
nose2

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nose2 is the successor to nose.

It's unittest with plugins.

nose2 is a new project and does not support all of the features of nose. See [differences](#) for a thorough rundown.

nose2's purpose is to extend unittest to make testing nicer and easier to understand.

CHAPTER 1

nose2 vs pytest

nose2 may or may not be a good fit for your project.

If you are new to python testing, we encourage you to also consider [pytest](#), a popular testing framework.

CHAPTER 2

Full Docs

Full documentation for `nose2` is available at docs.nose2.io

CHAPTER 3

Contributing

If you want to make contributions, please read the [contributing guide](#).

4.1 Getting started with nose2

4.1.1 Installation

The recommended way to install nose2 is with `pip`

```
pip install nose2
```

4.1.2 Running tests

To run tests in a project, use the `nose2` script that is installed with nose2:

```
nose2
```

This will find and run tests in all packages in the current working directory, and any sub-directories of the current working directory whose names start with 'test'.

To find tests, nose2 looks for modules whose names start with 'test'. In those modules, nose2 will load tests from all `unittest.TestCase` subclasses, as well as functions whose names start with 'test'.

The `nose2` script supports a number of command-line options, as well as extensive configuration via config files. For more information see *Using nose2* and *Configuring nose2*.

4.2 Using nose2

4.2.1 Naming Tests

nose2 will look in each directory under the starting directory, unless the configuration modifies the included paths. Within directories and within any Python packages found in the starting directory and any source directories in the

starting directory, nose2 will discover test modules and load tests from them. “Test modules” means any modules whose names start with “test”. See the Configuration section for ways to modify searching for tests.

Directories nose2 will look in:

- Directory that contains an `__init__.py` file (a Python package)
- Directory name that contains “test” after being lowercased.
- Directory name that is either `lib` or `src`

Each of the following test files will be run:

```
test.py
test_views.py
test_models.py
testThingy.py
```

These files will not be run:

```
not_a_test.py
myapp_test.py
some_test_file.py
```

Within test modules, nose2 will load tests from `unittest.TestCase` subclasses, and from test functions (functions whose names begin with “test”).

4.2.2 Running Tests

In the simplest case, go to the directory that includes your project source and run `nose2` there:

```
nose2
```

This will discover tests in packages and test directories under that directory, load them, and run them, then output something like:

```
.....
-----
Ran 77 tests in 1.897s

OK
```

To change the place discovery starts, or to change the top-level importable directory of the project, use the `-s` and `-t` options.

-s START_DIR, **--start-dir** START_DIR

Directory to start discovery. Defaults to the current working directory. This directory is where nose2 will start looking for tests.

-t TOP_LEVEL_DIRECTORY, **--top-level-directory** TOP_LEVEL_DIRECTORY, **--project-directory** TOP_

Top-level directory of the project. Defaults to the starting directory. This is the directory containing importable modules and packages, and is always prepended to `sys.path` before test discovery begins.

Specifying Tests to Run

Pass *test names* to nose2 on the command line to run individual test modules, classes, or tests.

A test name consists of a *python object part* and, for generator or parameterized tests, an *argument part*. The *python object part* is a dotted name, such as `pkg1.tests.test_things.SomeTests.test_ok`. The argument part is separated from the python object part by a colon (":") and specifies the *index* of the generated test to select, *starting from 1*. For example, `pkg1.test.test_things.test_params_func:1` would select the *first* test generated from the parameterized test `test_params_func`.

Plugins may provide other means of test selection.

Running Tests with `python setup.py test`

nose2 supports distribute/setuptools' `python setup.py test` standard for running tests. To use nose2 to run your package's tests, add the following to your `setup.py`:

```
setup(...
    test_suite='nose2.collector.collector',
    ...
)
```

(Not literally. Don't put the '...' parts in.)

Two warnings about running tests this way.

One: because the setuptools test command is limited, nose2 returns a "test suite" that actually takes over the test running process completely, bypassing the test result and test runner that call it. This may be incompatible with some packages.

Two: because the command line arguments to the test command may not match up properly with nose2's arguments, the nose2 instance started by the collector *does not accept any command line arguments*. This means that it always runs all tests, and that you cannot configure plugins on the command line when running tests this way. As a workaround, when running under the test command, nose2 will read configuration from `setup.cfg` if it is present, in addition to `unittest.cfg` and `nose2.cfg`. This enables you to put configuration specific to the setuptools test command in `setup.cfg` – for instance to activate plugins that you would otherwise activate via the command line.

4.2.3 Getting Help

Run:

```
nose2 -h
```

to get help for nose2 itself and all loaded plugins.

```
usage: nose2 [-s START_DIR] [-t TOP_LEVEL_DIRECTORY] [--config [CONFIG]]
             [--no-user-config] [--no-plugins] [--verbose] [--quiet] [-B] [-D]
             [--collect-only] [--log-capture] [-P] [-h]
             [testNames [testNames ...]]
```

positional arguments:
testNames

optional arguments:
-s START_DIR, --start-dir START_DIR
Directory to start discovery ('.' default)
-t TOP_LEVEL_DIRECTORY, --top-level-directory TOP_LEVEL_DIRECTORY, --project-
→directory TOP_LEVEL_DIRECTORY
Top level directory of project (defaults to start dir)
--config [CONFIG], -c [CONFIG]

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```

Config files to load, if they exist. ('unittest.cfg'
and 'nose2.cfg' in start directory default)
--no-user-config    Do not load user config files
--no-plugins        Do not load any plugins. Warning: nose2 does not do
                    anything if no plugins are loaded

--verbose, -v
--quiet
-h, --help          Show this help message and exit

plugin arguments:
Command-line arguments added by plugins:

-B, --output-buffer  Enable output buffer
-D, --debugger       Enter pdb on test fail or error
--collect-only       Collect and output test names, do not run any tests
--log-capture        Enable log capture
-P, --print-hooks    Print names of hooks in order of execution

```

4.3 Configuring nose2

4.3.1 Configuration Files

Most configuration of nose2 is done via config files. These are standard, .ini-style config files, with sections marked off by brackets (“[unittest]”) and key = value pairs within those sections. When the value is a list, put each value into its own line with proper indentation

```

key_expecteding_list = value1
                       value2

```

Two command line options, `-c` and `--no-user-config` may be used to determine which config files are loaded.

-c CONFIG, **--config** CONFIG

Config files to load. Default behavior is to look for `unittest.cfg` and `nose2.cfg` in the start directory, as well as any user config files (unless `--no-user-config` is selected).

--no-user-config

Do not load user config files. If not specified, in addition to the standard config files and any specified with `-c`, nose2 will look for `.unittest.cfg` and `.nose2.cfg` in the user’s \$HOME directory.

Configuring Test Discovery

The [unittest] section of nose2 config files is used to configure nose2 itself. The following options are available to configure test discovery:

start-dir

This option configures the default directory to start discovery. The default value is `."` (the current directory where nose2 is executed). This directory is where nose2 will start looking for tests.

code-directories

This option configures nose2 to add the named directories to `sys.path` and the discovery path. Use this if your project has code in a location other than the top level of the project, or the directories `lib` or `src`. The value here may be a list: put each directory on its own line in the config file.

test-file-pattern

This option configures how nose detects test modules. It is a file glob.

test-method-prefix

This option configures how nose detects test functions and methods. The prefix set here will be matched (via simple string matching) against the start of the name of each method in test cases and each function in test modules.

Examples:

```
[unittest]
start-dir = tests
code-directories = source
                  more_source
test-file-pattern = *_test.py
test-method-prefix = t
```

Specifying Plugins to Load

To avoid loading any plugins, use the `--no-plugins` option. Beware, though: nose2 does all test discovery and loading via plugins, so unless you are patching in a custom test loader and runner, when run with `--no-plugins`, nose2 will do nothing.

--no-plugins

Do not load any plugins. *This kills the nose2.*

To specify plugins to load beyond the builtin plugins automatically loaded, add a `plugins` entry under the `[unittest]` section in a config file.

plugins

List of plugins to load. Put one plugin module on each line.

To exclude some plugins that would otherwise be loaded, add an `exclude-plugins` entry under the `[unittest]` section in a config file.

exclude-plugins

List of plugins to exclude. Put one plugin module on each line.

Note: It bears repeating that in both `plugins` and `exclude-plugins` entries, you specify the plugin *module*, not the plugin *class*. The module is specified by the (dot-separated) *fully qualified* name.

Examples:

```
[unittest]
plugins = myproject.plugins.froblate
         otherproject.contrib.plugins.derper

exclude-plugins = nose2.plugins.loader.functions
                 nose2.plugins.outcomes
```

4.3.2 Configuring Plugins

Most plugins specify a config file section that may be used to configure the plugin. If nothing else, any plugin that specifies a config file section can be set to automatically register by including `always-on = True` in its config:

```
[my-plugin]
always-on = True
```

Plugins may accept any number of other config values, which may be booleans, strings, integers or lists. A polite plugin will document these options somewhere. Plugins that want to make use of nose2's [Sphinx](#) extension as detailed in *Documenting plugins* must extract all of their config values in their `__init__` methods.

4.3.3 Test Runner Tips and Tweaks

Running Tests in a Single Module

You can use `nose2.main` in the same way that `unittest.main` (and `unittest2.main`) have historically worked: to run the tests in a single module. Just put a block like the following at the end of the module:

```
if __name__ == '__main__':
    import nose2
    nose2.main()
```

Then *run the module directly* – In other words, do not run the `nose2` script.

Rolling Your Own Runner

You can take more control over the test runner by foregoing the `nose2` script and rolling your own. To do that, you just need to write a script that calls `nose2.discover`, for instance:

```
if __name__ == '__main__':
    import nose2
    nose2.discover()
```

You can pass several keyword arguments to `nose2.discover`, all of which are detailed in the documentation for `nose2.main.PluggableTestProgram`.

Altering the Default Plugin Set

To add plugin *modules* to the list of those automatically loaded, you can pass a list of module names to add (the `plugins`) argument or `exclude` (`excludedPlugins`). You can also subclass `nose2.main.PluggableTestProgram` and set the class-level `defaultPlugins` and `excludePlugins` attributes to alter plugin loading.

When Loading Plugins from Modules is not Enough

None of which will help if you need to register a plugin *instance* that you've loaded yourself. For that, use the `extraHooks` keyword argument to `nose2.discover`. Here, you pass in a list of 2-tuples, each of which contains a hook name and a plugin *instance* to register for that hook. This allows you to register plugins that need runtime configuration that is not easily passed in through normal channels – and also to register *objects that are not nose2 plugins* as hook targets. Here's a trivial example:

```
if __name__ == '__main__':
    import nose2
```

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```

class Hello(object):
    def startTestRun(self, event):
        print("hello!")

nose2.discover(extraHooks=[('startTestRun', Hello())])

```

This can come in handy when integrating with other systems that expect you to provide a test runner that they execute, rather than executing tests yourself (django, for instance).

4.4 Differences: nose2 vs nose vs unittest2

4.4.1 nose2 is not nose

What's Different

Python Versions

nose supports Python 2.4 and above, but nose2 only supports Python versions currently supported by the Python team.

Test Discovery and Loading

nose loads test modules lazily: tests in the first-loaded module are executed before the second module is imported. *nose2 loads all tests first, then begins test execution.* This has some important implications.

First, it means that nose2 does not need a custom importer. nose2 imports test modules with `__import__()`.

Second, it means that *nose2 does not support all of the test project layouts that nose does.* Specifically, projects that look like this will fail to load tests correctly with nose2:

```

.
|-- tests
|   |-- more_tests
|   |   |-- test.py
|   |-- test.py

```

To nose's loader, those two test modules look like different modules. But to nose2's loader, they look the same, and will not load correctly.

Test Fixtures

nose2 supports only the *same levels of fixtures as unittest2*. This means class level fixtures and module level fixtures are supported, but *package-level fixtures are not*. In addition, unlike nose, nose2 does not attempt to order tests named on the command-line to group those with the same fixtures together.

Parameterized and Generator Tests

nose2 supports *more kinds of parameterized and generator tests than nose*, and supports all test generators in test functions, test classes, and in unittest TestCase subclasses. nose supports them only in test functions and test classes that do not subclass unittest.TestCase. See: *Loader: Test Generators* and *Loader: Parameterized Tests* for more.

Configuration

nose expects plugins to make all of their configuration parameters available as command-line options. *nose2 expects almost all configuration to be done via configuration files.* Plugins should generally have only one command-line option: the option to activate the plugin. Other configuration parameters should be loaded from config files. This allows more repeatable test runs and keeps the set of command-line options small enough for humans to read. See: *Configuring nose2* for more.

Plugin Loading

nose uses setuptools entry points to find and load plugins. nose2 does not. Instead, *nose2 requires that all plugins be listed in config files.* This ensures that no plugin is loaded into a test system just by virtue of being installed somewhere, and makes it easier to include plugins that are part of the project under test. See: *Configuring nose2* for more.

Limited support for `python setup.py test`

nose2 supports setuptools' `python setup.py test` command, but via very different means than nose. To avoid the internal complexity forced on nose by the fact that the setuptools test command can't be configured with a custom test runner, when run this way, *nose2 essentially hijacks the test running process.* The "test suite" that `nose2.collector.collector()` returns actually *is* a test runner, cloaked inside of a test case. It loads and runs tests as normal, setting up its own test runner and test result, and calls `sys.exit()` itself – completely bypassing the test runner and test result that setuptools/unittest create. This may be incompatible with some projects.

Plugin API

nose2 implements a new plugin API based on the work done by Michael Foord in unittest2's `plugins` branch. This API is greatly superior to the one in nose, especially in how it allows plugins to interact with each other. But it is different enough from the API in nose that supporting nose plugins in nose2 is not practical: *plugins must be rewritten to work with nose2.* See: *Writing Plugins* for more.

Missing Plugins

nose2 does not include some of the more commonly-used plugins in nose. Some of nose's builtin plugins could not be ported to nose2 due to differences in internals. See: *Plugins for nose2* for information on the plugins built in to nose2.

Internals

nose wraps or replaces everything in unittest. nose2 does a bit less: *it does not wrap TestCases,* and does not wrap the test result class with a result proxy. nose2 does subclass `TestProgram`, and install its own loader, runner, and result classes. It does this unconditionally, rather than allowing arguments to `TestProgram.__init__()` to specify the test loader and runner. See *Internals* for more information.

License

While nose was LGPL, nose2 is BSD licensed. This change was made at the request of the majority of nose contributors.

What's the Same

Philosophy

nose2 has the same goals as nose: to extend unittest to make testing nicer and easier to understand. It aims to give developers flexibility, power and transparency, so that common test scenarios require no extra work, and uncommon test scenarios can be supported with minimal fuss and magic.

4.4.2 nose2 is not (exactly) unittest2/plugins

nose2 is based on the `unittest2/plugins` branch, but differs from it in several substantial ways. The *event api not exactly the same* because nose2 can't replace `unittest.TestCase`, and *does not configure the test run or plugin set globally*. nose2 also has a *wholly different reporting API* from unittest2's plugins, to better support some common cases (like adding extra information to error output). nose2 also *defers more work to plugins* than unittest2: the test loader, runner and result are just plugin callers, and all of the logic of test discovery, running and reporting is implemented in plugins. This means that unlike unittest2, *nose2 includes a substantial set of plugins that are active by default*.

4.5 Plugins for nose2

4.5.1 Built in and Loaded by Default

These plugins are loaded by default. To exclude one of these plugins from loading, add the plugin's fully qualified module name to the `exclude-plugins` list in a config file's `[unittest]` section, or pass the plugin module with the `--exclude-plugin` argument on the command line. You can also pass plugin module names to exclude to a `nose2.main.PluggableTestProgram` using the `excludePlugins` keyword argument.

Loader: Test discovery

Discovery-based test loader.

This plugin implements nose2's automatic test module discovery. It looks for test modules in packages and directories whose names start with `test`, then fires the `loadTestsFromModule()` hook for each one to allow other plugins to load the actual tests.

It also fires `handleFile()` for every file that it sees, and `matchPath()` for every Python module, to allow other plugins to load tests from other kinds of files and to influence which modules are examined for tests.

Configuration [discovery]

always-on

Default True

Type boolean

Sample configuration

The default configuration is equivalent to including the following in a `unittest.cfg` file.

```
[discovery]
always-on = True
```

Plugin class reference: DiscoveryLoader

class nose2.plugins.loader.discovery.DiscoveryLoader

Loader plugin that can discover tests

loadTestsFromName (*event*)

Load tests from module named by event.name

loadTestsFromNames (*event*)

Discover tests if no test names specified

Loader: Test Functions

Load tests from test functions in modules.

This plugin responds to `loadTestsFromModule()` by adding test cases for all test functions in the module to `event.extraTests`. It uses `session.testMethodPrefix` to find test functions.

Functions that are generators, have param lists, or take arguments are not collected.

This plugin also implements `loadTestsFromName()` to enable loading tests from dotted function names passed on the command line.

Fixtures

Test functions can specify setup and teardown fixtures as attributes on the function, for example:

```
x = 0

def test():
    assert x

def setup():
    global x
    x = 1

def teardown():
    global x
    x = 1

test.setup = setup
test.teardown = teardown
```

The setup attribute may be named `setup`, `setUp` or `setUpFunc`. The teardown attribute may be named `teardown`, `tearDown` or `tearDownFunc`.

Other attributes

The other significant attribute that may be set on a test function is `paramList`. When `paramList` is set, the function will be collected by the *parameterized test loader*. The easiest way to set `paramList` is with the `nose2.tools.params()` decorator.

Configuration [functions]

always-on

Default True

Type boolean

Sample configuration

The default configuration is equivalent to including the following in a `unittest.cfg` file.

```
[functions]
always-on = True
```

Plugin class reference: Functions

class `nose2.plugins.loader.functions.Functions`

Loader plugin that loads test functions

loadTestsFromModule (*event*)

Load test functions from `event.module`

loadTestsFromName (*event*)

Load test if `event.name` is the name of a test function

Loader: Test Generators

Load tests from generators.

This plugin implements `loadTestFromTestCase()`, `loadTestsFromName()` and `loadTestFromModule()` to enable loading tests from generators.

Generators may be functions or methods in test cases. In either case, they must yield a callable and arguments for that callable once for each test they generate. The callable and arguments may all be in one tuple, or the arguments may be grouped into a separate tuple:

```
def test_gen():
    yield check, 1, 2
    yield check, (1, 2)
```

To address a particular generated test via a command-line test name, append a colon (':') followed by the index (starting from 1) of the generated case you want to execute.

