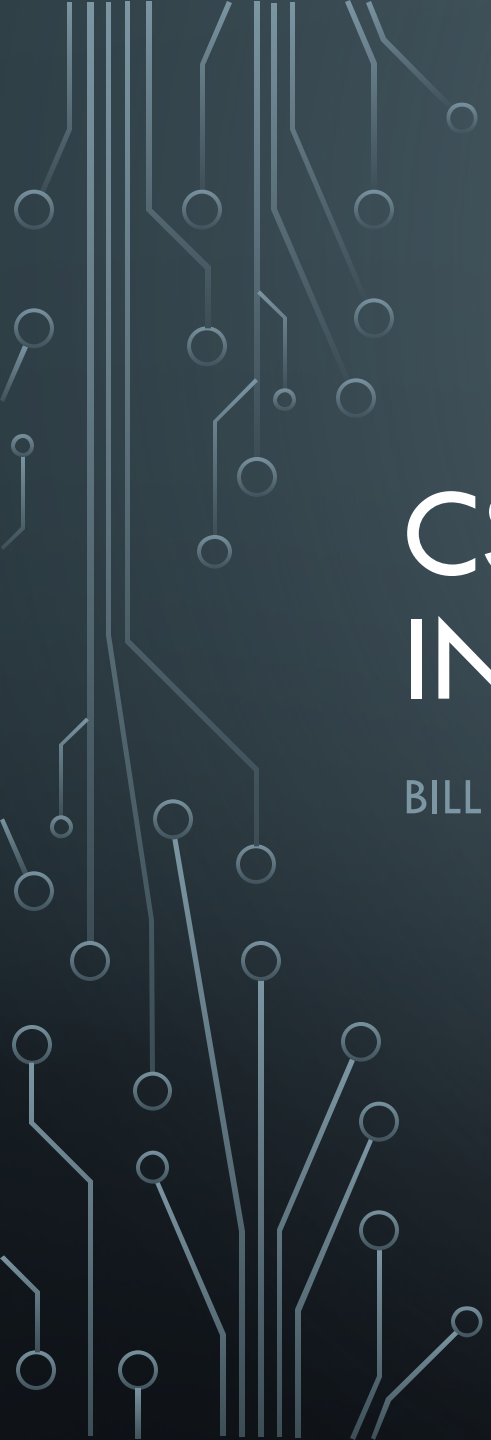

CS1632, LECTURE 5: INTRO TO UNIT TESTING

BILL LABOON

WHAT IS UNIT TESTING?

- A kind of automated testing
- Unit testing involves testing the smallest coherent "units" of code, such as functions, methods, or classes.
- It is white-box; you are looking at and testing the code directly.
- Ensures that the smallest pieces of the code work correctly (NOT that they work correctly with the rest of the system – very localized)

EXAMPLES

1. Testing that a .sort method sorts elements
2. Testing that passing a nil/null as an argument throws an exception
3. Testing that a formatNumber method formats a number properly
4. Checking that passing in a string to a function which expects an integer does not crash
5. Testing that a .send and .receive method exist on a class

UNIT TESTING

This is usually done by the developer writing the code, another developer (esp. in pair programming), or (very occasionally), a white-box tester.

WHAT'S THE POINT?

1. Problems found earlier
2. Faster turnaround time
3. Developer understands issues with his/her code
4. "Living documentation“
5. Able to tell if your changes caused issues elsewhere by running full test suite

MINITEST - OUR TESTING FRAMEWORK

- https://github.com/seattlerb/minitest
- Run “gem install minitest” or (better) add minitest to your Gemfile (see example) and run “bundle install”
- “…a complete suite of testing facilities supporting TDD, BDD, mocking, and benchmarking.
- Why Minitest? Relatively common, easy to learn, very fast, minimal.

MINITEST IS NOT THE ONLY UNIT TEST FRAMEWORK OUT THERE!

- Test::Unit (built-in)
- shoulda
- rspec
- Cucumber
- Ideas should apply to other testing frameworks easily

WHAT DO UNIT TESTS CONSIST OF?

- (optional) Set up code
- Preconditions
- Execution Steps
- Postconditions - a/k/a Assertions (a/k/a asserts, shoulds, musts)
- (optional) Tear down code

EXAMPLE (IN NATURAL LANGUAGE, NOT CODE)

I create two Integer objects, 1 and 1.

If I compare them with the equality operator, they SHOULD be equal.

(or "they MUST be equal.")

(or "I ASSERT that they will be equal")

POSTCONDITIONS = ASSERTIONS

- When you think "should" or "must", that is the assertion. It's what you're testing for.
- It's the EXPECTED BEHAVIOR of the unit test.
- When you execute the test, that's when you'll find out the OBSERVED BEHAVIOR.
- If the expected behavior matches the observed behavior, the test passes; otherwise it fails.

MINITEST ASSERTIONS

- Some assertions using MiniTest:
- assert_true
- assert_equals
- assert_includes
- assert_nil
- assert_raises

MINITEST ASSERTIONS

- You can also do the opposite with “refute” (like “assert not”)
- refute_true
- refute_equals
- refute_includes
- refute_nil
- refute_raises

TESTS ARE RUN IN RANDOM ORDER

- Make sure your tests are INDEPENDENT and SELF-CONTAINED
- Tests should be focused - one equivalence class, one method call
- Usually one or two assertions - rarely more than that
- Remember you are testing a small bit of code (a unit), not the whole system!

EXAMPLES IN SAMPLE_CODE/MINITEST_EXAMPLE