8.9.2 Class Variables ................................................. 74

9 Module SCons.Errors .............................................. 75
9.1 Functions ......................................................... 75
9.2 Variables ......................................................... 75
9.3 Class BuildError ................................................ 75
  9.3.1 Methods ..................................................... 76
  9.3.2 Properties .................................................. 78
9.4 Class InternalError ............................................. 78
  9.4.1 Methods ..................................................... 78
  9.4.2 Properties .................................................. 79
9.5 Class UserError ................................................ 80
  9.5.1 Methods ..................................................... 80
  9.5.2 Properties .................................................. 81
9.6 Class StopError ................................................ 81
  9.6.1 Methods ..................................................... 82
  9.6.2 Properties .................................................. 83
9.7 Class EnvironmentError ....................................... 83
  9.7.1 Methods ..................................................... 83
  9.7.2 Properties .................................................. 84
9.8 Class ExplicitExit ............................................. 85
  9.8.1 Methods ..................................................... 85
  9.8.2 Properties .................................................. 86

10 Module SCons.Executor ........................................ 87
10.1 Functions ....................................................... 87
10.2 Variables ....................................................... 87
10.3 Class Executor ................................................ 87
  10.3.1 Methods ..................................................... 87
  10.3.2 Class Variables .......................................... 89
10.4 Class Null ....................................................... 89
  10.4.1 Methods ..................................................... 89

11 Module SCons.Job ................................................ 91
11.1 Variables ....................................................... 91
11.2 Class InterruptState ......................................... 91
  11.2.1 Methods ..................................................... 91
11.3 Class Jobs ....................................................... 91
  11.3.1 Methods ..................................................... 91
11.4 Class Serial ..................................................... 92
  11.4.1 Methods ..................................................... 92
11.5 Class Worker ..................................................... 93
  11.5.1 Methods ..................................................... 93
  11.5.2 Properties .................................................. 94
11.6 Class ThreadPool .............................................. 94
  11.6.1 Methods ..................................................... 94
11.7 Class Parallel .................................................. 95
  11.7.1 Methods ..................................................... 95

12 Module SCons.Memoize .......................................... 96
12.1 Functions ....................................................... 97
12.2 Variables ....................................................... 98
# Contents

## 12.3 Class Counter
- 12.3.1 Methods

## 12.4 Class CountValue
- 12.4.1 Methods

## 12.5 Class CountDict
- 12.5.1 Methods

## 12.6 Class Memoizer
- 12.6.1 Methods

## 12.7 Class Memoized_Metaclass
- 12.7.1 Methods
- 12.7.2 Properties

## 13 Package SCons.Node
- 13.1 Modules
- 13.2 Functions
- 13.3 Variables
- 13.4 Class NodeInfoBase
  - 13.4.1 Methods
  - 13.4.2 Class Variables
- 13.5 Class BuildInfoBase
  - 13.5.1 Methods
  - 13.5.2 Class Variables
- 13.6 Class Node
  - 13.6.1 Methods
  - 13.6.2 Class Variables
- 13.7 Class NodeList
  - 13.7.1 Methods
- 13.8 Class Walker
  - 13.8.1 Methods

## 14 Module SCons.Node.Alias
- 14.1 Variables
- 14.2 Class AliasNameSpace
  - 14.2.1 Methods
- 14.3 Class AliasNodeInfo
  - 14.3.1 Methods
  - 14.3.2 Class Variables
- 14.4 Class AliasBuildInfo
  - 14.4.1 Methods
  - 14.4.2 Class Variables
- 14.5 Class Alias
  - 14.5.1 Methods
  - 14.5.2 Class Variables

## 15 Module SCons.Node.FS
- 15.1 Functions
- 15.2 Variables
- 15.3 Class EntryProxyAttributeError
  - 15.3.1 Methods
  - 15.3.2 Properties
- 15.4 Class DiskChecker
  - 15.4.1 Methods
# CONTENTS

15.5 Class EntryProxy .................................................. 136
  15.5.1 Methods .................................................. 136
  15.5.2 Class Variables ........................................... 137
15.6 Class Base ...................................................... 137
  15.6.1 Methods .................................................. 137
  15.6.2 Class Variables ........................................... 148
15.7 Class Entry ..................................................... 149
  15.7.1 Methods .................................................. 149
  15.7.2 Class Variables ........................................... 161
15.8 Class LocalFS .................................................... 161
  15.8.1 Methods .................................................. 161
  15.8.2 Class Variables ........................................... 162
15.9 Class FS .......................................................... 162
  15.9.1 Methods .................................................. 162
  15.9.2 Class Variables ........................................... 165
15.10 Class DirNodeInfo ................................................ 165
  15.10.1 Methods .................................................. 165
  15.10.2 Class Variables ........................................... 166
15.11 Class DirBuildInfo ................................................ 166
  15.11.1 Methods .................................................. 166
  15.11.2 Class Variables ........................................... 166
15.12 Class Dir ........................................................ 166
  15.12.1 Methods .................................................. 167
  15.12.2 Class Variables ........................................... 181
15.13 Class RootDir .................................................... 181
  15.13.1 Methods .................................................. 182
  15.13.2 Class Variables ........................................... 197
15.14 Class FileNodeInfo ................................................ 197
  15.14.1 Methods .................................................. 197
  15.14.2 Class Variables ........................................... 198
15.15 Class FileBuildInfo ................................................ 198
  15.15.1 Methods .................................................. 198
  15.15.2 Class Variables ........................................... 199
15.16 Class File ........................................................ 199
  15.16.1 Methods .................................................. 199
  15.16.2 Class Variables ........................................... 213
15.17 Class FileFinder .................................................. 213
  15.17.1 Methods .................................................. 213
  15.17.2 Class Variables ........................................... 214

16 Module SCons.Node.Python ........................................... 215
  16.1 Variables ..................................................... 215
  16.2 Class ValueNodeInfo ............................................ 215
    16.2.1 Methods .................................................. 215
    16.2.2 Class Variables ........................................... 215
  16.3 Class ValueBuildInfo ............................................ 216
    16.3.1 Methods .................................................. 216
    16.3.2 Class Variables ........................................... 216
  16.4 Class Value .................................................... 216
    16.4.1 Methods .................................................. 216
    16.4.2 Class Variables ........................................... 227
## Module SCons.Scanner.RC

- **Functions** on page 284
- **Variables** on page 284

## Package SCons.Script

- **Modules** on page 285
- **Functions** on page 285
- **Variables** on page 285
- **Class TargetList**
  - **Methods** on page 289

## Module SCons.Script.Interactive

- **Functions** on page 292
- **Variables** on page 292
- **Class SConsInteractiveCmd**
  - **Methods** on page 292
  - **Class Variables** on page 295

## Module SCons.Script.Main

- **Functions** on page 296
- **Variables** on page 296
- **Class SConsPrintHelpException**
  - **Methods** on page 297
  - **Properties** on page 298
- **Class Progressor**
  - **Methods** on page 299
  - **Class Variables** on page 299
- **Class BuildTask**
  - **Methods** on page 299
  - **Class Variables** on page 300
- **Class CleanTask**
  - **Methods** on page 303
- **Class QuestionTask**
  - **Methods** on page 307
- **Class TreePrinter**
  - **Methods** on page 311
- **Class FakeOptionParser**
  - **Methods** on page 311
  - **Class Variables** on page 311
- **Class Stats**
  - **Methods** on page 312
- **Class CountStats**
  - **Methods** on page 312
- **Class MemStats**
  - **Methods** on page 312

## Module SCons.Script.SConscript'

- **Functions** on page 314
- **Variables** on page 314
- **Class SConscriptReturn**
  - **Methods** on page 315
  - **Properties** on page 316
<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>32.4 Class Frame</td>
<td>316</td>
</tr>
<tr>
<td>32.4.1 Methods</td>
<td>317</td>
</tr>
<tr>
<td>32.5 Class SConsEnvironment</td>
<td>317</td>
</tr>
<tr>
<td>32.5.1 Methods</td>
<td>317</td>
</tr>
<tr>
<td>32.5.2 Class Variables</td>
<td>326</td>
</tr>
<tr>
<td>32.6 Class DefaultEnvironmentCall</td>
<td>326</td>
</tr>
<tr>
<td>32.6.1 Methods</td>
<td>326</td>
</tr>
<tr>
<td>33 Module SCons.Sig</td>
<td>327</td>
</tr>
<tr>
<td>33.1 Variables</td>
<td>327</td>
</tr>
<tr>
<td>33.2 Class MD5Null</td>
<td>327</td>
</tr>
<tr>
<td>33.2.1 Methods</td>
<td>327</td>
</tr>
<tr>
<td>33.3 Class TimeStampNull</td>
<td>328</td>
</tr>
<tr>
<td>33.3.1 Methods</td>
<td>328</td>
</tr>
<tr>
<td>34 Module SCons.Subst</td>
<td>329</td>
</tr>
<tr>
<td>34.1 Functions</td>
<td>329</td>
</tr>
<tr>
<td>34.2 Variables</td>
<td>330</td>
</tr>
<tr>
<td>34.3 Class Literal</td>
<td>330</td>
</tr>
<tr>
<td>34.3.1 Methods</td>
<td>330</td>
</tr>
<tr>
<td>34.4 Class SpecialAttrWrapper</td>
<td>331</td>
</tr>
<tr>
<td>34.4.1 Methods</td>
<td>331</td>
</tr>
<tr>
<td>34.5 Class CmdStringHolder</td>
<td>331</td>
</tr>
<tr>
<td>34.5.1 Methods</td>
<td>331</td>
</tr>
<tr>
<td>34.6 Class NLWrapper</td>
<td>334</td>
</tr>
<tr>
<td>34.6.1 Methods</td>
<td>334</td>
</tr>
<tr>
<td>34.7 Class Targets_or_Sources</td>
<td>335</td>
</tr>
<tr>
<td>34.7.1 Methods</td>
<td>335</td>
</tr>
<tr>
<td>34.8 Class Target_or_Source</td>
<td>336</td>
</tr>
<tr>
<td>34.8.1 Methods</td>
<td>337</td>
</tr>
<tr>
<td>35 Module SCons.Taskmaster</td>
<td>338</td>
</tr>
<tr>
<td>35.1 Functions</td>
<td>338</td>
</tr>
<tr>
<td>35.2 Variables</td>
<td>338</td>
</tr>
<tr>
<td>35.3 Class Stats</td>
<td>339</td>
</tr>
<tr>
<td>35.3.1 Methods</td>
<td>339</td>
</tr>
<tr>
<td>35.4 Class Task</td>
<td>339</td>
</tr>
<tr>
<td>35.4.1 Methods</td>
<td>339</td>
</tr>
<tr>
<td>35.5 Class Taskmaster</td>
<td>343</td>
</tr>
<tr>
<td>35.5.1 Methods</td>
<td>343</td>
</tr>
<tr>
<td>36 Module SCons.Util</td>
<td>346</td>
</tr>
<tr>
<td>36.1 Functions</td>
<td>346</td>
</tr>
<tr>
<td>36.2 Variables</td>
<td>351</td>
</tr>
<tr>
<td>36.3 Class CallableComposite</td>
<td>352</td>
</tr>
<tr>
<td>36.3.1 Methods</td>
<td>352</td>
</tr>
<tr>
<td>36.4 Class NodeList</td>
<td>354</td>
</tr>
<tr>
<td>36.4.1 Methods</td>
<td>354</td>
</tr>
<tr>
<td>36.5 Class DisplayEngine</td>
<td>356</td>
</tr>
<tr>
<td>36.5.1 Methods</td>
<td>356</td>
</tr>
<tr>
<td>36.6 Class mystr</td>
<td>356</td>
</tr>
<tr>
<td>36.6.1 Methods</td>
<td>356</td>
</tr>
</tbody>
</table>
36.6.2 Properties .............................................. 364
36.7 Class Proxy .............................................. 365
  36.7.1 Methods ............................................. 365
36.8 Class NoError ........................................... 366
  36.8.1 Methods ............................................. 366
36.8.2 Properties ........................................... 367
36.9 Class CLVar ............................................. 367
  36.9.1 Methods ............................................. 368
36.10 Class OrderedDict .................................... 369
  36.10.1 Methods ............................................ 369
36.11 Class Selector ....................................... 371
  36.11.1 Methods ............................................ 371
36.12 Class LogicalLines ................................ 372
  36.12.1 Methods ............................................ 372
36.13 Class UniqueList .................................. 372
  36.13.1 Methods ............................................ 372
36.14 Class Unbuffered .................................. 374
  36.14.1 Methods ............................................ 374
36.15 Class Null ............................................ 375
  36.15.1 Methods ............................................ 375

37 Package SCons.Variables ................................ 376
  37.1 Modules .............................................. 376
  37.2 Variables ............................................. 376
  37.3 Class Variables ..................................... 376
    37.3.1 Methods ........................................... 376
    37.3.2 Class Variables ................................ 378

38 Module SCons.Variables.BoolVariable’ ............ 379
  38.1 Functions ............................................. 379

39 Module SCons.Variables.EnumVariable’ ............ 380
  39.1 Functions ............................................. 380

40 Module SCons.Variables.ListVariable’ ............ 381
  40.1 Functions ............................................. 381

41 Module SCons.Variables.PackageVariable’ ......... 382
  41.1 Functions ............................................. 382

42 Module SCons.Variables.PathVariable’ ............. 383
  42.1 Variables ............................................. 383

43 Module SCons.Warnings ................................. 385
  43.1 Functions ............................................. 385
  43.2 Variables ............................................. 385
  43.3 Class Warning ....................................... 386
    43.3.1 Methods ........................................... 386
    43.3.2 Properties ....................................... 387
  43.4 Class CacheWriteErrorWarning .................... 388
    43.4.1 Methods ........................................... 388
    43.4.2 Properties ....................................... 389
  43.5 Class CorruptSConsignWarning ................... 389
43.6 Class DependencyWarning ................................................. 391
43.6.1 Methods ................................................................. 391
43.6.2 Properties ............................................................... 393
43.7 Class DeprecatedWarning ................................................ 393
43.7.1 Methods ................................................................. 393
43.7.2 Properties ............................................................... 394
43.8 Class DeprecatedCopyWarning ......................................... 395
43.8.1 Methods ................................................................. 395
43.8.2 Properties ............................................................... 396
43.9 Class DeprecatedOptionsWarning ..................................... 397
43.9.1 Methods ................................................................. 397
43.9.2 Properties ............................................................... 398
43.10 Class DeprecatedSourceSignaturesWarning ......................... 399
43.10.1 Methods ............................................................... 399
43.10.2 Properties ............................................................. 400
43.11 Class DeprecatedTargetSignaturesWarning ......................... 401
43.11.1 Methods ............................................................... 401
43.11.2 Properties ............................................................. 402
43.12 Class DuplicateEnvironmentWarning ................................ 403
43.12.1 Methods ............................................................... 403
43.12.2 Properties ............................................................. 404
43.13 Class FutureReservedVariableWarning .............................. 404
43.13.1 Methods ............................................................... 405
43.13.2 Properties ............................................................. 406
43.14 Class LinkWarning ....................................................... 406
43.14.1 Methods ............................................................... 406
43.14.2 Properties ............................................................. 408
43.15 Class MisleadingKeywordsWarning .................................. 408
43.15.1 Methods ............................................................... 408
43.15.2 Properties ............................................................. 409
43.16 Class MissingSConscriptWarning .................................... 410
43.16.1 Methods ............................................................... 410
43.16.2 Properties ............................................................. 411
43.17 Class NoMD5ModuleWarning ............................................ 411
43.17.1 Methods ............................................................... 412
43.17.2 Properties ............................................................. 413
43.18 Class NoMetaclassSupportWarning ................................... 413
43.18.1 Methods ............................................................... 413
43.18.2 Properties ............................................................. 415
43.19 Class NoObjectCountWarning ....................................... 415
43.19.1 Methods ............................................................... 415
43.19.2 Properties ............................................................. 416
43.20 Class NoParallelSupportWarning .................................... 417
43.20.1 Methods ............................................................... 417
43.20.2 Properties ............................................................. 418
43.21 Class PythonVersionWarning ......................................... 419
43.21.1 Methods ............................................................... 419
43.21.2 Properties ............................................................. 420
43.22 Class ReservedVariableWarning ..................................... 421
<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>43.22.1 Methods</td>
<td>421</td>
</tr>
<tr>
<td>43.22.2 Properties</td>
<td>422</td>
</tr>
<tr>
<td>43.23 Class StackSizeWarning</td>
<td>422</td>
</tr>
<tr>
<td>43.23.1 Methods</td>
<td>423</td>
</tr>
<tr>
<td>43.23.2 Properties</td>
<td>424</td>
</tr>
<tr>
<td>43.24 Class FortranCxxMixWarning</td>
<td>424</td>
</tr>
<tr>
<td>43.24.1 Methods</td>
<td>424</td>
</tr>
<tr>
<td>43.24.2 Properties</td>
<td>426</td>
</tr>
<tr>
<td>44 Package SCons.compat</td>
<td>427</td>
</tr>
<tr>
<td>44.1 Modules</td>
<td>427</td>
</tr>
<tr>
<td>44.2 Functions</td>
<td>428</td>
</tr>
<tr>
<td>44.3 Variables</td>
<td>428</td>
</tr>
<tr>
<td>45 Module SCons.compat.scons_UserString</td>
<td>429</td>
</tr>
<tr>
<td>45.1 Functions</td>
<td>429</td>
</tr>
<tr>
<td>45.2 Variables</td>
<td>429</td>
</tr>
<tr>
<td>45.3 Class UserString</td>
<td>429</td>
</tr>
<tr>
<td>45.3.1 Methods</td>
<td>429</td>
</tr>
<tr>
<td>46 Module SCons.compat.scons_hashlib</td>
<td>431</td>
</tr>
<tr>
<td>46.1 Functions</td>
<td>431</td>
</tr>
<tr>
<td>46.2 Variables</td>
<td>431</td>
</tr>
<tr>
<td>46.3 Class md5obj</td>
<td>431</td>
</tr>
<tr>
<td>46.3.1 Methods</td>
<td>431</td>
</tr>
<tr>
<td>46.3.2 Class Variables</td>
<td>431</td>
</tr>
<tr>
<td>46.4 Class md5obj</td>
<td>432</td>
</tr>
<tr>
<td>46.4.1 Methods</td>
<td>432</td>
</tr>
<tr>
<td>46.4.2 Class Variables</td>
<td>432</td>
</tr>
<tr>
<td>47 Module SCons.compat.scons_itertools</td>
<td>433</td>
</tr>
<tr>
<td>47.1 Functions</td>
<td>433</td>
</tr>
<tr>
<td>47.2 Variables</td>
<td>434</td>
</tr>
<tr>
<td>48 Module SCons.compat.scons_optparse</td>
<td>435</td>
</tr>
<tr>
<td>48.1 Variables</td>
<td>435</td>
</tr>
<tr>
<td>48.2 Class OptParseError</td>
<td>436</td>
</tr>
<tr>
<td>48.2.1 Methods</td>
<td>436</td>
</tr>
<tr>
<td>48.2.2 Properties</td>
<td>437</td>
</tr>
<tr>
<td>48.3 Class OptionError</td>
<td>437</td>
</tr>
<tr>
<td>48.3.1 Methods</td>
<td>438</td>
</tr>
<tr>
<td>48.3.2 Properties</td>
<td>439</td>
</tr>
<tr>
<td>48.4 Class OptionConflictError</td>
<td>439</td>
</tr>
<tr>
<td>48.4.1 Methods</td>
<td>439</td>
</tr>
<tr>
<td>48.4.2 Properties</td>
<td>441</td>
</tr>
<tr>
<td>48.5 Class OptionValueError</td>
<td>441</td>
</tr>
<tr>
<td>48.5.1 Methods</td>
<td>441</td>
</tr>
<tr>
<td>48.5.2 Properties</td>
<td>442</td>
</tr>
<tr>
<td>48.6 Class BadOptionError</td>
<td>443</td>
</tr>
<tr>
<td>48.6.1 Methods</td>
<td>443</td>
</tr>
<tr>
<td>48.6.2 Properties</td>
<td>444</td>
</tr>
<tr>
<td>48.7 Class HelpFormatter</td>
<td>444</td>
</tr>
</tbody>
</table>
48.7.1 Methods .................................................. 445
48.7.2 Class Variables ......................................... 446
48.8 Class IndentedHelpFormatter .............................. 446
48.8.1 Methods .................................................. 446
48.8.2 Class Variables ......................................... 447
48.9 Class TitledHelpFormatter ................................. 447
48.9.1 Methods .................................................. 447
48.9.2 Class Variables ......................................... 448
48.10 Class Option ................................................ 448
48.10.1 Methods .................................................. 449
48.10.2 Class Variables ......................................... 449
48.11 Class Values ............................................... 450
48.12 Class OptionContainer .................................... 450
48.13 Class OptionGroup ........................................ 451
48.14 Class OptionParser ........................................ 452
48.14.1 Methods .................................................. 454
48.14.2 Class Variables ......................................... 456
49 Module SCons.compat.scons_sets ............................ 457
49.1 Class BaseSet ............................................... 457
49.1.1 Methods .................................................. 458
49.1.2 Properties ............................................... 461
49.2 Class ImmutableSet ......................................... 461
49.2.1 Methods .................................................. 461
49.2.2 Properties ............................................... 464
49.3 Class Set .................................................... 464
49.3.1 Methods .................................................. 465
49.3.2 Properties ............................................... 469
50 Module SCons.compat.scons_sets15 .......................... 470
50.1 Class Set .................................................... 470
50.1.1 Methods .................................................. 470
51 Module SCons.compat.scons_shlex ............................ 472
51.1 Functions ................................................... 472
51.2 Class shlex ................................................ 472
51.2.1 Methods .................................................. 472
52 Module SCons.compat.scons_subprocess ...................... 473
52.1 Functions ................................................... 479
52.2 Variables ................................................... 480
52.3 Class CalledProcessError .................................. 480
52.3.1 Methods .................................................. 480
52.3.2 Properties ............................................... 481
52.4 Class Popen ................................................ 482
52.4.1 Methods .................................................. 482
52.4.2 Properties ............................................... 483
53 Module SCons.compat.scons_textwrap ........................ 484
<table>
<thead>
<tr>
<th>Module</th>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>SCons.compat.builts</td>
<td>Functions</td>
<td>484</td>
</tr>
<tr>
<td></td>
<td>Class TextWrapper</td>
<td>484</td>
</tr>
<tr>
<td></td>
<td>Methods</td>
<td>485</td>
</tr>
<tr>
<td></td>
<td>Class Variables</td>
<td>485</td>
</tr>
<tr>
<td>SCons.cpp</td>
<td>Functions</td>
<td>487</td>
</tr>
<tr>
<td></td>
<td>Variables</td>
<td>488</td>
</tr>
<tr>
<td>SCons.dblite</td>
<td>Functions</td>
<td>498</td>
</tr>
<tr>
<td></td>
<td>Variables</td>
<td>498</td>
</tr>
<tr>
<td></td>
<td>Class dblite</td>
<td>498</td>
</tr>
<tr>
<td></td>
<td>Methods</td>
<td>498</td>
</tr>
<tr>
<td>SCons.exitfuncs</td>
<td>Functions</td>
<td>499</td>
</tr>
<tr>
<td></td>
<td>Variables</td>
<td>499</td>
</tr>
<tr>
<td>md5</td>
<td>Variables</td>
<td>500</td>
</tr>
</tbody>
</table>
1 Package SCons

SCons

The main package for the SCons software construction utility.

Version: 1.2.0
Date: 2008/12/20 22:59:52

1.1 Modules

- **Action**: 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.
  *(Section 2, p. 6)*

- **Builder**: SCons.Builder
  Builder object subsystem.
  *(Section 3, p. 16)*

- **CacheDir**: CacheDir support
  *(Section 4, p. 29)*

- **ConfTest**: SCons.Conftest
  Autoconf-like configuration support; low level implementation of tests.
  *(Section 5, p. 31)*

- **Debug**: SCons.Debug
  Code for debugging SCons internal things.
  *(Section 6, p. 55)*

- **Defaults**: SCons.Defaults
  Builders and other things for the local site.
  *(Section 7, p. 37)*

- **Environment**: SCons.Environment
  Base class for construction Environments.
  *(Section 8, p. 40)*

- **Errors**: SCons.Errors
  This file contains the exception classes used to handle internal and user errors in SCons.
  *(Section 9, p. 75)*

- **Executor**: SCons.Executor
  A module for executing actions with specific lists of target and source Nodes.
  *(Section 10, p. 87)*

- **Job**: SCons.Job
  This module defines the Serial and Parallel classes that execute tasks to complete a build.
  *(Section 11, p. 91)*

- **Memoize**: Memoizer
  A metaclass implementation to count hits and misses of the computed values that various methods cache in memory.
  *(Section 12, p. 96)*

- **Node**: SCons.Node
  The Node package for the SCons software construction utility.
  *(Section 13, p. 103)*
    - **Alias**: scons.Node.Alias
      Alias nodes.
      *(Section 14, p. 118)*
– **FS**: scons.Node.FS
  File system nodes.
  *(Section 15, p. 132)*

– **Python**: scons.Node.Python
  Python nodes.
  *(Section 16, p. 215)*

• **PathList**: 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.
  *(Section 17, p. 228)*

• **SConf**: SCons.SConf
  Autoconf-like configuration support.
  *(Section 18, p. 229)*

• **SConsign**: SCons.SConsign
  Writing and reading information to the .sconsign file or files.
  *(Section 19, p. 248)*

• **Scanner**: SCons.Scanner
  The Scanner package for the SCons software construction utility.
  *(Section 20, p. 254)*
  – **C**: SCons.Scanner.C
    This module implements the dependency scanner for C/C++ code.
    *(Section 21, p. 267)*
  – **D**: SCons.Scanner.D
    Scanner for the Digital Mars "D" programming language.
    *(Section 22, p. 272)*
  – **Dir** *(Section 23, p. 274)*
  – **Fortran**: SCons.Scanner.Fortran
    This module implements the dependency scanner for Fortran code.
    *(Section 24, p. 275)*
  – **IDL**: SCons.Scanner.IDL
    This module implements the dependency scanner for IDL (Interface Definition Language) files.
    *(Section 25, p. 277)*
  – **LaTeX**: SCons.Scanner.LaTeX
    This module implements the dependency scanner for LaTeX code.
    *(Section 26, p. 278)*
  – **Prog** *(Section 27, p. 283)*
  – **RC**: SCons.Scanner.RC
    This module implements the dependency scanner for RC (Interface Definition Language) files.
    *(Section 28, p. 284)*

• **Script**: SCons.Script
  This file implements the main() function used by the scons script.
  *(Section 29, p. 285)*
  – **Interactive**: SCons interactive mode
    *(Section 30, p. 292)*
  – **Main**: SCons.Script
    This file implements the main() function used by the scons script.
    *(Section 31, p. 296)*
  – **SConscript**: SCons.Script.SConscript
    This module defines the Python API provided to SConscript and SConstruct files.
    *(Section 32, p. 314)*
• **Sig**: Place-holder for the old SCons.Sig module hierarchy
  This is no longer used, but code out there (such as the NSIS module on the SCons wiki) may try to import SCons.Sig.
  *(Section 33, p. 327)*

• **Subst**: SCons.Subst
  SCons string substitution.
  *(Section 34, p. 329)*

• **Taskmaster**: Generic Taskmaster module for the SCons build engine.
  *(Section 35, p. 338)*

• **Util**: SCons.Util
  Various utility functions go here.
  *(Section 36, p. 346)*

• **Variables**: engine.SCons.Variables
  This file defines the Variables class that is used to add user-friendly customizable variables to an SCons build.
  *(Section 37, p. 376)*
  - **BoolVariable**: engine.SCons.Variables.BoolVariable
    This file defines the option type for SCons implementing true/false values.
    *(Section 38, p. 379)*
  - **EnumVariable**: engine.SCons.Variables.EnumVariable
    This file defines the option type for SCons allowing only specified input-values.
    *(Section 39, p. 380)*
  - **ListVariable**: engine.SCons.Variables.ListVariable
    This file defines the option type for SCons implementing 'lists'.
    *(Section 40, p. 381)*
  - **PackageVariable**: engine.SCons.Variables.PackageVariable
    This file defines the option type for SCons implementing 'package activation'.
    *(Section 41, p. 382)*
  - **PathVariable**: SCons.Variables.PathVariable
    This file defines an option type for SCons implementing path settings.
    *(Section 42, p. 383)*

• **Warnings**: SCons.Warnings
  This file implements the warnings framework for SCons.
  *(Section 43, p. 385)*

• **compat**: 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.
  *(Section 44, p. 427)*
  - **scons_UserString**: A user-defined wrapper around string objects
    This class is "borrowed" from the Python 2.2 UserString and modified slightly for use with SCons.
    *(Section 45, p. 429)*
  - **scons_hashlib**: hashlib backwards-compatibility module for older (pre-2.5) Python versions
    This does not NOT (repeat, *NOT*) provide complete hashlib functionality.
    *(Section 46, p. 431)*
  - **scons_itertools**: Implementations of itertools functions for Python versions that don’t have iterators.
    *(Section 47, p. 433)*
  - **scons_optparse**: optparse - a powerful, extensible, and easy-to-use option parser.
    *(Section 48, p. 435)*
  - **scons_sets**: Classes to represent arbitrary sets (including sets of sets).
1.2 Variables

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>build</strong></td>
<td>Value: 'r3842'</td>
</tr>
<tr>
<td><strong>buildsys</strong></td>
<td>Value: 'scons-dev'</td>
</tr>
<tr>
<td><strong>developer</strong></td>
<td>Value: 'scons'</td>
</tr>
<tr>
<td><strong>revision</strong></td>
<td>Value: '/src/engine/SCons/<strong>init</strong>.py 3842 2008/12/20 22:59:52 sc...'</td>
</tr>
</tbody>
</table>
2 Module SCons.Action

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.

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.

2.1 Functions

rfile(n)

default_exitstatfunc(s)

remove_set_lineno_codes(x)

Action(act, *args, **kw)
A factory for action objects.

get_default_ENV(env)

2.2 Variables

<table>
<thead>
<tr>
<th>Name</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>revision</strong></td>
<td>'src/engine/SCons/Action.py 3842 2008/12/20 22:59:52 scons'</td>
</tr>
<tr>
<td>print_actions</td>
<td>False</td>
</tr>
<tr>
<td>execute_actions</td>
<td>False</td>
</tr>
</tbody>
</table>

continued on next page
2.3 Class ActionBase


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.

2.3.1 Methods

- `.cmp_(self, other)`
- `genstring(self, target, source, env)`
- `get_contents(self, target, source, env)`
- `.add_(self, other)`
- `.radd_(self, other)`
- `presub_lines(self, env)`
- `get_executor(self, env, overrides, tlist, slist, executor_kw)`
  Return the Executor for this Action.

2.4 Class CommandAction

SCons.Action.ActionBase

SCons.Action._ActionAction

SCons.Action.CommandAction

**Known Subclasses:** SCons.Action.LazyAction

Class for command-execution actions.

2.4.1 Methods

- `.init_(self, cmd, **kw)`
  Overrides: SCons.Action._ActionAction._init_
execute(self, target, source, env)

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.

get_presig(self, 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_implicit_deps(self, target, source, env)

_add_(self, other)

_call_(self, target, source, env, exitstatfunc=<class SCons.Action._null at 0x83f144c>, presub=<class SCons.Action._null at 0x83f144c>, show=<class SCons.Action._null at 0x83f144c>, execute=<class SCons.Action._null at 0x83f144c>, chdir=<class SCons.Action._null at 0x83f144c>)

_cmp_(self, other)

_radd_(self, other)

genstring(self, target, source, env)

get_contents(self, target, source, env)

get_executor(self, env, overrides, tlist, slist, executor_kw)

Return the Executor for this Action.

presub_lines(self, env)

print_cmd_line(self, s, target, source, env)
2.5 Class CommandGeneratorAction

SCons.Action.ActionBase

SCons.Action.CommandGeneratorAction

Known Subclasses: SCons.Action.LazyAction

Class for command-generator actions.

2.5.1 Methods

`_init_(self, generator, kw)`

`str_(self)`

genstring(self, target, source, env)


`call_(self, target, source, env, exitstatfunc=<class SCons.Action._null at 0x83f144c>, presub=<class SCons.Action._null at 0x83f144c>, show=<class SCons.Action._null at 0x83f144c>, execute=<class SCons.Action._null at 0x83f144c>, chdir=<class SCons.Action._null at 0x83f144c>)`

get_presig(self, 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_implicit_deps(self, target, source, env)

_add_(self, other)

_cmp_(self, other)

_radd_(self, other)

gen_contents(self, target, source, env)

get_executor(self, env, overrides, tlist, slist, executor_kw)

Return the Executor for this Action.

presub_lines(self, env)
2.6 Class LazyAction

```
SCons.Action.ActionBase
SCons.Action.CommandGeneratorAction
```

2.6.1 Methods

```
__init__(self, var, kw)
Overrides: SCons.Action.CommandGeneratorAction.__init__
```

```
get_parent_class(self, env)
```

```
__call__(self, target, source, env, *args, **kw)
```

```
get_presig(self, 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.
Overrides: SCons.Action.CommandGeneratorAction.get_presig
```

```
__add__(self, other)
```

```
__cmp__(self, other)
```

```
__radd__(self, other)
```

```
__str__(self)
```

```
execute(self, target, source, env)
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.
```
2.7 Class FunctionAction

SCons.Action.ActionBase
  SCons.Action._ActionAction
    SCons.Action.FunctionAction

Class for Python function actions.

2.7.1 Methods

_init_(self, execfunction, kw)
Overrides: SCons.Action._ActionAction._init_

function_name(self)

strfunction(self, target, source, env)

__str__(self)

execute(self, target, source, env)

get_presig(self, target, source, env)
Return the signature contents of this callable action.

get_implicit_deps(self, target, source, env)
Class ListAction

SCons.Action.ActionBase

SCons.Action.ListAction

Class for lists of other actions.

2.8.1 Methods

_init__(self, list)

genstring(self, target, source, env)

_str_(self)

presub_lines(self, env)
Overridess: SCons.Action.ActionBase.presub_lines

get_presig(self, target, source, env)

Return the signature contents of this action list.

Simple concatenation of the signatures of the elements.
2.9 Class ActionCaller

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.

2.9.1 Methods

_init_ (self, parent, args, kw)

get_contents(self, target, source, env)

subst(self, s, target, source, env)

subst_args(self, target, source, env)

subst_kw(self, target, source, env)

_call_ (self, target, source, env)

strfunction(self, target, source, env)

_str_(self)
2.10 Class ActionFactory

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.

2.10.1 Methods

```python
__init__(self, actfunc, strfunc, convert=<function <lambda> at 0x83ff3e4>)
```

```python
__call__(self, *args, **kw)
```
3  Module SCons.Builder

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.

3.1 Functions

**Builder(**kw)**

A factory for builder objects.

3.2 Variables

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>revision</strong></td>
<td>Value: 'src/engine/SCons/Builder.py 3842 2008/12/20 22:59:52 scons'</td>
</tr>
<tr>
<td>misleading_keywords</td>
<td>Value: {'sources': 'source', 'targets': 'target'}</td>
</tr>
</tbody>
</table>

3.3 Class DictCmdGenerator

UserDict.UserDict

SCons.Util.OrderedDict

SCons.Util.Selector

SCons.Builder.DictCmdGenerator
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.

### 3.3.1 Methods

```python
__init__(self, dict=False, source_ext_match=False)
Overrides: SCons.Util.OrderedDict.__init__
```

```python
src_suffixes(self)
```

```python
add_action(self, suffix, action)
Add a suffix-action pair to the mapping.
```

```python
__call__(self, target, source, env, for_signature)
Overrides: SCons.Util.Selector.__call__
```

```python
__cmp__(self, dict)
```

```python
__contains__(self, key)
```

```python
__delitem__(self, key)
Overrides: UserDict.UserDict.__delitem__
```

```python
__getitem__(self, key)
```

```python
__len__(self)
```

```python
__repr__(self)
```

```python
__setitem__(self, key, item)
Overrides: UserDict.UserDict.__setitem__
```

```python
clear(self)
Overrides: UserDict.UserDict.clear
```

```python
copy(self)
Overrides: UserDict.UserDict.copy
```

```python
fromkeys(cls, iterable, value=False)
```

```python
get(self, key, failobj=False)
```

```python
has_key(self, key)
```
items(self)
Overrides: UserDict.UserDict.items

iteritems(self)

iterkeys(self)

itervalues(self)

keys(self)
Overrides: UserDict.UserDict.keys

pop(self, key, *args)

popitem(self)
Overrides: UserDict.UserDict.popitem

setdefault(self, key, failobj=False)
Overrides: UserDict.UserDict.setdefault

update(self, dict)
Overrides: UserDict.UserDict.update

values(self)
Overrides: UserDict.UserDict.values

3.4 Class CallableSelector

UserDict.UserDict
SCons.Util.OrderedDict
SCons.Util.Selector
SCons.Builder.CallableSelector

A callable dictionary that will, in turn, call the value it finds if it can.

3.4.1 Methods

_call__(self, env, source)
Overrides: SCons.Util.Selector._call_

_cmp__(self, dict)

__contains__(self, key)
Class CallableSelector

Module SCons.Builder

__delitem__ *(self, key)*
Overrides: UserDict.UserDict.__delitem__

__getitem__ *(self, key)*

__init__ *(self, dict=False)*
Overrides: UserDict.UserDict.__init__

__len__ *(self)*

__repr__ *(self)*

__setitem__ *(self, key, item)*
Overrides: UserDict.UserDict.__setitem__

clear *(self)*
Overrides: UserDict.UserDict.clear

copy *(self)*
Overrides: UserDict.UserDict.copy

fromkeys *(cls, iterable, value=False)*

get *(self, key, failobj=False)*

has_key *(self, key)*

items *(self)*
Overrides: UserDict.UserDict.items

iteritems *(self)*

iterkeys *(self)*

itervalues *(self)*

keys *(self)*
Overrides: UserDict.UserDict.keys

pop *(self, key, *args)*

popitem *(self)*
Overrides: UserDict.UserDict.popitem

setdefault *(self, key, failobj=False)*
Overrides: UserDict.UserDict.setdefault
update(self, dict)
Overrides: UserDict.UserDict.update

dict(self)
Overrides: UserDict.UserDict.dict

global(self)
Overrides: UserDict.UserDict.global

3.5 Class DictEmitter

UserDict.UserDict
SCons.Util.OrderedDict
SCons.Util.Selector
SCons.Builder.DictEmitter

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.

3.5.1 Methods

call(self, target, source, env)
Overrides: SCons.Util.Selector._call_

cmp_(self, dict)

contains_(self, key)

delitem_(self, key)
Overrides: UserDict.UserDict._delitem_

getitem_(self, key)

init_(self, dict=False)
Overrides: UserDict.UserDict._init_

len_(self)

repr_(self)

setitem_(self, key, item)
Overrides: UserDict.UserDict._setitem_

clear(self)
Overrides: UserDict.UserDict.clear
```plaintext
<table>
<thead>
<tr>
<th>Method</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>copy(self)</code></td>
<td>Overrides: <code>UserDict.UserDict.copy</code></td>
</tr>
<tr>
<td><code>fromkeys(cls, iterable, value=False)</code></td>
<td></td>
</tr>
<tr>
<td><code>get(self, key, failobj=False)</code></td>
<td></td>
</tr>
<tr>
<td><code>has_key(self, key)</code></td>
<td></td>
</tr>
<tr>
<td><code>items(self)</code></td>
<td>Overrides: <code>UserDict.UserDict.items</code></td>
</tr>
<tr>
<td><code>iteritems(self)</code></td>
<td></td>
</tr>
<tr>
<td><code>iterkeys(self)</code></td>
<td></td>
</tr>
<tr>
<td><code>itervalues(self)</code></td>
<td></td>
</tr>
<tr>
<td><code>keys(self)</code></td>
<td>Overrides: <code>UserDict.UserDict.keys</code></td>
</tr>
<tr>
<td><code>pop(self, key, *args)</code></td>
<td></td>
</tr>
<tr>
<td><code>popitem(self)</code></td>
<td>Overrides: <code>UserDict.UserDict.popitem</code></td>
</tr>
<tr>
<td><code>setdefault(self, key, failobj=False)</code></td>
<td>Overrides: <code>UserDict.UserDict.setdefault</code></td>
</tr>
<tr>
<td><code>values(self)</code></td>
<td>Overrides: <code>UserDict.UserDict.values</code></td>
</tr>
</tbody>
</table>
```

### 3.6 Class ListEmitter

```
```

A callable list of emitters that calls each in sequence, returning the result.

#### 3.6.1 Methods

```
__call__(self, target, source, env)
```
Class ListEmitter

-module SCons.Builder

-__add__(self, other)
-__cmp__(self, other)
-__contains__(self, item)
-__delitem__(self, i)
-__delslice__(self, i, j)
-__eq__(self, other)
-__ge__(self, other)
-__getitem__(self, i)
-__getslice__(self, i, j)
-__gt__(self, other)
-__iadd__(self, other)
-__imul__(self, n)
-__init__(self, initlist=False)
-__le__(self, other)
-__len__(self)
-__lt__(self, other)
-__mul__(self, n)
-__ne__(self, other)
-__radd__(self, other)
-__repr__(self)
-__rmul__(self, n)
-__setitem__(self, i, item)
-__setslice__(self, i, j, other)
3.7 Class OverrideWarner

UserDict.UserDict  
SCons.Builder.OverrideWarner

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.

3.7.1 Methods

_init__(self, dict)  
Overrides: UserDict.UserDict._init_

warn(self)

_cmp__(self, dict)

Contains__ (self, key)

_delitem__ (self, key)

_getitem__ (self, key)

_len__ (self)
Class EmitterProxy

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.

3.8.1 Methods

_init_(self, var)
3.9 Class BuilderBase

Base class for Builders, objects that create output nodes (files) from input nodes (files).

3.9.1 Methods

__init__ (self, action=False, prefix='', suffix='', target_factory=False, source_factory=False, target_scanner=False, source_scanner=False, emitter=False, multi=0, env=False, single_source=False, name=False, chdir=<class SCons.Builder._Null at 0x845a1dc>, is_explicit=False, src_builder=False, ensure_suffix=False, **overrides)

__nonzero__ (self)

get_name (self, 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).

__cmp__ (self, other)

splitext (self, path, env=False)

get_single_executor (self, env, tlist, slist, executor_kw)

get_multi_executor (self, env, tlist, slist, executor_kw)

__call__ (self, env, target=False, source=False, chdir=<class SCons.Builder._Null at 0x845a1dc>, **kw)

adjust_suffix (self, suff)

get_prefix (self, env, sources=[])

set_suffix (self, suffix)

get_suffix (self, env, sources=[])

set_src_suffix (self, src_suffix)
get_src_suffix(self, env)
Get the first src_suffix in the list of src_suffixes.

add_emitter(self, 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(self, 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.

src_builder_sources(self, env, source, overwarn={})

get_src_builders(self, 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.

subst_src_suffixes(self, 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.

src_suffixes(self, 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.)
3.9.2 Class Variables

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>.<strong>metaclass</strong></td>
<td>Value: SCons.Memoize.MemoizedMetaclasse</td>
</tr>
<tr>
<td>memoizer_counters</td>
<td>Value: []</td>
</tr>
</tbody>
</table>

3.10 Class CompositeBuilder

SCons.Util.Proxy  
SCons.Builder.CompositeBuilder

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.

3.10.1 Methods

```python
__init__(self, builder, cmdgen)
Wrap an object as a Proxy object
Overrides: SCons.Util.Proxy.__init__. (inherited documentation)
```

```python
add_action(self, suffix, action)
```

```python
__cmp__(self, other)
```

```python
__getattr__(self, name)
Retrieve an attribute from the wrapped object. If the named attribute doesn’t exist, AttributeError is raised
```

```python
get(self)
Retrieve the entire wrapped object
```
4 Module SCons.CacheDir

CacheDir support

4.1 Functions

- **CacheRetrieveFunc**(*target, source, env*)
- **CacheRetrieveString**(*target, source, env*)
- **CachePushFunc**(*target, source, env*)

4.2 Variables

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>revision</strong></td>
<td>Value: <code>src/engine/SCons/CacheDir.py 3842 2008/12/20 22:59:52 sc...</code></td>
</tr>
<tr>
<td><strong>doc</strong></td>
<td>Value: ...</td>
</tr>
<tr>
<td>cache_enabled</td>
<td>Value: True</td>
</tr>
<tr>
<td>cache_debug</td>
<td>Value: False</td>
</tr>
<tr>
<td>cache_force</td>
<td>Value: False</td>
</tr>
<tr>
<td>cache_show</td>
<td>Value: False</td>
</tr>
<tr>
<td>CacheRetrieveSilent</td>
<td>Value: SCons.Action.Action(CacheRetrieveFunc, None)</td>
</tr>
</tbody>
</table>

4.3 Class CacheDir

4.3.1 Methods

- **__init__**(self, path)
- **CacheDebug**(self, fmt, target, cachefile)
- **is_enabled**(self)
- **cache_path**(self, node)
**retrieve(self, 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` 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.

**push(self, node)**

**push_if_forced(self, node)**
Module SCons.Conftest

SCons.Conftest

Autoconf-like configuration support; low level implementation of tests.

5.1 Functions

**CheckBuilder**(context, text=False, language=False)

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.

**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.

**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.

**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.
**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.

**CheckFunc(context, function_name, header=False, language=False)**

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.

**CheckHeader(context, header_name, header=False, language=False, include_quotes=False)**

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.

**CheckType(context, type_name, fallback=False, header=False, language=False)**

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.
**CheckTypeSize**\( (\text{context, type\_name, header=False, language=False, expect=False}) \)

This check can be used to get the size of a given type, or to check whether the type is of expected size.

Arguments:
- **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:
- **status** : int
  - 0 if the check failed, or the found size of the type if the check succeeded.

**CheckDeclaration**\( (\text{context, symbol, includes=False, language=False}) \)

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.

Arguments:
- **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:
- **status** : bool
  - True if the check failed, False if succeeded.
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.

### 5.2 Variables

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>LogInputFiles</td>
<td>Value: False</td>
</tr>
<tr>
<td>LogErrorMessages</td>
<td>Value: False</td>
</tr>
</tbody>
</table>
Module SCons.Debug

SCons.Debug

Code for debugging SCons internal things. Not everything here is
 guaranteed to work all the way back to Python 1.5.2, and shouldn’t be
 needed by most users.

6.1 Functions

\begin{tabular}{|l|}
\hline
\textbf{logInstanceCreation} \textit{(instance, name=False)} \\
\textbf{string_to_classes} \textit{(s)} \\
\textbf{fetchLoggedInstances} \textit{(classes='*')} \\
\textbf{countLoggedInstances} \textit{(classes, file=sys.stdout)} \\
\textbf{listLoggedInstances} \textit{(classes, file=sys.stdout)} \\
\textbf{dumpLoggedInstances} \textit{(classes, file=sys.stdout)} \\
\textbf{memory} \\
\textbf{caller_stack} \textit{(*backlist)} \\
\textbf{caller_trace} \textit{(back=0)} \\
\textbf{dump_caller_counts} \textit{(file=sys.stdout)} \\
\textbf{func_shorten} \textit{(func_tuple)} \\
\textbf{Trace} \textit{(msg, file=False, mode='w')} \\
\hline
\end{tabular}

Write a trace message to a file. Whenever a file is specified,
it becomes the default for the next call to Trace().

6.2 Variables

\begin{tabular}{|l|l|}
\hline
\textbf{Name} & \textbf{Description} \\
\hline
\texttt{revision} & Value: ’src/engine/SCons/Debug.py 3842 2008/12/20 \\
& 22:59:52 scons’ \\
\texttt{tracked_classes} & Value: {’Action.CommandAction’: []<weakref at \\
& 0x87fc6bc; to ’inst... \\
\texttt{caller_bases} & Value: {} \\
\texttt{caller_dicts} & Value: {} \\
\hline
\end{tabular}

continued on next page

48
<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>shorten_list</td>
<td>Value: [('scons', 1), ('/usr/...)]</td>
</tr>
<tr>
<td>TraceFP</td>
<td>Value: {}</td>
</tr>
<tr>
<td>TraceDefault</td>
<td>Value: '/dev/tty'</td>
</tr>
</tbody>
</table>
7 Module SConsDefaults

SConsDefaults

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.

7.1 Functions

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.)

StaticObjectEmitter(target, source, env)

SharedObjectEmitter(target, source, env)

SharedFlagChecker(source, target, env)

get_paths_str(dest)

chmod_func(dest, mode)

chmod_strfunc(dest, mode)

copy_func(dest, src)

delete_func(dest, must_exist=0)

delete_strfunc(dest, must_exist=0)
Class NullCmdGenerator
Module SCons.Defaults

**mkdir_func** (dest)

**move_func** (dest, src)

**touch_func** (dest)

## 7.2 Variables

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>_revision__</code></td>
<td>Value: 'src/engine/SCons/Defaults.py 3842 2008/12/20 22:59:52 sc...</td>
</tr>
<tr>
<td>SharedCheck</td>
<td>Value: SCons.Action.Action(SharedFlagChecker, None)</td>
</tr>
<tr>
<td>CScan</td>
<td>Value: SCons.Tool.Scanner</td>
</tr>
<tr>
<td>DScan</td>
<td>Value: SCons.Tool.Scanner</td>
</tr>
<tr>
<td>LaTeXScan</td>
<td>Value: SCons.Tool.Scanner</td>
</tr>
<tr>
<td>ObjSourceScan</td>
<td>Value: SCons.Tool.Scanner</td>
</tr>
<tr>
<td>ProgScan</td>
<td>Value: SCons.Tool.Scanner</td>
</tr>
<tr>
<td>DirScanner</td>
<td>Value: SCons.Scanner.Dir.DirScanner()</td>
</tr>
<tr>
<td>DirEntryScanner</td>
<td>Value: SCons.Scanner.Dir.DirEntryScanner()</td>
</tr>
<tr>
<td>CAction</td>
<td>Value: SCons.Action.Action(&quot;$CCCOM&quot;, &quot;$CCCOMSTR&quot;)</td>
</tr>
<tr>
<td>ShCAction</td>
<td>Value: SCons.Action.Action(&quot;$SHCCCOM&quot;, &quot;$SHCCCOMSTR&quot;)</td>
</tr>
<tr>
<td>CXXAction</td>
<td>Value: SCons.Action.Action(&quot;$CXXCOM&quot;, &quot;$CXXCOMSTR&quot;)</td>
</tr>
<tr>
<td>ShCXXAction</td>
<td>Value: SCons.Action.Action(&quot;$SHCXXCOM&quot;, &quot;$SHCXXCOMSTR&quot;)</td>
</tr>
<tr>
<td>ASAction</td>
<td>Value: SCons.Action.Action(&quot;$ASCOM&quot;, &quot;$ASCOMSTR&quot;)</td>
</tr>
<tr>
<td>ShLinkAction</td>
<td>Value: SCons.Action.Action(&quot;$SHLINKCOM&quot;, &quot;$SHLINKCOMSTR&quot;)</td>
</tr>
<tr>
<td>Chmod</td>
<td>Value: ActionFactory(chmod_func, chmod_strfunc)</td>
</tr>
<tr>
<td>Copy</td>
<td>Value: ActionFactory(copy_func, lambda dest, src: Copy(&quot;%s&quot;, &quot;%...</td>
</tr>
<tr>
<td>Delete</td>
<td>Value: ActionFactory(delete_func, delete_strfunc)</td>
</tr>
<tr>
<td>Mkdir</td>
<td>Value: ActionFactory(mkdir_func, lambda dir: 'Mkdir(%)', % get_p...</td>
</tr>
<tr>
<td>Move</td>
<td>Value: ActionFactory(move_func, lambda dest, src: Move(&quot;%s&quot;, &quot;%...</td>
</tr>
<tr>
<td>Touch</td>
<td>Value: ActionFactory(touch_func, lambda file: 'Touch(%)', % get_...</td>
</tr>
<tr>
<td>ConstructionEnvironment</td>
<td>Value: {'BUILDERS': {}, 'CONFIGUREDIR': '/./sconf_temp', 'CONFIG...</td>
</tr>
</tbody>
</table>

## 7.3 Class NullCmdGenerator

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\')\}"
```

7.3.1 Methods

```python
_init__(self, cmd)
```

```python
_call__(self, target, source, env, for_signature=False)
```

7.4 Class Variable_Method_Caller

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.)

7.4.1 Methods

```python
_init__(self, variable, method)
```

```python
_call__(self, *args, **kw)
```
Module SCons.Environment

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

8.1 Functions

<table>
<thead>
<tr>
<th>Function</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>alias_builder(\textit{env}, \textit{target}, \textit{source})</td>
<td></td>
</tr>
<tr>
<td>apply_tools(\textit{env}, \textit{tools}, \textit{toolpath})</td>
<td></td>
</tr>
<tr>
<td>copy_non_reserved_keywords(\textit{dict})</td>
<td></td>
</tr>
<tr>
<td>is_valid_construction_var(\textit{varstr})</td>
<td>Return if the specified string is a legitimate construction variable.</td>
</tr>
<tr>
<td>build_source(\textit{ss}, \textit{result})</td>
<td></td>
</tr>
<tr>
<td>default_decide_source(\textit{dependency}, \textit{target}, \textit{prev}_ni)</td>
<td></td>
</tr>
<tr>
<td>default_decide_target(\textit{dependency}, \textit{target}, \textit{prev}_ni)</td>
<td></td>
</tr>
<tr>
<td>default_copy_from_cache(\textit{src}, \textit{dst})</td>
<td></td>
</tr>
<tr>
<td>NoSubstitutionProxy(\textit{subject})</td>
<td></td>
</tr>
</tbody>
</table>

8.2 Variables

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>revision</strong></td>
<td>Value: 'src/engine/SCons/Environment.py 3842 2008/12/20 22:59:52...</td>
</tr>
<tr>
<td>CleanTargets</td>
<td>Value: {}</td>
</tr>
<tr>
<td>CalculatorArgs</td>
<td>Value: {}</td>
</tr>
<tr>
<td>AliasBuilder</td>
<td>Value: SCons.Builder.Builder(action= alias_builder, target_facto...</td>
</tr>
<tr>
<td>reserved_construction_var_names</td>
<td>Value: ['SOURCE', 'SOURCES', 'TARGET', 'TARGETS']</td>
</tr>
</tbody>
</table>
### 8.3 Class MethodWrapper

**Known Subclasses:** SCons.Environment.BuilderWrapper

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).

#### 8.3.1 Methods

<table>
<thead>
<tr>
<th>Method</th>
<th>Signature</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>__init__</code></td>
<td><code>(self, object, method, name=False)</code></td>
<td></td>
</tr>
<tr>
<td><code>__call__</code></td>
<td><code>(self, *args, **kwargs)</code></td>
<td>Returns an object that re-binds the underlying &quot;method&quot; to the specified new object.</td>
</tr>
</tbody>
</table>

### 8.4 Class BuilderWrapper

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 of attribute fetching or setting on these, so a little extra work shouldn’t hurt.

### 8.4.1 Methods

<table>
<thead>
<tr>
<th>Method</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>__repr__</code></td>
<td></td>
</tr>
<tr>
<td><code>__str__</code></td>
<td></td>
</tr>
<tr>
<td><code>__getattr__</code></td>
<td></td>
</tr>
<tr>
<td><code>__setattr__</code></td>
<td></td>
</tr>
<tr>
<td><code>__init__</code></td>
<td></td>
</tr>
<tr>
<td><code>clone</code></td>
<td>Returns an object that re-binds the underlying &quot;method&quot; to the specified new object.</td>
</tr>
</tbody>
</table>

### 8.5 Class BuilderDict


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.

#### 8.5.1 Methods

<table>
<thead>
<tr>
<th>Method</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>__init__</code></td>
<td>Overrides: UserDict.UserDict.<code>__init__</code></td>
</tr>
<tr>
<td><code>__semi_deepcopy__</code></td>
<td></td>
</tr>
<tr>
<td>Method</td>
<td>Description</td>
</tr>
<tr>
<td>------------------------</td>
<td>------------------------------------------</td>
</tr>
<tr>
<td><strong>setitem</strong> (self, item, val)</td>
<td>Overrides: UserDict.UserDict.<strong>setitem</strong></td>
</tr>
<tr>
<td><strong>delitem</strong> (self, item)</td>
<td>Overrides: UserDict.UserDict.<strong>delitem</strong></td>
</tr>
<tr>
<td><strong>cmp</strong> (self, dict)</td>
<td></td>
</tr>
<tr>
<td><strong>contains</strong> (self, key)</td>
<td></td>
</tr>
<tr>
<td><strong>getitem</strong> (self, key)</td>
<td></td>
</tr>
<tr>
<td><strong>len</strong> (self)</td>
<td></td>
</tr>
<tr>
<td><strong>repr</strong> (self)</td>
<td></td>
</tr>
<tr>
<td>clear (self)</td>
<td></td>
</tr>
<tr>
<td>copy (self)</td>
<td></td>
</tr>
<tr>
<td>fromkeys (cls, iterable, value=False)</td>
<td></td>
</tr>
<tr>
<td>get (self, key, failobj=False)</td>
<td></td>
</tr>
<tr>
<td>has_key (self, key)</td>
<td></td>
</tr>
<tr>
<td>keys (self)</td>
<td></td>
</tr>
<tr>
<td>items (self)</td>
<td></td>
</tr>
<tr>
<td>iteritems (self)</td>
<td></td>
</tr>
<tr>
<td>iterkeys (self)</td>
<td></td>
</tr>
<tr>
<td>itervalues (self)</td>
<td></td>
</tr>
<tr>
<td>pop (self, key, *args)</td>
<td></td>
</tr>
<tr>
<td>popitem (self)</td>
<td></td>
</tr>
<tr>
<td>.setdefault (self, key, failobj=False)</td>
<td></td>
</tr>
<tr>
<td>values (self)</td>
<td></td>
</tr>
</tbody>
</table>
8.6 Class SubstitutionEnvironment

**Known Subclasses:** SCons.Environment.Base

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.)

8.6.1 Methods

```python
__init__(self, **kw)

Initialization of an underlying SubstitutionEnvironment class.
```

```python
__cmp__(self, other)
```

```python
__delitem__(self, key)
```

```python
__getitem__(self, key)
```

```python
__setitem__(self, key, value)
```

```python
get(self, key, default=False)

Emulates the get() method of dictionaries.
```

```python
has_key(self, key)
```

```python
__contains__(self, key)
```

57
items(self)

arg2nodes(self, args, node_factory=<class SCons.Environment.Null at 0x87eaf8c>, lookup_list=<class SCons.Environment.Null at 0x87eaf8c>, **kw)

gvars(self)

lvars(self)

subst(self, string, raw=0, target=False, source=False, conv=False)

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(self, kw, raw=0, target=False, source=False)

subst_list(self, string, raw=0, target=False, source=False, conv=False)

Calls through to SCons.Subst.scons_subst_list(). See the documentation for that function.

subst_path(self, path, target=False, source=False)

Substitute a path list, turning EntryProxies into Nodes and leaving Nodes (and other objects) as-is.

subst_target_source(self, string, raw=0, target=False, source=False, conv=False)

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.

backtick(self, command)
AddMethod(self, function, name=False)

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.

RemoveMethod(self, function)

Removes the specified function’s MethodWrapper from the added_methods list, so we don’t re-bind it when making a clone.

Override(self, 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(self, *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.

MergeFlags(self, args, unique=False, dict=False)

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.

8.6.2 Class Variables

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
</table>
8.7 Class Base

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.

8.7.1 Methods

- **Action**(self, *args, **kw)

- **AddMethod**(self, function, name=False)

  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**(self, files, action)

- **AddPreAction**(self, files, action)

- **Alias**(self, target, source=[], action=False, **kw)

- **AlwaysBuild**(self, *targets)

- **Append**(self, **kw)

  Append values to existing construction variables in an Environment.

- **AppendENVPath**(self, name, newpath, envname='ENV', sep=':', delete_existing=False)

  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(self, 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.

BuildContext(self, **kw)

BuildDir(self, *args, **kw)

Builder(self, **kw)

CacheDir(self, path)

Clean(self, targets, files)

Clone(self, tools=[], toolpath=False, parse_flags=False, **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(self, 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(self, *args, **kw)

Copy(self, *args, **kw)

Decider(self, function)

Depends(self, target, dependency)
Explicitly specify that 'target’s depend on 'dependency'.

Detect(self, progs)
Return the first available program in progs.

Dictionary(self, *args)
Dir\((self, name, *args, **kw)\)

Dump\((self, key=False)\)

Using the standard Python pretty printer, dump the contents of the scons build environment to stdout.

If the key passed in is anything other than None, then that will be used as an index into the build environment dictionary and whatever is found there will be fed into the pretty printer. Note that this key is case sensitive.

Entry\((self, name, *args, **kw)\)

Environment\((self, **kw)\)

Execute\((self, action, *args, **kw)\)

Directly execute an action through an Environment

File\((self, name, *args, **kw)\)

FindFile\((self, file, dirs)\)

FindInstalledFiles\((self)\)

returns the list of all targets of the Install and InstallAs Builder.

FindIxes\((self, paths, prefix, suffix)\)

Search a list of paths for something that matches the prefix and suffix.

paths - the list of paths or nodes.
prefix - construction variable for the prefix.
suffix - construction variable for the suffix.

FindSourceFiles\((self, node=’.’)\)

returns a list of all source files.
<table>
<thead>
<tr>
<th>Method</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flatten(self, sequence)</td>
<td></td>
</tr>
<tr>
<td>GetBuildPath(self, files)</td>
<td></td>
</tr>
<tr>
<td>Glob(self, pattern, ondisk=True, source=False, strings=False)</td>
<td></td>
</tr>
<tr>
<td>Ignore(self, target, dependency)</td>
<td></td>
</tr>
<tr>
<td>Ignore a dependency.</td>
<td></td>
</tr>
<tr>
<td>Literal(self, string)</td>
<td></td>
</tr>
<tr>
<td>Local(self, *targets)</td>
<td></td>
</tr>
<tr>
<td>MergeFlags(self, args, unique=False, dict=False)</td>
<td></td>
</tr>
<tr>
<td>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.</td>
<td></td>
</tr>
<tr>
<td>NoCache(self, *targets)</td>
<td></td>
</tr>
<tr>
<td>Tags a target so that it will not be cached</td>
<td></td>
</tr>
<tr>
<td>NoClean(self, *targets)</td>
<td></td>
</tr>
<tr>
<td>Tags a target so that it will not be cleaned by -c</td>
<td></td>
</tr>
<tr>
<td>Override(self, overrides)</td>
<td></td>
</tr>
<tr>
<td>Produce a modified environment whose variables are overridden by the overrides dictionaries. &quot;overrides&quot; is a dictionary that will override the variables of this environment.</td>
<td></td>
</tr>
<tr>
<td>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.</td>
<td></td>
</tr>
</tbody>
</table>
### ParseConfig

```
ParseConfig(self, command, function=False, unique=False)
```

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

```
ParseDepends(self, filename, must_exist=False, 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

```
ParseFlags(self, *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(self, platform)
```

### Precious

```
Precious(self, *targets)
```

### Prepend

```
Prepend(self, **kw)
```

Prepend values to existing construction variables in an Environment.
PrependENVPath(self, name, newpath, envname='ENV', sep=':', delete_existing=False)

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(self, 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.