Configuration [generators]

always-on

Default True

Type boolean

Sample configuration

The default configuration is equivalent to including the following in a `unittest.cfg` file.

```
[generators]
always-on = True
```

Plugin class reference: Generators

```
class nose2.plugins.loader.generators.Generators
    Loader plugin that loads generator tests

    getTestCaseNames (event)
        Get generator test case names from test case class

    loadTestsFromModule (event)
        Load tests from generator functions in a module

    loadTestsFromName (event)
        Load tests from generator named on command line

    loadTestsFromTestCase (event)
        Load generator tests from test case
```

Loader: Parameterized Tests

Load tests from parameterized functions and methods.

This plugin implements `getTestCaseNames()`, `loadTestsFromModule()`, and `loadTestsFromName()` to support loading tests from parameterized test functions and methods.

To parameterize a function or test case method, use `nose2.tools.params()`.

To address a particular parameterized test via a command-line test name, append a colon (':') followed by the index (*starting from 1*) of the case you want to execute.

Such And The Parameters Plugin

The parameters plugin can work with the Such DSL, as long as the first argument of the test function is the “case” argument, followed by the other parameters:

```
from nose2.tools import such
from nose2.tools.params import params

with such.A('foo') as it:
    @it.should('do bar')
    @params(1,2,3)
    def test(case, bar):
        case.assert_(isinstance(bar, int))

    @it.should('do bar and extra')
    @params((1, 2), (3, 4), (5, 6))
    def testExtraArg(case, bar, foo):
        case.assert_(isinstance(bar, int))
        case.assert_(isinstance(foo, int))
```

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```
it.createTests(globals())
```

Configuration [parameters]

always-on

Default True

Type boolean

Sample configuration

The default configuration is equivalent to including the following in a `unittest.cfg` file.

```
[parameters]
always-on = True
```

Plugin class reference: Parameters

class `nose2.plugins.loader.parameters.Parameters`

Loader plugin that loads parameterized tests

getTestCaseNames (*event*)

Generate test case names for all parameterized methods

loadTestsFromModule (*event*)

Load tests from parameterized test functions in the module

loadTestsFromName (*event*)

Load parameterized test named on command line

Loader: Test Cases

Load tests from `unittest.TestCase` subclasses.

This plugin implements `loadTestsFromName()` and `loadTestsFromModule()` to load tests from `unittest.TestCase` subclasses found in modules or named on the command line.

Configuration [testcases]

always-on

Default True

Type boolean

Sample configuration

The default configuration is equivalent to including the following in a `unittest.cfg` file.

```
[testcases]
always-on = True
```

Plugin class reference: TestClassLoader

class `nose2.plugins.loader.testcases.TestClassLoader`

Loader plugin that loads from test cases

loadTestsFromModule (*event*)

Load tests in `unittest.TestCase` subclasses

loadTestsFromName (*event*)

Load tests from `event.name` if it names a test case/method

Loader: Test Classes

Load tests from classes that are *not* `unittest.TestCase` subclasses.

This plugin responds to `loadTestsFromModule()` by adding test cases for test methods found in classes in the module that are *not* subclasses of `unittest.TestCase`, but whose names (lowercased) match the configured test method prefix.

Test class methods that are generators or have param lists are not loaded here, but by the `nose2.plugins.loader.generators.Generators` and `nose2.plugins.loader.parameters.Parameters` plugins.

This plugin also implements `loadTestsFromName()` to enable loading tests from dotted class and method names passed on the command line.

This plugin makes two additional plugin hooks available for other test loaders to use:

`nose2.plugins.loader.testclasses.loadTestsFromClass(self, event)`

Parameters `event` – A `LoadFromClassEvent` instance

Plugins can use this hook to load tests from a class that is not a `unittest.TestCase` subclass. To prevent other plugins from loading tests from the test class, set `event.handled` to `True` and return a test suite. Plugins can also append tests to `event.extraTests`. Usually, that's what you want, since it allows other plugins to load their tests from the test case as well.

`nose2.plugins.loader.testclasses.getTestMethodNames(self, event)`

Parameters `event` – A `GetTestMethodNamesEvent` instance

Plugins can use this hook to limit or extend the list of test case names that will be loaded from a class that is not a `unittest.TestCase` subclass by the standard nose2 test loader plugins (and other plugins that respect the results of the hook). To force a specific list of names, set `event.handled` to `True` and return a list: this exact list will be the only test case names loaded from the test case. Plugins can also extend the list of names by appending test names to `event.extraNames`, and exclude names by appending test names to `event.excludedNames`.

About Test Classes

Test classes are classes that look test-like but are not subclasses of `unittest.TestCase`. Test classes support all of the same test types and fixtures as test cases.

To “look test-like” a class must have a name that, lowercased, matches the configured test method prefix – “test” by default. Test classes must also be able to be instantiated without arguments.

What are they useful for? Mostly the case where a test class can’t for some reason subclass `unittest.TestCase`. Otherwise, test class tests and test cases are functionally equivalent in nose2, and test cases have broader support and all of those helpful `assert*` methods – so when in doubt, you should use a `unittest.TestCase`.

Here’s an example of a test class:

```
class TestSomething(object):
    def test(self):
        assert self.something(), "Something failed!"
```

Configuration [test-classes]

always-on

Default True

Type boolean

Sample configuration

The default configuration is equivalent to including the following in a `unittest.cfg` file.

```
[test-classes]
always-on = True
```

Plugin class reference: TestClassLoader

class nose2.plugins.loader.testclasses.**TestClassLoader**

Loader plugin that loads test functions

loadTestsFromModule (*event*)

Load test classes from event.module

loadTestsFromName (*event*)

Load tests from event.name if it names a test class/method

register ()

Install extra hooks

Adds the new plugin hooks:

- loadTestsFromTestClass
- getTestMethodNames

Loader: load_tests protocol

Loader that implements the `load_tests` protocol.

This plugin implements the `load_tests` protocol as detailed in the documentation for `unittest2`.

See the `load_tests` protocol documentation for more information.

Warning: Test suites using the `load_tests` protocol do not work correctly with the `multiprocess` plugin as of nose2 04. This will be fixed in a future release.

Configuration [load_tests]

always-on

Default True

Type boolean

Sample configuration

The default configuration is equivalent to including the following in a `unittest.cfg` file.

```
[load_tests]
always-on = True
```

Plugin class reference: LoadTestsLoader

class `nose2.plugins.loader.loadtests.LoadTestsLoader`

Loader plugin that implements `load_tests`.

handleDir (*event*)

Run `load_tests` in packages.

If a package itself matches the test file pattern, run `load_tests` in its `__init__.py`, and stop default test discovery for that package.

moduleLoadedSuite (*event*)

Run `load_tests` in a module.

May add to or filter tests loaded in module.

Default filter: `__test__`

This plugin implements `startTestRun()`, which excludes all test objects that define a `__test__` attribute that evaluates to `False`.

Plugin class reference: DunderTestFilter

class `nose2.plugins.dundertest.DunderTestFilter`

Exclude all tests defining a `__test__` attribute that evaluates to `False`.

startTestRun (*event*)

Recurse `event.suite` and remove all test suites and test cases that define a `__test__` attribute that evaluates to `False`.

Reporting test results

Collect and report test results.

This plugin implements the primary user interface for nose2. It collects test outcomes and reports on them to the console, as well as firing several hooks for other plugins to do their own reporting.

To see this report, nose2 **MUST** be run with the `verbose` flag:

```
nose2 --verbose
```

This plugin extends standard unittest console reporting slightly by allowing custom report categories. To put events into a custom reporting category, change the `event.outcome` to whatever you want. Note, however, that customer categories are *not* treated as errors or failures for the purposes of determining whether a test run has succeeded.

Don't disable this plugin, unless you (a) have another one doing the same job, or (b) really don't want any test results (and want all test runs to `exit(1)`).

Configuration [test-result]**always-on**

Default True

Type boolean

descriptions

Default True

Type boolean

Sample configuration

The default configuration is equivalent to including the following in a `unittest.cfg` file.

```
[test-result]
always-on = True
descriptions = True
```

Plugin class reference: ResultReporter**class** nose2.plugins.result.ResultReporter

Result plugin that implements standard unittest console reporting

afterTestRun (*event*)

Handle afterTestRun hook

- prints error lists
- prints summary
- fires summary reporting hooks (`beforeErrorList()`, `beforeSummaryReport()`, etc)

startTest (*event*)

Handle startTest hook

- prints test description if verbosity > 1

testOutcome (*event*)

Handle testOutcome hook

- records test outcome in reportCategories
- prints test outcome label
- fires reporting hooks (*reportSuccess()*, *reportFailure()*, etc)

Buffering test output

Buffer stdout and/or stderr during test execution, appending any output to the error reports of failed tests.

This allows you to use print for debugging in tests without making your test runs noisy.

This plugin implements *startTest()*, *stopTest()*, *setTestOutcome()*, *outcomeDetail()*, *beforeInteraction()* and *afterInteraction()* to manage capturing sys.stdout and/or sys.stderr into buffers, attaching the buffered output to test error report detail, and getting out of the way when other plugins want to talk to the user.

Configuration [output-buffer]

always-on**Default** False**Type** boolean**stderr****Default** False**Type** boolean**stdout****Default** True**Type** boolean

Sample configuration

The default configuration is equivalent to including the following in a `unittest.cfg` file.

```
[output-buffer]
always-on = False
stderr = False
stdout = True
```

Command-line options

-B DEFAULT, **--output-buffer** DEFAULT
Enable output buffer

Plugin class reference: `OutputBufferPlugin`

class `nose2.plugins.buffer.OutputBufferPlugin`

Buffer output during test execution

afterInteraction (*event*)

Start buffering again (does not clear buffers)

beforeInteraction (*event*)

Stop buffering so users can see stdout

outcomeDetail (*event*)

Add buffered output to `event.extraDetail`

setTestOutcome (*event*)

Attach buffer(s) to `event.metadata`

startTest (*event*)

Start buffering selected stream(s)

stopTest (*event*)

Stop buffering

Dropping Into the Debugger

Start a `pdb.post_mortem()` on errors and failures.

This plugin implements `testOutcome()` and will drop into `pdb` whenever it sees a test outcome that includes `exc_info`.

It fires `beforeInteraction()` before launching `pdb` and `afterInteraction()` after. Other plugins may implement `beforeInteraction()` to return `False` and set `event.handled` to prevent this plugin from launching `pdb`.

Configuration [debugger]

`always-on`

Default `False`

Type `boolean`

`errors-only`

Default `False`

Type `boolean`

Sample configuration

The default configuration is equivalent to including the following in a `unittest.cfg` file.

```
[debugger]
always-on = False
errors-only = False
```

Command-line options

-D DEFAULT, **--debugger** DEFAULT
Enter pdb on test fail or error

Plugin class reference: Debugger

class nose2.plugins.debugger.**Debugger**
Enter pdb on test error or failure

pdb

For ease of mocking and using different pdb implementations, pdb is aliased as a class attribute.

pdb = <module 'pdb' from '/home/docs/.pyenv/versions/3.7.1/lib/python3.7/pdb.py'>

testOutcome (*event*)

Drop into pdb on unexpected errors or failures

Stopping After the First Error or Failure

Stop the test run after the first error or failure.

This plugin implements *testOutcome()* and sets *event.result.shouldStop* if it sees an outcome with *exc_info* that is not expected.

Command-line options

-F DEFAULT, **--fail-fast** DEFAULT
Stop the test run after the first error or failure

Plugin class reference: FailFast

class nose2.plugins.failfast.**FailFast**
Stop the test run after error or failure

testOutcome (*event*)

Stop on unexpected error or failure

Capturing log messages

Capture log messages during test execution, appending them to the error reports of failed tests.

This plugin implements *startTestRun()*, *startTest()*, *stopTest()*, *setTestOutcome()*, and *outcomeDetail()* to set up a logging configuration that captures log messages during test execution, and appends them to error reports for tests that fail or raise exceptions.

Configuration [log-capture]

always-on

Default False

Type boolean

clear-handlers

Default False

Type boolean

date-format

Default None

Type str

filter

Default ['-nose']

Type list

format

Default %(name)s: %(levelname)s: %(message)s

Type str

log-level

Default NOTSET

Type str

Sample configuration

The default configuration is equivalent to including the following in a `unittest.cfg` file.

```
[log-capture]
always-on = False
clear-handlers = False
filter = -nose
format = %(name)s: %(levelname)s: %(message)s
log-level = NOTSET
```

Command-line options

--log-capture DEFAULT
Enable log capture

Plugin class reference: LogCapture

```
class nose2.plugins.logcapture.LogCapture
    Capture log messages during test execution

    outcomeDetail (event)
        Append captured log messages to event.extraDetail

    setTestOutcome (event)
        Store captured log messages in event.metadata
```

startTest (*event*)
Set up handler for new test

startTestRun (*event*)
Set up logging handler

stopTest (*event*)
Clear captured messages, ready for next test

Test coverage reporting

Use this plugin to activate coverage report.

To use this plugin, you need to install nose2 [coverage_plugin]. e.g.

```
$ pip install nose2[coverage_plugin]>=0.6.5
```

Then, you can enable coverage reporting with :

```
$ nose2 --with-coverage
```

Or with this lines in `unittest.cfg` :

```
[coverage]
always-on = True
```

You can further specify coverage behaviors with a `.coveragerc` file, as specified by [Coverage Config](#). However, when doing so you should also be aware of *Differences From coverage*.

Configuration [coverage]

always-on

Default False

Type boolean

coverage

Default []

Type list

coverage-config

Default

Type str

coverage-report

Default []

Type list

Sample configuration

The default configuration is equivalent to including the following in a `unittest.cfg` file.

```
[coverage]
always-on = False
coverage =
coverage-config =
coverage-report =
```

Command-line options

```
--coverage PATH
    Measure coverage for filesystem path (multi-allowed)

--coverage-report TYPE
    Generate selected reports, available types: term, term-missing, annotate, html, xml (multi-allowed)

--coverage-config FILE
    Config file for coverage, default: .coveragerc

-C DEFAULT, --with-coverage DEFAULT
    Turn on coverage reporting
```

Plugin class reference: Coverage

```
class nose2.plugins.coverage.Coverage
```

afterSummaryReport (*event*)

Reporting data is collected, failure status determined and set. Now print any buffered error output saved from beforeSummaryReport

beforeSummaryReport (*event*)

Only called if active so stop coverage and produce reports.

createTests (*event*)

Start coverage early to catch imported modules.

Only called if active so, safe to just start without checking flags

handleArgs (*event*)

Get our options in order command line, config file, hard coded.

wasSuccessful (*event*)

Mark full test run as successful or unsuccessful

Differences From coverage

The `coverage` tool is the basis for nose2's coverage reporting. nose2 will seek to emulate `coverage` behavior whenever possible, but there are known cases where this is not feasible.

If you need the exact behaviors of `coverage`, consider having `coverage` invoke nose2.

Otherwise, please be aware of the following known differences:

- The `fail_under` parameter results in an exit status of 2 for `coverage`, but an exit status of 1 for nose2

Use assert statements in tests

Make assert statements print pretty output, including source.

This makes `assert x == y` more usable, as an alternative to `self.assertEqual(x, y)`

This plugin implements `outcomeDetail()` and checks for `event.exc_info`. If it finds that an `AssertionError` happened, it will inspect the traceback and add additional detail to the error report.

Configuration [pretty-assert]

always-on

Default False

Type boolean

Sample configuration

The default configuration is equivalent to including the following in a `unittest.cfg` file.

```
[pretty-assert]
always-on = False
```

Command-line options

--pretty-assert DEFAULT
Add pretty output for “assert” statements

Plugin class reference: PrettyAssert

class nose2.plugins.prettyassert.PrettyAssert

Add pretty output for “assert” statements

static addAssertDetail (*extraDetail*, *exc*, *trace*)

Add details to output regarding `AssertionError` and its context

extraDetail: a list of lines which will be joined with newlines and added to the output for this test failure – defined as part of the event format

exc: the `AssertionError` exception which was thrown

trace: a traceback object for the exception

assert statement inspection

The `prettyassert` plugin works by inspecting the stack frame which raised an `AssertionError`. Unlike `pytest`’s assertion rewriting code, it does not modify the built-in `AssertionError`.

As a result, it is somewhat limited in its capabilities – it can only report the *bound* values from that stack frame. That means that this type of statement works well:

```
x = f()
y = g()
assert x == y
```

but this type of statement does not:

```
assert f() == g()
```

It will still run, but the prettyassert will tell you that *f* and *g* are functions, not what they evaluated to. This is probably not what you want.

attribute resolution

The assertion inspection will resolve attributes, so that expressions like this will work as well:

```
assert x.foo == 1
```

But note that the attribute *x.foo* will be resolved *twice* in this case, if the assertion fails. Once when the assertion is evaluated, and again when it is inspected.

As a result, properties with dynamic values may not behave as expected under prettyassert inspection.

4.5.2 Built in but *not* Loaded by Default

These plugins are available as part of the nose2 package but *are not loaded by default*. To load one of these plugins, add the plugin module name (as dot-separated, fully qualified name) to the `plugins` list in a config file's `[unittestest]` section, or pass the plugin module with the `--plugin` argument on the command line. You can also pass plugin module names to a `nose2.main.PluggableTestProgram` using the `plugins` keyword argument.

Outputting XML Test Reports

Note: New in version 0.2

Output test reports in junit-xml format.

This plugin implements `startTest()`, `testOutcome()` and `stopTestRun()` to compile and then output a test report in junit-xml format. By default, the report is written to a file called `nose2-junit.xml` in the current working directory.

You can configure the output filename by setting `path` in a `[junit-xml]` section in a config file. Unicode characters which are invalid in XML 1.0 are replaced with the U+FFFD replacement character. In the case that your software throws an error with an invalid byte string.

By default, the ranges of discouraged characters are replaced as well. This can be changed by setting the `keep_restricted` configuration variable to `True`.

By default, the arguments of parametrized and generated tests are not printed. For instance, the following code:

```
# a.py
from nose2 import tools
```

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```

def test_gen():
    def check(a, b):
        assert a == b, '{}!={}'.format(a,b)

    yield check, 99, 99
    yield check, -1, -1

@tools.params('foo', 'bar')
def test_params(arg):
    assert arg in ['foo', 'bar', 'baz']

```

Produces this XML by default:

```

<testcase classname="a" name="test_gen:1" time="0.000171">
  <system-out />
</testcase>
<testcase classname="a" name="test_gen:2" time="0.000202">
  <system-out />
</testcase>
<testcase classname="a" name="test_params:1" time="0.000159">
  <system-out />
</testcase>
<testcase classname="a" name="test_params:2" time="0.000163">
  <system-out />
</testcase>

```

But if `test_fullname` is `True`, then the following XML is produced:

```

<testcase classname="a" name="test_gen:1 (99, 99)" time="0.000213">
  <system-out />
</testcase>
<testcase classname="a" name="test_gen:2 (-1, -1)" time="0.000194">
  <system-out />
</testcase>
<testcase classname="a" name="test_params:1 ('foo')" time="0.000178">
  <system-out />
</testcase>
<testcase classname="a" name="test_params:2 ('bar')" time="0.000187">
  <system-out />
</testcase>

```

Enable this Plugin

This plugin is built-in, but not loaded by default.

