir entries of the current directory, and returns True if a physical entry with the given name could be found.

@see reentry\_exists\_on\_disk

**entry\_labspath (name)**

**entry\_path (name)**

**entry\_tpath (name)**

**env**

**env\_set (env, safe=0)**

**executor**

**executor\_cleanup ()**

Let the executor clean up any cached information.

**exists ()**

Does this node exist?

**explain ()****file\_on\_disk (name)****for\_signature ()**

Return a string representation of the Node that will always be the same for this particular Node, no matter what. This is by contrast to the `__str__()` method, which might, for instance, return a relative path for a file Node. The purpose of this method is to generate a value to be used in signature calculation for the command line used to build a target, and we use this method instead of `str()` to avoid unnecessary rebuilds. This method does not need to return something that would actually work in a command line; it can return any kind of nonsense, so long as it does not change.

**fs**

Reference to parent Node.FS object

**get\_repositories ()**

Returns a list of repositories for this directory.

**get\_abspath ()**

Get the absolute path of the file.

**get\_all\_rdirs ()****get\_binfo ()**

Fetch a node's build information.

node - the node whose sources will be collected  
 cache - alternate node to use for the signature cache  
 returns - the build signature

This no longer handles the recursive descent of the node's children's signatures. We expect that they're already built and updated by someone else, if that's what's wanted.

**get\_build\_env ()**

Fetch the appropriate Environment to build this node.

**get\_build\_scanner\_path (scanner)**

Fetch the appropriate scanner path for this node.

**get\_builder (default\_builder=None)**

Return the set builder, or a specified default value

**get\_cachedir\_csig ()****get\_contents ()**

Return content signatures and names of all our children separated by new-lines. Ensure that the nodes are sorted.

**get\_csig ()**

Compute the content signature for Directory nodes. In general, this is not needed and the content signature is not stored in the DirNodeInfo. However, if `get_contents` on a Dir node is called which has a child directory, the child directory should return the hash of its contents.

**get\_dir ()****get\_env ()****get\_env\_scanner (env, kw={})****get\_executor (create=1)**

Fetch the action executor for this node. Create one if there isn't already one, and requested to do so.

**get\_found\_includes (env, scanner, path)**

Return this directory's implicit dependencies.

We don't bother caching the results because the scan typically shouldn't be requested more than once (as opposed to scanning .h file contents, which can be requested as many times as the files is #included by other files).

**get\_implicit\_deps** (env, initial\_scanner, path\_func, kw={})

Return a list of implicit dependencies for this node.

This method exists to handle recursive invocation of the scanner on the implicit dependencies returned by the scanner, if the scanner's recursive flag says that we should.

**get\_internal\_path** ()

**get\_labspath** ()

Get the absolute path of the file.

**get\_ninfo** ()

**get\_path** (dir=None)

Return path relative to the current working directory of the Node.FS.Base object that owns us.

**get\_path\_elements** ()

**get\_source\_scanner** (node)

Fetch the source scanner for the specified node

NOTE: "self" is the target being built, "node" is the source file for which we want to fetch the scanner.

Implies self.has\_builder() is true; again, expect to only be called from locations where this is already verified.

This function may be called very often; it attempts to cache the scanner found to improve performance.

**get\_state** ()

**get\_stored\_implicit** ()

Fetch the stored implicit dependencies

**get\_stored\_info** ()

**get\_string** (for\_signature)

This is a convenience function designed primarily to be used in command generators (i.e., CommandGeneratorActions or Environment variables that are callable), which are called with a for\_signature argument that is nonzero if the command generator is being called to generate a signature for the command line, which determines if we should rebuild or not.

Such command generators should use this method in preference to str(Node) when converting a Node to a string, passing in the for\_signature parameter, such that we will call Node.for\_signature() or str(Node) properly, depending on whether we are calculating a signature or actually constructing a command line.

**get\_subst\_proxy** ()

This method is expected to return an object that will function exactly like this Node, except that it implements any additional special features that we would like to be in effect for Environment variable substitution. The principle use is that some Nodes would like to implement a \_\_getattr\_\_() method, but putting that in the Node type itself has a tendency to kill performance. We instead put it in a proxy and return it from this method. It is legal for this method to return self if no new functionality is needed for Environment substitution.

**get\_suffix** ()

**get\_target\_scanner** ()

**get\_text\_contents** ()

We already emit things in text, so just return the binary version.

**get\_timestamp** ()

Return the latest timestamp from among our children

**get\_tpath** ()

**getmtime ()****getsize ()****glob (pathname, ondisk=True, source=False, strings=False, exclude=None)**

Returns a list of Nodes (or strings) matching a specified pathname pattern.

Pathname patterns follow UNIX shell semantics: \* matches any-length strings of any characters, ? matches any character, and [] can enclose lists or ranges of characters. Matches do not span directory separators.

The matches take into account Repositories, returning local Nodes if a corresponding entry exists in a Repository (either an in-memory Node or something on disk).

By default, the glob() function matches entries that exist on-disk, in addition to in-memory Nodes. Setting the “ondisk” argument to False (or some other non-true value) causes the glob() function to only match in-memory Nodes. The default behavior is to return both the on-disk and in-memory Nodes.

The “source” argument, when true, specifies that corresponding source Nodes must be returned if you’re globbing in a build directory (initialized with VariantDir()). The default behavior is to return Nodes local to the VariantDir().

The “strings” argument, when true, returns the matches as strings, not Nodes. The strings are path names relative to this directory.

The “exclude” argument, if not None, must be a pattern or a list of patterns following the same UNIX shell semantics. Elements matching a least one pattern of this list will be excluded from the result.

The underlying algorithm is adapted from the glob.glob() function in the Python library (but heavily modified), and uses fnmatch() under the covers.

**has\_builder ()**

Return whether this Node has a builder or not.

In Boolean tests, this turns out to be a *lot* more efficient than simply examining the builder attribute directly (“if node.builder: ...”). When the builder attribute is examined directly, it ends up calling `__getattr__` for both the `__len__` and `__nonzero__` attributes on instances of our Builder Proxy class(es), generating a bazillion extra calls and slowing things down immensely.**has\_explicit\_builder ()**

Return whether this Node has an explicit builder

This allows an internal Builder created by SCons to be marked non-explicit, so that it can be overridden by an explicit builder that the user supplies (the canonical example being directories).

**ignore****ignore\_set****implicit****implicit\_set****includes****is\_derived ()**

Returns true if this node is derived (i.e. built).

This should return true only for nodes whose path should be in the variant directory when duplicate=0 and should contribute their build signatures when they are used as source files to other derived files. For example: source with source builders are not derived in this sense, and hence should not return true.

**is\_explicit****is\_literal ()**

Always pass the string representation of a Node to the command interpreter literally.

**is\_sconscript ()**

Returns true if this node is an sconscript

**is\_under (dir)**

**is\_up\_to\_date ()**

If any child is not up-to-date, then this directory isn't, either.

**isdir ()**

**isfile ()**

**islink ()**

**link (srcdir, duplicate)**

Set this directory as the variant directory for the supplied source directory.

**linked**

**lstat ()**

**make\_ready ()**

Get a Node ready for evaluation.

This is called before the Taskmaster decides if the Node is up-to-date or not. Overriding this method allows for a Node subclass to be disambiguated if necessary, or for an implicit source builder to be attached.

**missing ()**

**multiple\_side\_effect\_has\_builder ()**

Return whether this Node has a builder or not.

In Boolean tests, this turns out to be a *lot* more efficient than simply examining the builder attribute directly ("if node.builder: ..."). When the builder attribute is examined directly, it ends up calling `__getattr__` for both the `__len__` and `__nonzero__` attributes on instances of our Builder Proxy class(es), generating a bazillion extra calls and slowing things down immensely.

**must\_be\_same (klass)**

This node, which already existed, is being looked up as the specified klass. Raise an exception if it isn't.

**name**

**new\_binfo ()**

**new\_ninfo ()**

**ninfo**

**nocache**

**noclean**

**on\_disk\_entries**

**path**

**postprocess ()**

Clean up anything we don't need to hang onto after we've been built.

**precious**

**prepare ()**

Prepare for this Node to be built.

This is called after the Taskmaster has decided that the Node is out-of-date and must be rebuilt, but before actually calling the method to build the Node.

This default implementation checks that explicit or implicit dependencies either exist or are derived, and initializes the BuildInfo structure that will hold the information about how this node is, uh, built.

(The existence of source files is checked separately by the Executor, which aggregates checks for all of the targets built by a specific action.)

Overriding this method allows for for a Node subclass to remove the underlying file from the file system. Note that subclass methods should call this base class method to get the child check and the BuildInfo structure.

**prerequisites**

**pseudo**

**push\_to\_cache ()**

Try to push a node into a cache

**rdir ()**

**ref\_count**

**rel\_path (other)**

Return a path to "other" relative to this directory.

**release\_target\_info ()**

Called just after this node has been marked up-to-date or was built completely.

This is where we try to release as many target node infos as possible for clean builds and update runs, in order to minimize the overall memory consumption.

By purging attributes that aren't needed any longer after a Node (=File) got built, we don't have to care that much how many KBytes a Node actually requires...as long as we free the memory shortly afterwards.

@see: built() and File.release\_target\_info()

**released\_target\_info**

**remove ()**

Remove this Node: no-op by default.

**render\_include\_tree ()**

Return a text representation, suitable for displaying to the user, of the include tree for the sources of this node.

**reentry ()**

**reentry\_exists\_on\_disk (name)**

Searches through the file/dir entries of the current *and* all its remote directories (repos), and returns True if a physical entry with the given name could be found. The local directory (self) gets searched first, so repositories take a lower precedence regarding the searching order.

@see entry\_exists\_on\_disk

**repositories**

**reset\_executor ()**

Remove cached executor; forces recompute when needed.

**retrieve\_from\_cache ()**

Try to retrieve the node's content from a cache

This method is called from multiple threads in a parallel build, so only do thread safe stuff here. Do thread unsafe stuff in built().

Returns true if the node was successfully retrieved.

**rexists ()**

Does this node exist locally or in a repository?

**rfile ()**

**root**

**rstr ()**

A Node.FS.Base object's string representation is its path name.

**sbuilder**

**scan ()**

Scan this node's dependents for implicit dependencies.

**scanner\_key ()**

A directory does not get scanned.

**scanner\_paths**

**sconsign ()**

Return the .sconsign file info for this directory.

**searched**

**select\_scanner (scanner)**

Selects a scanner for this Node.

This is a separate method so it can be overridden by Node subclasses (specifically, Node.FS.Dir) that *must* use their own Scanner and don't select one the Scanner.Selector that's configured for the target.

**set\_always\_build (always\_build=1)**

Set the Node's always\_build value.

**set\_executor (executor)**

Set the action executor for this node.

**set\_explicit (is\_explicit)**

**set\_local ()**

**set\_nocache (nocache=1)**

Set the Node's nocache value.

**set\_noclean (noclean=1)**

Set the Node's noclean value.

**set\_precious (precious=1)**

Set the Node's precious value.

**set\_pseudo (pseudo=True)**

Set the Node's precious value.

**set\_specific\_source (source)**

**set\_src\_builder (builder)**

Set the source code builder for this node.

**set\_state (state)**

**side\_effect**

**side\_effects**

**sources**

**sources\_set**

**src\_builder ()**

Fetch the source code builder for this node.

If there isn't one, we cache the source code builder specified for the directory (which in turn will cache the value from its parent directory, and so on up to the file system root).

**srcdir**

**srcdir\_duplicate** (name)

**srcdir\_find\_file** (filename)

**srcdir\_list** ()

**srcnode** ()

Dir has a special need for srcnode()...if we have a srcdir attribute set, then that *is* our srcnode.

**stat** ()

**state**

**store\_info**

**str\_for\_display** ()

**target\_from\_source** (prefix, suffix, splitext=<function splitext>)

Generates a target entry that corresponds to this entry (usually a source file) with the specified prefix and suffix.

Note that this method can be overridden dynamically for generated files that need different behavior. See Tool/swig.py for an example.

**target\_peers**

**up** ()

**variant\_dirs**

**visited** ()

Called just after this node has been visited (with or without a build).

**waiting\_parents**

**waiting\_s\_e**

**walk** (func, arg)

Walk this directory tree by calling the specified function for each directory in the tree.

This behaves like the `os.path.walk()` function, but for in-memory `Node.FS.Dir` objects. The function takes the same arguments as the functions passed to `os.path.walk()`:

`func(arg, dirname, fnames)`

Except that "dirname" will actually be the directory *Node*, not the string. The '.' and '..' entries are excluded from fnames. The fnames list may be modified in-place to filter the subdirectories visited or otherwise impose a specific order. The "arg" argument is always passed to `func()` and may be used in any way (or ignored, passing `None` is common).

**wkids**

`SCons.Node.FS.UnlinkFunc` (target, source, env)

`class SCons.Node.FS._Null`

Bases: `object`

`SCons.Node.FS._classEntry`

alias of `SCons.Node.FS.Entry`

## SCons.compat package

```
SCons.Node.FS._copy_func (fs, src, dest)
SCons.Node.FS._hardlink_func (fs, src, dst)
SCons.Node.FS._my_normcase (x)
SCons.Node.FS._my_splitdrive (p)
SCons.Node.FS._softlink_func (fs, src, dst)
SCons.Node.FS.diskcheck_types ()
SCons.Node.FS.do_diskcheck_match (node, predicate, errorfmt)
SCons.Node.FS.find_file (filename, paths, verbose=None)
    Find a node corresponding to either a derived file or a file that exists already.
    Only the first file found is returned, and none is returned if no file is found.
    filename: A filename to find paths: A list of directory path nodes to search in. Can be represented as a list, a tuple,
    or a callable that is called with no arguments and returns the list or tuple.
    returns The node created from the found file.
SCons.Node.FS.get_MkdirBuilder ()
SCons.Node.FS.get_default_fs ()
SCons.Node.FS.has_glob_magic (s)
SCons.Node.FS.ignore_diskcheck_match (node, predicate, errorfmt)
SCons.Node.FS.initialize_do_splitdrive ()
SCons.Node.FS.invalidate_node_memos (targets)
    Invalidate the memoized values of all Nodes (files or directories) that are associated with the given entries. Has
    been added to clear the cache of nodes affected by a direct execution of an action (e.g. Delete/Copy/Chmod).
    Existing Node caches become inconsistent if the action is run through Execute(). The argument targets can be a
    single Node object or filename, or a sequence of Nodes/filenames.
SCons.Node.FS.needs_normpath_match ()
    Matches zero or more characters at the beginning of the string.
SCons.Node.FS.save_strings (val)
SCons.Node.FS.sconsign_dir (node)
    Return the .sconsign file info for this directory, creating it first if necessary.
SCons.Node.FS.sconsign_none (node)
SCons.Node.FS.set_diskcheck (list)
SCons.Node.FS.set_duplicate (duplicate)
```

## SCons.Node.Python module

scons.Node.Python

Python nodes.

```
class SCons.Node.Python.Value (value, built_value=None, name=None)
```

Bases: **SCons.Node.Node**

A class for Python variables, typically passed on the command line or generated by a script, but not from a file or some other source.

```
class Attrs
```

Bases: **object**

**shared**

**BuildInfo**

alias of **ValueBuildInfo**

**Decider** (function)

**GetTag** (key)

Return a user-defined tag.

**NodeInfo**

alias of **ValueNodeInfo**

**Tag** (key, value)

Add a user-defined tag.

**\_add\_child** (collection, set, child)

Adds 'child' to 'collection', first checking 'set' to see if it's already present.

**\_children\_get** ()

**\_children\_reset** ()

**\_func\_exists**

**\_func\_get\_contents**

**\_func\_is\_derived**

**\_func\_rexists**

**\_func\_target\_from\_source**

**\_get\_scanner** (env, initial\_scanner, root\_node\_scanner, kw)

**\_memo**

**\_specific\_sources**

**\_tags**

**add\_dependency** (depend)

Adds dependencies.

**add\_ignore** (depend)

Adds dependencies to ignore.

**add\_prerequisite** (prerequisite)

Adds prerequisites

**add\_source** (source)

Adds sources.

**add\_to\_implicit** (deps)

**add\_to\_waiting\_parents** (node)

Returns the number of nodes added to our waiting parents list: 1 if we add a unique waiting parent, 0 if not. (Note that the returned values are intended to be used to increment a reference count, so don't think you can "clean up" this function by using True and False instead...)

**add\_to\_waiting\_s\_e** (node)

**add\_wkid** (wkid)

Add a node to the list of kids waiting to be evaluated

**all\_children** (scan=1)

Return a list of all the node's direct children.

**alter\_targets ()**

Return a list of alternate targets for this Node.

**always\_build**

**attributes**

**binfo**

**build (\*\*kw)**

Actually build the node.

This is called by the Taskmaster after it's decided that the Node is out-of-date and must be rebuilt, and after the prepare() method has gotten everything, uh, prepared.

This method is called from multiple threads in a parallel build, so only do thread safe stuff here. Do thread unsafe stuff in built().

**builder**

**builder\_set (builder)**

**built ()**

Called just after this node is successfully built.

**cached**

**changed (node=None, allowcache=False)**

Returns if the node is up-to-date with respect to the BuildInfo stored last time it was built. The default behavior is to compare it against our own previously stored BuildInfo, but the stored BuildInfo from another Node (typically one in a Repository) can be used instead.

Note that we now *always* check every dependency. We used to short-circuit the check by returning as soon as we detected any difference, but we now rely on checking every dependency to make sure that any necessary Node information (for example, the content signature of an #included .h file) is updated.

The allowcache option was added for supporting the early release of the executor/builder structures, right after a File target was built. When set to true, the return value of this changed method gets cached for File nodes. Like this, the executor isn't needed any longer for subsequent calls to changed().

@see: FS.File.changed(), FS.File.release\_target\_info()

**changed\_since\_last\_build**

**children (scan=1)**

Return a list of the node's direct children, minus those that are ignored by this node.

**children\_are\_up\_to\_date ()**

Alternate check for whether the Node is current: If all of our children were up-to-date, then this Node was up-to-date, too.

The SCons.Node.Alias and SCons.Node.Python.Value subclasses rebind their current() method to this method.