RemoveMethod(self, function)

Removes the specified function’s MethodWrapper from the added_methods list, so we don’t re-bind it when making a clone.

Replace(self, **kw)

Replace existing construction variables in an Environment with new construction variables and/or values.

ReplaceIxes(self, 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(self, *dirs, **kw)

Requires(self, 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(self, name='.sconsign', dbm_module=False)
Class Base Module SCons.Environment

Scanner(self, *args, **kw)

SetDefault(self, **kw)

SideEffect(self, side_effect, target)
Tell scons that side_effects are built as side effects of building targets.

SourceCode(self, entry, builder)
Arrange for a source code builder for (part of) a tree.

SourceSignatures(self, type)

Split(self, 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.

TargetSignatures(self, type)

Tool(self, tool, toolpath=False, **kw)

Value(self, value, built_value=False)

VariantDir(self, variant_dir, src_dir, duplicate=False)

WhereIs(self, prog, path=False, pathext=False, reject=[])
Find prog in the path.

_cmp_(self, other)

_contains_(self, key)

_delitem_(self, key)
Initialization of a basic SCons construction environment, including setting up special construction variables like BUILDER, PLATFORM, etc., and searching for and applying available Tools.

Note that we do *not* call the underlying base class (SubstitutionEnvironment) initialization, because we need to initialize things in a very specific order that doesn’t work with the much simpler base class initialization.

Overrides: SCons.Environment.SubstitutionEnvironment.__init__
items(self)

lvars(self)

scanner_map_delete(self, kw=False)
Delete the cached scanner map (if we need to).

subst(self, string, raw=0, target=False, source=False, conv=False)
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(self, kw, raw=0, target=False, source=False)

subst_list(self, string, raw=0, target=False, source=False, conv=False)
Calls through to SCons.Subst.sconssubst_list(). See
the documentation for that function.

subst_path(self, path, target=False, source=False)
Substitute a path list, turning EntryProxies into Nodes
and leaving Nodes (and other objects) as-is.

subst_target_source(self, string, raw=0, target=False, source=False, conv=False)
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.

8.7.2 Class Variables

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>metaclass</strong></td>
<td>Value: SCons.Memoize.MemoizedMetacl</td>
</tr>
</tbody>
</table>
8.8 Class OverrideEnvironment

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.

8.8.1 Methods

```python
__init__(self, subject, overrides={})
```

Initialization of a basic SCons construction environment, including setting up special construction variables like BUILDER, PLATFORM, etc., and searching for and applying available Tools.

Note that we do *not* call the underlying base class (SubstitutionEnvironment) initialization, because we need to initialize things in a very specific order that doesn’t work with the much simpler base class initialization.

Overrides: SCons.Environment.Base._init_ (inherited documentation)

```python
getattr(self, name)
```

```python
setattr(self, name, value)
```

```python
getitem(self, key)
```

Overrides: SCons.Environment.SubstitutionEnvironment._getitem_

```python
setitem(self, key, value)
```

Overrides: SCons.Environment.SubstitutionEnvironment._setitem_
### Class OverrideEnvironment

#### `_delitem`(self, key)

Overrides: `SCons.Environment.SubstitutionEnvironment._delitem__`

```python
def _delitem__(self, key):
    delitem(self, key)
```

#### `get`(self, key, default=False)

Emulates the `get()` method of dictionaries.


```python
def get(self, key, default=False):
    return self[key]
```

#### `has_key`(self, key)

Overrides: `SCons.Environment.SubstitutionEnvironment.has_key`

```python
def has_key(self, key):
    Overrides: SCons.Environment.SubstitutionEnvironment.has_key
```

#### `__contains__`(self, key)


```python
def __contains__(self, key):
    return self.has_key(key)
```

#### `Dictionary`(self)

Emulates the `items()` method of dictionaries.


```python
def Dictionary(self):
    return self.items()
```

#### `items`(self)

Emulates the `items()` method of dictionaries.

Overrides: `SCons.Environment.SubstitutionEnvironment.items`

```python
def items(self):
    Overrides: SCons.Environment.SubstitutionEnvironment.items
    return self.Dictionary() or []
```

#### `gvars`(self)


```python
def gvars(self):
    return self.Dictionary() or []
```

#### `lvars`(self)


```python
def lvars(self):
    return self.Dictionary() or []
```

#### `Replace`(self, **kw)

Replace existing construction variables in an Environment with new construction variables and/or values.


```python
def Replace(self, **kw):
    for k, v in kw.items():
        self.Replace({k: v})
```

#### `Action`(self, *args, **kw)

```python
def Action(self, *args, **kw):
    pass
```

#### `AddMethod`(self, function, name=False)

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.

```python
def AddMethod(self, function, name=False):
    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`(self, files, action)

```python
def AddPostAction(self, files, action):
    pass
```

#### `AddPreAction`(self, files, action)

```python
def AddPreAction(self, files, action):
    pass
```

#### `Alias`(self, target, source=[], action=False, **kw)

```python
def Alias(self, target, source=[], action=False, **kw):
    pass
```
Class OverrideEnvironment
Module SCons.Environment

<table>
<thead>
<tr>
<th>Method</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>AlwaysBuild</strong></td>
<td>Append values to existing construction variables in an Environment.</td>
</tr>
<tr>
<td><strong>Append</strong></td>
<td>Append values to existing construction variables in an Environment.</td>
</tr>
<tr>
<td><strong>AppendENVPath</strong></td>
<td>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).</td>
</tr>
<tr>
<td><strong>AppendUnique</strong></td>
<td>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.</td>
</tr>
<tr>
<td><strong>BuildDir</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Builder</strong></td>
<td></td>
</tr>
<tr>
<td><strong>CacheDir</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Clean</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Clone</strong></td>
<td>Return a copy of a construction Environment. The copy is like a Python &quot;deep copy&quot;--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.</td>
</tr>
<tr>
<td><strong>Command</strong></td>
<td>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.</td>
</tr>
<tr>
<td><strong>Configure</strong></td>
<td></td>
</tr>
</tbody>
</table>
### Class OverrideEnvironment

**Copy**

```python
self, *args, **kw
```

**Decider**

```python
self, function
```

**Depends**

```python
self, target, dependency
```

Explicitly specify that 'target's depend on 'dependency'.

**Detect**

```python
self, progs
```

Return the first available program in progs.

**Dir**

```python
self, name, *args, **kw
```

**Dump**

```python
self, key=False
```

Using the standard Python pretty printer, dump the contents of the scons build environment to stdout.

If the key passed in is anything other than None, then that will be used as an index into the build environment dictionary and whatever is found there will be fed into the pretty printer. Note that this key is case sensitive.

**Entry**

```python
self, name, *args, **kw
```

**Environment**

```python
self, **kw
```

**Execute**

```python
self, action, *args, **kw
```

Directly execute an action through an Environment.

**File**

```python
self, name, *args, **kw
```

**FindFile**

```python
self, file, dirs
```

**FindInstalledFiles**

returns the list of all targets of the Install and InstallAs Builder.
<table>
<thead>
<tr>
<th>Method</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>FindIxes</strong> ((self, paths, prefix, suffix))</td>
<td>Search a list of paths for something that matches the prefix and suffix.</td>
</tr>
<tr>
<td><strong>paths</strong></td>
<td>the list of paths or nodes.</td>
</tr>
<tr>
<td><strong>prefix</strong></td>
<td>construction variable for the prefix.</td>
</tr>
<tr>
<td><strong>suffix</strong></td>
<td>construction variable for the suffix.</td>
</tr>
<tr>
<td><strong>FindSourceFiles</strong></td>
<td>((self, node='.'))</td>
</tr>
<tr>
<td></td>
<td>returns a list of all source files.</td>
</tr>
<tr>
<td><strong>Flatten</strong></td>
<td>((self, sequence))</td>
</tr>
<tr>
<td><strong>GetBuildPath</strong></td>
<td>((self, files))</td>
</tr>
<tr>
<td><strong>Glob</strong></td>
<td>((self, pattern, ondisk=True, source=False, strings=False))</td>
</tr>
<tr>
<td><strong>Ignore</strong></td>
<td>((self, target, dependency))</td>
</tr>
<tr>
<td></td>
<td>Ignore a dependency.</td>
</tr>
<tr>
<td><strong>Literal</strong></td>
<td>((self, string))</td>
</tr>
<tr>
<td><strong>Local</strong></td>
<td>((self, *targets))</td>
</tr>
<tr>
<td><strong>MergeFlags</strong></td>
<td>((self, args, unique=False, dict=False))</td>
</tr>
<tr>
<td></td>
<td>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.</td>
</tr>
<tr>
<td><strong>NoCache</strong></td>
<td>((self, *targets))</td>
</tr>
<tr>
<td></td>
<td>Tags a target so that it will not be cached</td>
</tr>
<tr>
<td><strong>NoClean</strong></td>
<td>((self, *targets))</td>
</tr>
<tr>
<td></td>
<td>Tags a target so that it will not be cleaned by (-c)</td>
</tr>
</tbody>
</table>
**Override**(self, 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**(self, command, function=False, unique=False)

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**(self, filename, must_exist=False, 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**(self, *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**(self, platform)

**Precious**(self, *targets)
<table>
<thead>
<tr>
<th>Function</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Prepend</strong> *(self, *<em>kw)</em></td>
<td>Prepend values to existing construction variables in an Environment.</td>
</tr>
<tr>
<td><strong>PrependENVPath</strong> <em>(self, name, newpath, envname='ENV', sep=':', delete_existing=False)</em></td>
<td>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).</td>
</tr>
<tr>
<td><strong>PrependUnique</strong> *(self, delete_existing=0, *<em>kw)</em></td>
<td>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.</td>
</tr>
<tr>
<td><strong>RemoveMethod</strong> <em>(self, function)</em></td>
<td>Removes the specified function's MethodWrapper from the added.methods list, so we don't re-bind it when making a clone.</td>
</tr>
<tr>
<td><strong>ReplaceIxes</strong> <em>(self, path, old_prefix, old_suffix, new_prefix, new_suffix)</em></td>
<td>Replace old_prefix with new_prefix and old_suffix with new_suffix.</td>
</tr>
<tr>
<td><strong>Repository</strong> *(self, *dirs, *<em>kw)</em></td>
<td></td>
</tr>
<tr>
<td><strong>Requires</strong> <em>(self, target, prerequisite)</em></td>
<td>Specify that 'prerequisite' must be built before 'target', (but 'target' does not actually depend on 'prerequisite' and need not be rebuilt if it changes).</td>
</tr>
<tr>
<td><strong>SConsignFile</strong> <em>(self, name='.sconsign', dbm_module=False)</em></td>
<td></td>
</tr>
</tbody>
</table>
Scanner(self, *args, **kw)

SetDefault(self, **kw)

SideEffect(self, side_effect, target)
Tell scons that side_effects are built as side effects of building targets.

SourceCode(self, entry, builder)
Arrange for a source code builder for (part of) a tree.

SourceSignatures(self, type)

Split(self, 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.

TargetSignatures(self, type)

Tool(self, tool, toolpath=False, **kw)

Value(self, value, built_value=False)

VariantDir(self, variant_dir, src_dir, duplicate=False)

WhereIs(self, prog, path=False, pathext=False, reject=[]) Find prog in the path.

__cmp__(self, other)

arg2nodes(self, args, node_factory=<class SCons.Environment._Null at 0x87eaf8c>, lookup_list=<class SCons.Environment._Null at 0x87eaf8c>, **kw)

backtick(self, command)
get_CacheDir(self)

get_builder(self, name)
Fetch the builder with the specified name from the environment.

get_factory(self, factory, default='File')
Return a factory function for creating Nodes for this construction environment.

get_scanner(self, skey)
Find the appropriate scanner given a key (usually a file suffix).

get_src_sig_type(self)

get_tgt_sig_type(self)

scanner_map_delete(self, kw=False)
Delete the cached scanner map (if we need to).

subst(self, string, raw=0, target=False, source=False, conv=False)
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(self, kw, raw=0, target=False, source=False)

subst_list(self, string, raw=0, target=False, source=False, conv=False)
Calls through to SCons.Subst.scons_subst_list(). See the documentation for that function.

subst_path(self, path, target=False, source=False)
Substitute a path list, turning EntryProxies into Nodes and leaving Nodes (and other objects) as-is.
**8.8.2 Class Variables**

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>metaclass</em></td>
<td>Value: SCons.Memoize.Memoized_Metaclass</td>
</tr>
<tr>
<td>memoizer_conters</td>
<td>Value: []</td>
</tr>
</tbody>
</table>

**8.9 Class Base**


**Known Subclasses:** SCons.Environment.OverrideEnvironment, SCons.Script.SConscript'.SConsEnvironment

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.

**8.9.1 Methods**

**Action**(self, *args, **kw)

**AddMethod**(self, function, name=False)

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**(self, files, action)

**AddPreAction**(self, files, action)

**Alias**(self, target, source=[], action=False, **kw)
### Class Base Module SCons.Environment

#### AlwaysBuild

```python
AlwaysBuild(self, *targets)
```

Append values to existing construction variables in an Environment.

#### Append

```python
Append(self, **kw)
```

Append values to existing construction variables in an Environment.

#### AppendENVPath

```python
AppendENVPath(self, name, newpath, envname='ENV', sep=':', delete_existing=False)
```

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

```python
AppendUnique(self, 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.

#### BuildDir

```python
BuildDir(self, *args, **kw)
```

#### Builder

```python
Builder(self, **kw)
```

#### CacheDir

```python
CacheDir(self, path)
```

#### Clean

```python
Clean(self, targets, files)
```

#### Clone

```python
Clone(self, tools=[], toolpath=False, parse_flags=False, **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

```python
Command(self, 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

```python
Configure(self, *args, **kw)
```
Copy(self, *args, **kw)

Decider(self, function)

Depends(self, target, dependency)
Explicitly specify that 'target's depend on 'dependency'.

Detect(self, progs)
Return the first available program in progs.

Dictionary(self, *args)

Dir(self, name, *args, **kw)

Dump(self, key=False)
Using the standard Python pretty printer, dump the contents of the
scons build environment to stdout.
If the key passed in is anything other than None, then that will
be used as an index into the build environment dictionary and
whatever is found there will be fed into the pretty printer. Note
that this key is case sensitive.

Entry(self, name, *args, **kw)

Environment(self, **kw)

Execute(self, action, *args, **kw)
Directly execute an action through an Environment

File(self, name, *args, **kw)

FindFile(self, file, dirs)
<table>
<thead>
<tr>
<th>Method</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>FindInstalledFiles(self)</code></td>
<td>returns the list of all targets of the Install and InstallAs Builder.</td>
</tr>
<tr>
<td><code>FindIxes(self, paths, prefix, suffix)</code></td>
<td>Search a list of paths for something that matches the prefix and suffix. paths - the list of paths or nodes. prefix - construction variable for the prefix. suffix - construction variable for the suffix.</td>
</tr>
<tr>
<td><code>FindSourceFiles(self, node='.' )</code></td>
<td>returns a list of all source files.</td>
</tr>
<tr>
<td><code>Flatten(self, sequence)</code></td>
<td></td>
</tr>
<tr>
<td><code>GetBuildPath(self, files)</code></td>
<td></td>
</tr>
<tr>
<td><code>Glob(self, pattern, ondisk=True, source=False, strings=False)</code></td>
<td></td>
</tr>
<tr>
<td><code>Ignore(self, target, dependency)</code></td>
<td>Ignore a dependency.</td>
</tr>
<tr>
<td><code>Literal(self, string)</code></td>
<td></td>
</tr>
<tr>
<td><code>Local(self, *targets)</code></td>
<td></td>
</tr>
<tr>
<td><code>MergeFlags(self, args, unique=False, dict=False)</code></td>
<td>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.</td>
</tr>
<tr>
<td><code>NoCache(self, *targets)</code></td>
<td>Tags a target so that it will not be cached</td>
</tr>
<tr>
<td><code>NoClean(self, *targets)</code></td>
<td>Tags a target so that it will not be cleaned by -c</td>
</tr>
</tbody>
</table>
### Override(self, 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(self, command, function=False, unique=False)

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(self, filename, must_exist=False, 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(self, *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(self, platform)

### Precious(self, *targets)
<table>
<thead>
<tr>
<th>Function</th>
<th>Description</th>
</tr>
</thead>
</table>
| **Prepend**<br>
<code>Prepend(self, **kw)</code> | Prepend values to existing construction variables in an Environment. |
| **PrependENVPath**<br>
<code>PrependENVPath(self, name, newpath, envname='ENV', sep=':', delete_existing=False)</code> | 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**<br>
<code>PrependUnique(self, delete_existing=0, **kw)</code> | 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. |
| **RemoveMethod**<br>
<code>RemoveMethod(self, function)</code> | Removes the specified function’s MethodWrapper from the added_methods list, so we don't re-bind it when making a clone. |
| **Replace**<br>
<code>Replace(self, **kw)</code> | Replace existing construction variables in an Environment with new construction variables and/or values. |
| **ReplaceIXes**<br>
<code>ReplaceIXes(self, path, old_prefix, old_suffix, new_prefix, new_suffix)</code> | 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**<br>
<code>Repository(self, *dirs, **kw)</code> |
Requires(self, 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(self, name='.sconsign', dbm_module=False)

Scanner(self, *args, **kw)

SetDefault(self, **kw)

SideEffect(self, side_effect, target)
Tell scons that side_effects are built as side
effects of building targets.

SourceCode(self, entry, builder)
Arrange for a source code builder for (part of) a tree.

SourceSignatures(self, type)

Split(self, 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.

TargetSignatures(self, type)

Tool(self, tool, toolpath=False, **kw)

Value(self, value, built_value=False)

VariantDir(self, variant_dir, src_dir, duplicate=False)
<table>
<thead>
<tr>
<th>Function</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>WhereIs</code></td>
<td>Find prog in the path.</td>
</tr>
<tr>
<td><code>__cmp__</code></td>
<td></td>
</tr>
<tr>
<td><code>__contains__</code></td>
<td></td>
</tr>
<tr>
<td><code>__delitem__</code></td>
<td></td>
</tr>
<tr>
<td><code>__getitem__</code></td>
<td></td>
</tr>
<tr>
<td><code>__init__</code></td>
<td>Initialization of a basic SCons construction environment, including setting up special construction variables like BUILDER, PLATFORM, etc., and searching for and applying available Tools. Note that we do <em>not</em> call the underlying base class (SubstitutionEnvironment) initialization, because we need to initialize things in a very specific order that doesn’t work with the much simpler base class initialization. Overrides: SCons.Environment.SubstitutionEnvironment.<strong>init</strong>.</td>
</tr>
<tr>
<td><code>__setitem__</code></td>
<td></td>
</tr>
<tr>
<td><code>arg2nodes</code></td>
<td></td>
</tr>
<tr>
<td><code>backtick</code></td>
<td></td>
</tr>
<tr>
<td><code>get</code></td>
<td>Emulates the get() method of dictionaries.</td>
</tr>
<tr>
<td><code>get_CacheDir</code></td>
<td></td>
</tr>
<tr>
<td><code>get_builder</code></td>
<td>Fetch the builder with the specified name from the environment.</td>
</tr>
<tr>
<td><code>get_factory</code></td>
<td>Return a factory function for creating Nodes for this construction environment.</td>
</tr>
</tbody>
</table>
**get Scanner**

Find the appropriate scanner given a key (usually a file suffix).

**get Src Sig Type**

**get Tgt Sig Type**

**gvars**

**has_key**

**items**

**lvars**

**scanner_map_delete**

Delete the cached scanner map (if we need to).

**subst**

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**

**subst list**

Calls through to SCons.Subst.scons_subst_list(). See the documentation for that function.

**subst path**

Substitute a path list, turning EntryProxies into Nodes and leaving Nodes (and other objects) as is.
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.

### 8.9.2 Class Variables

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>metaclass</strong></td>
<td>Value: SCons.Memoize.Memoized_Metaclass</td>
</tr>
<tr>
<td>memoizer_counts</td>
<td>Value: []</td>
</tr>
</tbody>
</table>
9 Module SCons.Errors

This file contains the exception classes used to handle internal and user errors in SCons.

9.1 Functions

```python
convert_to_BuildError(status, exc_info=False)
```

Convert any return code a BuildError Exception.

‘satus’ can either be a return code or an Exception. The buildError.status we set here will normally be used as the exit status of the "scons" process.

9.2 Variables

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
</table>

9.3 Class BuildError

```
object

exceptions.BaseException

exceptions.Exception

SCons.Errors.BuildError
```

Errors occurring while building.

BuildError have the following attributes:

- 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.
Class BuildError

Module SCons.Errors

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 cause of the location of the 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 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 an action failure)

9.3.1 Methods

_init_ (self, node=False, errstr='Unknown error', status=2, exitstatus=2, filename=False, executor=False, action=False, command=False, exc_info=(None, None, None))

Overrides: exceptions.Exception._init__exitit(inherited documentation)

_str_ (self)
str(x)

Overrides: exceptions.BaseException._str__exitit(inherited documentation)
Class BuildError

Module SCons.Errors

```python
_delattr__(...)  
x._delattr_('name') ==> del x.name  
Overrides: object._delattr_

_getattribute__(...)  
x._getattribute_('name') ==> x.name  
Overrides: object._getattribute_

_getitem_(x, y)  
x[y]

_getslice_(x, i, j)  
x[i:j]  
Use of negative indices is not supported.

_hash_(x)  
hash(x)

_new__(T, S, ...)  
Return Value  
a new object with type S, a subtype of T  
Overrides: exceptions.BaseException._new_

_reduce__(...)  
helper for pickle  
Overrides: object._reduce_ extit(inherited documentation)

_reduce_ex__(...)  
helper for pickle

_repr_(x)  
repr(x)  
Overrides: object._repr_

_setattr__(...)  
x._setattr_('name', value) ==> x.name = value  
Overrides: object._setattr_

_setstate__(...) ```
9.3.2 Properties

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>class</strong></td>
<td>Value: &lt;attribute '<em>class</em>' of 'object' objects&gt;</td>
</tr>
<tr>
<td>args</td>
<td>Value: &lt;attribute 'args' of 'exceptions.BaseException' objects&gt;</td>
</tr>
<tr>
<td>message</td>
<td>Value: &lt;member 'message' of 'exceptions.BaseException' objects&gt;</td>
</tr>
</tbody>
</table>

9.4 Class InternalError

```
object
| exceptions.BaseException
| exceptions.Exception
| SCons.Errors.InternalError
```

9.4.1 Methods

```
__delattr__(...)  
x.__delattr__('name') == del x.name
Overrides: object.__delattr__

__getattribute__(...)  
x.__getattribute__('name') == x.name
Overrides: object.__getattribute__

__getitem__(x, y)  
x[y]

__getslice__(x, i, j)  
x[i:j]
Use of negative indices is not supported.

__hash__(x)  
hash(x)

__init__(...)  
x.__init__(...) initializes x; see x.__class__.__doc__ for signature
Overrides: exceptions.BaseException.__init__
```
```
._new__(T, S, ...)  

Return Value  
a new object with type S, a subtype of T  
Overrides: exceptions.BaseException._new__

._reduce__(...)  
helper for pickle  
Overrides: object._reduce__ extit(inherited documentation)

._reduce_ex__(...)  
helper for pickle

._repr__(x)  
repr(x)  
Overrides: object._repr__

._setattr__(...)  
x._setattr__('name', value) <=> x.name = value  
Overrides: object._setattr__

._setstate__(...)  

._str__(x)  
str(x)  
Overrides: object._str__

9.4.2 Properties

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>class</em></td>
<td>Value: &lt;attribute '<em>class</em>' of 'object' objects&gt;</td>
</tr>
<tr>
<td>args</td>
<td>Value: &lt;attribute 'args' of 'exceptions.BaseException' objects&gt;</td>
</tr>
<tr>
<td>message</td>
<td>Value: &lt;member 'message' of 'exceptions.BaseException' objects&gt;</td>
</tr>
</tbody>
</table>
```
9.5 Class UserError

object

exceptions.BaseException

exceptions.Exception

SCons.Errors.UserError

Known Subclasses: SCons.SConf.SConfError, SCons.Warnings.Warning

9.5.1 Methods

___delattr__(...)  
\texttt{x.__delattr__('name')} \leftrightarrow \texttt{del x.name}  
Overrides: object.__delattr__

___getattr__(...)  
\texttt{x.__getattr__('name')} \leftrightarrow \texttt{x.name}  
Overrides: object.__getattr__

___getitem__(x, y)  
\texttt{x[y]}

___getslice__(x, i, j)  
\texttt{x[i:j]}  
Use of negative indices is not supported.

___hash__(x)  
\texttt{hash(x)}

___init__(...)  
\texttt{x.__init__(...)} initializes \texttt{x}; see \texttt{x.__class__.__doc__} for signature  
Overrides: exceptions.BaseException.__init__

___new__(T, S, ...)  

Return Value  
a new object with type \texttt{S}, a subtype of \texttt{T}  
Overrides: exceptions.BaseException.__new__
Class StopError

Module SCons.Errors

```python
_reduce__(...)
helper for pickle
Overrides: object._reduce_ extit(inherited documentation)
```

```python
_reduce_ex__(...)
helper for pickle
```

```python
_repr__(x)
repr(x)
Overrides: object._repr_
```

```python
_setattr__(...)
x._setattr_('name', value) <== x.name = value
Overrides: object._setattr_
```

```python
_setstate__(...)
```

```python
_str__(x)
str(x)
Overrides: object._str_
```

9.5.2 Properties

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>class</em></td>
<td>Value: &lt;attribute '<em>class</em>' of 'object' objects&gt;</td>
</tr>
<tr>
<td>args</td>
<td>Value: &lt;attribute 'args' of 'exceptions.BaseException' objects&gt;</td>
</tr>
<tr>
<td>message</td>
<td>Value: &lt;member 'message' of 'exceptions.BaseException' objects&gt;</td>
</tr>
</tbody>
</table>

9.6 Class StopError

```
<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>object</td>
<td>exceptions.BaseException</td>
<td>exceptions.Exception</td>
</tr>
<tr>
<td></td>
<td></td>
<td>SCons.Errors.StopError</td>
</tr>
</tbody>
</table>
```
9.6.1 Methods

<table>
<thead>
<tr>
<th>Method</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>__delattr__(...)</code></td>
<td><code>x.__delattr__('name')</code> &lt;=&gt; del x.name</td>
</tr>
<tr>
<td></td>
<td>Overrides: object.<strong>delattr</strong></td>
</tr>
<tr>
<td><code>__getattr__</code></td>
<td></td>
</tr>
<tr>
<td><code>__getitem__(x, y)</code></td>
<td><code>x[y]</code></td>
</tr>
<tr>
<td><code>__getstate__</code></td>
<td></td>
</tr>
<tr>
<td><code>__hash__</code></td>
<td><code>hash(x)</code></td>
</tr>
<tr>
<td><code>__init__(...)</code></td>
<td><code>x.__init__(...)</code> initializes x; see x.<strong>class</strong>.<strong>doc</strong> for signature</td>
</tr>
<tr>
<td></td>
<td>Overrides: exceptions.BaseException.<strong>init</strong></td>
</tr>
</tbody>
</table>
| `__new__(T, S, ...)` | Return Value  
|                  | a new object with type S, a subtype of T                                  |
|                  | Overrides: exceptions.BaseException.__new__                                |
| `__reduce__`      | helper for pickle                                                           |
|                  | Overrides: object.__reduce__ extit(inherited documentation)                |
| `__reduce_ex__`   | helper for pickle                                                           |
| `__repr__(x)`    | `repr(x)`                                                                  |
|                  | Overrides: object.__repr__                                                 |
9.6.2 Properties

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>class</strong></td>
<td>Value: &lt;attribute '<strong>class</strong>' of 'object' objects&gt;</td>
</tr>
<tr>
<td>args</td>
<td>Value: &lt;attribute 'args' of 'exceptions.BaseException' objects&gt;</td>
</tr>
<tr>
<td>message</td>
<td>Value: &lt;member 'message' of 'exceptions.BaseException' objects&gt;</td>
</tr>
</tbody>
</table>

9.7 Class EnvironmentError

object

exceptions.BaseException

exceptions.Exception

SCons.Errors.EnvironmentError

9.7.1 Methods

__delattr__(...)

x.__delattr__('name') ==> del x.name

Overrides: object.__delattr__

__getattribute__(...)

x.__getattribute__('name') ==> x.name

Overrides: object.__getattribute__

__getitem__(x, y)

x[y]
```python
__getslice__(x, i, j)
x[i:j]
Use of negative indices is not supported.

__hash__(x)
hash(x)

__init__(...)
x.__init__(...) initializes x; see x.__class__.__doc__ for signature
Overrides: exceptions.BaseException.__init__

__new__(T, S, ...)

Return Value
   a new object with type S, a subtype of T
Overrides: exceptions.BaseException.__new__

__reduce__(...)
   helper for pickle
Overrides: object.__reduce__ (inherited documentation)

__reduce_ex__(...)
   helper for pickle

__repr__(x)
repr(x)
Overrides: object.__repr__

__setattr__(...)
x.__setattr__('name', value) ==> x.name = value
Overrides: object.__setattr__

__setstate__(...)

__str__(x)
str(x)
Overrides: object.__str__
```

9.7.2 Properties
### 9.8 Class ExplicitExit

object

exceptions.BaseException

exceptions.Exception

SCons.Errors.ExplicitExit

#### 9.8.1 Methods

```python
_init_(self, node=False, status=False, *args)
x._init_(...) initializes x; see x.__class__.doc__ for signature
Overrides: exceptions.Exception._init__exit((inherited documentation)

_delattr_(...)
x._delattr_(‘name’) <=> del x.name
Overrides: object._delattr__

_getattribute_(...)
x._getattribute_(‘name’) <=> x.name
Overrides: object._getattribute__

_getitem_(x, y)
x[y]

_getslice_(x, i, j)
x[i:j]
Use of negative indices is not supported.

_hash_(x)
hash(x)
```
9.8.2 Properties

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>._class_</code></td>
<td>Value: <code>&lt;attribute '__class__' of 'object' objects&gt;</code></td>
</tr>
<tr>
<td><code>args</code></td>
<td>Value: <code>&lt;attribute 'args' of 'exceptions.BaseException' objects&gt;</code></td>
</tr>
<tr>
<td><code>message</code></td>
<td>Value: <code>&lt;member 'message' of 'exceptions.BaseException' objects&gt;</code></td>
</tr>
</tbody>
</table>
Module SCons.Executor

SCons.Executor

A module for executing actions with specific lists of target and source Nodes.

10.1 Functions

get_NullEnvironment()

Use singleton pattern for Null Environments.

10.2 Variables

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>revision</strong></td>
<td>Value: 'src/engine/SCons/Executor.py 3842 2008/12/20 22:59:52 sc...</td>
</tr>
<tr>
<td>nullenv</td>
<td>Value: False</td>
</tr>
</tbody>
</table>

10.3 Class Executor

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.

10.3.1 Methods

__init__(self, action, env=False, overridelist=[], targets=[], sources=[], builder_kw={})

set_action_list(self, action)

get_action_list(self)

get_build_env(self)

Fetch or create the appropriate build Environment for this Executor.

get_build_scanner_path(self, scanner)

Fetch the scanner path for this executor’s targets and sources.

get_kw(self, kw={})
### Class Executor

**do_nothing**(*self, target, kw*)

**do_execute**(*self, target, kw*)

Actually execute the action list.

**__call__**(*self, target, **kw*)

**cleanup**(*self*)

**add_sources**(*self, 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.

**get_sources**(*self*)

**prepare**(*self*)

Preparatory checks for whether this Executor can go ahead and (try to) build its targets.

**add_pre_action**(*self, action*)

**add_post_action**(*self, action*)

**my_str**(*self*)

**__str__**(*self*)

**nullify**(*self*)

**get_contents**(*self*)

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.

**get_timestamp**(*self*)

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.

**scan_targets**(*self, scanner*)

**scan_sources**(*self, scanner*)
Class Null

Module SCons.Executor

```python
scan(self, 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.

```python
get_unignored_sources(self, ignore=())
```

```python
process_sources(self, func, ignore=())
```

```python
get_implicit_deps(self)
```
Return the executor’s implicit dependencies, i.e. the nodes of the commands to be executed.

10.3.2 Class Variables

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>memoizer_counters</td>
<td>Value: []</td>
</tr>
</tbody>
</table>

10.4 Class Null

A null Executor, with a null build Environment, that does nothing when the rest of the methods call it.

This might be able to disapper 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.

10.4.1 Methods

```python
_init_(self, *args, **kw)
```

```python
get_build_env(self)
```

```python
get_build_scanner_path(self)
```

```python
cleanup(self)
```

```python
prepare(self)
```

```python
get_unignored_sources(self, *args, **kw)
```

```python
get_action_list(self)
```
Class Null

Module SCons.Executor

```python
__call__(self, *args, **kw)

get_contents(self)

add_pre_action(self, action)

add_post_action(self, action)

set_action_list(self, action)
```
11 Module SCons.Job

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.

11.1 Variables

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>explicit_stack_size</td>
<td>Value: False</td>
</tr>
<tr>
<td>default_stack_size</td>
<td>Value: 256</td>
</tr>
<tr>
<td>interrupt_msg</td>
<td>Value: 'Build interrupted.'</td>
</tr>
</tbody>
</table>

11.2 Class InterruptState

11.2.1 Methods

- _init__(self)
- set(self)
- __call__(self)

11.3 Class Jobs

An instance of this class initializes N jobs, and provides methods for starting, stopping, and waiting on all N jobs.

11.3.1 Methods

- __init__(self, num, taskmaster)

create 'num' jobs using the given taskmaster.

If 'num' is 1 or less, then a serial job will be used, otherwise a parallel job with 'num' worker threads will be used.

The 'num_jobs' attribute will be set to the actual number of jobs allocated. If more than one job is requested but the Parallel class can’t do it, it gets reset to 1. Wrapping interfaces that care should check the value of 'num_jobs' after initialization.
```python
run(self, postfunc=<function <lambda> at 0x88de764>)
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.
```

```python
were_interrupted(self)
Returns whether the jobs were interrupted by a signal.
```

## 11.4 Class Serial

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.

### 11.4.1 Methods

```python
__init__(self, taskmaster)
Create a new serial job given a taskmaster.

The taskmaster's next_task() method should return the next task
that needs to be executed, or None if there are no more tasks. The
taskmaster's executed() method will be called for each task when it
is successfully executed or failed() will be called if it failed to
execute (e.g. execute() raised an exception).
```

```python
start(self)
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.
```
11.5 Class Worker

object

threading._Verbose

threading.Thread

SCons.Job.Worker

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.

11.5.1 Methods

```python
__init__(self, requestQueue, resultsQueue, interrupted)
Overrides: threading.Thread.__init__
```

```python
run(self)
Overrides: threading.Thread.run
```

```python
__delattr__(...)
x.__delattr__('name') == del x.name
```

```python
__getattr__(...)
x.__getattr__('name') == x.name
```

```python
__hash__(x)
hash(x)
```

```python
__new__(T, S, ...)
Return Value
a new object with type S, a subtype of T
```

```python
__reduce__(...)
helper for pickle
```

```python
__reduce_ex__(...)
helper for pickle
```

```python
__repr__(self)
repr(x)
Overrides: object.__repr__ (inherited documentation)
```
11.5.2 Properties

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>class</strong></td>
<td>Value: &lt;attribute '<strong>class</strong>' of 'object' objects&gt;</td>
</tr>
</tbody>
</table>

11.6 Class ThreadPool

This class is responsible for spawning and managing worker threads.

11.6.1 Methods

__init__(self, num, stack_size, interrupted)

Create the request and reply queues, and 'num' worker threads.

One must specify the stack size of the worker threads. The stack size is specified in kilobytes.

put(self, task)

Put task into request queue.

get(self)

Remove and return a result tuple from the results queue.
preparation_failed(self, task)

cleanup(self)

Shuts down the thread pool, giving each worker thread a chance to shut down gracefully.

11.7 Class Parallel

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.

11.7.1 Methods

__init__(self, taskmaster, num, stack_size)

Create a new parallel job given a taskmaster.

The taskmaster’s next_task() method should return the next task that needs to be executed, or None if there are no more tasks. The taskmaster’s executed() method will be called for each task when it is successfully executed or failed() will be called if the task failed to execute (i.e. execute() raised an exception).

Note: calls to taskmaster are serialized, but calls to execute() on distinct tasks are not serialized, because that is the whole point of parallel jobs: they can execute multiple tasks simultaneously.

start(self)

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.
12 Module SCons.Memoize

Memoizer

A metaclass 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. Here is an example of wrapping a method that returns a computed value, with no input parameters:

```python
memoizer_counters = []  # Memoization

memoizer_counters.append(SCons.Memoize.CountValue('foo'))  # Memoization

def foo(self):
    try:  # Memoization
        return self._memo['foo']  # Memoization
    except KeyError:  # Memoization
        pass  # Memoization

    result = self.compute_bar_value()

    self._memo['foo'] = result  # Memoization

    return result
```

Here is an example of wrapping a method that will return different values based on one or more input arguments:

```python
def _bar_key(self, argument):  # Memoization
    return argument  # Memoization

memoizer_counters.append(SCons.Memoize.CountDict('bar', _bar_key))  # Memoization

def bar(self, argument):

    memo_key = argument  # Memoization

    try:
        memo_dict = self._memo['bar']  # Memoization
    except KeyError:
        memo_dict = {}  # Memoization

    self._memo['dict'] = memo_dict  # Memoization

    else:
        try:
            return memo_dict[memo_key]  # Memoization
        except KeyError:
            pass  # Memoization

    result = self.compute_bar_value(argument)
```
Functions Module SCons.Memoize

```python

    memo_dict[memo_key] = result  # Memoization

    return result

```

At one point we avoided replicating this sort of logic in all the methods by putting it right into this module, but we've moved away from that at present (see the "Historical Note," below.).

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.

Historical Note: The initial Memoizer implementation actually handled the caching of values for the wrapped methods, based on a set of generic algorithms for computing hashable values based on the method’s arguments. This collected caching logic nicely, but had two drawbacks:

Running arguments through a generic key-conversion mechanism is slower (and less flexible) than just coding these things directly. Since the methods that need memoized values are generally performance-critical, slowing them down in order to collect the logic isn’t the right tradeoff.

Use of the memoizer really obscured what was being called, because all the memoized methods were wrapped with re-used generic methods. This made it more difficult, for example, to use the Python profiler to figure out how to optimize the underlying methods.

12.1 Functions

Dump(title=False)
12.2 Variables

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>revision</strong></td>
<td>Value: 'src/engine/SCons/Memoize.py 3842 2008/12/20 22:59:52 scons'</td>
</tr>
<tr>
<td><strong>doc</strong></td>
<td>Value: &quot;&quot;&quot;&quot;Memoi...</td>
</tr>
<tr>
<td>use_memoizer</td>
<td>Value: False</td>
</tr>
<tr>
<td>CounterList</td>
<td>Value: []</td>
</tr>
<tr>
<td>use_metaclass</td>
<td>Value: False</td>
</tr>
<tr>
<td>reason</td>
<td>Value: 'newinstancemethod() bug'</td>
</tr>
</tbody>
</table>

12.3 Class Counter

**Known Subclasses:** SCons.Memoize.CountDict, SCons.Memoize.CountValue

Base class for counting memoization hits and misses.

We expect that the metaclass initialization will have filled in the .name attribute that represents the name of the function being counted.

12.3.1 Methods

```python
_init__(self, method_name)
```

```python
display(self)
```

```python
_cmp__(self, other)
```

12.4 Class CountValue

```python
```

A counter class for simple, atomic memoized values.

A CountValue object should be instantiated in a class for each of the class’s methods that memoizes its return value by simply storing the return value in its _memo dictionary.

We expect that the metaclass initialization will fill in the
.underlying_method attribute with the method that we’re wrapping. 
We then call the underlying_method method after counting whether 
its memoized value has already been set (a hit) or not (a miss).

12.4.1 Methods

```python
_call__(self, *args, **kw)
_cmp__(self, other)
_init__(self, method_name)
```

display(self)

12.5 Class CountDict

SCons.Memoize.Counter

SCons.Memoize.CountDict

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 class 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.

We expect that the metaclass initialization will fill in the 
.underlying_method attribute with the method that we’re wrapping. 
We then call the underlying_method method after counting whether the 
computed key value is already present in the memoization dictionary 
(a hit) or not (a miss).

12.5.1 Methods

```python
_init__(self, method_name, keymaker)
```

Overrides: SCons.Memoize.Counter.\_init\_

```python
_call__(self, *args, **kw)
_cmp__(self, other)
```
12.6 Class Memoizer

Object which performs caching of method calls for its 'primary' instance.

12.6.1 Methods

```python
_self_ = (self)
```

12.7 Class Memoized_Metaclass

```
object ---
        |--- type ---
                |--- SCons.Memoize.Memoized_Metaclass
```

12.7.1 Methods

```python
__init__ = (cls, name, bases, cls_dict)
x__init__(...) initializes x; see x.__class__.__doc__ for signature
Overrides: object.__init__ (inherited documentation)
```

```python
__call__ = (x, ...)
x(...)  
```

```python
__cmp__ = (x, y)
cmp(x, y)
```

```python
__delattr__ = (...)  
x__delattr__('name') <==> del x.name
Overrides: object.__delattr__
```

```python
__getattribute__ = (...)  
x__getattribute__('name') <==> x.name
Overrides: object.__getattribute__
```

```python
__hash__ = (x)
hash(x)
Overrides: object.__hash__
```
Class Memoized_Metaclass  

Module SCons.Memoize

```python
__new__(T, S, ...)
```

Return Value

a new object with type S, a subtype of T

Overrides: object.__new__

```python
__reduce__(...)
```

helper for pickle

```python
__reduce_ex__(...)
```

helper for pickle

```python
__repr__(x)
```

repr(x)

Overrides: object.__repr__

```python
__setattr__(...)
```

x.__setattr__(‘name’, value) <<< x.name = value

Overrides: object.__setattr__

```python
__str__(x)
```

str(x)

```python
__subclasses__()
```

Return Value

list of immediate subclasses

```python
mro()
```

return a type's method resolution order

Return Value

list

12.7.2 Properties

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>base</strong></td>
<td>Value: <code>&lt;member '_base_' of 'type' objects&gt;</code></td>
</tr>
<tr>
<td><strong>bases</strong></td>
<td>Value: <code>&lt;attribute '_bases_' of 'type' objects&gt;</code></td>
</tr>
<tr>
<td><strong>basicsize</strong></td>
<td>Value: <code>&lt;member '_basicsize_' of 'type' objects&gt;</code></td>
</tr>
<tr>
<td><strong>class</strong></td>
<td>Value: <code>&lt;attribute '_class_' of 'object' objects&gt;</code></td>
</tr>
<tr>
<td><strong>dictoffset</strong></td>
<td>Value: <code>&lt;member '_dictoffset_' of 'type' objects&gt;</code></td>
</tr>
<tr>
<td><strong>flags</strong></td>
<td>Value: <code>&lt;member '_flags_' of 'type' objects&gt;</code></td>
</tr>
</tbody>
</table>
```

continued on next page
<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>itemsize</strong></td>
<td>Value: <code>&lt;member '_itemsize_' of 'type' objects&gt;</code></td>
</tr>
<tr>
<td><strong>mro</strong></td>
<td>Value: <code>&lt;member '_mro_' of 'type' objects&gt;</code></td>
</tr>
<tr>
<td><strong>name</strong></td>
<td>Value: <code>&lt;attribute '_name_' of 'type' objects&gt;</code></td>
</tr>
<tr>
<td><strong>weakrefoffset</strong></td>
<td>Value: <code>&lt;member '_weakrefoffset_' of 'type' objects&gt;</code></td>
</tr>
</tbody>
</table>
13 Package SCons.Node

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."

13.1 Modules

  Alias nodes.
  *(Section 14, p. 118)*
- FS: scons.Node.FS
  File system nodes.
  *(Section 15, p. 132)*
- Python: scons.Node.Python
  Python nodes.
  *(Section 16, p. 215)*

13.2 Functions

<table>
<thead>
<tr>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>classname(obj)</code></td>
</tr>
<tr>
<td><code>Annotate(node)</code></td>
</tr>
<tr>
<td><code>get_children(node, parent)</code></td>
</tr>
<tr>
<td><code>ignore_cycle(node, stack)</code></td>
</tr>
<tr>
<td><code>do_nothing(node, parent)</code></td>
</tr>
</tbody>
</table>

13.3 Variables
Class NodeInfoBase

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>revision</strong></td>
<td>Value: 'src/engine/SCons/Node/<strong>init</strong>.py 3842 2008/12/20 22:59:...</td>
</tr>
<tr>
<td>no_state</td>
<td>Value: 0</td>
</tr>
<tr>
<td>pending</td>
<td>Value: False</td>
</tr>
<tr>
<td>executing</td>
<td>Value: 2</td>
</tr>
<tr>
<td>up_to_date</td>
<td>Value: 3</td>
</tr>
<tr>
<td>executed</td>
<td>Value: 4</td>
</tr>
<tr>
<td>failed</td>
<td>Value: 5</td>
</tr>
<tr>
<td>StateString</td>
<td>Value: {0: 'no_state', 1: 'pending', 2: 'executing', 3: 'up_to_d...</td>
</tr>
<tr>
<td>implicit_cache</td>
<td>Value: 0</td>
</tr>
<tr>
<td>implicit_deps_unchanged</td>
<td>Value: 0</td>
</tr>
<tr>
<td>implicit_deps_changed</td>
<td>Value: 0</td>
</tr>
<tr>
<td>arg2nodes_lookups</td>
<td>Value: [&lt;bound method AliasNameSpace.lookup of {}&gt;]</td>
</tr>
</tbody>
</table>

13.4 Class NodeInfoBase


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.

13.4.1 Methods

_init__(self, node)

convert(self, node, val)

format(self, field_list=False, names=0)

merge(self, other)

update(self, node)

13.4.2 Class Variables

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>current_version_id</td>
<td>Value: False</td>
</tr>
</tbody>
</table>
13.5 Class BuildInfoBase


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.

13.5.1 Methods

- **init**(self, node)
- **merge**(self, other)

13.5.2 Class Variables

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>current_version_id</td>
<td>Value: False</td>
</tr>
</tbody>
</table>

13.6 Class Node


The base Node class, for entities that we know how to build, or use to build other Nodes.

13.6.1 Methods

- **Decider**(self, function)
- **init**(self)
- **add_dependency**(self, depend)
  Adds dependencies.
- **add_ignore**(self, depend)
  Adds dependencies to ignore.
<table>
<thead>
<tr>
<th>Method</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>add_prerequisite(self, prerequisite)</td>
<td>Adds prerequisites</td>
</tr>
<tr>
<td>add_source(self, source)</td>
<td>Adds sources.</td>
</tr>
<tr>
<td>add_to_implicit(self, deps)</td>
<td></td>
</tr>
<tr>
<td>add_to_waiting_parents(self, node)</td>
<td>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 &quot;clean up&quot; this function by using True and False instead...)</td>
</tr>
<tr>
<td>add_to_waiting_s_e(self, node)</td>
<td></td>
</tr>
<tr>
<td>add_wkid(self, wkid)</td>
<td>Add a node to the list of kids waiting to be evaluated</td>
</tr>
<tr>
<td>all_children(self, scan=False)</td>
<td>Return a list of all the node's direct children.</td>
</tr>
<tr>
<td>alter_targets(self)</td>
<td>Return a list of alternate targets for this Node.</td>
</tr>
<tr>
<td>build(self, **kw)</td>
<td>Actually build the node.</td>
</tr>
<tr>
<td>builder_set(self, builder)</td>
<td></td>
</tr>
<tr>
<td>built(self)</td>
<td>Called just after this node is successfully built.</td>
</tr>
</tbody>
</table>

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

**changed_since_last_build**(*self*, *target*, *prev_ni*)  

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.

**children**(*self*, *scan*=`False`)  

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

**children_are_up_to_date**(*self*)  

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.

<table>
<thead>
<tr>
<th>Method</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>clear(self)</td>
<td>Completely clear a Node of all its cached state (so that it can be re-evaluated by interfaces that do continuous integration builds).</td>
</tr>
<tr>
<td>clear_memoized_values(self)</td>
<td></td>
</tr>
<tr>
<td>del_info(self)</td>
<td>Delete the build info from this node.</td>
</tr>
<tr>
<td>disambiguate(self, must_exist=False)</td>
<td></td>
</tr>
<tr>
<td>do_not_store_info(self)</td>
<td></td>
</tr>
<tr>
<td>env_set(self, env, safe=0)</td>
<td></td>
</tr>
<tr>
<td>executor_cleanup(self)</td>
<td>Let the executor clean up any cached information.</td>
</tr>
<tr>
<td>exists(self)</td>
<td>Does this node exist?</td>
</tr>
<tr>
<td>explain(self)</td>
<td></td>
</tr>
<tr>
<td>for_signature(self)</td>
<td>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 <strong>str</strong>() 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.</td>
</tr>
<tr>
<td>get_abspath(self)</td>
<td>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.</td>
</tr>
</tbody>
</table>
### get_binfo(self)

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(self)

Fetch the appropriate Environment to build this node.

### get_build_scanner_path(self, scanner)

Fetch the appropriate scanner path for this node.

### get_builder(self, default_builder=False)

Return the set builder, or a specified default value.

### get_cachedir_csig(self)

### get_csig(self)

### get_env(self)

### get_env_scanner(self, env, kw={})

### get_executor(self, create=False)

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

### get_found_includes(self, 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(self, env, scanner, path)

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(self)

get_source_scanner(self, 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(self)

get_stored_implicit(self)

Fetch the stored implicit dependencies

get_stored_info(self)

get_string(self, 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(self)

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(self)

get_target_scanner(self)

has_builder(self)

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(self)

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).

is_derived(self)

Returns true iff 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_literal(self)
Always pass the string representation of a Node to the command interpreter literally.

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

make_ready(self)
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(self)

multiple_side_effect_has_builder(self)
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(self)

new_ninfo(self)

postprocess(self)
Clean up anything we don’t need to hang onto after we’ve been built.
### prepare(self)

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 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.

### remove(self)

Remove this Node: no-op by default.

### render_include_tree(self)

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

### reset_executor(self)

Remove cached executor; forces recompute when needed.

### retrieve_from_cache(self)

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 iff the node was successfully retrieved.

### rexists(self)

Does this node exist locally or in a repository?
scan(self)
Scan this node's dependents for implicit dependencies.

scanner_key(self)

select_scanner(self, scanner)
Selects a scanner for this Node.

This is a separate method so it can be overridden by Node subclass (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(self, always_build=False)
Set the Node's always_build value.

set_executor(self, executor)
Set the action executor for this node.

set_explicit(self, is_explicit)

set_nocache(self, nocache=False)
Set the Node's nocache value.

set_noclean(self, noclean=False)
Set the Node's noclean value.

set_precious(self, precious=False)
Set the Node's precious value.

set_specific_source(self, source)

set_state(self, state)

state_has_changed(self, target, prev_ni)

store_info(self)
Make the build signature permanent (that is, store it in the .sconsign file or equivalent).
visited(self)

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

### 13.6.2 Class Variables

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>metaclass</strong></td>
<td>Value: SCons.Memoize.MemoizedMetaclass</td>
</tr>
<tr>
<td>memoizer_counters</td>
<td>Value: []</td>
</tr>
</tbody>
</table>

### 13.7 Class NodeList


#### 13.7.1 Methods

- __str__(self)
- __add__(self, other)
- __cmp__(self, other)
- __contains__(self, item)
- __delitem__(self, i)
- __delslice__(self, i, j)
- __eq__(self, other)
- __ge__(self, other)
- __getitem__(self, i)
- __getslice__(self, i, j)
- __gt__(self, other)
- __iadd__(self, other)
- __imul__(self, n)
- __init__(self, initlist=False)
Class Walker

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 next() call. 'kids_func' is an optional function that will be called to
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.

13.8.1 Methods

```python
__init__(self, node, kids_func=<function get_children at 0x844748c>, cycle_func=<function ignore_cycle at 0x844f8ec>, eval_func=<function do_nothing at 0x844f924>)
```

```python
next(self)
```

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.