Even if you specify `always-on = True` in the configuration, it will not run unless you also enable it. You can do so by putting the following in a `unittest.cfg` or `nose2.cfg` file

```

[unittest]
plugins = nose2.plugins.junitxml

```

The `plugins` parameter may contain a list of plugin names, including `nose2.plugins.junitxml`

Configuration [junit-xml]

always-on

Default False

Type boolean

keep_restricted

Default False

Type boolean

path

Default nose2-junit.xml

Type str

test_fullname

Default False

Type boolean

test_properties

Default None

Type str

Sample configuration

The default configuration is equivalent to including the following in a `unittest.cfg` file.

```
[junit-xml]
always-on = False
keep_restricted = False
path = nose2-junit.xml
test_fullname = False
```

Command-line options

-X DEFAULT, **--junit-xml** DEFAULT
Generate junit-xml output report

Plugin class reference: JUnitXmlReporter

```
class nose2.plugins.junitxml.JUnitXmlReporter
    Output junit-xml test report to file

    startTest (event)
        Count test, record start time

    stopTestRun (event)
        Output xml tree to file
```

testOutcome (*event*)
Add test outcome to xml tree

Sample output

The XML test report for nose2's sample scenario with tests in a package looks like this:

```
<testsuite errors="1" failures="5" name="nose2-junit" skips="1" tests="25" time="0.004
↳ ">
  <testcase classname="pkg1.test.test_things" name="test_gen:1" time="0.000141" />
  <testcase classname="pkg1.test.test_things" name="test_gen:2" time="0.000093" />
  <testcase classname="pkg1.test.test_things" name="test_gen:3" time="0.000086" />
  <testcase classname="pkg1.test.test_things" name="test_gen:4" time="0.000086" />
  <testcase classname="pkg1.test.test_things" name="test_gen:5" time="0.000087" />
  <testcase classname="pkg1.test.test_things" name="test_gen_nose_style:1" time="0.
↳ 000085" />
  <testcase classname="pkg1.test.test_things" name="test_gen_nose_style:2" time="0.
↳ 000090" />
  <testcase classname="pkg1.test.test_things" name="test_gen_nose_style:3" time="0.
↳ 000085" />
  <testcase classname="pkg1.test.test_things" name="test_gen_nose_style:4" time="0.
↳ 000087" />
  <testcase classname="pkg1.test.test_things" name="test_gen_nose_style:5" time="0.
↳ 000086" />
  <testcase classname="pkg1.test.test_things" name="test_params_func:1" time="0.000093
↳ " />
  <testcase classname="pkg1.test.test_things" name="test_params_func:2" time="0.000098
↳ ">
    <failure message="test failure">Traceback (most recent call last):
      File "nose2/plugins/loader/parameters.py", line 162, in func
        return obj(*argSet)
      File "nose2/tests/functional/support/scenario/tests_in_package/pkg1/test/test_
↳ things.py", line 64, in test_params_func
        assert a == 1
    AssertionError
  </failure>
  </testcase>
  <testcase classname="pkg1.test.test_things" name="test_params_func_multi_arg:1"
↳ time="0.000094" />
  <testcase classname="pkg1.test.test_things" name="test_params_func_multi_arg:2"
↳ time="0.000089">
    <failure message="test failure">Traceback (most recent call last):
      File "nose2/plugins/loader/parameters.py", line 162, in func
        return obj(*argSet)
      File "nose2/tests/functional/support/scenario/tests_in_package/pkg1/test/test_
↳ things.py", line 69, in test_params_func_multi_arg
        assert a == b
    AssertionError
  </failure>
  </testcase>
  <testcase classname="pkg1.test.test_things" name="test_params_func_multi_arg:3"
↳ time="0.000096" />
  <testcase classname="" name="test_fixt" time="0.000091" />
  <testcase classname="" name="test_func" time="0.000084" />
  <testcase classname="pkg1.test.test_things.SomeTests" name="test_failed" time="0.
↳ 000113">
    <failure message="test failure">Traceback (most recent call last):
```

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```

File "nose2/tests/functional/support/scenario/tests_in_package/pkg1/test/test_
↪things.py", line 17, in test_failed
    assert False, "I failed"
AssertionError: I failed
</failure>
</testcase>
<testcase classname="pkg1.test.test_things.SomeTests" name="test_ok" time="0.000093
↪" />
<testcase classname="pkg1.test.test_things.SomeTests" name="test_params_method:1"
↪time="0.000099" />
<testcase classname="pkg1.test.test_things.SomeTests" name="test_params_method:2"
↪time="0.000101">
    <failure message="test failure">Traceback (most recent call last):
File "nose2/plugins/loader/parameters.py", line 144, in _method
    return method(self, *argSet)
File "nose2/tests/functional/support/scenario/tests_in_package/pkg1/test/test_
↪things.py", line 29, in test_params_method
    self.assertEqual(a, 1)
AssertionError: 2 != 1
</failure>
</testcase>
<testcase classname="pkg1.test.test_things.SomeTests" name="test_skippy" time="0.
↪000104">
    <skipped />
</testcase>
<testcase classname="pkg1.test.test_things.SomeTests" name="test_typeerr" time="0.
↪000096">
    <error message="test failure">Traceback (most recent call last):
File "nose2/tests/functional/support/scenario/tests_in_package/pkg1/test/test_
↪things.py", line 13, in test_typeerr
    raise TypeError("oops")
TypeError: oops
</error>
</testcase>
<testcase classname="pkg1.test.test_things.SomeTests" name="test_gen_method:1" time=
↪"0.000094" />
<testcase classname="pkg1.test.test_things.SomeTests" name="test_gen_method:2" time=
↪"0.000090">
    <failure message="test failure">Traceback (most recent call last):
File "nose2/plugins/loader/generators.py", line 145, in method
    return func(*args)
File "nose2/tests/functional/support/scenario/tests_in_package/pkg1/test/test_
↪things.py", line 24, in check
    assert x == 1
AssertionError
</failure>
</testcase>
</testsuite>

```

Selecting tests with attributes

Note: New in version 0.2

Filter tests by attribute, excluding any tests whose attributes do not match any of the specified attributes.

Attributes may be simple values or lists, and may be attributes of a test method (or function), a test case class, or the callable yielded by a generator test.

Given the following test module, the attrib plugin can be used to select tests in the following ways (and others!):

Note: All examples assume the attrib plugin has been activated in a config file:

```
[unittest]
plugins = nose2.plugins.attrib
```

```
import unittest

class Test(unittest.TestCase):

    def test_fast(self):
        pass
        test_fast.fast = 1
        test_fast.layer = 2
        test_fast.flags = ['blue', 'green']

    def test_faster(self):
        pass
        test_faster.fast = 1
        test_faster.layer = 1
        test_faster.flags = ['red', 'green']

    def test_slow(self):
        pass
        test_slow.fast = 0
        test_slow.slow = 1
        test_slow.layer = 2

    def test_slower(self):
        pass
        test_slower.slow = 1
        test_slower.layer = 3
        test_slower.flags = ['blue', 'red']
```

Select tests having an attribute

Running nose2 like this:

```
nose2 -v -A fast
```

Runs these tests:

```
test_fast (attrib_example.Test) ... ok
test_faster (attrib_example.Test) ... ok
```

This selects all tests that define the attribute as any True value.

Select tests that do not have an attribute

Running nose2 like this:

```
nose2 -v -A '!fast'
```

Runs these tests:

```
test_slow (attrib_example.Test) ... ok
test_slower (attrib_example.Test) ... ok
```

This selects all tests that define the attribute as a `False` value, *and those tests that do not have the attribute at all*.

Select tests having an attribute with a particular value

Running nose2 like this:

```
nose2 -v -A layer=2
```

Runs these tests:

```
test_fast (attrib_example.Test) ... ok
test_slow (attrib_example.Test) ... ok
```

This selects all tests that define the attribute with a matching value. The attribute value of each test case is converted to a string before comparison with the specified value. Comparison is case-insensitive.

Select tests having a value in a list attribute

Running nose2 like this:

```
nose2 -v -A flags=red
```

Runs these tests:

```
test_faster (attrib_example.Test) ... ok
test_slower (attrib_example.Test) ... ok
```

Since the `flags` attribute is a list, this test selects all tests with the value `red` in their `flags` attribute. Comparison done after string conversion and is case-insensitive.

Select tests that do not have a value in a list attribute

Running nose2 like this:

```
nose2 -v -A '!flags=red'
```

Runs these tests:

```
test_fast (attrib_example.Test) ... ok
```

The result in this case can be somewhat counter-intuitive. What the `attrib` plugin selects when you negate an attribute that is in a list are only those tests that *have the list attribute but without the value* specified. Tests that do not have the attribute at all are *not* selected.

Select tests using Python expressions

For more complex cases, you can use the `-E` command-line option to pass a Python expression that will be evaluated in the context of each test case. Only those test cases where the expression evaluates to `True` (and don't raise an exception) will be selected.

Running nose2 like this:

```
nose2 -v -E '"blue" in flags and layer > 2'
```

Runs only one test:

```
test_slower (attrib_example.Test) ... ok
```

Command-line options

- A** DEFAULT, **--attribute** DEFAULT
Select tests with matching attribute
- E** DEFAULT, **--eval-attribute** DEFAULT
Select tests for whose attributes the given Python expression evaluates to `True`

Plugin class reference: AttributeSelector

```
class nose2.plugins.attrib.AttributeSelector
    Filter tests by attribute

    handleArgs (args)
        Register if any attrs defined

    moduleLoadedSuite (event)
        Filter event.suite by specified attributes
```

Running Tests in Parallel with Multiple Processes

Note: New in version 0.3

Use the `mp` plugin to enable distribution of tests across multiple processes. Doing this may speed up your test run if your tests are heavily IO or CPU bound. But it *imposes an overhead cost* that is not trivial, and it *complicates the use of test fixtures* and may *conflict with plugins that are not designed to work with it*.

Usage

To activate the plugin, include the plugin module in the plugins list in `[unittest]` section in a config file:

```
[unittest]
plugins = nose2.plugins.mp
```

Or pass the module with the `--plugin` command-line option:

```
nose2 --plugin=nose2.plugins.mp
```

Then configure the number of processes to run. You can do that either with the `-N` option:

```
nose2 -N 2
```

or by setting processes in the `[multiprocess]` section of a config file:

```
[multiprocess]
processes = 2
```

Note: If you make the plugin always active by setting `always-on` in the `[multiprocess]` section of a config file, but do not set `processes` or pass `-N`, the number of processes defaults to the number of CPUs available. Also note that a value of 0 will set the actual number of processes to the number of CPUs on the computer.

Should one wish to specify the use of internet sockets for interprocess communications, specify the `bind_address` setting in the `[multiprocess]` section of the config file, for example:

```
[multiprocess]
bind_address = 127.0.0.1:1024
```

This will bind to port 1024 of 127.0.0.1. Also:

```
[multiprocess]
bind_address = 127.1.2.3
```

will bind to any random open port on 127.1.2.3. Any internet address or host-name which python can recognize as such, `bind`, *and* `connect` is acceptable. While `0.0.0.0` can be use for listening, it is not necessarily an address to which the OS can connect. When the port address is 0 or omitted, a random open port is used. If the setting is omitted or blank, then sockets are not used unless nose is being executed on Windows. In which case, an address on the loop back interface and a random port are used. Whenever used, processes employ a random shared key for authentication.

Guidelines for Test Authors

Not every test suite will work well, or work at all, when run in parallel. For some test suites, parallel execution makes no sense. For others, it will expose bugs and ordering dependencies test cases and test modules.

Overhead Cost

Starting subprocesses and dispatching tests takes time. A test run that includes a relatively small number of tests that are not I/O or CPU bound (or calling `time.sleep()`) is likely to be *slower* when run in parallel.

As of this writing, for instance, nose2's test suite takes about 10 times as long to run when using `multiprocessing`, due to the overhead cost.

Shared Fixtures

The individual test processes do not share state or data after launch. This means *tests that share a fixture* – tests that are loaded from modules where `setUpModule` is defined, and tests in test classes that define `setUpClass` – *must all be dispatched to the same process at the same time*. So if you use these kinds of fixtures, your test runs may be less parallel than you expect.

Tests Load Twice

Test cases may not be pickleable, so nose2 can't transmit them directly to its test runner processes. Tests are distributed by name. This means that *tests always load twice* – once in the main process, during initial collection, and then again in the test runner process, where they are loaded by name. This may be problematic for some test suites.

Random Execution Order

Tests do not execute in the same order when run in parallel. Results will be returned in effectively random order, and tests in the same module (*as long as they do not share fixtures*) may execute in any order and in different processes. Some tests suites have ordering dependencies, intentional or not, and those that do will fail randomly when run with this plugin.

Guidelines for Plugin Authors

The MultiProcess plugin is designed to work with other plugins. But other plugins may have to return the favor, especially if they load tests or care about something that happens *during* test execution.

New Methods

The MultiProcess plugin adds a few plugin hooks that other plugins can use to set themselves up for multiprocessing test runs. Plugins don't have to do anything special to register for these hooks, just implement the methods as normal.

registerInSubprocess (*self*, *event*)

Parameters *event* – *nose2.plugins.mp.RegisterInSubprocessEvent*

The `registerInSubprocess` hook is called after plugin registration to enable plugins that need to run in subprocesses to register that fact. The most common thing to do, for plugins that need to run in subprocesses, is:

```
def registerInSubprocess(self, event):
    event.pluginClasses.append(self.__class__)
```

It is not required that plugins append their own class. If for some reason there is a different plugin class, or set of classes, that should run in the test-running subprocesses, add that class or those classes instead.

startSubprocess (*self*, *event*)

Parameters *event* – *nose2.plugins.mp.SubprocessEvent*

The `startSubprocess` hook fires in each test-running subprocess after it has loaded its plugins but before any tests are executed.

Plugins can customize test execution here in the same way as in `startTestRun()`, by setting `event.executeTests`, and prevent test execution by setting `event.handled` to `True` and returning `False`.

stopSubprocess (*self*, *event*)

Parameters *event* – *nose2.plugins.mp.SubprocessEvent*

The `stopSubprocess` event fires just before each test running subprocess shuts down. Plugins can use this hook for any per-process finalization that they may need to do.

The same event instance is passed to `startSubprocess` and `stopSubprocess`, which enables plugins to use that event's metadata to communicate state or other information from the start to the stop hooks, if needed.

New Events

The `MultiProcess` plugin's new hooks come with custom event classes.

class `nose2.plugins.mp.RegisterInSubprocessEvent` (***metadata*)
Event fired to notify plugins that multiprocessing testing will occur

pluginClasses

Add a plugin class to this list to cause the plugin to be instantiated in each test-running subprocess. The most common thing to do, for plugins that need to run in subprocesses, is:

```
def registerInSubprocess(self, event):
    event.pluginClasses.append(self.__class__)
```

class `nose2.plugins.mp.SubprocessEvent` (*loader, result, runner, plugins, connection, **meta-data*)

Event fired at start and end of subprocess execution.

loader

Test loader instance

result

Test result

plugins

List of plugins loaded in the subprocess.

connection

The `multiprocessing.Connection` instance that the subprocess uses for communication with the main process.

executeTests

Callable that will be used to execute tests. Plugins may set this attribute to wrap or otherwise change test execution. The callable must match the signature:

```
def execute(suite, result):
    ...
```

Stern Warning

All event attributes, including “*event.metadata*“, must be *pickleable*. If your plugin sets any event attributes or puts anything into `event.metadata`, it is your responsibility to ensure that anything you can possibly put in is *pickleable*.

Do I Really Care?

If you answer *yes* to any of the following questions, then your plugin will not work with multiprocessing testing without modification:

- Does your plugin load tests?
- Does your plugin capture something that happens during test execution?
- Does your plugin require user interaction during test execution?
- Does your plugin set `executeTests` in `startTestRun`?

Here's how to handle each of those cases.

Loading Tests

- Implement `registerInSubprocess()` as suggested to enable your plugin in the test runner processes.

Capturing Test Execution State

- Implement `registerInSubprocess()` as suggested to enable your plugin in the test runner processes.
- Be wary of setting `event.metadata` unconditionally. Your plugin will execute in the main process and in the test runner processes, and will see `setTestOutcome()` and `testOutcome()` events *in both processes*. If you unconditionally set a key in `event.metadata`, the plugin instance in the main process will overwrite anything set in that key by the instance in the subprocess.
- If you need to write something to a file, implement `stopSubprocess()` to write a file in each test runner process.

Overriding Test Execution

- Implement `registerInSubprocess()` as suggested to enable your plugin in the test runner processes and make a note that your plugin is running under a multiprocessing session.
- When running multiprocessing, *do not* set `event.executeTests` in `startTestRun()` – instead, set it in `startSubprocess()` instead. This will allow the multiprocessing plugin to install its test executor in the main process, while your plugin takes over test execution in the test runner subprocesses.

Interacting with Users

- You are probably safe because as a responsible plugin author you are already firing the interaction hooks (`beforeInteraction()`, `afterInteraction()`) around your interactive bits, and skipping them when the `beforeInteraction()` hook returns `False` and sets `event.handled`.

If you're not doing that, start!

Possible Issues On Windows

On windows, there are a few known bugs with respect to multiprocessing.

First, on python 2.X or old versions of 3.X, if the `__main__` module accessing nose2 is a `__main__.py`, an assertion in python code module `multiprocessing.forking` may fail. The bug for 3.2 is <http://bugs.python.org/issue10845>.

Secondly, python on windows does not use `fork()`. It bootstraps from a separate interpreter invocation. In certain contexts, the “value” for a parameter will be taken as a “count” and subprocess use this to build the flag for the command-line. E.g., If this value is 2 billion (like a hash seed), `subprocess.py` may attempt to build a 2gig string, and possibly throw a `MemoryError` exception. The related bug is <http://bugs.python.org/issue20954>.

Reference

Enable this Plugin

This plugin is built-in, but not loaded by default.

Even if you specify `always-on = True` in the configuration, it will not run unless you also enable it. You can do so by putting the following in a `unittest.cfg` or `nose2.cfg` file

```
[unittest]
plugins = nose2.plugins.mp
```

The `plugins` parameter may contain a list of plugin names, including `nose2.plugins.mp`

Configuration [multiprocess]

`always-on`

Default False

Type boolean

`bind_address`

Default None

Type str

`processes`

Default 0

Type integer

`test-run-timeout`

Default 60.0

Type float

Sample configuration

The default configuration is equivalent to including the following in a `unittest.cfg` file.

