Testing With Dependencies

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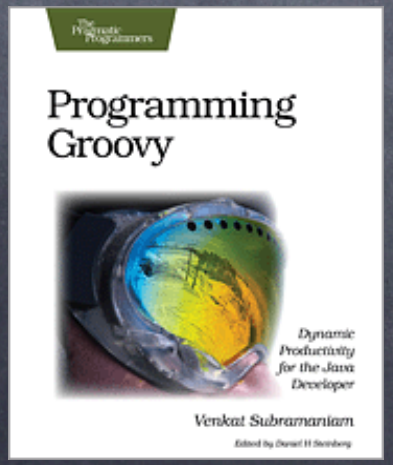
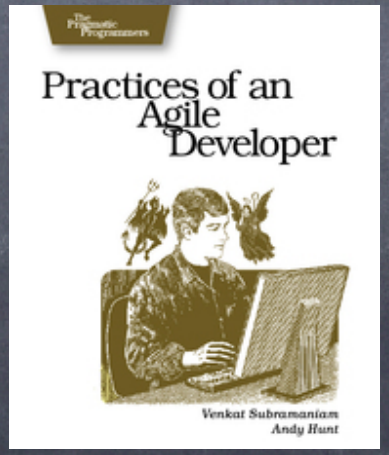
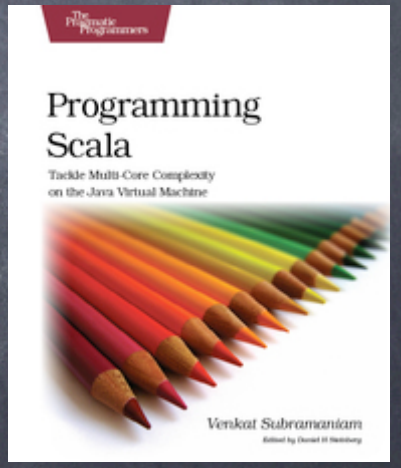




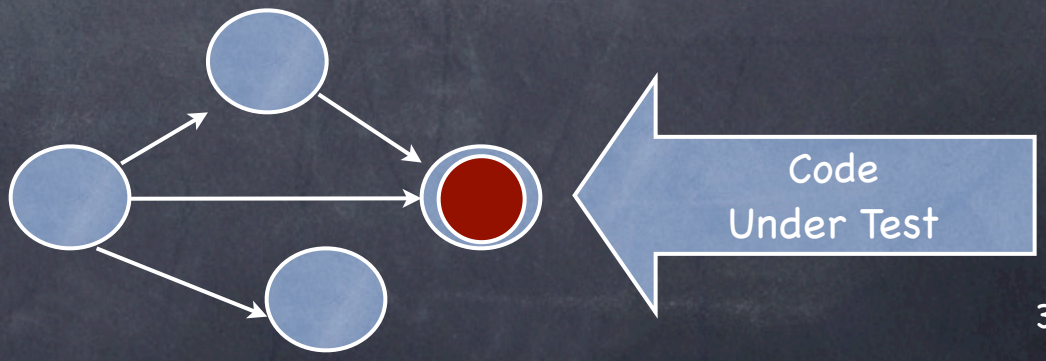


Unit Testing

- Unit Testing has significant benefits
  - Serves as a design tool
  - Helps to make code more robust
  - Serves as a documentation
  - Safety net while refactoring
  - Helps quickly identify problems
  - Gives feedback when code begins to break
  - ...

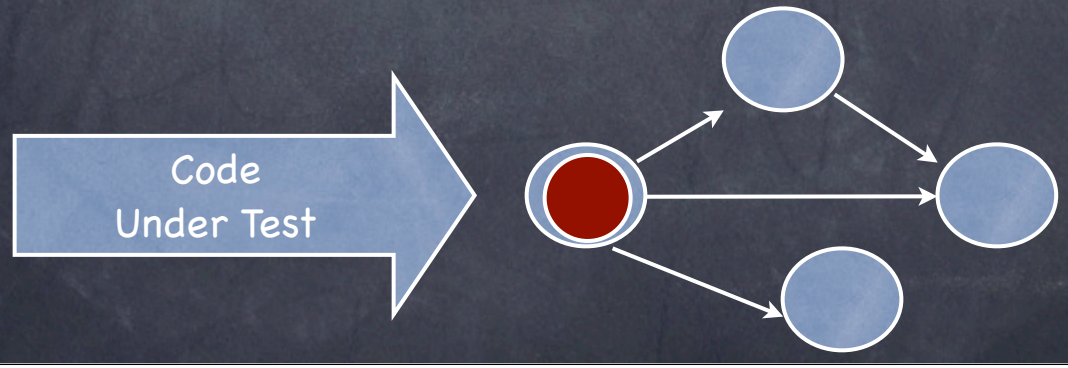
UT is easy when...