**clear ()**

Completely clear a Node of all its cached state (so that it can be re-evaluated by interfaces that do continuous integration builds).

**clear\_memoized\_values ()**

**del\_binfo ()**

Delete the build info from this node.

**depends**

**depends\_set**

**disambiguate** (must\_exist=None)

**env**

**env\_set** (env, safe=0)

**executor**

**executor\_cleanup** ()

Let the executor clean up any cached information.

**exists** ()

Does this node exists?

**explain** ()

**for\_signature** ()

Return a string representation of the Node that will always be the same for this particular Node, no matter what. This is by contrast to the `__str__()` method, which might, for instance, return a relative path for a file Node. The purpose of this method is to generate a value to be used in signature calculation for the command line used to build a target, and we use this method instead of `str()` to avoid unnecessary rebuilds. This method does not need to return something that would actually work in a command line; it can return any kind of nonsense, so long as it does not change.

**get\_abspath** ()

Return an absolute path to the Node. This will return simply `str(Node)` by default, but for Node types that have a concept of relative path, this might return something different.

**get\_binfo** ()

Fetch a node's build information.

node - the node whose sources will be collected cache - alternate node to use for the signature cache returns - the build signature

This no longer handles the recursive descent of the node's children's signatures. We expect that they're already built and updated by someone else, if that's what's wanted.

**get\_build\_env** ()

Fetch the appropriate Environment to build this node.

**get\_build\_scanner\_path** (scanner)

Fetch the appropriate scanner path for this node.

**get\_builder** (default\_builder=None)

Return the set builder, or a specified default value

**get\_cachedir\_csig** ()

**get\_contents** ()

Get contents for signature calculations. :return: bytes

**get\_csig** (calc=None)

Because we're a Python value node and don't have a real timestamp, we get to ignore the calculator and just use the value contents.

Returns string. Ideally string of hex digits. (Not bytes)

**get\_env** ()

**get\_env\_scanner** (env, kw={})

**get\_executor** (create=1)

Fetch the action executor for this node. Create one if there isn't already one, and requested to do so.

**get\_found\_includes** (env, scanner, path)

Return the scanned include lines (implicit dependencies) found in this node.

The default is no implicit dependencies. We expect this method to be overridden by any subclass that can be scanned for implicit dependencies.

**get\_implicit\_deps** (env, initial\_scanner, path\_func, kw={})

Return a list of implicit dependencies for this node.

This method exists to handle recursive invocation of the scanner on the implicit dependencies returned by the scanner, if the scanner's recursive flag says that we should.

**get\_ninfo** ()**get\_source\_scanner** (node)

Fetch the source scanner for the specified node

NOTE: "self" is the target being built, "node" is the source file for which we want to fetch the scanner.

Implies self.has\_builder() is true; again, expect to only be called from locations where this is already verified.

This function may be called very often; it attempts to cache the scanner found to improve performance.

**get\_state** ()**get\_stored\_implicit** ()

Fetch the stored implicit dependencies

**get\_stored\_info** ()**get\_string** (for\_signature)

This is a convenience function designed primarily to be used in command generators (i.e., CommandGeneratorActions or Environment variables that are callable), which are called with a for\_signature argument that is nonzero if the command generator is being called to generate a signature for the command line, which determines if we should rebuild or not.

Such command generators should use this method in preference to str(Node) when converting a Node to a string, passing in the for\_signature parameter, such that we will call Node.for\_signature() or str(Node) properly, depending on whether we are calculating a signature or actually constructing a command line.

**get\_subst\_proxy** ()

This method is expected to return an object that will function exactly like this Node, except that it implements any additional special features that we would like to be in effect for Environment variable substitution. The principle use is that some Nodes would like to implement a \_\_getattr\_\_() method, but putting that in the Node type itself has a tendency to kill performance. We instead put it in a proxy and return it from this method. It is legal for this method to return self if no new functionality is needed for Environment substitution.

**get\_suffix** ()**get\_target\_scanner** ()**get\_text\_contents** ()

By the assumption that the node.built\_value is a deterministic product of the sources, the contents of a Value are the concatenation of all the contents of its sources. As the value need not be built when get\_contents() is called, we cannot use the actual node.built\_value.

**has\_builder** ()

Return whether this Node has a builder or not.

In Boolean tests, this turns out to be a *lot* more efficient than simply examining the builder attribute directly ("if node.builder: ..."). When the builder attribute is examined directly, it ends up calling \_\_getattr\_\_ for both the \_\_len\_\_ and \_\_nonzero\_\_ attributes on instances of our Builder Proxy class(es), generating a bazillion extra calls and slowing things down immensely.

**has\_explicit\_builder** ()

Return whether this Node has an explicit builder

This allows an internal Builder created by SCons to be marked non-explicit, so that it can be overridden by an explicit builder that the user supplies (the canonical example being directories).

`ignore`

`ignore_set`

`implicit`

`implicit_set`

`includes`

`is_derived ()`

Returns true if this node is derived (i.e. built).

This should return true only for nodes whose path should be in the variant directory when `duplicate=0` and should contribute their build signatures when they are used as source files to other derived files. For example: source with source builders are not derived in this sense, and hence should not return true.

`is_explicit`

`is_literal ()`

Always pass the string representation of a Node to the command interpreter literally.

`is_sconscript ()`

Returns true if this node is an sconscript

`is_under (dir)`

`is_up_to_date ()`

Alternate check for whether the Node is current: If all of our children were up-to-date, then this Node was up-to-date, too.

The `SCons.Node.Alias` and `SCons.Node.Python.Value` subclasses rebind their `current()` method to this method.

`linked`

`make_ready ()`

Get a Node ready for evaluation.

This is called before the Taskmaster decides if the Node is up-to-date or not. Overriding this method allows for a Node subclass to be disambiguated if necessary, or for an implicit source builder to be attached.

`missing ()`

`multiple_side_effect_has_builder ()`

Return whether this Node has a builder or not.

In Boolean tests, this turns out to be a *lot* more efficient than simply examining the builder attribute directly (“if `node.builder: ...`”). When the builder attribute is examined directly, it ends up calling `__getattr__` for both the `__len__` and `__nonzero__` attributes on instances of our Builder Proxy class(es), generating a bazillion extra calls and slowing things down immensely.

`new_binfo ()`

`new_ninfo ()`

`ninfo`

`nocache`

`noclean`

`postprocess ()`

Clean up anything we don't need to hang onto after we've been built.

`precious`

**prepare ()**

Prepare for this Node to be built.

This is called after the Taskmaster has decided that the Node is out-of-date and must be rebuilt, but before actually calling the method to build the Node.

This default implementation checks that explicit or implicit dependencies either exist or are derived, and initializes the BuildInfo structure that will hold the information about how this node is, uh, built.

(The existence of source files is checked separately by the Executor, which aggregates checks for all of the targets built by a specific action.)

Overriding this method allows for for a Node subclass to remove the underlying file from the file system. Note that subclass methods should call this base class method to get the child check and the BuildInfo structure.

**prerequisites****pseudo****push\_to\_cache ()**

Try to push a node into a cache

**read ()**

Return the value. If necessary, the value is built.

**ref\_count****release\_target\_info ()**

Called just after this node has been marked up-to-date or was built completely.

This is where we try to release as many target node infos as possible for clean builds and update runs, in order to minimize the overall memory consumption.

By purging attributes that aren't needed any longer after a Node (=File) got built, we don't have to care that much how many KBytes a Node actually requires...as long as we free the memory shortly afterwards.

@see: built() and File.release\_target\_info()

**remove ()**

Remove this Node: no-op by default.

**render\_include\_tree ()**

Return a text representation, suitable for displaying to the user, of the include tree for the sources of this node.

**reset\_executor ()**

Remove cached executor; forces recompute when needed.

**retrieve\_from\_cache ()**

Try to retrieve the node's content from a cache

This method is called from multiple threads in a parallel build, so only do thread safe stuff here. Do thread unsafe stuff in built().

Returns true if the node was successfully retrieved.

**rexists ()**

Does this node exist locally or in a repository?

**scan ()**

Scan this node's dependents for implicit dependencies.

**scanner\_key ()****select\_scanner (scanner)**

Selects a scanner for this Node.

This is a separate method so it can be overridden by Node subclasses (specifically, Node.FS.Dir) that *must* use their own Scanner and don't select one the Scanner.Selector that's configured for the target.

**set\_always\_build (always\_build=1)**

Set the Node's always\_build value.

**set\_executor** (executor)

Set the action executor for this node.

**set\_explicit** (is\_explicit)

**set\_nocache** (nocache=1)

Set the Node's nocache value.

**set\_noclean** (noclean=1)

Set the Node's noclean value.

**set\_precious** (precious=1)

Set the Node's precious value.

**set\_pseudo** (pseudo=True)

Set the Node's precious value.

**set\_specific\_source** (source)

**set\_state** (state)

**side\_effect**

**side\_effects**

**sources**

**sources\_set**

**state**

**store\_info**

**str\_for\_display** ()

**target\_peers**

**visited** ()

Called just after this node has been visited (with or without a build).

**waiting\_parents**

**waiting\_s\_e**

**wkids**

**write** (built\_value)

Set the value of the node.

**class** SCons.Node.Python.ValueBuildInfo

Bases: SCons.Node.BuildInfoBase

**bact**

**bactsig**

**bdepends**

**bdependsigs**

**bimplicit**

**bimplicit**sig**b**sources**b**sourcesig**current\_version\_id** = 2**merge** (other)

Merge the fields of another object into this object. Already existing information is overwritten by the other instance's data. WARNING: If a `'__dict__'` slot is added, it should be updated instead of replaced.

**class** SCons.Node.Python.ValueNodeInfo

Bases: SCons.Node.NodeInfoBase

**convert** (node, val)**csig****current\_version\_id** = 2**field\_list** = ['csig']**format** (field\_list=None, names=0)**merge** (other)

Merge the fields of another object into this object. Already existing information is overwritten by the other instance's data. WARNING: If a `'__dict__'` slot is added, it should be updated instead of replaced.

**str\_to\_node** (s)**update** (node)

SCons.Node.Python.ValueWithMemo (value, built\_value=None, name=None)

Memoized Value() node factory.

## Module contents

SCons.Node

The Node package for the SCons software construction utility.

This is, in many ways, the heart of SCons.

A Node is where we encapsulate all of the dependency information about any thing that SCons can build, or about any thing which SCons can use to build some other thing. The canonical "thing," of course, is a file, but a Node can also represent something remote (like a web page) or something completely abstract (like an Alias).

Each specific type of "thing" is specifically represented by a subclass of the Node base class: Node.FS.File for files, Node.Alias for aliases, etc. Dependency information is kept here in the base class, and information specific to files/aliases/etc. is in the subclass. The goal, if we've done this correctly, is that any type of "thing" should be able to depend on any other type of "thing."

SCons.Node.**Annotate** (node)**class** SCons.Node.BuildInfoBaseBases: **object**

The generic base class for build information for a Node.

This is what gets stored in a `.sconsign` file for each target file. It contains a NodeInfo instance for this node (signature information that's specific to the type of Node) and direct attributes for the generic build stuff we have to track: sources, explicit dependencies, implicit dependencies, and action information.

**bact**

`bactsig``bdepends``bdependSIGs``bimplicit``bimplicitSIGs``bsources``bsourceSIGs``current_version_id = 2``merge (other)`

Merge the fields of another object into this object. Already existing information is overwritten by the other instance's data. WARNING: If a `'__dict__'` slot is added, it should be updated instead of replaced.

`class SCons.Node.Node``Bases: object`

The base Node class, for entities that we know how to build, or use to build other Nodes.

`class Attrs``Bases: object``shared``BuildInfo``alias of BuildInfoBase``Decider (function)``GetTag (key)`

Return a user-defined tag.

`NodeInfo``alias of NodeInfoBase``Tag (key, value)`

Add a user-defined tag.

`_add_child (collection, set, child)`

Adds 'child' to 'collection', first checking 'set' to see if it's already present.

`_children_get ()``_children_reset ()``_func_exists``_func_get_contents``_func_is_derived``_func_rexists``_func_target_from_source``_get_scanner (env, initial_scanner, root_node_scanner, kw)`

`_memo`

`_specific_sources`

`_tags`

`add_dependency (depend)`

Adds dependencies.

`add_ignore (depend)`

Adds dependencies to ignore.

`add_prerequisite (prerequisite)`

Adds prerequisites

`add_source (source)`

Adds sources.

`add_to_implicit (deps)`

`add_to_waiting_parents (node)`

Returns the number of nodes added to our waiting parents list: 1 if we add a unique waiting parent, 0 if not. (Note that the returned values are intended to be used to increment a reference count, so don't think you can "clean up" this function by using True and False instead...)

`add_to_waiting_s_e (node)`

`add_wkid (wkid)`

Add a node to the list of kids waiting to be evaluated

`all_children (scan=1)`

Return a list of all the node's direct children.

`alter_targets ()`

Return a list of alternate targets for this Node.

`always_build`

`attributes`

`binfo`

`build (**kw)`

Actually build the node.

This is called by the Taskmaster after it's decided that the Node is out-of-date and must be rebuilt, and after the `prepare()` method has gotten everything, uh, prepared.

This method is called from multiple threads in a parallel build, so only do thread safe stuff here. Do thread unsafe stuff in `built()`.

`builder`

`builder_set (builder)`

`built ()`

Called just after this node is successfully built.

`cached`

`changed (node=None, allowcache=False)`

Returns if the node is up-to-date with respect to the BuildInfo stored last time it was built. The default behavior is to compare it against our own previously stored BuildInfo, but the stored BuildInfo from another Node (typically one in a Repository) can be used instead.

Note that we now *always* check every dependency. We used to short-circuit the check by returning as soon as we detected any difference, but we now rely on checking every dependency to make sure that any necessary Node information (for example, the content signature of an #included .h file) is updated.

The allowcache option was added for supporting the early release of the executor/builder structures, right after a File target was built. When set to true, the return value of this changed method gets cached for File nodes. Like this, the executor isn't needed any longer for subsequent calls to changed().

@see: FS.File.changed(), FS.File.release\_target\_info()

**changed\_since\_last\_build**

**children** (scan=1)

Return a list of the node's direct children, minus those that are ignored by this node.

**children\_are\_up\_to\_date ()**

Alternate check for whether the Node is current: If all of our children were up-to-date, then this Node was up-to-date, too.

The SCons.Node.Alias and SCons.Node.Python.Value subclasses rebind their current() method to this method.

**clear ()**

Completely clear a Node of all its cached state (so that it can be re-evaluated by interfaces that do continuous integration builds).

**clear\_memoized\_values ()**

**del\_binfo ()**

Delete the build info from this node.

**depends**

**depends\_set**

**disambiguate** (must\_exist=None)

**env**

**env\_set** (env, safe=0)

**executor**

**executor\_cleanup ()**

Let the executor clean up any cached information.

**exists ()**

Does this node exist?

**explain ()**

**for\_signature ()**

Return a string representation of the Node that will always be the same for this particular Node, no matter what. This is by contrast to the \_\_str\_\_() method, which might, for instance, return a relative path for a file Node. The purpose of this method is to generate a value to be used in signature calculation for the command line used to build a target, and we use this method instead of str() to avoid unnecessary rebuilds. This method does not need to return something that would actually work in a command line; it can return any kind of nonsense, so long as it does not change.

**get\_abspath ()**

Return an absolute path to the Node. This will return simply str(Node) by default, but for Node types that have a concept of relative path, this might return something different.

**get\_binfo ()**

Fetch a node's build information.

node - the node whose sources will be collected cache - alternate node to use for the signature cache returns - the build signature

This no longer handles the recursive descent of the node's children's signatures. We expect that they're already built and updated by someone else, if that's what's wanted.

**get\_build\_env ()**

Fetch the appropriate Environment to build this node.

**get\_build\_scanner\_path (scanner)**

Fetch the appropriate scanner path for this node.

**get\_builder (default\_builder=None)**

Return the set builder, or a specified default value

**get\_cachedir\_csig ()**

**get\_contents ()**

Fetch the contents of the entry.

**get\_csig ()**

**get\_env ()**

**get\_env\_scanner (env, kw={})**

**get\_executor (create=1)**

Fetch the action executor for this node. Create one if there isn't already one, and requested to do so.

**get\_found\_includes (env, scanner, path)**

Return the scanned include lines (implicit dependencies) found in this node.

The default is no implicit dependencies. We expect this method to be overridden by any subclass that can be scanned for implicit dependencies.

**get\_implicit\_deps (env, initial\_scanner, path\_func, kw={})**

Return a list of implicit dependencies for this node.

This method exists to handle recursive invocation of the scanner on the implicit dependencies returned by the scanner, if the scanner's recursive flag says that we should.

**get\_ninfo ()**

**get\_source\_scanner (node)**

Fetch the source scanner for the specified node

NOTE: "self" is the target being built, "node" is the source file for which we want to fetch the scanner.

Implies self.has\_builder() is true; again, expect to only be called from locations where this is already verified.

This function may be called very often; it attempts to cache the scanner found to improve performance.

**get\_state ()**

**get\_stored\_implicit ()**

Fetch the stored implicit dependencies

**get\_stored\_info ()**

**get\_string (for\_signature)**

This is a convenience function designed primarily to be used in command generators (i.e., CommandGeneratorActions or Environment variables that are callable), which are called with a for\_signature argument that is nonzero if the command generator is being called to generate a signature for the command line, which determines if we should rebuild or not.

Such command generators should use this method in preference to `str(Node)` when converting a `Node` to a string, passing in the `for_signature` parameter, such that we will call `Node.for_signature()` or `str(Node)` properly, depending on whether we are calculating a signature or actually constructing a command line.

#### `get_subst_proxy ()`

This method is expected to return an object that will function exactly like this `Node`, except that it implements any additional special features that we would like to be in effect for Environment variable substitution. The principle use is that some `Nodes` would like to implement a `__getattr__()` method, but putting that in the `Node` type itself has a tendency to kill performance. We instead put it in a proxy and return it from this method. It is legal for this method to return self if no new functionality is needed for Environment substitution.

#### `get_suffix ()`

#### `get_target_scanner ()`

#### `has_builder ()`

Return whether this `Node` has a builder or not.