```
[multiprocess]
always-on = False
processes = 0
test-run-timeout = 60.0
```

Command-line options

`-N` DEFAULT, `--processes` DEFAULT
0 procs

Plugin class reference: `MultiProcess`

`class` `nose2.plugins.mp.MultiProcess`

`procs`

Get the appropriate number of procs for `self.procs` if `self._procs` is 0.

Organizing Test Fixtures into Layers

Note: New in version 0.4

Layers allow more flexible organization of test fixtures than test-, class- and module- level fixtures. Layers in nose2 are inspired by and aim to be compatible with the layers used by Zope's testrunner.

Using layers, you can do things like:

- Implement package-level fixtures by sharing a layer among all test cases in the package.
- Share fixtures across tests in different modules without having them run multiple times.
- Create a fixture tree deeper than three levels (test, class and module).
- Make fixtures available for other packages or projects to use.

A layer is a *new-style* class that implements at least a `setUp` classmethod:

```
class Layer(object):
    @classmethod
    def setUp(cls):
        # ...
```

It may also implement `tearDown`, `testSetUp` and `testTearDown`, all as classmethods.

To assign a layer to a test case, set the test case's `layer` property:

```
class Test(unittest.TestCase):
    layer = Layer
```

Note that the layer *class* is assigned, not an instance of the layer. Typically layer classes are not instantiated.

Sub-layers

Layers may subclass other layers:

```
class SubLayer(Layer):
    @classmethod
    def setUp(cls):
        # ...
```

In this case, all tests that belong to the sub-layer also belong to the base layer. For example for this test case:

```
class SubTest(unittest.TestCase):
    layer = SubLayer
```

The `setUp` methods from *both* `SubLayer` and `Layer` will run before any tests are run. The superclass's setup will always run before the subclass's setup. For `tearDown`, the reverse: the subclass's `tearDown` runs before the superclass's.

Warning: One important thing to note: layers that subclass other layers *must not* call their superclass's `setUp`, `tearDown`, etc. The test runner will take care of organizing tests so that the superclass's methods are called in the right order:

```

Layer.setUp ->
  SubLayer.setUp ->
    Layer.testSetUp ->
      SubLayer.testSetUp ->
        TestCase.setUp
        TestCase.run
        TestCase.tearDown
      SubLayer.testTearDown <-
    Layer.testTearDown <-
  SubLayer.tearDown <-
Layer.tearDown <-

```

If a sublayer calls its superclass's methods directly, *those methods will be called twice*.

Layer method reference

class Layer

Not an actual class, but reference documentation for the methods layers can implement. There is no layer base class. Layers must be subclasses of `object` or other layers.

classmethod setUp (cls)

The layer's `setUp` method is called before any tests belonging to that layer are executed. If no tests belong to the layer (or one of its sub-layers) then the `setUp` method will not be called.

classmethod tearDown (cls)

The layer's `tearDown` method is called after any tests belonging to the layer are executed, if the layer's `setUp` method was called and did not raise an exception. It will not be called if the layer has no `setUp` method, or if that method did not run or did raise an exception.

classmethod testSetUp (cls[, test])

The layer's `testSetUp` method is called before each test belonging to the layer (and its sub-layers). If the method is defined to accept an argument, the test case instance is passed to the method. The method may also be defined to take no arguments.

classmethod testTearDown (cls[, test])

The layer's `testTearDown` method is called after each test belonging to the layer (and its sub-layers), if the layer also defines a `setUpTest` method and that method ran successfully (did not raise an exception) for this test case.

Layers DSL

nose2 includes a DSL for setting up layer-using tests called “such”. Read all about it here: [Such: a Functional-Test Friendly DSL](#).

Pretty reports

The layers plugin module includes a second plugin that alters test report output to make the layer groupings more clear. When activated with the `--layer-reporter` command-line option (or via a config file), test output that normally looks like this:

```
test (test_layers.NoLayer) ... ok
test (test_layers.Outer) ... ok
test (test_layers.InnerD) ... ok
test (test_layers.InnerA) ... ok
test (test_layers.InnerA_1) ... ok
test (test_layers.InnerB_1) ... ok
test (test_layers.InnerC) ... ok
test2 (test_layers.InnerC) ... ok
```

```
-----
Ran 8 tests in 0.001s
```

```
OK
```

Will instead look like this:

```
test (test_layers.NoLayer) ... ok
Base
  test (test_layers.Outer) ... ok
  LayerD
    test (test_layers.InnerD) ... ok
  LayerA
    test (test_layers.InnerA) ... ok
  LayerB
  LayerC
    test (test_layers.InnerC) ... ok
    test2 (test_layers.InnerC) ... ok
  LayerB_1
    test (test_layers.InnerB_1) ... ok
  LayerA_1
    test (test_layers.InnerA_1) ... ok
```

```
-----
Ran 8 tests in 0.002s
```

```
OK
```

The layer reporter plugin can also optionally colorize the keywords (by default, 'A', 'having', and 'should') in output from tests defined with the *such DSL*.

If you would like to change how the layer is displayed, set the `description` attribute.

```
class LayerD(Layer):
    description = '*** This is a very important custom layer description ***'
```

Now the output will be the following:

```
test (test_layers.NoLayer) ... ok
Base
  test (test_layers.Outer) ... ok
  *** This is a very important custom layer description ***
  test (test_layers.InnerD) ... ok
  LayerA
    test (test_layers.InnerA) ... ok
  LayerB
  LayerC
    test (test_layers.InnerC) ... ok
    test2 (test_layers.InnerC) ... ok
```

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```

LayerB_1
  test (test_layers.InnerB_1) ... ok
LayerA_1
  test (test_layers.InnerA_1) ... ok
-----
Ran 8 tests in 0.002s
OK

```

Warnings and Caveats

Test case order and module isolation

Test cases that use layers will not execute in the same order as test cases that do not. In order to execute the layers efficiently, the test runner must reorganize *all* tests in the loaded test suite to group those having like layers together (and sub-layers under their parents). If you share layers across modules this may result in tests from one module executing interleaved with tests from a different module.

Mixing layers with `setUpClass` and module fixtures

Don't cross the streams.

The implementation of class- and module-level fixtures in `unittest2` depends on introspecting the class hierarchy inside of the `unittest.TestSuite`. Since the suites that the `layers` plugin uses to organize tests derive from `unittest.BaseTestSuite` (instead of `unittest.TestSuite`), class- and module-level fixtures in `TestCase` classes that use layers will be ignored.

Mixing layers and multiprocessing testing

In the initial release, *test suites using layers are incompatible with the multiprocessing plugin*. This should be fixed in a future release.

Plugin reference

Enable this Plugin

This plugin is built-in, but not loaded by default.

Even if you specify `always-on = True` in the configuration, it will not run unless you also enable it. You can do so by putting the following in a `unittest.cfg` or `nose2.cfg` file

```
[unittest]
plugins = nose2.plugins.layers
```

The `plugins` parameter may contain a list of plugin names, including `nose2.plugins.layers`

Configuration [layer-reporter]

always-on

Default False

Type boolean

colors

Default False

Type boolean

highlight-words

Default ['A', 'having', 'should']

Type list

indent

Default

Type str

Sample configuration

The default configuration is equivalent to including the following in a `unittest.cfg` file.

```
[layer-reporter]
always-on = False
colors = False
highlight-words = A
                having
                should
indent =
```

Command-line options

--layer-reporter DEFAULT

Add layer information to test reports

Plugin class reference: LayerReporter

class nose2.plugins.layers.LayerReporter

Plugin class reference: Layers

class nose2.plugins.layers.Layers

Loader: Doctests

Load tests from doctests.

This plugin implements `handleFile()` to load doctests from text files and python modules.

To disable loading doctests from text files, configure an empty extensions list:

```
[doctest]
extensions =
```

Enable this Plugin

This plugin is built-in, but not loaded by default.

Even if you specify `always-on = True` in the configuration, it will not run unless you also enable it. You can do so by putting the following in a `unittest.cfg` or `nose2.cfg` file

```
[unittest]
plugins = nose2.plugins.doctests
```

The `plugins` parameter may contain a list of plugin names, including `nose2.plugins.doctests`

Configuration [doctest]

`always-on`

Default False

Type boolean

`extensions`

Default ['.txt', '.rst']

Type list

Sample configuration

The default configuration is equivalent to including the following in a `unittest.cfg` file.

```
[doctest]
always-on = False
extensions = .txt
            .rst
```

Command-line options

--with-doctest DEFAULT

Load doctests from text files and modules

Plugin class reference: DocTestLoader

class nose2.plugins.doctests.DocTestLoader

handleFile (*event*)

Load doctests from text files and modules

Mapping exceptions to test outcomes

Map exceptions to test outcomes.

This plugin implements `setTestOutcome()` to enable simple mapping of exception classes to existing test outcomes.

By setting a list of exception classes in a nose2 config file, you can configure exceptions that would otherwise be treated as test errors, to be treated as failures or skips instead:

```
[outcomes]
always-on = True
treat-as-fail = NotImplementedError
treat-as-skip = TodoError
               IOError
```

Enable this Plugin

This plugin is built-in, but not loaded by default.

Even if you specify `always-on = True` in the configuration, it will not run unless you also enable it. You can do so by putting the following in a `unittest.cfg` or `nose2.cfg` file

```
[unittest]
plugins = nose2.plugins.outcomes
```

The `plugins` parameter may contain a list of plugin names, including `nose2.plugins.outcomes`

Configuration [outcomes]

always-on

Default False

Type boolean

treat-as-fail

Default []

Type list

treat-as-skip

Default []

Type list

Sample configuration

The default configuration is equivalent to including the following in a `unittest.cfg` file.

```
[outcomes]
always-on = False
treat-as-fail =
treat-as-skip =
```

Command-line options

--set-outcomes DEFAULT
Treat some configured exceptions as failure or skips

Plugin class reference: Outcomes

```
class nose2.plugins.outcomes.Outcomes
    Map exceptions to other test outcomes

    setTestOutcome(event)
        Update outcome, exc_info and reason based on configured mappings
```

Collecting tests without running them

This plugin implements `startTestRun()`, setting a test executor (`event.executeTests`) that just collects tests without executing them. To do so it calls `result.startTest`, `result.addSuccess` and `result.stopTest` for each test, without calling the test itself.

Enable this Plugin

This plugin is built-in, but not loaded by default.

Even if you specify `always-on = True` in the configuration, it will not run unless you also enable it. You can do so by putting the following in a `unittest.cfg` or `nose2.cfg` file

```
[unittest]
plugins = nose2.plugins.collect
```

The `plugins` parameter may contain a list of plugin names, including `nose2.plugins.collect`

Configuration [collect-only]

always-on

Default False

Type boolean

Sample configuration

The default configuration is equivalent to including the following in a `unittest.cfg` file.

```
[collect-only]
always-on = False
```

Command-line options

--collect-only DEFAULT
Collect and output test names; do not run any tests

Plugin class reference: CollectOnly

class nose2.plugins.collect.CollectOnly
Collect but don't run tests

collectTests (*suite, result*)
Collect tests, but don't run them

startTestRun (*event*)
Replace `event.executeTests`

Using Test IDs

Allow easy test selection with test ids.

Assigns (and, in verbose mode, prints) a sequential test id for each test executed. Ids can be fed back in as test names, and this plugin will translate them back to full test names. Saves typing!

This plugin implements `reportStartTest()`, `loadTestsFromName()`, `loadTestsFromNames()` and `stopTest()`.

Enable this Plugin

This plugin is built-in, but not loaded by default.

Even if you specify `always-on = True` in the configuration, it will not run unless you also enable it. You can do so by putting the following in a `unittest.cfg` or `nose2.cfg` file

```
[unittest]
plugins = nose2.plugins.testid
```

The `plugins` parameter may contain a list of plugin names, including `nose2.plugins.testid`

Configuration [testid]

always-on
Default False
Type boolean

id-file**Default** .noseids**Type** str**Sample configuration**

The default configuration is equivalent to including the following in a `unittest.cfg` file.

```
[testid]
always-on = False
id-file = .noseids
```

Command-line options

-I DEFAULT, **--with-id** DEFAULT
Add test ids to output

Plugin class reference: TestId

class nose2.plugins.testid.TestId

Allow easy test select with ids

loadIds ()

Load previously pickled 'ids' and 'tests' attributes.

loadTestsFromName (*event*)

Load tests from a name that is an id

If the name is a number, it might be an ID assigned by us. If we can find a test to which we have assigned that ID, `event.name` is changed to the test's real ID. In this way, tests can be referred to via sequential numbers.

loadTestsFromNames (*event*)

Translate test ids into test names

nextId ()

Increment ID and return it.

reportStartTest (*event*)

Record and possibly output test id

stopTestRun (*event*)

Write testids file

Profiling

Profile test execution using hotshot.

This plugin implements `startTestRun()` and replaces `event.executeTests` with `hotshot.Profile.runcall()`. It implements `beforeSummaryReport()` to output profiling information before the final test summary time. Config file options `filename`, `sort` and `restrict` can be used to change where profiling information is saved and how it is presented.

Load this plugin by running nose2 with the `-plugin=nose2.plugins.prof` option and activate it with the `-profile` option, or put the corresponding entries (`plugin` and `always_on`) in the respective sections of the configuration file.

Enable this Plugin

This plugin is built-in, but not loaded by default.

Even if you specify `always-on = True` in the configuration, it will not run unless you also enable it. You can do so by putting the following in a `unittest.cfg` or `nose2.cfg` file

```
[unittest]
plugins = nose2.plugins.prof
```

The `plugins` parameter may contain a list of plugin names, including `nose2.plugins.prof`

Configuration [profiler]

`always-on`

Default False

Type boolean

`filename`

Default

Type str

`restrict`

Default []

Type list

`sort`

Default cumulative

Type str

Sample configuration

The default configuration is equivalent to including the following in a `unittest.cfg` file.

```
[profiler]
always-on = False
filename =
restrict =
sort = cumulative
```

Command-line options

-P DEFAULT, **--profile** DEFAULT
Run tests under profiler

Plugin class reference: Profiler

```

class nose2.plugins.prof.Profiler
    Profile the test run

    beforeSummaryReport (event)
        Output profiling results

    register ()
        Don't register if hotshot is not found

    startTestRun (event)
        Set up the profiler

```

Tracing hook execution

This plugin is primarily useful for plugin authors who want to debug their plugins.

It prints each hook that is called to stderr, along with details of the event that was passed to the hook.

To do that, this plugin overrides `nose2.events.Plugin.register()` and, after registration, replaces all existing `nose2.events.Hook` instances in `session.hooks` with instances of a `Hook` subclass that prints information about each call.

Enable this Plugin

This plugin is built-in, but not loaded by default.

Even if you specify `always-on = True` in the configuration, it will not run unless you also enable it. You can do so by putting the following in a `unittest.cfg` or `nose2.cfg` file

```

[unittest]
plugins = nose2.plugins.printhooks

```

The `plugins` parameter may contain a list of plugin names, including `nose2.plugins.printhooks`

Configuration [print-hooks]

always-on

Default False

Type boolean

Sample configuration

The default configuration is equivalent to including the following in a `unittest.cfg` file.

```

[print-hooks]
always-on = False

```

Command-line options

-P DEFAULT, **--print-hooks** DEFAULT
Print names of hooks in order of execution

Plugin class reference: PrintHooks

class nose2.plugins.printheooks.**PrintHooks**

Print hooks as they are called

register ()

Override to inject noisy hook instances.

Replaces *Hook* instances in `self.session.hooks.hooks` with noisier objects.

Sample output

PrintHooks output for a test run that discovers one standard TestCase test in a python module.

Hooks that appear indented are called from within other hooks.

```
handleArgs: CommandLineArgsEvent (handled=False, args=Namespace(collect_only=None,
↳ config=['unittest.cfg', 'nose2.cfg'], debugger=None, fail_fast=None, load_
↳ plugins=True, log_level=30, print_hooks=None, profile=None, start_dir='.',
↳ testNames=[], top_level_directory=None, user_config=True, verbose=0, with_id=None))

createTests: CreateTestsEvent (loader=<PluggableTestLoader>, testNames=[], module=
↳ <module '__main__' from 'bin/nose2'>)

loadTestsFromNames: LoadFromNames (names=[], module=None)

    handleFile: HandleFileEvent (handled=False, loader=<PluggableTestLoader>, name=
↳ 'tests.py', path='nose2/tests/functional/support/scenario/one_test/tests.py',
↳ pattern='test*.py', topLevelDirectory='nose2/tests/functional/support/scenario/one_
↳ test')

    matchPath: MatchPathEvent (handled=False, name='tests.py', path='nose2/tests/
↳ functional/support/scenario/one_test/tests.py', pattern='test*.py')

    loadTestsFromModule: LoadFromModuleEvent (handled=False, loader=<PluggableTestLoader>
↳ , module=<module 'tests' from 'nose2/tests/functional/support/scenario/one_test/
↳ tests.py'>, extraTests=[])

        loadTestsFromTestCase: LoadFromTestCaseEvent (handled=False, loader=
↳ <PluggableTestLoader>, testCase=<class 'tests.Test'>, extraTests=[])

            getTestCaseNames: GetTestCaseNamesEvent (handled=False, loader=
↳ <PluggableTestLoader>, testCase=<class 'tests.Test'>, testMethodPrefix=None,
↳ extraNames=[], excludedNames=[], isTestMethod=<function isTestMethod at 0x1fccc80>)

                handleFile: HandleFileEvent (handled=False, loader=<PluggableTestLoader>, name=
↳ 'tests.pyc', path='nose2/tests/functional/support/scenario/one_test/tests.pyc',
↳ pattern='test*.py', topLevelDirectory='nose2/tests/functional/support/scenario/one_
↳ test')
```

