Unittest tutorial

practical exercise in Python

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Authors: Hrobjartur Thorsteinsson
(thorsteinssonh@gmail.com)

Assignment

Your assignment is to implement a missing unittest for the **phonebook** package. Clone the project from google code,

```
$ git clone http://code.google.com/p/unittesttutorial
```

Implement the **test_lookup** unit test inside the file **tests / test_dummydb_phonebook_layer.py**. Optionally implement the **test_unknown_command** inside the file **test / test_phonebook_terminal.py**. Note that this second test requires a bit more code reading and applies a more advanced use of the **Mock** class.

If you are interested in what the software does, try running the **phonebookterminal.py** (type help for instructions),

```
$ ./phonebookterminal.py

PHONE BOOK TERMINAL
v0.1.0
phonebook:
phonebook: insert Hrobjartur Thorsteinsson;Studlasel 24;4991911
phonebook: lookup Hrobjartur Thorsteinsson
Hrobjartur Thorsteinsson;Studlasel 24;4991911
phonebook:
phonebook: lookup Bolli Palmason
None
phonebook: exit
have a nice day!
$
```

The **phonebookterminal** software allows users to insert or lookup phonebook entries in a database.

Install software tools

The essential testing tools are the mock and nose package for python,

```
$ sudo apt-get install python-mock
$ sudo apt-get install python-nose
```

Optionally, if you want to compile UML diagrams or documentation,

```
$ sudo apt-get install graphviz
$ sudo apt-get install pylint
$ sudo apt-get install python-coverage
$ sudo apt-get install rst2pdf
```

Run the tests

The **nose** package includes a 'testrunner' called **nosetests**. The testrunner automatically looks up classes that derive from unittest.TestCase, executes the tests and reports a result.

Now execute all the tests found in the tests directory,

```
$ nosetests -v tests/
```

All but two tests should pass. Two tests have been defined but not yet implemented,

```
ERROR: test_lookup (test_dummydb_phonebook_layer.TestPhoneBookLayer)
ERROR: test_unknown_command (test_phonebook_terminal.TestPhoneBookTerminal)
```

Optionally use **coverage** to evaluate how well the tests are 'covering' the code,

```
$ nosetests -v --with-coverage tests/
$ coverage report

Name                                      Stmts   Miss Branch BrMiss  Cover
-----------------------------------------------------------------------
phonebook/__init__                            2      0      0      0   100%
phonebook/dummy_database                     15     10      2      2    29%
phonebook/dummydb_phonebook_layer            13      4      2      2    60%
phonebook/phonebook_layer_interface           7      2      0      0    71%
phonebook/phonebook_terminal                 57     28     12      3    55%
phonebook/version                             4      0      0      0   100%
-----------------------------------------------------------------------
TOTAL                                        98     44     16      7    55%
```

The percentage coverage should improve somewhat after implementing the new tests.

Create a git branch

You may want to create a git branch for your implementation,

```
$ git checkout -b <my_branch_name>
```

Later on you may want to push your code back to google code where we can compare our solutions,

```
$ git push origin <my_branch_name>
```

Hróbjartur will supply a username and password.

Handy assert statements and Mock

The test class provides some basic assert statements, e.g.,

```
def test_something(self):
    self.do_something()
    self.assertEqual(a,b)
    ... or
    self.assertItemsEqual( iterable_a, iterable_b )
    ... or
    self.assertTrue( some_bool )
    ... or
    self.assertRaises( SomeError, self.do_something() )
```

Mock objects also provide some handy assert statements specific to the mock. Here we use **Mock** as a listener, asserting the way it has been called,

```
def test_something(self):
   self.myobj.foo = Mock()
   self.myobj.do_something()
   self.myobj.foo.assert_called_with(some, args)
   ... or
   self.myobj.foo.assert_called_once_with(some, args)
   ... or
   self.myobj.foo.assert_any_call(some, args)
```

The **assert_any_call** checks if the mock has ever been called with, while the **assert_called_** check only the last known call to the mock. Import the **Mock** into a python shell to see what other options it provides.

We can also make mock provide fake input to your code unit,

```
def test_something(self):
    self.myobj.foo = Mock(return_value="any kind of data")
    ... or if we need a series of calls and return values
    self.myobj.foo = Mock(side_effect=[data1, data2, ...])
```

Code structure

The software uses a database abstraction layer (http://en.wikipedia.org/wiki/Database_abstraction_layer) to hide the functionality of an actual database module.

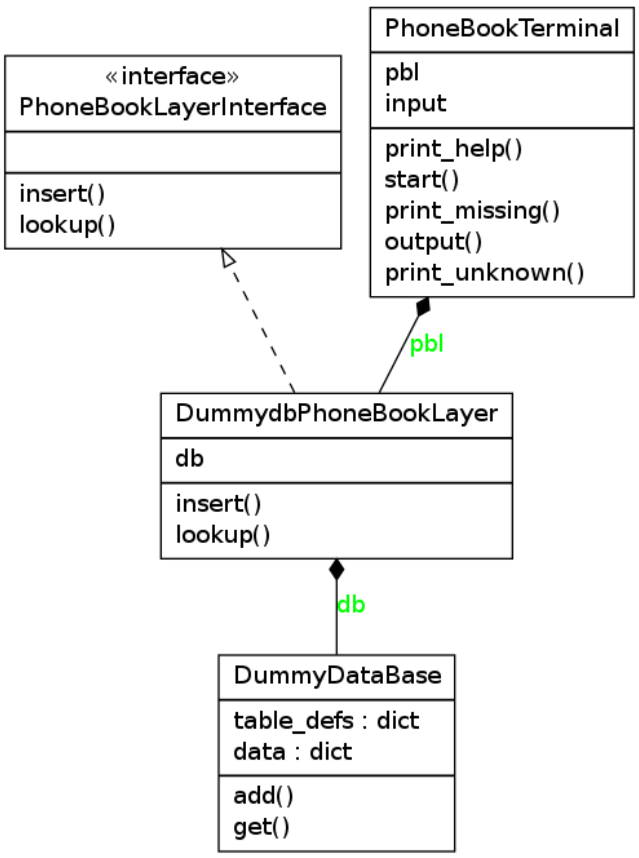
An abstraction layer is a 'programming pattern' that helps isolate your code from external libraries. This technique makes your code less dependent on those libraries by calling an intermediary layer.

In our case the database module being used is a demonstration module called **DummyDataBase**. Our abstraction from this database is called **DummydbPhoneBookLayer**, which implements an interface **PhoneBookLayerInterface**. The **PhoneBookTerminal** talks only to the **DummydbPhoneBookLayer**, which in turn talks to the **DummyDataBase**.

Class diagram

You can generate a UML class diagram for the code using **pyreverse** (shippes with pylint),

```
$ pyreverse -o png phonebook/*.py
```


«interface»
PhoneBookLayerInterface
insert()
lookup()
PhoneBookTerminal
pbl
input
print_help()
start()
print_missing()
output()
print_unknown()
pbl
DummydbPhoneBookLayer
db
insert()
lookup()
db
DummyDataBase
table_defs : dict
data : dict
add()
get()