In Boolean tests, this turns out to be a *lot* more efficient than simply examining the builder attribute directly (“if `node.builder: ...`”). When the builder attribute is examined directly, it ends up calling `__getattr__` for both the `__len__` and `__nonzero__` attributes on instances of our Builder Proxy class(es), generating a bazillion extra calls and slowing things down immensely.

#### `has_explicit_builder ()`

Return whether this `Node` has an explicit builder

This allows an internal Builder created by SCons to be marked non-explicit, so that it can be overridden by an explicit builder that the user supplies (the canonical example being directories).

#### `ignore`

#### `ignore_set`

#### `implicit`

#### `implicit_set`

#### `includes`

#### `is_derived ()`

Returns true if this node is derived (i.e. built).

This should return true only for nodes whose path should be in the variant directory when `duplicate=0` and should contribute their build signatures when they are used as source files to other derived files. For example: source with source builders are not derived in this sense, and hence should not return true.

#### `is_explicit`

#### `is_literal ()`

Always pass the string representation of a `Node` to the command interpreter literally.

#### `is_sconscript ()`

Returns true if this node is an sconscript

#### `is_up_to_date ()`

Default check for whether the `Node` is current: unknown `Node` subtypes are always out of date, so they will always get built.

#### `linked`

#### `make_ready ()`

Get a `Node` ready for evaluation.

This is called before the Taskmaster decides if the `Node` is up-to-date or not. Overriding this method allows for a `Node` subclass to be disambiguated if necessary, or for an implicit source builder to be attached.

**missing ()****multiple\_side\_effect\_has\_builder ()**

Return whether this Node has a builder or not.

In Boolean tests, this turns out to be a *lot* more efficient than simply examining the builder attribute directly (“if node.builder: ...”). When the builder attribute is examined directly, it ends up calling `__getattr__` for both the `__len__` and `__nonzero__` attributes on instances of our Builder Proxy class(es), generating a bazillion extra calls and slowing things down immensely.

**new\_binfo ()****new\_ninfo ()****ninfo****nocache****noclean****postprocess ()**

Clean up anything we don't need to hang onto after we've been built.

**precious****prepare ()**

Prepare for this Node to be built.

This is called after the Taskmaster has decided that the Node is out-of-date and must be rebuilt, but before actually calling the method to build the Node.

This default implementation checks that explicit or implicit dependencies either exist or are derived, and initializes the BuildInfo structure that will hold the information about how this node is, uh, built.

(The existence of source files is checked separately by the Executor, which aggregates checks for all of the targets built by a specific action.)

Overriding this method allows for for a Node subclass to remove the underlying file from the file system. Note that subclass methods should call this base class method to get the child check and the BuildInfo structure.

**prerequisites****pseudo****push\_to\_cache ()**

Try to push a node into a cache

**ref\_count****release\_target\_info ()**

Called just after this node has been marked up-to-date or was built completely.

This is where we try to release as many target node infos as possible for clean builds and update runs, in order to minimize the overall memory consumption.

By purging attributes that aren't needed any longer after a Node (=File) got built, we don't have to care that much how many KBytes a Node actually requires...as long as we free the memory shortly afterwards.

@see: `built()` and `File.release_target_info()`

**remove ()**

Remove this Node: no-op by default.

**render\_include\_tree ()**

Return a text representation, suitable for displaying to the user, of the include tree for the sources of this node.

**reset\_executor ()**

Remove cached executor; forces recompute when needed.

**retrieve\_from\_cache ()**

Try to retrieve the node's content from a cache

This method is called from multiple threads in a parallel build, so only do thread safe stuff here. Do thread unsafe stuff in built().

Returns true if the node was successfully retrieved.

**reexists ()**

Does this node exist locally or in a repository?

**scan ()**

Scan this node's dependents for implicit dependencies.

**scanner\_key ()**

**select\_scanner (scanner)**

Selects a scanner for this Node.

This is a separate method so it can be overridden by Node subclasses (specifically, Node.FS.Dir) that *must* use their own Scanner and don't select one the Scanner.Selector that's configured for the target.

**set\_always\_build (always\_build=1)**

Set the Node's always\_build value.

**set\_executor (executor)**

Set the action executor for this node.

**set\_explicit (is\_explicit)**

**set\_nocache (nocache=1)**

Set the Node's nocache value.

**set\_noclean (noclean=1)**

Set the Node's noclean value.

**set\_precious (precious=1)**

Set the Node's precious value.

**set\_pseudo (pseudo=True)**

Set the Node's precious value.

**set\_specific\_source (source)**

**set\_state (state)**

**side\_effect**

**side\_effects**

**sources**

**sources\_set**

**state**

**store\_info**

**target\_peers**

**visited ()**

Called just after this node has been visited (with or without a build).

**waiting\_parents**

`waiting_s_e``wkids``class SCons.Node.NodeInfoBase`Bases: `object`

The generic base class for signature information for a Node.

Node subclasses should subclass NodeInfoBase to provide their own logic for dealing with their own Node-specific signature information.

`convert (node, val)``current_version_id = 2``format (field_list=None, names=0)``merge (other)`Merge the fields of another object into this object. Already existing information is overwritten by the other instance's data. WARNING: If a `'__dict__'` slot is added, it should be updated instead of replaced.`update (node)``class SCons.Node.NodeList (initlist=None)`Bases: `collections.UserList``__UserList__cast (other)``__abc_impl = <_abc_data object>``append (item)`

S.append(value) – append value to the end of the sequence

`clear ()` → None -- remove all items from S`copy ()``count (value)` → integer -- return number of occurrences of value`extend (other)`

S.extend(iterable) – extend sequence by appending elements from the iterable

`index (value[, start[, stop]])` → integer -- return first index of value.

Raises ValueError if the value is not present.

Supporting start and stop arguments is optional, but recommended.

`insert (i, item)`

S.insert(index, value) – insert value before index

`pop ([, index])` → item -- remove and return item at index (default last).

Raise IndexError if list is empty or index is out of range.

`remove (item)`

S.remove(value) – remove first occurrence of value. Raise ValueError if the value is not present.

`reverse ()`S.reverse() – reverse *IN PLACE*`sort (*args, **kwargs)``class SCons.Node.Walker (node, kids_func=<function get_children>, cycle_func=<function ignore_cycle>, eval_func=<function do_nothing>)`

**Bases: object**

An iterator for walking a Node tree.

This is depth-first, children are visited before the parent. The Walker object can be initialized with any node, and returns the next node on the descent with each `get_next()` call. `get` the children of a node instead of calling 'children'. 'cycle\_func' is an optional function that will be called when a cycle is detected.

This class does not get caught in node cycles caused, for example, by C header file include loops.

**get\_next ()**

Return the next node for this walk of the tree.

This function is intentionally iterative, not recursive, to sidestep any issues of stack size limitations.

**is\_done ()**

`SCons.Node.changed_since_last_build_alias` (node, target, prev\_ni, repo\_node=None)

`SCons.Node.changed_since_last_build_entry` (node, target, prev\_ni, repo\_node=None)

`SCons.Node.changed_since_last_build_node` (node, target, prev\_ni, repo\_node=None)

Must be overridden in a specific subclass to return True if this Node (a dependency) has changed since the last time it was used to build the specified target. `prev_ni` is this Node's state (for example, its file timestamp, length, maybe content signature) as of the last time the target was built.

Note that this method is called through the dependency, not the target, because a dependency Node must be able to use its own logic to decide if it changed. For example, File Nodes need to obey if we're configured to use timestamps, but Python Value Nodes never use timestamps and always use the content. If this method were called through the target, then each Node's implementation of this method would have to have more complicated logic to handle all the different Node types on which it might depend.

`SCons.Node.changed_since_last_build_python` (node, target, prev\_ni, repo\_node=None)

`SCons.Node.changed_since_last_build_state_changed` (node, target, prev\_ni, repo\_node=None)

`SCons.Node.classname` (obj)

`SCons.Node.decide_source` (node, target, prev\_ni, repo\_node=None)

`SCons.Node.decide_target` (node, target, prev\_ni, repo\_node=None)

`SCons.Node.do_nothing` (node, parent)

`SCons.Node.do_nothing_node` (node)

`SCons.Node.exists_always` (node)

`SCons.Node.exists_base` (node)

`SCons.Node.exists_entry` (node)

Return if the Entry exists. Check the file system to see what we should turn into first. Assume a file if there's no directory.

`SCons.Node.exists_file` (node)

`SCons.Node.exists_none` (node)

`SCons.Node.get_children` (node, parent)

`SCons.Node.get_contents_dir` (node)

Return content signatures and names of all our children separated by new-lines. Ensure that the nodes are sorted.

`SCons.Node.get_contents_entry` (node)

Fetch the contents of the entry. Returns the exact binary contents of the file.

`SCons.Node.get_contents_file` (node)

`SCons.Node.get_contents_none` (node)

`SCons.Node.ignore_cycle` (node, stack)

`SCons.Node.is_derived_node` (node)

Returns true if this node is derived (i.e. built).

`SCons.Node.is_derived_none` (node)

`SCons.Node.rexists_base` (node)

## SCons.Platform package

SCons.Node.**reexists\_node** (node)

SCons.Node.**reexists\_none** (node)

SCons.Node.**store\_info\_file** (node)

SCons.Node.**store\_info\_pass** (node)

SCons.Node.**target\_from\_source\_base** (node, prefix, suffix, splitext)

SCons.Node.**target\_from\_source\_none** (node, prefix, suffix, splitext)

## SCons.Platform package

### Submodules

#### *SCons.Platform.aix module*

SCons.Platform.aix

Platform-specific initialization for IBM AIX systems.

There normally shouldn't be any need to import this module directly. It will usually be imported through the generic SCons.Platform.Platform() selection method.

SCons.Platform.aix.**generate** (env)

SCons.Platform.aix.**get\_xlc** (env, xlc=None, packages=[ ])

#### *SCons.Platform.cygwin module*

SCons.Platform.cygwin

Platform-specific initialization for Cygwin systems.

There normally shouldn't be any need to import this module directly. It will usually be imported through the generic SCons.Platform.Platform() selection method.

SCons.Platform.cygwin.**generate** (env)

#### *SCons.Platform.darwin module*

SCons.Platform.darwin

Platform-specific initialization for Mac OS X systems.

There normally shouldn't be any need to import this module directly. It will usually be imported through the generic SCons.Platform.Platform() selection method.

SCons.Platform.darwin.**generate** (env)

#### *SCons.Platform.hpux module*

SCons.Platform.hpux

Platform-specific initialization for HP-UX systems.

There normally shouldn't be any need to import this module directly. It will usually be imported through the generic SCons.Platform.Platform() selection method.

SCons.Platform.hpux.**generate** (env)

#### *SCons.Platform.irix module*

SCons.Platform.irix

Platform-specific initialization for SGI IRIX systems.

## SCons.Platform package

There normally shouldn't be any need to import this module directly. It will usually be imported through the generic `SCons.Platform.Platform()` selection method.

`SCons.Platform.irix.generate` (env)

### ***SCons.Platform.mingw module***

`SCons.Platform.mingw`

Platform-specific initialization for the MinGW system.

### ***SCons.Platform.os2 module***

`SCons.Platform.os2`

Platform-specific initialization for OS/2 systems.

There normally shouldn't be any need to import this module directly. It will usually be imported through the generic `SCons.Platform.Platform()` selection method.

`SCons.Platform.os2.generate` (env)

### ***SCons.Platform.posix module***

`SCons.Platform.posix`

Platform-specific initialization for POSIX (Linux, UNIX, etc.) systems.

There normally shouldn't be any need to import this module directly. It will usually be imported through the generic `SCons.Platform.Platform()` selection method.

`SCons.Platform.posix.escape` (arg)  
escape shell special characters

`SCons.Platform.posix.exec_popen3` (l, env, stdout, stderr)

`SCons.Platform.posix.exec_subprocess` (l, env)

`SCons.Platform.posix.generate` (env)

`SCons.Platform.posix.piped_env_spawn` (sh, escape, cmd, args, env, stdout, stderr)

`SCons.Platform.posix.subprocess_spawn` (sh, escape, cmd, args, env)

### ***SCons.Platform.sunos module***

`SCons.Platform.sunos`

Platform-specific initialization for Sun systems.

There normally shouldn't be any need to import this module directly. It will usually be imported through the generic `SCons.Platform.Platform()` selection method.

`SCons.Platform.sunos.generate` (env)

### ***SCons.Platform.virtualenv module***

`SCons.Platform.virtualenv`

Support for virtualenv.

`SCons.Platform.virtualenv.ImportVirtualenv` (env)

Copies virtualenv-related environment variables from OS environment to `env[ 'ENV' ]` and prepends virtualenv's `PATH` to `env[ 'ENV' ] [ 'PATH' ]`.

`SCons.Platform.virtualenv.IsInVirtualenv` (path)

Returns True, if `path` is under virtualenv's home directory. If not, or if we don't use virtualenv, returns False.

`SCons.Platform.virtualenv.Virtualenv` ()

Returns path to the virtualenv home if scons is executing within a virtualenv or None, if not.

`SCons.Platform.virtualenv._enable_virtualenv_default ()`

`SCons.Platform.virtualenv._ignore_virtualenv_default ()`

`SCons.Platform.virtualenv._inject_venv_path (env, path_list=None)`

Modify environment such that SCons will take into account its virtualenv when running external tools.

`SCons.Platform.virtualenv._inject_venv_variables (env)`

`SCons.Platform.virtualenv._is_path_in (path, base)`

Returns true, if **path** is located under the **base** directory.

`SCons.Platform.virtualenv._running_in_virtualenv ()`

Returns True, if scons is executed within a virtualenv

`SCons.Platform.virtualenv.select_paths_in_venv (path_list)`

Returns a list of paths from **path\_list** which are under virtualenv's home directory.

## ***SCons.Platform.win32 module***

`SCons.Platform.win32`

Platform-specific initialization for Win32 systems.

There normally shouldn't be any need to import this module directly. It will usually be imported through the generic `SCons.Platform.Platform()` selection method.

`class SCons.Platform.win32.ArchDefinition (arch, synonyms=[ ])`

Bases: **object**

Determine which windows CPU were running on. A class for defining architecture-specific settings and logic.

`SCons.Platform.win32.escape (x)`

`SCons.Platform.win32.exec_spawn (l, env)`

`SCons.Platform.win32.generate (env)`

`SCons.Platform.win32.get_architecture (arch=None)`

Returns the definition for the specified architecture string.

If no string is specified, the system default is returned (as defined by the `PROCESSOR_ARCHITECTURE` or `PROCESSOR_ARCHITECTURE` environment variables).

`SCons.Platform.win32.get_program_files_dir ()`

Get the location of the program files directory

`SCons.Platform.win32.get_system_root ()`

`SCons.Platform.win32.piped_spawn (sh, escape, cmd, args, env, stdout, stderr)`

`SCons.Platform.win32.spawn (sh, escape, cmd, args, env)`

`SCons.Platform.win32.spawnve (mode, file, args, env)`

## ***Module contents***

`SCons.Platform`

SCons platform selection.

This looks for modules that define a callable object that can modify a construction environment as appropriate for a given platform.

Note that we take a more simplistic view of "platform" than Python does. We're looking for a single string that determines a set of tool-independent variables with which to initialize a construction environment. Consequently, we'll examine both `sys.platform` and `os.name` (and anything else that might come in to play) in order to return some specification which is unique enough for our purposes.

## SCons.Scanner package

Note that because this subsystem just *selects* a callable that can modify a construction environment, it's possible for people to define their own "platform specification" in an arbitrary callable function. No one needs to use or tie in to this subsystem in order to roll their own platform definition.

`SCons.Platform.DefaultToolList` (platform, env)  
Select a default tool list for the specified platform.

`SCons.Platform.Platform` (name='darwin')  
Select a canned Platform specification.

`class SCons.Platform.PlatformSpec` (name, generate)  
Bases: **object**

`class SCons.Platform.TempFileMunge` (cmd, cmdstr=None)  
Bases: **object**

Convert long command lines to use a temporary file.

You can set an Environment variable (usually `TEMPFILE`) to this, then call it with a string argument, and it will perform temporary file substitution on it. This is used to circumvent limitations on the length of command lines. Example:

```
env["TEMPFILE"] = TempFileMunge
env["LINKCOM"] = "${TEMPFILE('$LINK $TARGET $SOURCES', '$LINKCOMSTR')}"
```

By default, the name of the temporary file used begins with a prefix of '@'. This may be configured for other tool chains by setting the `TEMPFILEPREFIX` variable. Example:

```
env["TEMPFILEPREFIX"] = '-@'           # diab compiler
env["TEMPFILEPREFIX"] = '-via'        # arm tool chain
env["TEMPFILEPREFIX"] = ''            # (the empty string) PC Lint
```

You can configure the extension of the temporary file through the `TEMPFILESUFFIX` variable, which defaults to '.lnk' (see comments in the code below). Example:

```
env["TEMPFILESUFFIX"] = '.lnk'        # PC Lint
```

Entries in the temporary file are separated by the value of the `TEMPFILEARGJOIN` variable, which defaults to an OS-appropriate value.

`_print_cmd_str` (target, source, env, cmdstr)

`SCons.Platform.platform_default` ()

Return the platform string for our execution environment.

The returned value should map to one of the `SCons/Platform/*.py` files. Since `scons` is architecture independent, though, we don't care about the machine architecture.

`SCons.Platform.platform_module` (name='darwin')

Return the imported module for the platform.

This looks for a module name that matches the specified argument. If the name is unspecified, we fetch the appropriate default for our execution environment.

## SCons.Scanner package

### Submodules

### SCons.Scanner.C module

`SCons.Scanner.C`

This module implements the dependency scanner for C/C++ code.

`SCons.Scanner.C.CConditionalScanner` ()

Return an advanced conditional Scanner instance for scanning source files

Interprets C/C++ Preprocessor conditional syntax (`#ifdef`, `#if`, `defined`, `#else`, `#elif`, etc.).

## SCons.Scanner package

`SCons.Scanner.C.CScanner ()`

Return a prototype Scanner instance for scanning source files that use the C pre-processor

`class SCons.Scanner.C.SConsCPPConditionalScanner (*args, **kw)`

Bases: `SCons.cpp.PreProcessor`

SCons-specific subclass of the `cpp.py` module's processing.