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```

runnerCreated: RunnerCreatedEvent (handled=False, runner=<PluggableTestRunner>)

resultCreated: ResultCreatedEvent (handled=False, result=<PluggableTestResult>)

startTestRun: StartTestRunEvent (handled=False, runner=<PluggableTestRunner>, suite=
↳<unittest2.suite.TestSuite tests=[<unittest2.suite.TestSuite tests=[<unittest2.
↳suite.TestSuite tests=[<tests.Test testMethod=test>]>]>], result=
↳<PluggableTestResult>, startTime=1327346684.77457, executeTests=<function <lambda>
↳at 0x1fccf50>)

startTest: StartTestEvent (handled=False, test=<tests.Test testMethod=test>, result=
↳<PluggableTestResult>, startTime=1327346684.774765)

    reportStartTest: ReportTestEvent (handled=False, testEvent=<nose2.events.
↳StartTestEvent object at 0x1fcd650>, stream=<nose2.util._WritelnDecorator object at
↳0x1f97a10>)

setTestOutcome: TestOutcomeEvent (handled=False, test=<tests.Test testMethod=test>,
↳result=<PluggableTestResult>, outcome='passed', exc_info=None, reason=None,
↳expected=True, shortLabel=None, longLabel=None)

testOutcome: TestOutcomeEvent (handled=False, test=<tests.Test testMethod=test>,
↳result=<PluggableTestResult>, outcome='passed', exc_info=None, reason=None,
↳expected=True, shortLabel=None, longLabel=None)

    reportSuccess: ReportTestEvent (handled=False, testEvent=<nose2.events.
↳TestOutcomeEvent object at 0x1fcd650>, stream=<nose2.util._WritelnDecorator object
↳at 0x1f97a10>)
.
stopTest: StopTestEvent (handled=False, test=<tests.Test testMethod=test>, result=
↳<PluggableTestResult>, stopTime=1327346684.775064)

stopTestRun: StopTestRunEvent (handled=False, runner=<PluggableTestRunner>, result=
↳<PluggableTestResult>, stopTime=1327346684.77513, timeTaken=0.00056004524230957031)

afterTestRun: StopTestRunEvent (handled=False, runner=<PluggableTestRunner>, result=
↳<PluggableTestResult>, stopTime=1327346684.77513, timeTaken=0.00056004524230957031)

    beforeErrorList: ReportSummaryEvent (handled=False, stopTestEvent=<nose2.events.
↳StopTestRunEvent object at 0x1eb0d90>, stream=<nose2.util._WritelnDecorator object
↳at 0x1f97a10>, reportCategories={'failures': [], 'skipped': [], 'errors': [],
↳'unexpectedSuccesses': [], 'expectedFailures': []})
-----

    beforeSummaryReport: ReportSummaryEvent (handled=False, stopTestEvent=<nose2.events.
↳StopTestRunEvent object at 0x1eb0d90>, stream=<nose2.util._WritelnDecorator object
↳at 0x1f97a10>, reportCategories={'failures': [], 'skipped': [], 'errors': [],
↳'unexpectedSuccesses': [], 'expectedFailures': []})
Ran 1 test in 0.001s

    wasSuccessful: ResultSuccessEvent (handled=False, result=<PluggableTestResult>,
↳success=False)
OK

    afterSummaryReport: ReportSummaryEvent (handled=False, stopTestEvent=<nose2.events.
↳StopTestRunEvent object at 0x1eb0d90>, stream=<nose2.util._WritelnDecorator object
↳at 0x1f97a10>, reportCategories={'failures': [], 'skipped': [], 'errors': [],
↳'unexpectedSuccesses': [], 'expectedFailures': []})

```

Loader: Egg Test discovery

What is Egg Discovery

Sometimes Python Eggs are marked as zip-safe and they can be installed zipped, instead of unzipped in an `.egg` folder. See <http://peak.telecommunity.com/DevCenter/PythonEggs> for more details. The normal `nose2.plugins.loader.discovery` plugin ignores modules located inside zip files.

The Egg Discovery plugin allows nose2 to discover tests within these zipped egg files.

This plugin requires `pkg_resources` (from `setuptools`) to work correctly.

Usage

To activate the plugin, include the plugin module in the plugins list in `[unittest]` section in a config file:

```
[unittest]
plugins = nose2.plugins.loader.eggdiscovery
```

Or pass the module with the `--plugin` command-line option:

```
nose2 --plugin=nose2.plugins.loader.eggdiscovery module_in_egg
```

Reference

Egg-based discovery test loader.

This plugin implements nose2's automatic test module discovery inside Egg Files. It looks for test modules in packages whose names start with `test`, then fires the `loadTestsFromModule()` hook for each one to allow other plugins to load the actual tests.

It also fires `handleFile()` for every file that it sees, and `matchPath()` for every Python module, to allow other plugins to load tests from other kinds of files and to influence which modules are examined for tests.

Enable this Plugin

This plugin is built-in, but not loaded by default.

Even if you specify `always-on = True` in the configuration, it will not run unless you also enable it. You can do so by putting the following in a `unittest.cfg` or `nose2.cfg` file

```
[unittest]
plugins = nose2.plugins.loader.eggdiscovery
```

The `plugins` parameter may contain a list of plugin names, including `nose2.plugins.loader.eggdiscovery`

Configuration [discovery]

always-on

Default True

Type boolean

Sample configuration

The default configuration is equivalent to including the following in a `unittest.cfg` file.

```
[discovery]
always-on = True
```

Plugin class reference: EggDiscoveryLoader

class `nose2.plugins.loader.eggdiscovery.EggDiscoveryLoader`

Loader plugin that can discover tests inside Egg Files

loadTestsFromName (*event*)

Load tests from module named by event.name

loadTestsFromNames (*event*)

Discover tests if no test names specified

4.5.3 Third-party Plugins

If you are a plugin author, please add your plugin to the list on the [nose2 wiki](#). If you are looking for more plugins, check that list!

4.6 Tools and Helpers

4.6.1 Tools for Test Authors

Decorators

nose2 ships with various decorators that assist you to write your tests.

Setup & Teardown

`nose2.tools.decorators.with_setup` (*setup*)

A decorator that sets the `setup()` method to be executed before the test.

It currently works only for function test cases.

Parameters `setup` (*function*) – The method to be executed before the test.

`nose2.tools.decorators.with_teardown` (*teardown*)

A decorator that sets the `teardown()` method to be after before the test.

It currently works only for function test cases.

Parameters `teardown` (*function*) – The method to be executed after the test.

Parameterized tests

`nose2.tools.params` (**paramList*)

Make a test function or method parameterized by parameters.

```
import unittest

from nose2.tools import params

@params(1, 2, 3)
def test_nums(num):
    assert num < 4

class Test(unittest.TestCase):

    @params((1, 2), (2, 3), (4, 5))
    def test_less_than(self, a, b):
        assert a < b
```

Parameters in the list may be defined as simple values, or as tuples. To pass a tuple as a simple value, wrap it in another tuple.

See also: *Loader: Parameterized Tests*

Such: a Functional-Test Friendly DSL

Note: New in version 0.4

Such is a DSL for writing tests with expensive, nested fixtures – which typically means functional tests. It requires the layers plugin (see *Organizing Test Fixtures into Layers*).

What does it look like?

Unlike some python testing DSLs, such is just plain old python.

```
import unittest

from nose2.tools import such

class SomeLayer(object):

    @classmethod
    def setUp(cls):
        it.somelayer = True

    @classmethod
    def tearDown(cls):
        del it.somelayer
```

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```

#
# Such tests start with a declaration about the system under test
# and will typically bind the test declaration to a variable with
# a name that makes nice sentences, like 'this' or 'it'.
#
with such.A('system with complex setup') as it:

    #
    # Each layer of tests can define setup and teardown methods.
    # setup and teardown methods defined here run around the entire
    # group of tests, not each individual test.
    #
    @it.has_setup
    def setup():
        it.things = [1]

    @it.has_teardown
    def teardown():
        it.things = []

    #
    # The 'should' decorator is used to mark tests.
    #
    @it.should('do something')
    def test():
        assert it.things
        #
        # Tests can use all of the normal unittest TestCase assert
        # methods by calling them on the test declaration.
        #
        it.assertEqual(len(it.things), 1)

    #
    # The 'having' context manager is used to introduce a new layer,
    # one that depends on the layer(s) above it. Tests in this
    # new layer inherit all of the fixtures of the layer above.
    #
    with it.having('an expensive fixture'):
        @it.has_setup
        def setup():
            it.things.append(2)

        #
        # Tests that take an argument will be passed the
        # unittest.TestCase instance that is generated to wrap
        # them. Tests can call any and all TestCase methods on this
        # instance.
        #
        @it.should('do more things')
        def test(case):
            case.assertEqual(it.things[-1], 2)

        #
        # Layers can be nested to any depth.
        #
        with it.having('another precondition'):

```

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```
@it.has_setup
def setup():
    it.things.append(3)

@it.has_teardown
def teardown():
    it.things.pop()

@it.should('do that not this')
def test(case):
    it.things.append(4)
    #
    # Tests can add their own cleanup functions.
    #
    case.addCleanup(it.things.pop)
    case.assertEqual(it.things[-1], 4, it.things)

@it.should('do this not that')
def test(case):
    case.assertEqual(it.things[-1], 3, it.things[:])

#
# A layer may have any number of sub-layers.
#
with it.having('a different precondition'):

    #
    # A layer defined with ``having`` can make use of
    # layers defined elsewhere. An external layer
    # pulled in with ``it.uses`` becomes a parent
    # of the current layer (though it doesn't actually
    # get injected into the layer's MRO).
    #
    it.uses(SomeLayer)

@it.has_setup
def setup():
    it.things.append(99)

@it.has_teardown
def teardown():
    it.things.pop()

#
# Layers can define setup and teardown methods that wrap
# each test case, as well, corresponding to TestCase.setUp
# and TestCase.tearDown.
#
@it.has_test_setup
def test_setup(case):
    it.is_funny = True
    case.is_funny = True

@it.has_test_teardown
def test_teardown(case):
    delattr(it, 'is_funny')
    delattr(case, 'is_funny')
```

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```

    @it.should('do something else')
    def test(case):
        assert it.things[-1] == 99
        assert it.is_funny
        assert case.is_funny

    @it.should('have another test')
    def test(case):
        assert it.is_funny
        assert case.is_funny

    @it.should('have access to an external fixture')
    def test(case):
        assert it.somelayer

    with it.having('a case inside the external fixture'):
        @it.should('still have access to that fixture')
        def test(case):
            assert it.somelayer

#
# To convert the layer definitions into test cases, you have to call
# `createTests` and pass in the module globals, so that the test cases
# and layer objects can be inserted into the module.
#
it.createTests(globals())

#
# Such tests and normal tests can coexist in the same modules.
#
class NormalTest(unittest.TestCase):

    def test(self):
        pass

```

The tests it defines are unittest tests, and can be used with nose2 with just the layers plugin. You also have the option of activating a reporting plugin (*nose2.plugins.layers.LayerReporter*) to provide a more discursive brand of output:

```

test (test_such.NormalTest) ... ok
A system with complex setup
  should do something ... ok
  having an expensive fixture
    should do more things ... ok
    having another precondition
      should do that not this ... ok
      should do this not that ... ok
    having a different precondition
      should do something else ... ok
      should have another test ... ok

```

```
-----
Ran 7 tests in 0.002s
```

```
OK
```

How does it work?

Such uses the things in python that are most like anonymous code blocks to allow you to construct tests with meaningful names and deeply-nested fixtures. Compared to DSLs in languages that do allow blocks, it is a little bit more verbose – the block-like decorators that mark fixture methods and test cases need to decorate *something*, so each fixture and test case has to have a function definition. You can use the same function name over and over here, or give each function a meaningful name.

The set of tests begins with a description of the system under test as a whole, marked with the A context manager:

```
from nose2.tools import such

with such.A('system described here') as it:
    # ...
```

Groups of tests are marked by the having context manager:

```
with it.having('a description of a group'):
    # ...
```

Within a test group (including the top-level group), fixtures are marked with decorators:

```
@it.has_setup
def setup():
    # ...

@it.has_test_setup
def setup_each_test_case():
    # ...
```

And tests are likewise marked with the should decorator:

```
@it.should('exhibit the behavior described here')
def test(case):
    # ...
```

Test cases may optionally take one argument. If they do, they will be passed the `unittest.TestCase` instance generated for the test. They can use this `TestCase` instance to execute assert methods, among other things. Test functions can also call assert methods on the top-level scenario instance, if they don't take the `case` argument:

```
@it.should("be able to use the scenario's assert methods")
def test():
    it.assertEqual(something, 'a value')

@it.should("optionally take an argument")
def test(case):
    case.assertEqual(case.attribute, 'some value')
```

Finally, to actually generate tests, you **must** call `createTests` on the top-level scenario instance:

```
it.createTests(globals())
```

This call generates the `unittest.TestCase` instances for all of the tests, and the layer classes that hold the fixtures defined in the test groups. See *Organizing Test Fixtures into Layers* for more about test layers.

Running tests

Since order is often significant in functional tests, **such DSL tests always execute in the order in which they are defined in the module**. Parent groups run before child groups, and sibling groups and sibling tests within a group execute in the order in which they are defined.

Otherwise, tests written in the such DSL are collected and run just like any other tests, with one exception: their names. The name of a such test case is the name of its immediately surrounding group, plus the description of the test, prepended with `test ####:`, where `####` is the test's (0-indexed) position within its group.

To run a case individually, you must pass in this full name – usually you'll have to quote it. For example, to run the case should do more things defined above (assuming the layers plugin is activated by a config file, and the test module is in the normal path of test collection), you would run nose2 like this:

```
nose2 "test_such.having an expensive fixture.test 0000: should do more things"
```

That is, for the generated test case, the **group description** is the **class name**, and the **test case description** is the **test case name**. As you can see if you run an individual test with the layer reporter active, all of the group fixtures execute in proper order when a test is run individually:

```
$ nose2 "test_such.having an expensive fixture.test 0000: should do more things"
A system with complex setup
  having an expensive fixture
    should do more things ... ok

-----
Ran 1 test in 0.000s

OK
```

Reference

`nose2.tools.such.A(description)`

Test scenario context manager.

Returns a `nose2.tools.such.Scenario` instance, which by convention is bound to it:

```
with such.A('test scenario') as it:
    # tests and fixtures
```

class `nose2.tools.such.Scenario` *(description)*

A test scenario.

A test scenario defines a set of fixtures and tests that depend on those fixtures.

createTests *(mod)*

Generate test cases for this scenario.

Warning: You must call this, passing in `globals()`, to generate tests from the scenario. If you don't, **no tests will be created**.

```
it.createTests(globals())
```

has_setup *(func)*

Add a `setup()` method to this group.

The `setup()` method will run once, before any of the tests in the containing group.

A group may define any number of `setup()` functions. They will execute in the order in which they are defined.

```
@it.has_setup
def setup():
    # ...
```

has_teardown (*func*)

Add a `teardown()` method to this group.

The `teardown()` method will run once, after all of the tests in the containing group.

A group may define any number of `teardown()` functions. They will execute in the order in which they are defined.

```
@it.has_teardown
def teardown():
    # ...
```

has_test_setup (*func*)

Add a test case `setup()` method to this group.

The `setup()` method will run before each of the tests in the containing group.

A group may define any number of test case `setup()` functions. They will execute in the order in which they are defined.

Test `setup()` functions may optionally take one argument. If they do, they will be passed the `unittest.TestCase` instance generated for the test.

```
@it.has_test_setup
def setup(case):
    # ...
```

has_test_teardown (*func*)

Add a test case `teardown()` method to this group.

The `teardown()` method will run before each of the tests in the containing group.

A group may define any number of test case `teardown()` functions. They will execute in the order in which they are defined.

Test `teardown()` functions may optionally take one argument. If they do, they will be passed the `unittest.TestCase` instance generated for the test.

```
@it.has_test_teardown
def teardown(case):
    # ...
```

having (*description*)

Define a new group under the current group.

Fixtures and tests defined within the block will belong to the new group.

```
with it.having('a description of this group'):
    # ...
```

should (*desc*)

Define a test case.

Each function marked with this decorator becomes a test case in the current group.

The decorator takes one optional argument, the description of the test case: what it **should** do. If this argument is not provided, the docstring of the decorated function will be used as the test case description.

Test functions may optionally take one argument. If they do, they will be passed the `unittest.TestCase` instance generated for the test. They can use this `TestCase` instance to execute assert methods, among other things.

```
@it.should('do this')
def dothis(case):
    # ....

@it.should
def dothat():
    "do that also"
    # ....
```

4.7 Changelog

nose2 uses semantic versioning (currently in 0.x) and the popular “keep a changelog” format (v1.0.0).

4.7.1 Unreleased

4.7.2 0.9.0

Added

- `nose2.plugins.prettyassert`, enabled with `-pretty-assert`, which pretty-prints `AssertionErrors` generated by `assert` statements

Changed

- Update trove classifier to “beta” from “alpha” status
- Cleanup code for EOLed python versions

Removed

- Dropped support for `distutils`. Installation now requires `setuptools`

Fixed

- Result reporter respects failure status set by other plugins
- JUnit XML plugin now includes the skip reason in its output

4.7.3 0.8.0

Added

- Add code to enable plugins to documentation

Removed

- Dropped support for python 3.3

Fixed

- For junitxml plugin use test module in place of classname if no classname exists

4.7.4 0.7.4

Added

- Setup tools invocation now handles coverage

Changed

- Running *nose2* via *setuptools* will now trigger *CreateTestsEvent* and *CreatedTestSuiteEvent*

Fixed

- Respect *fail_under* in coverage config
- Avoid infinite recursion when loading *setuptools* from zipped egg
- Manpage now renders reproducibly
- MP doc build now reproducible

4.7.5 0.7.3

Added

- support for python 3.6.

Fixed

- Tests failing due to *.coveragerc* not in MANIFEST

4.7.6 0.7.2

Fixed

- Proper indentation of test with docstring in layers
- MP plugin now calls startSubprocess in subprocess

4.7.7 0.7.1

(Built but never deployed.)

Changed

- Add Makefile to enable “quickstart” workflow
- Removed bootstrap.sh and test.sh

Fixed

- Automatically create .coverage file during coverage reporting
- Better handling of import failures

4.7.8 0.7.0

Note: v0.7.0 drops several unsupported python versions

Added

- support for Python 3.4, 3.5
- Add layer fixture events and hooks
- junit-xml: add logs in “system-out”
- Give full exc_info to loader.failedLoadTests

Changed

- Replace cov-core with coverage in the coverage plugin
- Give better error when cannot import a testname
- Better errors when tests fail to load
- Reduce the processes created in the MP plugin if there are not enough tests.
- Allow combination of MP and OutputBuffer plugins on Python 3

Removed

- Dropped unsupported Python 2.6, 3.2, 3.3
- `nose2.compat` is removed because it is no longer needed. If you have `from nose2.compat import unittest` in your code, you will need to replace it with `import unittest`.

Fixed

- Prevent crashing from `UnicodeDecodeError`
- Fix unicode stream encoding

4.7.9 0.6.2

Fixed

- fix the coverage plugin tests for `coverage==3.7.1`

4.7.10 0.6.1

Fixed

- missing test files added to package.

