Software Development Lifecycle

CSE219, Computer Science III

Stony Brook University

http://www.cs.stonybrook.edu/~cse219

WHAT IS THIS COURSE ABOUT?

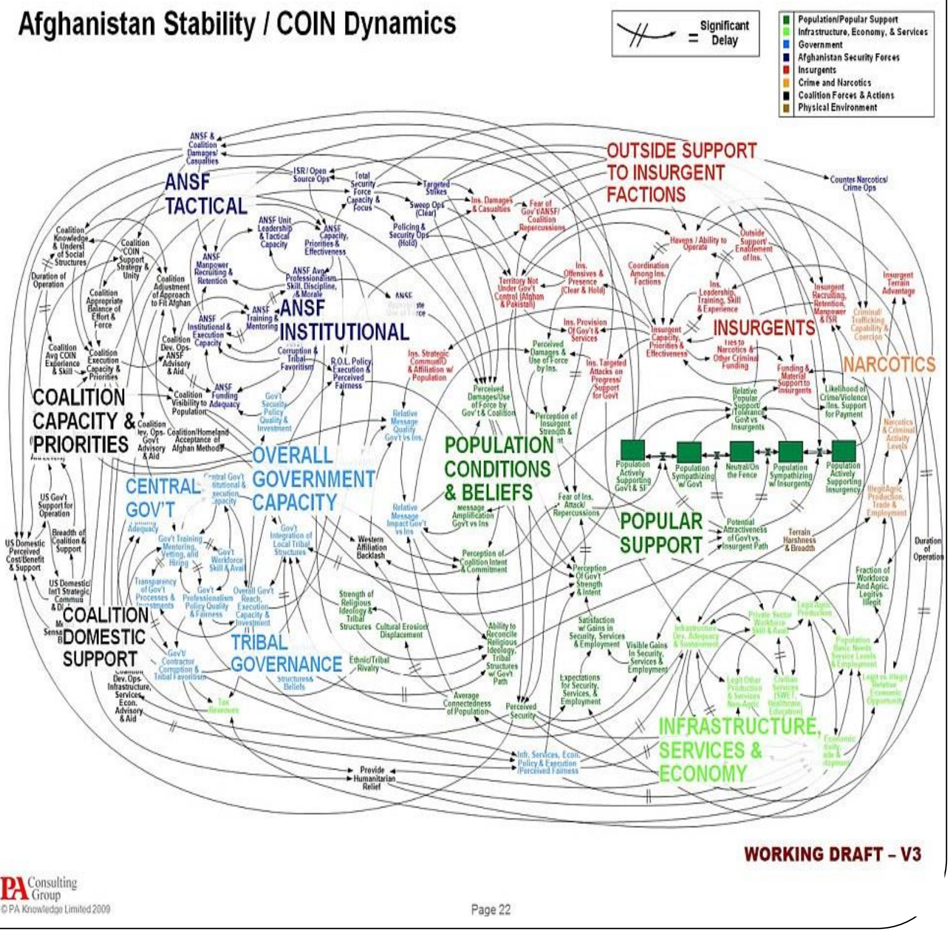
- Short Answer:
  - OOP mastery
  - No more toys
  - Plan, then do (design, then code)
  - Student to Pro

The LONG… answer = Software Development Lifecycle

- The *methodology* for constructing software systems of high quality.
- What properties make a software system high quality?
  - correctness
  - efficiency
  - ease of use (by other programmers in the case of frameworks)
  - reliability/robustness
  - maintainability
  - modifiability
  - extensibility
  - scalability

Klocs (1,000s Source lines of code)

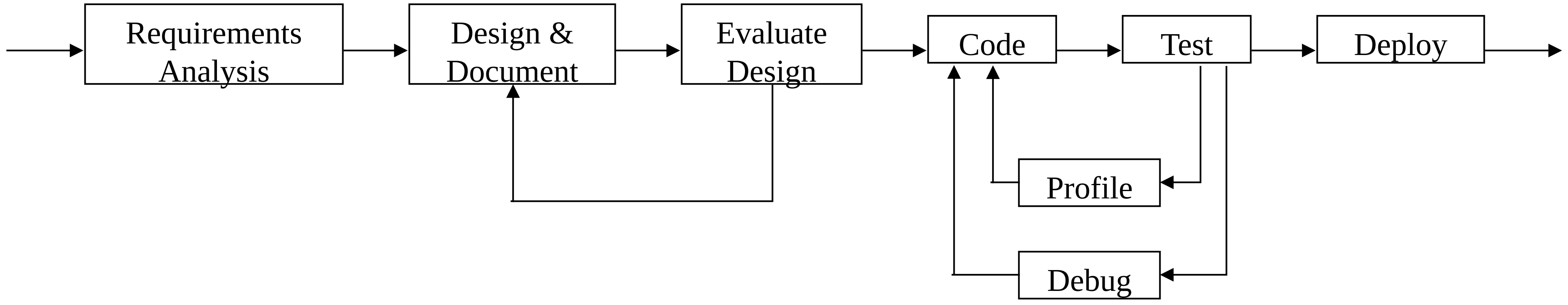
- As programs get larger, these goals become much more difficult to achieve. Why?
  - program complexity
  - team complexity



