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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.
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.
Because nose2 is based on unittest, you can start from the Python Standard Library’s documentation for unittest and then use nose2 to add value on top of that.

nose2 looks for tests in python files whose names start with test and runs every test function it discovers.

Here’s an example of a simple test, written in typical unittest style:

```
# in test_simple.py
import unittest

class TestStrings(unittest.TestCase):
    def test_upper(self):
        self.assertEqual("spam".upper(), "SPAM")
```

You can then run this test like so:

```
$ nose2 -v
test_upper (test_simple.TestStrings) ... ok
----------------------------------------------------------------------
Ran 1 test in 0.000s
OK
```

However, nose2 supports more testing configuration and provides more tools than unittest on its own.

For example, this test exercises just a few of nose2’s features:

```
# in test_fancy.py
from nose2.tools import params

@params("Sir Bedevere", "Miss Islington", "Duck")
def test_is_knight(value):
    assert value.startswith('Sir')
```

and then run this like so:

```
$ nose2 -v
test_is_knight (test_fancy) ... ok
----------------------------------------------------------------------
Ran 1 test in 0.000s
OK
```
$ nose2 -v --pretty-assert
test_fancy.test_is_knight:1
'Sir Bedevere' ... ok
test_fancy.test_is_knight:2
'Miss Islington' ... FAIL
test_fancy.test_is_knight:3
'Duck' ... FAIL

FAIL: test_fancy.test_is_knight:2
'Miss Islington'

Traceback (most recent call last):
  File "/mnt/ebs/home/sirosen/tmp/test_fancy.py", line 6, in test_is_knight
    assert value.startswith('Sir')
AssertionError

>>> assert value.startswith('Sir')

values:
    value = 'Miss Islington'
    value.startswith = <built-in method startswith of str object at 0x7f3c3172f430>

FAIL: test_fancy.test_is_knight:3
'Duck'

Traceback (most recent call last):
  File "/mnt/ebs/home/sirosen/tmp/test_fancy.py", line 6, in test_is_knight
    assert value.startswith('Sir')
AssertionError

>>> assert value.startswith('Sir')

values:
    value = 'Duck'
    value.startswith = <built-in method startswith of str object at 0x7f3c3172d490>

Ran 3 tests in 0.001s
FAILED (failures=2)
Full documentation for nose2 is available at docs.nose2.io
If you want to make contributions, please read the contributing guide.
5.1 Getting started with nose2

5.1.1 Installation

The recommended way to install nose2 is with pip:

```
pip install nose2
```

5.1.2 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.

5.2 Using nose2

5.2.1 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:

<table>
<thead>
<tr>
<th>test.py</th>
</tr>
</thead>
<tbody>
<tr>
<td>test_views.py</td>
</tr>
<tr>
<td>test_models.py</td>
</tr>
<tr>
<td>testThingy.py</td>
</tr>
</tbody>
</table>

These files will not be run:

<table>
<thead>
<tr>
<th>not_a_test.py</th>
</tr>
</thead>
<tbody>
<tr>
<td>myapp_test.py</td>
</tr>
<tr>
<td>some_test_file.py</td>
</tr>
</tbody>
</table>

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

5.2.2 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_LEVEL_DIRECTORY
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:

```python
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.

5.2.3 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]]
            [--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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5.3 Configuring nose2

5.3.1 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_expecting_list = value1
value2
```

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

\textbf{-c \textit{CONFIG}, --config \textit{CONFIG}}

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

\textbf{--no-user-config}

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

Configuring Test Discovery

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

\textbf{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.