We subclass this so that: 1) we can deal with files represented by Nodes, not strings; 2) we can keep track of the files that are missing.

`_do_if_else_condition (condition)`

Common logic for evaluating the conditions on `#if`, `#ifdef` and `#ifndef` lines.

`_match_tuples (tuples)`

`_parse_tuples (contents)`

`_process_tuples (tuples, file=None)`

`all_include (t)`

`do_define (t)`

Default handling of a `#define` line.

`do_elif (t)`

Default handling of a `#elif` line.

`do_else (t)`

Default handling of a `#else` line.

`do_endif (t)`

Default handling of a `#endif` line.

`do_if (t)`

Default handling of a `#if` line.

`do_ifdef (t)`

Default handling of a `#ifdef` line.

`do_ifndef (t)`

Default handling of a `#ifndef` line.

`do_import (t)`

Default handling of a `#import` line.

`do_include (t)`

Default handling of a `#include` line.

`do_include_next (t)`

Default handling of a `#include` line.

`do_nothing (t)`

Null method for when we explicitly want the action for a specific preprocessor directive to do nothing.

`do_undef (t)`

Default handling of a `#undef` line.

`eval_expression (t)`

Evaluates a C preprocessor expression.

This is done by converting it to a Python equivalent and `eval()`ing it in the C preprocessor namespace we use to track `#define` values.

**finalize\_result** (fname)

**find\_include\_file** (t)

Finds the #include file for a given preprocessor tuple.

**initialize\_result** (fname)

**process\_contents** (contents)

Pre-processes a file contents.

Is used by tests

**process\_file** (file)

Pre-processes a file.

This is the main internal entry point.

**read\_file** (file)

**resolve\_include** (t)

Resolve a tuple-ized #include line.

This handles recursive expansion of values without "" or <> surrounding the name until an initial " or < is found, to handle #include FILE where FILE is a #define somewhere else.

**restore** ()

Pops the previous dispatch table off the stack and makes it the current one.

**save** ()

Pushes the current dispatch table on the stack and re-initializes the current dispatch table to the default.

**scons\_current\_file** (t)

**start\_handling\_includes** (t=None)

Causes the PreProcessor object to start processing #import, #include and #include\_next lines.

This method will be called when a #if, #ifdef, #ifndef or #elif evaluates True, or when we reach the #else in a #if, #ifdef, #ifndef or #elif block where a condition already evaluated False.

**stop\_handling\_includes** (t=None)

Causes the PreProcessor object to stop processing #import, #include and #include\_next lines.

This method will be called when a #if, #ifdef, #ifndef or #elif evaluates False, or when we reach the #else in a #if, #ifdef, #ifndef or #elif block where a condition already evaluated True.

**tupleize** (contents)

Turns the contents of a file into a list of easily-processed tuples describing the CPP lines in the file.

The first element of each tuple is the line's preprocessor directive (#if, #include, #define, etc., minus the initial '#'). The remaining elements are specific to the type of directive, as pulled apart by the regular expression.

**class SCons.Scanner.C.SConsCPPConditionalScannerWrapper** (name, variable)

Bases: **object**

The SCons wrapper around a cpp.py scanner.

This is the actual glue between the calling conventions of generic SCons scanners, and the (subclass of) cpp.py class that knows how to look for #include lines with reasonably real C-preprocessor-like evaluation of #if/#ifdef/#else/#elif lines.

**recurse\_nodes** (nodes)

**select** (node)

**class SCons.Scanner.C.SConsCPPScanner** (\*args, \*\*kw)

Bases: **SCons.cpp.PreProcessor**

SCons-specific subclass of the cpp.py module's processing.

We subclass this so that: 1) we can deal with files represented by Nodes, not strings; 2) we can keep track of the files that are missing.

**`_do_if_else_condition`**(condition)

Common logic for evaluating the conditions on `#if`, `#ifdef` and `#ifndef` lines.

**`_match_tuples`**(tuples)

**`_parse_tuples`**(contents)

**`_process_tuples`**(tuples, file=None)

**`all_include`**(t)

**`do_define`**(t)

Default handling of a `#define` line.

**`do_elif`**(t)

Default handling of a `#elif` line.

**`do_else`**(t)

Default handling of a `#else` line.

**`do_endif`**(t)

Default handling of a `#endif` line.

**`do_if`**(t)

Default handling of a `#if` line.

**`do_ifdef`**(t)

Default handling of a `#ifdef` line.

**`do_ifndef`**(t)

Default handling of a `#ifndef` line.

**`do_import`**(t)

Default handling of a `#import` line.

**`do_include`**(t)

Default handling of a `#include` line.

**`do_include_next`**(t)

Default handling of a `#include` line.

**`do_nothing`**(t)

Null method for when we explicitly want the action for a specific preprocessor directive to do nothing.

**`do_undef`**(t)

Default handling of a `#undef` line.

**`eval_expression`**(t)

Evaluates a C preprocessor expression.

This is done by converting it to a Python equivalent and `eval()`ing it in the C preprocessor namespace we use to track `#define` values.

**`finalize_result`**(fname)

**`find_include_file`**(t)

Finds the `#include` file for a given preprocessor tuple.

**`initialize_result`**(fname)

**`process_contents`**(contents)

Pre-processes a file contents.

## SCons.Scanner package

Is used by tests

### `process_file (file)`

Pre-processes a file.

This is the main internal entry point.

### `read_file (file)`

### `resolve_include (t)`

Resolve a tuple-ized `#include` line.

This handles recursive expansion of values without "" or <> surrounding the name until an initial " or < is found, to handle `#include FILE` where `FILE` is a `#define` somewhere else.

### `restore ()`

Pops the previous dispatch table off the stack and makes it the current one.

### `save ()`

Pushes the current dispatch table on the stack and re-initializes the current dispatch table to the default.

### `scons_current_file (t)`

### `start_handling_includes (t=None)`

Causes the PreProcessor object to start processing `#import`, `#include` and `#include_next` lines.

This method will be called when a `#if`, `#ifdef`, `#ifndef` or `#elif` evaluates True, or when we reach the `#else` in a `#if`, `#ifdef`, `#ifndef` or `#elif` block where a condition already evaluated False.

### `stop_handling_includes (t=None)`

Causes the PreProcessor object to stop processing `#import`, `#include` and `#include_next` lines.

This method will be called when a `#if`, `#ifdef`, `#ifndef` or `#elif` evaluates False, or when we reach the `#else` in a `#if`, `#ifdef`, `#ifndef` or `#elif` block where a condition already evaluated True.

### `tupleize (contents)`

Turns the contents of a file into a list of easily-processed tuples describing the CPP lines in the file.

The first element of each tuple is the line's preprocessor directive (`#if`, `#include`, `#define`, etc., minus the initial `#`). The remaining elements are specific to the type of directive, as pulled apart by the regular expression.

`class SCons.Scanner.C.SConsCPPScannerWrapper (name, variable)`

Bases: `object`

The SCons wrapper around a `cpp.py` scanner.

This is the actual glue between the calling conventions of generic SCons scanners, and the (subclass of) `cpp.py` class that knows how to look for `#include` lines with reasonably real C-preprocessor-like evaluation of `#if/#ifdef/#else/#elif` lines.

### `recurse_nodes (nodes)`

### `select (node)`

`SCons.Scanner.C.dictify_CPPDEFINES (env)`

## **SCons.Scanner.D module**

SCons.Scanner.D

Scanner for the Digital Mars "D" programming language.

Coded by Andy Friesen 17 Nov 2003

`class SCons.Scanner.D.D`

Bases: `SCons.Scanner.Classic`

### `_recurse_all_nodes (nodes)`

```

_recurse_no_nodes (nodes)

add_scanner (skey, scanner)

add_skey (skey)
    Add a skey to the list of skeys

find_include (include, source_dir, path)

find_include_names (node)

get_skeys (env=None)

path (env, dir=None, target=None, source=None)

scan (node, path=())

select (node)

sort_key (include)

```

```

SCons.Scanner.D.DScanner ()
    Return a prototype Scanner instance for scanning D source files

```

## ***SCons.Scanner.Dir module***

```

SCons.Scanner.Dir.DirEntryScanner (**kw)
    Return a prototype Scanner instance for "scanning" directory Nodes for their in-memory entries

SCons.Scanner.Dir.DirScanner (**kw)
    Return a prototype Scanner instance for scanning directories for on-disk files

SCons.Scanner.Dir.do_not_scan (k)

SCons.Scanner.Dir.only_dirs (nodes)

SCons.Scanner.Dir.scan_in_memory (node, env, path=())
    "Scans" a Node.FS.Dir for its in-memory entries.

SCons.Scanner.Dir.scan_on_disk (node, env, path=())
    Scans a directory for on-disk files and directories therein.
    Looking up the entries will add these to the in-memory Node tree representation of the file system, so all we have
    to do is just that and then call the in-memory scanning function.

```

## ***SCons.Scanner.Fortran module***

SCons.Scanner.Fortran

This module implements the dependency scanner for Fortran code.

```

class SCons.Scanner.Fortran.F90Scanner (name, suffixes, path_variable, use_regex, incl_regex,
def_regex, *args, **kw)

```

Bases: **SCons.Scanner.Classic**

A Classic Scanner subclass for Fortran source files which takes into account both USE and INCLUDE statements. This scanner will work for both F77 and F90 (and beyond) compilers.

Currently, this scanner assumes that the include files do not contain USE statements. To enable the ability to deal with USE statements in include files, add logic right after the module names are found to loop over each include file, search for and locate each USE statement, and append each module name to the list of dependencies. Caching the search results in a common dictionary somewhere so that the same include file is not searched multiple times would be a smart thing to do.

```

_recurse_all_nodes (nodes)

```

```

_recurse_no_nodes (nodes)

add_scanner (skey, scanner)

add_skey (skey)
    Add a skey to the list of skeys

find_include (include, source_dir, path)

find_include_names (node)

get_skeys (env=None)

path (env, dir=None, target=None, source=None)

scan (node, env, path=())

select (node)

sort_key (include)

```

```

SCons.Scanner.Fortran.FortranScan (path_variable='FORTRANPATH')
    Return a prototype Scanner instance for scanning source files for Fortran USE & INCLUDE statements

```

## ***SCons.Scanner.IDL module***

SCons.Scanner.IDL

This module implements the dependency scanner for IDL (Interface Definition Language) files.

```

SCons.Scanner.IDL.IDLScan ()
    Return a prototype Scanner instance for scanning IDL source files

```

## ***SCons.Scanner.LaTeX module***

SCons.Scanner.LaTeX

This module implements the dependency scanner for LaTeX code.

```

class SCons.Scanner.LaTeX.FindENVPATH (variable)
    Bases: object
    A class to bind a specific E{*}PATH variable name to a function that will return all of the E{*}path directories.

```

```

class SCons.Scanner.LaTeX.LaTeX (name, suffixes, graphics_extensions, *args, **kw)
    Bases: SCons.Scanner.Base
    Class for scanning LaTeX files for included files.
    Unlike most scanners, which use regular expressions that just return the included file name, this returns a tuple
    consisting of the keyword for the inclusion ("include", "includegraphics", "input", or "bibliography"), and then the file
    name itself. Based on a quick look at LaTeX documentation, it seems that we should append .tex suffix for the
    "include" keywords, append .tex if there is no extension for the "input" keyword, and need to add .bib for the
    "bibliography" keyword that does not accept extensions by itself.
    Finally, if there is no extension for an "includegraphics" keyword latex will append .ps or .eps to find the file, while
    pdftex may use .pdf, .jpg, .tif, .mps, or .png.
    The actual subset and search order may be altered by DeclareGraphicsExtensions command. This complication is
    ignored. The default order corresponds to experimentation with teTeX:

```

```

$ latex --version
pdfTeX 3.141592-1.21a-2.2 (Web2C 7.5.4)
kpathsea version 3.5.4

```

**The order is:**

```
['.eps', '.ps'] for latex ['.png', '.pdf', '.jpg', '.tif'].
```

Another difference is that the search path is determined by the type of the file being searched: `env['TEXINPUTS']` for “input” and “include” keywords `env['TEXINPUTS']` for “includegraphics” keyword `env['TEXINPUTS']` for “lstinplisting” keyword `env['BIBINPUTS']` for “bibliography” keyword `env['BSTINPUTS']` for “bibliographystyle” keyword `env['INDEXSTYLE']` for “makeindex” keyword, no scanning support needed just allows user to set it if needed.

FIXME: also look for the class or style in `document[class|style]{} FIXME: also look for the argument of bibliographystyle{}`

`_latex_names (include_type, filename)`

`_recurse_all_nodes (nodes)`

`_recurse_no_nodes (nodes)`

`add_scanner (skey, scanner)`

`add_skey (skey)`

Add a skey to the list of skeys

`canonical_text (text)`

Standardize an input TeX-file contents.

**Currently:**

- removes comments, unwrapping comment-wrapped lines.

`env_variables = ['TEXINPUTS', 'BIBINPUTS', 'BSTINPUTS', 'INDEXSTYLE']`

`find_include (include, source_dir, path)`

`get_skeys (env=None)`

`keyword_paths = {'addbibresource': 'BIBINPUTS', 'addglobalbib': 'BIBINPUTS', 'addsectionbib': 'BIBINPUTS', 'bibliography': 'BIBINPUTS', 'bibliographystyle': 'BSTINPUTS', 'include': 'TEXINPUTS', 'includegraphics': 'TEXINPUTS', 'input': 'TEXINPUTS', 'lstinplisting': 'TEXINPUTS', 'makeindex': 'INDEXSTYLE', 'usepackage': 'TEXINPUTS'}`

`path (env, dir=None, target=None, source=None)`

`scan (node, subdir='.')`

`scan_recurse (node, path=())`

do a recursive scan of the top level target file This lets us search for included files based on the directory of the main file just as latex does

`select (node)`

`sort_key (include)`

`two_arg_commands = ['import', 'subimport', 'includefrom', 'subincludefrom', 'inputfrom', 'subinputfrom']`

`SCons.Scanner.LaTeX.LaTeXScanner ()`

Return a prototype Scanner instance for scanning LaTeX source files when built with latex.

`SCons.Scanner.LaTeX.PDFLaTeXScanner ()`

Return a prototype Scanner instance for scanning LaTeX source files when built with pdflatex.

`class SCons.Scanner.LaTeX._Null`

Bases: **object**

`SCons.Scanner.LaTeX._null`

alias of `SCons.Scanner.LaTeX._Null`

`SCons.Scanner.LaTeX.modify_env_var` (env, var, abspath)

## ***SCons.Scanner.Prog module***

`SCons.Scanner.Prog.ProgramScanner` (\*\*kw)

Return a prototype Scanner instance for scanning executable files for static-lib dependencies

`SCons.Scanner.Prog._subst_libs` (env, libs)

Substitute environment variables and split into list.

`SCons.Scanner.Prog.scan` (node, env, libpath=())

This scanner scans program files for static-library dependencies. It will search the LIBPATH environment variable for libraries specified in the LIBS variable, returning any files it finds as dependencies.

## ***SCons.Scanner.RC module***

`SCons.Scanner.RC`

This module implements the dependency scanner for RC (Interface Definition Language) files.

`SCons.Scanner.RC.RCScan` ()

Return a prototype Scanner instance for scanning RC source files

`SCons.Scanner.RC.no_tlb` (nodes)

Filter out .tlb files as they are binary and shouldn't be scanned

## ***SCons.Scanner.SWIG module***

`SCons.Scanner.SWIG`

This module implements the dependency scanner for SWIG code.

`SCons.Scanner.SWIG.SWIGScanner` ()

## ***Module contents***

`SCons.Scanner`

The Scanner package for the SCons software construction utility.

```
class SCons.Scanner.Base (function, name='NONE', argument=<class 'SCons.Scanner._Null'>,
keys=<class 'SCons.Scanner._Null'>, path_function=None, node_class=<class
'SCons.Node.FS.Base'>, node_factory=None, scan_check=None, recursive=None)
```

Bases: **object**

The base class for dependency scanners. This implements straightforward, single-pass scanning of a single file.

`_recurse_all_nodes` (nodes)

`_recurse_no_nodes` (nodes)

`add_scanner` (skey, scanner)

`add_skey` (skey)

Add a skey to the list of skeys

`get_skeys` (env=None)

`path` (env, dir=None, target=None, source=None)

`select` (node)

```
class SCons.Scanner.Classic (name, suffixes, path_variable, regex, *args, **kw)
```

Bases: **SCons.Scanner.Current**

A Scanner subclass to contain the common logic for classic CPP-style include scanning, but which can be customized to use different regular expressions to find the includes.

Note that in order for this to work “out of the box” (without overriding the `find_include()` and `sort_key()` methods), the regular expression passed to the constructor must return the name of the include file in group 0.

`_recurse_all_nodes (nodes)`

`_recurse_no_nodes (nodes)`

`add_scanner (skey, scanner)`

`add_skey (skey)`

Add a skey to the list of skeys

`find_include (include, source_dir, path)`

`find_include_names (node)`

`get_skeys (env=None)`

`path (env, dir=None, target=None, source=None)`

`scan (node, path=())`

`select (node)`

`sort_key (include)`

`class SCons.Scanner.ClassicCPP (name, suffixes, path_variable, regex, *args, **kw)`

Bases: `SCons.Scanner.Classic`

A Classic Scanner subclass which takes into account the type of bracketing used to include the file, and uses classic CPP rules for searching for the files based on the bracketing.

Note that in order for this to work, the regular expression passed to the constructor must return the leading bracket in group 0, and the contained filename in group 1.

`_recurse_all_nodes (nodes)`

`_recurse_no_nodes (nodes)`

`add_scanner (skey, scanner)`

`add_skey (skey)`

Add a skey to the list of skeys

`find_include (include, source_dir, path)`

`find_include_names (node)`

`get_skeys (env=None)`

`path (env, dir=None, target=None, source=None)`

`scan (node, path=())`

`select (node)`

`sort_key (include)`

`class SCons.Scanner.Current (*args, **kw)`

Bases: `SCons.Scanner.Base`

## SCons.Scanner package

A class for scanning files that are source files (have no builder) or are derived files and are current (which implies that they exist, either locally or in a repository).

