

Testing

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What is unit testing?

- Test a part of the program, typically a method or class.
- This can be automated.
- There is a useful framework called JUnit. Found in every widely used Java IDE.
- Unit testing is opposed to system testing where you test everything.

Why do unit testing?

- Can I trust this part of the code?
- Whack-a-mole of compensating bugs.
- Code reuse!
- Build something that works part by part.
- Fix something that is broken part by part.
- Prevents old errors from coming back.

Data coverage of code?

- Typical values (that you can verify easily)
- Extreme values, 0, "", null, empty list.
- Edge cases (where one value is at their extremes).
- Corner cases (where two values are at their extremes).
- Large data sets (Is your code efficient?).
- The big list of naughty strings (Google it!).
- When you solve a bug, make test cases for it so it does not come back and haunt you.

Regression testing

- Run your code with structured or randomized inputs.
- Make test cases out of the results!
- If you introduced a bug the regression tests will fail.
- If you solved a bug that had a regression test, that test will fail! Ops!

Test Driven Development (TDD) step by step

- Create one or more tests.
- Run the tests and make sure that they fail.
- Write code that passes the tests.
- Run the tests again.
- Refactor the code (to get rid of code duplication).
- Repeat.

TDD is a new name for an old idea

Edsger W. Dijkstra: The Humble Programmer (1972)

"But one should not first make the program and then prove its correctness, because then the requirement of providing the proof would only increase the poor programmer's burden. On the contrary: the programmer should let correctness proof and program grow hand in hand."

Kent Beck

"Never write a single line of code unless you have a failing automated test."

"Eliminate duplication" [Don't Repeat Yourself]

Mantras of Testing

- Test early.
- Test often.
- Have test coverage of data (edge cases, corner cases).
- Have test coverage of code (every if-statement).
- Don't think too much about adding a test, just add it!

Limits of testing

- It is hard/impossible to test GUI.
- Overzealous managers may demand adding tests to real life tested code.
- Alternatives to testing: Manual testing, traces, use a debugger, read the code