

Unit Testing

Object Oriented System Design

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WE ARE BAD CODERS AND WE SHOULD FEEL BAD

- ▶ Here in the BIT there are two things that we are generally bad at:
 1. Documentation
 2. Testing
- ▶ I don't have any great ideas about documentation. You just have to suck it up.
- ▶ Testing is a different matter. We must get better at testing. The good news is that there are plenty of tools and methods to help us.

TYPES OF TESTING

- ▶ Unit testing
- ▶ Integration testing
- ▶ Functional testing
- ▶ Performance testing
- ▶ Penetration testing
- ▶ Acceptance testing

THINGS WE DO INSTEAD OF TESTING

- ▶ We write a lot of code in one go - maybe the whole assignment.
- ▶ When things don't work, we stare at the code and try to figure out why.
- ▶ We throw in some print statements.
- ▶ We use a debugger.
- ▶ We write throwaway examples to test things.
- ▶ In short we waste time.

WHAT WE WANT TO DO.

- ▶ We will write tests that cover all our code.
- ▶ We will cleanly separate test modules from application code.
- ▶ We will write tests that *document* our code.
- ▶ We will write tests that run automatically.
- ▶ We will run our tests whenever we make a change to be sure nothing was broken.

UNIT TESTS

- ▶ Testing starts with *unit tests*.
- ▶ Unit tests are written and run by developers.
- ▶ They test code at the lowest level of functionality.
- ▶ Basically, every function has a set of tests.

TEST DRIVEN DEVELOPMENT

Suppose you want to add a new feature to a class. If you are practicing TDD, you

1. Write tests that test the new feature. (They should fail.)
2. Write code that passes the tests.
3. *Refactor*, or clean up your code.

UNIT TESTING TOOLS

- ▶ There are heaps of libraries and frameworks for writing unit testing modules.
- ▶ There is a family of testing tools that are collectively called “xUnit” that are all based on Smalltalk’s SUnit.
- ▶ This means that there is a common approach to unit testing that applies to many languages.
- ▶ Python’s standard testing library, `unittest`, is part of the xUnit family. We will use it this week.