\textbf{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 \texttt{lib} or \texttt{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:

```ini
[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:

```ini
[unittest]
plugins = myproject.plugins.frobulate
    otherproject.contrib.plugins.derper
exclude-plugins = nose2.plugins.loader.functions
    nose2.plugins.outcomes
```

5.3.2 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:
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.

### 5.3.3 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:

```python
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:

```python
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:

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

(continues on next page)
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).

5.4 Differences: nose2 vs nose vs unittest2

5.4.1 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.

5.4.2 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.

5.5 Plugins for nose2

5.5.1 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.
Plugin class reference: DiscoveryLoader

```python
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:

```python
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

5.5. Plugins for nose2
Sample configuration

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

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

Plugin class reference: Generators

```python
class nose2.plugins.loader.generators.Generators:
    # Loader plugin that loads generator tests
    
    getTestCasesNames(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 `getTestCasesNames()`, `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:

```python
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))
```

(continues on next page)
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

```python
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.

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

**Plugin class reference: TestCaseLoader**

```python
class nose2.plugins.loader.testcases.TestCaseLoader
    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:

```python
def loadTestsFromTestClass(self, event)
    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.

def getTestMethodNames(self, event)
    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:

```python
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.

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

Plugin class reference: TestClassLoader

```python
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
```

5.5. Plugins for nose2
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 multiprocessing plugin as of nose2 0.6.0. 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
Exlude 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)

---

5.5. Plugins for nose2
**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

```python
class nose2.plugins.buffer.OutputBufferPlugin:
    Buffer output during test execution.

    def afterInteraction(self, event):
        Start buffering again (does not clear buffers).

    def beforeInteraction(self, event):
        Stop buffering so users can see stdout.

    def outcomeDetail(self, event):
        Add buffered output to event.extraDetail.

    def setTestOutcome(self, event):
        Attach buffer(s) to event.metadata.

    def startTest(self, event):
        Start buffering selected stream(s).

    def stopTest(self, 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]

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

Sample configuration

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

```ini
[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/3.7.3/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

5.5. Plugins for nose2
**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.*

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

Then, you can enable coverage reporting with:

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

Or with this lines in `unittest.cfg`:

```ini
[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]**

```plaintext
always-on
  Default  False
  Type     boolean
```

**Sample configuration**

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

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

**Command-line options**

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

**Plugin class reference: PrettyAssert**

```python
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:
\begin{verbatim}
    x = f()
y = g()
assert x == y
\end{verbatim}

but this type of statement does not:

\begin{verbatim}
    assert f() == g()
\end{verbatim}

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:

\begin{verbatim}
    assert x.foo == 1
\end{verbatim}

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.

### 5.5.2 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 `[unittest]` 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 \( \text{U+FFFD} \) 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:

\begin{verbatim}
    # a.py
    from nose2 import tools
\end{verbatim}

(continues on next page)
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:

```xml
<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>
</testcase>
```

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

```xml
<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>
</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:

```ini
[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.

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

Command-line options

`--junit-xml-path FILE`
  Output XML filename

`-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

  handleArgs(event)
    Read option from command line and override the value in config file when necessary

5.5. Plugins for nose2
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"/>
</testsuite>
```
Selecting tests with attributes

5.5. Plugins for nose2
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!):

```python
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:
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 attribs 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 test 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 multiprocess 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:

```python
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 multiprocess 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, **metadata)
    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 multiprocess 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 multiprocess session.

- When running multiprocess, do not set `event.executeTests` in `startTestRun()` – instead, set it in `startSubprocess()` instead. This will allow the multiprocess 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 know 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](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 built 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, --\(\text{processes}\) DEFAULT
  # o procs

Plugin class reference: MultiProcess

```python
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:

```python
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:

```python
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:

```python
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:

```python
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 it superclass’s methods directly, *those methods will be called twice.*

**Layer method reference**

```python
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.

```python
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.

```python
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.