4.7.11 0.6.0

Added

- Junit XML report support properties
- Add a `createdTestSuite` event, fired after test loading

Changed

- Improve test coverage
- Improve CI
- When test loading fails, print the traceback

Fixed

- Junit-xml plugin fixed on windows
- Ensure tests are importable before trying to load them
- Fail test instead of skipping it, when setup fails
- Make the `collect` plugin work with layers
- Fix coverage plugin to take import-time coverage into account

4.7.12 0.5.0

Added

- `with_setup` and `with_teardown` decorators to set the setup & teardown on a function
- `dundertests` plugin to skip tests with `__test__ == False`
- `cartesian_params` decorator
- coverage plugin
- `EggDiscoveryLoader` for discovering tests within Eggs
- Support `params` with `such`
- Include logging output in junit XML

Changed

- `such` errors early if Layers plugin is not loaded
- Allow use of `nose2.main()` from within a test module

Fixed

- Such DSL ignores two `such.A` with the same description
- Record skipped tests as 'skipped' instead of 'skips'
- Result output failed on unicode characters
- Fix multiprocessing plugin on Windows
- Ensure plugins write to the event stream
- multiprocessing could lock master proc and fail to exit
- junit report path was sensitive to changes in cwd
- Test runs would crash if a TestCase `__init__` threw an exception
- Plugin failures no longer crash the whole test run
- Handle errors in test setup and teardown
- Fix reporting of xfail tests
- Log capture was waiting too long to render mutable objects to strings
- Layers plugin was not running `testSetUp/testTearDown` from higher `such` layers

4.7.13 0.4.7

Added

- `start-dir` config option. Thanks to Stéphane Klein.
- Help text for verbose flag. Thanks to Tim Sampson.
- Added badges to README. Thanks to Omer Katz.

Changed

- Updated six version requirement to be less Restrictive. Thanks to Stéphane Klein.
- Cleaned up numerous PEP8 violations. Thanks to Omer Katz.

Fixed

- Fixed broken import in collector.py. Thanks to Shaun Crampton.
- Fixed processes command line option in mp plugin. Thanks to Tim Sampson.
- Fixed handling of class fixtures in multiprocessing plugin. Thanks to Tim Sampson.
- Fixed intermittent test failure caused by nondeterministic key ordering. Thanks to Stéphane Klein.
- Fixed syntax error in printhooks. Thanks to Tim Sampson.
- Fixed formatting in changelog. Thanks to Omer Katz.
- Fixed typos in docs and examples. Thanks to Tim Sampson.

4.7.14 0.4.6

Changed

- Docs note support for python 3.3. Thanks Omer Katz for the bug report.

Fixed

- Fixed DeprecationWarning for compiler package on python 2.7. Thanks Max Arnold.
- Fixed lack of timing information in junitxml exception reports. Thanks Viacheslav Dukalskiy.
- Cleaned up junitxml xml output. Thanks Philip Thiem.

4.7.15 0.4.5

Fixed

- Fixed broken interaction between attrib and layers plugins. They can now be used together. Thanks @fajpunk.
- Fixed incorrect calling order of layer setup/teardown and test setup/test teardown methods. Thanks again @fajpunk for tests and fixes.

4.7.16 0.4.4

Fixed

- Fixed sort key generation for layers.

4.7.17 0.4.3

Fixed

- Fixed packaging for non-setuptools, pre-python 2.7. Thanks to fajpunk for the patch.

4.7.18 0.4.2

Added

- Added `uses` method to `such.Scenario` to allow use of externally-defined layers in such DSL tests.

Fixed

- Fixed unpredictable ordering of layer tests.

4.7.19 0.4.1

Fixed

- Fixed packaging bug.

4.7.20 0.4

Added

- `nose2.plugins.layers` to support Zope testing style fixture layers.
- `nose2.tools.such`, a spec-like DSL for writing tests with layers.
- `nose2.plugins.loader.loadtests` to support the unittest2 `load_tests` protocol.

4.7.21 0.3

Added

- `nose2.plugins.mp` to support distributing test runs across multiple processes.
- `nose2.plugins.testclasses` to support loading tests from ordinary classes that are not subclasses of `unittest.TestCase`.
- `nose2.main.PluggableTestProgram` now accepts an `extraHooks` keyword argument, which allows attaching arbitrary objects to the hooks system.

Changed

- The default script target was changed from `nose2.main` to `nose2.discover`. The former may still be used for running a single module of tests, unittest-style. The latter ignores the `module` argument. Thanks to @drcaciuc for the bug report (#32).

Fixed

- Fixed bug that caused Skip reason to always be set to None.

4.7.22 0.2

Added

- nose2.plugins.junitxml to support jUnit XML output
- nose2.plugins.attrib to support test filtering by attributes

Changed

- Added afterTestRun hook and moved result report output calls to that hook. This prevents plugin ordering issues with the stopTestRun hook (which still exists, and fires before afterTestRun).

Fixed

- Fixed bug in loading of tests by name that caused ImportError to be silently ignored.
- Fixed missing __unittest flag in several modules. Thanks to Wouter Overmeire for the patch.
- Fixed module fixture calls for function, generator and param tests.
- Fixed passing of command-line argument values to list options. Before this fix, lists of lists would be appended to the option target. Now, the option target list is extended with the new values. Thanks to memedough for the bug report.

4.7.23 0.1

Initial release.

5.1 Writing Plugins

nose2 supports plugins for test collection, selection, observation and reporting – among other things. There are two basic rules for plugins:

- Plugin classes must subclass `nose2.events.Plugin`.
- Plugins may implement any of the methods described in the *Hook reference*.

5.1.1 Hello World

Here's a basic plugin. It doesn't do anything besides log a message at the start of a test run.

```
import logging
import os

from nose2.events import Plugin

log = logging.getLogger('nose2.plugins.helloworld')

class HelloWorld(Plugin):
    configSection = 'helloworld'
    commandLineSwitch = (None, 'hello-world', 'Say hello!')

    def startTestRun(self, event):
        log.info('Hello pluginized world!')
```

To see this plugin in action, save it into an importable module, then add that module to the `plugins` key in the `[unittestest]` section of a config file loaded by nose2, such as `unittestest.cfg`. Then run nose2:

```
nose2 --log-level=INFO --hello-world
```

And you should see the log message before the first dot appears.

5.1.2 Loading plugins

As mentioned above, for nose2 to find a plugin, it must be in an importable module, and the module must be listed under the `plugins` key in the `[unittest]` section of a config file loaded by nose2:

```
[unittest]
plugins = mypackage.someplugin
         otherpackage.thatplugin
         thirdpackage.plugins.metoo
```

As you can see, plugin *modules* are listed, one per line. All plugin classes in those modules will be loaded – but not necessarily active. Typically plugins do not activate themselves (“register”) without seeing a command-line flag, or `always-on = True` in their config file section.

5.1.3 Command-line Options

nose2 uses `argparse` for command-line argument parsing. Plugins may enable command-line options that register them as active, or take arguments or flags controlling their operation.

The most basic thing to do is to set the plugin’s `commandLineSwitch` attribute, which will automatically add a command-line flag that registers the plugin.

To add other flags or arguments, you can use the Plugin methods `nose2.events.Plugin.addFlag()`, `nose2.events.Plugin.addArgument()` or `nose2.events.Plugin.addOption()`. If those don’t offer enough flexibility, you can directly manipulate the argument parser by accessing `self.session.argparse` or the plugin option group by accessing `self.session.pluginargs`.

Please note though that the *majority* of your plugin’s configuration should be done via config file options, not command line options.

5.1.4 Config File Options

Plugins may specify a config file section that holds their configuration by setting their `configSection` attribute. All plugins, regardless of whether they specify a config section, have a `config` attribute that holds a `nose2.config.Config` instance. This will be empty of values if the plugin does not specify a config section or if no loaded config file includes that section.

Plugins should extract the user’s configuration selections from their `config` attribute in their `__init__` methods. Plugins that want to use nose2’s `Sphinx` extension to automatically document themselves **must** do so.

Config file options may be extracted as strings, ints, booleans or lists.

You should provide reasonable defaults for all config options.

5.1.5 Guidelines

Events

in one major area: what it passes to hooks. Where nose passes a variety of arguments, nose2 *always passes an event*. The events are listed in the *Event reference*. nose2’s plugin API is based on the API in unittest2’s `plugins` branch (under-development). Its differs from nose’s

Here’s the key thing about that: *event attributes are read-write*. Unless stated otherwise in the documentation for a hook, you can set a new value for any event attribute, and *this will do something*. Plugins and nose2 systems will see

that new value and either use it instead of what was originally set in the event (example: the reporting stream or test executor), or use it to supplement something they find elsewhere (example: extraTests on a test loading event).

“Handling” events

Many hooks give plugins a chance to completely handle events, bypassing other plugins and any core nose2 operations. To do this, a plugin sets `event.handled` to True and, generally, returns an appropriate value from the hook method. What is an appropriate value varies by hook, and some hooks *can't* be handled in this way. But even for hooks where handling the event doesn't stop all processing, it *will* stop subsequently-loaded plugins from seeing the event.

Logging

nose2 uses the logging classes from the standard library. To enable users to view debug messages easily, plugins should use `logging.getLogger()` to acquire a logger in the `nose2.plugins` namespace.

5.1.6 Recipes

- Writing a plugin that monitors or controls test result output

Implement any of the `report*` hook methods, especially if you want to output to the console. If outputting to file or other system, you might implement `testOutcome()` instead.

Example: `nose2.plugins.result.ResultReporter`

- Writing a plugin that handles exceptions

If you just want to handle some exceptions as skips or failures instead of errors, see `nose2.plugins.outcomes.Outcomes`, which offers a simple way to do that. Otherwise, implement `setTestOutcome()` to change test outcomes.

Example: `nose2.plugins.outcomes.Outcomes`

- Writing a plugin that adds detail to error reports

Implement `testOutcome()` and put your extra information into `event.metadata`, then implement `outcomeDetail()` to extract it and add it to the error report.

Examples: `nose2.plugins.buffer.OutputBufferPlugin`, `nose2.plugins.logcapture.LogCapture`

- Writing a plugin that loads tests from files other than python modules

Implement `handleFile()`.

Example: `nose2.plugins.doctests.DocTestLoader`

- Writing a plugin that loads tests from python modules

Implement at least `loadTestsFromModule()`.

Warning: One thing to beware of here is that if you return tests as dynamically-generated test cases, or instances of a testcase class that is defined *anywhere* but the module being loaded, you *must* use `nose2.util.transplant_class()` to make the test case class appear to have originated in that module. Otherwise, module-level fixtures will not work for that test, and may be ignored entirely for the module if there are no test cases that are or appear to be defined there.

- Writing a plugin that prints a report

Implement `beforeErrorList()`, `beforeSummaryReport()` or `afterSummaryReport()`

Example: `nose2.plugins.prof.Profiler`

- Writing a plugin that selects or rejects tests

Implement `matchPath` or `getTestCaseNames`.

Example: `nose2.plugins.loader.parameters.Parameters`

5.2 Documenting plugins

You should do it. Nobody will use your plugins if you don't. Or if they do use them, they will curse you whenever things go wrong.

One easy way to document your plugins is to use nose2's [Sphinx](#) extension, which provides an `autoplugin` directive that will produce decent reference documentation from your plugin classes.

To use it, add `nose2.sphinxext` to the extensions list in the `conf.py` file in your docs directory.

Then add an `autoplugin` directive to a `*.rst` file, like this:

```
.. autoplugin :: mypackage.plugins.PluginClass
```

This will produce output that includes the config vars your plugin loads in `__init__`, as well as any command line options your plugin registers. This is why you *really* should extract config vars and register command-line options in `__init__`.

The output will also include an `autoclass` section for your plugin class, so you can put more narrative documentation in the plugin's docstring for users to read.

Of course you can, and should, write some words before the reference docs explaining what your plugin does and how to use it. You can put those words in the `*.rst` file itself, or in the docstring of the module where your plugin lives.

5.3 Event reference

class `nose2.events.CommandLineArgsEvent` (*args*, ***kw*)

Event fired after parsing of command line arguments.

Plugins can respond to this event by configuring themselves or other plugins or modifying the parsed arguments.

Note: Many plugins register options with callbacks. By the time this event fires, those callbacks have already fired. So you can't use this event to reliably influence all plugins.

args

Args object returned by `argparse`.

class `nose2.events.CreateTestsEvent` (*loader*, *testNames*, *module*, ***kw*)

Event fired before test loading.

Plugins can take over test loading by returning a test suite and setting `handled` on this event.

loader

Test loader instance

names

List of test names. May be empty or None.

module

Module to load from. May be None. If not None, names should be considered relative to this module.

class nose2.events.CreatedTestSuiteEvent (*suite*, ***kw*)

Event fired after test loading.

Plugins can replace the loaded test suite by returning a test suite and setting `handled` on this event.

suite

Test Suite instance

class nose2.events.DescribeTestEvent (*test*, *description=None*, *errorList=False*, ***kw*)

Event fired to get test description.

test

The test case

description

Description of the test case. Plugins can set this to change how tests are described in output to users.

errorList

Is the event fired as part of error list output?

class nose2.events.Event (***metadata*)

Base class for all events.

metadata

Storage for arbitrary information attached to an event.

handled

Set to `True` to indicate that a plugin has handled the event, and no other plugins or core systems should process it further.

version

Version of the event API. This will be incremented with each release of nose2 that changes the API.

version = '0.4'

class nose2.events.GetTestCaseNamesEvent (*loader*, *testCase*, *isTestMethod*, ***kw*)

Event fired to find test case names in a test case.

Plugins may return a list of names and set `handled` on this event to force test case name selection.

loader

Test loader instance

testCase

The `unittest.TestCase` instance being loaded.

testMethodPrefix

Set this to change the test method prefix. Unless set by a plugin, it is `None`.

extraNames

A list of extra test names to load from the test case. To cause extra tests to be loaded from the test case, append the names to this list. Note that the names here must be attributes of the test case.

excludedNames

A list of names to exclude from test loading. Add names to this list to prevent other plugins from loading the named tests.

isTestMethod

Callable that plugins can use to examine test case attributes to determine whether nose2 thinks they are test methods.

class nose2.events.**HandleFileEvent** (*loader, name, path, pattern, topLevelDirectory, **kw*)
Event fired when a non-test file is examined.

Note: This event is fired for all processed python files and modules including but not limited to the ones that match the test file pattern.

loader

Test loader instance

name

File basename

path

Full path to file

pattern

Current test file match pattern

topLevelDirectory

Top-level directory of the test run

extraTests

A list of extra tests loaded from the file. To load tests from a file without interfering with other plugins' loading activities, append tests to extraTests.

Plugins may set `handled` on this event and return a test suite to prevent other plugins from loading tests from the file. If any plugin sets `handled` to `True`, `extraTests` will be ignored.

class nose2.events.**LoadFromModuleEvent** (*loader, module, **kw*)
Event fired when a test module is loaded.

loader

Test loader instance

module

The module whose tests are to be loaded

extraTests

A list of extra tests loaded from the module. To load tests from a module without interfering with other plugins' loading activities, append tests to extraTests.

Plugins may set `handled` on this event and return a test suite to prevent other plugins from loading tests from the module. If any plugin sets `handled` to `True`, `extraTests` will be ignored.

class nose2.events.**LoadFromNameEvent** (*loader, name, module, **kw*)
Event fired to load tests from test names.

loader

Test loader instance

name

Test name to load

module

Module to load from. May be `None`. If not `None`, names should be considered relative to this module.

extraTests

A list of extra tests loaded from the name. To load tests from a test name without interfering with other plugins' loading activities, append tests to `extraTests`.

Plugins may set `handled` on this event and return a test suite to prevent other plugins from loading tests from the test name. If any plugin sets `handled` to `True`, `extraTests` will be ignored.

class `nose2.events.LoadFromNamesEvent` (*loader, names, module, **kw*)

Event fired to load tests from test names.

loader

Test loader instance

names

List of test names. May be empty or `None`.

module

Module to load from. May be `None`. If not `None`, names should be considered relative to this module.

extraTests

A list of extra tests loaded from the tests named. To load tests from test names without interfering with other plugins' loading activities, append tests to `extraTests`.

Plugins may set `handled` on this event and return a test suite to prevent other plugins from loading tests from the test names. If any plugin sets `handled` to `True`, `extraTests` will be ignored.

class `nose2.events.LoadFromTestCaseEvent` (*loader, testCase, **kw*)

Event fired when tests are loaded from a test case.

loader

Test loader instance

testCase

The `unittest.TestCase` instance being loaded.

extraTests

A list of extra tests loaded from the module. To load tests from a test case without interfering with other plugins' loading activities, append tests to `extraTests`.

Plugins may set `handled` on this event and return a test suite to prevent other plugins from loading tests from the test case. If any plugin sets `handled` to `True`, `extraTests` will be ignored.

class `nose2.events.MatchPathEvent` (*name, path, pattern, **kw*)

Event fired during file matching.

Plugins may return `False` and set `handled` on this event to prevent a file from being matched as a test file, regardless of other system settings.

path

Full path to the file

name

File basename

pattern

Current test file match pattern

class `nose2.events.ModuleSuiteEvent` (*loader, module, suite, **kw*)

class `nose2.events.OutcomeDetailEvent` (*outcomeEvent, **kw*)

Event fired to acquire additional details about test outcome.

outcomeEvent

A `nose2.events.TestOutcomeEvent` instance holding the test outcome to be described.

extraDetail

Extra detail lines to be appended to test outcome output. Plugins can append lines (of strings) to this list to include their extra information in the error list report.

class `nose2.events.PluginsLoadedEvent` (*pluginsLoaded*, ***kw*)
Event fired after all plugin classes are loaded.

pluginsLoaded

List of all loaded plugin classes

class `nose2.events.ReportSummaryEvent` (*stopTestEvent*, *stream*, *reportCategories*, ***kw*)
Event fired before and after summary report.

stopTestEvent

A `nose2.events.StopTestEvent` instance.

stream

The output stream. Plugins can set this to change or capture output.

reportCategories

Dictionary of report category and test events captured in that category. Default categories include 'errors', 'failures', 'skipped', 'expectedFails', and 'unexpectedSuccesses'. Plugins may add their own categories.

class `nose2.events.ReportTestEvent` (*testEvent*, *stream*, ***kw*)
Event fired to report a test event.

Plugins can respond to this event by producing output for the user.

testEvent

A test event. In most cases, a `nose2.events.TestOutcomeEvent` instance. For `startTest`, a `nose2.events.StartTestEvent` instance.

stream

The output stream. Plugins can set this to change or capture output.

class `nose2.events.ResultCreatedEvent` (*result*, ***kw*)
Event fired when test result handler is created.

result

Test result handler instance. Plugins may replace the test result by setting this attribute to a new test result instance.

class `nose2.events.ResultStopEvent` (*result*, *shouldStop*, ***kw*)
Event fired when a test run is told to stop.

Plugins can use this event to prevent other plugins from stopping a test run.

result

Test result

shouldStop

Set to `True` to indicate that the test run should stop.

class `nose2.events.ResultSuccessEvent` (*result*, *success*, ***kw*)
Event fired at end of test run to determine success.

