
CERN

Unit testing in PyHEADTAIL

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Unit tests

- Test small pieces (units) of code
- Why testing?
  - Find bugs during development
  - Simplifies integrating changes

Unit testing in Python

- unittest framework:
  - test automation
  - various assert methods
  - test suites

https://docs.python.org/2/library/unittest.html

Example: unit test

```
def my_super_fast_and_stable_cov(a,b):
    # some magic
    return result
```

Example: unit test

```
import unittest

class TestMyCov(unittest.TestCase):

    def test_cov_of_a_a_is_var(self):
        var = 1.
        mytol = 6 # error tolerance is 10^-6
        a = np.random.normal(loc=1, scale=sqrt(var), size=1000)
        var_a = my_super_fast_and_stable_cov(a,a)
        self.assertAlmostEqual(var, var_a, mytol, 'a good error message')

    def test_something_else(self):
        # some other test


if __name__ == '__main__':
    unittest.main()
```

Example: running the test

```
$ python TestMyCov.py

F.
======================================================================
FAIL: test_cov_of_a_a_is_var (__main__.TestMyCov)
----------------------------------------------------------------------
Traceback (most recent call last):
  File "TestMyCov.py", line 17, in test_cov_of_a_a_is_var
    self.assertAlmostEqual(var, var_a, mytol, 'a good error message')
AssertionError: a good error message

----------------------------------------------------------------------
Ran 2 tests in 0.000s

FAILED (failures=1)
```

Example: the test suite

```
...
#add your test classes here
test_list = [TestSlicing,
             TestParticles,
             TestParticleGenerators,
             TestAperture,
             TestSimpleLongTracking,
             TestListProxy,
             TestDetuner,
             TestTransverseTracking,
             TestMyCov]

 ...
```

```
python testing/unittests/testsuite.py
.................................
----------------------------------------------------------------------
Ran 33 tests in 0.039s

OK
```

Current Status

- Implemented in testing/unittests/
- Run them before comitting (git hooks)
- Add your own!

- Not strictly unit tests:
  test_itest_autorun.py

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