```python
is_done(self)
```
14 Module SCons.Node.Alias

scons.Node.Alias

Alias nodes.

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

14.1 Variables

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>revision</em></td>
<td>Value: 'src/engine/SCons/Node/Alias.py 3842 2008/12/20 22:59:52 ...</td>
</tr>
<tr>
<td>default_ans</td>
<td>Value: {}</td>
</tr>
</tbody>
</table>

14.2 Class AliasNameSpace

UserDict.UserDict

SCons.Node.Alias.AliasNameSpace

14.2.1 Methods

Alias(self, name, **kw)

lookup(self, name, **kw)

_cmp_(self, dict)

_contains_(self, key)

_delitem_-(self, key)

_getitem_-(self, key)

_init_-(self, dict=False, **kwargs)

_len_(self)

_repr_-(self)

_setitem_-(self, key, item)

clear(self)
copy(self)

fromkeys(cls, iterable, value=False)

get(self, key, failobj=False)

has_key(self, key)

items(self)

iteritems(self)

iterkeys(self)

itervalues(self)

keys(self)

pop(self, key, *args)

popitem(self)

setdefault(self, key, failobj=False)

update(self, dict=False, **kwargs)

values(self)

14.3 Class AliasNodeInfo


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.

14.3.1 Methods

str_to_node(self, s)

__init__(self, node)

convert(self, node, val)
14.3.2 Class Variables

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>current_version_id</td>
<td>Value: 1</td>
</tr>
<tr>
<td>field_list</td>
<td>Value: ['csig']</td>
</tr>
</tbody>
</table>

14.4 Class AliasBuildInfo

SCons.Node.BuildInfoBase


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.

14.4.1 Methods

_init_(self, node)

merge(self, other)

14.4.2 Class Variables

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>current_version_id</td>
<td>Value: 1</td>
</tr>
</tbody>
</table>

14.5 Class Alias

SCons.Node.Node

# 14.5.1 Methods

<table>
<thead>
<tr>
<th>Method</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>__init__(self, name)</code></td>
<td>Overrides: SCons.Node.Node.<strong>init</strong></td>
</tr>
<tr>
<td><code>str_for_display(self)</code></td>
<td></td>
</tr>
<tr>
<td><code>__str__(self)</code></td>
<td></td>
</tr>
<tr>
<td><code>make_ready(self)</code></td>
<td>Get a Node ready for evaluation.</td>
</tr>
<tr>
<td></td>
<td>This is called before the Taskmaster decides if the Node is</td>
</tr>
<tr>
<td></td>
<td>up-to-date or not. Overriding this method allows for a Node</td>
</tr>
<tr>
<td></td>
<td>subclass to be disambiguated if necessary, or for an implicit</td>
</tr>
<tr>
<td></td>
<td>source builder to be attached.</td>
</tr>
<tr>
<td><code>really_build(self, **kw)</code></td>
<td>Actually build the node.</td>
</tr>
<tr>
<td></td>
<td>This is called by the Taskmaster after it's decided that the Node</td>
</tr>
<tr>
<td></td>
<td>is out-of-date and must be rebuilt, and after the prepare() method has</td>
</tr>
<tr>
<td></td>
<td>gotten everything, uh, prepared.</td>
</tr>
<tr>
<td></td>
<td>This method is called from multiple threads in a parallel build, so only</td>
</tr>
<tr>
<td></td>
<td>do thread safe stuff here. Do thread unsafe stuff in <code>build()</code>.</td>
</tr>
<tr>
<td><code>is_up_to_date(self)</code></td>
<td>Alternate check for whether the Node is current: If all of our children</td>
</tr>
<tr>
<td></td>
<td>were up-to-date, then this Node was up-to-date, too.</td>
</tr>
<tr>
<td></td>
<td>current() method to this method.</td>
</tr>
<tr>
<td></td>
<td>Overrides: SCons.Node.Node.is_up_to_date</td>
</tr>
<tr>
<td><code>is_under(self, dir)</code></td>
<td></td>
</tr>
<tr>
<td><code>get_contents(self)</code></td>
<td>The contents of an alias is the concatenation of the content signatures of</td>
</tr>
<tr>
<td></td>
<td>all its sources.</td>
</tr>
<tr>
<td><code>sconsign(self)</code></td>
<td>An Alias is not recorded in .sconsign files</td>
</tr>
</tbody>
</table>
*Class Alias*

**Module SCons.Node.Alias**

`changed_since_last_build(self, target, prev_ni)`

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.

Overrides: SCons.Node.Node.changed_since_last_build

---

`build(self)`

A "builder" for aliases.


---

`convert(self)`

---

`get_csig(self)`

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


---

`Decider(self, function)`

---

`add_dependency(self, depend)`

Adds dependencies.

---

`add_ignore(self, depend)`

Adds dependencies to ignore.

---

`add_prerequisite(self, prerequisite)`

Adds prerequisites
### add_source(self, source)

Adds sources.

### add_to_implicit(self, deps)

### add_to_waiting_parents(self, 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(self, node)

### add_wkid(self, wkid)

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

### all_children(self, scan=False)

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

### alter_targets(self)

Return a list of alternate targets for this Node.

### builder_set(self, builder)

### built(self)

Called just after this node is successfully built.

### changed(self, node=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.
children(self, scan=False)

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

children_are_up_to_date(self)

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.


clear(self)

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(self)

del_binfo(self)

Delete the build info from this node.

disambiguate(self, must_exist=False)

do_not_store_info(self)

eval_set(self, env, safe=0)

executor_cleanup(self)

Let the executor clean up any cached information.

exists(self)

Does this node exists?

explain(self)
for_signature(self)

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(self)

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(self)

Fetch a node's build information.

node - the node whose sources will be collected

node - the node whose sources will be collected

node - the node whose sources will be collected

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(self)

Fetch the appropriate Environment to build this node.

get_build_scanner_path(self, scanner)

Fetch the appropriate scanner path for this node.

get_builder(self, default_builder=False)

Return the set builder, or a specified default value

get_cachedir_csig(self)

get_env(self)
### get_env_scanner

```python
get_env_scanner(self, env, kw={})
```

**get_env_scanner**

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

**get_executor**

```python
get_executor(self, create=False)
```

**get_executor**

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

### get_found_includes

```python
get_found_includes(self, env, scanner, path)
```

**get_found_includes**

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

```python
get_implicit_deps(self, env, scanner, path)
```

**get_implicit_deps**

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

```python
get_ninfo(self)
```

**get_ninfo**

### get_source_scanner

```python
get_source_scanner(self, node)
```

**get_source_scanner**

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

```python
get_state(self)
```

**get_state**

### get_stored_implicit

```python
get_stored_implicit(self)
```

**get_stored_implicit**

Fetch the stored implicit dependencies

### get_stored_info

```python
get_stored_info(self)
```

**get_stored_info**
**get_string(self, 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(self)**

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(self)**

**get_target_scanner(self)**

**has_builder(self)**

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.
<table>
<thead>
<tr>
<th>Method</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>has_explicit_builder(self)</code></td>
<td>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).</td>
</tr>
<tr>
<td><code>is_derived(self)</code></td>
<td>Returns true iff 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.</td>
</tr>
<tr>
<td><code>is_literal(self)</code></td>
<td>Always pass the string representation of a Node to the command interpreter literally.</td>
</tr>
<tr>
<td><code>missing(self)</code></td>
<td></td>
</tr>
<tr>
<td><code>multiple_side_effect_has_builder(self)</code></td>
<td>Return whether this Node has a builder or not. In Boolean tests, this turns out to be a <em>lot</em> more efficient than simply examining the builder attribute directly (“if node.builder: ...”). When the builder attribute is examined directly, it ends up calling <code>_getattr_</code> for both the <code>_len_</code> and <code>_nonzero_</code> attributes on instances of our Builder Proxy class(es), generating a bazillion extra calls and slowing things down immensely.</td>
</tr>
<tr>
<td><code>new_binfo(self)</code></td>
<td></td>
</tr>
<tr>
<td><code>new_ninfo(self)</code></td>
<td></td>
</tr>
<tr>
<td><code>postprocess(self)</code></td>
<td>Clean up anything we don’t need to hang onto after we’ve been built.</td>
</tr>
</tbody>
</table>
prepare(self)

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 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.

remove(self)

Remove this Node: no-op by default.

render_include_tree(self)

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

reset_executor(self)

Remove cached executor; forces recompute when needed.

retrieve_from_cache(self)

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 iff the node was successfully retrieved.

rexists(self)

Does this node exist locally or in a repository?
**Class Alias**

Module SCons.Node.Alias

---

**scan(self)**

Scan this node’s dependents for implicit dependencies.

**scanner_key(self)**

**select_scanner(self, 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(self, always_build=False)**

Set the Node’s always_build value.

**set_executor(self, executor)**

Set the action executor for this node.

**set_explicit(self, is_explicit)**

**set_nocache(self, nocache=False)**

Set the Node’s nocache value.

**set_noclean(self, noclean=False)**

Set the Node’s noclean value.

**set_precious(self, precious=False)**

Set the Node’s precious value.

**set_specific_source(self, source)**

**set_state(self, state)**

**state_has_changed(self, target, prev_num)**

**store_info(self)**

Make the build signature permanent (that is, store it in the .sconsign file or equivalent).
visited(self)

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

### 14.5.2 Class Variables

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>metaclass</strong></td>
<td>Value: SCons.Memoize.MemoizedMetaclass</td>
</tr>
<tr>
<td>memoizer_counters</td>
<td>Value: []</td>
</tr>
</tbody>
</table>
15 Module SCons.Node.FS

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.

15.1 Functions

<table>
<thead>
<tr>
<th>Function</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>save_strings(val)</td>
<td></td>
</tr>
<tr>
<td>initialize_do_splitdrive()</td>
<td></td>
</tr>
<tr>
<td>initialize_normpath_check()</td>
<td>Initialize the normpath_check regular expression.</td>
</tr>
<tr>
<td></td>
<td>This function is used by the unit tests to re-initialize the pattern when testing for behavior with different values of os.sep.</td>
</tr>
<tr>
<td>set_duplicate(duplicate)</td>
<td></td>
</tr>
<tr>
<td>LinkFunc(target, source, env)</td>
<td></td>
</tr>
<tr>
<td>LocalString(target, source, env)</td>
<td></td>
</tr>
<tr>
<td>UnlinkFunc(target, source, env)</td>
<td></td>
</tr>
<tr>
<td>MkdirFunc(target, source, env)</td>
<td></td>
</tr>
<tr>
<td>get_MkdirBuilder()</td>
<td></td>
</tr>
<tr>
<td>get_DefaultSCCSBuilder()</td>
<td></td>
</tr>
<tr>
<td>get_DefaultRCSBuilder()</td>
<td></td>
</tr>
<tr>
<td>do_diskcheck_match(node, predicate, errorfmt)</td>
<td></td>
</tr>
<tr>
<td>ignore_diskcheck_match(node, predicate, errorfmt)</td>
<td></td>
</tr>
<tr>
<td>do_diskcheck_rcs(node, name)</td>
<td></td>
</tr>
</tbody>
</table>
ignore_diskcheck_rcs(node, name)

do_diskcheck_sccs(node, name)

ignore_diskcheck_sccs(node, name)

set_diskcheck(list)

diskcheck_types()

has_glob_magic(s)

get_default_fs()

find_file(filename, paths, verbose=False)

find_file(str, [Dir()]) -> [nodes]

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.

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.

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.

15.2 Variables

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>revision</strong></td>
<td>Value: 'src/engine/SCons/Node/FS.py 3842 2008/12/20 22:59:52 scons'</td>
</tr>
</tbody>
</table>

continued on next page
Class EntryProxyAttributeError

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

15.3.1 Methods

```python
__init__(self, entry_proxy, attribute)
x.__init__(...) initializes x; see x.__class__.__doc__ for signature
Overrides: exceptions.AttributeError.__init__
```

Module SCons.Node.FS

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>do_store_info</td>
<td>Value: True</td>
</tr>
<tr>
<td>default_max_drift</td>
<td>Value: 172800</td>
</tr>
<tr>
<td>Save_Strings</td>
<td>Value: False</td>
</tr>
<tr>
<td>do_splitdrive</td>
<td>Value: False</td>
</tr>
<tr>
<td>needs_normpath_check</td>
<td>Value: False</td>
</tr>
<tr>
<td>Valid_Duplicates</td>
<td>Value: ['hard-soft-copy', 'soft-hard-copy', 'hard-copy', 'soft-c...</td>
</tr>
<tr>
<td>Link.Funcs</td>
<td>Value: []</td>
</tr>
<tr>
<td>Link</td>
<td>Value: SCons.Action.Action(LinkFunc, None)</td>
</tr>
<tr>
<td>LocalCopy</td>
<td>Value: SCons.Action.Action(LinkFunc, LocalString)</td>
</tr>
<tr>
<td>Unlink</td>
<td>Value: SCons.Action.Action(UnlinkFunc, None)</td>
</tr>
<tr>
<td>Mkdir</td>
<td>Value: SCons.Action.Action(MkdirFunc, None, presub=None)</td>
</tr>
<tr>
<td>MkdirBuilder</td>
<td>Value: False</td>
</tr>
<tr>
<td>DefaultSCCSBuilder</td>
<td>Value: False</td>
</tr>
<tr>
<td>DefaultRCSBuilder</td>
<td>Value: False</td>
</tr>
<tr>
<td>diskcheck_match</td>
<td>Value: DiskChecker('match', do_diskcheck_match, ignore_diskcheck...)</td>
</tr>
<tr>
<td>diskcheck_rcs</td>
<td>Value: DiskChecker('rcs', do_diskcheck_rcs, ignore_diskcheck_rcs)</td>
</tr>
<tr>
<td>diskcheck_sccs</td>
<td>Value: DiskChecker('sccs', do_diskcheck_sccs, ignore_diskcheck_s...)</td>
</tr>
<tr>
<td>diskcheckers</td>
<td>Value: [diskcheck_match, diskcheck_rcs, diskcheck_sccs,]</td>
</tr>
<tr>
<td>glob_magic_check</td>
<td>Value: re.compile(r'[*?[]')</td>
</tr>
<tr>
<td>default_fs</td>
<td>Value: False</td>
</tr>
</tbody>
</table>

15.3 Class EntryProxyAttributeError
### Class EntryProxy

#### AttributeError Module SCons.Node.FS

<table>
<thead>
<tr>
<th>Method</th>
<th>Description</th>
<th>Overrides</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>str</strong>(self)</td>
<td>str(x)</td>
<td>exceptions.BaseException.<strong>str</strong> (inherited documentation)</td>
</tr>
<tr>
<td><strong>delattr</strong>(...)</td>
<td>x.<strong>delattr</strong>(‘name’) &lt;=del x.name</td>
<td>object.<strong>delattr</strong></td>
</tr>
<tr>
<td><strong>getattr</strong>(...)</td>
<td>x.<strong>getattr</strong>(‘name’) &lt;= x.name</td>
<td>object.<strong>getattr</strong></td>
</tr>
<tr>
<td><strong>getitem</strong>(x, y)</td>
<td>x[y]</td>
<td></td>
</tr>
<tr>
<td><strong>getslice</strong>(x, i, j)</td>
<td>x[i:j]</td>
<td>Use of negative indices is not supported.</td>
</tr>
<tr>
<td><strong>hash</strong>(x)</td>
<td>hash(x)</td>
<td></td>
</tr>
</tbody>
</table>
| __new__(T, S, ...) | Return Value  
|                   | a new object with type S, a subtype of T         | exceptions.StandardError.__new__ |
| __reduce__(...)    | helper for pickle                                | object.__reduce__ (inherited documentation) |
| __reduce_ex__(...) | helper for pickle                                |                            |
| __repr__(x)        | repr(x)                                          | object.__repr__           |
Class DiskChecker

**Module SCons.Node.FS**

```python
__setattr__(...)  
x.__setattr__('name', value) ==> x.name = value
Overrides: object.__setattr__
```

```python
__setstate__(...)  
```

### 15.3.2 Properties

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>class</strong></td>
<td>Value: &lt;attribute '<strong>class</strong>' of 'object' objects&gt;</td>
</tr>
<tr>
<td>args</td>
<td>Value: &lt;attribute 'args' of 'exceptions.BaseException' objects&gt;</td>
</tr>
<tr>
<td>message</td>
<td>Value: &lt;member 'message' of 'exceptions.BaseException' objects&gt;</td>
</tr>
</tbody>
</table>

#### 15.4 Class DiskChecker

### 15.4.1 Methods

- **__init__(self, type, do, ignore)**

- **set_do(self)**

- **set_ignore(self)**

- **set(self, list)**

#### 15.5 Class EntryProxy

SCons.Util.Proxy  

SCons.Node.FS.EntryProxy

### 15.5.1 Methods

- **__getattr__(self, name)**

  Retrieve an attribute from the wrapped object. If the named attribute doesn’t exist, AttributeError is raised

  Overrides: SCons.Util.Proxy.__getattr__ (inherited documentation)

- **__cmp__(self, other)**

- **__init__(self, subject)**

  Wrap an object as a Proxy object
Class Base

get(self)
Retrieve the entire wrapped object

15.5.2 Class Variables

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>dictSpecialAttrs</td>
<td>Value: {'abspath': &lt;function _get_abspath at 0x84bc6f4&gt;, 'base'...</td>
</tr>
</tbody>
</table>

15.6 Class Base

SCons.Node.Node

SCons.Node.FS.Base


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.

15.6.1 Methods

_init__(self, name, directory, fs)
Initialize a generic Node.FS.Base object.

Call the superclass initialization, take care of setting up our relative and absolute paths, identify our parent directory, and indicate that this node should use signatures.


str_for_display(self)

must_be_same(self, klass)

This node, which already existed, is being looked up as the specified klass. Raise an exception if it isn’t.
<table>
<thead>
<tr>
<th>Method</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>get_dir(self)</code></td>
<td></td>
</tr>
<tr>
<td><code>rfile(self)</code></td>
<td></td>
</tr>
<tr>
<td><code>__str__(self)</code></td>
<td>A Node.FS.Base object’s string representation is its path name.</td>
</tr>
<tr>
<td><code>rstr(self)</code></td>
<td>A Node.FS.Base object’s string representation is its path name.</td>
</tr>
<tr>
<td><code>stat(self)</code></td>
<td></td>
</tr>
</tbody>
</table>
| `exists(self)` | Does this node exists?  
Overrides: SCons.Node.Node.exists (inherited documentation) |
| `rexists(self)` | Does this node exist locally or in a repository?  
| `getmtime(self)` | |
| `getsize(self)` | |
| `isdir(self)` | |
| `isfile(self)` | |
| `islink(self)` | |
| `is_under(self, dir)` | |
| `set_local(self)` | |
| `srcnode(self)` | If this node is in a build path, return the node corresponding to its source file. Otherwise, return ourself. |
### get_path(self, dir=False)

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

### set_src_builder(self, builder)

Set the source code builder for this node.

### src_builder(self)

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).

### get_abspath(self)

Get the absolute path of the file.


### for_signature(self)

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_subst_proxy(self)

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.

Overrides: SCons.Node.Node.get_subst_proxy (inherited documentation)
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.

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.

Search for a list of directories in the Repository list.

Decider

Adds dependencies.

Adds dependencies to ignore.

Adds prerequisites

Adds sources.

Adds to implicit
**add_to_waiting_parents(self, 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(self, node)**

**add_wkid(self, wkid)**

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

**all_children(self, scan=False)**

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

**alter_targets(self)**

Return a list of alternate targets for this Node.

**build(self, **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_set(self, builder)**

**built(self)**

Called just after this node is successfully built.
**changed**(self, node=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.

**changed_since_last_build**(self, target, prev_ni)

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.

**children**(self, scan=False)

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

**children_are_up_to_date**(self)

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.

clear(self)
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(self)

del_info(self)
Delete the build info from this node.

disambiguate(self, must_exist=False)

do_not_store_info(self)

env_set(self, env, safe=0)
executor_cleanup(self)
Let the executor clean up any cached information.

explain(self)

get_binfo(self)
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(self)
Fetch the appropriate Environment to build this node.

get_build_scanner_path(self, scanner)
Fetch the appropriate scanner path for this node.

get_builder(self, default_builder=False)
Return the set builder, or a specified default value
get_cachedir_csigen(self)

get_csigen(self)

get_enven(self)

get_env_scanner(self, env, kw={})

get_executor(self, create=False)
Fetch the action executor for this node. Create one if there isn’t already one, and requested to do so.

get_found_includes(self, 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(self, env, scanner, path)
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_ninfoen(self)

get_source_scanner(self, 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_stateen(self)

get_stored_impliciten(self)
Fetch the stored implicit dependencies
Class Base Module SCons.Node.FS

get_stored_info(self)

get_string(self, 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_target_scanner(self)

has_builder(self)

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(self)

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).

is_derived(self)

Returns true iff 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.
Class Base Module SCons.Node.FS

is_literal(self)
Always pass the string representation of a Node to the command interpreter literally.

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

make_ready(self)
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(self)

multiple_side_effect_has_builder(self)
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(self)

new_ninfo(self)

postprocess(self)
Clean up anything we don’t need to hang onto after we’ve been built.
**prepare**(*self*)

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.

**remove**(*self*)

Remove this Node: no-op by default.

**render_include_tree**(*self*)

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

**reset_executor**(*self*)

Remove cached executor; forces recompute when needed.

**retrieve_from_cache**(*self*)

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 iff the node was successfully retrieved.

**scan**(*self*)

Scan this node’s dependents for implicit dependencies.

**scanner_key**(*self*)
select_scanner(self, 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(self, always_build=False)
Set the Node’s always_build value.

set_executor(self, executor)
Set the action executor for this node.

set_explicit(self, is_explicit)

set_nocache(self, nocache=False)
Set the Node’s nocache value.

set_noclean(self, noclean=False)
Set the Node’s noclean value.

set_precious(self, precious=False)
Set the Node’s precious value.

set_specific_source(self, source)

set_state(self, state)

state_has_changed(self, target, prevni)

store_info(self)
Make the build signature permanent (that is, store it in the .sconsign file or equivalent).

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

15.6.2 Class Variables
15.7 Class Entry

SCons.Node.Node

    SCons.Node.FS.Base

SCons.Node.FS.Entry

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.

15.7.1 Methods

diskcheck_match(self)

disambiguate(self, must_exist=False)


rfile(self)

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

Overrides: SCons.Node.FS.Base.rfile

scanner_key(self)


get_contents(self)

Fetch the contents of the entry.

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

must_be_same(self, klass)

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

Overrides: SCons.Node.FS.Base.must_be_same
### exists(self)

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.

Overrides: SCons.Node.FS.Base.exists

### rel_path(self, other)

### new_ninfo(self)


### changed_since_last_build(self, target, prev_ni)

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.

Overrides: SCons.Node.Node.changed_since_last_build

### Decider(self, function)

### RDirs(self, pathlist)

Search for a list of directories in the Repository list.

### Rfindalldirs(self, 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.
**Class Entry**

---

---

**__init__**(self, name, directory, fs)

Initialize a generic Node.FS.Base object.

Call the superclass initialization, take care of setting up our relative and absolute paths, identify our parent directory, and indicate that this node should use signatures.


---

---

**__str__**(self)

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

---

---

**add_dependency**(self, depend)

Adds dependencies.

---

---

**add_ignore**(self, depend)

Adds dependencies to ignore.

---

---

**add_prerequisite**(self, prerequisite)

Adds prerequisites

---

---

**add_source**(self, source)

Adds sources.

---

---

**add_to_implicit**(self, deps)

---

---

**add_to_waiting_parents**(self, 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**(self, node)

---

---

**add_wkid**(self, wkid)

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

---

---

**all_children**(self, scan=False)

Return a list of all the node’s direct children.
### alter_targets(self)

Return a list of alternate targets for this Node.

### build(self, **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_set(self, builder)

### built(self)

Called just after this node is successfully built.

### changed(self, node=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.

### children(self, scan=False)

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

### children_are_up_to_date(self)

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.

rebind their current() method to this method.
clear(self)

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(self)

del_binfo(self)

Delete the build info from this node.

donot_store_info(self)

env_set(self, env, safe=0)

executor_cleanup(self)

Let the executor clean up any cached information.

explain(self)

for_signature(self)

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
rebuids. 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(self)

Get the absolute path of the file.

get\_binfo(self)

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(self)

Fetch the appropriate Environment to build this node.

get\_build\_scanner\_path(self, scanner)

Fetch the appropriate scanner path for this node.

get\_builder(self, default\_builder=False)

Return the set builder, or a specified default value

get\_cachedir\_csig(self)

get\_csig(self)

get\_dir(self)

get\_env(self)

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

get\_executor(self, create=False)

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

get\_found\_includes(self, 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

```python
def get_implicit_deps(self, env, scanner, path):
    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

```python
def get_ninfo(self):
```

### get Path

```python
def get_path(self, dir=False):
    Return path relative to the current working directory of the Node.FS.Base object that owns us.
```

### get Source Scanner

```python
def get_source_scanner(self, 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

```python
def get_state(self):
```

### get Stored Implicit

```python
def get_stored_implicit(self):
    Fetch the stored implicit dependencies
```

### get Stored Info

```python
def get_stored_info(self):
```

### get String

```python
def get_string(self, 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(self)

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.

Overrides: SCons.Node.Node.get_subst_proxy extit(inherited documentation)

### get_suffix(self)


### get_target_scanner(self)

### getmtime(self)

### getsize(self)

### has_builder(self)

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(self)

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).
### is_derived(self)

Returns true iff 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_literal(self)

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

### is_under(self, dir)

### is_up_to_date(self)

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

### isdir(self)

### isfile(self)

### islink(self)

### make_ready(self)

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(self)
multiple_side_effect_has_builder(self)

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(self)

postprocess(self)

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

prepare(self)

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.

remove(self)

Remove this Node: no-op by default.

render_include_tree(self)

Return a text representation, suitable for displaying to the user, of the include tree for the sources of this node.
### Class Entry Module SCons.Node.FS

<table>
<thead>
<tr>
<th>Method</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>rentry(self)</code></td>
<td></td>
</tr>
<tr>
<td><code>reset_executor(self)</code></td>
<td>Remove cached executor; forces recompute when needed.</td>
</tr>
<tr>
<td><code>retrieve_from_cache(self)</code></td>
<td>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 <code>built()</code>. Returns true iff the node was successfully retrieved.</td>
</tr>
<tr>
<td><code>rexists(self)</code></td>
<td>Does this node exist locally or in a repository?</td>
</tr>
<tr>
<td><code>rstr(self)</code></td>
<td>A Node.FS.Base object’s string representation is its path name.</td>
</tr>
<tr>
<td><code>scan(self)</code></td>
<td>Scan this node’s dependents for implicit dependencies.</td>
</tr>
<tr>
<td><code>select_scanner(self, scanner)</code></td>
<td>Selects a scanner for this Node.</td>
</tr>
<tr>
<td></td>
<td>This is a separate method so it can be overridden by Node subclasses (specifically, Node.FS.Dir) that <em>must</em> use their own Scanner and don’t select one the Scanner.Selector that’s configured for the target.</td>
</tr>
<tr>
<td><code>set_always_build(self, always_build=False)</code></td>
<td>Set the Node’s always_build value.</td>
</tr>
<tr>
<td><code>set_executor(self, executor)</code></td>
<td>Set the action executor for this node.</td>
</tr>
<tr>
<td><code>set_explicit(self, is_explicit)</code></td>
<td></td>
</tr>
<tr>
<td><code>set_local(self)</code></td>
<td></td>
</tr>
</tbody>
</table>
set_nocache(self, nocache=False)
Set the Node's nocache value.

set_noclean(self, noclean=False)
Set the Node's noclean value.

set_precious(self, precious=False)
Set the Node's precious value.

set_specific_source(self, source)

set_src_builder(self, builder)
Set the source code builder for this node.

set_state(self, state)

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

stat(self)

state_has_changed(self, target, prevchanges)

store_info(self)
Make the build signature permanent (that is, store it in the .sconsign file or equivalent).

str_for_display(self)
target_from_source(self, prefix, suffix, splitext=<function splitext at 0x83e6e2c>)

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.

visited(self)

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

15.7.2 Class Variables

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>metaclass</strong></td>
<td>Value: SCons.Memoize.Memoized_Metaclass</td>
</tr>
<tr>
<td>memoizer_counters</td>
<td>Value: []</td>
</tr>
</tbody>
</table>

15.8 Class LocalFS

Known Subclasses: SCons.Node.FS.FS

15.8.1 Methods

chmod(self, path, mode)

copy(self, src, dst)

copy2(self, src, dst)

exists(self, path)

getmtime(self, path)

getsize(self, path)

isdir(self, path)

isfile(self, path)

link(self, src, dst)
Class FS

Module SCons.Node.FS

```python
lstat(self, path)
listdir(self, path)
makedirs(self, path)
mkdir(self, path)
rename(self, old, new)
stat(self, path)
symlink(self, src, dst)
open(self, path)
unlink(self, path)
islink(self, path)
readlink(self, file)
```

15.8.2 Class Variables

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
</table>

15.9 Class FS

SCons.Node.FS.LocalFS →

SCons.Node.FS.FS

15.9.1 Methods

```python
__init__(self, path=False)
```

Initialize the Node.FS subsystem.

The supplied path is the top of the source tree, where we expect to find the top-level build file. If no path is supplied, the current directory is the default.

The path argument must be a valid absolute path.

```python
set_SConstruct_dir(self, dir)
```
**Class FS**

**Module SCons.Node.FS**

```python
get_max_drift(self)
```

```python
set_max_drift(self, max_drift)
```

```python
getcwd(self)
```

```python
chdir(self, 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._

```python
get_root(self, drive)
```

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

```python
Entry(self, name, directory=False, create=False)
```

_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._

```python
File(self, name, directory=False, create=False)
```

_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._

```python
Dir(self, name, directory=False, 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._
**VariantDir**(*self, variant_dir, src_dir, duplicate=False*)

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

**Repository**(*self, *dirs*)

Specify Repository directories to search.

**variant_dir_target_climb**(*self, 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.

**Glob**(*self, pathname, ondisk=True, source=True, strings=False, cwd=False*)

Globs

This is mainly a shim layer

**chmod**(*self, path, mode*)

**copy**(*self, src, dst*)

**copy2**(*self, src, dst*)

**exists**(*self, path*)

**getmtime**(*self, path*)

**getsize**(*self, path*)

**isdir**(*self, path*)

**isfile**(*self, path*)

**islink**(*self, path*)

**link**(*self, src, dst*)

**listdir**(*self, path*)
15.9.2 Class Variables

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>memoizer_counters</td>
<td>Value: []</td>
</tr>
<tr>
<td><strong>metaclass</strong></td>
<td>Value: SCons.Memoize.MemoizedMetaclasse</td>
</tr>
</tbody>
</table>

15.10 Class DirNodeInfo


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.

15.10.1 Methods

str_to_node(self, s)

__init__ (self, node)

convert(self, node, val)

format(self, field_list=False, names=0)

merge(self, other)
update(self, node)

15.10.2 Class Variables

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>current_version_id</td>
<td>Value: 1</td>
</tr>
<tr>
<td>fs</td>
<td>Value: False</td>
</tr>
</tbody>
</table>

15.11 Class DirBuildInfo

SCons.Node.BuildInfoBase

SCons.Node.FS.DirBuildInfo

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.

15.11.1 Methods

_init_(self, node)

merge(self, other)

15.11.2 Class Variables

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>current_version_id</td>
<td>Value: 1</td>
</tr>
</tbody>
</table>

15.12 Class Dir

SCons.Node.Node

SCons.Node.FS.Base

SCons.Node.FS.Dir

Known Subclasses: SCons.Node.FS.RootDir

A class for directories in a file system.
15.12.1 Methods

__init__(self, name, directory, fs)
Initialize a generic Node.FS.Base object.

Call the superclass initialization, take care of setting up our relative and absolute paths, identify our parent directory, and indicate that this node should use signatures.
Overrides: SCons.Node.FS.Base.__init__ (inherited documentation)

diskcheck_match(self)

Entry(self, name)
Looks up or creates an entry node named 'name' relative to this directory.

Dir(self, name, create=True)
Looks up or creates a directory node named 'name' relative to this directory.

File(self, name)
Looks up or creates a file node named 'name' relative to this directory.

link(self, srcdir, duplicate)
Set this directory as the variant directory for the supplied source directory.

getRepositories(self)
Returns a list of repositories for this directory.

get_all_rdirs(self)

addRepository(self, dir)

up(self)
**rel_path**(*self, other*)

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

**get_env_scanner**(*self, env, kw={})


**get_target_scanner**(*self*)


**get_found_includes**(*self, 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).

 Overrides: SCons.Node.Node.get_found_includes

**prepare**(*self*)

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 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.

 Overrides: SCons.Node.Node.prepare (inherited documentation)

**build**(*self, **kw*)

A null "builder" for directories.

multiple_side_effect_has_builder(self)
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.
Overrides: SCons.Node.Node.multiple_side_effect_has_builder extit(inherited documentation)

alter_targets(self)
Return any corresponding targets in a variant directory.

scanner_key(self)
A directory does not get scanned.

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

get_csig(self)
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.

do_duplicate(self, src)
changed_since_last_build(self, target, prev)

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 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.

Overrides: SCons.Node.Node.changed_since_last_build

is_up_to_date(self)

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

Overrides: SCons.Node.Node.is_up_to_date

dir(self)

dconstrain(self)

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

srcnode(self)

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

Overrides: SCons.Node.FS.Base.srcnode

get_timestamp(self)

Return the latest timestamp from among our children

entry_abspath(self, name)

entry_labspath(self, name)

entry_path(self, name)

entry_tpath(self, name)
entry_exists_on_disk(self, name)

srcdir_list(self)

srcdir_duplicate(self, name)

srcdir_find_file(self, filename)

dir_on_disk(self, name)

file_on_disk(self, name)

walk(self, 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).
**glob**(*self, pathname, ondisk=True, source=False, strings=False*)

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

**Decider**(*self, function*)

**RDirs**(*self, pathlist*)

Search for a list of directories in the Repository list.

**Rfindalldirs**(*self, 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.
<table>
<thead>
<tr>
<th>Method</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>__str__(self)</code></td>
<td>A Node.FS.Base object’s string representation is its path name.</td>
</tr>
<tr>
<td><code>add_dependency(self, depend)</code></td>
<td>Adds dependencies.</td>
</tr>
<tr>
<td><code>add_ignore(self, depend)</code></td>
<td>Adds dependencies to ignore.</td>
</tr>
<tr>
<td><code>add_prerequisite(self, prerequisite)</code></td>
<td>Adds prerequisites</td>
</tr>
<tr>
<td><code>add_source(self, source)</code></td>
<td>Adds sources.</td>
</tr>
<tr>
<td><code>add_to_implicit(self, deps)</code></td>
<td></td>
</tr>
<tr>
<td><code>add_to_waiting_parents(self, node)</code></td>
<td>Returns the number of nodes added to our waiting parents list:</td>
</tr>
<tr>
<td></td>
<td>1 if we add a unique waiting parent, 0 if not. (Note that the returned</td>
</tr>
<tr>
<td></td>
<td>values are intended to be used to increment a reference count, so don’t</td>
</tr>
<tr>
<td></td>
<td>think you can &quot;clean up&quot; this function by using True and False instead...)</td>
</tr>
<tr>
<td><code>add_to_waiting_s_e(self, node)</code></td>
<td></td>
</tr>
<tr>
<td><code>add_wkid(self, wkid)</code></td>
<td>Add a node to the list of kids waiting to be evaluated</td>
</tr>
<tr>
<td><code>all_children(self, scan=False)</code></td>
<td>Return a list of all the node’s direct children.</td>
</tr>
<tr>
<td><code>builder_set(self, builder)</code></td>
<td></td>
</tr>
<tr>
<td><code>built(self)</code></td>
<td>Called just after this node is successfully built.</td>
</tr>
</tbody>
</table>
changed(self, node=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.

children(self, scan=False)

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

children_are_up_to_date(self)

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.


clear(self)

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(self)

del_binfo(self)

Delete the build info from this node.

disambiguate(self, must_exist=False)

do_not_store_info(self)

env_set(self, env, safe=0)

executor_cleanup(self)

Let the executor clean up any cached information.
exists(self)
Does this node exists?

explain(self)

for_signature(self)
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(self)
Get the absolute path of the file.

get_binfo(self)
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(self)
Fetch the appropriate Environment to build this node.

get_build_scanner_path(self, scanner)
Fetch the appropriate scanner path for this node.
**get_builder**(self, default_builder=False)

Return the set builder, or a specified default value

**get_cachedir_csig**(self)

**get_dir**(self)

**get_env**(self)

**get_executor**(self, create=False)

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

**get_implicit_deps**(self, env, scanner, path)

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**(self)

**get_path**(self, dir=False)

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

**get_source_scanner**(self, 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**(self)

**get_stored_implicit**(self)

Fetch the stored implicit dependencies

**get_stored_info**(self)
### `get_string(self, 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(self)`

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.

Overrides: SCons.Node.Node.get_subst_proxy (inherited documentation)

### `get_suffix(self)`


### `getmtime(self)`

### `getsize(self)`

### `has_builder(self)`

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(self)
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).

isDerived(self)

Returns true iff 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.

isLiteral(self)
Always pass the string representation of a Node to the command interpreter literally.

isUnder(self, dir)

isdir(self)

isfile(self)

islink(self)

make_ready(self)
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(self)

must_be_same(self, klass)
This node, which already existed, is being looked up as the specified klass. Raise an exception if it isn’t.
<table>
<thead>
<tr>
<th>Method</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>new_binfo(self)</code></td>
<td>Clean up anything we don’t need to hang onto after we’ve been built.</td>
</tr>
<tr>
<td><code>new_ninfo(self)</code></td>
<td>Remove this Node: no-op by default.</td>
</tr>
<tr>
<td><code>postprocess(self)</code></td>
<td>Return a text representation, suitable for displaying to the user, of the include tree for the sources of this node.</td>
</tr>
<tr>
<td><code>render_inclu...tree(self)</code></td>
<td>Return a text representation, suitable for displaying to the user, of the include tree for the sources of this node.</td>
</tr>
<tr>
<td><code>r...entry(self)</code></td>
<td>Remove cached executor; forces recompute when needed.</td>
</tr>
<tr>
<td><code>reset_execu...tor(self)</code></td>
<td>Remove cached executor; forces recompute when needed.</td>
</tr>
<tr>
<td><code>retr...e_from_cache(self)</code></td>
<td>Try to retrieve the node’s content from a cache.</td>
</tr>
<tr>
<td><code>rexists(self)</code></td>
<td>Does this node exist locally or in a repository?</td>
</tr>
<tr>
<td><code>rfile(self)</code></td>
<td>A Node.FS.Base object’s string representation is its path name.</td>
</tr>
<tr>
<td><code>scan(self)</code></td>
<td>Scan this node’s dependents for implicit dependencies.</td>
</tr>
</tbody>
</table>
### Class Dir

**Module SCons.Node.FS**

<table>
<thead>
<tr>
<th>Method</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>select.Scanner(self, scanner)</code></td>
<td>Selects a scanner for this Node.</td>
</tr>
<tr>
<td></td>
<td>This is a separate method so it can be overridden by Node subclasses.</td>
</tr>
<tr>
<td></td>
<td>(specifically, Node.FS.Dir) that <em>must</em> use their own Scanner and don't</td>
</tr>
<tr>
<td></td>
<td>select one the Scanner.Scanner.Selector that's configured for the target.</td>
</tr>
<tr>
<td><code>set.always.build(self, always.build=False)</code></td>
<td>Set the Node's <code>always.build</code> value.</td>
</tr>
<tr>
<td><code>set.executor(self, executor)</code></td>
<td>Set the action executor for this node.</td>
</tr>
<tr>
<td><code>set.explicit(self, is.explicit)</code></td>
<td></td>
</tr>
<tr>
<td><code>set.local(self)</code></td>
<td></td>
</tr>
<tr>
<td><code>set.nocache(self, nocache=False)</code></td>
<td>Set the Node's nocache value.</td>
</tr>
<tr>
<td><code>set.noclean(self, noclean=False)</code></td>
<td>Set the Node's noclean value.</td>
</tr>
<tr>
<td><code>set.precious(self, precious=False)</code></td>
<td>Set the Node's precious value.</td>
</tr>
<tr>
<td><code>set.specific.source(self, source)</code></td>
<td></td>
</tr>
<tr>
<td><code>set.src.builder(self, builder)</code></td>
<td>Set the source code builder for this node.</td>
</tr>
<tr>
<td><code>set.state(self, state)</code></td>
<td></td>
</tr>
<tr>
<td><code>src.builder(self)</code></td>
<td>Fetch the source code builder for this node.</td>
</tr>
<tr>
<td></td>
<td>If there isn't one, we cache the source code builder specified for the</td>
</tr>
<tr>
<td></td>
<td>directory (which in turn will cache the value from its parent directory,</td>
</tr>
<tr>
<td></td>
<td>and so on up to the file system root).</td>
</tr>
<tr>
<td><code>stat(self)</code></td>
<td></td>
</tr>
</tbody>
</table>
state_changed (self, target, prev, ni)

store_info (self)

Make the build signature permanent (that is, store it in the .sconsign file or equivalent).

str_for_display (self)

target_from_source (self, prefix, suffix, splitext=<function splitext at 0x83e6e2c>)

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.

visited (self)

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

### 15.12.2 Class Variables

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>memoizer_counters</td>
<td>Value: []</td>
</tr>
<tr>
<td><strong>metaclass</strong></td>
<td>Value: SCons.Memoize.MemoizedMetaclasse</td>
</tr>
</tbody>
</table>

### 15.13 Class RootDir

SCons.Node.Node

SCons.Node.FS.Base

SCons.Node.FS.Dir

SCons.Node.FS.RootDir

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.
15.13.1 Methods

```python
__init__(self, name, fs)
Initialize a generic Node.FS.Base object.

Call the superclass initialization, take care of setting up our relative and absolute paths, identify our parent directory, and indicate that this node should use signatures.
Overrides: SCons.Node.FS.Dir.__init__
```

```python
must_be_same(self, klass)
This node, which already existed, is being looked up as the specified klass. Raise an exception if it isn’t.
Overrides: SCons.Node.FS.Base.must_be_same
```

```python
_str_(self)
A Node.FS.Base object’s string representation is its path name.
Overrides: SCons.Node.FS.Base._str_(inherited documentation)
```

```python
entry_abspath(self, name)
Overrides: SCons.Node.FS.Dir.entry_abspath
```

```python
entry_labspath(self, name)
Overrides: SCons.Node.FS.Dir.entry_labspath
```

```python
entry_path(self, name)
Overrides: SCons.Node.FS.Dir.entry_path
```

```python
entry_tpath(self, name)
Overrides: SCons.Node.FS.Dir.entry_tpath
```

```python
is_under(self, dir)
Overrides: SCons.Node.FS.Base.is_under
```

```python
up(self)
Overrides: SCons.Node.FS.Dir.up
```

```python
get_dir(self)
Overrides: SCons.Node.FS.Base.get_dir
```
Class RootDir

Module SCons.Node.FS

```python
src_builder(self)
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).
Overrides: SCons.Node.FS.Base.src
```

```
Decider(self, function)
```

```
Dir(self, name, create=True)
Looks up or creates a directory node named 'name' relative to
this directory.
```

```
Enter(self, name)
Looks up or creates an entry node named 'name' relative to
this directory.
```

```
File(self, name)
Looks up or creates a file node named 'name' relative to
this directory.
```

```
RDirs(self, pathlist)
Search for a list of directories in the Repository list.
```

```
Rfindalldirs(self, pathlist)
Return all of the directories for a given path list, including
the 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.
```

```
addRepository(self, dir)
```

```
add_dependency(self, depend)
Adds dependencies.
```
Class RootDir

Module SCons.Node.FS

add_ignore(self, depend)
Adds dependencies to ignore.

add_prerequisite(self, prerequisite)
Adds prerequisites.

add_source(self, source)
Adds sources.

add_to_implicit(self, deps)

add_to_waiting_parents(self, 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(self, node)

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

all_children(self, scan=False)
Return a list of all the node’s direct children.

alter_targets(self)
Return any corresponding targets in a variant directory.

build(self, **kw)
A null "builder" for directories.

builder_set(self, builder)

built(self)
Called just after this node is successfully built.
changed\(_{(self, \ node=\ False)}\)

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.

changed\_since\_last\_build\(_{(self, \ target, \ prev\_ni)}\)

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.

Overrides: SCons.Node.Node.changed\_since\_last\_build extit(inherited documentation)

children\(_{(self, \ scan=\ False)}\)

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

children\_are\_up\_to\_date\(_{(self)}\)

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.

<table>
<thead>
<tr>
<th>Method</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>clear(self)</td>
<td>Completely clear a Node of all its cached state (so that it can be re-evaluated by interfaces that do continuous integration builds).</td>
</tr>
<tr>
<td>clear_memoized_values(self)</td>
<td></td>
</tr>
<tr>
<td>del_info(self)</td>
<td>Delete the build info from this node.</td>
</tr>
<tr>
<td>dir_on_disk(self, name)</td>
<td></td>
</tr>
<tr>
<td>disambiguate(self, must_exist=False)</td>
<td></td>
</tr>
<tr>
<td>diskcheck_match(self)</td>
<td></td>
</tr>
<tr>
<td>do_duplicate(self, src)</td>
<td></td>
</tr>
<tr>
<td>do_not_store_info(self)</td>
<td></td>
</tr>
<tr>
<td>entry_exists_on_disk(self, name)</td>
<td></td>
</tr>
<tr>
<td>env_set(self, env, safe=0)</td>
<td></td>
</tr>
<tr>
<td>executor_cleanup(self)</td>
<td>Let the executor clean up any cached information.</td>
</tr>
<tr>
<td>exists(self)</td>
<td>Does this node exists?</td>
</tr>
<tr>
<td>explain(self)</td>
<td></td>
</tr>
<tr>
<td>file_on_disk(self, name)</td>
<td></td>
</tr>
</tbody>
</table>
for_signature(self)

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.


getRepositories(self)

Returns a list of repositories for this directory.

get_abspath(self)

Get the absolute path of the file.


get_all_rdirs(self)

get_binfo(self)

Fetch a node’s build information.

node - the node whose sources will be collected

node - the node whose sources will be collected

node - the node whose sources will be collected

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(self)

Fetch the appropriate Environment to build this node.

get_build_scanner_path(self, scanner)

Fetch the appropriate scanner path for this node.
get_builder(self, default_builder=False)

Return the set builder, or a specified default value.

get_cachedir_csig(self)

get_contents(self)

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

get_csig(self)

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_env(self)

get_env_scanner(self, env, kw={})


get_executor(self, create=False)

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

get_found_includes(self, 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).

Overrides: SCons.Node.Node.get_found_includes

get_implicit_deps(self, env, scanner, path)

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(self)
**get_path**(*self, dir=False*)

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

**get_source_scanner**(*self, 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**(*self*)

**get_stored_implicit**(*self*)

Fetch the stored implicit dependencies

**get_stored_info**(*self*)

**get_string**(*self, 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(self)**

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.

Overrides: SCons.Node.Node.get_subst_proxy (inherited documentation)

**get_suffix(self)**


**get_target_scanner(self)**


**get_timestamp(self)**

Return the latest timestamp from among our children

**getmtime(self)**

**getsize(self)**
glob(self, pathname, ondisk=True, source=False, strings=False)

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

has_builder(self)

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(self)

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).

is_derived(self)

Returns true iff 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_literal(self)

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

is_up_to_date(self)

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

Overrides: SCons.Node.Node.is_up_to_date

isdir(self)

isfile(self)

islink(self)

link(self, srcdir, duplicate)

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

make_ready(self)

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(self)

multiple_side_effect_has_builder(self)
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.
Overrider: SCons.Node.Node.multiple_side_effect_has_builder extit(inherited documentation)

new_binfo(self)

new_ninfo(self)

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

prepare(self)
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.
Overrider: SCons.Node.Node.prepare extit(inherited documentation)

rdir(self)
**Class RootDir**

**Module** SCons.Node.FS

---

**rel_path**(self, other)

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

---

**remove**(self)

Remove this Node: no-op by default.

---

**render_include_tree**(self)

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

---

**rentry**(self)

---

**reset_executor**(self)

Remove cached executor; forces recompute when needed.

---

**retrieve_from_cache**(self)

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 iff the node was successfully retrieved.

---

**rexists**(self)

Does this node exist locally or in a repository?


---

**rfile**(self)

---

**rstr**(self)

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

---

**scan**(self)

Scan this node’s dependents for implicit dependencies.

---

**scanner_key**(self)

A directory does not get scanned.

**sconsign(self)**

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

**select.Scanner(self, 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(self, always_build=False)**

Set the Node’s always_build value.

**set_executor(self, executor)**

Set the action executor for this node.

**set_explicit(self, is_explicit)**

**set_local(self)**

**set_nocache(self, nocache=False)**

Set the Node’s nocache value.

**set_noclean(self, noclean=False)**

Set the Node’s noclean value.

**set_precious(self, precious=False)**

Set the Node’s precious value.

**set_specific_source(self, source)**

**set_src_builder(self, builder)**

Set the source code builder for this node.

**set_state(self, state)**

**srcdir_duplicate(self, name)**

**srcdir_find_file(self, filename)**
### Class RootDir

#### srcdir_list(self)

#### srcnode(self)

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

Overrides: SCons.Node.FS.Base.srcnode

#### stat(self)

#### state_has_changed(self, target, prev_mtime)

#### store_info(self)

Make the build signature permanent (that is, store it in the .sconsign file or equivalent).

#### str_for_display(self)

#### target_from_source(self, prefix, suffix, splitext=<function splitext at 0x83e6e2c>)

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.

#### visited(self)

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

### 15.13.2 Class Variables

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>metaclass</em></td>
<td>Value: SCons.Memoize.Memoized_Metaclass</td>
</tr>
<tr>
<td>memoizer_counters</td>
<td>Value: []</td>
</tr>
</tbody>
</table>

### 15.14 Class FileNodeInfo

```
SCons.Node.NodeInfoBase
    SCons.Node.FS.FileNodeInfo
```

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.

### 15.14.1 Methods

- **str_to_node(self, s)**
- **_init_(self, node)**
- **convert(self, node, val)**
- **format(self, field_list=False, names=0)**
- **merge(self, other)**
update(self, node)

15.14.2 Class Variables

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>current_version_id</td>
<td>Value: 1</td>
</tr>
<tr>
<td>field_list</td>
<td>Value: ['csig', 'timestamp', 'size']</td>
</tr>
<tr>
<td>fs</td>
<td>Value: False</td>
</tr>
</tbody>
</table>

15.15 Class FileBuildInfo


Known Subclasses: SCons.SConf.SConfBuildInfo

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.

15.15.1 Methods

__init__(self, node)

convert_from_sconsign(self, 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(self)

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.

format(self, names=0)
merge(self, other)

prepare_dependencies(self)

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).

15.15.2 Class Variables

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>current_version_id</td>
<td>Value: 1</td>
</tr>
</tbody>
</table>

15.16 Class File

SCons.Node.Node

  SCons.Node.FS.Base

  SCons.Node.FS.File

A class for files in a file system.

15.16.1 Methods

diskcheck_match(self)

_init_(self, name, directory, fs)

  Initialize a generic Node.FS.Base object.

  Call the superclass initialization, take care of setting up our relative and absolute paths, identify our parent directory, and indicate that this node should use signatures.

  Overrides: SCons.Node.FS.Base._init_ extit(inherited documentation)

Entry(self, name)

Create an entry node named 'name' relative to the directory of this file.
<table>
<thead>
<tr>
<th>Function</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Dir</strong>(<em>self</em>, <em>name</em>, <em>create=True</em>)</td>
<td>Create a directory node named 'name' relative to the directory of this file.</td>
</tr>
<tr>
<td><strong>Dirs</strong>(<em>self</em>, <em>pathlist</em>)</td>
<td>Create a list of directories relative to the SConscript directory of this file.</td>
</tr>
<tr>
<td><strong>File</strong>(<em>self</em>, <em>name</em>)</td>
<td>Create a file node named 'name' relative to the directory of this file.</td>
</tr>
<tr>
<td><strong>scanner_key</strong>(<em>self</em>)</td>
<td>Overrides: SCons.Node.Node.scanner_key</td>
</tr>
<tr>
<td><strong>get_contents</strong>(<em>self</em>)</td>
<td></td>
</tr>
<tr>
<td><strong>get_content_hash</strong>(<em>self</em>)</td>
<td>Compute and return the MD5 hash for this file.</td>
</tr>
<tr>
<td><strong>get_size</strong>(<em>self</em>)</td>
<td></td>
</tr>
<tr>
<td><strong>get_timestamp</strong>(<em>self</em>)</td>
<td></td>
</tr>
<tr>
<td><strong>store_info</strong>(<em>self</em>)</td>
<td>Make the build signature permanent (that is, store it in the .sconsign file or equivalent). Overrides: SCons.Node.Node.store_info</td>
</tr>
<tr>
<td><strong>convert_old_entry</strong>(<em>self</em>, <em>old_entry</em>)</td>
<td></td>
</tr>
<tr>
<td><strong>get_stored_implicit</strong>(<em>self</em>)</td>
<td>Fetch the stored implicit dependencies Overrides: SCons.Node.Node.get_stored_implicit</td>
</tr>
<tr>
<td><strong>rel_path</strong>(<em>self</em>, <em>other</em>)</td>
<td></td>
</tr>
</tbody>
</table>
### get_found_includes(self, 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.

Overrides: SCons.Node.Node.get_found_includes

### retrieve_from_cache(self)

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 iff the node was successfully retrieved.

Overrides: SCons.Node.Node.retrieve_from_cache

### built(self)

Called just after this node is successfully built.


### visited(self)

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


### find_src_builder(self)

### has_src_builder(self)

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.

### alter_targets(self)

Return any corresponding targets in a variant directory.

make_ready(self)
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.

prepare(self)
Prepare for this file to be created.

remove(self)
Remove this file.
Overrides: SCons.Node.Node.remove

do_duplicate(self, src)

exists(self)
Does this node exist?
Overrides: SCons.Node.FS.Base.exists

get_max_drift_csig(self)

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_csig(self)

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

builder_set(self, builder)

changed_content(self, target, prev_ni)

changed_state(self, target, prev_ni)
**changed_timestamp_then_content**(*self, target, prev_ni*)

**changed_timestamp_newer**(*self, target, prev_ni*)

**changed_timestamp_match**(*self, target, prev_ni*)

**decide_source**(*self, target, prev_ni*)

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.

**decide_target**(*self, target, prev_ni*)

**changed_since_last_build**(*self, target, prev_ni*)

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.

Overrides: SCons.Node.Node.changed_since_last_build (inherited documentation)

**is_up_to_date**(*self*)

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

Overrides: SCons.Node.Node.is_up_to_date (inherited documentation)
### rfile(self)
*Overrides: SCons.Node.FS.Base.rfile*

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

### rstr(self)
*Overrides: SCons.Node.FS.Base.rstr (inherited documentation)*

### get_cachedir_csig(self)

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_cachedir_bsig(self)

### Decider(self, function)

### RDirs(self, pathlist)

Search for a list of directories in the Repository list.

### Rfindalldirs(self, 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.

### __str__(self)

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

### add_dependency(self, depend)

Adds dependencies.
add_ignore(self, depend)

Adds dependencies to ignore.

add_prerequisite(self, prerequisite)

Adds prerequisites

add_source(self, source)

Adds sources.

add_to_implicit(self, deps)

add_to_waiting_parents(self, 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_o(self, node)

add_wkid(self, wkid)

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

all_children(self, scan=False)

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

build(self, **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().
changed(self, node=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.

children(self, scan=False)

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

children_are_up_to_date(self)

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.


clear(self)

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(self)

del_binfo(self)

Delete the build info from this node.

disambiguate(self, must_exist=False)

do_not_store_info(self)

env_set(self, env, safe=0)

executor_cleanup(self)

Let the executor clean up any cached information.
### explain(self)

**for_signature(self)**

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(self)

Get the absolute path of the file.


### get_binfo(self)

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(self)

Fetch the appropriate Environment to build this node.

### get_build_scanner_path(self, scanner)

Fetch the appropriate scanner path for this node.

### get_builder(self, default_builder=False)

Return the set builder, or a specified default value

### get_dir(self)
get_env(self)

get_env_scanner(self, env, kw={})

get_executor(self, create=False)
Fetch the action executor for this node. Create one if there isn’t already one, and requested to do so.

get_implicit_deps(self, env, scanner, path)
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(self)

get_path(self, dir=False)
Return path relative to the current working directory of the Node.FS.Base object that owns us.

get_source_scanner(self, 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(self)
### get_string(self, 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(self)

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.

Overrides: SCons.Node.Node.get_subst_proxy (inherited documentation)

### get_suffix(self)


### get_target_scanner(self)

### getmtime(self)

### getsize(self)

### has_builder(self)

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(self)

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).

is_derived(self)

Returns true iff 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_literal(self)

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

is_under(self, dir)

isdir(self)

isfile(self)

islink(self)

missing(self)

multiple_side_effect_has_builder(self)

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.
<table>
<thead>
<tr>
<th>Method</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>must_be_same</strong>(<code>self, klass</code>)</td>
<td>This node, which already existed, is being looked up as the specified klass. Raise an exception if it isn’t.</td>
</tr>
<tr>
<td><strong>new_binfo</strong>(<code>self</code>)</td>
<td></td>
</tr>
<tr>
<td><strong>new_ninfo</strong>(<code>self</code>)</td>
<td></td>
</tr>
<tr>
<td><strong>postprocess</strong>(<code>self</code>)</td>
<td>Clean up anything we don’t need to hang onto after we’ve been built.</td>
</tr>
<tr>
<td><strong>render_include_tree</strong>(<code>self</code>)</td>
<td>Return a text representation, suitable for displaying to the user, of the include tree for the sources of this node.</td>
</tr>
<tr>
<td><strong>rentry</strong>(<code>self</code>)</td>
<td></td>
</tr>
<tr>
<td><strong>reset_executor</strong>(<code>self</code>)</td>
<td>Remove cached executor; forces recompute when needed.</td>
</tr>
<tr>
<td><strong>rexists</strong>(<code>self</code>)</td>
<td>Does this node exist locally or in a repository?</td>
</tr>
<tr>
<td><strong>scan</strong>(<code>self</code>)</td>
<td>Scan this node’s dependents for implicit dependencies.</td>
</tr>
<tr>
<td><strong>select.Scanner</strong>(<code>self, scanner</code>)</td>
<td>Selects a scanner for this Node.</td>
</tr>
<tr>
<td></td>
<td>This is a separate method so it can be overridden by Node subclasses (specifically, Node.FS.Dir) that <em>must</em> use their own Scanner and don’t select one the Scanner.Selector that’s configured for the target.</td>
</tr>
<tr>
<td><strong>set.always.build</strong>(<code>self, always_build=False</code>)</td>
<td>Set the Node's always.build value.</td>
</tr>
</tbody>
</table>
Class File

Module SCons.Node.FS

```python
set_executor(self, executor)
Set the action executor for this node.

set_explicit(self, is_explicit)

set_local(self)

set_nocache(self, nocache=False)
Set the Node's nocache value.

set_noclean(self, noclean=False)
Set the Node's noclean value.

set_precious(self, precious=False)
Set the Node's precious value.

set_specific_source(self, source)

set_src_builder(self, builder)
Set the source code builder for this node.

set_state(self, state)

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

stat(self)

state_has_changed(self, target, prev_ni)

str_for_display(self)
```
target_from_source(self, prefix, suffix, splitext=<function splitext at 0x83e6e2c>)

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.

15.16.2 Class Variables

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>memoizer_counters</td>
<td>Value: []</td>
</tr>
<tr>
<td>md5_chunksize</td>
<td>Value: 64</td>
</tr>
<tr>
<td>convert_copy_attrs</td>
<td>Value: ['bsources', 'bimplicit', 'bdepends', 'bact', 'bactsig', ...</td>
</tr>
<tr>
<td>convert_sig_attrs</td>
<td>Value: ['bsourcesigs', 'bimplicit.refs', 'bdependsigs']</td>
</tr>
</tbody>
</table>

15.17 Class FileFinder

15.17.1 Methods

__init__(self)

filedir_lookup(self, p, fd=False)

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(self, filename, paths, verbose=False)

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.

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.

15.17.2 Class Variables

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>metaclass</strong></td>
<td>Value: SCons.Memoize.Memoized_Metacl</td>
</tr>
<tr>
<td>memoizer_counte</td>
<td>Value: []</td>
</tr>
</tbody>
</table>
16 Module SCons.Node.Python

scons.Node.Python

Python nodes.

16.1 Variables

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>revision</strong></td>
<td>Value: ’src/engine/SCons/Node/Python.py 3842 2008/12/20 22:59:52...</td>
</tr>
</tbody>
</table>

16.2 Class ValueNodeInfo

SCons.Node.NodeInfoBase  


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.

16.2.1 Methods

- str_to_node(self, s)
- __init__(self, node)
- convert(self, node, val)
- format(self, field_list=False, names=0)
- merge(self, other)
- update(self, node)

16.2.2 Class Variables

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>current_version_id</td>
<td>Value: 1</td>
</tr>
<tr>
<td>field_list</td>
<td>Value: ['csig']</td>
</tr>
</tbody>
</table>
16.3 Class ValueBuildInfo


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.

16.3.1 Methods

```python
_init__(self, node)
```

```python
merge(self, other)
```

16.3.2 Class Variables

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>current_version_id</td>
<td>Value: 1</td>
</tr>
</tbody>
</table>

16.4 Class Value


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.

16.4.1 Methods

```python
_init__(self, value, built_value=False)
```


```python
str_for_display(self)
```

```python
__str__(self)
```
make_ready(self)
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.

build(self, **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().

is_up_to_date(self)
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.

rebind their current() method to this method.
Overrides: SCons.Node.Node.is_up_to_date

is_under(self, dir)

write(self, built_value)
Set the value of the node.

read(self)
Return the value. If necessary, the value is built.

get_contents(self)
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.
changed_since_last_build(self, target, prev

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 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.

