Introduction to CS356

CS356 Object-Oriented Design and Programming
http://cs356.yusun.io
September 26, 2014

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CAL POLY POMONA

About Myself

PhD in Software Engineering

- Ph.D. Research in Software Engineering & Software Modeling
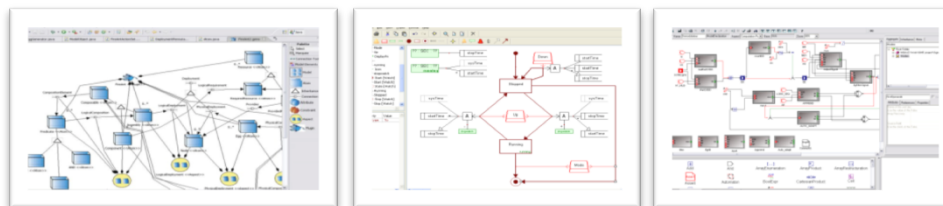- University of Alabama at Birmingham

Problem Domains

Represent the System
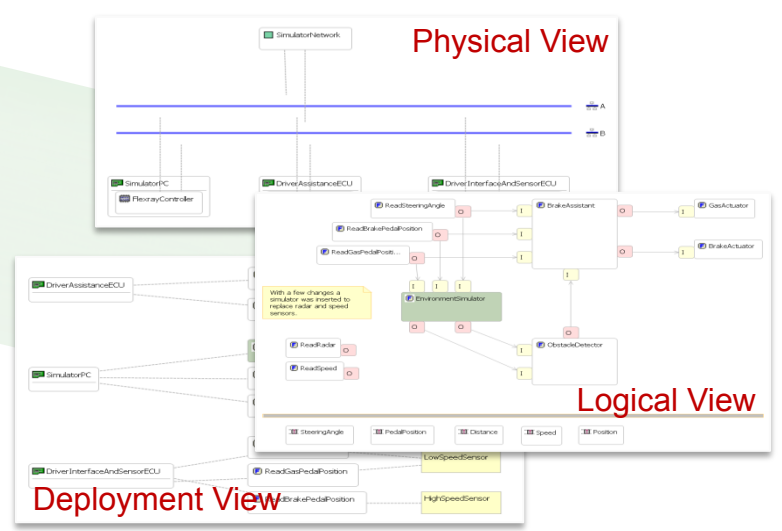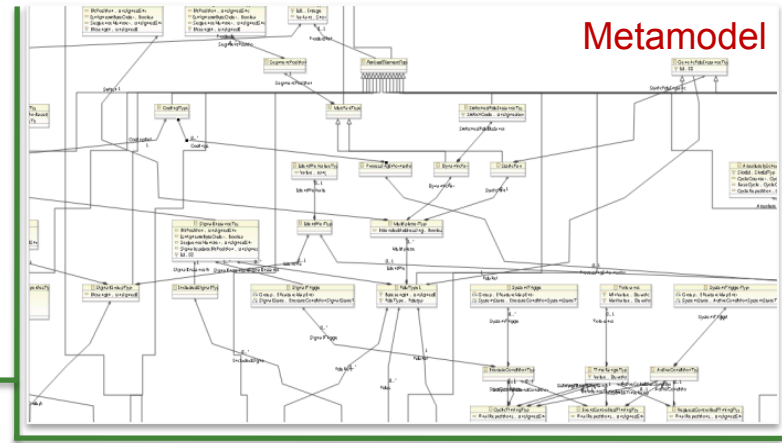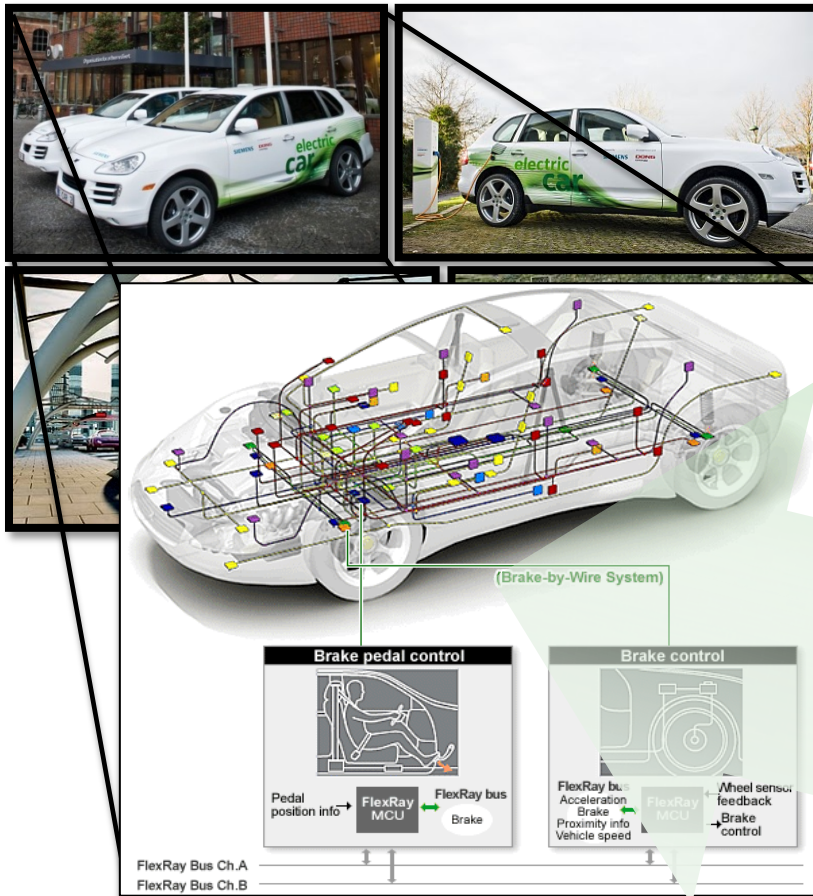
Domain-Specific Modeling Languages
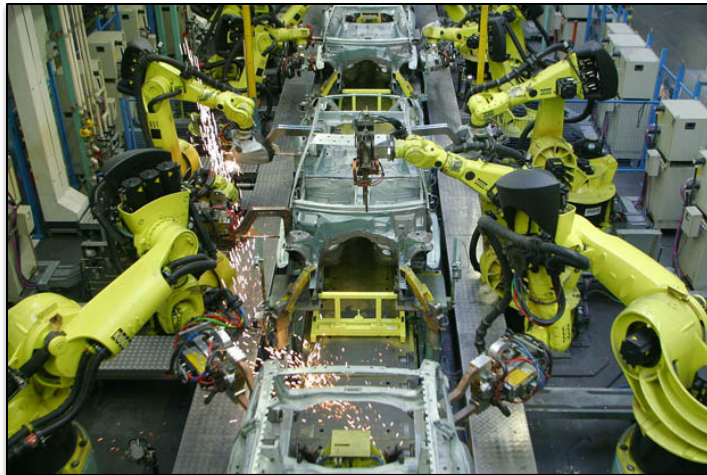
Generate the Code

