System Analysis and Design

# Course Introduction


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# About Me

- I am Vahid Rahimian
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# What is this course about?

- We will learn how to produce software
  - It is not just coding, or data structure or algorithms
- A Software which is
  - a scalable product
  - matching requirements of different stakeholders
  - developed and maintained by a large team
  - over a long period of time
  - with guaranteed quality
  - while released continuously fast.

# Why is this course important?

- Basics for many important topics:
  - Methodologies
  - Agile Software Development
  - Software Evolution
  - Design Patterns
  - Software Testing
  - Verification
  - Software Project Management
  - …

# Software Evolution Over Time

- As internet systems have evolved, there is a huge increase in
  - Number of Users
  - Number of Developers
  - Lines of Code
  - Number of Commits
  - Number of Deployments

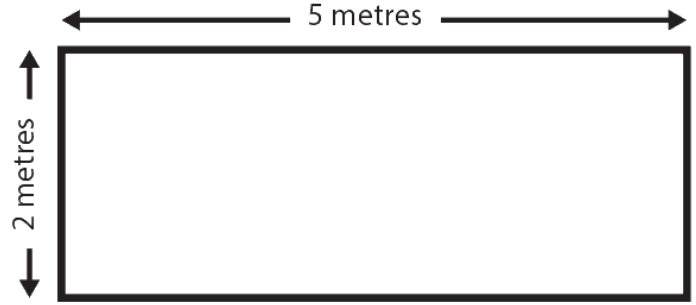
# Let's Talk Some Numbers

- Google.com
  - 3.5 billion searches per day [1]
- Netflix
  - 110 million streaming subscribers [2]
- Amazon
  - 5 million deployments per month [3]
- Google
  - 2 billion lines of code [4]

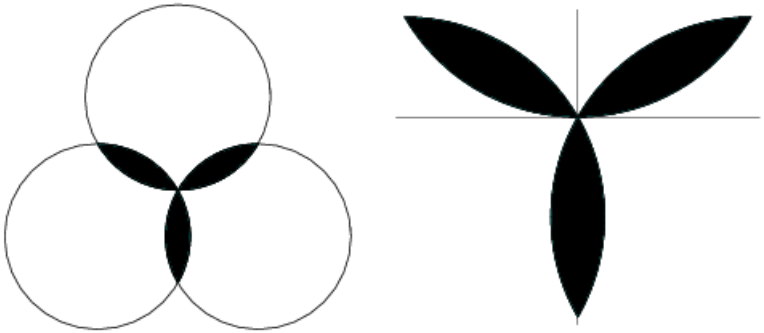

[1]. http://www.internetlivestats.com/google-search-statistics/
[2]. https://www.statista.com/statistics/250934/quarterly-number-of-netflix-streaming-subscribers-worldwide/
[3]. http://www.allthingsdistributed.com/2014/11/apollo-amazon-deployment-engine.html
[4]. https://www.wired.com/2015/09/google-2-billion-lines-codeand-one-place/

# Why Analysis & Design?

- Assume that you are an “area computer”
- Compute the area of the following figure

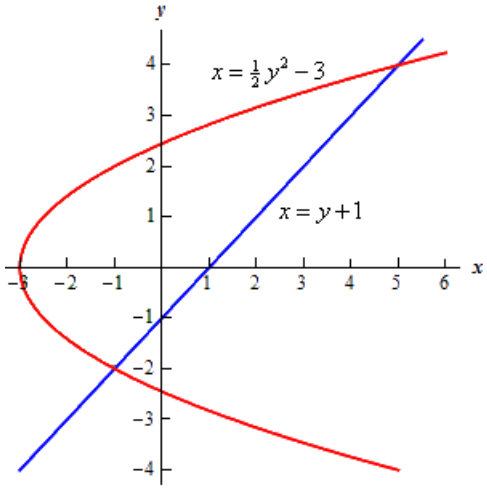



- Another computation



# Why Analysis & Design?

- So, why do we need integration in mathematics?