Overrides: SCons.Node.Node.changed_since_last_build

get_cs

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.


Decider(self, function)

add_dependency(self, depend)

Adds dependencies.

add_ignore(self, depend)

Adds dependencies to ignore.

add_prerequisite(self, prerequisite)

Adds prerequisites.

add_source(self, source)

Adds sources.

add_to_implicit(self, deps)
**add_to_waiting_parents***(self, 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***(self, node)***

**add_wkid***(self, wkid)***

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

**all_children***(self, scan=False)***

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

**alter_targets***(self)***

Return a list of alternate targets for this Node.

**builder_set***(self, builder)***

**built***(self)***

Called just after this node is successfully built.

**changed***(self, node=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.

**children***(self, scan=False)***

Return a list of the node’s direct children, minus those that are ignored by this node.
### children_are_up_to_date(self)
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.


### clear(self)
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(self)

### del_binfo(self)
Delete the build info from this node.

### disambiguate(self, must_exist=False)

### do_not_store_info(self)

### env_set(self, env, safe=0)

### executor_cleanup(self)
Let the executor clean up any cached information.

### exists(self)
Does this node exists?

### explain(self)

### for_signature(self)
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(self)**

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(self)**

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(self)**

Fetch the appropriate Environment to build this node.

**get_build_scanner_path(self, scanner)**

Fetch the appropriate scanner path for this node.

**get_builder(self, default_builder=False)**

Return the set builder, or a specified default value

**get_cachedir_csig(self)**

**get_env(self)**

**get_env_scanner(self, env, kw={})**

**get_executor(self, create=False)**

Fetch the action executor for this node. Create one if there isn’t already one, and requested to do so.
### `get_foundIncludes(self, 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(self, env, scanner, path)`

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(self)`

### `get_source_scanner(self, 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(self)`

### `get_stored_implicit(self)`

Fetch the stored implicit dependencies

### `get_stored_info(self)`
**get_string(self, 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(self)**

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(self)**

**get_target_scanner(self)**

**has_builder(self)**

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(self)
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).

is_derived(self)
Returns true iff 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_literal(self)
Always pass the string representation of a Node to the command interpreter literally.

missing(self)

multiple_side_effect_has_builder(self)
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(self)

new_ninfo(self)

postprocess(self)
Clean up anything we don’t need to hang onto after we’ve been built.
### prepare(self)

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 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.

### remove(self)

Remove this Node: no-op by default.

### render_include_tree(self)

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

### reset_executor(self)

Remove cached executor; forces recompute when needed.

### retrieve_from_cache(self)

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 iff the node was successfully retrieved.

### rexists(self)

Does this node exist locally or in a repository?
scan(self)
Scan this node’s dependents for implicit dependencies.

scanner_key(self)

select_scanner(self, 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(self, always_build=False)
Set the Node’s always_build value.

set_executor(self, executor)
Set the action executor for this node.

set_explicit(self, is_explicit)

set_nocache(self, nocache=False)
Set the Node’s nocache value.

set_noclean(self, noclean=False)
Set the Node’s noclean value.

set_precious(self, precious=False)
Set the Node’s precious value.

set_specific_source(self, source)

set_state(self, state)

state_has_changed(self, target, prev_ni)

store_info(self)
Make the build signature permanent (that is, store it in the .sconsign file or equivalent).
visited(self)

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

### 16.4.2 Class Variables

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>_metaclass_</code></td>
<td>Value: <code>SCons.Memoize.MemoizedMeta</code></td>
</tr>
<tr>
<td>memoizer_counts</td>
<td>Value: <code>[]</code></td>
</tr>
</tbody>
</table>
17 Module SCons.PathList

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.

17.1 Functions

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.

PathList(pathlist)

Returns the cached PathList object for the specified pathlist, creating and caching a new object as necessary.

17.2 Variables

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>revision</strong></td>
<td>Value: 'src/engine/SCons/PathList.py 3842 2008/12/20 22:59:52 sc...</td>
</tr>
<tr>
<td><strong>doc</strong></td>
<td>Value: &quot;&quot;SCons.Path...</td>
</tr>
<tr>
<td>TYPE_STRING_NO_SUBST</td>
<td>Value: 0</td>
</tr>
<tr>
<td>TYPE_STRING_SUBST</td>
<td>Value: False</td>
</tr>
<tr>
<td>TYPE_OBJECT</td>
<td>Value: 2</td>
</tr>
</tbody>
</table>
18 Module SCons.SConf

SCons.SConf
Autoconf-like configuration support.

18.1 Functions

<table>
<thead>
<tr>
<th>Function</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>SetBuildType(type)</code></td>
<td>Set the BuildType configuration.</td>
</tr>
<tr>
<td><code>SetCacheMode(mode)</code></td>
<td>Set the Configure cache mode. mode must be one of &quot;auto&quot;, &quot;force&quot;, or &quot;cache&quot;.</td>
</tr>
<tr>
<td><code>SetProgressDisplay(display)</code></td>
<td>Set the progress display to use (called from SCons.Script)</td>
</tr>
<tr>
<td><code>CreateConfigHBuilder(env)</code></td>
<td>Called just before the building targets phase begins.</td>
</tr>
<tr>
<td><code>SConf(*args, **kw)</code></td>
<td>-</td>
</tr>
<tr>
<td><code>CheckFunc(context, function_name, header=False, language=False)</code></td>
<td>-</td>
</tr>
<tr>
<td><code>CheckType(context, type_name, includes='', language=False)</code></td>
<td>-</td>
</tr>
<tr>
<td><code>CheckTypeSize(context, type_name, includes='', language=False, expect=False)</code></td>
<td>-</td>
</tr>
<tr>
<td><code>CheckDeclaration(context, declaration, includes='', language=False)</code></td>
<td>-</td>
</tr>
<tr>
<td><code>createIncludesFromHeaders(headers, leaveLast, include_quotes='''')</code></td>
<td>-</td>
</tr>
<tr>
<td><code>CheckHeader(context, header, include_quotes='&lt;&gt;', language=False)</code></td>
<td>A test for a C or C++ header file.</td>
</tr>
<tr>
<td><code>CheckCC(context)</code></td>
<td>-</td>
</tr>
<tr>
<td><code>CheckCXX(context)</code></td>
<td>-</td>
</tr>
<tr>
<td><code>CheckSHCC(context)</code></td>
<td>-</td>
</tr>
<tr>
<td><code>CheckSHCXX(context)</code></td>
<td>-</td>
</tr>
</tbody>
</table>
CheckCHeader(context, header, include_quotes='''''')

A test for a C header file.

CheckCXXHeader(context, header, include_quotes='''''')

A test for a C++ header file.

CheckLib(context, library=False, symbol='main', header=False, language=False, autoadd=False)

A test for a library. See also CheckLibWithHeader. Note that library may also be None to test whether the given symbol compiles without flags.

CheckLibWithHeader(context, libs, header, language, call=False, autoadd=False)

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.

18.2 Variables

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>build_type</td>
<td>Value: False</td>
</tr>
<tr>
<td>build_types</td>
<td>Value: ['clean', 'help']</td>
</tr>
<tr>
<td>dryrun</td>
<td>Value: 0</td>
</tr>
<tr>
<td>AUTO</td>
<td>Value: 0</td>
</tr>
<tr>
<td>FORCE</td>
<td>Value: False</td>
</tr>
<tr>
<td>CACHE</td>
<td>Value: 2</td>
</tr>
<tr>
<td>cache_mode</td>
<td>Value: 0</td>
</tr>
<tr>
<td>progress_display</td>
<td>Value: SCons.Util.display</td>
</tr>
<tr>
<td>SConfFS</td>
<td>Value: False</td>
</tr>
<tr>
<td>sconf_global</td>
<td>Value: False</td>
</tr>
<tr>
<td>BooleanTypes</td>
<td>Value: [type 'int'], [type 'bool']</td>
</tr>
</tbody>
</table>
18.3 Class SConfWarning

object

exceptions.BaseException

exceptions.Exception

SCons.Errors.UserError

SCons.Warnings.Warning

SCons.SConf.SConfWarning

18.3.1 Methods

__delattr__(...)

x.__delattr__('name') <==> del x.name

Overrides: object.__delattr__

__getattr__(...)

x.__getattr__('name') <==> x.name

Overrides: object.__getattr__

__getitem__(x, y)

x[y]

__getslice__(x, i, j)

x[i:j]

Use of negative indices is not supported.

__hash__(x)

hash(x)

__init__(...)

x.__init__(...) initializes x; see x.__class__.__doc__ for signature

Overrides: exceptions.BaseException.__init__

__new__(T, S, ...)

Return Value

a new object with type S, a subtype of T

Overrides: exceptions.BaseException.__new__
Class `SConfError`

Module `SCons.SConf`

```python
_reduce_(...)
helper for pickle
Overrides: object._reduce_
```

```python
_reduce_ex_(...)
helper for pickle
```

```python
_repr_(x)
repr(x)
Overrides: object._repr_
```

```python
_setattr_(...)
x._setattr_('name', value) <==> x.name = value
Overrides: object._setattr_
```

```python
_setstate_(...)
```

```python
_str_(x)
str(x)
Overrides: object._str_
```

### 18.3.2 Properties

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>class</em></td>
<td>Value: &lt;attribute '<em>class</em>' of 'object' objects&gt;</td>
</tr>
<tr>
<td>args</td>
<td>Value: &lt;attribute 'args' of 'exceptions.BaseException' objects&gt;</td>
</tr>
<tr>
<td>message</td>
<td>Value: &lt;member 'message' of 'exceptions.BaseException' objects&gt;</td>
</tr>
</tbody>
</table>

### 18.4 Class `SConfError`

```
object

exceptions.BaseException

exceptions.Exception

SCons.Errors.UserError

SCons.SConf.SConfError
```

**Known Subclasses:** `SCons.SConf.ConfigureCacheError`, `SCons.SConf.ConfigureDryRunError`
18.4.1 Methods

```python
__init__(self, msg)
x.__init__(...) initializes x; see x.__class__.__doc__ for signature
Overrides: exceptions.Exception.__init__(inherited documentation)
```

```python
__delattr__(...)
x.__delattr__('name') ==> del x.name
Overrides: object.__delattr__
```

```python
__getattr__(...)
x.__getattr__('name') ==> x.name
Overrides: object.__getattr__
```

```python
__getitem__(x, y)
x[y]
```

```python
__getslice__(x, i, j)
x[i:j]
Use of negative indices is not supported.
```

```python
__hash__(x)
hash(x)
```

```python
__new__(T, S, ...)
Return Value
a new object with type S, a subtype of T
Overrides: exceptions.BaseException.__new__
```

```python
__reduce__(...)
helper for pickle
Overrides: object.__reduce__(inherited documentation)
```

```python
__reduce_ex__(...)
helper for pickle
```

```python
__repr__(x)
repr(x)
Overrides: object.__repr__
```
18.4.2 Properties

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>class</strong></td>
<td>Value: &lt;attribute '<strong>class</strong>' of 'object' objects&gt;</td>
</tr>
<tr>
<td>args</td>
<td>Value: &lt;attribute 'args' of 'exceptions.BaseException' objects&gt;</td>
</tr>
<tr>
<td>message</td>
<td>Value: &lt;member 'message' of 'exceptions.BaseException' objects&gt;</td>
</tr>
</tbody>
</table>

18.5 Class ConfigureDryRunError

```
object

exceptions.BaseException

exceptions.Exception

SCons.Errors.UserError

SCons.SConf.SConfError

SCons.SConf.ConfigureDryRunError
```

Raised when a file or directory needs to be updated during a Configure process, but the user requested a dry-run

18.5.1 Methods

```
__init__(self, target)
```

Overrides: SCons.SConf.SConfError.__init__

```
__delattr__(...)```

```
x...delattr__('name') <==> del x.name
```

Overrides: object.__delattr__
### Class ConfigureDryRunError

<table>
<thead>
<tr>
<th>Method</th>
<th>Description</th>
</tr>
</thead>
</table>
| `.getattribute__(...)` | `x.__getattribute__(‘name’) <==> x.name`  
Overrides: `object.__getattribute__` |
| `.getitem__(x, y)` | `x[y]` |
| `.getslice__(x, i, j)` | `x[i:j]`  
Use of negative indices is not supported. |
| `.hash__(x)` | `hash(x)` |
| `.new__(T, S, ...)` | **Return Value**  
a new object with type S, a subtype of T  
Overrides: `exceptions.BaseException.__new__` |
| `.reduce__(...)` | helper for pickle  
Overrides: `object.__reduce__` extit(inherited documentation) |
| `.reduce_ex__(...)` | helper for pickle |
| `.repr__(x)` | `repr(x)`  
Overrides: `object.__repr__` |
| `.setattr__(...)` | `x.__setattr__(‘name’, value) <==> x.name = value`  
Overrides: `object.__setattr__` |
| `.setstate__(...)` |
| `.str__(x)` | `str(x)`  
Overrides: `object.__str__` |
18.5.2 Properties

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>_class_</code></td>
<td>Value: <code>&lt;attribute </code>.<em>class</em><code>of</code>object<code> objects&gt;</code></td>
</tr>
<tr>
<td>args</td>
<td>Value: <code>&lt;attribute </code>args<code>of</code>exceptions.BaseException<code> objects&gt;</code></td>
</tr>
<tr>
<td>message</td>
<td>Value: <code>&lt;member </code>message<code>of</code>exceptions.BaseException<code> objects&gt;</code></td>
</tr>
</tbody>
</table>

18.6 Class ConfigureCacheError

object

exceptions.BaseException

exceptions.Exception

SCons.Errors.UserError

SCons.SConf.SConfError

SCons.SConf.ConfigureCacheError

Raised when a use explicitly requested the cache feature, but the test is run the first time.

18.6.1 Methods

```python
__init__ (self, target)
Overrides: SCons.SConf.SConfError.__init__
```

```python
__delattr__(...)  
x.__delattr__('name') <==> del x.name
Overrides: object.__delattr__
```

```python
__getattribute__(...)  
x.__getattribute__('name') <==> x.name
Overrides: object.__getattribute__
```

```python
__getitem__ (x, y)
x[y]
```

```python
__getslice__ (x, i, j)
x[i:j]
```

Use of negative indices is not supported.
Class ConfigureCacheError  

Module SCons.SConf

__hash__(x)

hash(x)

__new__(T, S, ...)

Return Value

a new object with type S, a subtype of T

Overrides: exceptions.BaseException.__new__

__reduce__(...)

helper for pickle

Overrides: object.__reduce__ extit(inherited documentation)

__reduce_ex__(...)

helper for pickle

__repr__(x)

repr(x)

Overrides: object.__repr__

__setattr__(...)

x.__setattr__(\'name\', value) \implies x.name = value

Overrides: object.__setattr__

__setstate__(...)

__str__(x)

str(x)

Overrides: object.__str__

18.6.2 Properties

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>class</strong></td>
<td>Value: &lt;attribute '<strong>class</strong>' of 'object' objects&gt;</td>
</tr>
<tr>
<td>args</td>
<td>Value: &lt;attribute 'args' of 'exceptions.BaseException' objects&gt;</td>
</tr>
<tr>
<td>message</td>
<td>Value: &lt;member 'message' of 'exceptions.BaseException' objects&gt;</td>
</tr>
</tbody>
</table>
Class SConfBuildInfo


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.

18.7.1 Methods

```
set_build_result(self, result, string)

__init__(self, node)

convert_from_sconsign(self, 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(self)

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.

format(self, names=0)

merge(self, other)

prepare_dependencies(self)

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).
```
18.7.2 Class Variables

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>result</td>
<td>Value: False</td>
</tr>
<tr>
<td>string</td>
<td>Value: False</td>
</tr>
<tr>
<td>current_version_id</td>
<td>Value: 1</td>
</tr>
</tbody>
</table>

18.8 Class Streamer

'Sniffer' for a file-like writable object. Similar to the unix tool tee.

18.8.1 Methods

```python
__init__(self, orig)
write(self, str)
writelines(self, lines)
.getvalue(self)
flush(self)
```

Return everything written to orig since the Streamer was created.

18.9 Class SConfBuildTask

```
SCons.Taskmaster.Task  
SCons.SConf.SConfBuildTask
```

This is almost the same as SCons.Script.BuildTask. Handles SConfErrors correctly and knows about the current cache_mode.
18.9.1 Methods

**display**(self, 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 actually 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.

Overrides: SCons.Taskmaster.Task.display (inherited documentation)

**display_cached_string**(self, bi)

Logs the original builder messages, given the SConfBuildInfo instance bi.

**failed**(self)

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().

Overrides: SCons.Taskmaster.Task.failed (inherited documentation)

**collect_node_states**(self)

**execute**(self)

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().

Overrides: SCons.Taskmaster.Task.execute (inherited documentation)

**__init__**(self, tm, targets, top, node)

**exc_clear**(self)

Clears any recorded exception.

This also changes the "exception_raise" attribute to point to the appropriate do-nothing method.
exc_info(self)

Returns info about a recorded exception.

exception_set(self, exception=False)

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

exeucted(self)

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(self)

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(self)

Called when the task has been successfully executed
and the Taskmaster instance doesn't want to call
the Node's callback methods.
fail_continue(self)

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(self)

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().

get_target(self)

Fetch the target being built or updated by this task.

make_ready(self)

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(self)

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(self)

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(self)

Called to determine whether the task’s execute() method should be run.

This method allows one to skip the somewhat costly execution of the execute() method in a separate thread. For example, that would be unnecessary for up-to-date targets.

postprocess(self)

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(self)

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(self, method, node, description='node')

18.10 Class SConfBase

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.

### 18.10.1 Methods

<table>
<thead>
<tr>
<th>Method</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>_init_</code></td>
<td>Constructor. Pass additional tests in the <code>custom_tests</code>-dictionary, e.g. <code>custom_tests={'CheckPrivate':MyPrivateTest}</code>, where <code>MyPrivateTest</code> defines a custom test. Note also the <code>conf_dir</code> and <code>log_file</code> arguments (you may want to build tests in the VariantDir, not in the SourceDir).</td>
</tr>
<tr>
<td><code>Finish</code></td>
<td>Call this method after finished with your tests: <code>env = sconf.Finish()</code></td>
</tr>
<tr>
<td><code>Define</code></td>
<td>Define a pre processor symbol name, with the optional given value in the current config header. If value is None (default), then <code>#define name</code> is written. If value is not none, then <code>#define name value</code> 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 /* and */ will be put automatically.</td>
</tr>
<tr>
<td><code>BuildNodes</code></td>
<td>Tries to build the given nodes immediately. Returns 1 on success, 0 on error.</td>
</tr>
<tr>
<td><code>pspawn_wrapper</code></td>
<td>Wrapper function for handling piped spawns. This looks to the calling interface (in <code>Action.py</code>) like a &quot;normal&quot; 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 <code>Action.py</code> doesn’t have to know or care whether it’s spawning a piped command or not.</td>
</tr>
</tbody>
</table>
Class CheckContext

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.

### 18.11.1 Methods

__init__(self, sconf)
Constructor. Pass the corresponding SConf instance.

Message(self, text)
Inform about what we are doing right now, e.g. 'Checking for SOMETHING ... '

Result(self, res)
Inform about the result of the test. res may be an integer or a string. In case of an integer, the written text will be 'ok' or 'failed'. The result is only displayed when self.did_show_result is not set.

TryBuild(self, *args, **kw)

TryAction(self, *args, **kw)

TryCompile(self, *args, **kw)

TryLink(self, *args, **kw)

TryRun(self, *args, **kw)

__getattr__(self, attr)

BuildProg(self, text, ext)

CompileProg(self, text, ext)

CompileSharedObject(self, text, ext)

RunProg(self, text, ext)
<table>
<thead>
<tr>
<th>Function</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>AppendLIBS(self, lib_name_list)</code></td>
<td>Append library names to the context.</td>
</tr>
<tr>
<td><code>SetLIBS(self, val)</code></td>
<td>Set the library context.</td>
</tr>
<tr>
<td><code>Display(self, msg)</code></td>
<td>Display a message.</td>
</tr>
<tr>
<td><code>Log(self, msg)</code></td>
<td>Log a message.</td>
</tr>
</tbody>
</table>
19 Module SCons.SCons

SCons.SCons

Writing and reading information to the .sconsign file or files.

19.1 Functions

<table>
<thead>
<tr>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>corrupt_dblite_warning(filename)</td>
</tr>
<tr>
<td>Get_DataBase(dir)</td>
</tr>
<tr>
<td>Reset()</td>
</tr>
<tr>
<td>Reset global state. Used by unit tests that end up using SConsign multiple times to get a clean slate for each test.</td>
</tr>
<tr>
<td>write()</td>
</tr>
<tr>
<td>File(name, dbm_module=False)</td>
</tr>
<tr>
<td>Arrange for all signatures to be stored in a global .sconsign.db* file.</td>
</tr>
</tbody>
</table>

19.2 Variables

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>revision</strong></td>
<td>Value: 'src/engine/SCons/SConsign.py 3842 2008/12/20 22:59:52 sc...</td>
</tr>
<tr>
<td>sig_files</td>
<td>Value: []</td>
</tr>
<tr>
<td>DataBase</td>
<td>Value: {}</td>
</tr>
<tr>
<td>DB_Name</td>
<td>Value: '.sconsign'</td>
</tr>
<tr>
<td>DB_sync_list</td>
<td>Value: []</td>
</tr>
</tbody>
</table>

19.3 Class SConsignEntry

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.
Class Base

19.3.1 Methods

```
__init__(self)
```

```
convert_to_sconsign(self)
```

```
convert_from_sconsign(self, dir, name)
```

19.3.2 Class Variables

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>current_version_id</td>
<td>Value: False</td>
</tr>
</tbody>
</table>

19.4 Class Base

**Known Subclasses:** SCons.SConsign.DB, SCons.SConsign.Dir

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.

19.4.1 Methods

```
__init__(self)
```

```
get_entry(self, filename)
```

Fetch the specified entry attribute.

```
set_entry(self, filename, obj)
```

Set the entry.

```
do_not_set_entry(self, filename, obj)
```

```
store_info(self, filename, node)
```

```
do_not_store_info(self, filename, node)
```

```
merge(self)
```

262
19.5 Class DB

SCons.SConsign.Base

\hspace{1cm} SCons.SConsign.DB

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.

19.5.1 Methods

```python
_init__(self, dir)
 Overrides: SCons.SConsign.Base.__init__
```

```python
write(self, sync=False)
```

```python
do_not_set_entry(self, filename, obj)
```

```python
do_not_store_info(self, filename, node)
```

```python
get_entry(self, filename)
 Fetch the specified entry attribute.
```

```python
merge(self)
```

```python
set_entry(self, filename, obj)
 Set the entry.
```

```python
store_info(self, filename, node)
```

19.6 Class Dir

SCons.SConsign.Base

\hspace{1cm} SCons.SConsign.Dir

Known Subclasses: SCons.SConsign.DirFile
### 19.6.1 Methods

<table>
<thead>
<tr>
<th>Method</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>_init__(self, fp=False, dir=False)</code></td>
<td>fp - file pointer to read entries from</td>
</tr>
<tr>
<td></td>
<td>Overrides: SCons.SConsign.Base.<em>init</em>_</td>
</tr>
<tr>
<td><code>do_not_set_entry(self, filename, obj)</code></td>
<td>do not set entry</td>
</tr>
<tr>
<td><code>do_not_store_info(self, filename, node)</code></td>
<td>do not store info</td>
</tr>
<tr>
<td><code>get_entry(self, filename)</code></td>
<td>Fetch the specified entry attribute.</td>
</tr>
<tr>
<td><code>merge(self)</code></td>
<td></td>
</tr>
<tr>
<td><code>set_entry(self, filename, obj)</code></td>
<td>Set the entry.</td>
</tr>
<tr>
<td><code>store_info(self, filename, node)</code></td>
<td></td>
</tr>
</tbody>
</table>

### 19.7 Class DirFile

SCons.SConsign.Base

SCons.SConsign.Dir

SCons.SConsign.DirFile

Encapsulates reading and writing a per-directory .sconsign file.

#### 19.7.1 Methods

<table>
<thead>
<tr>
<th>Method</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>_init_(self, dir)</code></td>
<td>dir - the directory for the file</td>
</tr>
<tr>
<td></td>
<td>Overrides: SCons.SConsign.Dir.<em>init</em>_</td>
</tr>
</tbody>
</table>
write(self, sync=False)

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.

do_not_set_entry(self, filename, obj)
do_not_store_info(self, filename, node)

get_entry(self, filename)

Fetch the specified entry attribute.

merge(self)

set_entry(self, filename, obj)

Set the entry.

store_info(self, filename, node)

19.8   Class DB

SCons.SConsign.Base

SCons.SConsign.DB

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.

19.8.1   Methods

__init__(self, dir)
Override: SCons.SConsign.Base.__init__

write(self, sync=False)
do_not_set_entry(self, filename, obj)

do_not_store_info(self, filename, node)

get_entry(self, filename)

Fetch the specified entry attribute.

merge(self)

set_entry(self, filename, obj)

Set the entry.

store_info(self, filename, node)
20 Package SCons.Scanner

SCons.Scanner

The Scanner package for the SCons software construction utility.

20.1 Modules

- **C**: SCons.Scanner.C
  This module implements the dependency scanner for C/C++ code.
  *(Section 21, p. 267)*
- **D**: SCons.Scanner.D
  Scanner for the Digital Mars "D" programming language.
  *(Section 22, p. 272)*
- **Dir** *(Section 23, p. 274)*
- **Fortran**: SCons.Scanner.Fortran
  This module implements the dependency scanner for Fortran code.
  *(Section 24, p. 275)*
- **IDL**: SCons.Scanner.IDL
  This module implements the dependency scanner for IDL (Interface Definition Language) files.
  *(Section 25, p. 277)*
- **LaTeX**: SCons.Scanner.LaTeX
  This module implements the dependency scanner for LaTeX code.
  *(Section 26, p. 278)*
- **Prog** *(Section 27, p. 283)*
- **RC**: SCons.Scanner.RC
  This module implements the dependency scanner for RC (Interface Definition Language) files.
  *(Section 28, p. 284)*

20.2 Functions

<table>
<thead>
<tr>
<th>Scanner(function, *args, **kw)</th>
</tr>
</thead>
</table>

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.

20.3 Variables

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>...revision...</td>
<td>Value: 'src/engine/SCons/Scanner/<strong>init</strong>.py 3842 2008/12/20 22:...</td>
</tr>
</tbody>
</table>

*continued on next page*
20.4 Class FindPathDirs

A class to bind a specific *PATH variable name to a function that will return all of the *path directories.

20.4.1 Methods

```python
__init__(self, variable)
```

```python
__call__(self, env, dir=False, target=False, source=False, argument=False)
```

20.5 Class Base

**Known Subclasses:** SCons.Scanner.Current, SCons.Scanner.Selector, SCons.Scanner.LaTeX.LaTeX

The base class for dependency scanners. This implements straightforward, single-pass scanning of a single file.

20.5.1 Methods

```python
__call__(self, node, env, path=())
```

This method scans a single object. 'node' is the node that will be passed to the scanner function, and 'env' is the environment that will be passed to the scanner function. A list of direct dependency nodes for the specified node will be returned.

```python
__cmp__(self, other)
```

```python
__hash__(self)
```
_init_(self, function, name='NONE', argument=<class SCons.Scanner._Null at 0x87ea44c>, skeys=<class SCons.Scanner._Null at 0x87ea44c>, path_function=False, node_class=<class SCons.Node.FS.Entry at 0x84bd11c>, node_factory=False, scan_check=False, recursive=False)

Construct a new scanner object given a scanner function.

'function' - a scanner function taking two or three arguments and returning a list of strings.

'name' - a name for identifying this scanner object.

'argument' - an optional argument that, if specified, will be passed to both the scanner function and the path_function.

'skeys' - an optional list argument that can be used to determine which scanner should be used for a given Node. In the case of File nodes, for example, the 'skeys' would be file suffixes.

'path_function' - a function that takes four or five arguments (a construction environment, Node for the directory containing the SConscript file that defined the primary target, list of target nodes, list of source nodes, and optional argument for this instance) and returns a tuple of the directories that can be searched for implicit dependency files. May also return a callable() which is called with no args and returns the tuple (supporting Bindable class).

'node_class' - the class of Nodes which this scan will return. If node_class is None, then this scanner will not enforce any Node conversion and will return the raw results from the underlying scanner function.

'node_factory' - the factory function to be called to translate the raw results returned by the scanner function into the expected node_class objects.

'scan_check' - a function to be called to first check whether this node really needs to be scanned.

'recursive' - specifies that this scanner should be invoked recursively on all of the implicit dependencies it returns (the canonical example being #include lines in C source files). May be a callable, which will be called to filter the list of nodes found to select a subset for recursive scanning (the canonical example being only recursively scanning subdirectories within a directory).

The scanner function's first argument will be a Node that should be scanned for dependencies, the second argument will be an Environment object, the third argument will be the tuple of paths returned by the path_function, and the fourth argument will be the value passed into 'argument', and the returned list should contain the Nodes for all the direct dependencies of the file.

Examples:

s = Scanner(my_scanner_function)

s = Scanner(function=my_scanner_function)
20.6 Class Selector

SCons.Scanner.Base

SCons.Scanner.Selector

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.)
20.6.1 Methods

```python
_init_(self, dict, *args, **kw)
```

Construct a new scanner object given a scanner function.

'function' - a scanner function taking two or three arguments and returning a list of strings.

'name' - a name for identifying this scanner object.

'argument' - an optional argument that, if specified, will be passed to both the scanner function and the path function.

'skeys' - an optional list argument that can be used to determine which scanner should be used for a given Node. In the case of File nodes, for example, the 'skeys' would be file suffixes.

'path_function' - a function that takes four or five arguments (a construction environment, Node for the directory containing the SConscript file that defined the primary target, list of target nodes, list of source nodes, and optional argument for this instance) and returns a tuple of the directories that can be searched for implicit dependency files. May also return a callable() which is called with no args and returns the tuple (supporting Bindable class).

'node_class' - the class of Nodes which this scan will return. If node_class is None, then this scanner will not enforce any Node conversion and will return the raw results from the underlying scanner function.

'node_factory' - the factory function to be called to translate the raw results returned by the scanner function into the expected node_class objects.

'scan_check' - a function to be called to first check whether this node really needs to be scanned.

'recursive' - specifies that this scanner should be invoked recursively on all of the implicit dependencies it returns (the canonical example being #include lines in C source files). May be a callable, which will be called to filter the list of nodes found to select a subset for recursive scanning (the canonical example being only recursively scanning subdirectories within a directory).

The scanner function's first argument will be a Node that should be scanned for dependencies, the second argument will be an Environment object, the third argument will be the tuple of paths returned by the path_function, and the fourth argument will be the value passed into 'argument', and the returned list should contain the Nodes for all the direct dependencies of the file.

Examples:

```python
s = Scanner(my_scanner_function)
```

```python
s = Scanner(function = my_scanner_function)
```
```python
__call__(self, node, env, path=())
```

This method scans a single object. 'node' is the node that will be passed to the scanner function, and 'env' is the environment that will be passed to the scanner function. A list of direct dependency nodes for the specified node will be returned.

Overrides: SCons.Scanner.Base.__call__(inherited documentation)

```python
select(self, node)
```

Overrides: SCons.Scanner.Base.select

```python
add_scanner(self, skey, scanner)
```

Overrides: SCons.Scanner.Base.add_scanner

```python
__cmp__(self, other)
```

```python
__hash__(self)
```

```python
__str__(self)
```

```python
add_skey(self, skey)
```

Add a skey to the list of skeys

```python
get_skeys(self, env=False)
```

```python
path(self, env, dir=False, target=False, source=False)
```

```python
recurse_nodes(self, nodes)
```

### 20.7 Class Current

SCons.Scanner.Base

<table>
<thead>
<tr>
<th>SCons.Scanner.Current</th>
</tr>
</thead>
</table>

**Known Subclasses:** SCons.Scanner.Classic

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).
20.7.1 Methods

```
__init__(self, *args, **kw)
```

Construct a new scanner object given a scanner function.

'function' - a scanner function taking two or three arguments and returning a list of strings.

'name' - a name for identifying this scanner object.

'argument' - an optional argument that, if specified, will be passed to both the scanner function and the path_function.

'skeys' - an optional list argument that can be used to determine which scanner should be used for a given Node. In the case of File nodes, for example, the 'skeys' would be file suffixes.

'path_function' - a function that takes four or five arguments (a construction environment, Node for the directory containing the SConscript file that defined the primary target, list of target nodes, list of source nodes, and optional argument for this instance) and returns a tuple of the directories that can be searched for implicit dependency files. May also return a callable() which is called with no args and returns the tuple (supporting Bindable class).

'node_class' - the class of Nodes which this scan will return. If node_class is None, then this scanner will not enforce any Node conversion and will return the raw results from the underlying scanner function.

'node_factory' - the factory function to be called to translate the raw results returned by the scanner function into the expected node_class objects.

'scan_check' - a function to be called to first check whether this node really needs to be scanned.

'recursive' - specifies that this scanner should be invoked recursively on all of the implicit dependencies it returns (the canonical example being #include lines in C source files). May be a callable, which will be called to filter the list of nodes found to select a subset for recursive scanning (the canonical example being only recursively scanning subdirectories within a directory).

The scanner function's first argument will be a Node that should be scanned for dependencies, the second argument will be an Environment object, the third argument will be the tuple of paths returned by the path_function, and the fourth argument will be the value passed into 'argument', and the returned list should contain the Nodes for all the direct dependencies of the file.

Examples:

```python
s = Scanner(my_scanner_function)
```

```python
s = Scanner(function = my_scanner_function)
```
Class Classic

__,call__, (self, node, env, path=())

This method scans a single object. 'node' is the node that will be passed to the scanner function, and 'env' is the environment that will be passed to the scanner function. A list of direct dependency nodes for the specified node will be returned.

__,cmp__, (self, other)

__,hash__, (self)

__,str__, (self)

add.Scanner(self, skey, scanner)

add.skey(self, skey)

Add a skey to the list of skeys

get.skeys(self, env=False)

path(self, env, dir=False, target=False, source=False)

recurse.nodes(self, nodes)

select(self, node)

20.8 Class Classic

SCons.Scanner.Base

  SCons.Scanner.Current

  SCons.Scanner.Classic


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.
20.8.1 Methods

```python
__call__(self, node, env, path=())
```

This method scans a single object. 'node' is the node that will be passed to the scanner function, and 'env' is the environment that will be passed to the scanner function. A list of direct dependency nodes for the specified node will be returned.

```python
__cmp__(self, other)
```

```python
__hash__(self)
```

```python
__init__(self, name, suffixes, path_variable, regex, *args, **kw)
```

Overrides: SCons.Scanner.Current.__init__

```python
__str__(self)
```

```python
add_scanner(self, skey, scanner)
```

```python
add_skey(self, skey)
```

Add a skey to the list of skeys

```python
find_include(self, include, source_dir, path)
```

```python
find_include_names(self, node)
```

```python
get_skeys(self, env=False)
```

```python
path(self, env, dir=False, target=False, source=False)
```

```python
recurse_nodes(self, nodes)
```

```python
scan(self, node, path=())
```

```python
select(self, node)
```

```python
sort_key(self, include)
```

277
20.9 Class ClassicCPP

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.

20.9.1 Methods

```python
find_include(self, include, source_dir, path)
Overrides: SCons.Scanner.Classic.find_include
```

```python
sort_key(self, include)
Overrides: SCons.Scanner.Classic.sort_key
```

```python
__call__(self, node, env, path=())
This method scans a single object. 'node' is the node that will be passed to the scanner function, and 'env' is the environment that will be passed to the scanner function. A list of direct dependency nodes for the specified node will be returned.
```

```python
__cmp__(self, other)
```

```python
__hash__(self)
```

```python
__init__(self, name, suffixes, path_variable, regex, *args, **kw)
Overrides: SCons.Scanner.Current.__init__
```

```python
__str__(self)
```

```python
add_scanner(self, skey, scanner)
```

```python
add_skey(self, skey)
Add a skey to the list of skeys
```

```python
find_include_names(self, node)
```
get_skeys(self, env=False)

path(self, env, dir=False, target=False, source=False)

recurse_nodes(self, nodes)

scan(self, node, path=())

select(self, node)
21 Module SCons.Scanner.C

SCons.Scanner.C

This module implements the dependency scanner for C/C++ code.

21.1 Functions

dictify_CPPDEFINES(env)

CScanner()

Return a prototype Scanner instance for scanning source files that use the C pre-processor

21.2 Variables

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>revision</strong></td>
<td>Value: 'src/engine/SCons/Scanner/C.py 3842 2008/12/20 22:59:52 s...</td>
</tr>
</tbody>
</table>

21.3 Class SConsCPPScanner

SCons.cpp.PreProcessor SCons.Scanner.C.SConsCPPScanner

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.

21.3.1 Methods

__init__(self, *args, **kw)

Overrides: SCons.cpp.PreProcessor.__init__

initialize_result(self, fname)

Overrides: SCons.cpp.PreProcessor.initialize_result

finalize_result(self, fname)

Overrides: SCons.cpp.PreProcessor.finalize_result
Class SConsCPPScanner Module SCons.Scanner.C

```python
find_include_file(self, t)

Finds the #include file for a given preprocessor tuple.
 Overrides: SCons.cpp.PreProcessor.find_include_file extit(inherited documentation)
```

```python
read_file(self, file)

Overrides: SCons.cpp.PreProcessor.read_file
```

```python
__call__(self, file)

Pre-processes a file.

This is the main public entry point.
```

```python
all_include(self, t)
```

```python
do_define(self, t)

Default handling of a #define line.
```

```python
do_elif(self, t)

Default handling of a #elif line.
```

```python
do_else(self, t)

Default handling of a #else line.
```

```python
do_endif(self, t)

Default handling of a #endif line.
```

```python
do_if(self, t)

Default handling of a #if line.
```

```python
do ifndef(self, t)

Default handling of a #ifdef line.
```

281
do ifndef(self, t)

Default handling of a #ifndef line.

do import(self, t)

Default handling of a #import line.

do include(self, t)

Default handling of a #include line.

do include_next(self, t)

Default handling of a #include line.

do nothing(self, t)

Null method for when we explicitly want the action for a specific preprocessor directive to do nothing.

do undef(self, t)

Default handling of a #undef line.

eval_expression(self, 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.

process_contents(self, contents, fname=False)

Pre-processes a file contents.

This is the main internal entry point.
resolve_include(self, 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(self)

Pops the previous dispatch table off the stack and makes it the current one.

save(self)

Pushes the current dispatch table on the stack and re-initializes the current dispatch table to the default.

scons_current_file(self, t)

start_handling_includes(self, t=False)

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(self, t=False)

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(self, 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.

21.4 Class SConsCPPScannerWrapper

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.

21.4.1 Methods

_init_(self, name, variable)

_call_(self, node, env, path=())

recurse_nodes(self, nodes)

select(self, node)
Module SCons.Scanner.D

Scanner for the Digital Mars "D" programming language.

Coded by Andy Friesen
17 Nov 2003

22.1 Functions

\bf{DScanner()}

Return a prototype Scanner instance for scanning D source files

22.2 Variables

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>revision</strong></td>
<td>Value: 'src/engine/SCons/Scanner/D.py 3842 2008/12/20 22:59:52 s...</td>
</tr>
</tbody>
</table>

22.3 Class D

SCons.Scanner.Base

\downarrow

SCons.Scanner.Current

\downarrow

SCons.Scanner.Classic

\downarrow

SCons.Scanner.D.D

22.3.1 Methods

\bf{__init__/self}

Overrides: SCons.Scanner.Classic.__init__

\bf{find\_include(self, include, source\_dir, path)}

Overrides: SCons.Scanner.Classic.find\_include

\bf{find\_include\_names(self, node)}

Overrides: SCons.Scanner.Classic.find\_include\_names
This method scans a single object. 'node' is the node that will be passed to the scanner function, and 'env' is the environment that will be passed to the scanner function. A list of direct dependency nodes for the specified node will be returned.

<table>
<thead>
<tr>
<th>Method</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>call</strong></td>
<td>(self, node, env, path=())</td>
</tr>
<tr>
<td><strong>cmp</strong></td>
<td>(self, other)</td>
</tr>
<tr>
<td><strong>hash</strong></td>
<td>(self)</td>
</tr>
<tr>
<td><strong>str</strong></td>
<td>(self)</td>
</tr>
<tr>
<td>add.Scanner</td>
<td>(self, skey, scanner)</td>
</tr>
<tr>
<td>add_skey</td>
<td>(self, skey)</td>
</tr>
<tr>
<td>get_skeys</td>
<td>(self, env=)</td>
</tr>
<tr>
<td>path</td>
<td>(self, env, dir=False, target=False, source=False)</td>
</tr>
<tr>
<td>recurse_nodes</td>
<td>(self, nodes)</td>
</tr>
<tr>
<td>scan</td>
<td>(self, node, path=())</td>
</tr>
<tr>
<td>select</td>
<td>(self, node)</td>
</tr>
<tr>
<td>sort_key</td>
<td>(self, include)</td>
</tr>
</tbody>
</table>
23 Module SCons.Scanner.Dir

23.1 Functions

<table>
<thead>
<tr>
<th>only_dirs(nodes)</th>
</tr>
</thead>
</table>

DirScanner(**kw)

Return a prototype Scanner instance for scanning directories for on-disk files.

DirEntryScanner(**kw)

Return a prototype Scanner instance for "scanning" directory Nodes for their in-memory entries.

do_not_scan(k)

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.

scan_in_memory(node, env, path=())

"Scans" a Node.FS.Dir for its in-memory entries.

23.2 Variables

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>revision</strong></td>
<td>Value: 'src/engine/SCons/Scanner/Dir.py 3842 2008/12/20 22:59:52...</td>
</tr>
<tr>
<td>skip_entry</td>
<td>Value: {'.': 1, '..': 1, '.sconsign': 1, '.sconsign.bak': 1, '.s...</td>
</tr>
<tr>
<td>skip_entry_list</td>
<td>Value: ['.','.','.sconsign','.sconsign.dblite','.sconsign.d...</td>
</tr>
<tr>
<td>skip</td>
<td>Value: '.sconsign.db'</td>
</tr>
</tbody>
</table>
24  Module SCons.Scanner.Fortran

This module implements the dependency scanner for Fortran code.

24.1  Functions

<table>
<thead>
<tr>
<th>Function</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>FortranScan</td>
<td>Return a prototype Scanner instance for scanning source files</td>
</tr>
<tr>
<td></td>
<td>for Fortran USE &amp; INCLUDE statements</td>
</tr>
</tbody>
</table>

24.2  Variables

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>revision</td>
<td>Value:  'src/engine/SCons/Scanner/Fortran.py 3842</td>
</tr>
<tr>
<td></td>
<td>2008/12/20 22:5...</td>
</tr>
</tbody>
</table>

24.3  Class F90Scanner

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.

24.3.1  Methods

<table>
<thead>
<tr>
<th>Method</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>init</strong></td>
<td>(self, name, suffixes, path_variable, use_regex, incl_regex, def_regex, *args, **kw)</td>
</tr>
<tr>
<td></td>
<td>Overrides: SCons.Scanner.Classic.<strong>init</strong></td>
</tr>
</tbody>
</table>
```python
scan(self, node, env, path=(), path=())

 Overrides: SCons.Scanner.Classic.scan
```

```text
__call__(self, node, env, path=())

 This method scans a single object. 'node' is the node that will be passed to the scanner function, and 'env' is the environment that will be passed to the scanner function. A list of direct dependency nodes for the specified node will be returned.
```

```text
__cmp__(self, other)

__hash__(self)

__str__(self)

add_scanner(self, skey, scanner)

add_skey(self, skey)

Add a skey to the list of skeys

find_include(self, include, source_dir, path)

find_include_names(self, node)

get_skeys(self, env=False)

path(self, env, dir=False, target=False, source=False)

recurse_nodes(self, nodes)

select(self, node)

sort_key(self, include)
```
25 Module SCons.Scanner.IDL

SCons.Scanner.IDL

This module implements the dependency scanner for IDL (Interface Definition Language) files.

25.1 Functions

<table>
<thead>
<tr>
<th>Function</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>IDLScan()</td>
<td>Return a prototype Scanner instance for scanning IDL source files</td>
</tr>
</tbody>
</table>

25.2 Variables

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>revision</strong></td>
<td>Value: 'src/engine/SCons/Scanner/IDL.py 3842 2008/12/20 22:59:52...</td>
</tr>
</tbody>
</table>
26 Module SCons.Scanner.LaTeX

This module implements the dependency scanner for LaTeX code.

26.1 Functions

**modify_env_var**(*env, var, abspath*)

**LaTeXScanner**()

Return a prototype Scanner instance for scanning LaTeX source files when built with latex.

**PDFLaTeXScanner**()

Return a prototype Scanner instance for scanning LaTeX source files when built with pdflatex.

26.2 Variables

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>revision</em></td>
<td>Value: <code>/src/engine/SCons/Scanner/LaTeX.py 3842 2008/12/20 22:59:...</code></td>
</tr>
<tr>
<td>TexGraphics</td>
<td>Value: <code>['.eps', '.ps']</code></td>
</tr>
<tr>
<td>LatexGraphics</td>
<td>Value: <code>['.pdf', '.png', '.jpg', '.gif', '.tif']</code></td>
</tr>
</tbody>
</table>

26.3 Class FindENVPathDirs

A class to bind a specific *PATH variable name to a function that will return all of the *path directories.

26.3.1 Methods

**__init__**(*self, variable*)

**__call__**(*self, env, dir=False, target=False, source=False, argument=False*)

26.4 Class LaTeX

SCons.Scanner.Base ───>
SCons.Scanner.LaTeX.LaTeX

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
  pdfeTeX 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['BIBINPUTS'] for "bibliography" keyword
env['BSTINPUTS'] for "bibliographystyle" keyword

FIXME: also look for the class or style in document{class|style}{}
FIXME: also look for the argument of bibliographystyle{}
26.4.1 Methods

```python
__init__(self, name, suffixes, graphics_extensions, *args, **kw)
```

Construct a new scanner object given a scanner function.

'function' - a scanner function taking two or three arguments and returning a list of strings.

'name' - a name for identifying this scanner object.

'argument' - an optional argument that, if specified, will be passed to both the scanner function and the path_function.

'skeys' - an optional list argument that can be used to determine which scanner should be used for a given Node. In the case of File nodes, for example, the 'skeys' would be file suffixes.

'path_function' - a function that takes four or five arguments (a construction environment, Node for the directory containing the SConscript file that defined the primary target, list of target nodes, list of source nodes, and optional argument for this instance) and returns a tuple of the directories that can be searched for implicit dependency files. May also return a callable() which is called with no args and returns the tuple (supporting Bindable class).

'node_class' - the class of Nodes which this scan will return. If node_class is None, then this scanner will not enforce any Node conversion and will return the raw results from the underlying scanner function.

'node_factory' - the factory function to be called to translate the raw results returned by the scanner function into the expected node_class objects.

'scan_check' - a function to be called to first check whether this node really needs to be scanned.

'recursive' - specifies that this scanner should be invoked recursively on all of the implicit dependencies it returns (the canonical example being #include lines in C source files). May be a callable, which will be called to filter the list of nodes found to select a subset for recursive scanning (the canonical example being only recursively scanning subdirectories within a directory).

The scanner function's first argument will be a Node that should be scanned for dependencies, the second argument will be an Environment object, the third argument will be the tuple of paths returned by the path_function, and the fourth argument will be the value passed into 'argument', and the returned list should contain the Nodes for all the direct dependencies of the file.

Examples:

```python
s = Scanner(my_scanner_function)
```

```python
s = Scanner(function = my_scanner_function)
```
sort_key(self, include)

find_include(self, include, source_dir, path)

scan(self, node, path=())

call__(self, node, env, path=())

This method scans a single object. 'node' is the node that will be passed to the scanner function, and 'env' is the environment that will be passed to the scanner function. A list of direct dependency nodes for the specified node will be returned.

_cmp__(self, other)

__hash__(self)

__str__(self)

add_scanner(self, skey, scanner)

add_skey(self, skey)
Add a skey to the list of skeys

get_skeys(self, env=False)

path(self, env, dir=False, target=False, source=False)

recurse_nodes(self, nodes)

select(self, node)

26.4.2 Class Variables

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>keyword_paths</td>
<td>Value: {'bibliography': 'BIBINPUTS', 'bibliographystyle': 'BSTIN...'</td>
</tr>
<tr>
<td>env_variables</td>
<td>Value: ['BIBINPUTS', 'TEXINPUTS', 'BSTINPUTS']</td>
</tr>
</tbody>
</table>
27 Module SCons.Scanner.Prog

27.1 Functions

ProgramScanner(**kw)

Return a prototype Scanner instance for scanning executable files for static-lib dependencies

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.

27.2 Variables

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>revision</td>
<td>Value: 'src/engine/SCons/Scanner/Prog.py 3842 2008/12/20 22:59:5...</td>
</tr>
<tr>
<td>print_find_libs</td>
<td>Value: False</td>
</tr>
</tbody>
</table>
28 Module SCons.Scanner.RC

SCons.Scanner.RC

This module implements the dependency scanner for RC (Interface Definition Language) files.

28.1 Functions

<table>
<thead>
<tr>
<th>Function</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>RCScan()</td>
<td>Return a prototype Scanner instance for scanning RC source files</td>
</tr>
</tbody>
</table>

28.2 Variables

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>revision</strong></td>
<td>Value: <code>src/engine/SCons/Scanner/RC.py 3842 2008/12/20 22:59:52 ...</code></td>
</tr>
</tbody>
</table>
29 Package 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.

29.1 Modules

- **Interactive**: SCons interactive mode
  *(Section 30, p. 292)*
- **Main**: SCons.Script
  This file implements the main() function used by the scons script.
  *(Section 31, p. 296)*
- **SConscript**: SCons.Script.SConscript
  This module defines the Python API provided to SConscript and SConstruct files.
  *(Section 32, p. 314)*

29.2 Functions

- **HelpFunction**(text)

- **Variables**(files=[], args={})

- **Options**(files=[], args={})

29.3 Variables

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Revision</td>
<td>Value: 'src/engine/SCons/Script/<strong>init</strong>.py 3842 2008/12/20 22:5...</td>
</tr>
<tr>
<td>Start time</td>
<td>Value: 1229842957.69</td>
</tr>
<tr>
<td>Call stack</td>
<td>Value: []</td>
</tr>
<tr>
<td>PathVariable</td>
<td>Value: &lt;SCons.Variables.PathVariable._PathVariable instance...</td>
</tr>
<tr>
<td>PathOption</td>
<td>Value: &lt;SCons.Options.PathOption._PathOption instance at 0x...</td>
</tr>
<tr>
<td>Chmod</td>
<td>Value: ActionFactory(chmod_func, chmod_strfunc)</td>
</tr>
<tr>
<td>Copy</td>
<td>Value: ActionFactory(copy_func, lambda dest, src: 'Copy(&quot;%s&quot;, &quot;%s&quot;...)</td>
</tr>
<tr>
<td>Delete</td>
<td>Value: ActionFactory(delete_func, delete_strfunc)</td>
</tr>
<tr>
<td>Name</td>
<td>Description</td>
</tr>
<tr>
<td>------------------</td>
<td>-----------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Mkdir</td>
<td>Value: ActionFactory(mkdir_func, lambda dir: 'Mkdir(%s)' % get_p...</td>
</tr>
<tr>
<td>Move</td>
<td>Value: ActionFactory(move_func, lambda dest, src: 'Move(&quot;%s&quot;, &quot;%...</td>
</tr>
<tr>
<td>Touch</td>
<td>Value: ActionFactory(touch_func, lambda file: 'Touch(%s)' % get...</td>
</tr>
<tr>
<td>CScanner</td>
<td>Value: SCons.Tool.CScanner</td>
</tr>
<tr>
<td>DScanner</td>
<td>Value: SCons.Tool.DScanner</td>
</tr>
<tr>
<td>DirScanner</td>
<td>Value: SCons.Scanner.Dir.DirScanner()</td>
</tr>
<tr>
<td>ProgramScanner</td>
<td>Value: SCons.Tool.ProgramScanner</td>
</tr>
<tr>
<td>SourceFileScanner</td>
<td>Value: SCons.Tool.SourceFileScanner</td>
</tr>
<tr>
<td>CScan</td>
<td>Value: SCons.Tool.CScanner</td>
</tr>
<tr>
<td>ARGUMENTS</td>
<td>Value: {}</td>
</tr>
<tr>
<td>ARGLIST</td>
<td>Value: []</td>
</tr>
<tr>
<td>BUILD_TARGETS</td>
<td>Value: []</td>
</tr>
<tr>
<td>COMMAND_LINE_TARGETS</td>
<td>Value: []</td>
</tr>
<tr>
<td>DEFAULT_TARGETS</td>
<td>Value: []</td>
</tr>
<tr>
<td>help_text</td>
<td>Value: False</td>
</tr>
<tr>
<td>sconscript_reading</td>
<td>Value: 0</td>
</tr>
<tr>
<td>GlobalDefaultEnvironmentFunctions</td>
<td>Value: ['Default', 'EnsurePythonVersion', 'EnsureSConsVersion', ...</td>
</tr>
<tr>
<td>GlobalDefaultBuilders</td>
<td>Value: ['CFile', 'CXXFile', 'DVI', 'Jar', 'Java', 'JavaH', 'Libr...</td>
</tr>
<tr>
<td>SConscript</td>
<td>Value: &lt;SCons.Script.SConscript.DefaultEnvironmentCall instance ...</td>
</tr>
<tr>
<td>Command</td>
<td>Value: &lt;SCons.Script.SConscript.DefaultEnvironmentCall instance ...</td>
</tr>
<tr>
<td>AddPostAction</td>
<td>Value: &lt;SCons.Script.SConscript.DefaultEnvironmentCall instance ...</td>
</tr>
<tr>
<td>AddPreAction</td>
<td>Value: &lt;SCons.Script.SConscript.DefaultEnvironmentCall instance ...</td>
</tr>
<tr>
<td>Alias</td>
<td>Value: &lt;SCons.Script.SConscript.DefaultEnvironmentCall instance ...</td>
</tr>
<tr>
<td>AlwaysBuild</td>
<td>Value: &lt;SCons.Script.SConscript.DefaultEnvironmentCall instance ...</td>
</tr>
<tr>
<td>BuildDir</td>
<td>Value: &lt;SCons.Script.SConscript.DefaultEnvironmentCall instance ...</td>
</tr>
<tr>
<td>CFile</td>
<td>Value: &lt;SCons.Script.SConscript.DefaultEnvironmentCall instance ...</td>
</tr>
<tr>
<td>CXXFile</td>
<td>Value: &lt;SCons.Script.SConscript.DefaultEnvironmentCall instance ...</td>
</tr>
<tr>
<td>CacheDir</td>
<td>Value: &lt;SCons.Script.SConscript.DefaultEnvironmentCall instance ...</td>
</tr>
<tr>
<td>Clean</td>
<td>Value: &lt;SCons.Script.SConscript.DefaultEnvironmentCall instance ...</td>
</tr>
<tr>
<td>DVI</td>
<td>Value: &lt;SCons.Script.SConscript.DefaultEnvironmentCall instance ...</td>
</tr>
<tr>
<td>Decider</td>
<td>Value: &lt;SCons.Script.SConscript.DefaultEnvironmentCall instance ...</td>
</tr>
<tr>
<td>Name</td>
<td>Description</td>
</tr>
<tr>
<td>---------------------</td>
<td>-----------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Default</td>
<td>Value: <code>&lt;SCons.Script.SConscript.DefaultEnvironmentCall instance ...</code></td>
</tr>
<tr>
<td>Depends</td>
<td>Value: <code>&lt;SCons.Script.SConscript.DefaultEnvironmentCall instance ...</code></td>
</tr>
<tr>
<td>Dir</td>
<td>Value: <code>&lt;SCons.Script.SConscript.DefaultEnvironmentCall instance ...</code></td>
</tr>
<tr>
<td>EnsurePythonVersion</td>
<td>Value: <code>&lt;SCons.Script.SConscript.DefaultEnvironmentCall instance ...</code></td>
</tr>
<tr>
<td>EnsureSConsVersion</td>
<td>Value: <code>&lt;SCons.Script.SConscript.DefaultEnvironmentCall instance ...</code></td>
</tr>
<tr>
<td>Entry</td>
<td>Value: <code>&lt;SCons.Script.SConscript.DefaultEnvironmentCall instance ...</code></td>
</tr>
<tr>
<td>Execute</td>
<td>Value: <code>&lt;SCons.Script.SConscript.DefaultEnvironmentCall instance ...</code></td>
</tr>
<tr>
<td>Exit</td>
<td>Value: <code>&lt;SCons.Script.SConscript.DefaultEnvironmentCall instance ...</code></td>
</tr>
<tr>
<td>Export</td>
<td>Value: <code>&lt;SCons.Script.SConscript.DefaultEnvironmentCall instance ...</code></td>
</tr>
<tr>
<td>File</td>
<td>Value: <code>&lt;SCons.Script.SConscript.DefaultEnvironmentCall instance ...</code></td>
</tr>
<tr>
<td>FindFile</td>
<td>Value: <code>&lt;SCons.Script.SConscript.DefaultEnvironmentCall instance ...</code></td>
</tr>
<tr>
<td>FindInstalledFiles</td>
<td>Value: <code>&lt;SCons.Script.SConscript.DefaultEnvironmentCall instance ...</code></td>
</tr>
<tr>
<td>FindSourceFiles</td>
<td>Value: <code>&lt;SCons.Script.SConscript.DefaultEnvironmentCall instance ...</code></td>
</tr>
<tr>
<td>Flatten</td>
<td>Value: <code>&lt;SCons.Script.SConscript.DefaultEnvironmentCall instance ...</code></td>
</tr>
<tr>
<td>GetBuildPath</td>
<td>Value: <code>&lt;SCons.Script.SConscript.DefaultEnvironmentCall instance ...</code></td>
</tr>
<tr>
<td>GetLaunchDir</td>
<td>Value: <code>&lt;SCons.Script.SConscript.DefaultEnvironmentCall instance ...</code></td>
</tr>
<tr>
<td>Glob</td>
<td>Value: <code>&lt;SCons.Script.SConscript.DefaultEnvironmentCall instance ...</code></td>
</tr>
<tr>
<td>Help</td>
<td>Value: <code>&lt;SCons.Script.SConscript.DefaultEnvironmentCall instance ...</code></td>
</tr>
<tr>
<td>Ignore</td>
<td>Value: <code>&lt;SCons.Script.SConscript.DefaultEnvironmentCall instance ...</code></td>
</tr>
<tr>
<td>Import</td>
<td>Value: <code>&lt;SCons.Script.SConscript.DefaultEnvironmentCall instance ...</code></td>
</tr>
<tr>
<td>Install</td>
<td>Value: <code>&lt;SCons.Script.SConscript.DefaultEnvironmentCall instance ...</code></td>
</tr>
<tr>
<td>InstallAs</td>
<td>Value: <code>&lt;SCons.Script.SConscript.DefaultEnvironmentCall instance ...</code></td>
</tr>
<tr>
<td>Jar</td>
<td>Value: <code>&lt;SCons.Script.SConscript.DefaultEnvironmentCall instance ...</code></td>
</tr>
<tr>
<td>Java</td>
<td>Value: <code>&lt;SCons.Script.SConscript.DefaultEnvironmentCall instance ...</code></td>
</tr>
<tr>
<td>JavaH</td>
<td>Value: <code>&lt;SCons.Script.SConscript.DefaultEnvironmentCall instance ...</code></td>
</tr>
</tbody>
</table>

continued on next page
<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Library</td>
<td>Value: <code>&lt;SCons.Script.SConscript.DefaultEnvironmentCall instance ...</code></td>
</tr>
<tr>
<td>Literal</td>
<td>Value: <code>&lt;SCons.Script.SConscript.DefaultEnvironmentCall instance ...</code></td>
</tr>
<tr>
<td>Local</td>
<td>Value: <code>&lt;SCons.Script.SConscript.DefaultEnvironmentCall instance ...</code></td>
</tr>
<tr>
<td>M4</td>
<td>Value: <code>&lt;SCons.Script.SConscript.DefaultEnvironmentCall instance ...</code></td>
</tr>
<tr>
<td>MSVSProject</td>
<td>Value: <code>&lt;SCons.Script.SConscript.DefaultEnvironmentCall instance ...</code></td>
</tr>
<tr>
<td>NoCache</td>
<td>Value: <code>&lt;SCons.Script.SConscript.DefaultEnvironmentCall instance ...</code></td>
</tr>
<tr>
<td>NoClean</td>
<td>Value: <code>&lt;SCons.Script.SConscript.DefaultEnvironmentCall instance ...</code></td>
</tr>
<tr>
<td>Object</td>
<td>Value: <code>&lt;SCons.Script.SConscript.DefaultEnvironmentCall instance ...</code></td>
</tr>
<tr>
<td>PCH</td>
<td>Value: <code>&lt;SCons.Script.SConscript.DefaultEnvironmentCall instance ...</code></td>
</tr>
<tr>
<td>PDF</td>
<td>Value: <code>&lt;SCons.Script.SConscript.DefaultEnvironmentCall instance ...</code></td>
</tr>
<tr>
<td>Package</td>
<td>Value: <code>&lt;SCons.Script.SConscript.DefaultEnvironmentCall instance ...</code></td>
</tr>
<tr>
<td>ParseDepends</td>
<td>Value: <code>&lt;SCons.Script.SConscript.DefaultEnvironmentCall instance ...</code></td>
</tr>
<tr>
<td>PostScript</td>
<td>Value: <code>&lt;SCons.Script.SConscript.DefaultEnvironmentCall instance ...</code></td>
</tr>
<tr>
<td>Precious</td>
<td>Value: <code>&lt;SCons.Script.SConscript.DefaultEnvironmentCall instance ...</code></td>
</tr>
<tr>
<td>Program</td>
<td>Value: <code>&lt;SCons.Script.SConscript.DefaultEnvironmentCall instance ...</code></td>
</tr>
<tr>
<td>RES</td>
<td>Value: <code>&lt;SCons.Script.SConscript.DefaultEnvironmentCall instance ...</code></td>
</tr>
<tr>
<td>RMIC</td>
<td>Value: <code>&lt;SCons.Script.SConscript.DefaultEnvironmentCall instance ...</code></td>
</tr>
<tr>
<td>Repository</td>
<td>Value: <code>&lt;SCons.Script.SConscript.DefaultEnvironmentCall instance ...</code></td>
</tr>
<tr>
<td>Requires</td>
<td>Value: <code>&lt;SCons.Script.SConscript.DefaultEnvironmentCall instance ...</code></td>
</tr>
<tr>
<td>SConscriptChdir</td>
<td>Value: <code>&lt;SCons.Script.SConscript.DefaultEnvironmentCall instance ...</code></td>
</tr>
<tr>
<td>SConsignFile</td>
<td>Value: <code>&lt;SCons.Script.SConscript.DefaultEnvironmentCall instance ...</code></td>
</tr>
<tr>
<td>SharedLibrary</td>
<td>Value: <code>&lt;SCons.Script.SConscript.DefaultEnvironmentCall instance ...</code></td>
</tr>
<tr>
<td>SharedObject</td>
<td>Value: <code>&lt;SCons.Script.SConscript.DefaultEnvironmentCall instance ...</code></td>
</tr>
<tr>
<td>SideEffect</td>
<td>Value: <code>&lt;SCons.Script.SConscript.DefaultEnvironmentCall instance ...</code></td>
</tr>
<tr>
<td>SourceCode</td>
<td>Value: <code>&lt;SCons.Script.SConscript.DefaultEnvironmentCall instance ...</code></td>
</tr>
</tbody>
</table>

continued on next page
29.4 Class TargetList

UserList.UserList ─── SCons.Script.TargetList

29.4.1 Methods