**`_recurse_all_nodes (nodes)`**

**`_recurse_no_nodes (nodes)`**

**`add_scanner (skey, scanner)`**

**`add_skey (skey)`**

Add a skey to the list of skeys

**`get_skeys (env=None)`**

**`path (env, dir=None, target=None, source=None)`**

**`select (node)`**

**`class SCons.Scanner.FindPathDirs (variable)`**

Bases: **`object`**

A class to bind a specific E{\*}PATH variable name to a function that will return all of the E{\*}path directories.

**`SCons.Scanner.Scanner (function, *args, **kw)`**

Public interface factory function for creating different types of Scanners based on the different types of “functions” that may be supplied.

TODO: Deprecate this some day. We’ve moved the functionality inside the Base class and really don’t need this factory function any more. It was, however, used by some of our Tool modules, so the call probably ended up in various people’s custom modules patterned on SCons code.

**`class SCons.Scanner.Selector (dict, *args, **kw)`**

Bases: **`SCons.Scanner.Base`**

A class for selecting a more specific scanner based on the scanner\_key() (suffix) for a specific Node.

TODO: This functionality has been moved into the inner workings of the Base class, and this class will be deprecated at some point. (It was never exposed directly as part of the public interface, although it is used by the Scanner() factory function that was used by various Tool modules and therefore was likely a template for custom modules that may be out there.)

**`_recurse_all_nodes (nodes)`**

**`_recurse_no_nodes (nodes)`**

**`add_scanner (skey, scanner)`**

**`add_skey (skey)`**

Add a skey to the list of skeys

**`get_skeys (env=None)`**

**`path (env, dir=None, target=None, source=None)`**

**`select (node)`**

**`class SCons.Scanner._Null`**

Bases: **`object`**

**`SCons.Scanner._null`**

alias of **`SCons.Scanner._Null`**

## SCons.Script package

### Submodules

### SCons.Script.Interactive module

SCons interactive mode

```
class SCons.Script.Interactive.SConsInteractiveCmd (**kw)
```

Bases: `cmd.Cmd`

`build [TARGETS]` Build the specified TARGETS and their dependencies. 'b' is a synonym. `clean [TARGETS]` Clean (remove) the specified TARGETS and their dependencies. 'c' is a synonym. `exit` Exit SCons interactive mode. `help [COMMAND]` Prints help for the specified COMMAND. 'h' and '?' are synonyms. `shell [COMMANDLINE]` Execute COMMANDLINE in a subshell. 'sh' and '!' are synonyms. `version` Prints SCons version information.

`_do_one_help (arg)`

`_doc_to_help (obj)`

`_strip_initial_spaces (s)`

`cmdloop (intro=None)`

Repeatedly issue a prompt, accept input, parse an initial prefix off the received input, and dispatch to action methods, passing them the remainder of the line as argument.

`columnize (list, displaywidth=80)`

Display a list of strings as a compact set of columns.

Each column is only as wide as necessary. Columns are separated by two spaces (one was not legible enough).

`complete (text, state)`

Return the next possible completion for 'text'.

If a command has not been entered, then complete against command list. Otherwise try to call `complete_<command>` to get list of completions.

`complete_help (*args)`

`completedefault (*ignored)`

Method called to complete an input line when no command-specific `complete_*`() method is available.

By default, it returns an empty list.

`completenames (text, *ignored)`

`default (argv)`

Called on an input line when the command prefix is not recognized.

If this method is not overridden, it prints an error message and returns.

`do_EOF (argv)`

`do_build (argv)`

`build [TARGETS]` Build the specified TARGETS and their dependencies. 'b' is a synonym.

`do_clean (argv)`

`clean [TARGETS]` Clean (remove) the specified TARGETS and their dependencies. 'c' is a synonym.

`do_exit (argv)`

`exit` Exit SCons interactive mode.

`do_help (argv)`

`help [COMMAND]` Prints help for the specified COMMAND. 'h' and '?' are synonyms.

`do_shell (argv)`

`shell [COMMANDLINE]` Execute COMMANDLINE in a subshell. 'sh' and '!' are synonyms.

`do_version (argv)`

`version` Prints SCons version information.

`doc_header = 'Documented commands (type help <topic>):'`

`doc_leader = "`

`emptyline ()`

Called when an empty line is entered in response to the prompt.

If this method is not overridden, it repeats the last nonempty command entered.

`get_names ()`

`identchars = 'abcdefghijklmnopqrstuvwxyzABCDEFGHIJKLMNOPQRSTUVWXYZ0123456789_'`

`intro = None`

`lastcmd = "`

`misc_header = 'Miscellaneous help topics:'`

`nohelp = '*** No help on %s'`

`onecmd (line)`

Interpret the argument as though it had been typed in response to the prompt.

This may be overridden, but should not normally need to be; see the `precmd()` and `postcmd()` methods for useful execution hooks. The return value is a flag indicating whether interpretation of commands by the interpreter should stop.

`parseline (line)`

Parse the line into a command name and a string containing the arguments. Returns a tuple containing (command, args, line). 'command' and 'args' may be None if the line couldn't be parsed.

`postcmd (stop, line)`

Hook method executed just after a command dispatch is finished.

`postloop ()`

Hook method executed once when the `cmdloop()` method is about to return.

`precmd (line)`

Hook method executed just before the command line is interpreted, but after the input prompt is generated and issued.

`preloop ()`

Hook method executed once when the `cmdloop()` method is called.

`print_topics (header, cmds, cmdlen, maxcol)`

`prompt = '(Cmd) '`

`ruler = '='`

`synonyms = {'b': 'build', 'c': 'clean', 'h': 'help', 'scons': 'build', 'sh': 'shell'}`

`undoc_header = 'Undocumented commands:'`

```
use_rawinput = 1
```

```
SCons.Script.Interactive.interact (fs, parser, options, targets, target_top)
```

## SCons.Script.Main module

SCons.Script

This file implements the main() function used by the scons script.

Architecturally, this *is* the scons script, and will likely only be called from the external “scons” wrapper. Consequently, anything here should not be, or be considered, part of the build engine. If it’s something that we expect other software to want to use, it should go in some other module. If it’s specific to the “scons” script invocation, it goes here.

```
SCons.Script.Main.AddOption (*args, **kw)
```

```
class SCons.Script.Main.BuildTask (tm, targets, top, node)
```

```
Bases: SCons.Taskmaster.OutOfDateTask
```

```
An SCons build task.
```

```
_abc_impl = <_abc_data object>
```

```
_exception_raise ()
```

```
Raises a pending exception that was recorded while getting a Task ready for execution.
```

```
_no_exception_to_raise ()
```

```
display (message)
```

```
Hook to allow the calling interface to display a message.
```

This hook gets called as part of preparing a task for execution (that is, a Node to be built). As part of figuring out what Node should be built next, the actual target list may be altered, along with a message describing the alteration. The calling interface can subclass Task and provide a concrete implementation of this method to see those messages.

```
do_failed (status=2)
```

```
exc_clear ()
```

```
Clears any recorded exception.
```

This also changes the “exception\_raise” attribute to point to the appropriate do-nothing method.

```
exc_info ()
```

```
Returns info about a recorded exception.
```

```
exception_set (exception=None)
```

```
Records an exception to be raised at the appropriate time.
```

This also changes the “exception\_raise” attribute to point to the method that will, in fact

```
execute ()
```

```
Called to execute the task.
```

This method is called from multiple threads in a parallel build, so only do thread safe stuff here. Do thread unsafe stuff in prepare(), executed() or failed().

```
executed ()
```

Called when the task has been successfully executed and the Taskmaster instance wants to call the Node’s callback methods.

This may have been a do-nothing operation (to preserve build order), so we must check the node’s state before deciding whether it was “built”, in which case we call the appropriate Node method. In any event, we always call “visited()”, which will handle any post-visit actions that must take place regardless of whether or not the target was an actual built target or a source Node.

```
executed_with_callbacks ()
```

Called when the task has been successfully executed and the Taskmaster instance wants to call the Node's callback methods.

This may have been a do-nothing operation (to preserve build order), so we must check the node's state before deciding whether it was "built", in which case we call the appropriate Node method. In any event, we always call "visited()", which will handle any post-visit actions that must take place regardless of whether or not the target was an actual built target or a source Node.

#### **executed\_without\_callbacks ()**

Called when the task has been successfully executed and the Taskmaster instance doesn't want to call the Node's callback methods.

#### **fail\_continue ()**

Explicit continue-the-build failure.

This sets failure status on the target nodes and all of their dependent parent nodes.

Note: Although this function is normally invoked on nodes in the executing state, it might also be invoked on up-to-date nodes when using Configure().

#### **fail\_stop ()**

Explicit stop-the-build failure.

This sets failure status on the target nodes and all of their dependent parent nodes.

Note: Although this function is normally invoked on nodes in the executing state, it might also be invoked on up-to-date nodes when using Configure().

#### **failed ()**

Default action when a task fails: stop the build.

Note: Although this function is normally invoked on nodes in the executing state, it might also be invoked on up-to-date nodes when using Configure().

#### **get\_target ()**

Fetch the target being built or updated by this task.

#### **make\_ready ()**

Make a task ready for execution

#### **make\_ready\_all ()**

Marks all targets in a task ready for execution.

This is used when the interface needs every target Node to be visited—the canonical example being the "scons -c" option.

#### **make\_ready\_current ()**

Marks all targets in a task ready for execution if any target is not current.

This is the default behavior for building only what's necessary.

#### **needs\_execute ()**

Returns True (indicating this Task should be executed) if this Task's target state indicates it needs executing, which has already been determined by an earlier up-to-date check.

#### **postprocess ()**

Post-processes a task after it's been executed.

This examines all the targets just built (or not, we don't care if the build was successful, or even if there was no build because everything was up-to-date) to see if they have any waiting parent Nodes, or Nodes waiting on a common side effect, that can be put back on the candidates list.

#### **prepare ()**

Called just before the task is executed.

This is mainly intended to give the target Nodes a chance to unlink underlying files and make all necessary directories before the Action is actually called to build the targets.

#### **trace\_message (method, node, description='node')**

```
class SCons.Script.Main.CleanTask (tm, targets, top, node)
```

Bases: `SCons.Taskmaster.AlwaysTask`

An SCons clean task.

`_abc_impl = <_abc_data object>`

`_clean_targets (remove=True)`

`_exception_raise ()`

Raises a pending exception that was recorded while getting a Task ready for execution.

`_get_files_to_clean ()`

`_no_exception_to_raise ()`

`display (message)`

Hook to allow the calling interface to display a message.

This hook gets called as part of preparing a task for execution (that is, a Node to be built). As part of figuring out what Node should be built next, the actual target list may be altered, along with a message describing the alteration. The calling interface can subclass Task and provide a concrete implementation of this method to see those messages.

`exc_clear ()`

Clears any recorded exception.

This also changes the “exception\_raise” attribute to point to the appropriate do-nothing method.

`exc_info ()`

Returns info about a recorded exception.

`exception_set (exception=None)`

Records an exception to be raised at the appropriate time.

This also changes the “exception\_raise” attribute to point to the method that will, in fact

`execute ()`

`executed ()`

Called when the task has been successfully executed and the Taskmaster instance doesn't want to call the Node's callback methods.

`executed_with_callbacks ()`

Called when the task has been successfully executed and the Taskmaster instance wants to call the Node's callback methods.

This may have been a do-nothing operation (to preserve build order), so we must check the node's state before deciding whether it was “built”, in which case we call the appropriate Node method. In any event, we always call “visited()”, which will handle any post-visit actions that must take place regardless of whether or not the target was an actual built target or a source Node.

`executed_without_callbacks ()`

Called when the task has been successfully executed and the Taskmaster instance doesn't want to call the Node's callback methods.

`fail_continue ()`

Explicit continue-the-build failure.

This sets failure status on the target nodes and all of their dependent parent nodes.

Note: Although this function is normally invoked on nodes in the executing state, it might also be invoked on up-to-date nodes when using Configure().

`fail_stop ()`

Explicit stop-the-build failure.

This sets failure status on the target nodes and all of their dependent parent nodes.

Note: Although this function is normally invoked on nodes in the executing state, it might also be invoked on up-to-date nodes when using Configure().

**failed ()**

Default action when a task fails: stop the build.

Note: Although this function is normally invoked on nodes in the executing state, it might also be invoked on up-to-date nodes when using `Configure()`.

**fs\_delete (path, pathstr, remove=True)****get\_target ()**

Fetch the target being built or updated by this task.

**make\_ready ()**

Marks all targets in a task ready for execution.

This is used when the interface needs every target Node to be visited—the canonical example being the “scons -c” option.

**make\_ready\_all ()**

Marks all targets in a task ready for execution.

This is used when the interface needs every target Node to be visited—the canonical example being the “scons -c” option.

**make\_ready\_current ()**

Marks all targets in a task ready for execution if any target is not current.

This is the default behavior for building only what’s necessary.

**needs\_execute ()**

Always returns True (indicating this Task should always be executed).

Subclasses that need this behavior (as opposed to the default of only executing Nodes that are out of date w.r.t. their dependencies) can use this as follows:

```
class MyTaskSubclass(SCons.Taskmaster.Task):
```

```
    needs_execute = SCons.Taskmaster.AlwaysTask.needs_execute
```

**postprocess ()**

Post-processes a task after it’s been executed.

This examines all the targets just built (or not, we don’t care if the build was successful, or even if there was no build because everything was up-to-date) to see if they have any waiting parent Nodes, or Nodes waiting on a common side effect, that can be put back on the candidates list.

**prepare ()**

Called just before the task is executed.

This is mainly intended to give the target Nodes a chance to unlink underlying files and make all necessary directories before the Action is actually called to build the targets.

**remove ()****show ()****trace\_message (method, node, description='node')**

```
class SCons.Script.Main.CountStats
```

```
    Bases: SCons.Script.Main.Stats
```

```
    do_append (label)
```

```
    do_nothing (*args, **kw)
```

```
    do_print ()
```

```
    enable (outfp)
```

```
class SCons.Script.Main.FakeOptionParser
```

Bases: **object**

A do-nothing option parser, used for the initial OptionsParser variable.

During normal SCons operation, the OptionsParser is created right away by the main() function. Certain tests scripts however, can introspect on different Tool modules, the initialization of which can try to add a new, local option to an otherwise uninitialized OptionsParser object. This allows that introspection to happen without blowing up.

```
class FakeOptionValues
```

Bases: **object**

```
add_local_option(*args, **kw)
```

```
values = <SCons.Script.Main.FakeOptionParser.FakeOptionValues object>
```

```
SCons.Script.Main.GetBuildFailures ()
```

```
SCons.Script.Main.GetOption (name)
```

```
class SCons.Script.Main.MemStats
```

Bases: **SCons.Script.Main.Stats**

```
do_append (label)
```

```
do_nothing (*args, **kw)
```

```
do_print ()
```

```
enable (outfp)
```

```
SCons.Script.Main.PrintHelp (file=None)
```

```
SCons.Script.Main.Progress (*args, **kw)
```

```
class SCons.Script.Main.Progressor (obj, interval=1, file=None, overwrite=False)
```

Bases: **object**

```
count = 0
```

```
erase_previous ()
```

```
prev = "
```

```
replace_string (node)
```

```
spinner (node)
```

```
string (node)
```

```
target_string = '$TARGET'
```

```
write (s)
```

```
class SCons.Script.Main.QuestionTask (tm, targets, top, node)
```

Bases: **SCons.Taskmaster.AlwaysTask**

An SCons task for the -q (question) option.

```
_abc_impl = <_abc_data object>
```

```
_exception_raise ()
```

Raises a pending exception that was recorded while getting a Task ready for execution.

```
_no_exception_to_raise ()
```

**display (message)**

Hook to allow the calling interface to display a message.

This hook gets called as part of preparing a task for execution (that is, a Node to be built). As part of figuring out what Node should be built next, the actual target list may be altered, along with a message describing the alteration. The calling interface can subclass Task and provide a concrete implementation of this method to see those messages.

**exc\_clear ()**

Clears any recorded exception.

This also changes the “exception\_raise” attribute to point to the appropriate do-nothing method.

**exc\_info ()**

Returns info about a recorded exception.

**exception\_set (exception=None)**

Records an exception to be raised at the appropriate time.

This also changes the “exception\_raise” attribute to point to the method that will, in fact

**execute ()**

Called to execute the task.

This method is called from multiple threads in a parallel build, so only do thread safe stuff here. Do thread unsafe stuff in prepare(), executed() or failed().

**executed ()**

Called when the task has been successfully executed and the Taskmaster instance wants to call the Node’s callback methods.

This may have been a do-nothing operation (to preserve build order), so we must check the node’s state before deciding whether it was “built”, in which case we call the appropriate Node method. In any event, we always call “visited()”, which will handle any post-visit actions that must take place regardless of whether or not the target was an actual built target or a source Node.

**executed\_with\_callbacks ()**

Called when the task has been successfully executed and the Taskmaster instance wants to call the Node’s callback methods.

This may have been a do-nothing operation (to preserve build order), so we must check the node’s state before deciding whether it was “built”, in which case we call the appropriate Node method. In any event, we always call “visited()”, which will handle any post-visit actions that must take place regardless of whether or not the target was an actual built target or a source Node.

**executed\_without\_callbacks ()**

Called when the task has been successfully executed and the Taskmaster instance doesn’t want to call the Node’s callback methods.

**fail\_continue ()**

Explicit continue-the-build failure.

This sets failure status on the target nodes and all of their dependent parent nodes.

Note: Although this function is normally invoked on nodes in the executing state, it might also be invoked on up-to-date nodes when using Configure().

**fail\_stop ()**

Explicit stop-the-build failure.

This sets failure status on the target nodes and all of their dependent parent nodes.

Note: Although this function is normally invoked on nodes in the executing state, it might also be invoked on up-to-date nodes when using Configure().

**failed ()**

Default action when a task fails: stop the build.

Note: Although this function is normally invoked on nodes in the executing state, it might also be invoked on up-to-date nodes when using Configure().

**get\_target ()**

Fetch the target being built or updated by this task.

**make\_ready ()**

Marks all targets in a task ready for execution if any target is not current.  
This is the default behavior for building only what's necessary.