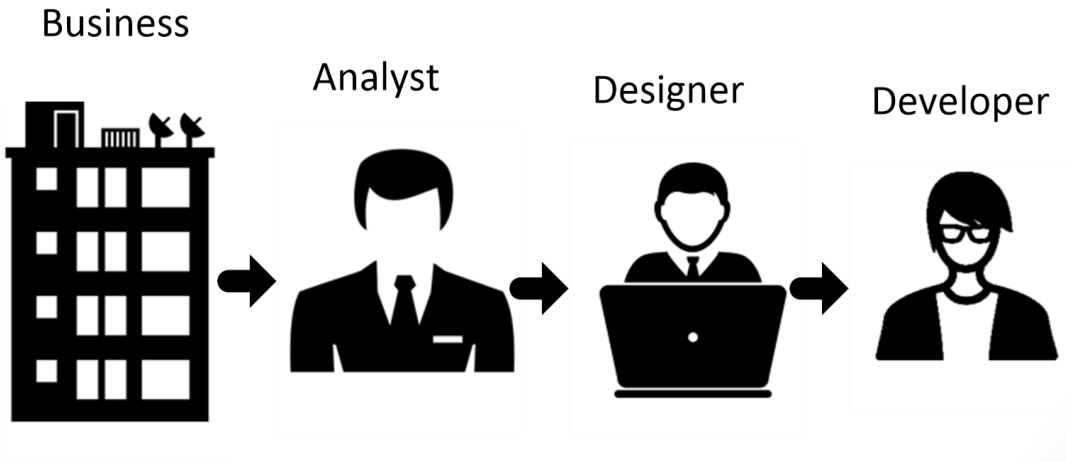

- Integration is time consuming, but it works 99% of time

# Why Analysis & Design?

- If your job is area computing, you should learn integration
- To learn integration:
  - Some models: what is dx? what does integral sign mean?
  - Some processes: what is the procedure?
  - Some patterns: integration by parts
- Your job is building software ☺

# Why Analysis & Design?

- Building software for businesses needs an ability to analyze their systems to propose solutions for their problems
- Building software for analysists' business solutions need an ability to design a software solution



# How This Course Will Help

- What is ‘progress’ in your career?
  - More responsibility / independence
  - Doing critical tasks
  - Going up in software production cycle
  - Managing a big project
  - Building a business
- Better for people with some industrial work experience
- Hard-Skill vs Soft-Skill

# Deep into the topic

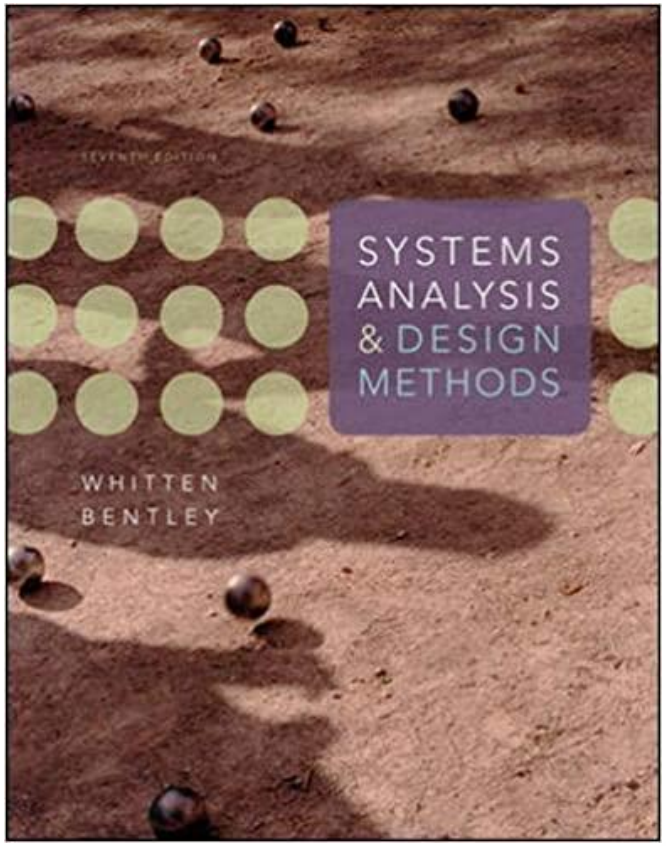
- Build a photo-sharing system, like Instagram
- What to do?
  - :)

# Text Book

- **Systems Analysis and Design Methods**

  7th Edition (2007)

  (Irwin/McGraw Hill)



# Additional References


- K.S. Rubin, Essential Scrum: A practical guide to the most popular Agile process. Addison-Wesley, 2012.
- M. Fowler, C. Kobryn, and K. Scott, UML distilled: A brief guide to the standard object modeling language, 3rd ed. Addison-Wesley Professional, 2004.
- D.J. Duffy, Domain architectures: Models and architectures for UML applications. John Wiley & Sons, 2004.
- L. Bass, I. Weber, and L. Zhu, DevOps: A software architect's perspective. Addison-Wesley Professional, 2015.
- M. Fowler, Patterns of enterprise application architecture. Addison-Wesley Longman Publishing, 2002.

# Policy

- Assignments + Projects: 8+ Points
- Midtem Exam: 5 Points
- Final Exam: 7 Points

- Student’s presence in classes is mandatory
  - Only 4 absences allowed
  - When you are in the class, be in the class

- We may have un-informed quizzes

# Policy

- Do NOT cheat
  - In exams, assignments, project, …
- It is OK to ask questions ANY time
  - But better to ask in breaking points

# Course Outline

- General Practices:
  - Project Management
  - Feasibility Study
- Analysis Practices:
  - Requirement Engineering
  - Process Analysis
  - ER Analysis

# Course Outline

- Design Practices:
  - Software Architecture
  - UX/UI Design
  - Data Design
  - API Design
- Other:
  - DevOps
  - OOA Analysis / Design

# What you should know

- A (Modeling) Language
  - UML
- A Methodology
  - Scrum

# Any Questions?

*Don’t let the noise of others’ opinions drown out your own inner voice*

*Steve Jobs, Stanford University speech, 2005*