```python
__add__(self, other)
__cmp__(self, other)
__contains__(self, item)
__delitem__(self, i)
__delslice__(self, i, j)
__eq__(self, other)
__ge__(self, other)
__getitem__(self, i)
```
Class TargetList

getslice_(self, i, j)

_gt_(self, other)

_iadd_(self, other)

_imul_(self, n)

_init_(self, initlist=False)

_le_(self, other)

_len_(self)

_lt_(self, other)

_mul_(self, n)

_ne_(self, other)

_radd_(self, other)

_repr_(self)

_rmul_(self, n)

_setitem_(self, i, item)

_setslice_(self, i, j, other)

append(self, item)

count(self, item)

extend(self, other)

index(self, item, *args)

insert(self, i, item)

pop(self, i=-1)

remove(self, item)

reverse(self)
sort(self, *args, **kwds)
30 Module SCons.Script.Interactive

SCons interactive mode

30.1 Functions

**interact** *(fs, parser, options, targets, target_top)*

30.2 Variables

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>revision</strong></td>
<td>Value: <code>src/engine/SCons/Script/Interactive.py 3842 2008/12/20 2...</code></td>
</tr>
<tr>
<td><strong>doc</strong></td>
<td>Value: <code>...</code></td>
</tr>
</tbody>
</table>

30.3 Class SConsInteractiveCmd

```
cmd.Cmd
    SCons.Script.Interactive.SConsInteractiveCmd
```

**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.

30.3.1 Methods

```
__init__ *(self, **kw)*
```

Instantiate a line-oriented interpreter framework.

The optional argument 'completekey' is the readline name of a completion key; it defaults to the Tab key. If completekey is not None and the readline module is available, command completion is done automatically. The optional arguments stdin and stdout specify alternate input and output file objects; if not specified, sys.stdin and sys.stdout are used.

Overrides: cmd.Cmd.__init__ (inherited documentation)
### default(self, 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.

Overrides: cmd.Cmd.default

### onecmd(self, 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.

Overrides: cmd.Cmd.onecmd

### do_build(self, argv)

*build [TARGETS]*
Build the specified TARGETS and their dependencies. 'b' is a synonym.

### do_clean(self, argv)

*clean [TARGETS]*
Clean (remove) the specified TARGETS and their dependencies. 'c' is a synonym.

### do_EOF(self, argv)

### do_exit(self, argv)

*exit*
Exit SCons interactive mode.

### do_help(self, argv)

*help [COMMAND]*
Prints help for the specified COMMAND. 'h' and '?' are synonyms.

Overrides: cmd.Cmd.do_help

### do_shell(self, argv)

*shell [COMMANDLINE]*
Execute COMMANDLINE in a subshell. 'sh' and '!' are synonyms.

### do_version(self, argv)

*version*
Prints SCons version information.
<table>
<thead>
<tr>
<th>Function</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>cmdloop(self, intro=False)</strong></td>
<td>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.</td>
</tr>
<tr>
<td><strong>columnize(self, list, displaywidth=80)</strong></td>
<td>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).</td>
</tr>
<tr>
<td><strong>complete(self, text, state)</strong></td>
<td>Return the next possible completion for 'text'. If a command has not been entered, then complete against command list. Otherwise try to call complete_&lt;command&gt; to get list of completions.</td>
</tr>
<tr>
<td>*<em>complete_help(self, <em>args)</em></em></td>
<td></td>
</tr>
<tr>
<td>*<em>completedefault(self, <em>ignored)</em></em></td>
<td>Method called to complete an input line when no command-specific complete.*() method is available. By default, it returns an empty list.</td>
</tr>
<tr>
<td>*<em>completenames(self, text, <em>ignored)</em></em></td>
<td></td>
</tr>
<tr>
<td><strong>emptyline(self)</strong></td>
<td>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.</td>
</tr>
<tr>
<td><strong>get_names(self)</strong></td>
<td></td>
</tr>
<tr>
<td><strong>parseline(self, line)</strong></td>
<td>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.</td>
</tr>
<tr>
<td><strong>postcmd(self, stop, line)</strong></td>
<td>Hook method executed just after a command dispatch is finished.</td>
</tr>
</tbody>
</table>
**postloop**(self)

Hook method executed once when the cmdloop() method is about to return.

**precmd**(self, line)

Hook method executed just before the command line is interpreted, but after the input prompt is generated and issued.

**preloop**(self)

Hook method executed once when the cmdloop() method is called.

**print_topics**(self, header, cmds, cmdlen, maxcol)

### 30.3.2 Class Variables

<table>
<thead>
<tr>
<th>Name</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>synonyms</td>
<td>{'b': 'build', 'c': 'clean', 'h': 'help', 'scons': 'build...</td>
</tr>
<tr>
<td>doc_header</td>
<td>'Documented commands (type help &lt;topic&gt;):'</td>
</tr>
<tr>
<td>doc_leader</td>
<td>''</td>
</tr>
<tr>
<td>identchars</td>
<td>'abcdefghijklmnopqrstuvwxyzABCDEFGHIJKLMNOPQRSTUVWXYZ0123...</td>
</tr>
<tr>
<td>intro</td>
<td>False</td>
</tr>
<tr>
<td>lastcmd</td>
<td>''</td>
</tr>
<tr>
<td>misc_header</td>
<td>'Miscellaneous help topics:'</td>
</tr>
<tr>
<td>nohelp</td>
<td>'*** No help on %s'</td>
</tr>
<tr>
<td>prompt</td>
<td>'(Cmd)'</td>
</tr>
<tr>
<td>ruler</td>
<td>'='</td>
</tr>
<tr>
<td>undoc_header</td>
<td>'Undocumented commands:'</td>
</tr>
<tr>
<td>use_rawinput</td>
<td>False</td>
</tr>
</tbody>
</table>
Module SCons.Script.Main

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.

31.1 Functions

- `fetch_win32_parallel_msg()`
- `Progress(*args, **kw)`
- `GetBuildFailures()`
- `python_version_string()`
- `python_version_unsupported(version=(2, 5, 2, 'final', 0))`
- `python_version_deprecated(version=(2, 5, 2, 'final', 0))`
- `AddOption(*args, **kw)`
- `GetOption(name)`
- `SetOption(name, value)`
- `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()

- `version_string(label, module)`
- `main()`

31.2 Variables
### 31.3 Class SConsPrintHelpException

```
object               
SCons.Script.Main.SConsPrintHelpException
```

#### 31.3.1 Methods

<table>
<thead>
<tr>
<th>Method</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>delattr</strong>(...)</td>
<td>x.<strong>delattr</strong>('name') &lt;=&gt; del x.name</td>
</tr>
<tr>
<td><strong>getattr</strong>(...)</td>
<td>x.<strong>getattr</strong>('name') &lt;=&gt; x.name</td>
</tr>
<tr>
<td><strong>getitem</strong>(x, y)</td>
<td>x[y]</td>
</tr>
</tbody>
</table>
----getslice__(x, i, j)----

x[i:j]

Use of negative indices is not supported.

----hash__(x)----

hash(x)

----init__(...)----

x._init__(...) initializes x; see x._class__.__doc__ for signature

Overrides: exceptions.BaseException._init_

----new__(T, S, ...)----

Return Value

a new object with type S, a subtype of T

Overrides: exceptions.BaseException._new_

----reduce__(...)----

helper for pickle

Overrides: object._reduce__ extit(inherited documentation)

----reduce_ex__(...)----

helper for pickle

----repr__(x)----

repr(x)

Overrides: object._repr_

----setattr__(...)----

x._setattr__(‘name’, value) <==> x.name = value

Overrides: object._setattr_

----setstate__(...)----

----str__(x)----

str(x)

Overrides: object._str_

31.3.2 Properties
31.4 Class Progressor

31.4.1 Methods

```python
_init__(self, obj, interval=False, file=False, overwrite=False)
write(self, s)
erase_previous(self)
spinner(self, node)
string(self, node)
replace_string(self, node)
__call__(self, node)
```

31.4.2 Class Variables

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>prev</td>
<td>Value: ''</td>
</tr>
<tr>
<td>count</td>
<td>Value: 0</td>
</tr>
<tr>
<td>target_string</td>
<td>Value: '${TARGET}'</td>
</tr>
</tbody>
</table>

31.5 Class BuildTask

```
```

An SCons build task.
31.5.1 Methods

**display**(self, 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 actually 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.

Overrides: SCons.Taskmaster.Task.display (inherited documentation)

**prepare**(self)

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.

Overrides: SCons.Taskmaster.Task.prepare (inherited documentation)

**needs_execute**(self)

Called to determine whether the task’s execute() method should be run.

This method allows one to skip the somewhat costly execution of the execute() method in a separate thread. For example, that would be unnecessary for up-to-date targets.

Overrides: SCons.Taskmaster.Task.needs_execute (inherited documentation)

**execute**(self)

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().

Overrides: SCons.Taskmaster.Task.execute (inherited documentation)

**do_failed**(self, status=2)
**executed(self)**

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.

Overrides: SCons.Taskmaster.Task.executed (inherited documentation)

**failed(self)**

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().

Overrides: SCons.Taskmaster.Task.failed (inherited documentation)

**postprocess(self)**

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.

Overrides: SCons.Taskmaster.Task.postprocess (inherited documentation)

**make_ready(self)**

Make a task ready for execution

Overrides: SCons.Taskmaster.Task.make_ready

**__init__(self, tm, targets, top, node)**

**exc_clear(self)**

Clears any recorded exception.

This also changes the "exception_raise" attribute to point to the appropriate do-nothing method.
### exc_info(self)

Returns info about a recorded exception.

### exception_set(self, exception=False)

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

### executed_with_callbacks(self)

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(self)

Called when the task has been successfully executed and the Taskmaster instance doesn’t want to call the Node’s callback methods.

### fail_continue(self)

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(self)

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().

get_target(self)

Fetch the target being built or updated by this task.

make_ready_all(self)

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(self)

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.

trace_message(self, method, node, description='node')

31.5.2 Class Variables

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>progress</td>
<td>Value: Null()</td>
</tr>
</tbody>
</table>

31.6 Class CleanTask


An SCons clean task.
### 31.6.1 Methods

<table>
<thead>
<tr>
<th>Method</th>
<th>Description</th>
</tr>
</thead>
</table>
| `fs_delete()`   | 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()`.
| `show()`        |                                                                                                                                                                                                            |
| `remove()`      |                                                                                                                                                                                                            |
| `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()`.
|                 | Overrides: SCons.Taskmaster.Task.execute (inherited documentation)                                                                                                                                           |
| `executed()`    | Called when the task has been successfully executed and the Taskmaster instance doesn’t want to call the Node’s callback methods.                                                                       |
|                 | Overrides: SCons.Taskmaster.Task.executed                                                                                                                                                                   |
| `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.                                               |
|                 | Overrides: SCons.Taskmaster.Task.make_ready                                                                                                                                                                 |
| `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. |
|                 | Overrides: SCons.Taskmaster.Task.prepare (inherited documentation)                                                                                                                                          |
__init__(self, tm, targets, top, node)

display(self, 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 actually 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(self)

Clears any recorded exception.

This also changes the "exception_raise" attribute to point to the appropriate do-nothing method.

exc_info(self)

Returns info about a recorded exception.

exception_set(self, exception=False)

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

executed_with_callbacks(self)

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(self)

Called when the task has been successfully executed and the Taskmaster instance doesn’t want to call the Node’s callback methods.

fail_continue(self)

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(self)

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().

get_target(self)

Fetch the target being built or updated by this task.

make_ready_all(self)

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(self)**

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(self)**

Called to determine whether the task’s execute() method should be run.

This method allows one to skip the somewhat costly execution of the execute() method in a separate thread. For example, that would be unnecessary for up-to-date targets.

**postprocess(self)**

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.

**trace_message(self, method, node, description='node')**

### 31.7 Class QuestionTask

SCons.Taskmaster.Task →

SCons.Script.Main.QuestionTask

An SCons task for the -q (question) option.

#### 31.7.1 Methods

**prepare(self)**

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.

Overrides: SCons.Taskmaster.Task.prepare (inherited documentation)
execute(self)

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().

Overrides: SCons.Taskmaster.Task.execute (inherited documentation)

executed(self)

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.

Overrides: SCons.Taskmaster.Task.executed (inherited documentation)

__init__(self, tm, targets, top, node)

display(self, 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 actually 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(self)

Clears any recorded exception.

This also changes the "exception_raise" attribute to point to the appropriate do-nothing method.

exc_info(self)

Returns info about a recorded exception.
exception_set(self, exception=False)

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

exected_with_callbacks(self)

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.

exected_without_callbacks(self)

Called when the task has been successfully executed
and the Taskmaster instance doesn’t want to call
the Node’s callback methods.

fail_continue(self)

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(self)

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(self)

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(self)

Fetch the target being built or updated by this task.

### make_ready(self)

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(self)

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(self)

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(self)

Called to determine whether the task’s execute() method should be run.

This method allows one to skip the somewhat costly execution of the execute() method in a separate thread. For example, that would be unnecessary for up-to-date targets.
postprocess(self)

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.

trace_message(self, method, node, description=’node’)

31.8 Class TreePrinter

31.8.1 Methods

__init__(self, derived=False, prune=False, status=False)

get_all_children(self, node)

get Derived_children(self, node)

display(self, t)

31.9 Class FakeOptionParser

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.

31.9.1 Methods

add local_option(self, *args, **kw)

31.9.2 Class Variables

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>values</td>
<td>Value: FakeOptionValues()</td>
</tr>
</tbody>
</table>
31.10  Class Stats


31.10.1  Methods

.. _init_: \_\_init\_\_(\self\_)

enable(\self\_, \outfp\_)

do\_nothing(\self\_, \*\args\_, \**\kw\_)

31.11  Class CountStats


31.11.1  Methods

\_\_init\_\_(\self\_)

do\_append(\self\_, \label\_)

do\_print(\self\_)

\_\_init\_\_(\self\_)

do\_nothing(\self\_, \*\args\_, \**\kw\_)

enable(\self\_, \outfp\_)

31.12  Class MemStats


31.12.1  Methods

\_\_init\_\_(\self\_)

\_\_init\_\_(\self\_)

do\_append(\self\_, \label\_)

do\_print(\self\_)

\_\_init\_\_(\self\_)

do\_nothing(\self\_, \*\args\_, \**\kw\_)

enable(self, outfp)
32 Module SCons.Script.SConscript’

SCons.Script.SConscript

This module defines the Python API provided to SConscript and SConstruct files.

32.1 Functions

get_called_namespaces()

Return the locals and globals for the function that called into this module in the current call stack.

compute_exports(exports)

Compute a dictionary of exports given one of the parameters to the Export() function or the exports argument to SConscript().

Return(*vars, **kw)

SConscript_exception(file=sys.stdout)

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.

annotate(node)

Annotate a node with the stack frame describing the SConscript file and line number that created it.

Configure(*args, **kw)

get_DefaultEnvironmentProxy()

BuildDefaultGlobals()

Create a dictionary containing all the default globals for SConstruct and SConscript files.

32.2 Variables

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>revision</strong></td>
<td>Value: 'src/engine/SCons/Script/SConscript.py 3842 2008/12/20 22...</td>
</tr>
</tbody>
</table>

continued on next page
### 32.3 Class SConscriptReturn

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>launch_dir</td>
<td>Value: '/home/scons/release'</td>
</tr>
<tr>
<td>GlobalDict</td>
<td>Value: False</td>
</tr>
<tr>
<td>_global_exports</td>
<td>Value: {}</td>
</tr>
<tr>
<td>_sconscript_chdir</td>
<td>Value: False</td>
</tr>
<tr>
<td>call_stack</td>
<td>Value: []</td>
</tr>
<tr>
<td>stack_bottom</td>
<td>Value: '% Stack boTTom %'</td>
</tr>
</tbody>
</table>

#### 32.3.1 Methods

- **_delattr_(**(...)**):**
  ```python
  x._delattr_('name') ==> del x.name
  ```
  Overrides: object._delattr_

- **_getattribute_(**(...)**):**
  ```python
  x._getattribute_('name') ==> x.name
  ```
  Overrides: object._getattribute_

- **_getitem_(**(*)**):**
  ```python
  x[y]
  ```

- **_getslice_(**(*, ,)**):**
  ```python
  x[i:j]
  ```
  Use of negative indices is not supported.

- **_hash_(**(*)**):**
  ```python
  hash(x)
  ```

- **_init_(**(*)**):**
  ```python
  x._init_(...) initializes x; see x._class__._doc__ for signature
  ```
  Overrides: exceptions.BaseException._init_
Class Frame

Module SCons.Script.SConscript'

.. _new__(T, S, ...)

**Return Value**

A new object with type S, a subtype of T

Overrides: exceptions.BaseException._new_

.. _reduce__(...)

Helper for pickle

Overrides: object._reduce__ extit(inherited documentation)

.. _reduce_ex__(...)

Helper for pickle

.. _repr__(x)

repr(x)

Overrides: object._repr_

.. _setattr__(...)

x._setattr_('name', value) <--> x.name = value

Overrides: object._setattr_

.. _str__(x)

str(x)

Overrides: object._str_

### 32.3.2 Properties

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>class</strong></td>
<td>Value: &lt;attribute '<strong>class</strong>' of 'object' objects&gt;</td>
</tr>
<tr>
<td>args</td>
<td>Value: &lt;attribute 'args' of 'exceptions.BaseException' objects&gt;</td>
</tr>
<tr>
<td>message</td>
<td>Value: &lt;member 'message' of 'exceptions.BaseException' objects&gt;</td>
</tr>
</tbody>
</table>

### 32.4 Class Frame

A frame on the SConstruct/SConscript call stack
32.4.1 Methods

__init__(self, fs, exports, sconscript)

32.5 Class SConsEnvironment

SCons.Environment.SubstitutionEnvironment
SCons.Environment.Base
SCons.Script.SConscript’.SConsEnvironment

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.

32.5.1 Methods

Configure(self, *args, **kw)

Default(self, *targets)

EnsureSConsVersion(self, major, minor, revision=0)
Exit abnormally if the SCons version is not late enough.

EnsurePythonVersion(self, major, minor)
Exit abnormally if the Python version is not late enough.

Exit(self, value=0)

Export(self, *vars)

GetLaunchDir(self)

GetOption(self, name)

Help(self, text)

Import(self, *vars)

SConscript(self, *ls, **kw)
### SConsEnvironment

A class that provides environment-related actions.

#### Methods:

- **SConscriptChdir**
  
  ```python
  SConscriptChdir(self, flag)
  ```

- **SetOption**
  
  ```python
  SetOption(self, name, value)
  ```

- **Action**
  
  ```python
  Action(self, *args, **kw)
  ```

- **AddMethod**
  
  ```python
  AddMethod(self, function, name=False)
  ```

  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**
  
  ```python
  AddPostAction(self, files, action)
  ```

- **AddPreAction**
  
  ```python
  AddPreAction(self, files, action)
  ```

- **Alias**
  
  ```python
  Alias(self, target, source=[], action=False, **kw)
  ```

- **AlwaysBuild**
  
  ```python
  AlwaysBuild(self, *targets)
  ```

- **Append**
  
  ```python
  Append(self, **kw)
  ```

  Append values to existing construction variables in an Environment.

- **AppendENVPath**
  
  ```python
  AppendENVPath(self, name, newpath, envname='ENV', sep=':', delete_existing=False)
  ```

  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**
  
  ```python
  AppendUnique(self, 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.

- **BuildDir**
  
  ```python
  BuildDir(self, *args, **kw)
  ```

- **Builder**
  
  ```python
  Builder(self, **kw)
  ```

- **CacheDir**
  
  ```python
  CacheDir(self, path)
  ```
### Clean

**Clean**(*self*, *targets*, *files*)

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.

### Clone

**Clone**(*self*, *tools*=[], *toolpath*=False, *parse_flags*=False, **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

**Command**(*self*, *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.

### Copy

**Copy**(*self*, *args*, **kw**)

### Decider

**Decider**(*self*, *function*)

### Depends

**Depends**(*self*, *target*, *dependency*)

Explicitly specify that 'target's depend on 'dependency'.

### Detect

**Detect**(*self*, *progs*)

Return the first available program in progs.

### Dictionary

**Dictionary**(*self*, *args*)

### Dir

**Dir**(*self*, *name*, *args*, **kw**)

### Dump

**Dump**(*self*, *key*=False)

Using the standard Python pretty printer, dump the contents of the scons build environment to stdout.

If the key passed in is anything other than None, then that will be used as an index into the build environment dictionary and whatever is found there will be fed into the pretty printer. Note that this key is case sensitive.
<table>
<thead>
<tr>
<th>Method</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Entry(self, name, *args, **kw)</td>
<td></td>
</tr>
<tr>
<td>Environment(self, **kw)</td>
<td></td>
</tr>
<tr>
<td>Execute(self, action, *args, **kw)</td>
<td>Directly execute an action through an Environment</td>
</tr>
<tr>
<td>File(self, name, *args, **kw)</td>
<td></td>
</tr>
<tr>
<td>FindFile(self, file, dirs)</td>
<td></td>
</tr>
<tr>
<td>FindInstalledFiles(self)</td>
<td>returns the list of all targets of the Install and InstallAs Builder.</td>
</tr>
<tr>
<td>FindIxes(self, paths, prefix, suffix)</td>
<td>Search a list of paths for something that matches the prefix and suffix. paths - the list of paths or nodes. prefix - construction variable for the prefix. suffix - construction variable for the suffix.</td>
</tr>
<tr>
<td>FindSourceFiles(self, node='.')</td>
<td>returns a list of all source files.</td>
</tr>
<tr>
<td>Flatten(self, sequence)</td>
<td></td>
</tr>
<tr>
<td>GetBuildPath(self, files)</td>
<td></td>
</tr>
<tr>
<td>Glob(self, pattern, ondisk=True, source=False, strings=False)</td>
<td></td>
</tr>
<tr>
<td>Ignore(self, target, dependency)</td>
<td>Ignore a dependency.</td>
</tr>
<tr>
<td>Literal(self, string)</td>
<td></td>
</tr>
<tr>
<td>Local(self, *targets)</td>
<td></td>
</tr>
</tbody>
</table>
### MergeFlags

```
MergeFlags(self, args, unique=False, dict=False)
```

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

```
NoCache(self, *targets)
```

Tags a target so that it will not be cached

### NoClean

```
NoClean(self, *targets)
```

Tags a target so that it will not be cleaned by -c

### Override

```
Override(self, overrides)
```

Produce a modified environment whose variables are overriden 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

```
ParseConfig(self, command, function=False, unique=False)
```

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

```
ParseDepends(self, filename, must_exist=False, 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

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

### Precious

### Prepend

Prepend values to existing construction variables in an Environment.

### PrependENVPath

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

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.

### RemoveMethod

Removes the specified function’s MethodWrapper from the added_methods list, so we don’t re-bind it when making a clone.

### Replace

Replace existing construction variables in an Environment with new construction variables and/or values.
ReplaceIxes(self, 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(self, *dirs, **kw)

Requires(self, 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(self, name=’.sconsign’, dbm_module=False)

Scanner(self, *args, **kw)

SetDefault(self, **kw)

SideEffect(self, side_effect, target)

Tell scons that side_effects are built as side
effects of building targets.

SourceCode(self, entry, builder)

Arrange for a source code builder for (part of) a tree.

SourceSignatures(self, type)

Split(self, 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.
Class SConsEnvironment

Module SCons.Script.SCons

TargetSignatures(self, type)

Tool(self, tool, toolpath=False, **kw)

Value(self, value, built_value=False)

VariantDir(self, variant_dir, src_dir, duplicate=False)

WhereIs(self, prog, path=False, pathext=False, reject=[])

Find prog in the path.

__cmp__(self, other)

__contains__(self, key)

__delitem__(self, key)

__getitem__(self, key)

__init__(self, platform=False, tools=False, toolpath=False, variables=False, parse_flags=False, **kw)

Initialization of a basic SCons construction environment, including setting up special construction variables like BUILDER, PLATFORM, etc., and searching for and applying available Tools.

Note that we do *not* call the underlying base class (SubstitutionEnvironment) initialization, because we need to initialize things in a very specific order that doesn’t work with the much simpler base class initialization.

Overrides: SCons.Environment.SubstitutionEnvironment.__init__

__setitem__(self, key, value)

arg2nodes(self, args, node_factory=<class SCons.Environment.Null at 0x87eaf8c>, lookup_list=<class SCons.Environment.Null at 0x87eaf8c>, **kw)

backtick(self, command)

get(self, key, default=False)

Emulates the get() method of dictionaries.

get_CacheDir(self)
Class `SConsEnvironment`  

### Methods

#### `get_builder(self, name)`
Fetch the builder with the specified name from the environment.

#### `get_factory(self, factory, default='File')`  
Return a factory function for creating Nodes for this construction environment.

#### `get_scanner(self, key)`
Find the appropriate scanner given a key (usually a file suffix).

#### `get_src_sig_type(self)`

#### `get_tgt_sig_type(self)`

#### `gvars(self)`

#### `has_key(self, key)`

#### `items(self)`

#### `lvars(self)`

#### `scanner_map_delete(self, kw=False)`
Delete the cached scanner map (if we need to).

#### `subst(self, string, raw=0, target=False, source=False, conv=False)`
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(self, kw, raw=0, target=False, source=False)`

#### `subst_list(self, string, raw=0, target=False, source=False, conv=False)`
Calls through to `SCons.Subst.scons_subst_list()`. See the documentation for that function.
substitute a path list, turning EntryProxies into Nodes and leaving Nodes (and other objects) as-is.

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.

32.5.2 Class Variables

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>metaclass</strong></td>
<td>Value: SCons.Memoize.Memoized_Metaclass</td>
</tr>
<tr>
<td>memoizer_counters</td>
<td>Value: []</td>
</tr>
</tbody>
</table>

32.6 Class DefaultEnvironmentCall

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).

32.6.1 Methods

__init__(self, method_name, subst=0)

__call__(self, *args, **kw)
33 Module SCons.Sig

Place-holder for the old SCons.Sig module hierarchy

This is no longer used, but code out there (such as the NSIS module on the SCons wiki) may try to import SCons.Sig. If so, we generate a warning that points them to the line that caused the import, and don’t die.

If someone actually tried to use the sub-modules or functions within the package (for example, SCons.Sig.MD5.signature()), then they’ll still get an AttributeError, but at least they’ll know where to start looking.

33.1 Variables

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>revision</td>
<td>Value: 'src/engine/SCons/Sig.py 3842 2008/12/20 22:59:52 scons'</td>
</tr>
<tr>
<td>.doc</td>
<td>Value: &quot;Place-holder for the old SCons.Sig module hierar...</td>
</tr>
<tr>
<td>msg</td>
<td>Value: 'The SCons.Sig module no longer exists.\nRemove the f...'</td>
</tr>
<tr>
<td>default_calc</td>
<td>Value: False</td>
</tr>
<tr>
<td>default_module</td>
<td>Value: False</td>
</tr>
<tr>
<td>MD5</td>
<td>Value: MD5Null()</td>
</tr>
<tr>
<td>TimeStamp</td>
<td>Value: TimeStampNull()</td>
</tr>
</tbody>
</table>

33.2 Class MD5Null

SCons.Util_Null

 SCons.Sig.MD5Null

33.2.1 Methods

```python
__repr__(self)
Overrides: SCons.Util_Null.__repr__
```

```python
__call__(self, *args, **kwargs)
```

```python
__delattr__(self, name)
```

```python
__getattr__(self, mname)
```

```python
__init__(self, *args, **kwargs)
```

```python
__new__(cls, *args, **kwargs)
```

33.3 Class TimeStampNull

SCons.Util_Null

SCons.Sig.TimeStampNull

33.3.1 Methods

```python
__nonzero__(self)
`setattr`_

_options

`new`

_options

__init__(self, *args, **kwargs)

_options

__new__(cls, *args, **kwargs)

_options

__nonzero__(self)

_options

__call__(self, *args, **kwargs)

_options

__delattr__(self, name)

_options

__getattr__(self, mname)

_options

__repr__(self)

_options

Overrides: SCons.Util_Null._repr_
```
Module SCons.Subst

SCons.Subst

SCons string substitution.

34.1 Functions

SetAllowableExceptions(*excepts)

raise_exception(exception, target, s)

quote_spaces(arg)

Generic function for putting double quotes around any string that has white space in it.

escape_list(list, escape_func)

Escape a list of arguments by running the specified escape_func on every object in the list that has an escape() method.

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_subst(strSubst, env, mode=False, target=False, source=False, gvars={}, lvars={}, conv=False)

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.
**Class Literal Module SCons.Subst**

`scons_subst_list(strSubst, env, mode=False, target=False, source=False, gvars={}, lvars={}, conv=False)`

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_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:

```python
env2 = env.Clone(CCFLAGS = '$CCFLAGS -g')
```

We do this with some straightforward, brute-force code here...

### 34.2 Variables

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>AllowableExceptions</td>
<td>Value: (&lt;type 'exceptions.IndexError'&gt;, &lt;type 'exceptions.NameError'&gt;)</td>
</tr>
<tr>
<td>SUBST_CMD</td>
<td>Value: 0</td>
</tr>
<tr>
<td>SUBST_RAW</td>
<td>Value: False</td>
</tr>
<tr>
<td>SUBST_RAW</td>
<td>Value: 2</td>
</tr>
</tbody>
</table>

### 34.3 Class Literal

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.

#### 34.3.1 Methods

- `_init__(self, lstr)`
- `_str__(self)`
- `escape(self, escape_func)`
for_signature(self)

is_literal(self)

34.4 Class SpecialAttrWrapper

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.

34.4.1 Methods

_init_ (self, lstr, for_signature=False)
The for_signature parameter, if supplied, will be the canonical string we return from for_signature(). Else we will simply return lstr.

_str_ (self)

escape(self, escape_func)

for_signature(self)

is_literal(self)

34.5 Class CmdStringHolder

UserString.UserString  \[\rightarrow\]
SCons.Subst.CmdStringHolder

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.

34.5.1 Methods

_init_ (self, cmd, literal=False)
Overrides: UserString.UserString._init_
### is_literal(self)

### escape(self, escape_func, quote_func=<function quote_spaces at 0x83f5d14>)

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.

<table>
<thead>
<tr>
<th>Method</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>add</strong>(self, other)</td>
</tr>
<tr>
<td><strong>cmp</strong>(self, string)</td>
</tr>
<tr>
<td><strong>complex</strong>(self)</td>
</tr>
<tr>
<td><strong>contains</strong>(self, char)</td>
</tr>
<tr>
<td><strong>float</strong>(self)</td>
</tr>
<tr>
<td><strong>getitem</strong>(self, index)</td>
</tr>
<tr>
<td><strong>getslice</strong>(self, start, end)</td>
</tr>
<tr>
<td><strong>hash</strong>(self)</td>
</tr>
<tr>
<td><strong>int</strong>(self)</td>
</tr>
<tr>
<td><strong>len</strong>(self)</td>
</tr>
<tr>
<td><strong>long</strong>(self)</td>
</tr>
<tr>
<td><strong>mod</strong>(self, args)</td>
</tr>
<tr>
<td><strong>mul</strong>(self, n)</td>
</tr>
<tr>
<td><strong>radd</strong>(self, other)</td>
</tr>
<tr>
<td><strong>repr</strong>(self)</td>
</tr>
<tr>
<td><strong>rmul</strong>(self, n)</td>
</tr>
<tr>
<td><strong>str</strong>(self)</td>
</tr>
<tr>
<td>capitalize(self)</td>
</tr>
</tbody>
</table>
center(self, width, *args)

count(self, sub, start=0, end=2147483647)

decode(self, encoding=False, errors=False)

encode(self, encoding=False, errors=False)

endswith(self, suffix, start=0, end=2147483647)

expandtabs(self, tabsize=8)

find(self, sub, start=0, end=2147483647)

index(self, sub, start=0, end=2147483647)

isalnum(self)

isalpha(self)

isdecimal(self)

isdigit(self)

islower(self)

isnumeric(self)

isspace(self)

istitle(self)

isspace(self)

isupper(self)

join(self, seq)

ljust(self, width, *args)

lower(self)

lstrip(self, chars=False)

partition(self, sep)

replace(self, old, new, maxsplit=-1)
34.6 Class NLWrapper

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...

34.6.1 Methods

`__init__`(self, list, func)
34.7 Class Targets_or_Sources

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 UserList.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 UserList.UserList methods in practice.

34.7.1 Methods

```python
_init__(self, nl)
Overrides: UserList.UserList._init_

__getattr__(self, attr)

__getitem__(self, i)
Overrides: UserList.UserList.__getitem__

__getslice__(self, i, j)
Overrides: UserList.UserList.__getslice__

__str__(self)

__repr__(self)
Overrides: UserList.UserList.__repr__

__add__(self, other)

__cmp__(self, other)

__contains__(self, item)

__delitem__(self, i)

__delslice__(self, i, j)

__eq__(self, other)

__ge__(self, other)

__gt__(self, other)
```
34.8 Class Target_or_Source

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.
34.8.1 Methods

```python
__init__(self, nl)

__getattr__(self, attr)

__str__(self)

__repr__(self)
```
35 Module SCons.Taskmaster

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.

35.1 Functions

dump_stats()

find_cycle(stack, visited)

35.2 Variables

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>doc</strong></td>
<td>Value: ...</td>
</tr>
<tr>
<td><strong>revision</strong></td>
<td>Value: ’src/engine/SCons/Taskmaster.py 3842 2008/12/20 22:59:52 ...</td>
</tr>
<tr>
<td>StateString</td>
<td>Value: {0: ’no_state’, 1: ’pending’, 2: ’executing’, 3: ’up_to_d...</td>
</tr>
<tr>
<td>NODE_NO_STATE</td>
<td>Value: 0</td>
</tr>
<tr>
<td>NODE_PENDING</td>
<td>Value: False</td>
</tr>
<tr>
<td>NODE_EXECUTING</td>
<td>Value: 2</td>
</tr>
<tr>
<td>NODE_UP_TO_DATE</td>
<td>Value: 3</td>
</tr>
<tr>
<td>NODE_EXECUTED</td>
<td>Value: 4</td>
</tr>
<tr>
<td>NODE_FAILED</td>
<td>Value: 5</td>
</tr>
</tbody>
</table>

continued on next page
<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CollectStats</td>
<td>Value: False</td>
</tr>
<tr>
<td>StatsNodes</td>
<td>Value: []</td>
</tr>
<tr>
<td>init</td>
<td>Value: '%(considered)3d %(already_handled)3d</td>
</tr>
<tr>
<td></td>
<td>%(problem)3d %(child)...</td>
</tr>
</tbody>
</table>

### 35.3 Class Stats

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.)

#### 35.3.1 Methods

```
__init__(self)
```

Instantiates a Taskmaster.Stats object, initializing all appropriate counters to zero.

### 35.4 Class Task


Default SCons build engine task.

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.

#### 35.4.1 Methods

```
__init__(self, tm, targets, top, node)
```
<table>
<thead>
<tr>
<th>Method</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>trace_message</code></td>
<td><code>(self, method, node, description='node')</code></td>
</tr>
<tr>
<td><code>display</code></td>
<td>Hook to allow the calling interface to display a message.</td>
</tr>
<tr>
<td></td>
<td>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 actually 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.</td>
</tr>
<tr>
<td><code>prepare</code></td>
<td>Called just before the task is executed.</td>
</tr>
<tr>
<td></td>
<td>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.</td>
</tr>
<tr>
<td><code>get_target</code></td>
<td>Fetch the target being built or updated by this task.</td>
</tr>
<tr>
<td><code>needs_execute</code></td>
<td>Called to determine whether the task’s execute() method should be run.</td>
</tr>
<tr>
<td></td>
<td>This method allows one to skip the somewhat costly execution of the execute() method in a separate thread. For example, that would be unnecessary for up-to-date targets.</td>
</tr>
<tr>
<td><code>execute</code></td>
<td>Called to execute the task.</td>
</tr>
<tr>
<td></td>
<td>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().</td>
</tr>
</tbody>
</table>
### executed_without_callbacks(self)

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(self)

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(self)

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.

### failed(self)

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().

---

354
fail_stop(self)

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().

fail_continue(self)

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().

make_ready_all(self)

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(self)

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(self)

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.
postprocess(self)

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.

exc_info(self)

Returns info about a recorded exception.

exc_clear(self)

Clears any recorded exception.

This also changes the "exception_raise" attribute to point to the appropriate do-nothing method.

exception_set(self, exception=False)

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

35.5 Class Taskmaster

The Taskmaster for walking the dependency DAG.

35.5.1 Methods

_init_(self, targets=[], tasker=<class SCons.Taskmaster.Task at 0x8b6d6c>, order=False, trace=False)
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."

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.

trace_message

trace_node

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.

will_not_build

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).
Class Taskmaster

Module SCons.Taskmaster

stop(self)

Stops the current build completely.

cleanup(self)

Check for dependency cycles.
### 36 Module SCons.Util

SCons.Util

Various utility functions go here.

#### 36.1 Functions

<table>
<thead>
<tr>
<th>Function</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>dictify(keys, values, result={})</code></td>
<td></td>
</tr>
<tr>
<td><code>containsAny(str, set)</code></td>
<td>Check whether sequence str contains ANY of the items in set.</td>
</tr>
<tr>
<td><code>containsAll(str, set)</code></td>
<td>Check whether sequence str contains ALL of the items in set.</td>
</tr>
<tr>
<td><code>containsOnly(str, set)</code></td>
<td>Check whether sequence str contains ONLY items in set.</td>
</tr>
<tr>
<td><code>splitext(path)</code></td>
<td>Same as os.path.splitext() but faster.</td>
</tr>
<tr>
<td><code>updrive(path)</code></td>
<td>Make the drive letter (if any) upper case.</td>
</tr>
<tr>
<td></td>
<td>This is useful because Windows is inconsistent on the case of the drive letter, which can cause inconsistencies when calculating command signatures.</td>
</tr>
<tr>
<td><code>get_environment_var(varstr)</code></td>
<td>Given a string, first determine if it looks like a reference to a single environment variable, like &quot;$FOO&quot; or &quot;${FOO}&quot;. If so, return that variable with no decorations (&quot;FOO&quot;). If not, return None.</td>
</tr>
</tbody>
</table>
### render_tree(root, child_func, prune=0, margin=[0], visited={})

Render a tree of nodes into an ASCII tree view.
- **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.

### print_tree(root, child_func, prune=0, showtags=0, margin=[0], visited={})

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.
- **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.

### is_Dict(obj, isinstance=<built-in function isinstance>, DictTypes=dict, UserDict)

### is_List(obj, isinstance=<built-in function isinstance>, ListTypes=list, UserList)

### is_Sequence(obj, isinstance=<built-in function isinstance>, SequenceTypes=(<type 'list'>, <type 'tuple'>, <class UserList.UserList ...))

### is_Tuple(obj, isinstance=<built-in function isinstance>, tuple=<type 'tuple'>)

### is_String(obj, isinstance=<built-in function isinstance>, StringTypes=(<type 'str'>, <type 'unicode'>, <class UserString.UserSt...))

### is_Scalar(obj, isinstance=<built-in function isinstance>, StringTypes=(<type 'str'>, <type 'unicode'>, <class UserString.UserSt..., SequenceTypes=(<type 'list'>, <type 'tuple'>, <class UserList.UserList ...))

### do_flatten(sequence, result, isinstance=<built-in function isinstance>, StringTypes=(<type 'str'>, <type 'unicode'>, <class UserString.UserSt..., SequenceTypes=(<type 'list'>, <type 'tuple'>, <class UserList.UserList ...))
Functions Module SCons.Util

flatten(obj, isinstance=<built-in function isinstance>, StringTypes=('<type 'str'>', '<type 'unicode'>', <class UserString.UserString>, SequenceTypes=('<type 'list'>', '<type 'tuple'>', <class UserList.UserList>), do_flatten=<function do_flatten at 0x83eb2cc>)
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.

flatten_sequence(sequence, isinstance=<built-in function isinstance>, StringTypes=('<type 'str'>', '<type 'unicode'>', <class UserString.UserString>, SequenceTypes=('<type 'list'>', '<type 'tuple'>', <class UserList.UserList>), do_flatten=<function do_flatten at 0x83eb2cc>)
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.

to_String(s, isinstance=<built-in function isinstance>, str=<type 'str'>, UserString=<class UserString.UserString at 0xb7b40b6c>, BaseStringTypes=('<type 'str'>', '<type 'unicode'>'))

to_String_for_subst(s, isinstance=<built-in function isinstance>, join=<function join at 0xb7ccce2c>, str=<type 'str'>, to_String=<function to_String at 0x83eb374>, BaseStringTypes=('<type 'str'>', '<type 'unicode'>), SequenceTypes=('<type 'list'>', '<type 'tuple'>', <class UserList.UserList>), UserString=<class UserString.UserString at 0xb7b40b6c>)

to_String_for_signature(obj, to_String_for_subst=<function to_String_for_subst at 0x83eb3ac>, AttributeError=<type 'exceptions.AttributeError'>)

semi_deepcopy(x)
RegGetValue(root, key)

This utility function returns a value in the registry without having to open the key first. Only available on Windows platforms with a version of Python that can read the registry. Returns the same thing as SCons.Util.RegQueryValueEx, except you just specify the entire path to the value, and don’t have to bother opening the key first. So:

Instead of:

```python
k = SCons.Util.RegOpenKeyEx(SCons.Util.HKEY_LOCAL_MACHINE,
                          r'SOFTWARE\Microsoft\Windows\CurrentVersion')
out = SCons.Util.RegQueryValueEx(k,
                        'ProgramFilesDir')
```

You can write:

```python
out = SCons.Util.RegGetValue(SCons.Util.HKEY_LOCAL_MACHINE,
                          r'SOFTWARE\Microsoft\Windows\CurrentVersion\ProgramFilesDir')
```

WhereIs(file, path=False, pathext=False, reject=[])  
PrependPath(oldpath, newpath, sep=':', delete_existing=False)

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.
AppendPath\( (\text{oldpath}, \text{newpath}, \text{sep}=':', \text{delete}\_\text{existing}=\text{False}) \)

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 \text{os.path.normpath} and \text{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: "/foo/bar:/biz/boom:/foo"

If \text{delete}\_\text{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.

get\_native\_path(\text{path})

Transforms an absolute path into a native path for the system. Non-Cygwin version, just leave the path alone.

Split(\text{arg})

case\_sensitive\_suffixes(\text{s1}, \text{s2})

adjustixes(\text{fname}, \text{pre}, \text{suf}, \text{ensure}\_\text{suffix}=\text{False})

unique(s)

Return a list of the elements in \(s\), but without duplicates.

For example, \text{unique([1,2,3,1,2,3])} is some permutation of \([1,2,3]\), \text{unique("abcabc")} some permutation of \(\text{"a", \text{"b", \text{"c"}, and}\} \text{unique([[1, 2], [2, 3], [1, 2]]) some permutation of \([2, 3], [1, 2]\).}

For best speed, all sequence elements should be hashable. Then \text{unique()} will usually work in linear time.

If not possible, the sequence elements should enjoy a total ordering, and if \text{list(s).sort()} doesn’t raise \text{TypeError} it’s assumed that they do enjoy a total ordering. Then \text{unique()} will usually work in \(O(N\log2(N))\) time.

If that’s not possible either, the sequence elements must support equality-testing. Then \text{unique()} will usually work in quadratic time.

uniquer(\text{seq}, \text{idfun}=\text{False})
uniquer_hashables(seq)

make_path_relative(path)

makes an absolute path name to a relative pathname.

AddMethod(object, function, name=False)

Adds either a bound method to an instance or an unbound method to
a class. If name is omitted the name of the specified function
is used by default.
Example:
```python
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)
```

RenameFunction(function, name)

Returns a function identical to the specified function, but with
the specified name.

MD5signature(s)

MD5filesignature(fname, chunksize=65536)

MD5collect(signatures)

Collects a list of signatures into an aggregate signature.
signatures - a list of signatures
returns - the aggregate signature

36.2 Variables

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>UnicodeType</td>
<td>Value: types.UnicodeType</td>
</tr>
<tr>
<td>DictTypes</td>
<td>Value: dict, UserDict</td>
</tr>
<tr>
<td>ListTypes</td>
<td>Value: list, UserList</td>
</tr>
<tr>
<td>SequenceTypes</td>
<td>Value: (type 'list'), (type 'tuple'), &lt;class UserList.UserList ...</td>
</tr>
</tbody>
</table>

continued on next page
<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>StringTypes</td>
<td>Value: (&lt;type 'str'&gt;, &lt;type 'unicode'&gt;, &lt;class UserString.UserString...</td>
</tr>
<tr>
<td>BaseStringTypes</td>
<td>Value: (&lt;type 'str'&gt;, &lt;type 'unicode'&gt;)</td>
</tr>
<tr>
<td>d</td>
<td>Value: {&lt;type 'instance'&gt;: &lt;function semi_deepcopy_inst at 0x83...</td>
</tr>
<tr>
<td>can_read_reg</td>
<td>Value: 0</td>
</tr>
<tr>
<td>hkey_mod</td>
<td>Value: win32con</td>
</tr>
<tr>
<td>RegOpenKeyEx</td>
<td>Value: win32api.RegOpenKeyEx</td>
</tr>
<tr>
<td>RegEnumKey</td>
<td>Value: win32api.RegEnumKey</td>
</tr>
<tr>
<td>RegEnumValue</td>
<td>Value: win32api.RegEnumValue</td>
</tr>
<tr>
<td>RegQueryValueEx</td>
<td>Value: win32api.RegQueryValueEx</td>
</tr>
<tr>
<td>HKEY_CLASSES_ROOT</td>
<td>Value: hkey_mod.HKEY_CLASSES_ROOT</td>
</tr>
<tr>
<td>HKEY_LOCAL_MACHINE</td>
<td>Value: hkey_mod.HKEY_LOCAL_MACHINE</td>
</tr>
<tr>
<td>HKEY_CURRENT_USER</td>
<td>Value: hkey_mod.HKEY_CURRENT_USER</td>
</tr>
<tr>
<td>HKEY_USERS</td>
<td>Value: hkey_mod.HKEY_USERS</td>
</tr>
<tr>
<td>display</td>
<td>Value: SCons.Util.display</td>
</tr>
<tr>
<td>md5</td>
<td>Value: True</td>
</tr>
</tbody>
</table>

### 36.3 Class CallableComposite

UserList.UserList  
SCons.Util.CallableComposite

A simple composite callable class that, when called, will invoke all of its contained callables with the same arguments.

#### 36.3.1 Methods

```python
__call__(self, *args, **kwargs)
```

```python
__add__(self, other)
```

```python
__cmp__(self, other)
```

```python
__contains__(self, item)
```

```python
__delitem__(self, i)
```

```python
__delslice__(self, i, j)
```

```python
__eq__(self, other)
```

```python
__ge__(self, other)
```

```python
__getitem__(self, i)
```
Class CallableComposite

Module SCons.Util

```python
__getslice__(self, i, j)
__gt__(self, other)
__iadd__(self, other)
__imul__(self, n)
__init__(self, initlist=False)
__le__(self, other)
__len__(self)
__lt__(self, other)
__mul__(self, n)
__ne__(self, other)
__radd__(self, other)
__repr__(self)
__rmul__(self, n)
__setitem__(self, i, item)
__setslice__(self, i, j, other)
append(self, item)
count(self, item)
extend(self, other)
index(self, item, *args)
insert(self, i, item)
pop(self, i=-1)
remove(self, item)
reverse(self)
```
36.4 Class NodeList

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:

```python
>>> someList = NodeList([ 'foo', 'bar '])
>>> someList.strip()
['foo', 'bar ']
```

36.4.1 Methods

- `nonzero(self)`
- `str(self)`
- `getattr(self, name)`
- `add(self, other)`
- `cmp(self, other)`
- `contains(self, item)`
- `delitem(self, i)`
- `delslice(self, i, j)`
- `eq(self, other)`
- `ge(self, other)`
- `getitem(self, i)`
- `getslice(self, i, j)`
- `gt(self, other)`
- `iadd(self, other)`
36.5 Class DisplayEngine

36.5.1 Methods

```python
__init__(self)
print_it(self, text, append_newline=False)
dont_print(self, text, append_newline=False)
set_mode(self, mode)
```

36.6 Class mystr

object

```
basestring
```

```
str
SCons.Util.mystr
```

36.6.1 Methods

```python
__add__(x, y)
x+y

__contains__(x, y)
y in x

__delattr__(...)
x.__delattr__('name') == del x.name

__eq__(x, y)
x==y

__ge__(x, y)
x>=y

__getattribute__(...)
x.__getattribute__('name') == x.name
```

Overrides: object.__getattribute__
Class mystr

Module SCons.Util

```python
__getitem__(x, y)
x[y]
```

```python
__getnewargs__(...)
```

```python
__getslice__(x, i, j)
x[i:j]
Use of negative indices is not supported.
```

```python
__gt__(x, y)
x>y
```

```python
__hash__(x)
hash(x)
Overrides: object.__hash__
```

```python
__init__(...)
x.__init__(...) initializes x; see x.__class__.__doc__ for signature
```

```python
__le__(x, y)
x<=y
```

```python
__len__(x)
len(x)
```

```python
__lt__(x, y)
x<y
```

```python
__mod__(x, y)
x%y
```

```python
__mul__(x, n)
x*n
```

```python
__ne__(x, y)
x!=y
```
<table>
<thead>
<tr>
<th>Method</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>new</strong>(T, S, ...)</td>
<td>Return Value</td>
</tr>
<tr>
<td></td>
<td>a new object with type S, a subtype of T</td>
</tr>
<tr>
<td></td>
<td>Overrides: basestring.<strong>new</strong></td>
</tr>
<tr>
<td><strong>reduce</strong>(...)</td>
<td>helper for pickle</td>
</tr>
<tr>
<td><strong>reduce_ex</strong>(...)</td>
<td>helper for pickle</td>
</tr>
<tr>
<td><strong>repr</strong>(x)</td>
<td>repr(x)</td>
</tr>
<tr>
<td></td>
<td>Overrides: object.<strong>repr</strong></td>
</tr>
<tr>
<td><strong>rmod</strong>(x, y)</td>
<td>y%x</td>
</tr>
<tr>
<td><strong>rmul</strong>(x, n)</td>
<td>n*x</td>
</tr>
<tr>
<td><strong>setattr</strong>(...)</td>
<td>x.<strong>setattr</strong>(‘name’, value) &gt;= x.name = value</td>
</tr>
<tr>
<td><strong>str</strong>(x)</td>
<td>str(x)</td>
</tr>
<tr>
<td></td>
<td>Overrides: object.<strong>str</strong></td>
</tr>
<tr>
<td>capitalize(S)</td>
<td>Return a copy of the string S with only its first character capitalized.</td>
</tr>
<tr>
<td></td>
<td>Return Value</td>
</tr>
<tr>
<td></td>
<td>string</td>
</tr>
<tr>
<td>center(S, width, fillchar=...)</td>
<td>Return S centered in a string of length width. Padding is done using the specified fill character (default is a space)</td>
</tr>
<tr>
<td></td>
<td>Return Value</td>
</tr>
<tr>
<td></td>
<td>string</td>
</tr>
<tr>
<td>Function</td>
<td>Description</td>
</tr>
<tr>
<td>-------------------</td>
<td>--------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td><strong>count</strong></td>
<td>Return the number of non-overlapping occurrences of substring sub in string S[start:end]. Optional arguments start and end are interpreted as in slice notation.</td>
</tr>
<tr>
<td><strong>decode</strong></td>
<td>Decodes S using the codec registered for encoding. encoding defaults to the default encoding. errors may be given to set a different error handling scheme. Default is 'strict' meaning that encoding errors raise a UnicodeDecodeError. Other possible values are 'ignore' and 'replace' as well as any other name registered with codecs.register_error that is able to handle UnicodeDecodeErrors.</td>
</tr>
<tr>
<td><strong>encode</strong></td>
<td>Encodes S using the codec registered for encoding. encoding defaults to the default encoding. errors may be given to set a different error handling scheme. Default is 'strict' meaning that encoding errors raise a UnicodeEncodeError. Other possible values are 'ignore', 'replace' and 'xmlcharrefreplace' as well as any other name registered with codecs.register_error that is able to handle UnicodeEncodeErrors.</td>
</tr>
<tr>
<td><strong>endswith</strong></td>
<td>Return True if S ends with the specified suffix, False otherwise. With optional start, test S beginning at that position. With optional end, stop comparing S at that position. suffix can also be a tuple of strings to try.</td>
</tr>
<tr>
<td><strong>expandtabs</strong></td>
<td>Return a copy of S where all tab characters are expanded using spaces. If tabsize is not given, a tab size of 8 characters is assumed.</td>
</tr>
</tbody>
</table>
find($S$, $sub$, $start$=..., $end$=...)

Return the lowest index in $S$ where substring $sub$ is found, such that $sub$ is contained within $s[start:end]$. Optional arguments $start$ and $end$ are interpreted as in slice notation.

Return -1 on failure.

Return Value

int

index($S$, $sub$, $start$=..., $end$=...)

Like $S$.find() but raise ValueError when the substring is not found.

Return Value

int

isalnum($S$)

Return True if all characters in $S$ are alphanumeric and there is at least one character in $S$, False otherwise.

Return Value

bool

isalpha($S$)

Return True if all characters in $S$ are alphabetic and there is at least one character in $S$, False otherwise.

Return Value

bool

isdigit($S$)

Return True if all characters in $S$ are digits and there is at least one character in $S$, False otherwise.

Return Value

bool

islower($S$)

Return True if all cased characters in $S$ are lowercase and there is at least one cased character in $S$, False otherwise.

Return Value

bool

isspace($S$)

Return True if all characters in $S$ are whitespace and there is at least one character in $S$, False otherwise.

Return Value

bool
<table>
<thead>
<tr>
<th>Method</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>istitle(S)</td>
<td>Return True if S is a titlecased string and there is at least one character in S, i.e. uppercase characters may only follow uncased characters and lowercase characters only cased ones. Return False otherwise.</td>
</tr>
<tr>
<td>Return Value</td>
<td>bool</td>
</tr>
<tr>
<td>isupper(S)</td>
<td>Return True if all cased characters in S are uppercase and there is at least one cased character in S, False otherwise.</td>
</tr>
<tr>
<td>Return Value</td>
<td>bool</td>
</tr>
<tr>
<td>join(S, sequence)</td>
<td>Return a string which is the concatenation of the strings in the sequence. The separator between elements is S.</td>
</tr>
<tr>
<td>Return Value</td>
<td>string</td>
</tr>
<tr>
<td>ljust(S, width, fillchar=...)</td>
<td>Return S left justified in a string of length width. Padding is done using the specified fill character (default is a space).</td>
</tr>
<tr>
<td>Return Value</td>
<td>string</td>
</tr>
<tr>
<td>lower(S)</td>
<td>Return a copy of the string S converted to lowercase.</td>
</tr>
<tr>
<td>Return Value</td>
<td>string</td>
</tr>
<tr>
<td>lstrip(S, chars=...)</td>
<td>Return a copy of the string S with leading whitespace removed. If chars is given and not None, remove characters in chars instead. If chars is unicode, S will be converted to unicode before stripping</td>
</tr>
<tr>
<td>Return Value</td>
<td>string or unicode</td>
</tr>
</tbody>
</table>
partition($S$, $sep$)

Searches for the separator $sep$ in $S$, and returns the part before it, the separator itself, and the part after it. If the separator is not found, returns $S$ and two empty strings.

Return Value

(head, sep, tail)

replace(...)

$S$.replace(old, new[, count]) -> string

Return a copy of string $S$ with all occurrences of substring old replaced by new. If the optional argument count is given, only the first count occurrences are replaced.

rfind($S$, $sub$, start=..., end=...)

Return the highest index in $S$ where substring $sub$ is found, such that sub is contained within $s[start:end]$. Optional arguments start and end are interpreted as in slice notation.

Return -1 on failure.

Return Value

int

rindex($S$, $sub$, start=..., end=...)

Like $S$.rfind() but raise ValueError when the substring is not found.

Return Value

int

rjust($S$, width, fillchar=...)

Return $S$ right justified in a string of length width. Padding is done using the specified fill character (default is a space)

Return Value

string

rpartition($S$, $sep$)

Searches for the separator $sep$ in $S$, starting at the end of $S$, and returns the part before it, the separator itself, and the part after it. If the separator is not found, returns two empty strings and $S$.

Return Value

(tail, sep, head)
<table>
<thead>
<tr>
<th>Function</th>
<th>Description</th>
<th>Return Value</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>rsplit(S, sep=..., maxsplit=...)</code></td>
<td>Return a list of the words in the string S, using sep as the delimiter string, starting at the end of the string and working to the front. If maxsplit is given, at most maxsplit splits are done. If sep is not specified or is None, any whitespace string is a separator.</td>
<td>list of strings</td>
</tr>
<tr>
<td><code>rstrip(S, chars=...)</code></td>
<td>Return a copy of the string S with trailing whitespace removed. If chars is given and not None, remove characters in chars instead. If chars is unicode, S will be converted to unicode before stripping.</td>
<td>string or unicode</td>
</tr>
<tr>
<td><code>split(S, sep=..., maxsplit=...)</code></td>
<td>Return a list of the words in the string S, using sep as the delimiter string. If maxsplit is given, at most maxsplit splits are done. If sep is not specified or is None, any whitespace string is a separator.</td>
<td>list of strings</td>
</tr>
<tr>
<td><code>splitlines(S, keepends=...)</code></td>
<td>Return a list of the lines in S, breaking at line boundaries. Line breaks are not included in the resulting list unless keepends is given and true.</td>
<td>list of strings</td>
</tr>
<tr>
<td><code>startswith(S, prefix, start=..., end=...)</code></td>
<td>Return True if S starts with the specified prefix, False otherwise. With optional start, test S beginning at that position. With optional end, stop comparing S at that position. prefix can also be a tuple of strings to try.</td>
<td>bool</td>
</tr>
</tbody>
</table>
strip($S$, $chars=\ldots$)  
Return a copy of the string $S$ with leading and trailing  
whitespace removed.  
If $chars$ is given and not None, remove characters in $chars$ instead.  
If $chars$ is unicode, $S$ will be converted to unicode before stripping  
Return Value  
  string or unicode

swapcase($S$)  
Return a copy of the string $S$ with uppercase characters  
converted to lowercase and vice versa.  
Return Value  
  string

title($S$)  
Return a titlecased version of $S$, i.e. words start with uppercase  
characters, all remaining cased characters have lowercase.  
Return Value  
  string

translate($S$, $table$, $deletechars=\ldots$)  
Return a copy of the string $S$, where all characters occurring  
in the optional argument $deletechars$ are removed, and the  
remaining characters have been mapped through the given  
translation table, which must be a string of length 256.  
Return Value  
  string

upper($S$)  
Return a copy of the string $S$ converted to uppercase.  
Return Value  
  string

zfill($S$, $width$)  
Pad a numeric string $S$ with zeros on the left, to fill a field  
of the specified width. The string $S$ is never truncated.  
Return Value  
  string

36.6.2 Properties
<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>class</strong></td>
<td>Value: <code>&lt;attribute '__class__' of 'object' objects&gt;</code></td>
</tr>
</tbody>
</table>

### 36.7 Class Proxy

**Known Subclasses:** SCons.Builder.CompositeBuilder, SCons.Node.FS.EntryProxy

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