**make\_ready\_all ()**

Marks all targets in a task ready for execution.  
This is used when the interface needs every target Node to be visited—the canonical example being the “scons -c” option.

**make\_ready\_current ()**

Marks all targets in a task ready for execution if any target is not current.  
This is the default behavior for building only what's necessary.

**needs\_execute ()**

Always returns True (indicating this Task should always be executed).  
Subclasses that need this behavior (as opposed to the default of only executing Nodes that are out of date w.r.t. their dependencies) can use this as follows:

```
class MyTaskSubclass(SCons.Taskmaster.Task):
```

```
    needs_execute = SCons.Taskmaster.AlwaysTask.needs_execute
```

**postprocess ()**

Post-processes a task after it's been executed.  
This examines all the targets just built (or not, we don't care if the build was successful, or even if there was no build because everything was up-to-date) to see if they have any waiting parent Nodes, or Nodes waiting on a common side effect, that can be put back on the candidates list.

**prepare ()**

Called just before the task is executed.  
This is mainly intended to give the target Nodes a chance to unlink underlying files and make all necessary directories before the Action is actually called to build the targets.

```
trace_message (method, node, description='node')
```

```
exception SCons.Script.Main.SConsPrintHelpException
```

```
Bases: Exception
```

```
args
```

**with\_traceback ()**

Exception.with\_traceback(tb) – set self.\_\_traceback\_\_ to tb and return self.

```
SCons.Script.Main.SetOption (name, value)
```

```
class SCons.Script.Main.Stats
```

```
Bases: object
```

```
do_nothing (*args, **kw)
```

```
enable (outfp)
```

```
class SCons.Script.Main.TreePrinter (derived=False, prune=False, status=False, sLineDraw=False)
```

```
Bases: object
```

```
display (t)
```

```
get_all_children (node)
```

**get\_derived\_children** (node)

SCons.Script.Main.**\_SConstruct\_exists** (dirname='', repositories=[], filelist=None)

This function checks that an SConstruct file exists in a directory. If so, it returns the path of the file. By default, it checks the current directory.

SCons.Script.Main.**\_build\_targets** (fs, options, targets, target\_top)

SCons.Script.Main.**\_create\_path** (plist)

SCons.Script.Main.**\_exec\_main** (parser, values)

SCons.Script.Main.**\_load\_all\_site\_scons\_dirs** (topdir, verbose=None)

Load all of the predefined site\_scons dir. Order is significant; we load them in order from most generic (machine-wide) to most specific (topdir). The verbose argument is only for testing.

SCons.Script.Main.**\_load\_site\_scons\_dir** (topdir, site\_dir\_name=None)

Load the site directory under topdir.

If a site dir name is supplied use it, else use default "site\_scons" Prepend site dir to sys.path. If a "site\_tools" subdir exists, prepend to toolpath. Import "site\_init.py" from site dir if it exists.

SCons.Script.Main.**\_main** (parser)

SCons.Script.Main.**\_scons\_internal\_error** ()

Handle all errors but user errors. Print out a message telling the user what to do in this case and print a normal trace.

SCons.Script.Main.**\_scons\_internal\_warning** (e)

Slightly different from `_scons_user_warning` in that we use the *current call stack* rather than `sys.exc_info()` to get our stack trace. This is used by the warnings framework to print warnings.

SCons.Script.Main.**\_scons\_syntax\_error** (e)

Handle syntax errors. Print out a message and show where the error occurred.

SCons.Script.Main.**\_scons\_user\_error** (e)

Handle user errors. Print out a message and a description of the error, along with the line number and routine where it occurred. The file and line number will be the deepest stack frame that is not part of SCons itself.

SCons.Script.Main.**\_scons\_user\_warning** (e)

Handle user warnings. Print out a message and a description of the warning, along with the line number and routine where it occurred. The file and line number will be the deepest stack frame that is not part of SCons itself.

SCons.Script.Main.**\_set\_debug\_values** (options)

SCons.Script.Main.**fetch\_win32\_parallel\_msg** ()

SCons.Script.Main.**find\_deepest\_user\_frame** (tb)

Find the deepest stack frame that is not part of SCons.

Input is a "pre-processed" stack trace in the form returned by `traceback.extract_tb()` or `traceback.extract_stack()`

SCons.Script.Main.**main** ()

SCons.Script.Main.**path\_string** (label, module)

SCons.Script.Main.**python\_version\_deprecated** (version=sys.version\_info(major=3, minor=7, micro=8, releaselevel='final', serial=0))

SCons.Script.Main.**python\_version\_string** ()

SCons.Script.Main.**python\_version\_unsupported** (version=sys.version\_info(major=3, minor=7, micro=8, releaselevel='final', serial=0))

SCons.Script.Main.**revert\_io** ()

SCons.Script.Main.**test\_load\_all\_site\_scons\_dirs** (d)

SCons.Script.Main.**version\_string** (label, module)

## SCons.Script.SConsOptions module

SCons.Script.SConsOptions.**Parser** (version)

Returns an options parser object initialized with the standard SCons options.

```
class SCons.Script.SConsOptions.SConsIndentedHelpFormatter (indent_increment=2,
max_help_position=24, width=None, short_first=1)
```

Bases: `optparse.IndentedHelpFormatter`

`NO_DEFAULT_VALUE = 'none'`

`_format_text (text)`

Format a paragraph of free-form text for inclusion in the help output at the current indentation level.

`dedent ()`

`expand_default (option)`

`format_description (description)`

`format_epilog (epilog)`

`format_heading (heading)`

This translates any heading of "options" or "Options" into "SCons Options." Unfortunately, we have to do this here, because those titles are hard-coded in the optparse calls.

`format_option (option)`

A copy of the normal `optparse.IndentedHelpFormatter.format_option()` method. This has been snarfed so we can modify text wrapping to out liking:

- **add our own regular expression that doesn't break on hyphens**  
(so things like `--no-print-directory` don't get broken);
- **wrap the list of options themselves when it's too long**  
(the `wrapper.fill(opts)` call below);
- set the `subsequent_indent` when wrapping the `help_text`.

`format_option_strings (option)`

Return a comma-separated list of option strings & metavariables.

`format_usage (usage)`

`indent ()`

`set_long_opt_delimiter (delim)`

`set_parser (parser)`

`set_short_opt_delimiter (delim)`

`store_option_strings (parser)`

```
class SCons.Script.SConsOptions.SConsOption (*opts, **attrs)
```

Bases: `optparse.Option`

`ACTIONS = ('store', 'store_const', 'store_true', 'store_false', 'append', 'append_const', 'count', 'callback', 'help', 'version')`

`ALWAYS_TYPED_ACTIONS = ('store', 'append')`

`ATTRS = ['action', 'type', 'dest', 'default', 'nargs', 'const', 'choices', 'callback', 'callback_args', 'callback_kwargs', 'help', 'metavar']`

```
CHECK_METHODS = [<function Option._check_action>, <function Option._check_type>, <function
Option._check_choice>, <function Option._check_dest>, <function Option._check_const>, <function
Option._check_nargs>, <function Option._check_callback>, <function SConsOption._check_nargs_optional>]
```

```
CONST_ACTIONS = ('store_const', 'append_const', 'store', 'append', 'callback')
```

```
STORE_ACTIONS = ('store', 'store_const', 'store_true', 'store_false', 'append', 'append_const', 'count')
```

```
TYPED_ACTIONS = ('store', 'append', 'callback')
```

```
TYPES = ('string', 'int', 'long', 'float', 'complex', 'choice')
```

```
TYPE_CHECKER = {'choice': <function check_choice>, 'complex': <function check_builtin>, 'float': <function
check_builtin>, 'int': <function check_builtin>, 'long': <function check_builtin>}
```

```
_check_action ()
```

```
_check_callback ()
```

```
_check_choice ()
```

```
_check_const ()
```

```
_check_dest ()
```

```
_check_nargs ()
```

```
_check_nargs_optional ()
```

```
_check_opt_strings (opts)
```

```
_check_type ()
```

```
_set_attrs (attrs)
```

```
_set_opt_strings (opts)
```

```
check_value (opt, value)
```

```
convert_value (opt, value)
```

```
get_opt_string ()
```

```
process (opt, value, values, parser)
```

```
take_action (action, dest, opt, value, values, parser)
```

```
takes_value ()
```

```
class SCons.Script.SConsOptions.SConsOptionGroup (parser, title, description=None)
```

```
Bases: optparse.OptionGroup
```

```
A subclass for SCons-specific option groups.
```

```
The only difference between this and the base class is that we print the group's help text flush left, underneath their own title but lined up with the normal "SCons Options".
```

```
_check_conflict (option)
```

```
_create_option_list ()
```

```
_create_option_mappings ()
```

**`_share_option_mappings (parser)`**

**`add_option (Option)`**

`add_option(opt_str, ..., kwarg=val, ...)`

**`add_options (option_list)`**

**`destroy ()`**

see `OptionParser.destroy()`.

**`format_description (formatter)`**

**`format_help (formatter)`**

Format an option group's help text, outdenting the title so it's flush with the "SCons Options" title we print at the top.

**`format_option_help (formatter)`**

**`get_description ()`**

**`get_option (opt_str)`**

**`has_option (opt_str)`**

**`remove_option (opt_str)`**

**`set_conflict_handler (handler)`**

**`set_description (description)`**

**`set_title (title)`**

**`class SCons.Script.SConsOptions.SConsOptionParser`** (usage=None, option\_list=None, option\_class=<class 'optparse.Option'>, version=None, conflict\_handler='error', description=None, formatter=None, add\_help\_option=True, prog=None, epilog=None)

Bases: `optparse.OptionParser`

**`_add_help_option ()`**

**`_add_version_option ()`**

**`_check_conflict (option)`**

**`_create_option_list ()`**

**`_create_option_mappings ()`**

**`_get_all_options ()`**

**`_get_args (args)`**

**`_init_parsing_state ()`**

**`_match_long_opt (opt : string) → string`**

Determine which long option string 'opt' matches, ie. which one it is an unambiguous abbreviation for. Raises `BadOptionError` if 'opt' doesn't unambiguously match any long option string.

**`_populate_option_list (option_list, add_help=True)`**

**`_process_args (largs, rargs, values)`**

**`_process_args(largs : [string],`**

`rargs : [string], values : Values)`

Process command-line arguments and populate 'values', consuming options and arguments from 'rargs'. If 'allow\_interspersed\_args' is false, stop at the first non-option argument. If true, accumulate any interspersed non-option arguments in 'largs'.

**`_process_long_opt (rargs, values)`**

SCons-specific processing of long options.

This is copied directly from the normal optparse.\_process\_long\_opt() method, except that, if configured to do so, we catch the exception thrown when an unknown option is encountered and just stick it back on the "leftover" arguments for later (re-)processing.

**`_process_short_opts (rargs, values)`**

**`_share_option_mappings (parser)`**

**`add_local_option (*args, **kw)`**

Adds a local option to the parser.

This is initiated by a SetOption() call to add a user-defined command-line option. We add the option to a separate option group for the local options, creating the group if necessary.

**`add_option (Option)`**

`add_option(opt_str, ..., kwarg=val, ...)`

**`add_option_group (*args, **kwargs)`**

**`add_options (option_list)`**

**`check_values (values : Values, args : [string])`**

`-> (values : Values, args : [string])`

Check that the supplied option values and leftover arguments are valid. Returns the option values and leftover arguments (possibly adjusted, possibly completely new – whatever you like). Default implementation just returns the passed-in values; subclasses may override as desired.

**`destroy ()`**

Declare that you are done with this OptionParser. This cleans up reference cycles so the OptionParser (and all objects referenced by it) can be garbage-collected promptly. After calling destroy(), the OptionParser is unusable.

**`disable_interspersed_args ()`**

Set parsing to stop on the first non-option. Use this if you have a command processor which runs another command that has options of its own and you want to make sure these options don't get confused.

**`enable_interspersed_args ()`**

Set parsing to not stop on the first non-option, allowing interspersing switches with command arguments. This is the default behavior. See also disable\_interspersed\_args() and the class documentation description of the attribute allow\_interspersed\_args.

**`error (msg : string)`**

Print a usage message incorporating 'msg' to stderr and exit. If you override this in a subclass, it should not return – it should either exit or raise an exception.

**`exit (status=0, msg=None)`**

**`expand_prog_name (s)`**

**`format_description (formatter)`**

**`format_epilog (formatter)`**

**format\_help** (formatter=None)

**format\_option\_help** (formatter=None)

**get\_default\_values** ()

**get\_description** ()

**get\_option** (opt\_str)

**get\_option\_group** (opt\_str)

**get\_prog\_name** ()

**get\_usage** ()

**get\_version** ()

**has\_option** (opt\_str)

**parse\_args** (args=None, values=None)

**parse\_args**(args : [string] = sys.argv[1:],

values : Values = None)

-> (values : Values, args : [string])

Parse the command-line options found in 'args' (default: sys.argv[1:]). Any errors result in a call to 'error()', which by default prints the usage message to stderr and calls sys.exit() with an error message. On success returns a pair (values, args) where 'values' is a Values instance (with all your option values) and 'args' is the list of arguments left over after parsing options.

**preserve\_unknown\_options** = False

**print\_help** (file : file = stdout)

Print an extended help message, listing all options and any help text provided with them, to 'file' (default stdout).

**print\_usage** (file : file = stdout)

Print the usage message for the current program (self.usage) to 'file' (default stdout). Any occurrence of the string "%prog" in self.usage is replaced with the name of the current program (basename of sys.argv[0]). Does nothing if self.usage is empty or not defined.

**print\_version** (file : file = stdout)

Print the version message for this program (self.version) to 'file' (default stdout). As with print\_usage(), any occurrence of "%prog" in self.version is replaced by the current program's name. Does nothing if self.version is empty or undefined.

**remove\_option** (opt\_str)

**reparse\_local\_options** ()

Re-parse the leftover command-line options.

Parse options stored in *self.largs*, so that any value overridden on the command line is immediately available if the user turns around and does a **GetOption()** right away.

We mimic the processing of the single args in the original OptionParser **\_process\_args()**, but here we allow exact matches for long-opts only (no partial argument names!). Otherwise there could be problems in **add\_local\_option()** below. When called from there, we try to reparse the command-line arguments that

1. haven't been processed so far (*self.largs*), but

2. are possibly not added to the list of options yet.

So, when we only have a value for "--myargument" so far, a command-line argument of "--myarg=test" would set it, per the behaviour of **\_match\_long\_opt()**, which allows for partial matches of the option name, as long as the common prefix appears to be unique. This would lead to further confusion, because we might want to add another option "--myarg" later on (see issue #2929).

```

set_conflict_handler (handler)

set_default (dest, value)

set_defaults (**kwargs)

set_description (description)

set_process_default_values (process)

set_usage (usage)

standard_option_list = []

```

```

class SCons.Script.SConsOptions.SConsValues (defaults)

```

Bases: `optparse.Values`

Holder class for uniform access to SCons options, regardless of whether or not they can be set on the command line or in the SConscript files (using the `SetOption()` function).

A SCons option value can originate three different ways:

1. set on the command line;
2. set in an SConscript file;

3. the default setting (from the the `op.add_option()` calls in the `Parser()` function, below).

The command line always overrides a value set in a SConscript file, which in turn always overrides default settings. Because we want to support user-specified options in the SConscript file itself, though, we may not know about all of the options when the command line is first parsed, so we can't make all the necessary precedence decisions at the time the option is configured.

The solution implemented in this class is to keep these different sets of settings separate (command line, SConscript file, and default) and to override the `__getattr__()` method to check them in turn. This should allow the rest of the code to just fetch values as attributes of an instance of this class, without having to worry about where they came from.

Note that not all command line options are settable from SConscript files, and the ones that are must be explicitly added to the "settable" list in this class, and optionally validated and coerced in the `set_option()` method.

```

_update (dict, mode)

```

```

_update_careful (dict)

```

Update the option values from an arbitrary dictionary, but only use keys from dict that already have a corresponding attribute in self. Any keys in dict without a corresponding attribute are silently ignored.

```

_update_loose (dict)

```

Update the option values from an arbitrary dictionary, using all keys from the dictionary regardless of whether they have a corresponding attribute in self or not.

```

ensure_value (attr, value)

```

```

read_file (filename, mode='careful')

```

```

read_module (modname, mode='careful')

```

```

set_option (name, value)

```

Sets an option from an SConscript file.

```

settable = ['clean', 'diskcheck', 'duplicate', 'help', 'implicit_cache', 'max_drift', 'md5_chunksize', 'no_exec',
'num_jobs', 'random', 'stack_size', 'warn', 'silent', 'no_progress']

```

```

SCons.Script.SConsOptions.diskcheck_convert (value)

```

## ***SCons.Script.SConscript module***

SCons.Script.SConscript

This module defines the Python API provided to SConscript and SConstruct files.

SCons.Script.SConscript.**BuildDefaultGlobals** ()

Create a dictionary containing all the default globals for SConstruct and SConscript files.

SCons.Script.SConscript.**Configure** (\*args, \*\*kw)

class SCons.Script.SConscript.**DefaultEnvironmentCall** (method\_name, subst=0)

Bases: **object**

A class that implements “global function” calls of Environment methods by fetching the specified method from the DefaultEnvironment’s class. Note that this uses an intermediate proxy class instead of calling the DefaultEnvironment method directly so that the proxy can override the subst() method and thereby prevent expansion of construction variables (since from the user’s point of view this was called as a global function, with no associated construction environment).

class SCons.Script.SConscript.**Frame** (fs, exports, sconscrip)

Bases: **object**

A frame on the SConstruct/SConscript call stack

SCons.Script.SConscript.**Return** (\*vars, \*\*kw)

class SCons.Script.SConscript.**SConsEnvironment** (platform=None, tools=None, toolpath=None, variables=None, parse\_flags=None, \*\*kw)

Bases: **SCons.Environment.Base**

An Environment subclass that contains all of the methods that are particular to the wrapper SCons interface and which aren’t (or shouldn’t be) part of the build engine itself.

Note that not all of the methods of this class have corresponding global functions, there are some private methods.

**Action** (\*args, \*\*kw)

**AddMethod** (function, name=None)

Adds the specified function as a method of this construction environment with the specified name. If the name is omitted, the default name is the name of the function itself.