Afghanistan Stability / COIN Dynamics
= Significant Delay
Population/Popular Support
Infrastructure, Economy, & Services
Government
Afghanistan Security Forces
Insurgents
Crime and Narcotics
Coalition Forces & Actions
Physical Environment
ANSF TACTICAL
ANSF INSTITUTIONAL
OUTSIDE SUPPORT TO INSURGENT FACTIONS
INSURGENTS
NARCOTICS
COALITION CAPACITY & PRIORITIES
OVERALL GOVERNMENT CAPACITY
CENTRAL GOV'T
POPULATION CONDITIONS & BELIEFS
POPULAR SUPPORT
COALITION DOMESTIC SUPPORT
TRIBAL GOVERNANCE
INFRASTRUCTURE, SERVICES & ECONOMY
Provide Humanitarian Relief
WORKING DRAFT – V3
PA Consulting Group
© PA Knowledge Limited 2009
Page 22

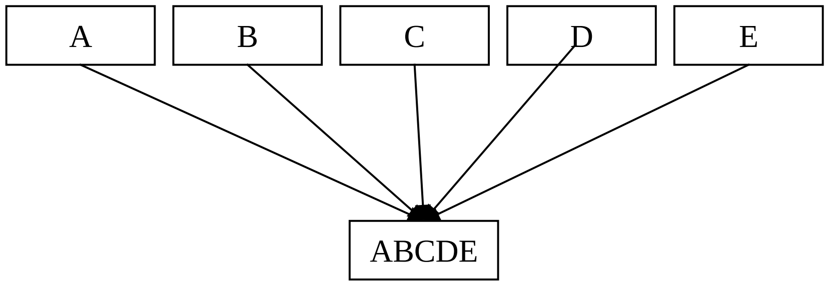
Software Development Lifecycle

- As programs get larger, these become much more difficult to achieve.
  - program complexity
  - team complexity (more people are involved)
- **How can these properties be achieved?**
  - By using well proven, established processes
    - preferably while taking advantage of good tools



Software Development Lifecycle

- Other Steps to Consider:
  - Software Integration:
    - Done in large projects
    - Combine developed software into a cohesive unit



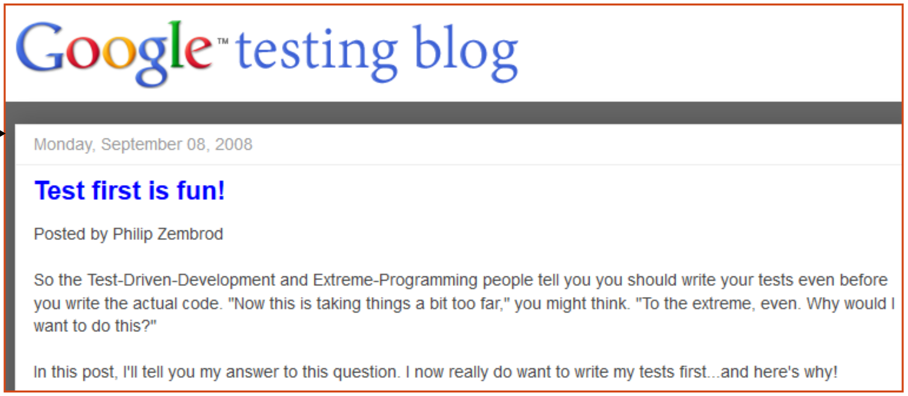
  - Software Maintenance:
    - Follows Deployment
    - Monitoring and Updating deployed software

Software maintenance

- Follows Deployment
- Monitoring and Updating deployed software

Updated Software Development Lifecycle

- Waterfall Model:
  - Many variations:



Google testing blog

Monday, September 08, 2008

Test first is fun!

