

# Structured Systems Analysis and Design & Project

(Week 1, Session 1) Monsoon 2018

# SSAD - What can we expect?

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- ▶ Creating user-friendly software
  - ▶ Frontend: GUI / Web
  - ▶ Backend: Databases + Network
- ▶ By the end of this course you
  - ▶ should be able to create reasonably large, maintainable software using software engineering principles, processes and more...
  - ▶ Should be able to communicate with each other and others
  - ▶ Should be able to document



# What do these have in common?

- They all need a *lot* of software to operate.

How much?

- The Boeing 777 flies with over 4,000,000 lines of code on-board.
- A typical top-level game has between 1 and 2 M SLOC (source lines of code)

- These are **huge** software systems that can not be thought of one line or class at a time. The software engineer needs to think about the design at different levels—from a line of code up to the entire system.



Software engineering design

$$1 \text{ SLOC/min/SE} * 60 \text{ min/hr} * 40 \text{ hrs/wk} = 2,400 \text{ SLOC/wk/SE}$$

$$2,400 \text{ SLOC/wk/SE} * 50 \text{ wk/year} = 120,000 \text{ SLOC/year/SE}$$

$$2 * 10^6 \text{ SLOC} / 1.2 * 10^5 \text{ SLOC/yr/SE} = \sim 17 \text{ SEs for the year}$$



Teamwork



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What is your e-mail address?

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Error 404

Do you have an Amazon.com password?

☐ No, I am a new customer.

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One large ecommerce application. Complex!!!

One small software upgrade. Easy.

One 90 minute outage. Priceless?

This is a financial-critical system.

This team needed a better understanding of the process for developing a financial-critical system, and how to bring an upgrade

Software development process

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The software engineer's daily job is to answer questions about the software system.

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- ▶ How can I help the customer? What is required to solve the customer's problem?
- ▶ How will the user interact with the system?
- ▶ What operating system, language, hardware is going to be used?
- ▶ What is the overall software system structure and how do different components interact with each other?
- ▶ What code do I have to write?
- ▶ How do I organize my team so we are effective?
- ▶ Can we finish the game in time to have it on the shelves for Christmas shopping?



To answer those questions, the software engineer must work with many people.

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- ▶ Customers asking for the system
- ▶ People who will use the system
- ▶ Domain experts: banking, avionics, security, medical, scientists, ...
- ▶ Engineers from other engineering disciplines
- ▶ Most closely with the other software engineers on the project

Communication



Yes, software engineers get their hands dirty writing programs using the latest technologies and techniques.

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Maintenance  
Agile, SCRUM  
Interaction  
Desktop, embedded, mobile, web-based  
Open source  
Networks  
Extreme programming  
Concurrency  
Teams  
Data flow  
SVN, CVS  
Accessibility  
Computer games  
Testing  
Functions, Methods  
Security  
Websites  
Ruby, PHP  
Web servers  
Graphics  
Hardware  
User-centered  
GUI  
AJAX  
Software architecture  
Meetings  
Linux, .NET, OS X  
SQL  
UML  
Financial systems  
Requirements scenarios  
Databases  
Design patterns  
Java, C++, Python  
Objects, classes  
Software models

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# Attitude

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- ▶ To be confident of setting up your own computer, automate routine tasks, and be skilful with several aspect of software development (most of the time).
- ▶ You can't say – I can't do it because no one taught me how.
  - ▶ Useful [links](#) to online reading material will be provided
  - ▶ You are expected to do most of the work
    - ▶ Because *doing is learning*.
- ▶ The more you struggle now, the easier it will be later.





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Keep checking regularly...

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