**AddPostAction** (files, action)

**AddPreAction** (files, action)

**Alias** (target, source=[], action=None, \*\*kw)

**AlwaysBuild** (\*targets)

**Append** (\*\*kw)

Append values to existing construction variables in an Environment.

**AppendENVPPath** (name, newpath, envname='ENV', sep=':', delete\_existing=0)

Append path elements to the path ‘name’ in the ‘ENV’ dictionary for this environment. Will only add any particular path once, and will normpath and normcase all paths to help assure this. This can also handle the case where the env variable is a list instead of a string.

If delete\_existing is 0, a newpath which is already in the path will not be moved to the end (it will be left where it is).

**AppendUnique** (delete\_existing=0, \*\*kw)

Append values to existing construction variables in an Environment, if they’re not already there. If delete\_existing is 1, removes existing values first, so values move to end.

**Builder** (\*\*kw)

**CacheDir** (path)

**Clean** (targets, files)

**Clone** (tools=[], toolpath=None, parse\_flags=None, \*\*kw)

Return a copy of a construction Environment. The copy is like a Python “deep copy”—that is, independent copies are made recursively of each objects—except that a reference is copied when an object is not deep-copyable (like a function). There are no references to any mutable objects in the original Environment.

**Command** (target, source, action, \*\*kw)

Builds the supplied target files from the supplied source files using the supplied action. Action may be any type that the Builder constructor will accept for an action.

**Configure** (\*args, \*\*kw)

**Decider** (function)

**Default** (\*targets)

**Depends** (target, dependency)

Explicitly specify that ‘target’s depend on ‘dependency’.

**Detect** (progs)

Return the first available program in progs.

**Parameters:** **progs** (*str or list*) – one or more command names to check for

**Returns str:** first name from progs that can be found.

**Dictionary** (\*args)

Return construction variables from an environment.

**Parameters:** **\*args** (*optional*) – variable names to look up

**Returns:** If *args* omitted, the dictionary of all construction variables. If one arg, the corresponding value is returned. If more than one arg, a list of values is returned.

**Raises:** **KeyError** – if any of *args* is not in the construction environment.

**Dir** (name, \*args, \*\*kw)

**Dump** (key=None, format='pretty')

Return construction variables serialized to a string.

**Parameters:**

- **key** (*optional*) – if None, format the whole dict of variables. Else format the value of *key* (Default value = None)

- **format** (*optional*) – specify the format to serialize to. “pretty” generates a pretty-printed string, “json” a JSON-formatted string. (Default value = None, equivalent to “pretty”)

**EnsurePythonVersion** (major, minor)

Exit abnormally if the Python version is not late enough.

**EnsureSConsVersion** (major, minor, revision=0)

Exit abnormally if the SCons version is not late enough.

**Entry** (name, \*args, \*\*kw)

**Environment** (\*\*kw)

**Execute** (action, \*args, \*\*kw)

Directly execute an action through an Environment

**Exit** (value=0)

**Export** (\*vars, \*\*kw)

**File** (name, \*args, \*\*kw)

**FindFile** (file, dirs)

**FindInstalledFiles** ()

returns the list of all targets of the Install and InstallAs Builder.

**FindIndexes** (paths, prefix, suffix)

Search a list of paths for something that matches the prefix and suffix.

**Parameters:**

- **paths** – the list of paths or nodes.
- **prefix** – construction variable for the prefix.
- **suffix** – construction variable for the suffix.

Returns: the matched path or None

**FindSourceFiles** (node=' . ')

returns a list of all source files.

**Flatten** (sequence)

**GetBuildPath** (files)

**GetLaunchDir** ()

**GetOption** (name)

**Glob** (pattern, ondisk=True, source=False, strings=False, exclude=None)

**Help** (text, append=False)

**Ignore** (target, dependency)

Ignore a dependency.

**Import** (\*vars)

**Literal** (string)

**Local** (\*targets)

**MergeFlags** (args, unique=1, dict=None)

Merge the dict in args into the construction variables of this env, or the passed-in dict. If args is not a dict, it is converted into a dict using ParseFlags. If unique is not set, the flags are appended rather than merged.

**NoCache** (\*targets)

Tags a target so that it will not be cached

**NoClean** (\*targets)

Tags a target so that it will not be cleaned by -c

**Override** (overrides)

Produce a modified environment whose variables are overridden by the overrides dictionaries. "overrides" is a dictionary that will override the variables of this environment.

This function is much more efficient than Clone() or creating a new Environment because it doesn't copy the construction environment dictionary, it just wraps the underlying construction environment, and doesn't even create a wrapper object if there are no overrides.

**ParseConfig** (command, function=None, unique=1)

Use the specified function to parse the output of the command in order to modify the current environment. The 'command' can be a string or a list of strings representing a command and its arguments. 'Function' is an optional argument that takes the environment, the output of the command, and the unique flag. If no function is specified, MergeFlags, which treats the output as the result of a typical 'X-config' command (i.e. gtk-config), will merge the output into the appropriate variables.

**ParseDepends** (filename, must\_exist=None, only\_one=0)

Parse a mkdep-style file for explicit dependencies. This is completely abusable, and should be unnecessary in the "normal" case of proper SCons configuration, but it may help make the transition from a Make hierarchy easier for some people to swallow. It can also be genuinely useful when using a tool that can write a .d file, but for which writing a scanner would be too complicated.

**ParseFlags** (\*flags)

Parse the set of flags and return a dict with the flags placed in the appropriate entry. The flags are treated as a typical set of command-line flags for a GNU-like toolchain and used to populate the entries in the dict immediately below. If one of the flag strings begins with a bang (exclamation mark), it is assumed to be a command and the rest of the string is executed; the result of that evaluation is then added to the dict.

**Platform** (platform)

**Precious** (\*targets)

**Prepend** (\*\*kw)

Prepend values to existing construction variables in an Environment.

**PrependENVPath** (name, newpath, envname='ENV', sep=':', delete\_existing=1)

Prepend path elements to the path 'name' in the 'ENV' dictionary for this environment. Will only add any particular path once, and will normpath and normcase all paths to help assure this. This can also handle the case where the env variable is a list instead of a string.

If delete\_existing is 0, a newpath which is already in the path will not be moved to the front (it will be left where it is).

**PrependUnique** (delete\_existing=0, \*\*kw)

Prepend values to existing construction variables in an Environment, if they're not already there. If delete\_existing is 1, removes existing values first, so values move to front.

**Pseudo** (\*targets)

**PyPackageDir** (modulename)

**RemoveMethod** (function)

Removes the specified function's MethodWrapper from the added\_methods list, so we don't re-bind it when making a clone.

**Replace** (\*\*kw)

Replace existing construction variables in an Environment with new construction variables and/or values.

**ReplaceIxes** (path, old\_prefix, old\_suffix, new\_prefix, new\_suffix)

Replace old\_prefix with new\_prefix and old\_suffix with new\_suffix.

env - Environment used to interpolate variables. path - the path that will be modified. old\_prefix - construction variable for the old prefix. old\_suffix - construction variable for the old suffix. new\_prefix - construction variable for the new prefix. new\_suffix - construction variable for the new suffix.

**Repository** (\*dirs, \*\*kw)

**Requires** (target, prerequisite)

Specify that 'prerequisite' must be built before 'target', (but 'target' does not actually depend on 'prerequisite' and need not be rebuilt if it changes).

**SConscript** (\*ls, \*\*kw)

Execute SCons configuration files.

**Parameters:** *\*Is* (*str* or *list*) – configuration file(s) to execute.

**Keyword**

**Arguments:**

- **dirs** (*list*) – execute SConscript in each listed directory.
- **name** (*str*) – execute script ‘name’ (used only with ‘dirs’).
- **exports** (*list* or *dict*) – locally export variables the called script(s) can import.
- **variant\_dir** (*str*) – mirror sources needed for the build in a variant directory to allow building in it.
- **duplicate** (*bool*) – physically duplicate sources instead of just adjusting paths of derived files (used only with ‘variant\_dir’) (default is True).
- **must\_exist** (*bool*) – fail if a requested script is missing (default is False, default is deprecated).

**Returns:** list of variables returned by the called script

**Raises:** **UserError** – a script is not found and such exceptions are enabled.

**SConscriptChdir** (*flag*)

**SConsignFile** (*name*=' .sconsign', *dbm\_module*=None)

**Scanner** (*\*args*, *\*\*kw*)

**SetDefault** (*\*\*kw*)

**SetOption** (*name*, *value*)

**SideEffect** (*side\_effect*, *target*)

Tell scons that *side\_effects* are built as side effects of building targets.

**Split** (*arg*)

This function converts a string or list into a list of strings or Nodes. This makes things easier for users by allowing files to be specified as a white-space separated list to be split.

**The input rules are:**

- A single string containing names separated by spaces. These will be split apart at the spaces.
- A single Node instance
- A list containing either strings or Node instances. Any strings in the list are not split at spaces.

In all cases, the function returns a list of Nodes and strings.

**Tool** (*tool*, *toolpath*=None, *\*\*kw*)

**Value** (*value*, *built\_value*=None, *name*=None)

**VariantDir** (*variant\_dir*, *src\_dir*, *duplicate*=1)

**WhereIs** (*prog*, *path*=None, *pathext*=None, *reject*=[ ])

Find prog in the path.

**\_canonicalize** (*path*)

**\_changed\_build** (*dependency*, *target*, *prev\_ni*, *repo\_node*=None)

**\_changed\_content** (*dependency*, *target*, *prev\_ni*, *repo\_node*=None)

**\_changed\_source** (*dependency*, *target*, *prev\_ni*, *repo\_node*=None)

**\_changed\_timestamp\_match** (*dependency*, *target*, *prev\_ni*, *repo\_node*=None)

**`_changed_timestamp_newer`** (dependency, target, prev\_ni, repo\_node=None)

**`_changed_timestamp_then_content`** (dependency, target, prev\_ni, repo\_node=None)

**`_copy2_from_cache`** (src, dst)

**`_copy_from_cache`** (src, dst)

**`_exceeds_version`** (major, minor, v\_major, v\_minor)

Return 1 if 'major' and 'minor' are greater than the version in 'v\_major' and 'v\_minor', and 0 otherwise.

**`_find_toolpath_dir`** (tp)

**`_get_SConscript_filenames`** (ls, kw)

Convert the parameters passed to SConscript() calls into a list of files and export variables. If the parameters are invalid, throws SCons.Errors.UserError. Returns a tuple (l, e) where l is a list of SConscript filenames and e is a list of exports.

**`_get_major_minor_revision`** (version\_string)

Split a version string into major, minor and (optionally) revision parts.

This is complicated by the fact that a version string can be something like 3.2b1.

**`_gsm`** ()

**`_init_special`** ()

Initial the dispatch tables for special handling of special construction variables.

**`_update`** (dict)

Update an environment's values directly, bypassing the normal checks that occur when users try to set items.

**`arg2nodes`** (args, node\_factory=<class 'SCons.Environment.\_Null'>, lookup\_list=<class 'SCons.Environment.\_Null'>, \*\*kw)

**`backtick`** (command)

**`get`** (key, default=None)

Emulates the get() method of dictionaries.

**`get_CacheDir`** ()

**`get_builder`** (name)

Fetch the builder with the specified name from the environment.

**`get_factory`** (factory, default='File')

Return a factory function for creating Nodes for this construction environment.

**`get_scanner`** (skey)

Find the appropriate scanner given a key (usually a file suffix).

**`get_src_sig_type`** ()

**`get_tgt_sig_type`** ()

**`gvars`** ()

**`has_key`** (key)

Emulates the has\_key() method of dictionaries.

**`items`** ()

Emulates the items() method of dictionaries.

**keys ()**

Emulates the keys() method of dictionaries.

**lvars ()****scanner\_map\_delete (kw=None)**

Delete the cached scanner map (if we need to).

**subst (string, raw=0, target=None, source=None, conv=None, executor=None)**

Recursively interpolates construction variables from the Environment into the specified string, returning the expanded result. Construction variables are specified by a \$ prefix in the string and begin with an initial underscore or alphabetic character followed by any number of underscores or alphanumeric characters. The construction variable names may be surrounded by curly braces to separate the name from trailing characters.

**subst\_kw (kw, raw=0, target=None, source=None)****subst\_list (string, raw=0, target=None, source=None, conv=None, executor=None)**

Calls through to SCons.Subst.scons\_subst\_list(). See the documentation for that function.

**subst\_path (path, target=None, source=None)**

Substitute a path list, turning EntryProxies into Nodes and leaving Nodes (and other objects) as-is.

**subst\_target\_source (string, raw=0, target=None, source=None, conv=None, executor=None)**

Recursively interpolates construction variables from the Environment into the specified string, returning the expanded result. Construction variables are specified by a \$ prefix in the string and begin with an initial underscore or alphabetic character followed by any number of underscores or alphanumeric characters. The construction variable names may be surrounded by curly braces to separate the name from trailing characters.

**values ()**

Emulates the values() method of dictionaries.

**exception SCons.Script.SConscript.SConscriptReturn**

Bases: **Exception**

**args****with\_traceback ()**

Exception.with\_traceback(tb) – set self.\_\_traceback\_\_ to tb and return self.

SCons.Script.SConscript.**SConscript\_exception** (file=<\_io.TextIOWrapper name='<stderr>' mode='w' encoding='utf-8'>)

Print an exception stack trace just for the SConscript file(s). This will show users who have Python errors where the problem is, without cluttering the output with all of the internal calls leading up to where we exec the SConscript.

SCons.Script.SConscript.**\_\_SConscript** (fs, \*files, \*\*kw)

SCons.Script.SConscript.**annotate** (node)

Annotate a node with the stack frame describing the SConscript file and line number that created it.

SCons.Script.SConscript.**compute\_exports** (exports)

Compute a dictionary of exports given one of the parameters to the Export() function or the exports argument to SConscript().

SCons.Script.SConscript.**get\_DefaultEnvironmentProxy** ()

SCons.Script.SConscript.**get\_calling\_namespaces** ()

Return the locals and globals for the function that called into this module in the current call stack.

SCons.Script.SConscript.**handle\_missing\_SConscript** (f, must\_exist=None)

Take appropriate action on missing file in SConscript() call.

Print a warning or raise an exception on missing file. On first warning, print a deprecation message.

**Parameters:**

- **f** (*str*) – path of missing configuration file
- **must\_exist** (*bool*) – raise exception if file does not exist

**Raises:** **UserError** if 'must\_exist' is True or if **global** – SCons.Script.\_no\_missing\_sconscript is True.

## Module contents

SCons.Script

This file implements the main() function used by the sconscript.

Architecturally, this *is* the sconscript, and will likely only be called from the external “sconscript” wrapper. Consequently, anything here should not be, or be considered, part of the build engine. If it’s something that we expect other software to want to use, it should go in some other module. If it’s specific to the “sconscript” script invocation, it goes here.

SCons.Script.**HelpFunction** (text, append=False)

*class* SCons.Script.**TargetList** (initlist=None)

Bases: **collections.UserList**

**\_UserList\_\_cast** (other)

**\_abc\_impl** = <\_abc\_data object>

**\_add\_Default** (list)

**\_clear** ()

**\_do\_nothing** (\*args, \*\*kw)

**append** (item)

S.append(value) – append value to the end of the sequence

**clear** () → None -- remove all items from S

**copy** ()

**count** (value) → integer -- return number of occurrences of value

**extend** (other)

S.extend(iterable) – extend sequence by appending elements from the iterable

**index** (value[, start[, stop]]) → integer -- return first index of value.

Raises ValueError if the value is not present.

Supporting start and stop arguments is optional, but recommended.

**insert** (i, item)

S.insert(index, value) – insert value before index

**pop** ([, index]) → item -- remove and return item at index (default last).

Raise IndexError if list is empty or index is out of range.

**remove** (item)

S.remove(value) – remove first occurrence of value. Raise ValueError if the value is not present.

**reverse** ()

S.reverse() – reverse *IN PLACE*

**sort** (\*args, \*\*kws)

## SCons.Tool package

```
SCons.Script.Variables (files=None, args={})
SCons.Script._Add_Arguments (alist)
SCons.Script._Add_Targets (tlist)
SCons.Script._Get_Default_Targets (d, fs)
SCons.Script._Set_Default_Targets (env, tlist)
SCons.Script._Set_Default_Targets_Has_Been_Called (d, fs)
SCons.Script._Set_Default_Targets_Has_Not_Been_Called (d, fs)
SCons.Script.set_missing_sconscript_error (flag=1)
    Set behavior on missing file in SConscript() call. Returns previous value
```

## SCons.Tool package

### Module contents

SCons.Tool

SCons tool selection.

This looks for modules that define a callable object that can modify a construction environment as appropriate for a given tool (or tool chain).

Note that because this subsystem just *selects* a callable that can modify a construction environment, it's possible for people to define their own "tool specification" in an arbitrary callable function. No one needs to use or tie in to this subsystem in order to roll their own tool definition.

SCons.Tool.**CreateJarBuilder** (env)

The Jar builder expects a list of class files which it can package into a jar file.

The jar tool provides an interface for passing other types of java files such as .java, directories or swig interfaces and will build them to class files in which it can package into the jar.

SCons.Tool.**CreateJavaClassDirBuilder** (env)

SCons.Tool.**CreateJavaClassFileBuilder** (env)

SCons.Tool.**CreateJavaFileBuilder** (env)

SCons.Tool.**CreateJavaHBuilder** (env)

SCons.Tool.**CreateLibSymlinks** (env, symlinks)

Physically creates symlinks. The symlinks argument must be a list in form [ (link, linktarget), ... ], where link and linktarget are SCons nodes.

SCons.Tool.**EmitLibSymlinks** (env, symlinks, libnode, \*\*kw)

Used by emitters to handle (shared/versioned) library symlinks

SCons.Tool.**FindAllTools** (tools, env)

SCons.Tool.**FindTool** (tools, env)

SCons.Tool.**Initializers** (env)

SCons.Tool.**LibSymlinksActionFunction** (target, source, env)

SCons.Tool.**LibSymlinksStrFun** (target, source, env, \*args)

SCons.Tool.**StringizeLibSymlinks** (symlinks)

Converts list with pairs of nodes to list with pairs of node paths (strings). Used mainly for debugging.