```python
proxyObj = Proxy(objA),
```

Then, if in the future, you do something like this

```python
x = proxyObj.var1,
```

since Proxy does not have a 'var1' attribute (but presumably objA does), the request actually is equivalent to saying

```python
x = objA.var1
```

Inherit from this class to create a Proxy.

#### 36.7.1 Methods

- **__init__(self, subject)**
  - Wrap an object as a Proxy object

- **__getattr__(self, name)**
  - Retrieve an attribute from the wrapped object. If the named attribute doesn’t exist, AttributeError is raised

- **get(self)**
  - Retrieve the entire wrapped object

- **__cmp__(self, other)**
36.8 Class _NoError

object

exceptions.BaseException

exceptions.Exception

SCons.Util._NoError

36.8.1 Methods

_x_delattr__(*args*)

\[ x._delattr_('name') \] \[\text{\texttt{\textasciitilde}}} \text{\texttt{del x.name}} \]

Overrides: object._delattr_

_x_getattribute__(*args*)

\[ x._getattribute_('name') \] \[\text{\texttt{\textasciitilde}}} \text{\texttt{x.name}} \]

Overrides: object._getattribute_

_getitem_(\*args)

\[ x[y] \]

_getslice_(\*args)

\[ x[i:j] \]

Use of negative indices is not supported.

_x_hash_(\*args)

\[ \text{\texttt{hash(x)}} \]

_x_init__(*args*)

\[ x._init__(*args*) \text{\texttt{initializes x; see }} x._\text{\texttt{class\ldots}}._\text{\texttt{doc\ldots}} \text{\texttt{for signature}} \]

Overrides: exceptions.BaseException._init_

_x_new_(\*args)

Return Value

\[ \text{\texttt{a new object with type S, a subtype of T}} \]

Overrides: exceptions.BaseException._new_
36.8.2 Properties

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>class</strong></td>
<td>Value: &lt;attribute '<strong>class</strong>' of 'object' objects&gt;</td>
</tr>
<tr>
<td>args</td>
<td>Value: &lt;attribute 'args' of 'exceptions.BaseException' objects&gt;</td>
</tr>
<tr>
<td>message</td>
<td>Value: &lt;member 'message' of 'exceptions.BaseException' objects&gt;</td>
</tr>
</tbody>
</table>

36.9 Class CLVar

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.
36.9.1 Methods

```python
_init__(self, seq=[])  # Overrides: UserList.UserList._init_
_add__(self, other)    # Overrides: UserList.UserList._add_
_radd__(self, other)   # Overrides: UserList.UserList._radd_
_coerce__(self, other)
_str__(self)
_cmp__(self, other)
_contains__(self, item)
_delitem__(self, i)
_delslice__(self, i, j)
_eq__(self, other)
_ge__(self, other)
_getitem__(self, i)
_getslice__(self, i, j)
_gt__(self, other)
_iadd__(self, other)
_imul__(self, n)
_le__(self, other)
_len__(self)
_lt__(self, other)
_mul__(self, n)
_ne__(self, other)
```
36.10 Class OrderedDict

UserDict.UserDict  
    SCons.Util.OrderedDict

Known Subclasses: SCons.Util.Selector

36.10.1 Methods

___init__ (self, dict=False)
Overrides: UserDict.UserDict.__init__

__delitem__ (self, key)
Overrides: UserDict.UserDict.__delitem__

__setitem__ (self, key, item)
Overrides: UserDict.UserDict.__setitem__

clear (self)
Overrides: UserDict.UserDict.clear
copy(self)
Overrides: UserDict.UserDict.copy

items(self)
Overrides: UserDict.UserDict.items

keys(self)
Overrides: UserDict.UserDict.keys

popitem(self)
Overrides: UserDict.UserDict.popitem

setdefault(self, key, failobj=False)
Overrides: UserDict.UserDict.setdefault

update(self, dict)
Overrides: UserDict.UserDict.update

values(self)
Overrides: UserDict.UserDict.values

__cmp__(self, dict)

__contains__(self, key)

__getitem__(self, key)

__len__(self)

__repr__(self)

fromkeys(cls, iterable, value=False)

get(self, key, failobj=False)

has_key(self, key)

iteritems(self)

iterkeys(self)

itervalues(self)

pop(self, key, *args)
36.11 Class Selector

UserDict.UserDict

SCons.Util.OrderedDict

SCons.Util.Selector


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.

36.11.1 Methods

__call__(self, env, source)

__cmp__(self, dict)

__contains__(self, key)

__delitem__(self, key)

Overrides: UserDict.UserDict.__delitem__

__getitem__(self, key)

__init__(self, dict=False)

Overrides: UserDict.UserDict.__init__

__len__(self)

__repr__(self)

__setitem__(self, key, item)

Overrides: UserDict.UserDict.__setitem__

clear(self)

Overrides: UserDict.UserDict.clear

copy(self)

Overrides: UserDict.UserDict.copy

fromkeys(cls, iterable, value=False)

get(self, key, failobj=False)

has_key(self, key)
36.12 Class LogicalLines

36.12.1 Methods

_init__(self, fileobj)

readline(self)

readlines(self)

36.13 Class UniqueList

UserList.UserList

SCons.Util.UniqueList

36.13.1 Methods

_init__(self, seq=[])  
Overrides: UserList.UserList._init_
<table>
<thead>
<tr>
<th>Method</th>
<th>Description</th>
<th>Overrides</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>__lt__</code></td>
<td>Less than</td>
<td>UserList.UserList.<strong>lt</strong></td>
</tr>
<tr>
<td><code>__le__</code></td>
<td>Less than or equal to</td>
<td>UserList.UserList.<strong>le</strong></td>
</tr>
<tr>
<td><code>__eq__</code></td>
<td>Equal to</td>
<td>UserList.UserList.<strong>eq</strong></td>
</tr>
<tr>
<td><code>__ne__</code></td>
<td>Not equal to</td>
<td>UserList.UserList.<strong>ne</strong></td>
</tr>
<tr>
<td><code>__gt__</code></td>
<td>Greater than</td>
<td>UserList.UserList.<strong>gt</strong></td>
</tr>
<tr>
<td><code>__ge__</code></td>
<td>Greater than or equal to</td>
<td>UserList.UserList.<strong>ge</strong></td>
</tr>
<tr>
<td><code>__cmp__</code></td>
<td>Compare</td>
<td>UserList.UserList.<strong>cmp</strong></td>
</tr>
<tr>
<td><code>__len__</code></td>
<td>Length</td>
<td>UserList.UserList.<strong>len</strong></td>
</tr>
<tr>
<td><code>__getitem__</code></td>
<td>Get item at index i</td>
<td>UserList.UserList.<strong>getitem</strong></td>
</tr>
<tr>
<td><code>__setitem__</code></td>
<td>Set item at index i</td>
<td>UserList.UserList.<strong>setitem</strong></td>
</tr>
<tr>
<td><code>__getslice__</code></td>
<td>Get slice from i to j</td>
<td>UserList.UserList.<strong>getslice</strong></td>
</tr>
<tr>
<td><code>__setslice__</code></td>
<td>Set slice from i to j</td>
<td>UserList.UserList.<strong>setslice</strong></td>
</tr>
<tr>
<td><code>__add__</code></td>
<td>Add</td>
<td>UserList.UserList.<strong>add</strong></td>
</tr>
<tr>
<td><code>__radd__</code></td>
<td>Right add</td>
<td>UserList.UserList.<strong>radd</strong></td>
</tr>
<tr>
<td><code>__iadd__</code></td>
<td>In-place add</td>
<td>UserList.UserList.<strong>iadd</strong></td>
</tr>
<tr>
<td><code>__mul__</code></td>
<td>Multiply</td>
<td>UserList.UserList.<strong>mul</strong></td>
</tr>
<tr>
<td><code>__rmul__</code></td>
<td>Right multiply</td>
<td>UserList.UserList.<strong>rmul</strong></td>
</tr>
</tbody>
</table>
36.14 Class Unbuffered

A proxy class that wraps a file object, flushing after every write, and delegating everything else to the wrapped object.

36.14.1 Methods

_init_(self, file)

write(self, arg)
Class Null

36.15 Class Null

Known Subclasses: SCons.Sig.MD5Null, SCons.Sig.TimeStampNull

Null objects always and reliably "do nothing."

36.15.1 Methods

__new__(cls, *args, **kwargs)

__init__(self, *args, **kwargs)

__call__(self, *args, **kwargs)

__repr__(self)

__nonzero__(self)

__getattr__(self, mname)

__setattr__(self, name, value)

__delattr__(self, name)
37 Package SCons.Variables

This file defines the Variables class that is used to add user-friendly customizable variables to an SCons build.

37.1 Modules

- **BoolVariable**: engine.SCons.Variables.BoolVariable
  This file defines the option type for SCons implementing true/false values.
  *(Section 38, p. 379)*
- **EnumVariable**: engine.SCons.Variables.EnumVariable
  This file defines the option type for SCons allowing only specified input-values.
  *(Section 39, p. 380)*
- **ListVariable**: engine.SCons.Variables.ListVariable
  This file defines the option type for SCons implementing 'lists'.
  *(Section 40, p. 381)*
- **PackageVariable**: engine.SCons.Variables.PackageVariable
  This file defines the option type for SCons implementing 'package activation'.
  *(Section 41, p. 382)*
- **PathVariable**: SCons.Variables.PathVariable
  This file defines an option type for SCons implementing path settings.
  *(Section 42, p. 383)*

37.2 Variables

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>.revision</td>
<td>Value: ‘src/engine/SCons/Variables/<strong>init</strong>.py’ 3842 2008/12/20 2...</td>
</tr>
</tbody>
</table>

37.3 Class Variables

37.3.1 Methods

```python
__init__(self, files=[], args={}, is_global=False)
```

- `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

```python
keys(self)
```

Returns the keywords for the options
Add(self, key, help='', default=False, validator=False, converter=False, **kw)

Add an option.

key - the name of the variable, or a list or tuple of arguments
help - optional help text for the options
default - optional default value
validator - optional function that is called to validate the option’s value
    Called with (key, value, environment)
converter - optional function that is called to convert the option’s value before
    putting it in the environment.

AddVariables(self, *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:

t = opt.AddVariables(
    ('debug', '', 0),
    ('CC', 'The C compiler'),
    ('VALIDATE', 'An option for testing validation', 'notset',
        validator, None),
)

Update(self, env, args=False)

Update an environment with the option variables.

env - the environment to update.

UnknownVariables(self)

Returns any options in the specified arguments lists that were not known, declared options in this object.

Save(self, 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
GenerateHelpText(self, env, sort=False)

Generate the help text for the options.

env - an environment that is used to get the current values of the options.

FormatVariableHelpText(self, env, key, help, default, actual, aliases=[])
Module SCons.Variables.BoolVariable

engine.SCons.Variables.BoolVariable

This file defines the option type for SCons implementing true/false values.

Usage example:

```python
opts = Variables()
opts.Add(BoolVariable('embedded', 'build for an embedded system', 0))
...
if env['embedded'] == 1:
    ...
```

38.1 Functions

| 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 valued. The result is usable for input to opts.Add().
39 Module SCons.Variables.EnumVariable

engine.SCons.Variables.EnumVariable

This file defines the option type for SCons allowing only specified input-values.

Usage example:

```python
opts = Variables()
opts.Add(EnumVariable('debug', 'debug output and symbols', 'no',
  allowed_values=('yes', 'no', 'full'),
  map={}, ignorecase=2))
...
if env['debug'] == 'full':
  ...
```

39.1 Functions

**EnumVariable(key, help, default, allowed_values, map={}, ignorecase=0)**

The input parameters describe a 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 (eg. 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).
40 Module SCons.Variables.ListVariable

engine.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(...)

40.1 Functions

| 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).
41 Module SCons.Variables.PackageVariable

engine.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 existance)

To replace autoconf's --with-xxx=yyy

```python
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 ...
```

41.1 Functions

<table>
<thead>
<tr>
<th>PackageVariable(key, help, default, searchfunc=False)</th>
</tr>
</thead>
<tbody>
<tr>
<td>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().</td>
</tr>
<tr>
<td>A 'package list' option may either be 'all', 'none' or a list of package names (seperated by space).</td>
</tr>
</tbody>
</table>
42 Module SCons.Variables.PathVariable'

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'))

42.1 Variables
<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>PathVariable</td>
<td><strong>Value</strong>: <code>&lt;SCons.Variables.PathVariable._PathVariableClass instance...</code></td>
</tr>
</tbody>
</table>
43 Module SCons.Warnings

SCons.Warnings

This file implements the warnings framework for SCons.

43.1 Functions

**suppressWarningClass(clazz)**

Suppresses all warnings that are of type clazz or derived from clazz.

**enableWarningClass(clazz)**

Suppresses all warnings that are of type clazz or derived from clazz.

**warningAsException(flag=False)**

Turn warnings into exceptions. Returns the old value of the flag.

**warn(clazz, *args)**

**process_warn_strings(arguments)**

Process string specifications of enabling/disabling warnings, as 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.

43.2 Variables
43.3 Class Warning

object

exceptions.BaseException

exceptions.Exception

SCons.Errors.UserError

SCons.Warnings.Warning

**Known Subclasses:**
- SCons.SConf.SConfWarning
- SCons.Warnings.CacheWriteErrorWarning
- SCons.Warnings.CorruptSCoNWarning
- SCons.Warnings.DependencyWarning
- SCons.Warnings.DeprecatedWarning
- SCons.Warnings.DuplicateEnvironmentWarning
- SCons.Warnings.LinkWarning
- SCons.Warnings.FutureReservedVariableWarning
- SCons.Warnings.MisleadingKeywordsWarning
- SCons.Warnings.MissingSCoNscriptWarning
- SCons.Warnings.NoMD5ModuleWarning
- SCons.Warnings.NoMetaclassSupportWarning
- SCons.Warnings.NoObjectCountWarning
- SCons.Warnings.NoParallelSupportWarning
- SCons.Warnings.ReservedVariableWarning
- SCons.Warnings.StackSizeWarning

43.3.1 Methods

```python
__delattr__(...)  
x.__delattr__('name') <=> del x.name
Overrides: object.__delattr__
```

```python
__getattribute__(...)  
x.__getattribute__('name') <=> x.name
Overrides: object.__getattribute__
```

```python
__getitem__(x, y)  
x[y]
```

```python
__getslice__(x, i, j)  
x[i:j]
Use of negative indices is not supported.
```

```python
__hash__(x)  
hash(x)
```
Class Warning

Module SCons.Warnings

_init__(...)  
x.__init__(...) initializes x; see x.__class__.__doc__ for signature  
Overrides: exceptions.BaseException.__init__

__new__(T, S, ...)  
Return Value  
a new object with type S, a subtype of T  
Overrides: exceptions.BaseException.__new__

__reduce__(...)  
helper for pickle  
Overrides: object.__reduce__ extit(inherited documentation)

__reduce_ex__(...)  
helper for pickle

__repr__(x)  
repr(x)  
Overrides: object.__repr__

__setattr__(...)  
x.__setattr__(name, value) <=> x.name = value  
Overrides: object.__setattr__

__setstate__(...)  

__str__(x)  
str(x)  
Overrides: object.__str__

43.3.2 Properties

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>class</strong></td>
<td>Value: &lt;attribute '<strong>class</strong>' of 'object' objects&gt;</td>
</tr>
<tr>
<td>args</td>
<td>Value: &lt;attribute 'args' of 'exceptions.BaseException' objects&gt;</td>
</tr>
<tr>
<td>message</td>
<td>Value: &lt;member 'message' of 'exceptions.BaseException' objects&gt;</td>
</tr>
</tbody>
</table>
43.4 Class CacheWriteErrorWarning

object  
exceptions.BaseException  
  exceptions.Exception  
    SCons.Errors.UserError  
      SCons.Warnings.Warning  
        SCons.Warnings.CacheWriteErrorWarning

43.4.1 Methods

```
__delattr__(...)  
x.__delattr__('name') == del x.name  
Overrides: object.__delattr__

__getattr__(...)  
x.__getattr__('name') == x.name  
Overrides: object.__getattr__

__getitem__(x, y)  
x[y]

__getslice__(x, i, j)  
x[i:j]  
Use of negative indices is not supported.

__hash__(x)  
hash(x)

__init__(...)  
x.__init__(...) initializes x; see x.__class__.__doc__ for signature  
Overrides: exceptions.BaseException.__init__

__new__(T, S, ...)  
Return Value  
a new object with type S, a subtype of T  
Overrides: exceptions.BaseException.__new__
```
43.4.2 Properties

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>__class__</code></td>
<td>Value: <code>&lt;attribute '__class__' of 'object' objects&gt;</code></td>
</tr>
<tr>
<td>args</td>
<td>Value: <code>&lt;attribute 'args' of 'exceptions.BaseException' objects&gt;</code></td>
</tr>
<tr>
<td>message</td>
<td>Value: <code>&lt;member 'message' of 'exceptions.BaseException' objects&gt;</code></td>
</tr>
</tbody>
</table>

43.5 Class CorruptSConsignWarning

```python
tree
object
  exceptions.BaseException
    exceptions.Exception
      SCons.Errors.UserError
      SCons.Warnings.Warning
        SCons.Warnings.CorruptSConsignWarning
```

### 43.5.1 Methods

<table>
<thead>
<tr>
<th>Method</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>__delattr__(...)</code></td>
<td>(x.<strong>delattr</strong>('name') \Rightarrow \text{del x.name}) (\text{Overrides: object.<strong>delattr</strong>})</td>
</tr>
<tr>
<td><code>__getattr__(...)</code></td>
<td>(x.<strong>getattr</strong>('name') \Rightarrow x.name) (\text{Overrides: object.<strong>getattr</strong>})</td>
</tr>
<tr>
<td><code>__getitem__(x, y)</code></td>
<td>(x[y])</td>
</tr>
<tr>
<td><code>__getslice__(x, i, j)</code></td>
<td>(x[i:j]) Use of negative indices is not supported.</td>
</tr>
<tr>
<td><code>__hash__(x)</code></td>
<td>(\text{hash(x)})</td>
</tr>
<tr>
<td><code>__init__(...)</code></td>
<td>(x.<strong>init</strong>(...)) initializes (x); see (x.<strong>class</strong>.<strong>doc</strong>) for signature (\text{Overrides: exceptions.BaseException.<strong>init</strong>})</td>
</tr>
<tr>
<td><code>__new__(T, S, ...)</code></td>
<td>Return Value (\text{a new object with type } S, \text{a subtype of } T) (\text{Overrides: exceptions.BaseException.<strong>new</strong>})</td>
</tr>
<tr>
<td><code>__reduce__(...)</code></td>
<td>helper for pickle (\text{Overrides: object.<strong>reduce</strong> (inherited documentation)})</td>
</tr>
<tr>
<td><code>__reduce_ex__(...)</code></td>
<td>helper for pickle</td>
</tr>
<tr>
<td><code>__repr__(x)</code></td>
<td>(\text{repr(x)}) (\text{Overrides: object.<strong>repr</strong>})</td>
</tr>
</tbody>
</table>
43.5.2 Properties

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>class</strong></td>
<td>Value: &lt;attribute '<strong>class</strong>' of 'object' objects&gt;</td>
</tr>
<tr>
<td>args</td>
<td>Value: &lt;attribute 'args' of 'exceptions.BaseException' objects&gt;</td>
</tr>
<tr>
<td>message</td>
<td>Value: &lt;member 'message' of 'exceptions.BaseException' objects&gt;</td>
</tr>
</tbody>
</table>

43.6 Class DependencyWarning

object

exceptions.BaseException

exceptions.Exception

SCons.Errors.UserError

SCons.Warnings.Warning

SCons.Warnings.DependencyWarning

43.6.1 Methods

__delattr__(...)

x.__delattr__('name') ==> del x.name

Overrides: object.__delattr__

__getattribute__(...)

x.__getattribute__('name') ==> x.name

Overrides: object.__getattribute__
### Class Dependency Warning

**Module** SCons.Warnings

<table>
<thead>
<tr>
<th>Method</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>.getitem__(x, y)</code></td>
<td><code>x[y]</code></td>
</tr>
<tr>
<td><code>.getslice__(x, i, j)</code></td>
<td><code>x[i:j]</code></td>
</tr>
<tr>
<td><code>.hash__(x)</code></td>
<td><code>hash(x)</code></td>
</tr>
<tr>
<td><code>.init__(...)</code></td>
<td><code>x.__init__(...)</code> initializes x; see x.<strong>class</strong>.<strong>doc</strong> for signature</td>
</tr>
<tr>
<td><code>.new__(T, S, ...)</code></td>
<td><strong>Return Value</strong> a new object with type S, a subtype of T</td>
</tr>
<tr>
<td><code>.reduce__(...)</code></td>
<td>helper for pickle</td>
</tr>
<tr>
<td><code>.reduce_ex__(...)</code></td>
<td>helper for pickle</td>
</tr>
<tr>
<td><code>.repr__(x)</code></td>
<td><code>repr(x)</code></td>
</tr>
<tr>
<td><code>.setattr__(...)</code></td>
<td><code>x.__setattr__(name', value) &lt;==&gt; x.name = value</code></td>
</tr>
<tr>
<td><code>.setstate__(...)</code></td>
<td></td>
</tr>
<tr>
<td><code>.str__(x)</code></td>
<td><code>str(x)</code></td>
</tr>
</tbody>
</table>
43.6.2 Properties

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>class</strong></td>
<td>Value: <code>&lt;attribute 'class' of 'object' objects&gt;</code></td>
</tr>
<tr>
<td>args</td>
<td>Value: <code>&lt;attribute 'args' of 'exceptions.BaseException' objects&gt;</code></td>
</tr>
<tr>
<td>message</td>
<td>Value: <code>&lt;member 'message' of 'exceptions.BaseException' objects&gt;</code></td>
</tr>
</tbody>
</table>

43.7 Class DeprecatedWarning

object

exceptions.BaseException

exceptions.Exception

SCons.Errors.UserError

SCons.Warnings.Warning

SCons.Warnings.DeprecatedWarning


43.7.1 Methods

```python
__delattr__(...)  
x.__delattr__('name') <==> del x.name
```

Overrides: object.__delattr__

```python
__getattribute__(...)  
x.__getattribute__('name') <==> x.name
```

Overrides: object.__getattribute__

```python
__getitem__(x, y)  
x[y]
```

```python
__getslice__(x, i, j)  
x[i:j]
```

Use of negative indices is not supported.
Class DeprecatedWarning

Module SCons.Warnings

__hash__(x)

hash(x)

__init__(...)

x.__init__(...) initializes x; see x.__class__.__doc__ for signature
Overrides: exceptions.BaseException.__init__

__new__(T, S, ...)

Return Value
   a new object with type S, a subtype of T
Overrides: exceptions.BaseException.__new__

__reduce__(...)

helper for pickle
Overrides: object.__reduce__ extit(inherited documentation)

__reduce_ex__(...)

helper for pickle

__repr__(x)

repr(x)
Overrides: object.__repr__

__setattr__(...)

x.__setattr__(’name’, value) <=> x.name = value
Overrides: object.__setattr__

__setstate__(...)


__str__(x)

str(x)
Overrides: object.__str__

43.7.2 Properties

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>class</strong></td>
<td>Value: &lt;attribute ‘<strong>class</strong>’ of ‘object’ objects&gt;</td>
</tr>
<tr>
<td>args</td>
<td>Value: &lt;attribute ‘args’ of ‘exceptions.BaseException’ objects&gt;</td>
</tr>
<tr>
<td>message</td>
<td>Value: &lt;member ‘message’ of ‘exceptions.BaseException’ objects&gt;</td>
</tr>
</tbody>
</table>
43.8 Class DeprecatedCopyWarning

```
Object    
exceptions.BaseException  
    exceptions.Exception  
        SCons.Errors.UserError  
            SCons.Warnings.Warning  
                SCons.Warnings.DeprecatedWarning

43.8.1 Methods

```delattr__(...)```  
```
x...delattr__(’name’)  <==  del x.name
```
Overrides: object...delattr__

```getattribute__(...)```  
```
x...getattribute__(’name’)  <==  x.name
```
Overrides: object...getattribute__

```getitem__(x, y)```  
```
x[y]
```

```getslice__(x, i, j)```  
```
x[i:j]
```

Use of negative indices is not supported.

```hash__(x)```  
```
hash(x)
```

```init__(...)```  
```
x...init__(...)  initializes  x;  see  x...class...doc  for  signature
```
Overrides: exceptions.BaseException...init__
Class DeprecatedCopyWarning

`__new__(T, S, ...)`

Return Value

a new object with type S, a subtype of T

Overrides: exceptions.BaseException.__new__

`__reduce__(...)`

helper for pickle

Overrides: object.__reduce__ extit(inherited documentation)

`__reduce_ex__(...)`

helper for pickle

`__repr__(x)`

repr(x)

Overrides: object.__repr__

`__setattr__(...)`

x.__setattr__('name', value) <==> x.name = value

Overrides: object.__setattr__

`__setstate__(...)`

`__str__(x)`

str(x)

Overrides: object.__str__

### 43.8.2 Properties

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>class</strong></td>
<td>Value: &lt;attribute '<strong>class</strong>' of 'object' objects&gt;</td>
</tr>
<tr>
<td>args</td>
<td>Value: &lt;attribute 'args' of 'exceptions.BaseException' objects&gt;</td>
</tr>
<tr>
<td>message</td>
<td>Value: &lt;member 'message' of 'exceptions.BaseException' objects&gt;</td>
</tr>
</tbody>
</table>
43.9 Class DeprecatedOptionsWarning

43.9.1 Methods

```python
x.__delattr__('name') == del x.name  
Overrides: object.__delattr__
```

```python
x.__getattribute__('name') == x.name  
Overrides: object.__getattribute__
```

```python
x[y]  
```

```python
x[i:j]  
Use of negative indices is not supported.
```

```python
hash(x)
```

```python
x.__init__(...) initializes x; see x.__class__.__doc__ for signature  
Overrides: exceptions.BaseException.__init__
```
Class DeprecatedOptionsWarning

Module SCons.Warnings

```python
__new__(T, S, ...)
```

**Return Value**

A new object with type S, a subtype of T

Overrides: exceptions.BaseException.__new__

```python
__reduce__(...)
```

Helper for pickle

Overrides: object.__reduce__

```python
__reduce_ex__(...)
```

Helper for pickle

```python
__repr__(x)
```

repr(x)

Overrides: object.__repr__

```python
__setattr__(...)
```

x.__setattr__(‘name’, value) #=> x.name = value

Overrides: object.__setattr__

```python
__setstate__(...)
```

```python
__str__(x)
```

str(x)

Overrides: object.__str__

### 43.9.2 Properties

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>class</strong></td>
<td>Value: &lt;attribute '<strong>class</strong>' of 'object' objects&gt;</td>
</tr>
<tr>
<td>args</td>
<td>Value: &lt;attribute 'args' of 'exceptions.BaseException' objects&gt;</td>
</tr>
<tr>
<td>message</td>
<td>Value: &lt;member 'message' of 'exceptions.BaseException' objects&gt;</td>
</tr>
</tbody>
</table>
43.10 Class DeprecatedSourceSignaturesWarning

object

exceptions.BaseException

exceptions.Exception

SCons.Errors.UserError

SCons.Warnings.Warning

SCons.Warnings.DeprecatedWarning

SCons.Warnings.DeprecatedSourceSignaturesWarning

43.10.1 Methods

.__delattr__(...)
x.__delattr__('name') ==> del x.name
Overrides: object.__delattr__

.__getattribute__(...)
x.__getattribute__('name') ==> x.name
Overrides: object.__getattribute__

.__getitem__(x, y)
x[y]

.__getslice__(x, i, j)
x[i:j]
Use of negative indices is not supported.

.__hash__(x)
hash(x)

.__init__(...)
x.__init__(...) initializes x; see x.__class__.__init__ for signature
Overrides: exceptions.BaseException.__init__
### Class DeprecatedSourceSignaturesWarning

#### __init__(T, S, ...)

**Return Value**

a new object with type S, a subtype of T

Overrides: exceptions.BaseException.__new__

#### __reduce__(...)

helper for pickle

Overrides: object.__reduce__ (inherited documentation)

#### __reduce_ex__(...)

helper for pickle

#### __repr__(x)

repr(x)

Overrides: object.__repr__

#### __setattr__(...)

x.__setattr__('name', value) <=> x.name = value

Overrides: object.__setattr__

#### __setstate__(...)

#### __str__(x)

str(x)

Overrides: object.__str__

### 43.10.2 Properties

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>class</strong></td>
<td>Value: &lt;attribute '<strong>class</strong>' of 'object' objects&gt;</td>
</tr>
<tr>
<td>args</td>
<td>Value: &lt;attribute 'args' of 'exceptions.BaseException' objects&gt;</td>
</tr>
<tr>
<td>message</td>
<td>Value: &lt;member 'message' of 'exceptions.BaseException' objects&gt;</td>
</tr>
</tbody>
</table>
43.11 Class DeprecatedTargetSignaturesWarning

object

exceptions.BaseException

exceptions.Exception

SCons.Errors.UserError

SCons.Warnings.Warning

SCons.Warnings.DeprecatedWarning

SCons.Warnings.DeprecatedTargetSignaturesWarning

43.11.1 Methods

```python
__delattr__(...)  
x.__delattr__("name")  ==>  del x.name

Overrides: object.__delattr__
```

```python
__getattribute__(...)  
x.__getattribute__("name")  ==>  x.name

Overrides: object.__getattribute__
```

```python
__getitem__(x, y)  
x[y]
```

```python
__getslice__(x, i, j)  
x[i:j]

Use of negative indices is not supported.
```

```python
__hash__(x)  
hash(x)
```

```python
__init__(...)  
x.__init__(...)  initializes  x;  see  x.__class__.__doc__  for  signature

Overrides: exceptions.BaseException.__init__
```
Class DeprecatedTargetSignaturesWarning

Module SCons.Warnings

__new__(T, S, ...)

Return Value
   a new object with type S, a subtype of T
Overrides: exceptions.BaseException.__new__

__reduce__(...)
helper for pickle
Overrides: object.__reduce__ extit(inherited documentation)

__reduce_ex__(...)
helper for pickle

__repr__(x)
repr(x)
Overrides: object.__repr__

__setattr__(...)
x.__setattr__('name', value) <==> x.name = value
Overrides: object.__setattr__

__setstate__(...)

__str__(x)
str(x)
Overrides: object.__str__

43.11.2 Properties

<table>
<thead>
<tr>
<th>Name</th>
<th>Value: &lt;attribute '<strong>class</strong>' of 'object' objects&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>class</strong></td>
<td>Value: &lt;attribute 'args' of 'exceptions.BaseException' objects&gt;</td>
</tr>
<tr>
<td>args</td>
<td>Value: &lt;member 'message' of 'exceptions.BaseException' objects&gt;</td>
</tr>
<tr>
<td>message</td>
<td></td>
</tr>
</tbody>
</table>
43.12 Class DuplicateEnvironmentWarning

```python
class DuplicateEnvironmentWarning(object):
    def __delattr__(self, name):
        del self.name
        # Overrides: object.__delattr__

    def __getattribute__(self, name):
        return self.name
        # Overrides: object.__getattribute__

    def __getitem__(self, x, y):
        return x[y]

    def __getslice__(self, x, i, j):
        return x[i:j]
        # Use of negative indices is not supported.

    def __hash__(self):
        return hash(self)

    def __init__(self,...):
        # Initializes self; see self.__class__.__doc__ for signature
        # Overrides: exceptions.BaseException.__init__

    def __new__(self, T, S, ...):
        # Return a new object with type S, a subtype of T
        # Overrides: exceptions.BaseException.__new__
```

43.12.1 Methods
43.12.2 Properties

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>class</strong></td>
<td>&lt;attribute '<strong>class</strong>' of 'object' objects&gt;</td>
<td><strong>class</strong></td>
</tr>
<tr>
<td>args</td>
<td>&lt;attribute 'args' of 'exceptions.BaseException' objects&gt;</td>
<td>args</td>
</tr>
<tr>
<td>message</td>
<td>&lt;member 'message' of 'exceptions.BaseException' objects&gt;</td>
<td>message</td>
</tr>
</tbody>
</table>

43.13 Class FutureReservedVariableWarning
43.13.1 Methods

```python
__delattr__(...)  
x.__delattr__('name') ==> del x.name
Overrides: object.__delattr__
```

```python
__getattribute__(...)  
x.__getattribute__('name') ==> x.name
Overrides: object.__getattribute__
```

```python
__getitem__(x, y)  
x[y]
```

```python
__getslice__(x, i, j)  
x[i:j]
```

Use of negative indices is not supported.

```python
__hash__(x)  
hash(x)
```

```python
__init__(...)  
x.__init__(...) initializes x; see x.__class__.__doc__ for signature
Overrides: exceptions.BaseException.__init__
```

```python
__new__(T, S, ...)  
Return Value
  a new object with type S, a subtype of T
Overrides: exceptions.BaseException.__new__
```

```python
__reduce__(...)  
helper for pickle
Overrides: object.__reduce__/extit(inherited documentation)
```

```python
__reduce_ex__(...)  
helper for pickle
```

```python
__repr__(x)  
repr(x)
Overrides: object.__repr__
```
_setattr_(...)  
x._setattr_('name', value) <==> x.name = value  
Overrides: object._setattr_

_setstate__(...)  

_str_(x)  
str(x)  
Overrides: object._str_

43.13.2 Properties

<table>
<thead>
<tr>
<th>Name</th>
<th>Value: &lt;attribute '<strong>class</strong>' of 'object' objects&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>class</strong></td>
<td></td>
</tr>
<tr>
<td>args</td>
<td>Value: &lt;attribute 'args' of 'exceptions.BaseException' objects&gt;</td>
</tr>
<tr>
<td>message</td>
<td>Value: &lt;member 'message' of 'exceptions.BaseException' objects&gt;</td>
</tr>
</tbody>
</table>

43.14 Class LinkWarning

object

exceptions.BaseException

exceptions.Exception

SCons.Errors.UserError

SCons.Warnings.Warning

SCons.Warnings.LinkWarning

Known Subclasses: SCons.Warnings.FortranCxxMixWarning

43.14.1 Methods

_delattr_(...)  
x._delattr_('name') <==> del x.name  
Overrides: object._delattr_

_getattribute_(...)  
x._getattribute_('name') <==> x.name  
Overrides: object._getattribute_
### Class LinkWarning

#### __getitem__(x, y)

\[ x[y] \]

#### __getslice__(x, i, j)

\[ x[i:j] \]

Use of negative indices is not supported.

#### __hash__(x)

hash(x)

#### __init__(...)

\[ \text{x.__init__(...)} \text{ initializes x; see x.__class__:__doc__ for signature} \]

Overrides: exceptions.BaseException.__init__

#### __new__(T, S, ...)

Return Value
- a new object with type S, a subtype of T

Overrides: exceptions.BaseException.__new__

#### __reduce__(...)

helper for pickle

Overrides: object.__reduce__ extit(inherited documentation)

#### __reduce_ex__(...)

helper for pickle

#### __repr__(x)

repr(x)

Overrides: object.__repr__

#### __setattr__(...)

\[ \text{x.__setattr__("name", value) } \text{\iff} \text{x.name = value} \]

Overrides: object.__setattr__

#### __setstate__(...)

#### __str__(x)

str(x)

Overrides: object.__str__
43.14.2 Properties

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>class</strong></td>
<td>Value: <code>&lt;attribute '__class__' of 'object' objects&gt;</code></td>
</tr>
<tr>
<td>args</td>
<td>Value: <code>&lt;attribute 'args' of 'exceptions.BaseException' objects&gt;</code></td>
</tr>
<tr>
<td>message</td>
<td>Value: <code>&lt;member 'message' of 'exceptions.BaseException' objects&gt;</code></td>
</tr>
</tbody>
</table>

43.15 Class MisleadingKeywordsWarning

object

exceptions.BaseException

exceptions.Exception

SCons.Errors.UserError

SCons.Warnings.Warning

SCons.Warnings.MisleadingKeywordsWarning

43.15.1 Methods

```python
__delattr__(...)  
x.__delattr__('name') == del x.name  
Overrides: object.__delattr__

__getattribute__(...)  
x.__getattribute__('name') == x.name  
Overrides: object.__getattribute__

__getitem__(x, y)  
x[y]

__getslice__(x, i, j)  
x[i:j]  
Use of negative indices is not supported.

__hash__(x)  
hash(x)
```
Class MisleadingKeywordsWarning

_module SCons.Warnings

_init_

x._init_(...) initializes x; see x._class_._doc_ for signature
Overrides: exceptions.BaseException._init_

_new_(T, S, ...)

Return Value
a new object with type S, a subtype of T
Overrides: exceptions.BaseException._new_

_reduce_

helper for pickle
Overrides: object._reduce_ extit(inherited documentation)

_reduce_ex_

helper for pickle

_repr_(x)

repr(x)
Overrides: object._repr_

_setattr_

x._setattr_('name', value) <==> x.name = value
Overrides: object._setattr_

_setstate_

_str_(x)

str(x)
Overrides: object._str_

43.15.2 Properties

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>class</em></td>
<td>Value: &lt;attribute '<em>class</em>' of 'object' objects&gt;</td>
</tr>
<tr>
<td>args</td>
<td>Value: &lt;attribute 'args' of 'exceptions.BaseException' objects&gt;</td>
</tr>
<tr>
<td>message</td>
<td>Value: &lt;member 'message' of 'exceptions.BaseException' objects&gt;</td>
</tr>
</tbody>
</table>
43.16 Class MissingSConscriptWarning

object

exceptions.BaseException

exceptions.Exception

SCons.Errors.UserError

SCons.Warnings.Warning

SCons.Warnings.MissingSConscriptWarning

43.16.1 Methods

```python
__delattr__(...)

x.__delattr__('name') == del x.name
Overrider: object.__delattr__
```

```python
__getattr__(...)

x.__getattr__('name') == x.name
Overrider: object.__getattr__
```

```python
__getitem__(...)

x[y]
```

```python
__getslice__(...)

x[i:j]
Use of negative indices is not supported.
```

```python
__hash__(...)

hash(x)
```

```python
__init__(...)

x.__init__(...) initializes x; see x.__class__.__doc__ for signature
Overrider: exceptions.BaseException.__init__
```

```python
__new__(...)

Return Value

a new object with type S, a subtype of T
Overrider: exceptions.BaseException.__new__
```
```
_class__(...)  
helper for pickle  
Overrides: object._class_  

__reduce_ex__(...)  
helper for pickle  

__repr__(x)  
repr(x)  
Overrides: object.__repr__

__setattr__(...)  
x.__setattr__('name', value) <==> x.name = value  
Overrides: object.__setattr__

__setstate__(...)  

__str__(x)  
str(x)  
Overrides: object.__str__
```

### 43.16.2 Properties

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>class</strong></td>
<td>Value: &lt;attribute '<strong>class</strong>' of 'object' objects&gt;</td>
</tr>
<tr>
<td>args</td>
<td>Value: &lt;attribute 'args' of 'exceptions.BaseException' objects&gt;</td>
</tr>
<tr>
<td>message</td>
<td>Value: &lt;member 'message' of 'exceptions.BaseException' objects&gt;</td>
</tr>
</tbody>
</table>

#### 43.17 Class NoMD5ModuleWarning

```
object  
exceptions.BaseException  
  exceptions.Exception  
    SCons.Errors.UserError  
    SCons.Warnings.Warning  
      SCons.Warnings.NoMD5ModuleWarning
```
# 43.17.1 Methods

<table>
<thead>
<tr>
<th>Method</th>
<th>Definition</th>
<th>Overrides</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><code>__delattr__</code></td>
<td><code>x.__delattr__('name')</code> \leftrightarrow del x.name</td>
<td>object.<strong>delattr</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><code>__getattribute__</code></td>
<td><code>x.__getattribute__('name')</code> \leftrightarrow x.name</td>
<td>object.<strong>getattribute</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><code>__getitem__</code></td>
<td><code>x[y]</code></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><code>__getslice__</code></td>
<td><code>x[i:j]</code></td>
<td>Use of negative indices is not supported.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><code>__hash__</code></td>
<td><code>hash(x)</code></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><code>__init__</code></td>
<td><code>x.__init__(...)</code> initialize x; see x.<strong>class</strong>.<strong>doc</strong> for signature</td>
<td>exceptions.BaseException.<strong>init</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><code>__new__</code></td>
<td><code>...</code> Return Value</td>
<td></td>
</tr>
<tr>
<td></td>
<td>a new object with type S, a subtype of T</td>
<td>exceptions.BaseException.<strong>new</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><code>__reduce__</code></td>
<td>helper for pickle</td>
<td>object.<strong>reduce</strong> extit(inherited documentation)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><code>__reduce_ex__</code></td>
<td>helper for pickle</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><code>__repr__</code></td>
<td><code>repr(x)</code></td>
<td>object.<strong>repr</strong></td>
</tr>
</tbody>
</table>
Class NoMetaclassSupportWarning

Module SCons.Warnings

```python
setattr

x._setattr_('name', value) ==> x.name = value
Overrides: object._setattr_
```

```python
_setstate__(...)
```

```python
_str__(x)
str(x)
Overrides: object._str_
```

### 43.17.2 Properties

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>class</em></td>
<td>Value: &lt;attribute '<strong>class</strong>' of 'object' objects&gt;</td>
</tr>
<tr>
<td>args</td>
<td>Value: &lt;attribute 'args' of 'exceptions.BaseException' objects&gt;</td>
</tr>
<tr>
<td>message</td>
<td>Value: &lt;member 'message' of 'exceptions.BaseException' objects&gt;</td>
</tr>
</tbody>
</table>

### 43.18 Class NoMetaclassSupportWarning

```
object   |
exceptions.BaseException   |
    exceptions.Exception   |
    SCons.Errors.UserError  |
    SCons.Warnings.Warning  |
    SCons.Warnings.NoMetaclassSupportWarning |
```

### 43.18.1 Methods

```python
_delattr__(...)

x._delattr_('name') ==> del x.name
Overrides: object._delattr_
```

```python
_getattribute__(...)

x._getattribute_('name') ==> x.name
Overrides: object._getattribute_
```
### Class NoMetaclassSupportWarning

<table>
<thead>
<tr>
<th>Method</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>.getitem(x, y)</code></td>
<td><code>x[y]</code></td>
</tr>
<tr>
<td><code>.getslice(x, i, j)</code></td>
<td><code>x[i:j]</code></td>
</tr>
<tr>
<td></td>
<td>Use of negative indices is not supported.</td>
</tr>
<tr>
<td><code>.hash(x)</code></td>
<td><code>hash(x)</code></td>
</tr>
<tr>
<td><code>.init(...)</code></td>
<td><code>x.__init__(...)</code> initializes x; see <code>x.__class__.__doc__</code> for signature</td>
</tr>
<tr>
<td></td>
<td>Overrides: exceptions.BaseException.<strong>init</strong></td>
</tr>
<tr>
<td><code>.new(T, S, ...)</code></td>
<td>Return Value</td>
</tr>
<tr>
<td></td>
<td>a new object with type S, a subtype of T</td>
</tr>
<tr>
<td></td>
<td>Overrides: exceptions.BaseException.<strong>new</strong></td>
</tr>
<tr>
<td><code>.reduce(...)</code></td>
<td>helper for pickle</td>
</tr>
<tr>
<td></td>
<td>Overrides: object.<strong>reduce</strong> extit(inherited documentation)</td>
</tr>
<tr>
<td><code>.reduce_ex(...)</code></td>
<td>helper for pickle</td>
</tr>
<tr>
<td><code>.repr(x)</code></td>
<td><code>repr(x)</code></td>
</tr>
<tr>
<td></td>
<td>Overrides: object.<strong>repr</strong></td>
</tr>
<tr>
<td><code>.setattr(...)</code></td>
<td><code>x.__setattr__(name, value) &lt;--&gt; x.name = value</code></td>
</tr>
<tr>
<td></td>
<td>Overrides: object.<strong>setattr</strong></td>
</tr>
<tr>
<td><code>.setstate(...)</code></td>
<td></td>
</tr>
<tr>
<td><code>.str_(x)</code></td>
<td><code>str(x)</code></td>
</tr>
<tr>
<td></td>
<td>Overrides: object.<strong>str</strong></td>
</tr>
</tbody>
</table>
Class NoObjectCountWarning

43.18.2 Properties

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>class</strong></td>
<td>Value: &lt;attribute '<strong>class</strong>' of 'object' objects&gt;</td>
</tr>
<tr>
<td>args</td>
<td>Value: &lt;attribute 'args' of 'exceptions.BaseException' objects&gt;</td>
</tr>
<tr>
<td>message</td>
<td>Value: &lt;member 'message' of 'exceptions.BaseException' objects&gt;</td>
</tr>
</tbody>
</table>

43.19 Class NoObjectCountWarning

object

exceptions.BaseException

exceptions.Exception

SCons.Errors.UserError

SCons.Warnings.Warning

SCons.Warnings.NoObjectCountWarning

43.19.1 Methods

__delattr__(...)  
x.__delattr__('name') <=> del x.name
Overrrides: object.__delattr__

__getattr__(...)  
x.__getattr__('name') <=> x.name
Overrrides: object.__getattr__

__getitem__(x, y)  
x[y]

__getslice__(x, i, j)  
x[i:j]
Use of negative indices is not supported.

__hash__(x)  
hash(x)
Class NoObjectCountWarning

Module SCons.Warnings

```python
__init__(...)
```
x.__init__(...) initializes x; see x.__class__.__doc__ for signature
 Overrides: exceptions.BaseException.__init__

```python
__new__(T, S, ...)
```
Return Value
   a new object with type $S$, a subtype of $T$
 Overrides: exceptions.BaseException.__new__

```python
__reduce__(...)
```
  helper for pickle
 Overrides: object.__reduce__ (inherited documentation)

```python
__reduce_ex__(...)
```
  helper for pickle

```python
__repr__(x)
```
repr(x)
 Overrides: object.__repr__

```python
__setattr__(...)
```
x.__setattr__('name', value) <=> x.name = value
Overrides: object.__setattr__

```python
__setstate__(...)
```

```python
__str__(x)
```
str(x)
 Overrides: object.__str__

### 43.19.2 Properties

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>class</strong></td>
<td>Value: &lt;attribute '<strong>class</strong>' of 'object' objects&gt;</td>
</tr>
<tr>
<td>args</td>
<td>Value: &lt;attribute 'args' of 'exceptions.BaseException' objects&gt;</td>
</tr>
<tr>
<td>message</td>
<td>Value: &lt;member 'message' of 'exceptions.BaseException' objects&gt;</td>
</tr>
</tbody>
</table>

429
### 43.20 Class NoParallelSupportWarning

```
object
    exceptions.BaseException
        exceptions.Exception
            SCons.Errors.UserError
                SCons.Warnings.Warning
                    SCons.Warnings.NoParallelSupportWarning
```

#### 43.20.1 Methods

<table>
<thead>
<tr>
<th>Method</th>
<th>Description</th>
</tr>
</thead>
</table>
| `__delattr__(...)` | x.__delattr__('name') == del x.name  
Override: object.__delattr__ |
| `__getattribute__(...)` | x.__getattribute__('name') == x.name  
Override: object.__getattribute__ |
| `__getitem__(...)` | x[y]  |
| `__getslice__(...)` | x[i:j]  
Use of negative indices is not supported. |
| `__hash__(...)` | hash(x)  |
| `__init__(...)` | x.__init__(...) initializes x; see x.__class__.__doc__ for signature  
Override: exceptions.BaseException.__init__ |
| `__new__(...)` | a new object with type S, a subtype of T  
Override: exceptions.BaseException.__new__ |
Class NoParallelSupportWarning

Module SCons.Warnings

__.reduce__(...)  
helper for pickle  
Overrides: object.__reduce__ extit(inherited documentation)

__.reduce_ex__(...)  
helper for pickle

__.repr__(x)  
repr(x)  
Overrides: object.__repr__

__.setattr__(...)  
x.__setattr__('name', value) <==> x.name = value  
Overrides: object.__setattr__

__.setstate__(...)  

__.str__(x)  
str(x)  
Overrides: object.__str__

43.20.2 Properties

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>.class</em></td>
<td>Value: &lt;attribute '<em>class</em>' of 'object' objects&gt;</td>
</tr>
<tr>
<td>args</td>
<td>Value: &lt;attribute 'args' of 'exceptions.BaseException' objects&gt;</td>
</tr>
<tr>
<td>message</td>
<td>Value: &lt;member 'message' of 'exceptions.BaseException' objects&gt;</td>
</tr>
</tbody>
</table>
43.21 Class PythonVersionWarning

object

exceptions.BaseException

exceptions.Exception

SCons.Errors.UserError

SCons.Warnings.Warning

SCons.Warnings.DeprecatedWarning

SCons.Warnings.PythonVersionWarning

43.21.1 Methods

```python
__delattr__(...)  
x.__delattr__('name')  ==  del x.name  
Overrides: object.__delattr__
```

```python
__getattribute__(...)  
x.__getattribute__('name')  ==  x.name  
Overrides: object.__getattribute__
```

```python
__getitem__(x, y)  
x[y]
```

```python
__getslice__(x, i, j)  
x[i:j]  
Use of negative indices is not supported.
```

```python
__hash__(x)  
hash(x)
```

```python
__init__(...)  
x.__init__(...)  initializes x; see x.__class__.__doc__  for  signature
Overrides: exceptions.BaseException.__init__
```
Class PythonVersionWarning

Module SCons.Warnings

```python
__new__(T, S, ...)
```

Return Value

- a new object with type S, a subtype of T

Overrides: exceptions.BaseException.__new__

```python
__reduce__(...)
```

helper for pickle

Overrides: object.__reduce__ extit(inherited documentation)

```python
__reduce_ex__(...)
```

helper for pickle

```python
__repr__(x)
```

repr(x)

Overrides: object.__repr__

```python
__setattr__(...)
```

x.__setattr__('name', value) \implies x.name = value

Overrides: object.__setattr__

```python
__setstate__(...)
```

```python
__str__(x)
```

str(x)

Overrides: object.__str__

### 43.21.2 Properties

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>class</strong></td>
<td>Value: &lt;attribute '<strong>class</strong>' of 'object' objects&gt;</td>
</tr>
<tr>
<td>args</td>
<td>Value: &lt;attribute 'args' of 'exceptions.BaseException' objects&gt;</td>
</tr>
<tr>
<td>message</td>
<td>Value: &lt;member 'message' of 'exceptions.BaseException' objects&gt;</td>
</tr>
</tbody>
</table>
### 43.22 Class ReservedVariableWarning

```python
class ReservedVariableWarning(object):
    __delattr__(...) = del x.name
    __getattr__(...) = x.name
    __getitem__(x, y) = x[y]
    __getslice__(x, i, j) = x[i:j]
    __hash__(x) = hash(x)
    __init__(...) initializes x; see x.__class__.__doc__ for signature
    __new__(T, S, ...) = a new object with type S, a subtype of T
```

**43.22.1 Methods**

- `__delattr__(...)`
  
  x.__delattr__('name') == del x.name

  Overrides: object.__delattr__

- `__getattr__(...)`
  
  x.__getattr__('name') == x.name

  Overrides: object.__getattr__

- `__getitem__(x, y)`
  
  x[y]

- `__getslice__(x, i, j)`
  
  x[i:j]

  Use of negative indices is not supported.

- `__hash__(x)`
  
  hash(x)

- `__init__(...)`
  
  x.__init__(...) initializes x; see x.__class__.__doc__ for signature

  Overrides: exceptions.BaseException.__init__

- `__new__(T, S, ...)`
  
  Return Value

  A new object with type S, a subtype of T

  Overrides: exceptions.BaseException.__new__
Class StackSizeWarning

Module SCons.Warnings

```
_reduce__(...)  
helper for pickle
Overrides: object._reduce_
```

```
_reduce_ex__(...)  
helper for pickle
```

```
_repr__(x)  
repr(x)
Overrides: object._repr_
```

```
_setattr__(...)  
x._setattr_('name', value) <=> x.name = value
Overrides: object._setattr_
```

```
_setstate__(...)  
```

```
_str__(x)  
str(x)
Overrides: object._str_
```

### 43.22.2 Properties

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>class</strong></td>
<td>Value: &lt;attribute '<strong>class</strong>' of 'object' objects&gt;</td>
</tr>
<tr>
<td>args</td>
<td>Value: &lt;attribute 'args' of 'exceptions.BaseException' objects&gt;</td>
</tr>
<tr>
<td>message</td>
<td>Value: &lt;member 'message' of 'exceptions.BaseException' objects&gt;</td>
</tr>
</tbody>
</table>

### 43.23 Class StackSizeWarning

```
object

exceptions.BaseException

exceptions.Exception

SCons.Errors.UserError

SCons.Warnings.Warning

SCons.Warnings.StackSizeWarning
```
43.23.1 Methods

```python
__delattr__(...)  
x.__delattr__('name') ==> del x.name
Overrides: object.__delattr__
```

```python
__getattr__(...)  
x.__getattr__('name') ==> x.name
Overrides: object.__getattr__
```

```python
__getitem__(x, y)  
x[y]
```

```python
__getslice__(x, i, j)  
x[i:j]
Use of negative indices is not supported.
```

```python
__hash__(x)  
hash(x)
```

```python
__init__(...)  
x.__init__(...) initializes x; see x.__class__.__doc__ for signature
Overrides: exceptions.BaseException.__init__
```

```python
__new__(T, S, ...)  
Return Value  
a new object with type S, a subtype of T
Overrides: exceptions.BaseException.__new__
```

```python
__reduce__(...)  
helper for pickle
Overrides: object.__reduce__, extit(inherited documentation)
```

```python
__reduce_ex__(...)  
helper for pickle
```

```python
__repr__(x)  
repr(x)
Overrides: object.__repr__
```
class FortranCxxMixWarning

43.23.2 Properties

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>class</strong></td>
<td>Value: &lt;attribute '<strong>class</strong>' of 'object' objects&gt;</td>
</tr>
<tr>
<td>args</td>
<td>Value: &lt;attribute 'args' of 'exceptions.BaseException' objects&gt;</td>
</tr>
<tr>
<td>message</td>
<td>Value: &lt;member 'message' of 'exceptions.BaseException' objects&gt;</td>
</tr>
</tbody>
</table>

43.24 Class FortranCxxMixWarning

43.24.1 Methods

<table>
<thead>
<tr>
<th><strong>delattr</strong>(...)</th>
</tr>
</thead>
<tbody>
<tr>
<td>x.<strong>delattr</strong>('name')</td>
</tr>
<tr>
<td>Overrides: object.<strong>delattr</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>getattribute</strong>(...)</th>
</tr>
</thead>
<tbody>
<tr>
<td>x.<strong>getattribute</strong>('name')</td>
</tr>
<tr>
<td>Overrides: object.<strong>getattribute</strong></td>
</tr>
</tbody>
</table>

437
`__getitem__`(x, y)

\[ x[y] \]

`__getslice__`(x, i, j)

\[ x[i:j] \]

Use of negative indices is not supported.

