

ITEC 120

Lecture 10
Software development

Review

- Questions
- Lego Robots
 - Capabilities
 - How it relates to programming

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Objectives

- Analyze how to build Software
- What works
- What doesn't
- How to improve chance of success

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How to?

- Take a minute or two and think of the process you use to write the programs for homework assignments
 - Steps involved
 - When are you finished
- Share with class

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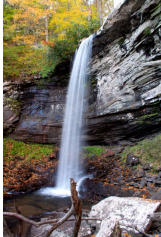
Stages

*Works in school
*Doesn't work in real world

- Classic

```

    graph TD
      Understand --> Plan
      Plan --> Build
      Build --> Test
      Test --> Submit
  
```



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Understand

- What problem are you trying to solve?
- Reading the problem
- Repeat the problem
 - 1-2 sentence description of problem
 - Elevator speech
- Answer questions about problem

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Understand

- Problem decomposition
- Don't understand something?
 - Break it apart into smaller pieces until you get something
- Put pieces together

```

    graph LR
      Input --> Break[Break apart with substring]
      Break --> Change[Change variable types]
      Change --> Formula
      Formula --> Output
  
```

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Plan

- Translate problem into the pieces of code you will need (don't write code though)

Input	Break apart with substring	Change variable types	Formula
Scanner String variables	substring indexOf	Double.valueOf	Hp - dmg + dmg*arm

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Plan + Learn

- If you don't know how to do X...
- Write a small program that does only X
- Figure out how it works
- Then go back and look at the plan and adjust

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Check

- Verify
 - After planning your solution, does it match the problem you are trying to solve?

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Timing

- How much time do you spend planning and designing a solution?
- How much time do you think it takes to understand / plan a 15,000 LOC iPhone/iPod application
- I don't leave understand/plan until I see how the entire system works in my head

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Build

- Write your code in jEdit / whatever editor you prefer
- Shouldn't have to think too much while doing it
- Follow the plan
- Estimate how long it will take you to do X

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Build

- Strategies
 - What are your strategies for writing code?
 - Write small chunks
 - Imagine input given to what you have written
 - Keep track of where you are

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Test

- Does what you built actually work?
- How do you test your programs?
- What happens if you do X
- More on this on Friday

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Cost

- What is the cost when you find a bug in
 - Understanding the problem
 - Planning the solution
 - Building the solution
 - Testing the solution

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Industry

- Mythical Man Month
 - No silver bullet
 - Can't speed it up by adding bodies
- Software fails
- Planning fails
- Find small pieces and make them work

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Methods

- Waterfall
- Spiral
- Evolutionary
- eXtreme Programming
- Scumm

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Teams

- Rarely work in a vacuum or alone
- What is your role?
 - Talk to the customer
 - Designs the solution
 - Manages other coders
 - Builds software
 - Tests software

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Maintenance

- In the real world, software needs checkups
- Familiar with codebase
- Adding features to X
- Hard because hands are tied

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Summary

- Process of building software
- Not easy
- Several places to go wrong

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