- Unit testing is easy when
  - your code does not depend on any thing
    - No database, file system, web service, socket, ... dependencies
  - your code can be tested fully in isolation
  - Does not require other classes/components, frameworks, etc.
- You quickly create an object, run some tests, and off you go



UT is hard when...

- Unit testing is hard when
  - your code had dependencies
  - it needs to fetch that data from the database
  - needs access to the network for some validation
  - needs to validate the credit card number
  - ...



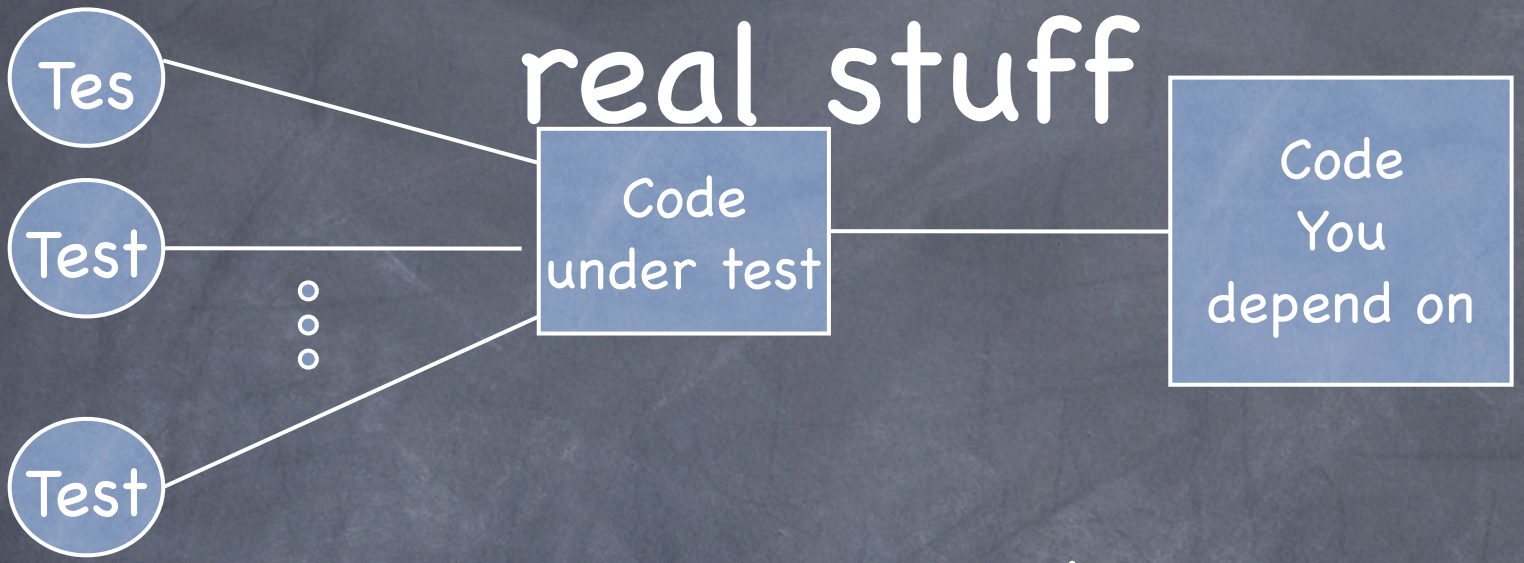
But remember UT means Automation

- But when we talk about unit testing, we mean automated unit testing
- We need to be able to run tests quickly
- Run them as many times as we like
- You certainly don't want to do either laborious and/or manual setup and tear down
- You want to check for behavior and ill-behavior of dependent code as well