`__hash__`(x)

\[ \text{hash}(x) \]

`__init__`(...)

\[ x.__init__(...) \text{ initializes } x; \text{ see } x.__class__.\_\_doc\_ \text{ for signature} \]

Overrides: exceptions.BaseException.__init__

`__new__`(T, S, ...)

Return Value

a new object with type S, a subtype of T

Overrides: exceptions.BaseException.__new__

`__reduce__`(...)

helper for pickle

Overrides: object.__reduce__. extit(inherited documentation)

`__reduce_ex__`(...)

helper for pickle

`__repr__`(x)

\[ \text{repr}(x) \]

Overrides: object.__repr__

`__setattr__`(...)

\[ x.__setattr__(\text{\textquoteleft name\textquoteright}, \text{value}) \leftrightarrow x.name = \text{value} \]

Overrides: object.__setattr__

`__setstate__`(...)

\[ \text{str}(x) \]

Overrides: object.__str__
### 43.24.2 Properties

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>_class_</code></td>
<td>Value: <code>&lt;attribute '_class_' of 'object' objects&gt;</code></td>
</tr>
<tr>
<td><code>args</code></td>
<td>Value: <code>&lt;attribute 'args' of 'exceptions.BaseException' objects&gt;</code></td>
</tr>
<tr>
<td><code>message</code></td>
<td>Value: <code>&lt;member 'message' of 'exceptions.BaseException' objects&gt;</code></td>
</tr>
</tbody>
</table>
44 Package SCons.compat

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 __builtin__ 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.

Simply enough, things that go in the __builtin__ name space come from our builtins module.

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.

44.1 Modules

- **_scons_UserString**: A user-defined wrapper around string objects
  This class is "borrowed" from the Python 2.2 UserString and modified slightly for use with SCons.  
  *(Section 45, p. 429)*

- **_scons_hashlib**: hashlib backwards-compatibility module for older (pre-2.5) Python versions
  This does not not NOT (repeat, *NOT*) provide complete hashlib functionality.  
  *(Section 46, p. 431)*

- **_scons_itertools**: Implementations of itertools functions for Python versions that don’t have iterators.  
  *(Section 47, p. 433)*

- **_scons_optparse**: optparse - a powerful, extensible, and easy-to-use option parser.
Variables

*Variables Package SCons.compat*

(Section 48, p. 435)

- **scons_sets**: Classes to represent arbitrary sets (including sets of sets).
  (Section 49, p. 457)
- **scons_sets15**: A lexical analyzer class for simple shell-like syntaxes.
  (Section 50, p. 470)
- **scons_subprocess**: subprocess - Subprocesses with accessible I/O streams
  This module allows you to spawn processes, connect to their input/output/error pipes, and obtain their return codes.
  (Section 51, p. 472)
- **scons_textwrap**: Text wrapping and filling.
  (Section 52, p. 473)
- **builtins**: Compatibility idioms for __builtin__ names
  This module adds names to the __builtin__ module for things that we want to use in SCons but which don’t show up until later Python versions than the earliest ones we support.
  (Section 53, p. 484)

44.2 Functions

```
import_as(module, name)
```

Imports the specified module (from our local directory) as the specified name.

44.3 Variables

<table>
<thead>
<tr>
<th>Name</th>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>doc</strong></td>
<td>...</td>
<td></td>
</tr>
<tr>
<td><strong>revision</strong></td>
<td>'src/engine/SCons/compat/<strong>init</strong>.py 3842 2008/12/20 22:5...</td>
<td></td>
</tr>
<tr>
<td>version_string</td>
<td>string.split(sys.version) [0]</td>
<td></td>
</tr>
<tr>
<td>version ints</td>
<td>map(int, string.split(version_string, '.'))</td>
<td></td>
</tr>
</tbody>
</table>
45 Module SCons.compat._scons_UserString

A user-defined wrapper around string objects

This class is "borrowed" from the Python 2.2 UserString and modified slightly for use with SCons. It is *NOT* guaranteed to be fully compliant with the standard UserString class from all later versions of Python. In particular, it does not necessarily contain all of the methods found in later versions.

45.1 Functions

\texttt{is\_String(obj)}

45.2 Variables

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
</table>
| __revision__ | Value: `src/engine/SCons/compat/_scons_UserString.py`  
            | 3842 2008/1...                                        |
| __doc__   | Value: ...                                        |

45.3 Class UserString

45.3.1 Methods

\texttt{\_init\_(self, seq)}

\texttt{\_str\_(self)}

\texttt{\_repr\_(self)}

\texttt{\_int\_(self)}

\texttt{\_long\_(self)}

\texttt{\_float\_(self)}

\texttt{\_complex\_(self)}

\texttt{\_hash\_(self)}

\texttt{\_cmp\_(self, string)}

\texttt{\_contains\_(self, char)}
<table>
<thead>
<tr>
<th>Method</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>__len__</code>(self)</td>
<td></td>
</tr>
<tr>
<td><code>__getitem__</code>(self, index)</td>
<td></td>
</tr>
<tr>
<td><code>__getslice__</code>(self, start, end)</td>
<td></td>
</tr>
<tr>
<td><code>__add__</code>(self, other)</td>
<td></td>
</tr>
<tr>
<td><code>__radd__</code>(self, other)</td>
<td></td>
</tr>
<tr>
<td><code>__mul__</code>(self, n)</td>
<td></td>
</tr>
<tr>
<td><code>__rmul__</code>(self, n)</td>
<td></td>
</tr>
</tbody>
</table>
Module SCons.compat._scons_hashlib

hashlib backwards-compatibility module for older (pre-2.5) Python versions

This does not not NOT (repeat, *NOT*) provide complete hashlib functionality. It only wraps the portions of MD5 functionality used by SCons, in an interface that looks like hashlib (or enough for our purposes, anyway). In fact, this module will raise an ImportError if the underlying md5 module isn’t available.

46.1 Functions

\texttt{md5(string='')} 

46.2 Variables

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>_doc_</td>
<td>Value: ...</td>
</tr>
<tr>
<td>_revision_</td>
<td>Value: 'src/engine/SCons/compat/_scons_hashlib.py 38422008/12/2...'</td>
</tr>
</tbody>
</table>

46.3 Class md5obj

46.3.1 Methods

\_init\_(self, name, string='') 

\_repr\_(self) 

copy(self) 

digest(self) 

update(self, arg) 

hexdigest(self) 

46.3.2 Class Variables

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>md5_module</td>
<td>Value: &lt;module 'md5' from '/usr/lib/python2.5/md5.pyc'&gt;</td>
</tr>
</tbody>
</table>
46.4 Class md5obj

46.4.1 Methods

```python
__init__(self, name, string='')

__repr__(self)

copy(self)

digest(self)

update(self, arg)

hexdigest(self)
```

46.4.2 Class Variables

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>md5_module</td>
<td>Value: &lt;module 'md5' from '/usr/lib/python2.5/md5.pyc'&gt;</td>
</tr>
</tbody>
</table>
Implementations of itertools functions for Python versions that don’t have iterators.

These implement the functions by creating the entire list, not returning it element-by-element as the real itertools functions do. This means that early Python versions won’t get the performance benefit of using the itertools, but we can still use them so the later Python versions do get the advantages of using iterators.

Because we return the entire list, we intentionally do not implement the itertools functions that "return" infinitely-long lists: the count(), cycle() and repeat() functions. Other functions below have remained unimplemented simply because they aren’t being used (yet) and it wasn’t obvious how to do it. Or, conversely, we only implemented those functions that *were* easy to implement (mostly because the Python documentation contained examples of equivalent code).

Note that these do not have independent unit tests, so it’s possible that there are bugs.

### 47.1 Functions

- `chain(*iterables)`
- `count(n=0)`
- `cycle(iterable)`
- `dropwhile(predicate, iterable)`
- `groupby(iterable, *args)`
- `ifilter(predicate, iterable)`
- `ifilterfalse(predicate, iterable)`
- `imap(function, *iterables)`
- `islice(*args, **kw)`
- `izip(*iterables)`
- `repeat(*args, **kw)`
47.2 Variables

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>revision</strong></td>
<td>Value: 'src/engine/SCons/compat/_scons_itertools.py 3842 2008/12...</td>
</tr>
<tr>
<td><strong>doc</strong></td>
<td>Value: ...</td>
</tr>
</tbody>
</table>
Module SCons.compat._scons_optparse

optparse - a powerful, extensible, and easy-to-use option parser.

By Greg Ward <gward@python.net>

Originally distributed as Optik; see http://optik.sourceforge.net/.

If you have problems with this module, please do not file bugs, patches, or feature requests with Python; instead, use Optik’s SourceForge project page:
   http://sourceforge.net/projects/optik

For support, use the optik-users@lists.sourceforge.net mailing list (http://lists.sourceforge.net/lists/listinfo/optik-users).

Version: 1.5.3

Copyright: Copyright (c) 2001-2006 Gregory P. Ward. All rights reserved. Copyright (c) 2002-2006 Python Software Foundation. All rights reserved.

Redistribution and use in source and binary forms, with or without modification, are permitted provided that the following conditions are met:

* Redistributions of source code must retain the above copyright notice, this list of conditions and the following disclaimer.
* Redistributions in binary form must reproduce the above copyright notice, this list of conditions and the following disclaimer in the documentation and/or other materials provided with the distribution.
* Neither the name of the author nor the names of its contributors may be used to endorse or promote products derived from this software without specific prior written permission.

THIS SOFTWARE IS PROVIDED BY THE COPYRIGHT HOLDERS AND CONTRIBUTORS "AS IS" AND ANY EXPRESS OR IMPLIED WARRANTIES, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE DISCLAIMED. IN NO EVENT SHALL THE AUTHOR OR CONTRIBUTORS BE LIABLE FOR ANY DIRECT, INDIRECT, INCIDENTAL, SPECIAL, EXEMPLARY, OR CONSEQUENTIAL DAMAGES (INCLUDING, BUT NOT LIMITED TO, PROCUREMENT OF SUBSTITUTE GOODS OR SERVICES; LOSS OF USE, DATA, OR PROFITS; OR BUSINESS INTERRUPTION) HOWEVER CAUSED AND ON ANY THEORY OF LIABILITY, WHETHER IN CONTRACT, STRICT LIABILITY, OR TORT (INCLUDING NEGLIGENCE OR OTHERWISE) ARISING IN ANY WAY OUT OF THE USE OF THIS SOFTWARE, EVEN IF ADVISED OF THE POSSIBILITY OF SUCH DAMAGE.

48.1 Variables

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>SUPPRESS_HELP</td>
<td>Value: 'SUPPRESSHELP'</td>
</tr>
<tr>
<td>SUPPRESS_USAGE</td>
<td>Value: 'SUPPRESSUSAGE'</td>
</tr>
</tbody>
</table>
### 48.2 Class OptParseError

**object**  
exceptions.BaseException  
**exceptions.Exception**  
*SCons.compat.scons_optparse.OptParseError*

**Known Subclasses:**  
*SCons.compat.scons_optparse.BadOptionError, SCons.compat.scons_optparse.OptionError, SCons.compat.scons_optparse.OptionValueError*

### 48.2.1 Methods

<table>
<thead>
<tr>
<th>Method</th>
<th>Signature</th>
<th>Description</th>
</tr>
</thead>
</table>
| __init__        | (self, msg)                                    | x.__init__(...) initializes x; see x.__class__.__doc__ for signature  
|                 |                                                 | Overrides: exceptions.Exception.__init__ (inherited documentation) |
| __str__         | (self)                                         | str(x)  
|                 |                                                 | Overrides: exceptions.BaseException.__str__ (inherited documentation) |
| __delattr__     |                                                | x.__delattr__('name') == del x.name  
|                 |                                                 | Overrides: object.__delattr__ |
| __getattribute__|                                                | x.__getattribute__('name') == x.name  
|                 |                                                 | Overrides: object.__getattribute__ |
| __getitem__     | (x, y)                                         | x[y] |
| __getslice__    | (x, i, j)                                      | x[i:j]  
|                 |                                                 | Use of negative indices is not supported. |
| __hash__        | (x)                                            | hash(x) |
Class OptionError

Module SCons.compat.scons_optparse

```python
__new__(T, S, ...)
```

Return Value

a new object with type S, a subtype of T

Overrides: exceptions.BaseException.__new__

```python
__reduce__(...)
helper for pickle
```

Overrides: object.__reduce__. extit(inherited documentation)

```python
__reduce_ex__(...)
helper for pickle
```

```python
__repr__(x)
repr(x)
```

Overrides: object.__repr__

```python
__setattr__(...)
x.__setattr__('name', value) <==> x.name = value
```

Overrides: object.__setattr__

```python
__setstate__(...)
```

48.2.2 Properties

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>class</strong></td>
<td>Value: &lt;attribute '<strong>class</strong>' of 'object' objects&gt;</td>
</tr>
<tr>
<td>args</td>
<td>Value: &lt;attribute 'args' of 'exceptions.BaseException' objects&gt;</td>
</tr>
<tr>
<td>message</td>
<td>Value: &lt;member 'message' of 'exceptions.BaseException' objects&gt;</td>
</tr>
</tbody>
</table>

48.3 Class OptionError

object

exceptions.BaseException

exceptions.Exception

SCons.compat.scons_optparse.OptParseError

SCons.compat.scons_optparse.OptionError

Known Subclasses: SCons.compat.scons_optparse.OptionConflictError
Class OptionError

Raised if an Option instance is created with invalid or inconsistent arguments.

48.3.1 Methods

```python
__init__(self, msg, option)
x.__init__(...) initializes x; see x.__class__.__doc__ for signature
Overrides: SCons.compat.scons.optparse.OptParseError.__init__
```

```python
__str__(self)
str(x)
Overrides: SCons.compat.scons.optparse.OptParseError.__str__
```

```python
__delattr__(...)
x.__delattr__('name') == del x.name
Overrides: object.__delattr__
```

```python
__getattr__(...)
x.__getattr__('name') == x.name
Overrides: object.__getattr__
```

```python
getitem_(x, y)
x[y]
```

```python
getslice_(x, i, j)
x[i:j]
Use of negative indices is not supported.
```

```python
__hash__(x)
hash(x)
```

```python
__new__(T, S, ...)
Return Value
    a new object with type S, a subtype of T
Overrides: exceptions.BaseException.__new__
```

```python
__reduce__(...)
helper for pickle
Overrides: object.__reduce__ extit(inherited documentation)
```
Class OptionConflictError

Module SCons.compat.scons_optparse

```python
__reduce_ex__(...)
helper for pickle
```

```python
__repr__(x)
repr(x)
Overrides: object.__repr__
```

```python
__setattr__(...)
x.__setattr__(‘name’, value) <=> x.name = value
Overrides: object.__setattr__
```

```python
__setstate__(...)
```

48.3.2 Properties

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>class</em></td>
<td>Value: &lt;attribute '<em>class</em>' of 'object' objects&gt;</td>
</tr>
<tr>
<td>args</td>
<td>Value: &lt;attribute 'args' of 'exceptions.BaseException' objects&gt;</td>
</tr>
<tr>
<td>message</td>
<td>Value: &lt;member 'message' of 'exceptions.BaseException' objects&gt;</td>
</tr>
</tbody>
</table>

48.4 Class OptionConflictError

object

exceptions.BaseException

exceptions.Exception

SCons.compat.scons_optparse.OptParseError

SCons.compat.scons_optparse.OptionError

SCons.compat.scons_optparse.OptionConflictError

Raised if conflicting options are added to an OptionParser.

48.4.1 Methods

```python
__delattr__(...)
x.__delattr__(‘name’) <=> del x.name
Overrides: object.__delattr__
```
Class OptionConflictError

Module SCons.compat.scons_optparse

```python
__getattribute__(...)  
x.__getattribute__('name') <==> x.name  
 Overrides: object.__getattribute__

__getitem__(x, y)  
x[y]

__getslice__(x, i, j)  
x[i:j]  
Use of negative indices is not supported.

__hash__(x)  
hash(x)

__init__(self, msg, option)  
x.__init__(...) initializes x; see x.__class__.__doc__ for signature  
 Overrides: SCons.compat.scons_optparse.OptParseError.__init__

__new__(T, S, ...)  
Return Value  
a new object with type S, a subtype of T  
 Overrides: exceptions.BaseException.__new__

__reduce__(...)  
helper for pickle  
 Overrides: object.__reduce__ extit(inherited documentation)

__reduce_ex__(...)  
helper for pickle

__repr__(x)  
repr(x)  
 Overrides: object.__repr__

__setattr__(...)  
x.__setattr__('name', value) <==> x.name = value  
 Overrides: object.__setattr__

__setstate__(...)  
```

453
48.4.2 Properties

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>.class_</code></td>
<td>Value: <code>&lt;attribute '__class__' of 'object' objects&gt;</code></td>
</tr>
<tr>
<td>args</td>
<td>Value: <code>&lt;attribute 'args' of 'exceptions.BaseException' objects&gt;</code></td>
</tr>
<tr>
<td>message</td>
<td>Value: <code>&lt;member 'message' of 'exceptions.BaseException' objects&gt;</code></td>
</tr>
</tbody>
</table>

48.5 Class OptionValueError

```
object
exceptions.BaseException
    exceptions.Exception
SCons.compat.scons_optparse.OptParseError
    SCons.compat.scons_optparse.OptionValueError
```

Raised if an invalid option value is encountered on the command line.

48.5.1 Methods

```
__delattr__(...)  
x.__delattr__('name') ===> del x.name
Overrides: object.__delattr__

__getattr__(...)  
x.__getattr__('name') ===> x.name
Overrides: object.__getattr__

__getitem__(x, y)  
x[y]
```
Class OptionValueError Module SCons.compat._scons_optparse

```python
_getslicer__ (x, i, j)
x [i:j]
Use of negative indices is not supported.
```

```python
__hash__ (x)
hash (x)
```

```python
__init__ (self, msg)
x .__init__(...) initializes x; see x .__class__. __doc__ for signature
Overrides: exceptions .Exception .__init__. extit(inherited documentation)
```

```python
__new__ (T, S, ...)
Return Value
   a new object with type S, a subtype of T
Overrides: exceptions .BaseException .__new__.extit
```

```python
__reduce__ (...)
helper for pickle
Overrides: object .__reduce__. extit(inherited documentation)
```

```python
__reduce_ex__ (...)
helper for pickle
```

```python
__repr__ (x)
repr (x)
Overrides: object .__repr__.extit
```

```python
__setattr__ (...)
x .__setattr__ (’name’, value) <=> x .name = value
Overrides: object .__setattr__.extit
```

```python
__setstate__ (...)
```

```python
__str__ (self)
str (x)
Overrides: exceptions .BaseException .__str__. extit(inherited documentation)
```

### 48.5.2 Properties
48.6 Class BadOptionError

Raised if an invalid option is seen on the command line.

48.6.1 Methods

```python
__init__(self, opt, str)
Overrides: SCons.compat.scons_optparse.OptParseError.__init__

__str__(self)
Overrides: SCons.compat.scons_optparse.OptParseError.__str__

__delattr__(...)
x.__delattr__('name') == del x.name
Overrides: object.__delattr__

__getattr__(...)
x.__getattr__('name') == x.name
Overrides: object.__getattr__

__getitem__(x, y)
x[y]
```
48.6.2 Properties

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>class</strong></td>
<td>Value: <code>&lt;attribute '__class__' of 'object' objects&gt;</code></td>
</tr>
<tr>
<td>args</td>
<td>Value: <code>&lt;attribute 'args' of 'exceptions.BaseException' objects&gt;</code></td>
</tr>
<tr>
<td>message</td>
<td>Value: <code>&lt;member 'message' of 'exceptions.BaseException' objects&gt;</code></td>
</tr>
</tbody>
</table>

48.7 Class HelpFormatter

Known Subclasses: `SCons.compat.scons_optparse.IndentedHelpFormatter`, `SCons.compat.scons_optparse.TitledHelpFormatter`
Abstract base class for formatting option help. OptionParser instances should use one of the HelpFormatter subclasses for formatting help; by default IndentedHelpFormatter is used.

Instance attributes:

- `parser`: OptionParser
  - the controlling OptionParser instance
- `indent_increment`: int
  - the number of columns to indent per nesting level
- `max_help_position`: int
  - the maximum starting column for option help text
- `help_position`: int
  - the calculated starting column for option help text; initially the same as the maximum
- `width`: int
  - total number of columns for output (pass None to constructor for this value to be taken from the $COLUMNS environment variable)
- `level`: int
  - current indentation level
- `current_indent`: int
  - current indentation level (in columns)
- `help_width`: int
  - number of columns available for option help text (calculated)
- `default_tag`: str
  - text to replace with each option's default value, "%default" by default. Set to false value to disable default value expansion.
- `option_strings`: { Option : str }
  - maps Option instances to the snippet of help text explaining the syntax of that option, e.g. "-h, --help" or "-f FILE, --file=FILE"
- `_short_opt_fmt`: str
  - format string controlling how short options with values are printed in help text. Must be either "%s%s" ("-fFILE") or "%s %s" ("-f FILE"), because those are the two syntaxes that Optik supports.
- `_long_opt_fmt`: str
  - similar but for long options; must be either "%s %s" ("--file FILE") or "%s=%s" ("--file=FILE").

### 48.7.1 Methods

```python
__init__(self, indent_increment, max_help_position, width, short_first)
```

```python
set_parser(self, parser)
```

```python
set_short_opt_delimiter(self, delim)
```

```python
set_long_opt_delimiter(self, delim)
```
48.7.2 Class Variables

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>NO_DEFAULT_VALUE</td>
<td>Value: 'none'</td>
</tr>
</tbody>
</table>

48.8 Class IndentedHelpFormatter

SCons.compat.scons_optparse.HelpFormatter

Format help with indented section bodies.

48.8.1 Methods

```python
_init_(self, indent_increment=2, max_help_position=24, width=False, short_first=False)
```

Overrides: SCons.compat.scons_optparse.HelpFormatter._init_

```python
format_usage(self, usage)
```

Overrides: SCons.compat.scons_optparse.HelpFormatter.format_usage

```python
format_heading(self, heading)
```

Overrides: SCons.compat.scons_optparse.HelpFormatter.format_heading
Class TitledHelpFormatter

```python
dedent(self)
expand_default(self, option)
format_description(self, description)
format_epilog(self, epilog)
format_option(self, option)
format_option_strings(self, option)
Return a comma-separated list of option strings & metavariables.
indent(self)
set_long_opt_delimiter(self, delim)
set_parser(self, parser)
set_short_opt_delimiter(self, delim)
store_option_strings(self, parser)
```

### 48.8.2 Class Variables

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>NO_DEFAULT_VALUE</td>
<td>Value: 'none'</td>
</tr>
</tbody>
</table>

### 48.9 Class TitledHelpFormatter

SCons.compat.scons.optparse.HelpFormatter  

SCons.compat.scons.optparse.TitledHelpFormatter

Format help with underlined section headers.

#### 48.9.1 Methods

```python
__init__(self, indent_increment=0, max_help_position=24, width=False, short_first=0)
Overrideres: SCons.compat.scons.optparse.HelpFormatter.__init__

format_usage(self, usage)
Overrideres: SCons.compat.scons.optparse.HelpFormatter.format_usage
```
format_heading(self, heading)
Overrides: SCons.compat.scons.optparse.HelpFormatter.format_heading

dedent(self)

expand_default(self, option)

format_description(self, description)

format_epilog(self, epilog)

format_option(self, option)

format_option_strings(self, option)
Return a comma-separated list of option strings & metavariables.

indent(self)

set_long_opt_delimiter(self, delim)

set_parser(self, parser)

set_short_opt_delimiter(self, delim)

store_option_strings(self, parser)

48.9.2 Class Variables

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>NO_DEFAULT_VALUE</td>
<td>Value: 'none'</td>
</tr>
</tbody>
</table>

48.10 Class Option

Instance attributes:
- _short_opts : [string]
- _long_opts : [string]

  action : string
  type : string
  dest : string
  default : any
  nargs : int
  const : any
  choices : [string]
  callback : function
callback_args : (any*)
callback_kwargs : { string : any }
help : string
metavar : string

48.10.1 Methods

__init__(self, *opts, **attrs)
__str__(self)
__repr__(self)
takes_value(self)
get_opt_string(self)
check_value(self, opt, value)
convert_value(self, opt, value)
process(self, opt, value, values, parser)
take_action(self, action, dest, opt, value, values, parser)

48.10.2 Class Variables

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ATTRS</td>
<td>Value: ['action', 'type', 'dest', 'default', 'nargs', 'const', '...</td>
</tr>
<tr>
<td>ACTIONS</td>
<td>Value: ('store', 'store_const', 'store_true', 'store_false', 'append', 'ap...</td>
</tr>
<tr>
<td>STORE_ACTIONS</td>
<td>Value: ('store', 'store_const', 'store_true', 'store_false', 'ap...</td>
</tr>
<tr>
<td>TYPED_ACTIONS</td>
<td>Value: ('store', 'append', 'callback')</td>
</tr>
<tr>
<td>ALWAYS_TYPED_ACTIONS</td>
<td>Value: ('store', 'append')</td>
</tr>
<tr>
<td>CONST_ACTIONS</td>
<td>Value: ('store_const', 'append_const')</td>
</tr>
<tr>
<td>TYPES</td>
<td>Value: ('string', 'int', 'long', 'float', 'complex', 'choice')</td>
</tr>
<tr>
<td>TYPE_CHECKER</td>
<td>Value: {'choice': &lt;function check_choice at 0x853a25c&gt;, 'complex...</td>
</tr>
<tr>
<td>CHECK_METHODS</td>
<td>Value: [check_action, _check_type, _check_choice, _check_dest, ...</td>
</tr>
</tbody>
</table>
48.11 Class Values

48.11.1 Methods

\_\_init\_\_(self, defaults=False)

\_\_str\_\_(self)

\_\_repr\_\_(self)

\_\_cmp\_\_(self, other)

read\_module(self, modname, mode='careful')

read\_file(self, filename, mode='careful')

ensure\_value(self, attr, value)

48.12 Class OptionContainer

Known Subclasses: SCons.compat.scons_optparse.OptionGroup, SCons.compat.scons_optparse.OptionParser

Abstract base class.

Class attributes:

standard\_option\_list : [Option]
   list of standard options that will be accepted by all instances
   of this parser class (intended to be overridden by subclasses).

Instance attributes:

option\_list : [Option]
   the list of Option objects contained by this OptionContainer

\_short\_opt : { string : Option }
   dictionary mapping short option strings, eg. "-f" or "-X",
   to the Option instances that implement them. If an Option
   has multiple short option strings, it will appear in this
   dictionary multiple times. [1]

\_long\_opt : { string : Option }
   dictionary mapping long option strings, eg. "--file" or
   "--exclude", to the Option instances that implement them.
   Again, a given Option can occur multiple times in this
   dictionary. [1]

defaults : { string : any }
   dictionary mapping option destination names to default
   values for each destination [1]

[1] These mappings are common to (shared by) all components of the
    controlling OptionParser, where they are initially created.
48.12.1 Methods

```python
_init__(self, option_class, conflict_handler, description)
```

```python
set_conflict_handler(self, handler)
```

```python
set_description(self, description)
```

```python
get_description(self)
```

```python
destroy(self)
```

`see OptionParser.destroy().`

```python
add_option(Option)
add_option(opt_str, ..., kwarg=val, ...)
```

```python
add_options(self, option_list)
```

```python
get_option(self, opt_str)
```

```python
has_option(self, opt_str)
```

```python
remove_option(self, opt_str)
```

```python
format_option_help(self, formatter)
```

```python
format_description(self, formatter)
```

```python
format_help(self, formatter)
```

48.13 Class OptionGroup

SCons.compat.scons_optparse.OptionContainer

SCons.compat.scons_optparse.OptionGroup

48.13.1 Methods

```python
_init__(self, parser, title, description=False)
```

Overrrides: SCons.compat.scons_optparse.OptionContainer._init_

```python
set_title(self, title)
```
### 48.14 Class OptionParser

OptionParser is a subclass of `scons.compat.scons_optparse.OptionContainer`. It provides a method to add options and handle conflicts. Here are its key methods:

- `destroy(self)`: See `OptionParser.destroy()`. Overrides `SCons.compat.scons_optparse.OptionContainer.destroy`
- `format_help(self, formatter)`: Overrides `SCons.compat.scons_optparse.OptionContainer.format_help`
- `add_option(Option)`, `add_option(opt_str, ...)`, `add_options(self, option_list)`: Methods to add options
- `format_description(self, formatter)`, `format_option_help(self, formatter)`: Methods to format option descriptions and help
- `get_description(self)`, `get_option(self, opt_str)`: Methods to get descriptions and options
- `has_option(self, opt_str)`, `remove_option(self, opt_str)`: Methods to check and remove options
- `set_conflict_handler(self, handler)`, `set_description(self, description)`: Methods to set conflict handlers and descriptions

**Class attributes:**
- `standard_option_list` : `[Option]` list of standard options that will be accepted by all instances of this parser class (intended to be overridden by subclasses).

**Instance attributes:**
- `usage` : string a usage string for your program. Before it is displayed to the user, "%prog" will be expanded to the name of your program (self.prog or os.path.basename(sys.argv[0])).
- `prog` : string the name of the current program (to override

---

```
Class OptionParser

SCons.compat.scons_optparse.OptionContainer	SCons.compat.scons_optparse.OptionParser

Class attributes:
    standard_option_list : [Option]
        list of standard options that will be accepted by all instances of this parser class (intended to be overridden by subclasses).

Instance attributes:
    usage : string
        a usage string for your program. Before it is displayed to the user, "%prog" will be expanded to the name of your program (self.prog or os.path.basename(sys.argv[0])).
    prog : string
        the name of the current program (to override

465
```
Class OptionParser

Module SCons.compat.scons_optionparse

    os.path.basename(sys.argv[0])).
    epilog : string
        paragraph of help text to print after option help

    option_groups : [OptionGroup]
        list of option groups in this parser (option groups are
        irrelevant for parsing the command-line, but very useful
        for generating help)

    allow_interpersed_args : bool = true
        if true, positional arguments may be interspersed with options.
        Assuming -a and -b each take a single argument, the command-line
        -ablah foo bar -bboo baz
        will be interpreted the same as
        -ablah -bboo -- foo bar baz
        If this flag were false, that command line would be interpreted as
        -ablah -- foo bar -bboo baz
        -- ie. we stop processing options as soon as we see the first
        non-option argument. (This is the tradition followed by
        Python's getopt module, Perl's Getopt::Std, and other argument-
        parsing libraries, but it is generally annoying to users.)

    process_default_values : bool = true
        if true, option default values are processed similarly to option
        values from the command line: that is, they are passed to the
        type-checking function for the option's type (as long as the
        default value is a string). (This really only matters if you
        have defined custom types; see SF bug #955889.) Set it to false
        to restore the behaviour of Optik 1.4.1 and earlier.

    rargs : [string]
        the argument list currently being parsed. Only set when
        parse_args() is active, and continually trimmed down as
        we consume arguments. Mainly there for the benefit of
        callback options.

    largs : [string]
        the list of leftover arguments that we have skipped while
        parsing options. If allow_interpersed_args is false, this
        list is always empty.

    values : Values
        the set of option values currently being accumulated. Only
        set when parse_args() is active. Also mainly for callbacks.

Because of the 'rargs', 'largs', and 'values' attributes,
OptionParser is not thread-safe. If, for some perverse reason, you
need to parse command-line arguments simultaneously in different
threads, use different OptionParser instances.
48.14.1 Methods

```python
__init__(self, usage=False, option_list=False, option_class=<class
SCons.compat.scons_optparse.Option at 0x851ff8c>, version=False, conflict_handler='error',
description=False, formatter=False, add_help_option=True, prog=False, epilog=False)
Overrides: SCons.compat.scons_optparse.OptionContainer.__init__

destroy(self)

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.
Overrides: SCons.compat.scons_optparse.OptionContainer.destroy

set_usage(self, usage)

enable_interspersed_args(self)

disable_interspersed_args(self)

set_process_default_values(self, process)

set_default(self, dest, value)

set_defaults(self, **kwargs)

get_default_values(self)

add_option_group(self, *args, **kwargs)

get_option_group(self, opt_str)

parse_args(self, args=False, values=False)

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 an Values instance (with all
your option values) and 'args' is the list of arguments left
over after parsing options.
```
### Class OptionParser

**Module SCons.compat.scons_optparse**

<table>
<thead>
<tr>
<th>Method</th>
<th>Documentation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>check_values</strong> <em>(self, values, args)</em></td>
<td>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.</td>
</tr>
<tr>
<td><strong>get_prog_name</strong> <em>(self)</em></td>
<td></td>
</tr>
<tr>
<td><strong>expand_prog_name</strong> <em>(self, s)</em></td>
<td></td>
</tr>
<tr>
<td><strong>get_description</strong> <em>(self)</em></td>
<td>Overrides: SCons.compat.scons_optparse.OptionContainer.get_description</td>
</tr>
<tr>
<td><strong>exit</strong> <em>(self, status=0, msg=False)</em></td>
<td></td>
</tr>
<tr>
<td><strong>error</strong> <em>(self, msg)</em></td>
<td>Error (msg : string)</td>
</tr>
<tr>
<td><strong>print_usage</strong> <em>(self, file=False)</em></td>
<td>Print the usage message for the current program (self.usage) to 'file' (default stdout). Any occurrence of the string &quot;%prog&quot; 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.</td>
</tr>
<tr>
<td><strong>get_version</strong> <em>(self)</em></td>
<td></td>
</tr>
</tbody>
</table>
print_version(self, file=False)
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.

format_option_help(self, formatter=False)
Overrides: SCons.compat.scons_optparse.OptionContainer.format_option_help

format_epilog(self, formatter)

format_help(self, formatter=False)
Overrides: SCons.compat.scons_optparse.OptionContainer.format_help

print_help(self, file=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).

add_option(Option)
add_option(opt_str, ..., kwarg=val, ...)

add_options(self, option_list)

format_description(self, formatter)

get_option(self, opt_str)

has_option(self, opt_str)

remove_option(self, opt_str)

set_conflict_handler(self, handler)

set_description(self, description)

### 48.14.2 Class Variables

| Name                | Description | Value: [] |
Module SCons.compat._scons_sets

Classes to represent arbitrary sets (including sets of sets).

This module implements sets using dictionaries whose values are ignored. The usual operations (union, intersection, deletion, etc.) are provided as both methods and operators.

Important: sets are not sequences! While they support 'x in s', 'len(s)', and 'for x in s', none of those operations are unique for sequences; for example, mappings support all three as well. The characteristic operation for sequences is subscripting with small integers: s[i], for i in range(len(s)). Sets don’t support subscripting at all. Also, sequences allow multiple occurrences and their elements have a definite order; sets on the other hand don’t record multiple occurrences and don’t remember the order of element insertion (which is why they don’t support s[i]).

The following classes are provided:

BaseSet -- All the operations common to both mutable and immutable sets. This is an abstract class, not meant to be directly instantiated.

Set -- Mutable sets, subclass of BaseSet; not hashable.

ImmutableSet -- Immutable sets, subclass of BaseSet; hashable. An iterable argument is mandatory to create an ImmutableSet.

_TemporarilyImmutableSet -- A wrapper around a Set, hashable, giving the same hash value as the immutable set equivalent would have. Do not use this class directly.

Only hashable objects can be added to a Set. In particular, you cannot really add a Set as an element to another Set; if you try, what is actually added is an ImmutableSet built from it (it compares equal to the one you tried adding).

When you ask if ‘x in y’ where x is a Set and y is a Set or ImmutableSet, x is wrapped into a _TemporarilyImmutableSet z, and what’s tested is actually ‘z in y’.

49.1 Class BaseSet

```
object
    SCons.compat._scons_sets.BaseSet
```

Known Subclasses: SCons.compat._scons_sets.ImmutableSet, SCons.compat._scons_sets.Set, SCons.compat._scons_sets._TemporarilyImmutableSet

Common base class for mutable and immutable sets.
### 49.1.1 Methods

<table>
<thead>
<tr>
<th>Method</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>_init_(self)</td>
<td>This is an abstract class. Overrides: object.<em>init</em></td>
</tr>
<tr>
<td>_len_(self)</td>
<td>Return the number of elements of a set.</td>
</tr>
<tr>
<td>_repr_(self)</td>
<td>Return string representation of a set.</td>
</tr>
<tr>
<td>_str_(self)</td>
<td>Return string representation of a set.</td>
</tr>
<tr>
<td>_iter_(self)</td>
<td>Return an iterator over the elements or a set. This is the keys iterator for the underlying dict.</td>
</tr>
<tr>
<td>_cmp_(self, other)</td>
<td></td>
</tr>
<tr>
<td>_eq_(self, other)</td>
<td></td>
</tr>
<tr>
<td>_ne_(self, other)</td>
<td></td>
</tr>
<tr>
<td>copy(self)</td>
<td>Return a shallow copy of a set.</td>
</tr>
<tr>
<td>_copy_(self)</td>
<td>Return a shallow copy of a set.</td>
</tr>
<tr>
<td>_deepcopy_(self, memo)</td>
<td>Return a deep copy of a set; used by copy module.</td>
</tr>
<tr>
<td>Method</td>
<td>Description</td>
</tr>
<tr>
<td>----------------</td>
<td>----------------------------------------------------------------------------</td>
</tr>
<tr>
<td><code>__or__(self, other)</code></td>
<td>Return the union of two sets as a new set. (I.e. all elements that are in either set.)</td>
</tr>
<tr>
<td><code>union(self, other)</code></td>
<td>Return the union of two sets as a new set. (I.e. all elements that are in either set.)</td>
</tr>
<tr>
<td><code>__and__(self, other)</code></td>
<td>Return the intersection of two sets as a new set. (I.e. all elements that are in both sets.)</td>
</tr>
<tr>
<td><code>intersection(self, other)</code></td>
<td>Return the intersection of two sets as a new set. (I.e. all elements that are in both sets.)</td>
</tr>
<tr>
<td><code>__xor__(self, other)</code></td>
<td>Return the symmetric difference of two sets as a new set. (I.e. all elements that are in exactly one of the sets.)</td>
</tr>
<tr>
<td><code>symmetric_difference(self, other)</code></td>
<td>Return the symmetric difference of two sets as a new set. (I.e. all elements that are in exactly one of the sets.)</td>
</tr>
<tr>
<td><code>__sub__(self, other)</code></td>
<td>Return the difference of two sets as a new Set. (I.e. all elements that are in this set and not in the other.)</td>
</tr>
<tr>
<td><code>difference(self, other)</code></td>
<td>Return the difference of two sets as a new Set. (I.e. all elements that are in this set and not in the other.)</td>
</tr>
</tbody>
</table>
### Class BaseSet

**Module** SCons.compat_sets

#### `.contains`(self, element)
Report whether an element is a member of a set.

(Called in response to the expression 'element in self'.)

#### `issubset`(self, other)
Report whether another set contains this set.

#### `issuperset`(self, other)
Report whether this set contains another set.

#### `__le__`(self, other)
Report whether another set contains this set.

#### `__ge__`(self, other)
Report whether this set contains another set.

#### `__lt__`(self, other)

#### `__gt__`(self, other)

#### `__delattr__`(self, name)
\[x.__delattr__('name') \leftrightarrow \text{del} x.name\]

#### `__getattr__`(self, name)
\[x.__getattr__('name') \leftrightarrow x.name\]

#### `__hash__`(x)
\[\text{hash}(x)\]

#### `__new__`(T, S, ...)
Return Value

\[\text{a new object with type } S, \text{ a subtype of } T\]

#### `__reduce__`(self)
helper for pickle

#### `__reduce_ex__`(self)
helper for pickle
49.2 Class ImmutableSet

Immutable set class.

49.2.1 Methods

```python
__init__(self, iterable=False)
```
Construct an immutable set from an optional iterable.
Overrrides: SCons.compat.scons_sets.BaseSet.__init__

```python
__hash__(self)
```
hash(x)
overrides: object.__hash__ (inherited documentation)

```python
__getstate__(self)
```

```python
__setstate__(self, state)
```

```python
__and__(self, other)
```
Return the intersection of two sets as a new set.
(I.e. all elements that are in both sets.)

```python
__cmp__(self, other)
```

```python
__contains__(self, element)
```
Report whether an element is a member of a set.
(Called in response to the expression 'element in self'.)
**Class ImmutableSet**

<table>
<thead>
<tr>
<th>Method</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>copy</strong>(self)</td>
<td>Return a shallow copy of a set.</td>
</tr>
<tr>
<td><strong>deepcopy</strong>(self, memo)</td>
<td>Return a deep copy of a set; used by copy module.</td>
</tr>
<tr>
<td><strong>delattr</strong>(...)</td>
<td>x.<strong>delattr</strong>('name') ==&gt; del x.name</td>
</tr>
<tr>
<td><strong>eq</strong>(self, other)</td>
<td></td>
</tr>
<tr>
<td><strong>ge</strong>(self, other)</td>
<td>Report whether this set contains another set.</td>
</tr>
<tr>
<td><strong>getattribute</strong>(...)</td>
<td>x.<strong>getattribute</strong>('name') ==&gt; x.name</td>
</tr>
<tr>
<td><strong>gt</strong>(self, other)</td>
<td></td>
</tr>
<tr>
<td><strong>iter</strong>(self)</td>
<td>Return an iterator over the elements or a set.</td>
</tr>
<tr>
<td></td>
<td>This is the keys iterator for the underlying dict.</td>
</tr>
<tr>
<td><strong>le</strong>(self, other)</td>
<td>Report whether another set contains this set.</td>
</tr>
<tr>
<td><strong>len</strong>(self)</td>
<td>Return the number of elements of a set.</td>
</tr>
<tr>
<td><strong>lt</strong>(self, other)</td>
<td></td>
</tr>
<tr>
<td><strong>ne</strong>(self, other)</td>
<td></td>
</tr>
<tr>
<td><strong>new</strong>(T, S, ...)</td>
<td>Return Value</td>
</tr>
<tr>
<td></td>
<td>a new object with type S, a subtype of T</td>
</tr>
</tbody>
</table>
### Class ImmutableSet

<table>
<thead>
<tr>
<th>Method</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>__or__</code></td>
<td>Return the union of two sets as a new set. (I.e. all elements that are in either set.)</td>
</tr>
<tr>
<td><code>__reduce__</code></td>
<td>helper for pickle</td>
</tr>
<tr>
<td><code>__reduce_ex__</code></td>
<td>helper for pickle</td>
</tr>
<tr>
<td><code>__repr__</code></td>
<td>Return string representation of a set. This looks like 'Set([&lt;list of elements&gt;])'. Overrides: object.<strong>repr</strong></td>
</tr>
<tr>
<td><code>__setattr__</code></td>
<td>x.<strong>setattr</strong>('name', value) == x.name = value</td>
</tr>
<tr>
<td><code>__str__</code></td>
<td>Return string representation of a set. This looks like 'Set([&lt;list of elements&gt;])'. Overrides: object.<strong>str</strong></td>
</tr>
<tr>
<td><code>__sub__</code></td>
<td>Return the difference of two sets as a new Set. (I.e. all elements that are in this set and not in the other.)</td>
</tr>
<tr>
<td><code>__xor__</code></td>
<td>Return the symmetric difference of two sets as a new set. (I.e. all elements that are in exactly one of the sets.)</td>
</tr>
<tr>
<td><code>copy</code></td>
<td>Return a shallow copy of a set.</td>
</tr>
</tbody>
</table>
```python

difference(self, other)

Return the difference of two sets as a new Set.
(I.e. all elements that are in this set and not in the other.)

intersection(self, other)

Return the intersection of two sets as a new set.
(I.e. all elements that are in both sets.)

issubset(self, other)

Report whether another set contains this set.

issuperset(self, other)

Report whether this set contains another set.

symmetric_difference(self, other)

Return the symmetric difference of two sets as a new set.
(I.e. all elements that are in exactly one of the sets.)

union(self, other)

Return the union of two sets as a new set.
(I.e. all elements that are in either set.)
```

49.2.2 Properties

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>class</strong></td>
<td>Value: <code>&lt;attribute '__class__' of 'object' objects&gt;</code></td>
</tr>
</tbody>
</table>

49.3 Class Set

```
object

SCons.compat.scons_sets.BaseSet

SCons.compat.scons_sets.Set
```

Mutable set class.
### 49.3.1 Methods

<table>
<thead>
<tr>
<th>Method</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>.init__(self, iterable=False)</code></td>
<td>Construct a set from an optional iterable. Overrides: SCons.compat.scons_sets.BaseSet.<em>init</em>_</td>
</tr>
<tr>
<td><code>.getstate__(self)</code></td>
<td></td>
</tr>
<tr>
<td><code>.setstate__(self, data)</code></td>
<td></td>
</tr>
<tr>
<td><code>.hash__(self)</code></td>
<td>A Set cannot be hashed. Overrides: object.<strong>hash</strong></td>
</tr>
<tr>
<td><code>.ior__(self, other)</code></td>
<td>Update a set with the union of itself and another.</td>
</tr>
<tr>
<td><code>union_update(self, other)</code></td>
<td>Update a set with the union of itself and another.</td>
</tr>
<tr>
<td><code>.iand__(self, other)</code></td>
<td>Update a set with the intersection of itself and another.</td>
</tr>
<tr>
<td><code>intersection_update(self, other)</code></td>
<td>Update a set with the intersection of itself and another.</td>
</tr>
<tr>
<td><code>.ixor__(self, other)</code></td>
<td>Update a set with the symmetric difference of itself and another.</td>
</tr>
<tr>
<td><code>symmetric_difference_update(self, other)</code></td>
<td>Update a set with the symmetric difference of itself and another.</td>
</tr>
<tr>
<td><code>.isub__(self, other)</code></td>
<td>Remove all elements of another set from this set.</td>
</tr>
<tr>
<td><code>difference_update(self, other)</code></td>
<td>Remove all elements of another set from this set.</td>
</tr>
<tr>
<td><code>update(self, iterable)</code></td>
<td>Add all values from an iterable (such as a list or file).</td>
</tr>
<tr>
<td>Method</td>
<td>Description</td>
</tr>
<tr>
<td>---------------</td>
<td>-----------------------------------------------------------------------------</td>
</tr>
<tr>
<td><code>clear(self)</code></td>
<td>Remove all elements from this set.</td>
</tr>
<tr>
<td><code>add(self, element)</code></td>
<td>Add an element to a set. This has no effect if the element is already present.</td>
</tr>
<tr>
<td><code>remove(self, element)</code></td>
<td>Remove an element from a set; it must be a member. If the element is not a member, raise a KeyError.</td>
</tr>
<tr>
<td><code>discard(self, element)</code></td>
<td>Remove an element from a set if it is a member. If the element is not a member, do nothing.</td>
</tr>
<tr>
<td><code>pop(self)</code></td>
<td>Remove and return an arbitrary set element.</td>
</tr>
<tr>
<td><code>__asImmutable__(self)</code></td>
<td>as immutable</td>
</tr>
<tr>
<td><code>__asTemporarilyImmutable__(self)</code></td>
<td>as temporarily immutable</td>
</tr>
<tr>
<td><code>__and__(self, other)</code></td>
<td>Return the intersection of two sets as a new set. (I.e. all elements that are in both sets.)</td>
</tr>
<tr>
<td><code>__cmp__(self, other)</code></td>
<td></td>
</tr>
<tr>
<td><code>__contains__(self, element)</code></td>
<td>Report whether an element is a member of a set. (Called in response to the expression ‘element in self’.)</td>
</tr>
<tr>
<td><code>__copy__(self)</code></td>
<td>Return a shallow copy of a set.</td>
</tr>
<tr>
<td><code>__deepcopy__(self, memo)</code></td>
<td>Return a deep copy of a set; used by copy module.</td>
</tr>
<tr>
<td>Method</td>
<td>Description</td>
</tr>
<tr>
<td>-------------</td>
<td>-----------------------------------------------------------------------------</td>
</tr>
<tr>
<td><strong>delattr</strong></td>
<td>x.<strong>delattr</strong>('name') == del x.name</td>
</tr>
<tr>
<td><strong>eq</strong></td>
<td>(self, other)</td>
</tr>
<tr>
<td><strong>ge</strong></td>
<td>Report whether this set contains another set.</td>
</tr>
<tr>
<td><strong>getattribute</strong></td>
<td>x.<strong>getattribute</strong>('name') == x.name</td>
</tr>
<tr>
<td><strong>gt</strong></td>
<td>(self, other)</td>
</tr>
<tr>
<td><strong>iter</strong></td>
<td>Return an iterator over the elements or a set.</td>
</tr>
<tr>
<td><strong>le</strong></td>
<td>Report whether another set contains this set.</td>
</tr>
<tr>
<td><strong>len</strong></td>
<td>Return the number of elements of a set.</td>
</tr>
<tr>
<td><strong>lt</strong></td>
<td>(self, other)</td>
</tr>
<tr>
<td><strong>ne</strong></td>
<td>(self, other)</td>
</tr>
<tr>
<td><strong>new</strong></td>
<td>Return a new object with type S, a subtype of T</td>
</tr>
<tr>
<td><strong>or</strong></td>
<td>Return the union of two sets as a new set.</td>
</tr>
<tr>
<td><strong>reduce</strong></td>
<td>helper for pickle</td>
</tr>
</tbody>
</table>

Report whether this set contains another set.

Return an iterator over the elements or a set.

This is the keys iterator for the underlying dict.

Return the union of two sets as a new set.

(I.e. all elements that are in either set.)
```python
__reduce_ex__(...)  
helper for pickle

__repr__(self)  
Return string representation of a set.  
This looks like 'Set([<list of elements>])'.  
Overrides: object.__repr__

__setattr__(...)  
x.__setattr__('name', value)  
x.name = value

__str__(self)  
Return string representation of a set.  
This looks like 'Set([<list of elements>])'.  
Overrides: object.__str__

__sub__(self, other)  
Return the difference of two sets as a new Set.  
(I.e. all elements that are in this set and not in the other.)

__xor__(self, other)  
Return the symmetric difference of two sets as a new set.  
(I.e. all elements that are in exactly one of the sets.)

copy(self)  
Return a shallow copy of a set.

difference(self, other)  
Return the difference of two sets as a new Set.  
(I.e. all elements that are in this set and not in the other.)

intersection(self, other)  
Return the intersection of two sets as a new set.  
(I.e. all elements that are in both sets.)
```
issubset(self, other)
Report whether another set contains this set.

issuperset(self, other)
Report whether this set contains another set.

symmetric_difference(self, other)
Return the symmetric difference of two sets as a new set.
(I.e. all elements that are in exactly one of the sets.)

union(self, other)
Return the union of two sets as a new set.
(I.e. all elements that are in either set.)

49.3.2 Properties

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>class</strong></td>
<td>Value: &lt;attribute '<strong>class</strong>' of 'object' objects&gt;</td>
</tr>
</tbody>
</table>
50 Module SCons.compat._scons_sets15

50.1 Class Set

The set class. It can contain mutable objects.

50.1.1 Methods

<table>
<thead>
<tr>
<th>Method</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>_init_</code>(self, seq=False)</td>
<td>The constructor. It can take any object giving an iterator as an optional argument to populate the new set.</td>
</tr>
<tr>
<td><code>_str_</code>(self)</td>
<td></td>
</tr>
<tr>
<td><code>copy(self)</code></td>
<td>Shallow copy of a set object.</td>
</tr>
<tr>
<td><code>contains</code>(self, elem)</td>
<td></td>
</tr>
<tr>
<td><code>len</code>(self)</td>
<td></td>
</tr>
<tr>
<td><code>getitem</code>(self, index)</td>
<td></td>
</tr>
<tr>
<td><code>items</code>(self)</td>
<td>Returns a list of the elements in the set.</td>
</tr>
<tr>
<td><code>add</code>(self, elem)</td>
<td>Add one element to the set.</td>
</tr>
<tr>
<td><code>remove</code>(self, elem)</td>
<td>Remove an element from the set. Return an error if elem is not in the set.</td>
</tr>
<tr>
<td><code>discard</code>(self, elem)</td>
<td>Remove an element from the set. Do nothing if elem is not in the set.</td>
</tr>
<tr>
<td><code>sort</code>(self, func=&lt;built-in function cmp&gt;)</td>
<td></td>
</tr>
<tr>
<td><code>_iter_</code>(self)</td>
<td></td>
</tr>
<tr>
<td><code>_or_</code>(self, other)</td>
<td>Union of two sets.</td>
</tr>
<tr>
<td>Method</td>
<td>Description</td>
</tr>
<tr>
<td>---------</td>
<td>--------------------------------------------------</td>
</tr>
<tr>
<td><code>_sub_</code>(self, other)</td>
<td>Difference of two sets.</td>
</tr>
<tr>
<td><code>_and_</code>(self, other)</td>
<td>Intersection of two sets.</td>
</tr>
<tr>
<td><code>_add_</code>(self, other)</td>
<td>Symmetric difference of two sets.</td>
</tr>
<tr>
<td><code>_mul_</code>(self, other)</td>
<td>Cartesian product of two sets.</td>
</tr>
<tr>
<td><code>_lt_</code>(self, other)</td>
<td>Returns 1 if the lhs set is contained but not equal to the rhs set.</td>
</tr>
<tr>
<td><code>_le_</code>(self, other)</td>
<td>Returns 1 if the lhs set is contained in the rhs set.</td>
</tr>
<tr>
<td><code>_eq_</code>(self, other)</td>
<td>Returns 1 if the sets are equal.</td>
</tr>
<tr>
<td><code>_cmp_</code>(self, other)</td>
<td>Returns 1 if the sets are equal.</td>
</tr>
</tbody>
</table>
51 Module SCons.compat._scons_shlex

A lexical analyzer class for simple shell-like syntaxes.

51.1 Functions

\texttt{split}(s, \texttt{comments}=False)

51.2 Class shlex

A lexical analyzer class for simple shell-like syntaxes.

51.2.1 Methods

\texttt{\_init\_}(\texttt{self}, \texttt{instream}=False, \texttt{infile}=False, \texttt{posix}=False)

\texttt{push\_token}(\texttt{self}, \texttt{tok})
Push a token onto the stack popped by the \texttt{get\_token} method

\texttt{push\_source}(\texttt{self}, \texttt{newstream}, \texttt{newfile}=False)
Push an input source onto the lexer's input source stack.

\texttt{pop\_source}(\texttt{self})
Pop the input source stack.

\texttt{get\_token}(\texttt{self})
Get a token from the input stream (or from stack if it's nonempty)

\texttt{read\_token}(\texttt{self})

\texttt{sourcehook}(\texttt{self}, \texttt{newfile})
Hook called on a filename to be sourced.

\texttt{error\_leader}(\texttt{self}, \texttt{infile}=False, \texttt{lineno}=False)

\texttt{\_\_iter\_\_}(\texttt{self})

\texttt{next}(\texttt{self})
52 Module SCons.compat._scons_subprocess

subprocess - Subprocesses with accessible I/O streams

This module allows you to spawn processes, connect to their
input/output/error pipes, and obtain their return codes. This module
intends to replace several other, older modules and functions, like:

os.system
os.spawn*
os.popen*
popen2.*
commands.*

Information about how the subprocess module can be used to replace these
modules and functions can be found below.

Using the subprocess module
============================

This module defines one class called Popen:

class Popen(args, bufsize=0, executable=None,
            stdin=None, stdout=None, stderr=None,
            preexec_fn=None, close_fds=False, shell=False,
            cwd=None, env=None, universal_newlines=False,
            startupinfo=None, creationflags=0):

Arguments are:

args should be a string, or a sequence of program arguments. The
program to execute is normally the first item in the args sequence or
string, but can be explicitly set by using the executable argument.

On UNIX, with shell=False (default): In this case, the Popen class
uses os.execvp() to execute the child program. args should normally
be a sequence. A string will be treated as a sequence with the string
as the only item (the program to execute).

On UNIX, with shell=True: If args is a string, it specifies the
command string to execute through the shell. If args is a sequence,
the first item specifies the command string, and any additional items
will be treated as additional shell arguments.

On Windows: the Popen class uses CreateProcess() to execute the child
program, which operates on strings. If args is a string, it will be
converted to a string using the list2cmdline method. Please note that
not all MS Windows applications interpret the command line the same
way: The list2cmdline is designed for applications using the same
rules as the MS C runtime.

bufsize, if given, has the same meaning as the corresponding argument to the built-in open() function: 0 means unbuffered, 1 means line buffered, any other positive value means use a buffer of (approximately) that size. A negative bufsize means to use the system default, which usually means fully buffered. The default value for bufsize is 0 (unbuffered).

stdin, stdout and stderr specify the executed programs’ standard input, standard output and standard error file handles, respectively. Valid values are PIPE, an existing file descriptor (a positive integer), an existing file object, and None. PIPE indicates that a new pipe to the child should be created. With None, no redirection will occur; the child’s file handles will be inherited from the parent. Additionally, stderr can be STDOUT, which indicates that the stderr data from the applications should be captured into the same file handle as for stdout.

If preexec_fn is set to a callable object, this object will be called in the child process just before the child is executed.

If close_fds is true, all file descriptors except 0, 1 and 2 will be closed before the child process is executed.

if shell is true, the specified command will be executed through the shell.

If cwd is not None, the current directory will be changed to cwd before the child is executed.

If env is not None, it defines the environment variables for the new process.

If universal_newlines is true, the file objects stdout and stderr are opened as a text files, but lines may be terminated by any of \n, the Unix end-of-line convention, \r, the Macintosh convention or \r\n, the Windows convention. All of these external representations are seen as \n by the Python program. Note: This feature is only available if Python is built with universal newline support (the default). Also, the newlines attribute of the file objects stdout, stdin and stderr are not updated by the communicate() method.

The startupinfo and creationflags, if given, will be passed to the underlying CreateProcess() function. They can specify things such as appearance of the main window and priority for the new process. (Windows only)

This module also defines two shortcut functions:
call(*popenargs, **kwargs):
    Run command with arguments. Wait for command to complete, then
    return the returncode attribute.

    The arguments are the same as for the Popen constructor. Example:

    retcode = call(['ls', '-l'])

call_check(*popenargs, **kwargs):
    Run command with arguments. Wait for command to complete. If the
    exit code was zero then return, otherwise raise
    CalledProcessError. The CalledProcessError object will have the
    return code in the returncode attribute.

    The arguments are the same as for the Popen constructor. Example:

    call_check(['ls', '-l'])

Exceptions
----------
Exceptions raised in the child process, before the new program has
started to execute, will be re-raised in the parent. Additionally,
the exception object will have one extra attribute called
'child_traceback', which is a string containing traceback information
from the childs point of view.