Posted by Philip Zembrod

So the Test-Driven-Development and Extreme-Programming people tell you you should write your tests even before you write the actual code. "Now this is taking things a bit too far," you might think. "To the extreme, even. Why would I want to do this?"

In this post, I'll tell you my answer to this question. I now really do want to write my tests first...and here's why!

1. Requirements Analysis
2. Design
3. Evaluate Design
4. Code
5. Test, Debug, & Profile Components
6. Integrate
7. Test, Debug, & Profile Whole Program
8. Deploy
9. Maintain

- Note that there are many variations

Software Development Lifecycle

- There are other models:
  - Agile Programming
  - Extreme Programming
  - Pair Programming
  - Etc.
- We'll talk more about these at the end of the semester

Software Development Lifecycle

- Software Jobs:
  - Programmers = the most time consuming job in software development
  - Additionaly, you should know ***how to design, program, test, debug software***
    - Other types of jobs beside programmers:
      - Designer
      - Database, Network, Security Administrator
      - Tester
      - Project Leader
      - Manager
      - Documentation developer / Instructor
      - **Founder/CEO**
  - NOTE: designers & programmers on a project may not be the same people!

Design, then develop

- We will design all classes before coding
  - not easy to do
  - UML is used for software design
- You cannot design a system unless you really understand the necessary technology
  - designs cannot be created without testing
  - trying out different small-scale examples (HWs 2 & 3)

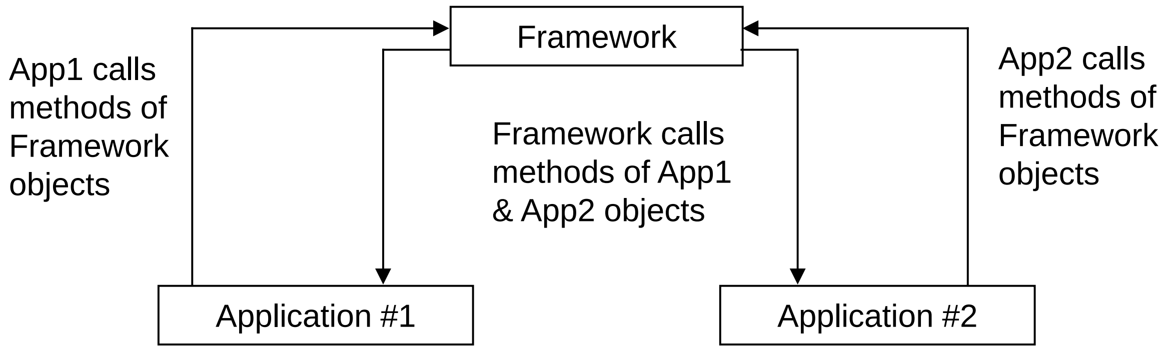
The HW Plan

- HW 1 – Build Process
- HW 2 – Technology Ramp-Up – GUIs, Events & XML
- HW 3 – Technology Ramp-Up – 2D Graphics & Threads
- HW 4 - UML Design
- HW 5 – Implementation Stage #1
- HW 6 – Implementation Stage #2
- Final Project – Completed Work

What is a framework?

- More than just one class, but many classes working together
- Groups of classes that form the basis for customization
  - cooperating classes for a particular technology
    - ex: multimedia, the Web, databases, etc.
  - used to build new applications & other frameworks
  - Example: what's Java's application framework for the domain of GUI development?

- Applications Using Frameworks:


Framework
App1 calls methods of Framework objects
Framework calls methods of App1 & App2 objects
App2 calls methods of Framework objects
Application #1
Application #2

Common Java Frameworks

1. Spring MVC
2. Struts
3. Apache Axis
4. Apache Xerces
5. Hibernate
6. JDOM
7. Java Applet
8. Apache Velocity
9. Apache ORO
10. JAX-WS

Framework developers must explain how to use them all together properly:

- API

- Tutorials

Frameworks are open source as well as for purchase.

Think about how you might create a framework.

Gaining the ability to make frameworks will make you a powerful developer.

Source: VeraCode Blog: http://www.veracode.com/blog/2012/01/top-ten-java-frameworks-observed-in-customer-applications

Lots and lots of frameworks

Google App Engine

jQuery write less, do more.

AngularJS by Google

enchant.js engine

Bootstrap

unity

Framework documentation

- Frameworks are many classes working together
- Framework developers must explain how to use them
  - API
  - Commenting
  - Tutorials
- Frameworks can be open source, free, proprietary

Who cares?

- We are constantly using Java frameworks
- Think about how you might create a framework
- Learning how and why to ***make*** frameworks will make you a powerful developer