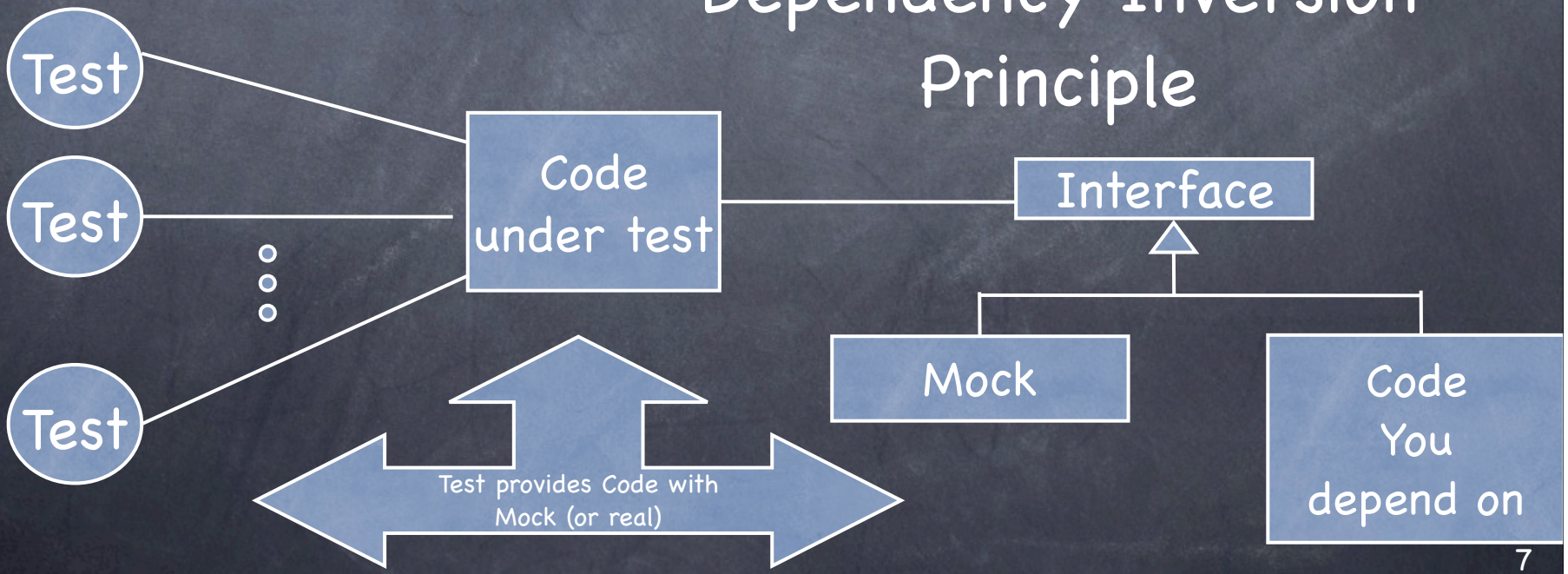
What's a Mock?

- A Mock object stands in for the real object
- It is an object that you first coach... tell him what to say and how to dance, then you set him loose, and he mimics what you coached
- Simulates the behavior of your dependencies for you

But my code depends on real stuff



Dependency Inversion Principle



What can a Mock do for you?

- A Mock Object can
  - simulate the expected functionality
  - isolates your code from details that may be filled in later
  - speeds up development of code under test
  - Can simulate both behavior and ill-behavior
  - can be refined incrementally by replacing with actual code

A class to create

- Write a Monitor class that will monitor a directory on the file system for any addition or deletion of files
- It raises an alarm or sends an email when a change is detected
- Remember you want to automate your tests
  - Each time you run your test
    - don't expect me to create a file in the directory being monitored
    - No, don't expect me to listen to your stinkin' alarm or be spammed by your emails