The most common exception raised is OSError. This occurs, for
example, when trying to execute a non-existent file. Applications
should prepare for OS Errors.

A ValueError will be raised if Popen is called with invalid arguments.

check call() will raise CalledProcessError, if the called process
returns a non-zero return code.

Security
--------
Unlike some other popen functions, this implementation will never call
/bin/sh implicitly. This means that all characters, including shell
metacharacters, can safely be passed to child processes.

Popen objects
=============:
Instances of the Popen class have the following methods:

poll()
    Check if child process has terminated. Returns returncode
    attribute.
wait()
   Wait for child process to terminate. Returns returncode attribute.

communicate(input=None)
   Interact with process: Send data to stdin. Read data from stdout and stderr, until end-of-file is reached. Wait for process to terminate. The optional stdin argument should be a string to be sent to the child process, or None, if no data should be sent to the child.

   communicate() returns a tuple (stdout, stderr).

   Note: The data read is buffered in memory, so do not use this method if the data size is large or unlimited.

The following attributes are also available:

stdin
   If the stdin argument is PIPE, this attribute is a file object that provides input to the child process. Otherwise, it is None.

stdout
   If the stdout argument is PIPE, this attribute is a file object that provides output from the child process. Otherwise, it is None.

stderr
   If the stderr argument is PIPE, this attribute is file object that provides error output from the child process. Otherwise, it is None.

pid
   The process ID of the child process.

returncode
   The child return code. A None value indicates that the process hasn't terminated yet. A negative value -N indicates that the child was terminated by signal N (UNIX only).

Replacing older functions with the subprocess module
====================================================
In this section, "a => b" means that b can be used as a replacement for a.

Note: All functions in this section fail (more or less) silently if the executed program cannot be found; this module raises an OSError exception.

In the following examples, we assume that the subprocess module is imported with "from subprocess import *".
Replacing /bin/sh shell backquote
---------------------------------
output='mycmd myarg'
==> 
output = Popen(['mycmd', 'myarg'], stdout=PIPE).communicate()[0]

Replacing shell pipe line
-------------------------
output='dmesg | grep hda'
==> 
p1 = Popen(['dmesg'], stdout=PIPE)
p2 = Popen(['grep', 'hda'], stdin=p1.stdout, stdout=PIPE)
output = p2.communicate()[0]

Replacing os.system()
---------------------
sts = os.system("mycmd + " myarg")
==> 
p = Popen("mycmd + " myarg", shell=True)
pid, sts = os.waitpid(p.pid, 0)

Note:
* Calling the program through the shell is usually not required.
* It's easier to look at the returncode attribute than the exitstatus.
A more real-world example would look like this:

try:
    retcode = call("mycmd + " myarg", shell=True)
    if retcode < 0:
        print >>sys.stderr, "Child was terminated by signal", -retcode
    else:
        print >>sys.stderr, "Child returned", retcode
except OSError, e:
    print >>sys.stderr, "Execution failed:", e

Replacing os.spawn*
-------------------
P_NOWAIT example:

pid = os.spawnlp(os.P_NOWAIT, "/bin/mycmd", "mycmd", "myarg")
==> 
pid = Popen(['"/bin/mycmd", "myarg"]).pid
P_WAIT example:

```python
retcode = os.spawnlp(os.P_WAIT, "/bin/mymd", "mcmd", "myarg")
=>
retcode = call(["/bin/mymd", "myarg"])
```

Vector example:

```python
os.spawnvp(os.P_NOWAIT, path, args)
=>
Popen([path] + args[1:])
```

Environment example:

```python
os.spawnlpe(os.P_NOWAIT, "/bin/mymd", "mcmd", "myarg", env)
=>
Popen(["/bin/mymd", "myarg"], env={"PATH": "/usr/bin"})
```

Replacing os.popen*

```python
pipe = os.popen(cmd, mode='r', bufsize)
=>
pipe = Popen(cmd, shell=True, bufsize=bufsize, stdout=PIPE).stdout

pipe = os.popen(cmd, mode='w', bufsize)
=>
pipe = Popen(cmd, shell=True, bufsize=bufsize, stdin=PIPE).stdin
```

(\(child_{stdin}\), \(child_{stdout}\)) = os.popen2(cmd, mode, bufsize)  
=>
\(p = Popen(cmd, shell=True, bufsize=bufsize, 
      stdin=PIPE, stdout=PIPE, close_fds=True)\)  
(\(child_{stdin}\), \(child_{stdout}\)) = (p.stdin, p.stdout)

(\(child_{stdin}\), \(child_{stdout}\),  
\(child_{stderr}\)) = os.popen3(cmd, mode, bufsize)  
=>
\(p = Popen(cmd, shell=True, bufsize=bufsize, 
      stdin=PIPE, stdout=PIPE, stderr=PIPE, close_fds=True)\)  
(\(child_{stdin}\), \(child_{stdout}\), \(child_{stderr}\)) = (p.stdin, p.stdout, p.stderr)
Functions Module SCons.compat._scons_subprocess

\[
\text{(child\_stdin, child\_stdout, and\_stderr) = os.popen4(cmd, mode, bufsize)}
\]
\[
\quad =>
\quad p = Popen(cmd, shell=True, bufsize=bufsize, 
\quad \quad stdin=PIPE, stdout=PIPE, stderr=STDOUT, close\_fds=True)
\]
\[
\text{(child\_stdin, child\_stdout, and\_stderr) = (p.stdin, p.stdout)}
\]

Replacing popen2.*
------------------
Note: If the cmd argument to popen2 functions is a string, the command
is executed through /bin/sh. If it is a list, the command is directly
executed.

\[
\text{(child\_stdout, child\_stdin) = popen2.popen2("somestring", bufsize, mode)}
\]
\[
\quad =>
\quad p = Popen(["somestring"], shell=True, bufsize=bufsize 
\quad \quad stdin=PIPE, stdout=PIPE, close\_fds=True)
\]
\[
\text{(child\_stdout, child\_stdin) = (p.stdout, p.stdin)}
\]

\[
\text{(child\_stdout, child\_stdin) = popen2.popen2(["mycmd", "myarg"], bufsize, mode)}
\]
\[
\quad =>
\quad p = Popen(["mycmd", "myarg"], bufsize=bufsize, 
\quad \quad stdin=PIPE, stdout=PIPE, close\_fds=True)
\]
\[
\text{(child\_stdout, child\_stdin) = (p.stdout, p.stdin)}
\]

The popen2.Popen3 and popen3.Popen4 basically works as subprocess.Popen,
except that:

* subprocess.Popen raises an exception if the execution fails
* the capturestderr argument is replaced with the stderr argument.
* stdin=PIPE and stdout=PIPE must be specified.
* popen2 closes all file descriptors by default, but you have to specify
  close_fds=True with subprocess.Popen.

52.1 Functions

\[
\text{call(*popenargs, **kwargs)}
\]

Run command with arguments. Wait for command to complete, then
return the returncode attribute.

The arguments are the same as for the Popen constructor. Example:

\[
\text{retcode = call(["ls", "}
\]
\[
\text{"-l"])
\]
### 52.2 Variables

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>PIPE</td>
<td>Value: -1</td>
</tr>
<tr>
<td>STDOUT</td>
<td>Value: -2</td>
</tr>
</tbody>
</table>

### 52.3 Class CalledProcessError

```python
check_call(*popenargs, **kwargs)
```

Run command with arguments. Wait for command to complete. If the exit code was zero then return, otherwise raise CalledProcessError. The CalledProcessError object will have the return code in the returncode attribute.

The arguments are the same as for the Popen constructor. Example:

```python
check_call(['ls', '-l'])
```

### 52.3.1 Methods

- `_init_`(self, returncode, cmd)
  - `x._init__(...)` initializes x; see `x._class___.doc__` for signature
  - Overrides: `exceptions.Exception._init__.extit(inherited documentation)`

- `_str_`(self)
  - `str(x)`
  - Overrides: `exceptions.BaseException._str_. extit(inherited documentation)`

- `_delattr_`(...
  - `x._delattr_('name') <== del x.name`
  - Overrides: `object._delattr__`
Class CalledProcessError

Module SCons.compat._scons_subprocess

```python
__getattr__(...)  
x.__getattr__('name') <-> x.name
Overrides: object.__getattr__
```

```python
__getitem__(x, y)  
x[y]
```

```python
__getslice__(x, i, j)  
x[i:j]
Use of negative indices is not supported.
```

```python
__hash__(x)  
hash(x)
```

```python
__new__(T, S, ...)  
Return Value
   a new object with type S, a subtype of T
Overrides: exceptions.BaseException.__new__
```

```python
__reduce__(...)  
helper for pickle
Overrides: object.__reduce__ extit(inherited documentation)
```

```python
__reduce_ex__(...)  
helper for pickle
```

```python
__repr__(x)  
repr(x)
Overrides: object.__repr__
```

```python
__setattr__(...)  
x.__setattr__('name', value) <-> x.name = value
Overrides: object.__setattr__
```

```python
__setstate__(...)  
```

52.3.2 Properties

continued on next page
### 52.4 Class Popen

```python
def __init__(self, args, bufsize=0, executable=False, stdin=False, stdout=False, stderr=False, preexec_fn=False, close_fds=False, shell=False, cwd=False, env=False, universal_newlines=False, startupinfo=False, creationflags=0)
    Create new Popen instance.
    Overrides: object.__init__
```

```python
def __del__(self)
    del self
```

```python
def communicate(self, input=False)
    Interact with process: Send data to stdin. Read data from stdout and stderr, until end-of-file is reached. Wait for process to terminate. The optional input argument should be a string to be sent to the child process, or None, if no data should be sent to the child.
    communicate() returns a tuple (stdout, stderr).
```

```python
def poll(self, _deadstate=False)
    Check if child process has terminated. Returns returncode attribute.
```

```python
def wait(self)
    Wait for child process to terminate. Returns returncode attribute.
```

```python
def _delattr__(self, name)
    del self.name
```

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>class</strong></td>
<td>Value: &lt;attribute '<strong>class</strong>' of 'object' objects&gt;</td>
</tr>
<tr>
<td>args</td>
<td>Value: &lt;attribute 'args' of 'exceptions.BaseException' objects&gt;</td>
</tr>
<tr>
<td>message</td>
<td>Value: &lt;member 'message' of 'exceptions.BaseException' objects&gt;</td>
</tr>
</tbody>
</table>

Module `SCons.compat.scons_subprocess`
__getattr__(...)  
x.__getattr__('name') == x.name

__hash__(x)  
hash(x)

__new__(T, S, ...)  
Return Value  
a new object with type S, a subtype of T

__reduce__(...)  
helper for pickle

__reduce_ex__(...)  
helper for pickle

__repr__(x)  
repr(x)

__setattr__(...)  
x.__setattr__('name', value) == x.name = value

__str__(x)  
str(x)

52.4.2 Properties

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>class</strong></td>
<td>Value: &lt;attribute '<strong>class</strong>' of 'object' objects&gt;</td>
</tr>
</tbody>
</table>
Module SCons.compat._scons_textwrap

53 Module SCons.compat._scons_textwrap

Text wrapping and filling.

53.1 Functions

<table>
<thead>
<tr>
<th>Function</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>wrap(text, width=70, **kwargs)</td>
<td>Wrap a single paragraph of text, returning a list of wrapped lines. Reformat the single paragraph in 'text' so it fits in lines of no more than 'width' columns, and return a list of wrapped lines. By default, tabs in 'text' are expanded with string.expandtabs(), and all other whitespace characters (including newline) are converted to space. See TextWrapper class for available keyword args to customize wrapping behaviour.</td>
</tr>
<tr>
<td>fill(text, width=70, **kwargs)</td>
<td>Fill a single paragraph of text, returning a new string. Reformat the single paragraph in 'text' to fit in lines of no more than 'width' columns, and return a new string containing the entire wrapped paragraph. As with wrap(), tabs are expanded and other whitespace characters converted to space. See TextWrapper class for available keyword args to customize wrapping behaviour.</td>
</tr>
</tbody>
</table>

53.2 Class TextWrapper

Object for wrapping/filling text. The public interface consists of the wrap() and fill() methods; the other methods are just there for subclasses to override in order to tweak the default behaviour. If you want to completely replace the main wrapping algorithm, you’ll probably have to override _wrap_chunks().

Several instance attributes control various aspects of wrapping:
- width (default: 70) the maximum width of wrapped lines (unless break_long_words is false)
- initial_indent (default: "") string that will be prepended to the first line of wrapped output. Counts towards the line’s width.
- subsequent_indent (default: ") string that will be prepended to all lines save the first of wrapped output; also counts towards each line’s width.
- expand_tabs (default: true) Expand tabs in input text to spaces before further processing. Each tab will become 1 .. 8 spaces, depending on its position in
its line. If false, each tab is treated as a single character.
replace_whitespace (default: true)
    Replace all whitespace characters in the input text by spaces
    after tab expansion. Note that if expand_tabs is false and
    replace_whitespace is true, every tab will be converted to a
    single space!
fix_sentence_endings (default: false)
    Ensure that sentence-ending punctuation is always followed
    by two spaces. Off by default because the algorithm is
    (unavoidably) imperfect.
break_long_words (default: true)
    Break words longer than 'width'. If false, those words will not
    be broken, and some lines might be longer than 'width'.

53.2.1 Methods

```python
_init_(self, width=70, initial_indent=' ', subsequent_indent=' ', expand_tabs=True,
        replace_whitespace=True, fix_sentence_endings=False, break_long_words=True)
```

wrap(self, text)

```
wrap(text : string) -> [string]
```

Reformat the single paragraph in 'text' so it fits in lines of
no more than 'self.width' columns, and return a list of wrapped
lines. Tabs in 'text' are expanded with string.expandtabs(),
and all other whitespace characters (including newline) are
converted to space.

fill(self, text)

```
fill(text : string) -> string
```

Reformat the single paragraph in 'text' to fit in lines of no
more than 'self.width' columns, and return a new string
containing the entire wrapped paragraph.

53.2.2 Class Variables

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
</table>
| whitespace_trans      | Value: '\x00\x01\x02\x03\x04\x05\x06\x07\x08
\x0e\x0f\x10\x11... |
| uspace                | Value: 32   |
| wordsep_re            | Value: re.compile(r'[^s]\s\w\w\{2,\}-(?=\w\{2,\})|(?<=|w!"\')&\.|
| sentence_end_re       | Value: re.compile(r'[abcde\fghijklmnopqrstuvwxyz][.\!?!]"\r\n\']') |

continued on next page
<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>x</td>
<td>Value: 32</td>
</tr>
</tbody>
</table>
Module SCons.compat.builtins

Compatibility idioms for __builtin__ names

This module adds names to the __builtin__ module for things that we want to use in SCons but which don’t show up until later Python versions than the earliest ones we support.

This module checks for the following __builtin__ names:

```python
all()
any()
bool()
dict()
True
False
zip()
```

Implementations of functions 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.)

If you’re looking at this with pydoc and various names don’t show up in the FUNCTIONS or DATA output, that means those names are already built in to this version of Python and we don’t need to add them from this module.

### 54.1 Functions

<table>
<thead>
<tr>
<th>Function</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>all(iterable)</code></td>
<td>Returns True if all elements of the iterable are true.</td>
</tr>
<tr>
<td><code>any(iterable)</code></td>
<td>Returns True if any element of the iterable is true.</td>
</tr>
<tr>
<td><code>bool(value)</code></td>
<td>Demote a value to 0 or 1, depending on its truth value. This is not to be confused with types.BooleanType, which is way too hard to duplicate in early Python versions to be worth the trouble.</td>
</tr>
</tbody>
</table>
dict(seq=[], **kwargs)

New dictionary initialization.

zip(*lists)

Emulates the behavior we need from the built-in zip() function added in Python 2.2.

Returns a list of tuples, where each tuple contains the i-th element from each of the argument sequences. The returned list is truncated in length to the length of the shortest argument sequence.

54.2 Variables

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>doc</strong></td>
<td>Value: ...</td>
</tr>
<tr>
<td><strong>revision</strong></td>
<td>Value: 'src/engine/SCons/compat/builtins.py 3842 2008/12/20 22:5...</td>
</tr>
<tr>
<td>False</td>
<td>Value: False</td>
</tr>
<tr>
<td>True</td>
<td>Value: True</td>
</tr>
</tbody>
</table>
55 Module SCons.cpp

SCons C Pre-Processor module

55.1 Functions

```cpp
def CPP_to_Python_Ops_Sub(m, d={r'\x': '\\', r'!': 'not ', r'!=': '!= ', r'&&': 'and ', r',': ', r';': ';', ...})

CPP_to_Python(s)

Converts a C pre-processor expression into an equivalent Python expression that can be evaluated.
```

55.2 Variables

<table>
<thead>
<tr>
<th>Name</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>doc</strong></td>
<td>Value: ...</td>
</tr>
</tbody>
</table>
| cpp_lines_dict               | Value: {r'define': |s+([A-Za-z][A-Za-z0-9]*)(\(`\)*)\})
| Table                        | Value: {r'define': |re.compile(r'|s+([A-Za-z][A-Za-z0-9]*)(\(`\)*)\})
| e                            | Value: |'\|\$\|s+\((el|ndef|include_next|ndif|else\}|include|if... |
| CPP_Expression               | Value: |re.compile(r'|?m)\|s+\((el|ndef|include_next|ndif|e...
| CPP_to_Python_Ops_Dict       | Value: |re.compile(r'|?r\|s+\((el|ndef|include_next|ndif|e...
| CPP_to_Python_Ops_Expression | Value: |re.compile(r'|?\|s+\((el|ndef|include_next|ndif|e...
| CPP_to_Python_Eval_List      | Value: |re.compile(r'|\s+\((el|ndef|include_next|ndif|e...
| line_continuations           | Value: |re.compile(r'|?\|s+\((el|ndef|include_next|ndif|e...
| function_name               | Value: |re.compile(r'|\s+\((el|ndef|include_next|ndif|e...
| function_arg_separator      | Value: |re.compile(r'|\s+\((el|ndef|include_next|ndif|e...

55.3 Class FunctionEvaluator

Handles delayed evaluation of a #define function call.
55.3.1 Methods

```python
__init__(self, name, args, expansion)
```

Squirrels away the arguments and expansion value of a #define macro function for later evaluation when we must actually expand a value that uses it.

```python
__call__(self, *values)
```

Evaluates the expansion of a #define macro function called with the specified values.

55.4 Class PreProcessor

**Known Subclasses:** SCons.cpp.DumbPreProcessor, SCons.Scanner.C.SConsCPPScanner

The main workhorse class for handling C pre-processing.

55.4.1 Methods

```python
__call__(self, file)
```

Pre-processes a file.

This is the main public entry point.

```python
__init__(self, current='.', cpppath=(), dict={}, all=0)
```

```python
all_include(self, t)
```

```python
do_define(self, t)
```

Default handling of a #define line.

```python
do_elif(self, t)
```

Default handling of a #elif line.
<table>
<thead>
<tr>
<th>Function</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>do_else(self, t)</code></td>
<td>Default handling of a #else line.</td>
</tr>
<tr>
<td><code>do endif(self, t)</code></td>
<td>Default handling of a #endif line.</td>
</tr>
<tr>
<td><code>do if(self, t)</code></td>
<td>Default handling of a #if line.</td>
</tr>
<tr>
<td><code>do ifdef(self, t)</code></td>
<td>Default handling of a #ifdef line.</td>
</tr>
<tr>
<td><code>do ifndef(self, t)</code></td>
<td>Default handling of a #ifndef line.</td>
</tr>
<tr>
<td><code>do include(self, t)</code></td>
<td>Default handling of a #include line.</td>
</tr>
<tr>
<td><code>do include_next(self, t)</code></td>
<td>Default handling of a #include line.</td>
</tr>
<tr>
<td><code>do nothing(self, t)</code></td>
<td>Null method for when we explicitly want the action for a specific preprocessor directive to do nothing.</td>
</tr>
<tr>
<td><code>do undef(self, t)</code></td>
<td>Default handling of a #undef line.</td>
</tr>
<tr>
<td>Method</td>
<td>Description</td>
</tr>
<tr>
<td>------------------------</td>
<td>-----------------------------------------------------------------------------</td>
</tr>
<tr>
<td><code>eval_expression(self, t)</code></td>
<td>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.</td>
</tr>
<tr>
<td><code>finalize_result(self, fname)</code></td>
<td></td>
</tr>
<tr>
<td><code>find_include_file(self, t)</code></td>
<td>Finds the #include file for a given preprocessor tuple.</td>
</tr>
<tr>
<td><code>initialize_result(self, fname)</code></td>
<td></td>
</tr>
<tr>
<td><code>process_contents(self, contents, fname=False)</code></td>
<td>Pre-processes a file contents. This is the main internal entry point.</td>
</tr>
<tr>
<td><code>read_file(self, file)</code></td>
<td></td>
</tr>
<tr>
<td><code>resolve_include(self, t)</code></td>
<td>Resolve a tuple-ized #include line. This handles recursive expansion of values without &quot;&quot; or &lt;&gt; surrounding the name until an initial &quot; or &lt; is found, to handle #include FILE where FILE is a #define somewhere else.</td>
</tr>
<tr>
<td><code>restore(self)</code></td>
<td>Pops the previous dispatch table off the stack and makes it the current one.</td>
</tr>
<tr>
<td><code>save(self)</code></td>
<td>Pushes the current dispatch table on the stack and re-initializes the current dispatch table to the default.</td>
</tr>
<tr>
<td><code>scons_current_file(self, t)</code></td>
<td></td>
</tr>
</tbody>
</table>
start_handling.includes\(\texttt{self, t=False}\)

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\(\texttt{self, t=False}\)

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\(\texttt{self, contents}\)

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.

### 55.5 Class DumbPreProcessor

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.

#### 55.5.1 Methods

\_\_init\_\_(\texttt{self, *args, **kw})

Overrides: SCons.cpp.PreProcessor._\_init\_
Class DumbPreProcessor Module SCons.cpp

```cpp
_call__ (self, file)
Pre-processes a file.
This is the main public entry point.

all_include (self, t)

do_define (self, t)
Default handling of a #define line.

do_elif (self, t)
Default handling of a #elif line.

do_else (self, t)
Default handling of a #else line.

do_endif (self, t)
Default handling of a #endif line.

do_if (self, t)
Default handling of a #if line.

do_ifdef (self, t)
Default handling of a #ifdef line.

do ifndef (self, t)
Default handling of a #ifndef line.

do_import (self, t)
Default handling of a #import line.
```
<table>
<thead>
<tr>
<th>Method Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>do_include(self, t)</code></td>
<td>Default handling of a #include line.</td>
</tr>
<tr>
<td><code>do_include_next(self, t)</code></td>
<td>Default handling of a #include line.</td>
</tr>
<tr>
<td><code>do_nothing(self, t)</code></td>
<td>Null method for when we explicitly want the action for a specific preprocessor directive to do nothing.</td>
</tr>
<tr>
<td><code>do_undef(self, t)</code></td>
<td>Default handling of a #undef line.</td>
</tr>
<tr>
<td><code>eval_expression(self, t)</code></td>
<td>Evaluates a C preprocessor expression.</td>
</tr>
<tr>
<td></td>
<td>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.</td>
</tr>
<tr>
<td><code>finalize_result(self, fname)</code></td>
<td></td>
</tr>
<tr>
<td><code>find_include_file(self, t)</code></td>
<td>Finds the #include file for a given preprocessor tuple.</td>
</tr>
<tr>
<td><code>initialize_result(self, fname)</code></td>
<td></td>
</tr>
<tr>
<td><code>process_contents(self, contents, fname=False)</code></td>
<td>Pre-processes a file contents.</td>
</tr>
<tr>
<td></td>
<td>This is the main internal entry point.</td>
</tr>
<tr>
<td><code>read_file(self, file)</code></td>
<td></td>
</tr>
</tbody>
</table>
### `resolve_include(self, 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(self)`

Pops the previous dispatch table off the stack and makes it the current one.

### `save(self)`

Pushes the current dispatch table on the stack and re-initializes the current dispatch table to the default.

### `scons_current_file(self, t)`

### `start_handling.includes(self, t=False)`

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(self, t=False)`

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(self, 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.
56 Module SCons.dblite

56.1 Functions

```python
corruption_warning(filename)
is_string(s)
unicode(s)
open(file, flag=False, mode=438)
```

56.2 Variables

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>keep_all_files</td>
<td>Value: 0</td>
</tr>
<tr>
<td>ignore_corrupt_dbfiles</td>
<td>Value: 0</td>
</tr>
<tr>
<td>dblite_suffix</td>
<td>Value: '.dblite'</td>
</tr>
<tr>
<td>tmp_suffix</td>
<td>Value: '.tmp'</td>
</tr>
</tbody>
</table>

56.3 Class dblite

56.3.1 Methods

```python
__init__(self, file_base_name, flag, mode)
__del__(self)
sync(self)
__getitem__(self, key)
__setitem__(self, key, value)
keys(self)
has_key(self, key)
__contains__(self, key)
iterkeys(self)
__iter__(self)
__len__(self)
```
57  Module SCons.exitfuncs

SCons.exitfuncs

Register functions which are executed when SCons exits for any reason.

57.1  Functions

| 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 |

57.2  Variables

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>revision</strong></td>
<td>Value: 'src/engine/SCons/exitfuncs.py 3842 2008/12/20 22:59:52 s...</td>
</tr>
<tr>
<td>x</td>
<td>Value: sys.exitfunc</td>
</tr>
</tbody>
</table>
## 58 Module md5

### 58.1 Variables

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>blocksize</td>
<td>Value: False</td>
</tr>
<tr>
<td>digest_size</td>
<td>Value: 16</td>
</tr>
</tbody>
</table>
Index

cmd.Cmd.cmdloop (function), 293
cmd.Cmd.columnize (function), 294
cmd.Cmd.complete (function), 294
cmd.Cmd.complete_help (function), 294
cmd.Cmd.completedefault (function), 294
cmd.Cmd.completenames (function), 294
cmd.Cmd.emptyline (function), 294
cmd.Cmd.get_names (function), 294
cmd.Cmd.parseline (function), 294
cmd.Cmd.postcmd (function), 294
cmd.Cmd.postloop (function), 294
cmd.Cmd.precmd (function), 295
cmd.Cmd.preloop (function), 295
cmd.Cmd.print_topics (function), 295


md5 (module), 500

object.__delattr__ (function), 93, 356, 460, 462, 466, 482
object.__getattribute__ (function), 93, 460, 462, 467, 482
object.__init__ (function), 357
object.__new__ (function), 93, 460, 462, 467, 483
object.__reduce__ (function), 93, 101, 358, 460, 463, 467, 483

object.__repr__ (function), 483
object.__setattr__ (function), 93, 358, 460, 463, 468, 483
object.__str__ (function), 94, 101, 483

SCons (package), 2–5
SCons.Action (module), 6–15
SCons.Builder (module), 16–28
SCons.Builder.Builder (function), 17
SCons.Builder.BuilderBase (class), 26–28
SCons.Builder.CallableSelector (class), 19–21
SCons.Builder.CompositeBuilder (class), 28
SCons.Builder.DictCmdGenerator (class), 17–19
SCons.Builder.DictEmitter (class), 21–22
SCons.Builder.EmitterProxy (class), 25–26
SCons.Builder.ListEmitter (class), 22–24
SCons.Builder.OverrideWarner (class), 24–25
SCons.CacheDir (module), 29–30
SCons.CacheDir.CacheDir (class), 29–30
SCons.CacheDir.CacheDirPushFunc (function), 29
SCons.CacheDir.CacheRetrieveFunc (function), 29
SCons.CacheDir.CacheRetrieveString (function), 29
SCons.compat (package), 427–428
SCons.compat.scons_hashlib (module), 431–432
SCons.compat.scons_irtools (module), 433–434
SCons.compat.scons_optparse (module), 435–456
SCons.compat.scons_sets (module), 457–469
SCons.compat.scons_sets15 (module), 470–471
SCons.compat.scons_shlex (module), 472
SCons.compat.scons_subprocess (module), 473–483
SCons.compat.scons_textwrap (module), 484–486
SCons.compat.scons_UserString (module), 429–430
SCons.compat.builtins (module), 487–488
SCons.compat.import_as (function), 428
SCons.ConfTest (module), 51–54
SCons.cpp (module), 489–497

514
SCons.dblite (module), 498
SCons.dblite.corruption_warning (function), 498
SCons.dblite.dblite (class), 498
SCons.dblite.is_string (function), 498
SCons.dblite.open (function), 498
SCons.dblite.unicode (function), 498
SCons.Debug (module), 35–36
SCons.Debug.caller_stack (function), 35
SCons.Debug.caller_trace (function), 35
SCons.Debug.countLoggedInstances (function), 35
SCons.Debug.dump_caller_counts (function), 35
SCons.Debug.dumpLoggedInstances (function), 35
SCons.Debug.fetchLoggedInstances (function), 35
SCons.Debug.func_shorten (function), 35
SCons.Debug.listLoggedInstances (function), 35
SCons.Debug.logInstanceCreation (function), 35
SCons.Debug.memory (function), 35
SCons.Debug.string_to_classes (function), 35
SCons.Debug.Trace (function), 35
SCons.Defaults (module), 37–39
SCons.Environment (module), 40–74
SCons.Environment.alias_builder (function), 40
SCons.Environment.apply_tools (function), 40
SCons.Environment.build_source (function), 40
SCons.Environment.BuilderDict (class), 42–43
SCons.Environment.BuilderWrapper (class), 41–42
SCons.Environment.copy_non_reserved_keywords (function), 40
SCons.Environment.default_copy_from_cache (function), 40
SCons.Environment.default_decide_source (function), 40
SCons.Environment.default_decide_target (function), 40
SCons.Environment.is_valid_construction_var (function), 40
SCons.Environment.MethodWrapper (class), 41
SCons.Environment.NoSubstitutionProxy (function), 40
SCons.Environment.OverrideEnvironment (class), 56–65
SCons.Environment.SubstitutionEnvironment (class), 43–47
SCons.Errors (module), 75–86
SCons.Executor (module), 87–90
SCons.Executor.Executor (class), 87–89
SCons.Executor.get_NullEnvironment (function), 87
SCons.Executor.Null (class), 89–90
SCons.exitfuncs (module), 499
SCons.exitfuncs.register (function), 499
SCons.Job (module), 91–95
SCons.Job.InterruptState (class), 91
SCons.Job.Jobs (class), 91–92
SCons.Job.Parallel (class), 95
SCons.Job.Serial (class), 92
SCons.Job.ThreadPool (class), 94–95
SCons.Job.Worker (class), 92–94
SCons.Memoize (module), 96–102
SCons.Node (package), 103–117
SCons.Node.Alias (module), 118–131
SCons.Node.FS (module), 132–214
SCons.PathList (module), 228
SCons.PathList.node_conv (function), 228
SCons.PathList.PathList (function), 228
SCons.Scanner (module)
SCons.Scanner.Base (class), 255–257
SCons.Scanner.Classic (class), 263–264
SCons.Scanner.ClassicCPP (class), 264–266
SCons.Scanner.Current (class), 260–263
SCons.Scanner.FindPathDirs (class), 255
SCons.Scanner.Scanner (function), 254
SCons.Scanner.Selector (class), 257–260
SCons.Scanner (package), 254–266
SCons.Scanner.C (module), 267–271
SCons.Scanner.D (module), 272–273
SCons.Scanner.Dir (module), 274
SCons.Scanner.Fortran (module), 275–276
SCons.Scanner.IDL (module), 277
SCons.Scanner.LaTeX (module), 278–282
SCons.Scanner.Prog (module), 283
SCons.Scanner.RC (module), 284
SCons.SConf (module), 229–247
SCons.SConf.CheckCC (function), 229
SCons.SConf.CheckCHeader (function), 229
SCons.SConf.CheckContext (class), 245–247
SCons.SConf.CheckCXX (function), 229
SCons.SConf.CheckCXXHeader (function), 230
SCons.SConf.CheckDeclaration (function), 229
SCons.SConf.CheckFunc (function), 229
SCons.SConf.CheckHeader (function), 229
SCons.SConf.CheckLib (function), 230
SCons.SConf.CheckLibWithHeader (function), 230

515
<table>
<thead>
<tr>
<th>Function/Class</th>
<th>Lines</th>
</tr>
</thead>
<tbody>
<tr>
<td>SCons.Action.CommandAction.<em>str</em>_ (method)</td>
<td>8</td>
</tr>
<tr>
<td>SCons.Action.CommandAction.execute (method)</td>
<td>9, 11</td>
</tr>
<tr>
<td>SCons.Action.CommandAction.get_presig (method)</td>
<td>9</td>
</tr>
<tr>
<td>SCons.Action.CommandAction.process (method)</td>
<td>9, 12</td>
</tr>
<tr>
<td>SCons.Action.CommandAction.strfunction (method)</td>
<td>9, 12</td>
</tr>
<tr>
<td>SCons.Action.CommandGeneratorAction (class)</td>
<td>9–10</td>
</tr>
<tr>
<td>SCons.Action.CommandGeneratorAction.<em>call</em>_ (method)</td>
<td>10</td>
</tr>
<tr>
<td>SCons.Action.CommandGeneratorAction.<em>init</em>_ (method)</td>
<td>10</td>
</tr>
<tr>
<td>SCons.Action.CommandGeneratorAction.get_implicit_deps (method)</td>
<td>10, 12</td>
</tr>
<tr>
<td>SCons.Action.CommandGeneratorAction.get_presig (method)</td>
<td>10</td>
</tr>
<tr>
<td>SCons.Action.default_exitstatfunc (function)</td>
<td>7</td>
</tr>
<tr>
<td>SCons.Action.FunctionAction (class)</td>
<td>12–13</td>
</tr>
<tr>
<td>SCons.Action.FunctionAction.execute (method)</td>
<td>12</td>
</tr>
<tr>
<td>SCons.Action.FunctionAction.function_name (method)</td>
<td>12</td>
</tr>
<tr>
<td>SCons.Action.FunctionAction.get_implicit_deps (method)</td>
<td>12</td>
</tr>
<tr>
<td>SCons.Action.FunctionAction.get_presig (method)</td>
<td>12</td>
</tr>
<tr>
<td>SCons.Action.get_default_ENV (function)</td>
<td>7</td>
</tr>
<tr>
<td>SCons.Action.LazyAction (class)</td>
<td>10–12</td>
</tr>
<tr>
<td>SCons.Action.LazyAction.get_parent_class (method)</td>
<td>11</td>
</tr>
<tr>
<td>SCons.Action.ListAction (class)</td>
<td>13–14</td>
</tr>
<tr>
<td>SCons.Action.ListAction.<em>call</em>_ (method)</td>
<td>13</td>
</tr>
<tr>
<td>SCons.Action.ListAction.<em>init</em>_ (method)</td>
<td>13</td>
</tr>
<tr>
<td>SCons.Action.ListAction.get_implicit_deps (method)</td>
<td>14</td>
</tr>
<tr>
<td>SCons.Action.ListAction.get_presig (method)</td>
<td>13</td>
</tr>
<tr>
<td>SCons.Action.remove_set_lineno_codes (function)</td>
<td>7</td>
</tr>
<tr>
<td>SCons.Action.rfile (function)</td>
<td>7</td>
</tr>
<tr>
<td>SCons.Conftest.CheckBuilder (function)</td>
<td>31</td>
</tr>
<tr>
<td>SCons.Conftest.CheckCC (function)</td>
<td>31</td>
</tr>
<tr>
<td>SCons.Conftest.CheckCXX (function)</td>
<td>31</td>
</tr>
<tr>
<td>SCons.Conftest.CheckDeclaration (function)</td>
<td>33</td>
</tr>
<tr>
<td>SCons.Conftest.CheckFunc (function)</td>
<td>32</td>
</tr>
<tr>
<td>SCons.Conftest.CheckHeader (function)</td>
<td>32</td>
</tr>
<tr>
<td>SCons.Conftest.CheckLib (function)</td>
<td>33</td>
</tr>
<tr>
<td>SCons.Conftest.CheckSHCC (function)</td>
<td>31</td>
</tr>
<tr>
<td>SCons.Conftest.CheckSHCXX (function)</td>
<td>31</td>
</tr>
<tr>
<td>SCons.Conftest.CheckType (function)</td>
<td>32</td>
</tr>
<tr>
<td>SCons.Conftest.CheckTypeSize (function)</td>
<td>32</td>
</tr>
<tr>
<td>SCons.cpp.CPP_to_Python (function)</td>
<td>489</td>
</tr>
<tr>
<td>SCons.cpp.CPP_to_Python_Ops_Sub (function)</td>
<td>489</td>
</tr>
<tr>
<td>SCons.cpp.DumbPreProcessor (class)</td>
<td>493–497</td>
</tr>
<tr>
<td>SCons.cpp.FunctionEvaluator (class)</td>
<td>489–490</td>
</tr>
<tr>
<td>SCons.cpp.FunctionEvaluator.<em>call</em>_ (method)</td>
<td>490</td>
</tr>
<tr>
<td>SCons.cpp.FunctionEvaluator.<em>init</em>_ (method)</td>
<td>490</td>
</tr>
<tr>
<td>SCons.cpp.PreProcessor (class)</td>
<td>490–493</td>
</tr>
<tr>
<td>SCons.cpp.PreProcessor.<em>call</em>_ (method)</td>
<td>268, 490, 493</td>
</tr>
<tr>
<td>SCons.cpp.PreProcessor.<em>init</em>_ (method)</td>
<td>490</td>
</tr>
<tr>
<td>SCons.cpp.PreProcessor.all_include (method)</td>
<td>268, 490, 494</td>
</tr>
<tr>
<td>SCons.cpp.PreProcessor.do_define (method)</td>
<td>268, 490, 494</td>
</tr>
<tr>
<td>SCons.cpp.PreProcessor.do_else (method)</td>
<td>268, 490, 494</td>
</tr>
<tr>
<td>SCons.cpp.PreProcessor.do_endif (method)</td>
<td>268, 491, 494</td>
</tr>
<tr>
<td>SCons.cpp.PreProcessor.do_if (method)</td>
<td>268, 491, 494</td>
</tr>
<tr>
<td>SCons.cpp.PreProcessor.do_ifdef (method)</td>
<td>268, 491, 494</td>
</tr>
<tr>
<td>SCons.cpp.PreProcessor.do_ifndef (method)</td>
<td>268, 491, 494</td>
</tr>
<tr>
<td>SCons.cpp.PreProcessor.do_import (method)</td>
<td>269, 491, 494</td>
</tr>
<tr>
<td>SCons.cpp.PreProcessor.do_include (method)</td>
<td>269, 491, 495</td>
</tr>
<tr>
<td>SCons.cpp.PreProcessor.do_undef (method)</td>
<td>269, 491, 495</td>
</tr>
<tr>
<td>SCons.cpp.PreProcessor.eval_expression (method)</td>
<td>269, 491, 495</td>
</tr>
<tr>
<td>SCons.cpp.PreProcessor.finalize_result (method)</td>
<td>492, 495</td>
</tr>
<tr>
<td>SCons.cpp.PreProcessor.find_include_file (method)</td>
<td>492, 495</td>
</tr>
</tbody>
</table>
SCons.cpp.PreProcessor.initialize_result (method), 492, 495
SCons.cpp.PreProcessor.process_contents (method), 269, 492, 495
SCons.cpp.PreProcessor.read_file (method), 492, 495
SCons.cpp.PreProcessor.resolve_include (method), 269, 492, 495
SCons.cpp.PreProcessor.restore (method), 270, 492
SCons.cpp.PreProcessor.save (method), 270, 492, 496
SCons.cpp.PreProcessor.scons_current_file (method), 270, 492, 496
SCons.cpp.PreProcessor.start_handling_includes (method), 270, 492, 496
SCons.cpp.PreProcessor.stop_handling_includes (method), 270, 493, 496
SCons.cpp.PreProcessor.tupleize (method), 270, 493, 496
SCons.Defaults.chmod_func (function), 37
SCons.Defaults.chomp_strfunc (function), 37
SCons.Defaults.chomp (function), 37
SCons.Defaults.default_environment (function), 37
SCons.Defaults.delete_func (function), 37
SCons.Defaults.delete_strfunc (function), 37
SCons.Defaults.get_paths_str (function), 37
SCons.Defaults.mkdir_func (function), 37
SCons.Defaults.move_func (function), 38
SCons.Defaults.null_cmd_generator (class), 38–39
SCons.Defaults.null_cmd_generator._call_ (method), 39
SCons.Defaults.null_cmd_generator._init_ (method), 39
SCons.Defaults.shared_flag_checker (function), 37
SCons.Defaults.shared_object_emitter (function), 37
SCons.Defaults.static_object_emitter (function), 37
SCons.Defaults.touch_func (function), 38
SCons.Defaults.variable_method_caller (class), 39
SCons.Defaults.variable_method_caller._call_ (method), 39
SCons.Defaults.variable_method_caller._init_ (method), 39
SCons.Errors.BuildError (class), 75–78
SCons.Errors.convert_to_BuildError (function), 75
SCons.Errors.EnvironmentError (class), 83–85
SCons.Errors.ExplicitExit (class), 85–86
SCons.Errors.InternalError (class), 78–80
SCons.Errors.StopError (class), 81–83
SCons.Errors.UserError (class), 80–81
SCons.Memoize.CountDict (class), 99–100
SCons.Memoize.CountDict._call_ (method), 99
SCons.Memoize.Counter (class), 98
SCons.Memoize.Counter.display (method), 98, 99
SCons.Memoize.CountValue (class), 98–99
SCons.Memoize.CountValue._call_ (method), 99
SCons.Memoize.Dump (function), 97
SCons.Memoize.EnableMemoization (function), 97
SCons.Memoize.Memoized_Metaclass (class), 100–102
SCons.Memoize.Memoizer (class), 100
SCons.Memoize.Memoizer._init_ (method), 100
SCons.Node.Annotate (function), 103
SCons.Node.BuildInfoBase (class), 105
SCons.Node.BuildInfoBase._init_ (method), 105
SCons.Node.classname (function), 103
SCons.Node.do_nothing (function), 103
SCons.Node.get_children (function), 103
SCons.Node.ignore_cycle (function), 103
SCons.Node.Node._init_ (method), 105
SCons.Node.Node.add_prerequisite (method), 105, 122, 140, 151, 173, 184, 205, 218
SCons.Node.Node.add_source (method), 106, 122, 140, 151, 173, 184, 205, 218
SCons.Node.Node.add_to Implicit (method), 106, 123, 140, 151, 173, 184, 205, 218
SCons.Node.Node.add_to_waiting_parents (method), 106, 123, 140, 151, 173, 184, 205, 218
SCons.Node.Node.add_to_waiting_s_e (method), 106, 123, 141, 151, 173, 184, 205, 219
SCons.Node.Node.add_wiki (method), 106, 123, 141, 151, 173, 184, 205, 219
SCons.Node.Node.all_children (method), 106, 123, 141, 151, 173, 184, 205, 219
SCons.Node.Node.build (method), 106, 141, 152, 205
SCons.Node.Node.built (method), 106, 123, 141, 152, 173, 184, 219
<table>
<thead>
<tr>
<th>Class/Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>SCons.Subst.Target_or_Source.<em>init</em> (method), 337</td>
</tr>
<tr>
<td>SCons.Subst.Target_or_Source.<em>repr</em> (method), 337</td>
</tr>
<tr>
<td>SCons.Subst.Target_or_Source.<em>str</em> (method), 337</td>
</tr>
<tr>
<td>SCons.Subst.Targets_or_Sources (class), 334–336</td>
</tr>
<tr>
<td>SCons.Subst.Targets_or_Sources.<em>getattr</em> (method), 335</td>
</tr>
<tr>
<td>SCons.Subst.Targets_or_Sources.<em>str</em> (method), 335</td>
</tr>
<tr>
<td>SCons.Util._NoError (class), 365–367</td>
</tr>
<tr>
<td>SCons.Util.AddMethod (function), 351</td>
</tr>
<tr>
<td>SCons.Util.adjustixes (function), 350</td>
</tr>
<tr>
<td>SCons.Util.AppendPath (function), 349</td>
</tr>
<tr>
<td>SCons.Util.CallableComposite (class), 352–354</td>
</tr>
<tr>
<td>SCons.Util.CallableComposite.<em>call</em> (method), 352</td>
</tr>
<tr>
<td>SCons.Util.case_sensitive_suffixes (function), 350</td>
</tr>
<tr>
<td>SCons.Util.CLVar (class), 367–369</td>
</tr>
<tr>
<td>SCons.Util.CLVar.<em>coerce</em> (method), 368</td>
</tr>
<tr>
<td>SCons.Util.CLVar.<em>str</em> (method), 368</td>
</tr>
<tr>
<td>SCons.Util.containsAll (function), 346</td>
</tr>
<tr>
<td>SCons.Util.containsAny (function), 346</td>
</tr>
<tr>
<td>SCons.Util.containsOnly (function), 346</td>
</tr>
<tr>
<td>SCons.Util.dctify (function), 346</td>
</tr>
<tr>
<td>SCons.Util.DisplayEngine (class), 355–356</td>
</tr>
<tr>
<td>SCons.Util.DisplayEngine.<em>init</em> (method), 356</td>
</tr>
<tr>
<td>SCons.Util.DisplayEngine.dont_print (method), 356</td>
</tr>
<tr>
<td>SCons.Util.DisplayEngine.print_it (method), 356</td>
</tr>
<tr>
<td>SCons.Util.DisplayEngine.set_mode (method), 356</td>
</tr>
<tr>
<td>SCons.Util.do_flatten (function), 347</td>
</tr>
<tr>
<td>SCons.Util.flatten (function), 347</td>
</tr>
<tr>
<td>SCons.Util.flatten_sequence (function), 348</td>
</tr>
<tr>
<td>SCons.Util.get_environment_var (function), 346</td>
</tr>
<tr>
<td>SCons.Util.get_native_path (function), 350</td>
</tr>
<tr>
<td>SCons.Util.IDX (function), 347</td>
</tr>
<tr>
<td>SCons.Util.is_Dict (function), 347</td>
</tr>
<tr>
<td>SCons.Util.is_List (function), 347</td>
</tr>
<tr>
<td>SCons.Util.is_Scalar (function), 347</td>
</tr>
<tr>
<td>SCons.Util.is_Sequence (function), 347</td>
</tr>
<tr>
<td>SCons.Util.is_String (function), 347</td>
</tr>
<tr>
<td>SCons.Util.is_Tuple (function), 347</td>
</tr>
<tr>
<td>SCons.Util.LogicalLines (class), 372</td>
</tr>
<tr>
<td>SCons.Util.LogicalLines.<em>init</em> (method), 372</td>
</tr>
<tr>
<td>SCons.Util.LogicalLines.readline (method), 372</td>
</tr>
<tr>
<td>SCons.Util.LogicalLines.readlines (method), 372</td>
</tr>
<tr>
<td>SCons.Util.make_path_relative (function), 351</td>
</tr>
<tr>
<td>SCons.Util.MD5collect (function), 351</td>
</tr>
<tr>
<td>SCons.Util.MD5filesignature (function), 351</td>
</tr>
<tr>
<td>SCons.Util.MD5signature (function), 351</td>
</tr>
<tr>
<td>SCons.Util.mystd (class), 356–365</td>
</tr>
<tr>
<td>SCons.Util.NodeList (class), 354–355</td>
</tr>
<tr>
<td>SCons.Util.NodeList.<em>getattr</em> (method), 354</td>
</tr>
<tr>
<td>SCons.Util.NodeList.<em>nonzero</em> (method), 354</td>
</tr>
<tr>
<td>SCons.Util.NodeList.<em>str</em> (method), 354</td>
</tr>
<tr>
<td>SCons.Util.Null.<em>call</em> (method), 327, 328, 375</td>
</tr>
<tr>
<td>SCons.Util.Null.<em>delattr</em> (method), 327, 328, 375</td>
</tr>
<tr>
<td>SCons.Util.Null.<em>getattr</em> (method), 327, 328, 375</td>
</tr>
<tr>
<td>SCons.Util.Null.<em>init</em> (method), 327, 328, 375</td>
</tr>
<tr>
<td>SCons.Util.Null.<em>new</em> (method), 327, 328, 375</td>
</tr>
<tr>
<td>SCons.Util.Null.<em>nonzero</em> (method), 327, 328, 375</td>
</tr>
<tr>
<td>SCons.Util.Null.<em>repr</em> (method), 375</td>
</tr>
<tr>
<td>SCons.Util.Null.<em>setattr</em> (method), 328, 375</td>
</tr>
<tr>
<td>SCons.Util.OrderedDict (class), 369–370</td>
</tr>
<tr>
<td>SCons.Util.PrependPath (function), 349</td>
</tr>
<tr>
<td>SCons.Util.print_tree (function), 347</td>
</tr>
<tr>
<td>SCons.Util.Proxy (class), 365</td>
</tr>
<tr>
<td>SCons.Util.Proxy.<em>init</em> (method), 136, 365</td>
</tr>
<tr>
<td>SCons.Util.Proxy.get (method), 28, 136, 365</td>
</tr>
<tr>
<td>SCons.Util.RegGetValue (function), 348</td>
</tr>
<tr>
<td>SCons.Util.rename_tree (function), 346</td>
</tr>
<tr>
<td>SCons.Util.rename_tree (function), 351</td>
</tr>
<tr>
<td>SCons.Util.rename_tree (function), 351</td>
</tr>
<tr>
<td>SCons.Util.rename_tree (function), 351</td>
</tr>
<tr>
<td>SCons.Util.rename_tree (function), 351</td>
</tr>
<tr>
<td>SCons.Util.rename_tree (function), 351</td>
</tr>
<tr>
<td>SCons.Util.rename_tree (function), 351</td>
</tr>
<tr>
<td>SCons.Util.rename_tree (function), 351</td>
</tr>
<tr>
<td>SCons.Util.rename_tree (function), 351</td>
</tr>
<tr>
<td>SCons.Util.rename_tree (function), 351</td>
</tr>
<tr>
<td>SCons.Util.rename_tree (function), 351</td>
</tr>
<tr>
<td>SCons.Util.rename_tree (function), 351</td>
</tr>
<tr>
<td>SCons.Util.rename_tree (function), 351</td>
</tr>
<tr>
<td>SCons.Util.rename_tree (function), 351</td>
</tr>
<tr>
<td>SCons.Util.rename_tree (function), 351</td>
</tr>
<tr>
<td>SCons.Util.rename_tree (function), 351</td>
</tr>
<tr>
<td>SCons.Util.rename_tree (function), 351</td>
</tr>
<tr>
<td>SCons.Util.rename_tree (function), 351</td>
</tr>
<tr>
<td>SCons.Util.rename_tree (function), 351</td>
</tr>
<tr>
<td>SCons.Util.rename_tree (function), 351</td>
</tr>
<tr>
<td>SCons.Util.rename_tree (function), 351</td>
</tr>
<tr>
<td>SCons.Util.rename_tree (function), 351</td>
</tr>
<tr>
<td>SCons.Util.rename_tree (function), 351</td>
</tr>
<tr>
<td>SCons.Util.rename_tree (function), 351</td>
</tr>
<tr>
<td>SCons.Util.rename_tree (function), 351</td>
</tr>
<tr>
<td>SCons.Util.rename_tree (function), 351</td>
</tr>
<tr>
<td>SCons.Util.rename_tree (function), 351</td>
</tr>
<tr>
<td>SCons.Util.rename_tree (function), 351</td>
</tr>
<tr>
<td>SCons.Util.rename_tree (function), 351</td>
</tr>
<tr>
<td>SCons.Util.rename_tree (function), 351</td>
</tr>
<tr>
<td>SCons.Util.rename_tree (function), 351</td>
</tr>
<tr>
<td>SCons.Util.rename_tree (function), 351</td>
</tr>
<tr>
<td>SCons.Util.rename_tree (function), 351</td>
</tr>
<tr>
<td>SCons.Util.rename_tree (function), 351</td>
</tr>
<tr>
<td>SCons.Util.rename_tree (function), 351</td>
</tr>
<tr>
<td>SCons.Util.rename_tree (function), 351</td>
</tr>
<tr>
<td>SCons.Util.rename_tree (function), 351</td>
</tr>
<tr>
<td>SCons.Util.rename_tree (function), 351</td>
</tr>
<tr>
<td>SCons.Util.rename_tree (function), 351</td>
</tr>
<tr>
<td>SCons.Util.rename_tree (function), 351</td>
</tr>
<tr>
<td>SCons.Util.rename_tree (function), 351</td>
</tr>
<tr>
<td>SCons.Util.rename_tree (function), 351</td>
</tr>
<tr>
<td>SCons.Util.rename_tree (function), 351</td>
</tr>
<tr>
<td>SCons.Util.rename_tree (function), 351</td>
</tr>
<tr>
<td>SCons.Util.rename_tree (function), 351</td>
</tr>
<tr>
<td>SCons.Util.rename_tree (function), 351</td>
</tr>
<tr>
<td>SCons.Util.rename_tree (function), 351</td>
</tr>
<tr>
<td>SCons.Util.rename_tree (function), 351</td>
</tr>
<tr>
<td>SCons.Util.rename_tree (function), 351</td>
</tr>
<tr>
<td>SCons.Util.rename_tree (function), 351</td>
</tr>
<tr>
<td>SCons.Util.rename_tree (function), 351</td>
</tr>
<tr>
<td>SCons.Util.rename_tree (function), 351</td>
</tr>
<tr>
<td>SCons.Util.rename_tree (function), 351</td>
</tr>
<tr>
<td>SCons.Util.rename_tree (function), 351</td>
</tr>
<tr>
<td>SCons.Util.rename_tree (function), 351</td>
</tr>
<tr>
<td>SCons.Util.rename_tree (function), 351</td>
</tr>
<tr>
<td>SCons.Util.rename_tree (function), 351</td>
</tr>
<tr>
<td>SCons.Util.rename_tree (function), 351</td>
</tr>
<tr>
<td>SCons.Util.rename_tree (function), 351</td>
</tr>
<tr>
<td>SCons.Util.rename_tree (function), 351</td>
</tr>
<tr>
<td>SCons.Util.rename_tree (function), 351</td>
</tr>
<tr>
<td>SCons.Util.rename_tree (function), 351</td>
</tr>
<tr>
<td>SCons.Util.rename_tree (function), 351</td>
</tr>
<tr>
<td>SCons.Util.rename_tree (function), 351</td>
</tr>
<tr>
<td>SCons.Util.rename_tree (function), 351</td>
</tr>
<tr>
<td>SCons.Util.rename_tree (function), 351</td>
</tr>
<tr>
<td>SCons.Util.rename_tree (function), 351</td>
</tr>
<tr>
<td>SCons.Util.rename_tree (function), 351</td>
</tr>
<tr>
<td>SCons.Util.rename_tree (function), 351</td>
</tr>
<tr>
<td>SCons.Util.rename_tree (function), 351</td>
</tr>
<tr>
<td>SCons.Util.rename_tree (function), 351</td>
</tr>
<tr>
<td>SCons.Util.rename_tree (function), 351</td>
</tr>
<tr>
<td>SCons.Util.rename_tree (function), 351</td>
</tr>
<tr>
<td>SCons.Util.rename_tree (function), 351</td>
</tr>
<tr>
<td>SCons.Util.rename_tree (function), 351</td>
</tr>
<tr>
<td>SCons.Util.rename_tree (function), 351</td>
</tr>
<tr>
<td>SCons.Util.rename_tree (function), 351</td>
</tr>
<tr>
<td>SCons.Util.rename_tree (function), 351</td>
</tr>
<tr>
<td>SCons.Util.rename_tree (function), 351</td>
</tr>
<tr>
<td>SCons.Util.rename_tree (function), 351</td>
</tr>
<tr>
<td>SCons.Util.rename_tree (function), 351</td>
</tr>
<tr>
<td>SCons.Util.rename_tree (function), 351</td>
</tr>
<tr>
<td>SCons.Util.rename_tree (function), 351</td>
</tr>
<tr>
<td>SCons.Util.rename_tree (function), 351</td>
</tr>
<tr>
<td>SCons.Util.rename_tree (function), 351</td>
</tr>
<tr>
<td>SCons.Util.rename_tree (function), 351</td>
</tr>
<tr>
<td>SCons.Util.rename_tree (function), 351</td>
</tr>
<tr>
<td>SCons.Util.rename_tree (function), 351</td>
</tr>
<tr>
<td>SCons.Util.rename_tree (function), 351</td>
</tr>
<tr>
<td>SCons.Util.rename_tree (function), 351</td>
</tr>
<tr>
<td>SCons.Util.rename_tree (function), 351</td>
</tr>
<tr>
<td>SCons.Util.rename_tree (function), 351</td>
</tr>
<tr>
<td>SCons.Util.rename_tree (function), 351</td>
</tr>
<tr>
<td>SCons.Util.rename_tree (function), 351</td>
</tr>
<tr>
<td>SCons.Util.rename_tree (function), 351</td>
</tr>
<tr>
<td>SCons.Util.rename_tree (function), 351</td>
</tr>
<tr>
<td>SCons.Util.rename_tree (function), 351</td>
</tr>
<tr>
<td>SCons.Util.rename_tree (function), 351</td>
</tr>
<tr>
<td>SCons.Util.rename_tree (function), 351</td>
</tr>
<tr>
<td>SCons.Util.rename_tree (function), 351</td>
</tr>
</tbody>
</table>
| SCon
UserString.UserString.__getitem__ (function), 332
UserString.UserString.__getslice__ (function), 332
UserString.UserString.__hash__ (function), 332
UserString.UserString.__int__ (function), 332
UserString.UserString.__len__ (function), 332
UserString.UserString.__mod__ (function), 332
UserString.UserString.__mul__ (function), 332
UserString.UserString.__radd__ (function), 332
UserString.UserString.__repr__ (function), 332
UserString.UserString.__str__ (function), 332
UserString.UserString.capitalize (function), 332
UserString.UserString.center (function), 332
UserString.UserString.count (function), 333
UserString.UserString.decode (function), 333
UserString.UserString.encode (function), 333
UserString.UserString.endswith (function), 333
UserString.UserString.expandtabs (function), 333
UserString.UserString.find (function), 333
UserString.UserString.index (function), 333
UserString.UserString.isalnum (function), 333
UserString.UserString.isalpha (function), 333
UserString.UserString.isspace (function), 333
UserString.UserString.istitle (function), 333
UserString.UserString.isupper (function), 333
UserString.UserString.join (function), 333
UserString.UserString.ljust (function), 333
UserString.UserString.lower (function), 333
UserString.UserString.lstrip (function), 333
UserString.UserString.partition (function), 333
UserString.UserString.replace (function), 333
UserString.UserString.rfind (function), 334
UserString.UserString.rindex (function), 334
UserString.UserString.rjust (function), 334
UserString.UserString.rpartition (function), 334
UserString.UserString.rsplit (function), 334
UserString.UserString.rstrip (function), 334
UserString.UserString.split (function), 334
UserString.UserString.splitlines (function), 334
UserString.UserString.startswith (function), 334
UserString.UserString.strip (function), 334
UserString.UserString.swapcase (function), 334
UserString.UserString.title (function), 334
UserString.UserString.translate (function), 334
UserString.UserString.upper (function), 334
UserString.UserString.zfill (function), 334