```python
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.

```python
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
    Layer_B_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.

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

Now the output will be the following:
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 Test-Case classes that use layers will be ignored.

Mixing layers and multiprocess testing

In the initial release, test suites using layers are incompatible with the multiprocess 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:

```
[nose2]
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`

```python
class nose2.plugins.layers.LayerReporter
```
Plugin class reference: Layers

```python
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:

```ini
[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:

```ini
[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.

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

Command-line options

```
--with-doctest  DEFAULT
    Load doctests from text files and modules
```

5.5. Plugins for nose2
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.testidTestId
    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 cProfile.

This plugin implements startTestRun() and replaces event.executeTests with cProfile.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 \texttt{--plugin=nose2.plugins.prof} option and activate it with the \texttt{--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 \texttt{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 \texttt{unittest.cfg} or \texttt{nose2.cfg} file:

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

The \texttt{plugins} parameter may contain a list of plugin names, including \texttt{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 \texttt{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

```python
class nose2.plugins.prof.Profiler
    Profile the test run
    beforeSummaryReport(event)
        Output profiling results
    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:

```ini
[unittest]
plugins = nose2.plugins.printhooks
```

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

Configuration [print-hooks]

```ini
always-on
    Default  False
    Type     boolean
```

Sample configuration

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

```ini
[print-hooks]
always-on = False
```

Command-line options

```bash
--print-hooks DEFAULT
    Print names of hooks in order of execution
```
Plugin class reference: PrintHooks

```python
class nose2.plugins.printhooks.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.

```python
handleArgs: CommandLineArgsEvent(handled=False, args=Namespace(collect_only=None,
    --config=['unittest.cfg', 'nose2.cfg'], debugger=None, fail_fast=None, load_ plugs=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: LoadFromNamesEvent(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')

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

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

startTestRun: StartTestRunEvent(handled=False, runner=<PluggableTestRunner>, suite=
    suite.TestSuite tests=[<tests.Test testMethod=test>]>]>>, result=<
    PluggableTestResults>, startTime=1327346684.77457, executeTests=<function <lambda>
    at 0x1fccc50>)
```
startTest: StartTestEvent (handled=False, test=<tests.Test testMethod=test>, result=\nPluggableTestResult>, startTime=1327346684.774765)

reportStartTest: ReportTestEvent (handled=False, testEvent=<nose2.events.\nStartTestEvent object at 0x1fcd650>, stream=<nose2.util._WritelnDecorator object at\n0x1f97a10>)

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

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

reportSuccess: ReportTestEvent (handled=False, testEvent=<nose2.events.\nTestOutcomeEvent object at 0x1fcd650>, stream=<nose2.util._WritelnDecorator object\nat 0x1f97a10>)

stopTest: StopTestEvent (handled=False, test=<tests.Test testMethod=test>, result=\nPluggableTestResult>, stopTime=1327346684.775064)

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

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

beforeErrorList: ReportSummaryEvent (handled=False, stopTestEvent=<nose2.events.\nStopTestRunEvent object at 0x1f97a10>, reportCategories={'failures': [], 'skipped': [], 'errors': [],\n'unexpectedSuccesses': [], 'expectedFailures': []})

beforeSummaryReport: ReportSummaryEvent (handled=False, stopTestEvent=<nose2.events.\nStopTestRunEvent object at 0x1f97a10>, reportCategories={'failures': [], 'skipped': [], 'errors': [],\n'unexpectedSuccesses': [], 'expectedFailures': []})

Ran 1 test in 0.001s

wasSuccessful: ResultSuccessEvent (handled=False, result=<PluggableTestResult>,\nsuccess=False)

OK

afterSummaryReport: ReportSummaryEvent (handled=False, stopTestEvent=<nose2.events.\nStopTestRunEvent object at 0x1f97a10>, reportCategories={'failures': [], 'skipped': [], 'errors': [],\n'unexpectedSuccesses': [], 'expectedFailures': []})

Loader: Egg Test discovery

5.5. Plugins for nose2
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
```

5.5.3 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!

5.6 Tools and Helpers

5.6.1 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.

    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.

    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.

```python
import unittest
from nose2.tools import params

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.