This event fires at the end of the test run and allows plugins to determine whether the test run was successful.

result

Test result

success

Set this to `True` to indicate that the test run was successful. If no plugin sets the success to `True`, the

test run fails. Should be initialized to `None` to indicate that the status has not been set yet (so that plugins can always differentiate an explicit failure in an earlier hook from no pass/fail status having been set yet).

class `nose2.events.RunnerCreatedEvent` (*runner*, ***kw*)

Event fired when test runner is created.

runner

Test runner instance. Plugins may replace the test runner by setting this attribute to a new test runner instance.

class `nose2.events.StartLayerSetupEvent` (*layer*, ***kw*)

Event fired before running a layer setup.

layer

The current layer instance, for which setup is about to run.

class `nose2.events.StartLayerSetupTestEvent` (*layer*, *test*, ***kw*)

Event fired before test cases setups in layers.

layer

The current layer instance.

test

The test instance for which the setup is about to run.

class `nose2.events.StartLayerTeardownEvent` (*layer*, ***kw*)

Event fired before running a layer teardown.

layer

The current layer instance, for which teardown is about to run.

class `nose2.events.StartLayerTeardownTestEvent` (*layer*, *test*, ***kw*)

Event fired before test cases teardowns in layers.

layer

The current layer instance.

test

The test instance for which teardown is about to run.

class `nose2.events.StartTestEvent` (*test*, *result*, *startTime*, ***kw*)

Event fired before a test is executed.

test

The test case

result

Test result

startTime

Timestamp of test start

class `nose2.events.StartTestRunEvent` (*runner*, *suite*, *result*, *startTime*, *executeTests*, ***kw*)

Event fired when test run is about to start.

Test collection is complete before this event fires, but no tests have yet been executed.

runner

Test runner

suite

Top-level test suite to execute. Plugins can filter this suite, or set `event.suite` to change which tests execute (or how they execute).

result

Test result

startTime

Timestamp of test run start

executeTests

Callable that will be used to execute tests. Plugins may set this attribute to wrap or otherwise change test execution. The callable must match the signature:

```
def execute(suite, result):  
    ...
```

To prevent normal test execution, plugins may set `handled` on this event to `True`. When `handled` is true, the test executor does not run at all.

class `nose2.events.StopLayerSetupEvent` (*layer*, ***kw*)

Event fired after running a layer setup.

layer

The current layer instance, for which setup just ran.

class `nose2.events.StopLayerSetupTestEvent` (*layer*, *test*, ***kw*)

Event fired after test cases setups in layers.

layer

The current layer instance.

test

The test instance for which the setup just finished.

class `nose2.events.StopLayerTeardownEvent` (*layer*, ***kw*)

Event fired after running a layer teardown.

layer

The current layer instance, for which teardown just ran.

class `nose2.events.StopLayerTeardownTestEvent` (*layer*, *test*, ***kw*)

Event fired after test cases teardowns in layers.

layer

The current layer instance.

test

The test instance for which teardown just ran.

class `nose2.events.StopTestEvent` (*test*, *result*, *stopTime*, ***kw*)

Event fired after a test is executed.

test

The test case

result

Test result

stopTime

Timestamp of test stop

class `nose2.events.StopTestRunEvent` (*runner*, *result*, *stopTime*, *timeTaken*, ***kw*)

Event fired when test run has stopped.

runner

Test runner

result

Test result

stopTime

Timestamp of test run stop

timeTaken

Number of seconds test run took to execute

```
class nose2.events.TestOutcomeEvent (test, result, outcome, exc_info=None, reason=None,
                                     expected=False, shortLabel=None, longLabel=None,
                                     **kw)
```

Event fired when a test completes.

test

The test case

result

Test result

outcome

Description of test outcome. Typically will be one of 'error', 'failed', 'skipped', or 'passed'.

exc_infoIf the test resulted in an exception, the tuple of (exception class, exception value, traceback) as returned by `sys.exc_info()`. If the test did not result in an exception, `None`.**reason**For test outcomes that include a reason (`Skips`, for example), the reason.**expected**Boolean indicating whether the test outcome was expected. In general, all tests are expected to pass, and any other outcome will have `expected` as `False`. The exceptions to that rule are unexpected successes and expected failures.**shortLabel**

A short label describing the test outcome. (For example, 'E' for errors).

longLabel

A long label describing the test outcome (for example, 'ERROR' for errors).

Plugins may influence how the rest of the system sees the test outcome by setting `outcome` or `exc_info` or `expected`. They may influence how the test outcome is reported to the user by setting `shortLabel` or `longLabel`.

```
class nose2.events.UserInteractionEvent (**kw)
```

Event fired before and after user interaction.

Plugins that capture stdout or otherwise prevent user interaction should respond to this event.

To prevent the user interaction from occurring, return `False` and set `handled`. Otherwise, turn off whatever you are doing that prevents users from typing/clicking/touching/psionics/whatever.

5.4 Hook reference

Note: Hooks are listed here in order of execution.

5.4.1 Pre-registration Hooks

pluginsLoaded (*self*, *event*)

Parameters **event** – *nose2.events.PluginsLoadedEvent*

The `pluginsLoaded` hook is called after all config files have been read, and all plugin classes loaded. Plugins that register automatically (those that call `nose2.events.Plugin.register()` in `__init__` or have `always-on = True` set in their config file sections) will have already been registered with the hooks they implement. Plugins waiting for command-line activation will not yet be registered.

Plugins can use this hook to examine or modify the set of loaded plugins, inject their own hook methods using `nose2.events.PluginInterface.addMethod()`, or take other actions to set up or configure themselves or the test run.

Since `pluginsLoaded` is a pre-registration hook, it is called for *all plugins* that implement the method, whether they have registered or not. Plugins that do not automatically register themselves should limit their actions in this hook to configuration, since they may not actually be active during the test run.

handleArgs (*self*, *event*)

Parameters **event** – *nose2.events.CommandLineArgsEvent*

The `handleArgs` hook is called after all arguments from the command line have been parsed. Plugins can use this hook to handle command-line arguments in non-standard ways. They should not use it to try to modify arguments seen by other plugins, since the order in which plugins execute in a hook is not guaranteed.

Since `handleArgs` is a pre-registration hook, it is called for *all plugins* that implement the method, whether they have registered or not. Plugins that do not automatically register themselves should limit their actions in this hook to configuration, since they may not actually be active during the test run.

5.4.2 Standard Hooks

These hooks are called for registered plugins only.

createTests (*self*, *event*)

Parameters **event** – A *nose2.events.CreateTestsEvent* instance

Plugins can take over test loading by returning a test suite and setting `event.handled` to `True`.

loadTestsFromNames (*self*, *event*)

Parameters **event** – A *nose2.events.LoadFromNamesEvent* instance

Plugins can return a test suite or list of test suites and set `event.handled` to `True` to prevent other plugins from loading tests from the given names, or append tests to `event.extraTests`. Plugins can also remove names from `event.names` to prevent other plugins from acting on those names.

loadTestsFromName (*self*, *event*)

Parameters **event** – A *nose2.events.LoadFromNameEvent* instance

Plugins can return a test suite and set `event.handled` to `True` to prevent other plugins from loading tests from the given name, or append tests to `event.extraTests`.

handleFile (*self*, *event*)

Parameters **event** – A *nose2.events.HandleFileEvent* instance

Plugins can use this hook to load tests from files that are not Python modules. Plugins may either append tests to `event.extraTest`, or, if they want to prevent other plugins from processing the file, set `event.handled` to `True` and return a test case or test suite.

matchPath (*self*, *event*)

Parameters *event* – A `nose2.events.MatchPathEvent` instance

Plugins can use this hook to prevent python modules from being loaded by the test loader or force them to be loaded by the test loader. Set `event.handled` to `True` and return `False` to cause the loader to skip the module. Set `event.handled` to `True` and return `True` to cause the loader to load the module.

loadTestsFromModule (*self*, *event*)

Parameters *event* – A `nose2.events.LoadFromModuleEvent` instance

Plugins can use this hook to load tests from test modules. To prevent other plugins from loading from the module, set `event.handled` and return a test suite. Plugins can also append tests to `event.extraTests` – usually that’s what you want to do, since that will allow other plugins to load their tests from the module as well.

See also *this warning* about test cases not defined in the module.

loadTestsFromTestCase (*self*, *event*)

Parameters *event* – A `nose2.events.LoadFromTestCaseEvent` instance

Plugins can use this hook to load tests from a `unittest.TestCase`. To prevent other plugins from loading tests from the test case, set `event.handled` to `True` and return a test suite. Plugins can also append tests to `event.extraTests` – usually that’s what you want to do, since that will allow other plugins to load their tests from the test case as well.

getTestCaseNames (*self*, *event*)

Parameters *event* – A `nose2.events.GetTestCaseNamesEvent` instance

Plugins can use this hook to limit or extend the list of test case names that will be loaded from a `unittest.TestCase` by the standard nose2 test loader plugins (and other plugins that respect the results of the hook). To force a specific list of names, set `event.handled` to `True` and return a list: this exact list will be the only test case names loaded from the test case. Plugins can also extend the list of names by appending test names to `event.extraNames`, and exclude names by appending test names to `event.excludedNames`.

runnerCreated (*self*, *event*)

Parameters *event* – A `nose2.events.RunnerCreatedEvent` instance

Plugins can use this hook to wrap, capture or replace the test runner. To replace the test runner, set `event.runner`.

resultCreated (*self*, *event*)

Parameters *event* – A `nose2.events.ResultCreatedEvent` instance

Plugins can use this hook to wrap, capture or replace the test result. To replace the test result, set `event.result`.

startTestRun (*self*, *event*)

Parameters *event* – A `nose2.events.StartTestRunEvent` instance

Plugins can use this hook to take action before the start of the test run, and to replace or wrap the test executor. To replace the executor, set `event.executeTests`. This must be a callable that takes two arguments: the top-level test and the test result.

To prevent the test executor from running at all, set `event.handled` to `True`.

startLayerSetup (*self*, *event*)

Parameters *event* – A `nose2.events.StartLayerSetupEvent` instance (only available in suites with layers).

Plugins can use this hook to take action before the start of the `setUp` in a layer.

stopLayerSetup (*self*, *event*)

Parameters **event** – A `nose2.events.StopLayerSetupEvent` instance (only available in suites with layers).

Plugins can use this hook to take action after `setUp` finishes, in a layer.

startLayerSetupTest (*self*, *event*)

Parameters **event** – A `nose2.events.StartLayerSetupTestEvent` instance (only available in suites with layers).

Plugins can use this hook to take action before the start of `testSetUp` in a layer.

stopLayerSetupTest (*self*, *event*)

Parameters **event** – A `nose2.events.StopLayerSetupTestEvent` instance (only available in suites with layers).

Plugins can use this hook to take action after `testSetUp` finishes, in a layer.

startTest (*self*, *event*)

Parameters **event** – A `nose2.events.StartTestEvent` instance

Plugins can use this hook to take action immediately before a test runs.

reportStartTest (*self*, *event*)

Parameters **event** – A `nose2.events.ReportTestEvent` instance

Plugins can use this hook to produce output for the user at the start of a test. If you want to print to the console, write to `event.stream`. Remember to respect `self.session.verbosity` when printing to the console. To prevent other plugins from reporting to the user, set `event.handled` to `True`.

describeTest (*self*, *event*)

Parameters **event** – A `nose2.events.DescribeTestEvent` instance

Plugins can use this hook to alter test descriptions. To return a nonstandard description for a test, set `event.description`. Be aware that other plugins may have set this also!

setTestOutcome (*self*, *event*)

Parameters **event** – A `nose2.events.TestOutcomeEvent` instance

Plugins can use this hook to alter test outcomes. Plugins can `event.outcome` to change the outcome of the event, tweak, change or remove `event.exc_info`, set or clear `event.expected`, and so on.

testOutcome (*self*, *event*)

Parameters **event** – A `nose2.events.TestOutcomeEvent` instance

Plugins can use this hook to take action based on the outcome of tests. Plugins *must not* alter test outcomes in this hook: that's what `setTestOutcome()` is for. Here, plugins may only react to the outcome event, not alter it.

reportSuccess (*self*, *event*)

Parameters **event** – A `nose2.events.LoadFromNamesEvent` instance

Plugins can use this hook to report test success to the user. If you want to print to the console, write to `event.stream`. Remember to respect `self.session.verbosity` when printing to the console. To prevent other plugins from reporting to the user, set `event.handled` to `True`.

reportError (*self*, *event*)

Parameters event – A `nose2.events.ReportTestEvent` instance

Plugins can use this hook to report a test error to the user. If you want to print to the console, write to `event.stream`. Remember to respect `self.session.verbosity` when printing to the console. To prevent other plugins from reporting to the user, set `event.handled` to `True`.

reportFailure (*self*, *event*)

Parameters event – A `nose2.events.ReportTestEvent` instance

Plugins can use this hook to report test failure to the user. If you want to print to the console, write to `event.stream`. Remember to respect `self.session.verbosity` when printing to the console. To prevent other plugins from reporting to the user, set `event.handled` to `True`.

reportSkip (*self*, *event*)

Parameters event – A `nose2.events.ReportTestEvent` instance

Plugins can use this hook to report a skipped test to the user. If you want to print to the console, write to `event.stream`. Remember to respect `self.session.verbosity` when printing to the console. To prevent other plugins from reporting to the user, set `event.handled` to `True`.

reportExpectedFailure (*self*, *event*)

Parameters event – A `nose2.events.ReportTestEvent` instance

Plugins can use this hook to report an expected failure to the user. If you want to print to the console, write to `event.stream`. Remember to respect `self.session.verbosity` when printing to the console. To prevent other plugins from reporting to the user, set `event.handled` to `True`.

reportUnexpectedSuccess (*self*, *event*)

Parameters event – A `nose2.events.ReportTestEvent` instance

Plugins can use this hook to report an unexpected success to the user. If you want to print to the console, write to `event.stream`. Remember to respect `self.session.verbosity` when printing to the console. To prevent other plugins from reporting to the user, set `event.handled` to `True`.

reportOtherOutcome (*self*, *event*)

Parameters event – A `nose2.events.ReportTestEvent` instance

Plugins can use this hook to report a custom test outcome to the user. If you want to print to the console, write to `event.stream`. Remember to respect `self.session.verbosity` when printing to the console. To prevent other plugins from reporting to the user, set `event.handled` to `True`.

stopTest (*self*, *event*)

Parameters event – A `nose2.events.StopTestEvent` instance

Plugins can use this hook to take action after a test has completed running and reported its outcome.

startLayerTeardownTest (*self*, *event*)

Parameters event – A `nose2.events.StartLayerTeardownTestEvent` instance (only available in suites with layers).

Plugins can use this hook to take action before the start of `testTearDown()` in a layer.

stopLayerTeardownTest (*self*, *event*)

Parameters event – A `nose2.events.StopLayerTeardownTestEvent` instance (only available in suites with layers).

Plugins can use this hook to take action after `testTearDown()` finishes, in a layer.

startLayerTeardown (*self*, *event*)

Parameters event – A `nose2.events.StartLayerTeardownEvent` instance (only available in suites with layers).

Plugins can use this hook to take action before the start of the `tearDown()` in a layer.

stopLayerTeardown (*self*, *event*)

Parameters event – A `nose2.events.StopLayerTeardownEvent` instance (only available in suites with layers).

Plugins can use this hook to take action after `tearDown()` finishes, in a layer.

stopTestRun (*self*, *event*)

Parameters event – A `nose2.events.StopTestRunEvent` instance

Plugins can use this hook to take action at the end of a test run.

afterTestRun (*self*, *event*)

Parameters event – A `nose2.events.StopTestRunEvent` instance

Note: New in version 0.2

Plugins can use this hook to take action *after* the end of a test run, such as printing summary reports like the builtin result reporter plugin `nose2.plugins.result.ResultReporter`.

resultStop (*self*, *event*)

Parameters event – A `nose2.events.ResultStopEvent` instance

Plugins can use this hook to *prevent* other plugins from stopping a test run. This hook fires when something calls `nose2.result.PluggableTestResult.stop()`. If you want to prevent this from stopping the test run, set `event.shouldStop` to `False`.

beforeErrorList (*self*, *event*)

Parameters event – A `nose2.events.ReportSummaryEvent` instance

Plugins can use this hook to output or modify summary information before the list of errors and failures is output. To modify the categories of outcomes that will be reported, plugins can modify the `event.reportCategories` dictionary. Plugins can set, wrap, or capture the output stream by reading or setting `event.stream`. If you want to print to the console, write to `event.stream`. Remember to respect `self.session.verbosity` when printing to the console.

outcomeDetail (*self*, *event*)

Parameters event – A `nose2.events.OutcomeDetailEvent` instance

Plugins can use this hook to add additional elements to error list output. Append extra detail lines to `event.extraDetail`; these will be joined together with newlines before being output as part of the detailed error/failure message, after the traceback.

beforeSummaryReport (*self*, *event*)

Parameters event – A `nose2.events.ReportSummaryEvent` instance

Plugins can use this hook to output or modify summary information before the summary lines are output. To modify the categories of outcomes that will be reported in the summary, plugins can modify the `event.reportCategories` dictionary. Plugins can set, wrap or capture the output stream by reading or setting `event.stream`. If you want to print to the console, write to `event.stream`. Remember to respect `self.session.verbosity` when printing to the console.

wasSuccessful (*self*, *event*)

Parameters `event` – A `nose2.events.ResultSuccessEvent` instance

Plugins can use this hook to mark a test run as successful or unsuccessful. If not plugin marks the run as successful, the default state is failure. To mark a run as successful, set `event.success` to `True`. Be ware that other plugins may set this attribute as well!

afterSummaryReport (`self, event`)

Parameters `event` – A `nose2.events.ReportSummaryEvent` instance

Plugins can use this hook to output a report to the user after the summary line is output. If you want to print to the console, write to `event.stream`. Remember to respect `self.session.verbosity` when printing to the console.

5.4.3 User Interaction Hooks

These hooks are called when plugins want to interact with the user.

beforeInteraction (`event`)

Parameters `event` – A `nose2.events.UserInteractionEvent`

Plugins should respond to this hook by getting out of the way of user interaction, if the need to, or setting `event.handled` and returning `False`, if they need to but can't.

afterInteraction (`event`)

Parameters `event` – A `nose2.events.UserInteractionEvent`

Plugins can respond to this hook by going back to whatever they were doing before the user stepped in and started poking around.

5.5 Session reference

5.5.1 Session

In nose2, all configuration for a test run is encapsulated in a `Session` instance. Plugins always have the session available as `self.session`.

class `nose2.session.Session`

Configuration session.