*class* SCons.Tool.**Tool** (name, toolpath=None, \*\*kw)

Bases: **object**

**\_load\_dotted\_module\_py2** (short\_name, full\_name, searchpaths=None)

**\_tool\_module** ()

```
class SCons.Tool.ToolInitializer (env, tools, names)
```

Bases: **object**

A class for delayed initialization of Tools modules.

Instances of this class associate a list of Tool modules with a list of Builder method names that will be added by those Tool modules. As part of instantiating this object for a particular construction environment, we also add the appropriate ToolInitializerMethod objects for the various Builder methods that we want to use to delay Tool searches until necessary.

**apply\_tools** (env)

Searches the list of associated Tool modules for one that exists, and applies that to the construction environment.

**remove\_methods** (env)

Removes the methods that were added by the tool initialization so we no longer copy and re-bind them when the construction environment gets cloned.

```
class SCons.Tool.ToolInitializerMethod (name, initializer)
```

Bases: **object**

This is added to a construction environment in place of a method(s) normally called for a Builder (env.Object, env.StaticObject, etc.). When called, it has its associated ToolInitializer object search the specified list of tools and apply the first one that exists to the construction environment. It then calls whatever builder was (presumably) added to the construction environment in place of this particular instance.

**get\_builder** (env)

Returns the appropriate real Builder for this method name after having the associated ToolInitializer object apply the appropriate Tool module.

```
class SCons.Tool._ImpLibInfoSupport
```

Bases: **object**

**get\_lib\_noversionlinks** (env, \*args, \*\*kw)

**get\_lib\_prefix** (env, \*args, \*\*kw)

**get\_lib\_suffix** (env, \*args, \*\*kw)

**get\_lib\_version** (env, \*args, \*\*kw)

**property** libtype

```
class SCons.Tool._LdModInfoSupport
```

Bases: **object**

**get\_lib\_noversionlinks** (env, \*args, \*\*kw)

**get\_lib\_prefix** (env, \*args, \*\*kw)

**get\_lib\_suffix** (env, \*args, \*\*kw)

**get\_lib\_version** (env, \*args, \*\*kw)

**property** libtype

```
class SCons.Tool._LibInfoGeneratorBase (libtype, infoname)
```

Bases: **object**

Generator base class for library-related info such as suffixes for versioned libraries, symlink maps, sonames etc. It handles commonities of SharedLibrary and LoadableModule

```
_support_classes = {'ImpLib': <class 'SCons.Tool._ImpLibInfoSupport'>, 'LdMod': <class 'SCons.Tool._LdModInfoSupport'>, 'ShLib': <class 'SCons.Tool._ShLibInfoSupport'>}
```

```
generate_versioned_lib_info (env, args, result=None, **kw)
```

```
get_lib_noversion_symlinks (env, *args, **kw)
```

```
get_lib_prefix (env, *args, **kw)
```

```
get_lib_suffix (env, *args, **kw)
```

```
get_lib_version (env, *args, **kw)
```

```
get_versioned_lib_info_generator (**kw)
```

**property** libtype

```
class SCons.Tool._LibNameGenerator (libtype)
```

```
Bases: SCons.Tool._LibInfoGeneratorBase
```

Generates “unmangled” library name from a library file node.

Generally, it’s thought to revert modifications done by prefix/suffix generators (`_LibPrefixGenerator`/`_LibSuffixGenerator`) used by a library builder. For example, on `gnulink` the suffix generator used by `SharedLibrary` builder appends `$SHLIBVERSION` to `$SHLIBSUFFIX` producing node name which ends with `“$SHLIBSUFFIX.$SHLIBVERSION”`. Correspondingly, the implementation of `_LibNameGenerator` replaces `“$SHLIBSUFFIX.$SHLIBVERSION”` with `“$SHLIBSUFFIX”` in the node’s basename. So that, if `$SHLIBSUFFIX` is `“.so”`, `$SHLIBVERSION` is `“0.1.2”` and the node path is `“/foo/bar/libfoo.so.0.1.2”`, the `_LibNameGenerator` shall return `“libfoo.so”`. Other link tools may implement it’s own way of library name unmangling.

```
_support_classes = {'ImpLib': <class 'SCons.Tool._ImpLibInfoSupport'>, 'LdMod': <class 'SCons.Tool._LdModInfoSupport'>, 'ShLib': <class 'SCons.Tool._ShLibInfoSupport'>}
```

```
generate_versioned_lib_info (env, args, result=None, **kw)
```

```
get_lib_noversion_symlinks (env, *args, **kw)
```

```
get_lib_prefix (env, *args, **kw)
```

```
get_lib_suffix (env, *args, **kw)
```

```
get_lib_version (env, *args, **kw)
```

```
get_versioned_lib_info_generator (**kw)
```

**property** libtype

```
class SCons.Tool._LibPrefixGenerator (libtype)
```

```
Bases: SCons.Tool._LibInfoGeneratorBase
```

Library prefix generator, used as `target_prefix` in `SharedLibrary` and `LoadableModule` builders

```
_support_classes = {'ImpLib': <class 'SCons.Tool._ImpLibInfoSupport'>, 'LdMod': <class 'SCons.Tool._LdModInfoSupport'>, 'ShLib': <class 'SCons.Tool._ShLibInfoSupport'>}
```

```
generate_versioned_lib_info (env, args, result=None, **kw)
```

```
get_lib_noversion_symlinks (env, *args, **kw)
```

```
get_lib_prefix (env, *args, **kw)
```

```
get_lib_suffix (env, *args, **kw)
```

```
get_lib_version (env, *args, **kw)
```

```
get_versioned_lib_info_generator (**kw)
```

**property libtype**

```
class SCons.Tool._LibSonameGenerator (libtype)
```

```
  Bases: SCons.Tool._LibInfoGeneratorBase
```

```
  Library soname generator. Returns library soname (e.g. libfoo.so.0) for a given node (e.g. /foo/bar/libfoo.so.0.1.2)
```

```
  _support_classes = {'ImpLib': <class 'SCons.Tool._ImpLibInfoSupport'>, 'LdMod': <class 'SCons.Tool._LdModInfoSupport'>, 'ShLib': <class 'SCons.Tool._ShLibInfoSupport'>}
```

```
  generate_versioned_lib_info (env, args, result=None, **kw)
```

```
  get_lib_noversion_symlinks (env, *args, **kw)
```

```
  get_lib_prefix (env, *args, **kw)
```

```
  get_lib_suffix (env, *args, **kw)
```

```
  get_lib_version (env, *args, **kw)
```

```
  get_versioned_lib_info_generator (**kw)
```

**property libtype**

```
class SCons.Tool._LibSuffixGenerator (libtype)
```

```
  Bases: SCons.Tool._LibInfoGeneratorBase
```

```
  Library suffix generator, used as target_suffix in SharedLibrary and LoadableModule builders
```

```
  _support_classes = {'ImpLib': <class 'SCons.Tool._ImpLibInfoSupport'>, 'LdMod': <class 'SCons.Tool._LdModInfoSupport'>, 'ShLib': <class 'SCons.Tool._ShLibInfoSupport'>}
```

```
  generate_versioned_lib_info (env, args, result=None, **kw)
```

```
  get_lib_noversion_symlinks (env, *args, **kw)
```

```
  get_lib_prefix (env, *args, **kw)
```

```
  get_lib_suffix (env, *args, **kw)
```

```
  get_lib_version (env, *args, **kw)
```

```
  get_versioned_lib_info_generator (**kw)
```

**property libtype**

```
class SCons.Tool._LibSymlinkGenerator (libtype)
```

```
  Bases: SCons.Tool._LibInfoGeneratorBase
```

```
  Library symlink map generator. It generates a list of symlinks that should be created by SharedLibrary or LoadableModule builders
```

```
  _support_classes = {'ImpLib': <class 'SCons.Tool._ImpLibInfoSupport'>, 'LdMod': <class 'SCons.Tool._LdModInfoSupport'>, 'ShLib': <class 'SCons.Tool._ShLibInfoSupport'>}
```

```
  generate_versioned_lib_info (env, args, result=None, **kw)
```

```
  get_lib_noversion_symlinks (env, *args, **kw)
```

```
  get_lib_prefix (env, *args, **kw)
```

```
  get_lib_suffix (env, *args, **kw)
```

```
  get_lib_version (env, *args, **kw)
```

```
get_versioned_lib_info_generator (**kw)
```

*property* libtype

```
class SCons.Tool._ShLibInfoSupport
```

```
Bases: object
```

```
get_lib_noversionsymlinks (env, *args, **kw)
```

```
get_lib_prefix (env, *args, **kw)
```

```
get_lib_suffix (env, *args, **kw)
```

```
get_lib_version (env, *args, **kw)
```

*property* libtype

```
SCons.Tool._call_env_subst (env, string, *args, **kw)
```

```
SCons.Tool._call_linker_cb (env, callback, args, result=None)
```

Returns the result of `env['LINKCALLBACKS'][callback](args)` if `env['LINKCALLBACKS']` is a dictionary and `env['LINKCALLBACKS'][callback]` is callable. If these conditions are not met, return the value provided as the `*result` argument. This function is mainly used for generating library info such as versioned suffixes, symlink maps, sonames etc. by delegating the core job to callbacks configured by current linker tool

```
SCons.Tool.createCFileBuilders (env)
```

This is a utility function that creates the CFile/CXXFile Builders in an Environment if they are not there already. If they are there already, we return the existing ones. This is a separate function because soooo many Tools use this functionality. The return is a 2-tuple of (CFile, CXXFile)

```
SCons.Tool.createLoadableModuleBuilder (env)
```

This is a utility function that creates the LoadableModule Builder in an Environment if it is not there already. If it is already there, we return the existing one.

```
SCons.Tool.createObjBuilders (env)
```

This is a utility function that creates the StaticObject and SharedObject Builders in an Environment if they are not there already. If they are there already, we return the existing ones. This is a separate function because soooo many Tools use this functionality. The return is a 2-tuple of (StaticObject, SharedObject)

```
SCons.Tool.createProgBuilder (env)
```

This is a utility function that creates the Program Builder in an Environment if it is not there already. If it is already there, we return the existing one.

```
SCons.Tool.createSharedLibBuilder (env)
```

This is a utility function that creates the SharedLibrary Builder in an Environment if it is not there already. If it is already there, we return the existing one.

```
SCons.Tool.createStaticLibBuilder (env)
```

This is a utility function that creates the StaticLibrary Builder in an Environment if it is not there already. If it is already there, we return the existing one.

```
SCons.Tool.find_program_path (env, key_program, default_paths=None)
```

Find the location of a tool using various means. Mainly for windows where tools aren't all installed in /usr/bin, etc.

**Parameters:**

- **env** – Current Construction Environment.
- **key\_program** – Tool to locate.
- **default\_paths** – List of additional paths this tool might be found in.

```
SCons.Tool.tool_list (platform, env)
```

## SCons.Variables package

### Submodules

#### SCons.Variables.BoolVariable module

SCons.Variables.BoolVariable

This file defines the option type for SCons implementing true/false values.

Usage example:

```
opts = Variables()
opts.Add(BoolVariable('embedded', 'build for an embedded system', 0))
...
if env['embedded'] == 1:
...
```

SCons.Variables.BoolVariable.**BoolVariable** (key, help, default)

The input parameters describe a boolean option, thus they are returned with the correct converter and validator appended. The 'help' text will be appended by '(yes|no)' to show the valid values. The result is usable for input to `opts.Add()`.

#### SCons.Variables.EnumVariable module

SCons.Variables.EnumVariable

This file defines the option type for SCons allowing only specified input-values.

Usage example:

```
opts = Variables()
opts.Add(EnumVariable('debug', 'debug output and symbols', 'no',
                    allowed_values=('yes', 'no', 'full'),
                    map={}, ignorecase=2))
...
if env['debug'] == 'full':
...
```

SCons.Variables.EnumVariable.**EnumVariable** (key, help, default, allowed\_values, map={}, ignorecase=0)

The input parameters describe an option with only certain values allowed. They are returned with an appropriate converter and validator appended. The result is usable for input to `Variables.Add()`.

'key' and 'default' are the values to be passed on to `Variables.Add()`.

'help' will be appended by the allowed values automatically

'allowed\_values' is a list of strings, which are allowed as values for this option.

The 'map'-dictionary may be used for converting the input value into canonical values (e.g. for aliases).

'ignorecase' defines the behaviour of the validator:

If `ignorecase == 0`, the validator/converter are case-sensitive. If `ignorecase == 1`, the validator/converter are case-insensitive. If `ignorecase == 2`, the validator/converter is case-insensitive and the converted value will always be lower-case.

The 'validator' tests whether the value is in the list of allowed values. The 'converter' converts input values according to the given 'map'-dictionary (unmapped input values are returned unchanged).

#### SCons.Variables.ListVariable module

SCons.Variables.ListVariable

This file defines the option type for SCons implementing 'lists'.

A 'list' option may either be 'all', 'none' or a list of names separated by comma. After the option has been processed, the option value holds either the named list elements, all list elements or no list elements at all.

Usage example:

```
list_of_libs = Split('x11 gl qt ical')

opts = Variables()
opts.Add(ListVariable('shared',
                    'libraries to build as shared libraries',
                    'all',
                    elems = list_of_libs))

...
for lib in list_of_libs:
    if lib in env['shared']:
        env.SharedObject(...)
    else:
        env.Object(...)
```

SCons.Variables.ListVariable.**ListVariable** (key, help, default, names, map={})

The input parameters describe a 'package list' option, thus they are returned with the correct converter and validator appended. The result is usable for input to opts.Add() .

A 'package list' option may either be 'all', 'none' or a list of package names (separated by space).

## ***SCons.Variables.PackageVariable module***

SCons.Variables.PackageVariable

This file defines the option type for SCons implementing 'package activation'.

To be used whenever a 'package' may be enabled/disabled and the package path may be specified.

Usage example:

### **Examples:**

x11=no (disables X11 support) x11=yes (will search for the package installation dir) x11=/usr/local/X11 (will check this path for existence)

To replace autoconf's `--with-xxx=yyy`

```
opts = Variables()
opts.Add(PackageVariable('x11',
                        'use X11 installed here (yes = search some places',
                        'yes'))

...
if env['x11'] == True:
    dir = ... search X11 in some standard places ...
    env['x11'] = dir
if env['x11']:
    ... build with x11 ...
```

SCons.Variables.PackageVariable.**PackageVariable** (key, help, default, searchfunc=None)

The input parameters describe a 'package list' option, thus they are returned with the correct converter and validator appended. The result is usable for input to opts.Add() .

A 'package list' option may either be 'all', 'none' or a list of package names (separated by space).

## ***SCons.Variables.PathVariable module***

SCons.Variables.PathVariable

This file defines an option type for SCons implementing path settings.

To be used whenever a user-specified path override should be allowed.

### **Arguments to PathVariable are:**

option-name = name of this option on the command line (e.g. "prefix") option-help = help string for option  
option-dflt = default value for this option validator = [optional] validator for option value. Predefined validators are:

PathAccept – accepts any path setting; no validation  
 PathsDir – path must be an existing directory  
 PathsDirCreate – path must be a dir; will create  
 PathsFile – path must be a file  
 PathExists – path must exist (any type) [default]

The validator is a function that is called and which should return True or False to indicate if the path is valid. The arguments to the validator function are: (key, val, env). The key is the name of the option, the val is the path specified for the option, and the env is the env to which the Options have been added.

Usage example:

```
Examples:
    prefix=/usr/local

opts = Variables()

opts = Variables()
opts.Add(PathVariable('qtdir',
                     'where the root of Qt is installed',
                     qtdir, PathIsDir))
opts.Add(PathVariable('qt_includes',
                     'where the Qt includes are installed',
                     '$qtdir/includes', PathIsDirCreate))
opts.Add(PathVariable('qt_libraries',
                     'where the Qt library is installed',
                     '$qtdir/lib'))
```

## Module contents

SCons.Variables

This file defines the Variables class that is used to add user-friendly customizable variables to an SCons build.

`class SCons.Variables.Variables (files=None, args=None, is_global=True)`

Bases: **object**

Holds all the options, updates the environment with the variables, and renders the help text.

If `is_global` is True, this is a singleton, create only once.

### Parameters:

- **files** (*optional*) – List of option configuration files to load (backward compatibility). If a single string is passed it is automatically placed in a file list (Default value = None)
- **args** (*optional*) – dictionary to override values set from *files*. (Default value = None)
- **is\_global** (*optional*) – global instance? (Default value = True)

`Add (key, help=' ', default=None, validator=None, converter=None, **kw)`

Add an option.

### Parameters:

- **key** – the name of the variable, or a list or tuple of arguments
- **help** – optional help text for the options (Default value = "")
- **default** – optional default value for option (Default value = None)
- **validator** – optional function called to validate the option's value (Default value = None)
- **converter** – optional function to be called to convert the option's value before putting it in the environment. (Default value = None)
- **\*\*kw** – keyword args, unused.

`AddVariables (*optlist)`

Add a list of options.

Each list element is a tuple/list of arguments to be passed on to the underlying method for adding options.

Example:

```
opt.AddVariables(
    ('debug', '', 0),
    ('CC', 'The C compiler'),
    ('VALIDATE', 'An option for testing validation', 'notset', validator, None),
)
```

**FormatVariableHelpText** (env, key, help, default, actual, aliases=[])

**GenerateHelpText** (env, sort=None)

Generate the help text for the options.

**env** - an environment that is used to get the current values of the options.

**cmp** - Either a function as follows: The specific sort function should take two arguments and return -1, 0 or 1

or a boolean to indicate if it should be sorted.

**Save** (filename, env)

Saves all the options in the given file. This file can then be used to load the options next run. This can be used to create an option cache file.

filename - Name of the file to save into env - the environment get the option values from

**UnknownVariables** ()

Returns any options in the specified arguments lists that were not known, declared options in this object.

**Update** (env, args=None)

Update an environment with the option variables.

env - the environment to update.

**\_do\_add** (key, help='', default=None, validator=None, converter=None)

**format** = '\n%s: %s\n default: %s\n actual: %s\n'

**format\_** = '\n%s: %s\n default: %s\n actual: %s\n aliases: %s\n'

**instance** = None

**keys** ()

Returns the keywords for the options

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