```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
```

(continues on next page)
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'):
        @it.has_setup
        def setup():
            
```

(continues on next page)
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')

@it.should('do something else')
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:

```python
from nose2.tools import such

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

Groups of tests are marked by the `having` context manager:

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

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

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

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

And tests are likewise marked with the `should` decorator:

```python
@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:

```python
@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:

```python
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.

```python
@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.

```python
@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.

```python
@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.

```python
@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.

```python
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.

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

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

## 5.7 Changelog

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

### 5.7.1 Unreleased

### 5.7.2 0.9.1

**Changed**

- the prof plugin now uses cProfile instead of hotshot for profiling, and therefore now supports python versions which do not include hotshot
- skipped tests now include the user’s reason in junit XML’s message field

**Fixed**

- the prettyassert plugin mishandled multi-line function definitions
- Using a plugin’s CLI flag when the plugin is already enabled via config no longer errors – it is a no-op instead

### 5.7.3 0.9.0

**Added**

- nose2.plugins.prettyassert, enabled with –pretty-assert, which pretty-prints AssertionError generated by assert statements

**Changed**

- Update trove classifier to “beta” from “alpha” status
- Cleanup code for EOLed python versions
nose2, Release 0.6.0

**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

### 5.7.4 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

### 5.7.5 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

### 5.7.6 0.7.3

**Added**

- support for python 3.6.
Fixed

- Tests failing due to .coveragerc not in MANIFEST

5.7.7 0.7.2

Fixed

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

5.7.8 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

5.7.9 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
nose2, Release 0.6.0

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

5.7.10 0.6.2

Fixed

- fix the coverage plugin tests for coverage==3.7.1

5.7.11 0.6.1

Fixed

- missing test files added to package.

5.7.12 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
5.7.13 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

5.7.14 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.
nose2, Release 0.6.0

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 multiprocess 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.

5.7.15 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.

5.7.16 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.

5.7.17 0.4.4

Fixed

- Fixed sort key generation for layers.
5.7.18 0.4.3

Fixed

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

5.7.19 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.

5.7.20 0.4.1

Fixed

- Fixed packaging bug.

5.7.21 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.

5.7.22 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 @dtcaciuc for the bug report (#32).
nose2, Release 0.6.0

Fixed

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

5.7.23 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.

5.7.24 0.1

Initial release.
6.1 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.

6.1.1 Hello World

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

```python
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 `[unittest]` section of a config file loaded by nose2, such as `unittest.cfg`. Then run nose2:

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

And you should see the log message before the first dot appears.
6.1.2 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:

```ini
[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.

6.1.3 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.

6.1.4 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.

6.1.5 Guidelines

Events

nose2’s plugin API is based on the API in `unittest2`’s `plugins` branch (under-development). Its differs from nose’s 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.

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.

6.1.6 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`

6.2 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:

```plaintext
.. 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.

6.3 Event reference

```plaintext
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.
```

```plaintext
args
   Args object returned by argparse.
```

```plaintext
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.
```

```plaintext
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.

6.3. Event reference
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

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.

```python
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

tsuite
    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:

    ```python
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

timestamp
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_info
If 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.

6.4 Hook reference

Note: Hooks are listed here in order of execution.
6.4.1 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.

6.4.2 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.

```python
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.

```python
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.

```python
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.

```python
startTest(self, event)
```

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

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

```python
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.

```python
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.name`. Be aware that other plugins may have set this also!

```python
setTestOutcome(self, event)
```

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

Plugins can use this hook to alter test outcomes. Plugins can alter `event.outcome` to change the outcome of the test, `event.exc_info`, set or clear `event.expected`, and so on.

```python
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.

```python
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.

```python
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.

6.4.3 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.

6.5 Session reference

6.5.1 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**


**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’.

**unittest**

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

### 6.5.2 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

### 6.6 Plugin class reference

The plugin system in nose2 is based on the plugin system in unittest2’s `plugins` branch.

#### 6.6.1 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:

```python
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.