Encapsulates all configuration for a given test run.

argparse

An instance of `argparse.ArgumentParser`. Plugins can use this directly to add arguments and argument groups, but *must* do so in their `__init__` methods.

pluginargs

The `argparse` argument group in which plugins (by default) place their command-line arguments. Plugins can use this directly to add arguments, but *must* do so in their `__init__` methods.

hooks

The `nose2.events.PluginInterface` instance contains all available plugin methods and hooks.

plugins

The list of loaded – but not necessarily *active* – plugins.

verbosity

Current verbosity level. Default: 1.

startDir

Start directory of test run. Test discovery starts here. Default: current working directory.

topLevelDir

Top-level directory of test run. This directory is added to `sys.path`. Default: starting directory.

libDirs

Names of code directories, relative to starting directory. Default: ['lib', 'src']. These directories are added to `sys.path` and discovery if they exist.

testFilePattern

Pattern used to discover test module files. Default: `test*.py`

testMethodPrefix

Prefix used to discover test methods and functions: Default: 'test'.

unittestest

The config section for nose2 itself.

configClass

alias of `nose2.config.Config`

get (*section*)

Get a config section.

Parameters *section* – The section name to retrieve.

Returns instance of `self.configClass`.

isPluginLoaded (*pluginName*)

Returns `True` if a given plugin is loaded.

Parameters *pluginName* – the name of the plugin module: e.g. "nose2.plugins.layers".

loadConfigFiles (**filenames*)

Load config files.

Parameters *filenames* – Names of config files to load.

Loads all names files that exist into `self.config`.

loadPlugins (*modules=None, exclude=None*)

Load plugins.

Parameters *modules* – List of module names from which to load plugins.

loadPluginsFromModule (*module*)

Load plugins from a module.

Parameters *module* – A python module containing zero or more plugin classes.

prepareSysPath ()

Add code directories to `sys.path`

registerPlugin (*plugin*)

Register a plugin.

Parameters *plugin* – A `nose2.events.Plugin` instance.

Register the plugin with all methods it implements.

setStartDir (*args_start_dir=None*)

start dir comes from config and may be overridden by an argument

setVerbosity (*args_verbosity, args_verbose, args_quiet*)

Determine verbosity from various (possibly conflicting) sources of info

Parameters

- **args_verbosity** – The `-verbosity` argument value
- **args_verbose** – count of `-v` options
- **args_quiet** – count of `-q` options

start with `config`, override with any given `-verbosity`, then adjust up/down with `-vvv -qq`, etc

5.5.2 Config

Configuration values loaded from config file sections are made available to plugins in `Config` instances. Plugins that set `configSection` will have a `Config` instance available as `self.config`.

class `nose2.config.Config` (*items*)

Configuration for a plugin or other entities.

Encapsulates configuration for a single plugin or other element. Corresponds to a `ConfigParser.Section` but provides an extended interface for extracting items as a certain type.

as_bool (*key, default=None*)

Get key value as boolean

1, t, true, on, yes and y (case insensitive) are accepted as `True` values. All other values are `False`.

as_float (*key, default=None*)

Get key value as float

as_int (*key, default=None*)

Get key value as integer

as_list (*key, default=None*)

Get key value as list.

The value is split into lines and returned as a list. Lines are stripped of whitespace, and lines beginning with `#` are skipped.

as_str (*key, default=None*)

Get key value as str

get (*key, default=None*)

Get key value

5.6 Plugin class reference

The plugin system in nose2 is based on the plugin system in unittest2's `plugins` branch.

5.6.1 Plugin base class

class `nose2.events.Plugin`

Base class for nose2 plugins

All nose2 plugins must subclass this class.

session

The `nose2.session.Session` under which the plugin has been loaded.

config

The `nose2.config.Config` representing the plugin's config section as loaded from the session's config files.

commandLineSwitch

A tuple of (short opt, long opt, help text) that defines a command line flag that activates this plugin. The short opt may be `None`. If defined, it must be a single upper-case character. Both short and long opt must *not* start with dashes.

Example:

```
commandLineSwitch = ('B', 'buffer-output', 'Buffer output during tests')
```

configSection

The name config file section to load into this plugin's config.

alwaysOn

If this plugin should automatically register itself, set `alwaysOn` to `True`. Default is `False`.

Note: Plugins that use config values from config files and want to use the nose2 sphinx extension to automatically generate documentation *must* extract all config values from `self.config` in `__init__`. Otherwise the extension will not be able to detect the config keys that the plugin uses.

addArgument (*callback, short_opt, long_opt, help_text=None*)

Add command-line option that takes one argument.

Parameters

- **callback** – Callback function to run when flag is seen. The callback will receive one argument.
- **short_opt** – Short option. Must be uppercase, no dashes.
- **long_opt** – Long option. Must not start with dashes
- **help_text** – Help text for users so they know what this flag does.

addFlag (*callback, short_opt, long_opt, help_text=None*)

Add command-line flag that takes no arguments

Parameters

- **callback** – Callback function to run when flag is seen. The callback will receive one empty argument.
- **short_opt** – Short option. Must be uppercase, no dashes.
- **long_opt** – Long option. Must not start with dashes
- **help_text** – Help text for users so they know what this flag does.

addMethods (**methods*)

Add new plugin methods to hooks registry

Any plugins that are already registered and implement a method added here will be registered for that method as well.

addOption (*callback, short_opt, long_opt, help_text=None, nargs=0*)

Add command-line option.

Parameters

- **callback** – Callback function to run when flag is seen. The callback will receive one argument. The “callback” may also be a list, in which case values submitted on the command line will be appended to the list.
- **short_opt** – Short option. Must be uppercase, no dashes.
- **long_opt** – Long option. Must not start with dashes
- **help_text** – Help text for users so they know what this flag does.
- **nargs** – Number of arguments to consume from command line.

register()

Register with appropriate hooks.

This activates the plugin and enables it to receive events.

5.6.2 Plugin interface classes

class `nose2.events.PluginInterface`

Definition of plugin interface.

Instances of this class contain the methods that may be called, and a dictionary of `nose2.events.Hook` instances bound to each method.

In a plugin, `PluginInterface` instance is typically available as `self.session.hooks`, and plugin hooks may be called on it directly:

```
event = events.LoadFromModuleEvent(module=the_module)
self.session.hooks.loadTestsFromModule(event)
```

preRegistrationMethods

Tuple of methods that are called before registration.

methods

Tuple of available plugin hook methods.

hookClass

Class to instantiate for each hook. Default: `nose2.events.Hook`.

addMethod (*method*)

Add a method to the available method.

This allows plugins to register for this method.

Parameters *method* – A method name

hookClass

alias of `Hook`

register (*method*, *plugin*)

Register a plugin for a method.

Parameters

- **method** – A method name
- **plugin** – A plugin instance

class `nose2.events.Hook` (*method*)

A plugin hook

Each plugin method in the `nose2.events.PluginInterface` is represented at runtime by a `Hook` instance that lists the plugins that should be called by that hook.

method

The name of the method that this `Hook` represents.

plugins

The list of plugin instances bound to this hook.

6.1 Contributing to nose2

Please do! nose2 cannot move forward without contributions from the testing community.

If you're unsure how to get started, feel free to ask for help from the nose2 community via the [mailing list](#). We welcome contributors with all levels of experience.

6.1.1 The Basics

nose2 is hosted on [github](#). Our home there is <https://github.com/nose-devs/nose2>. We use github's issue tracking and collaboration tools *exclusively* for managing nose2's development. This means:

- Please report issues here: <https://github.com/nose-devs/nose2/issues>
- Please make feature requests in the same place
- Please submit all patches as github pull requests

6.1.2 Coding Guidelines

The main rule is: *any patch that touches code should include tests*. And of course all tests should pass under all supported versions of Python.

If you aren't sure how to add tests, or you don't know why existing tests fail on your changes, submit your patch and ask for help testing it.

Tests are easy to run. Just install `tox` (`pip install tox`), and run `tox` in the nose2 root directory. You can also use `make test` to easily install and run `tox` correctly.

Some additional tips for the python and documentation in this project.

- Code should be [pep8](#) compliant

- Where possible, write code which passes `pyflakes` linting (consider using `flake8` to do `pyflakes` and `pep8` checking)
- For consistency with `unittest` please use CamelCase for class names, methods, attributes and function parameters that map directly to class attributes.
- Try to use raw strings for docstrings – ensures that ReST won't be confused by characters like `\\`
- For complex functionality, include sample usage in docstrings

6.1.3 Workflow, Branching and Pull Requests

The basic workflow should be to do the work in a topic branch in your fork then post a pull request for that branch.

For any pull request,

- *Make sure it meets the standards set in this document*
- *Make sure it merges cleanly*
- *List any issues closed by the pull request*
- *Squash intermediate commits.* Consider using `git rebase --interactive` to squash typo fixes, aborted implementations, etc.

6.1.4 Reporting Bugs

The best bug reports are ones which:

- *Check for duplicates.* Do a quick search to try to make sure you aren't reporting a known bug
- *Use a clear descriptive title*
- *Explain what behavior you expected.*
- *Provide a specific example of how to reproduce.* Example code, the command(s) you ran, and anything else which may be relevant
- *Include a stacktrace* where applicable

In many cases, you can help by including the following information:

- *What version of python are you running?*
- *What OS and OS version are you running?* `uname -a` output helps, but additional description like “Ubuntu Linux 17.10” may be useful too
- *What other python packages do you have installed?* The best thing in this case is to show us the results of `pip freeze`

If you are willing and able, *write a failing test.*

6.1.5 Requesting Enhancements

When requesting new features,

- *Say why you want it.* Focus more on the problem which needs to be solved than the specifics of how to solve it
- *Suggest what you think is the easiest implementation path.* If you have an idea about how a feature could be implemented, write it down

- *Volunteer to write it!* nose2 is maintained as a community effort. If you want a new feature, the best way to get it added is to write it yourself!

6.2 Internals

Reference material for things you probably only need to care about if you want to contribute to nose2.

6.2.1 nose2.main

class nose2.main.PluggableTestProgram(**kw)

TestProgram that enables plugins.

Accepts the same parameters as `unittest.TestProgram`, but most of them are ignored as their functions are handled by plugins.

Parameters

- **module** – Module in which to run tests. Default: `__main__()`
- **defaultTest** – Default test name. Default: `None`
- **argv** – Command line args. Default: `sys.argv`
- **testRunner** – *IGNORED*
- **testLoader** – *IGNORED*
- **exit** – Exit after running tests?
- **verbosity** – Base verbosity
- **failfast** – *IGNORED*
- **catchbreak** – *IGNORED*
- **buffer** – *IGNORED*
- **plugins** – List of additional plugin modules to load
- **excludePlugins** – List of plugin modules to exclude
- **extraHooks** – List of hook names and plugin *instances* to register with the session's hooks system. Each item in the list must be a 2-tuple of (hook name, plugin instance)

sessionClass

The class to instantiate to create a test run configuration session. Default: `nose2.session.Session`

loaderClass

The class to instantiate to create a test loader. Default: `nose2.loader.PluggableTestLoader`.

Warning: Overriding this attribute is the only way to customize the test loader class. Passing a test loader to `__init__()` does not work.

runnerClass

The class to instantiate to create a test runner. Default: `nose2.runner.PluggableTestRunner`.

Warning: Overriding this attribute is the only way to customize the test runner class. Passing a test runner to `__init__()` does not work.

defaultPlugins

List of default plugin modules to load.

createTests ()

Create top-level test suite

findConfigFiles (cfg_args)

Find available config files

classmethod getCurrentSession ()

Returns the current session, or None if no `nose2.session.Session` is running.

handleArgs (args)

Handle further arguments.

Handle arguments parsed out of command line after plugins have been loaded (and injected their argument configuration).

handleCfgArgs (cfg_args)

Handle initial arguments.

Handle the initial, pre-plugin arguments parsed out of the command line.

loadPlugins ()

Load available plugins

`self.defaultPlugins`()` and `self.excludePlugins()` are passed to the session to alter the list of plugins that will be loaded.

This method also registers any (hook, plugin) pairs set in `self.hooks`. This is a good way to inject plugins that fall outside of the normal loading procedure, for example, plugins that need some runtime information that can't easily be passed to them through the configuration system.

loaderClass

alias of `nose2.loader.PluggableTestLoader`

parseArgs (argv)

Parse command line args

Parses arguments and creates a configuration session, then calls `createTests()`.

runTests ()

Run tests

runnerClass

alias of `nose2.runner.PluggableTestRunner`

sessionClass

alias of `nose2.session.Session`

setInitialArguments ()

Set pre-plugin command-line arguments.

This set of arguments is parsed out of the command line before plugins are loaded.

`nose2.main.discover (*args, **kwargs)`

Main entry point for test discovery.

Running discover calls `nose2.main.PluggableTestProgram`, passing through all arguments and keyword arguments **except module**: `module` is discarded, to force test discovery.

`nose2.main.main`
 alias of `nose2.main.PluggableTestProgram`

6.2.2 nose2.exceptions

exception `nose2.exceptions.LoadTestsFailure`
 Raised when a test cannot be loaded

exception `nose2.exceptions.TestNotFoundError`
 Raised when a named test cannot be found

6.2.3 nose2.loader

class `nose2.loader.PluggableTestLoader (session)`
 Test loader that defers all loading to plugins

Parameters `session` – Test run session.

suiteClass

Suite class to use. Default: `unittest.TestSuite`.

discover (*start_dir=None, pattern=None*)

Compatibility shim for `load_tests` protocol.

failedImport (*name*)

Make test case representing a failed import.

failedLoadTests (*name, exception*)

Make test case representing a failed test load.

loadTestsFromModule (*module*)

Load tests from module.

Fires `loadTestsFromModule()` hook.

loadTestsFromName (*name, module=None*)

Load tests from test name.

Fires `loadTestsFromName()` hook.

loadTestsFromNames (*testNames, module=None*)

Load tests from test names.

Fires `loadTestsFromNames()` hook.

sortTestMethodsUsing (*name*)

Sort key for test case test methods.

suiteClass

alias of `unittest.suite.TestSuite`

6.2.4 nose2.result

class `nose2.result.PluggableTestResult (session)`
 Test result that defers to plugins.

All test outcome recording and reporting is deferred to plugins, which are expected to implement `startTest()`, `stopTest()`, `testOutcome()`, and `wasSuccessful()`.

Parameters `session` – Test run session.

shouldStop

When `True`, test run should stop before running another test.

addError (*test*, *err*)

Test case resulted in error.

Fires `setTestOutcome()` and `testOutcome()` hooks.

addExpectedFailure (*test*, *err*)

Test case resulted in expected failure.

Fires `setTestOutcome()` and `testOutcome()` hooks.

addFailure (*test*, *err*)

Test case resulted in failure.

Fires `setTestOutcome()` and `testOutcome()` hooks.

addSkip (*test*, *reason*)

Test case was skipped.

Fires `setTestOutcome()` and `testOutcome()` hooks.

addSuccess (*test*)

Test case resulted in success.

Fires `setTestOutcome()` and `testOutcome()` hooks.

addUnexpectedSuccess (*test*)

Test case resulted in unexpected success.

Fires `setTestOutcome()` and `testOutcome()` hooks.

startTest (*test*)

Start a test case.

Fires `startTest()` hook.

stop ()

Stop test run.

Fires `resultStop()` hook, and sets `self.shouldStop` to `event.shouldStop`.

stopTest (*test*)

Stop a test case.

Fires `stopTest()` hook.

wasSuccessful ()

Was test run successful?

Fires `wasSuccessful()` hook, and returns `event.success`.

6.2.5 nose2.runner

class `nose2.runner.PluggableTestRunner` (*session*)

Test runner that defers most work to plugins.

Parameters `session` – Test run session

resultClass

Class to instantiate to create test result. Default: `nose2.result.PluggableTestResult`.

resultClass

alias of `nose2.result.PluggableTestResult`

run (*test*)

Run tests.

Parameters *test* – A unittest `TestSuite`` or `TestClass`.

Returns Test result

Fires `startTestRun()` and `stopTestRun()` hooks.

6.2.6 nose2.util

`nose2.util.call_with_args_if_expected` (*func*, **args*)

Take *:func:* and call it with supplied *:args:*, in case that signature expects any. Otherwise call the function without any arguments.

`nose2.util.ensure_importable` (*dirname*)

Ensure a directory is on `sys.path`.

`nose2.util.exc_info_to_string` (*err*, *test*)

Format exception info for output

`nose2.util.format_traceback` (*test*, *err*)

Converts a `sys.exc_info()` -style tuple of values into a string.

`nose2.util.has_module_fixtures` (*test*)

Does this test live in a module with module fixtures?

`nose2.util.isgenerator` (*obj*)

Is this object a generator?

`nose2.util.ispackage` (*path*)

Is this path a package directory?

`nose2.util.ln` (*label*, *char*='-', *width*=70)

Draw a divider, with *label* in the middle.

```
>>> ln('hello there')
'----- hello there -----'
```

width and *divider char* may be specified. Defaults are 70 and '-', respectively.

`nose2.util.module_from_name` (*name*)

Import module from *name*

`nose2.util.name_from_args` (*name*, *index*, *args*)

Create test name from test args

`nose2.util.name_from_path` (*path*)

Translate *path* into module name

Returns a two-element tuple:

1. a dotted module name that can be used in an import statement (e.g., `pkg1.test.test_things`)
2. a full path to filesystem directory, which must be on `sys.path` for the import to succeed.

`nose2.util.num_expected_args` (*func*)

Return the number of arguments that *:func:* expects

`nose2.util.object_from_name` (*name*, *module=None*)

Given a dotted name, return the corresponding object.

Getting the object can fail for two reason:

- the object is a module that cannot be imported.
- the object is a class or a function that does not exists.

Since we cannot distinguish between these two cases, we assume we are in the first one. We expect the stacktrace is explicit enough for the user to understand the error.

`nose2.util.parse_log_level` (*lvl*)

Return numeric log level given a string

`nose2.util.safe_decode` (*string*)

Safely decode a byte string into unicode

`nose2.util.test_from_name` (*name*, *module*)

Import test from name

`nose2.util.transplant_class` (*cls*, *module*)

Make `cls` appear to reside in `module`.

Parameters

- `cls` – A class
- `module` – A module name

Returns A subclass of `cls` that appears to have been defined in `module`.

The returned class's `__name__` will be equal to `cls.__name__`, and its `__module__` equal to `module`.

`nose2.util.try_import_module_from_name` (*splitted_name*)

Try to find the longest importable from the `splitted_name`, and return the corresponding module, as well as the potential `ImportError` exception that occurs when trying to import a longer name.

For instance, if `splitted_name` is `['a', 'b', 'c']` but only `a.b` is importable, this function:

1. tries to import `a.b.c` and fails
2. tries to import `a.b` and succeeds
3. return `a.b` and the exception that occurred at step 1.

`nose2.util.valid_module_name` (*path*)

Is `path` a valid module name?

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