Mocking Exercise 1

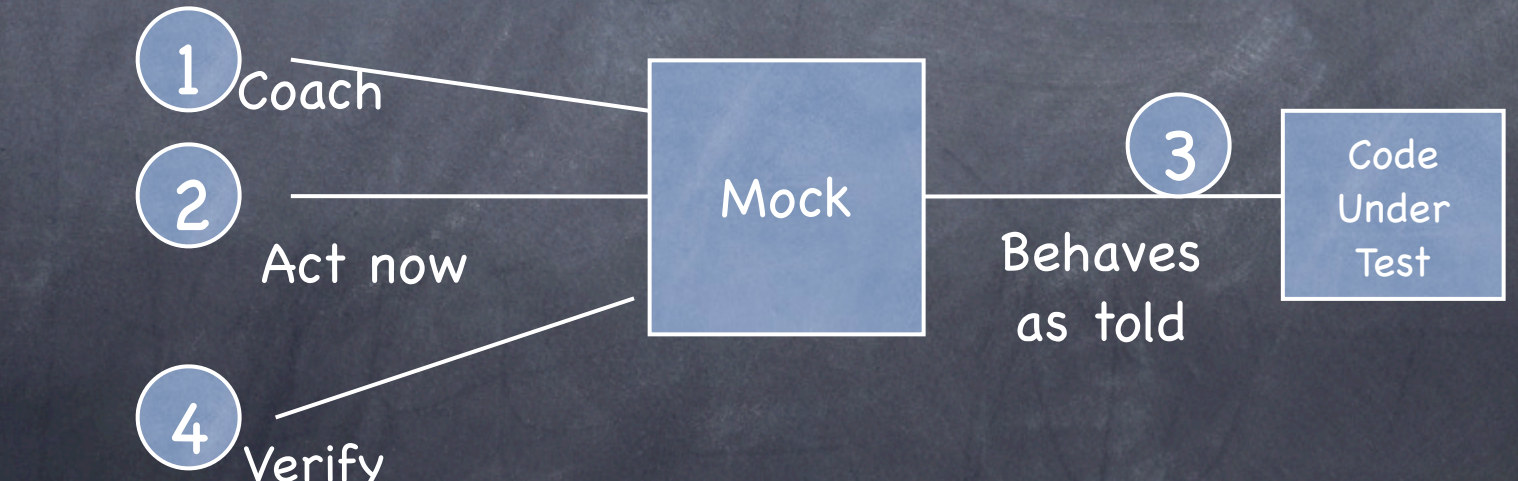
- Mock to stand in for the code that will
  - Represent the file system (or change to it)
  - Code to raise an alarm
  - Code to send out an email

Frameworks to ease your pain

- You can certainly hand toss your mock
- In fact, that is not a bad idea
  - You understand what's going on
  - You control your code
  - You have the flexibility to modify at your will
- But, you may end up creating a lot of classes
  - Why not simply use a mock instead of creating one... this is where the frameworks come in
    - EasyMock, JMock, etc.

EasyMock

- EasyMock helps create Mock objects for you on the fly
- Instead of spending time creating a Mock class, you can get ready to use it
- Let's take a look at using EasyMock



Mocking Exercise 2

- Mocking with EasyMock

EasyMock is Easy?

- While the objective is to make it easier to create mock, the reality is it can get a bit tedious setting up the mock's behavior
- Should you use EasyMock
- If it is simpler to hand toss a mock, do so
- If it is easier to use EasyMock, then use it
- On a project, you may use either approach at different places

Switching between Mock and Real

- Your code works with Mock
- Will it work with real object
- When problems creep up, you may want to experiment with mock and real object
- So, how can you switch between these so you can test with mock or real code
- Let's see how...

To Mock or not to?

- To
  - Mock only code that code under test directly depends on
  - Mock object that is hard to work with
  - Mock object that takes effort to set up
  - Mock object whose behavior is hard to predict
  - Mock object that requires lots of resources
  - Mock objects that are computationally expensive or very slow to respond
  - Mock objects that your test needs to verify with

To Mock or not to?

- Not To
  - Do not mock for the sake of mocking, ask if you can eliminate the need for mock by refactoring your code
  - Mock your objects but not resources like database, etc.
  - When writing the real code is easier than writing mock
  - Do not mock what will slow down your UT, mocks should be used to speed up UT

Other Frameworks

- You may hand toss a Mock or use EasyMock/JMock for POJOs
- What about something more complex like Servlets, EJBs, JDBC, etc.
- Imagine hand tossing a Mock for one of these interfaces?
- You may use frameworks like MockRunner to help you with that

MockRunner

- To unit test apps in J2EE environment
- Provides mock for Servlet, JDBC, JMS, struts actions, ... without the real container
  - No need for the app server or database
  - Does not provide any in-container testing
  - Can be combined with MockEJB for EJB

Dynamic Languages

- Dynamic Languages (like Ruby and Groovy) make Mocking easier
- Duck Typing and Meta Programming eliminates the need for heavy weight frameworks and tools

Mocking Exercise 3

- Mocking Using Dynamic Languages

References

- http://mockobjects.com
- http://easymock.org

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