```python
def register() -> None:
    # Register with appropriate hooks.
    # This activates the plugin and enables it to receive events.
```

### 6.6.2 Plugin interface classes

```python
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 = nose2.events.Hook
    # Class to instantiate for each hook. Default: nose2.events.Hook.

    addMethod(method: str) -> None:
        # Add a method to the available method.
        # This allows plugins to register for this method.
        #
        Parameters
        method – A method name

    hookClass = alias of nose2.events.Hook

    register(method: str, plugin: object) -> None:
        # Register a plugin for a method.
        #
        Parameters
        method – A method name
        plugin – A plugin instance
```

```python
class nose2.events.Hook:
    # A plugin hook
```

### 6.6.3 Pre-registration methods

**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

**register** (method: str, plugin: object)

Register a plugin for a method.

- **Parameters**
  - **method** – A method name
  - **plugin** – A plugin instance
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.
7.1 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.

7.1.1 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

7.1.2 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

7.1.3 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.

7.1.4 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.

7.1.5 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!

7.2 Internals

Reference material for things you probably only need to care about if you want to contribute to nose2.

7.2.1 nose2.main

class nose2.main.PluggableTestProgram(**kw)

TestProgram that enables plugins.

Accepts the same parameters as \texttt{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 \texttt{instances} to register with the session’s hooks system. Each item in the list must be a 2-tuple of (hook name, plugin instance)

\texttt{sessionClass}

The class to instantiate to create a test run configuration session. Default: \texttt{nose2.session.Session}

\texttt{loaderClass}

The class to instantiate to create a test loader. Default: \texttt{nose2.loader.PluggableTestLoader}.

\textbf{Warning:} Overriding this attribute is the only way to customize the test loader class. Passing a test loader to \texttt{\_\_init\_\_()} does not work.

\texttt{runnerClass}

The class to instantiate to create a test runner. Default: \texttt{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.
7.2.2 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

7.2.3 nose2.loader

**class** nose2.loader.PluggableTestLoader (session)
  Test loader that defers all loading to plugins

  **Parameters**
  
  **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

7.2.4 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.

7.2.5 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.

7.2.6 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.in (label, char='-', width=70)
Draw a divider, with label in the middle.

```python
>>> 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 expected arguments that :func: expects
nose2.util.\texttt{object\_from\_name}(name, module=\texttt{None})

Given a dotted name, return the corresponding object.

Getting the object can fail for two reasons:

- 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.\texttt{parse\_log\_level}(lvl)

Return numeric log level given a string.

nose2.util.\texttt{safe\_decode}(string)

Safely decode a byte string into unicode.

nose2.util.\texttt{test\_from\_name}(name, module)

Import test from \texttt{name}.

nose2.util.\texttt{transplant\_class}(cls, module)

Make \texttt{cls} appear to reside in \texttt{module}.

\textbf{Parameters}

- \texttt{cls} – A class
- \texttt{module} – A module name

\textbf{Returns} A subclass of \texttt{cls} that appears to have been defined in \texttt{module}.

The returned class’s \texttt{\_name\_} will be equal to \texttt{cls.\_name\_}, and its \texttt{\_module\_} equal to \texttt{module}.

nose2.util.\texttt{try\_import\_module\_from\_name}(splitted\_name)

Try to find the longest importable from the \texttt{splitted\_name}, and return the corresponding module, as well as the potential \texttt{ImportError} exception that occurs when trying to import a longer name.

For instance, if \texttt{splitted\_name} is ['a', 'b', 'c'] but only \texttt{a.b} is importable, this function:

1. tries to import \texttt{a.b.c} and fails
2. tries to import \texttt{a.b} and succeeds
3. return \texttt{a.b} and the exception that occurred at step 1.

nose2.util.\texttt{valid\_module\_name}(path)

Is \texttt{path} a valid module name?
CHAPTER 8

Indices and tables

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