Low-Level Software Artifacts

...

Embedded Software Systems

Metamodel

Physical View

Logical View

Deployment View

(Brake-by-Wire System)

Brake pedal control

Brake control

Pedal position info → FlexRay MCU ⇄ FlexRay bus → Brake

FlexRay bus: Acceleration Brake Proximity info Vehicle speed ⇄ FlexRay MCU → Wheel sensor feedback → Brake control

FlexRay Bus Ch.A
FlexRay Bus Ch.B

Embedded Software Systems ⬡ Mercedes-Benz

Control Code

Schedule Planning & Analysis

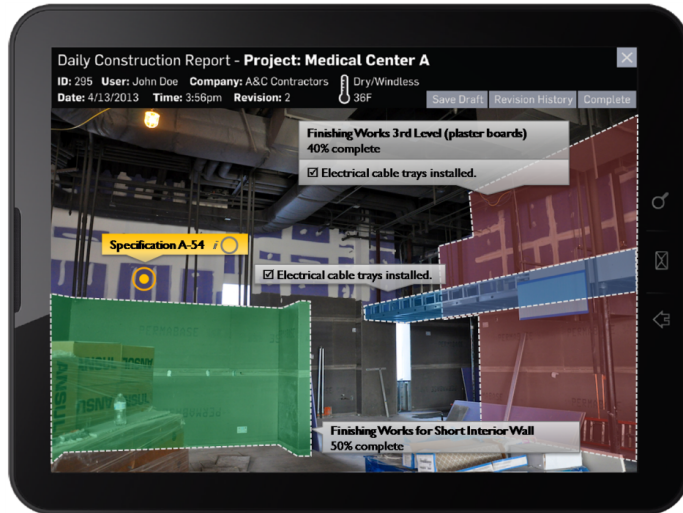Models

Software Engineer in Amazon

amazon

- Amazon Silk
- Cloud-Based Web Browser for Amazon Kindle Devices

Cloud-based Mobile Software Systems

Director of Engineering in Startup
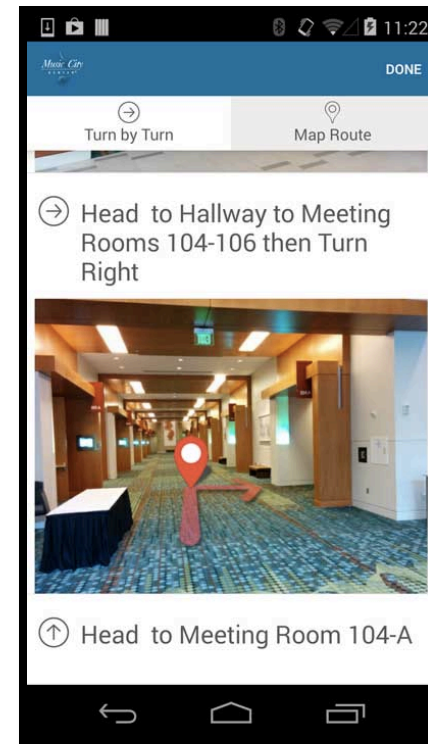
Mobile Augmented Reality

· For more info and demos: http://www.cloudpoint.io/

Post-doc in "ISIS"

- **Institute for Software Integrated Systems (ISIS)**
- **Vanderbilt University**

- Indoor Navigation System
- http://zii.io

Post-doc in "ISIS"

This is a terrible time to be named ISIS

By Alexandra Petri September 3

Whom am I denouncing, again? (Mandel Ngan/Agence France-Presse via Getty)

Isis mobile payments company rebrands to SoftCard

BUSINESS & ECONOMY - SEPTEMBER 3, 2014 4:03AM

· Software Integrated Systems Institute (SISI)

·IS^2

· The Institute for Software Integrated Systems (Thesis)

·Institute of Software (IS)

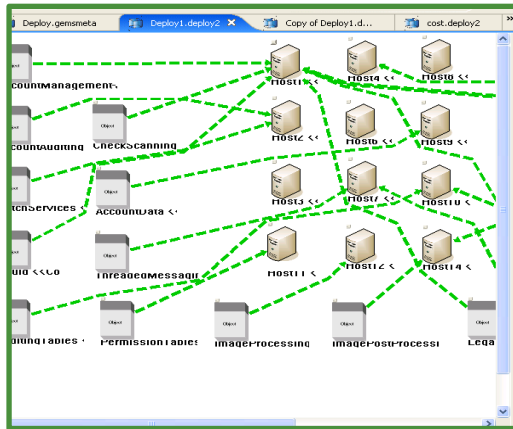# Summary of My Research Area
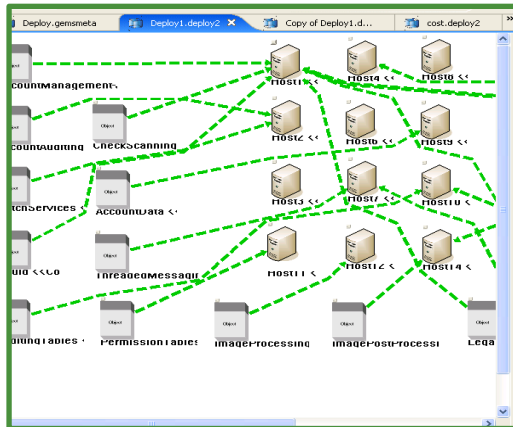
Software Engineering -
Model-Driven Engineering/
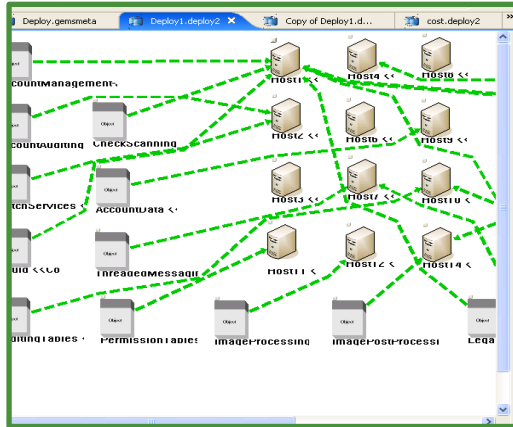End-User Programming

Summary of My Research Area

Software Engineering -
Model-Driven Engineering/
End-User Programming

Cloud Computing –
Optimization/Application

Summary of My Research Area

Software Engineering -
Model-Driven Engineering/
End-User Programming

Cloud Computing –
Optimization/Application

Mobile Computing –
Augmented Reality/
Any Cool Applications
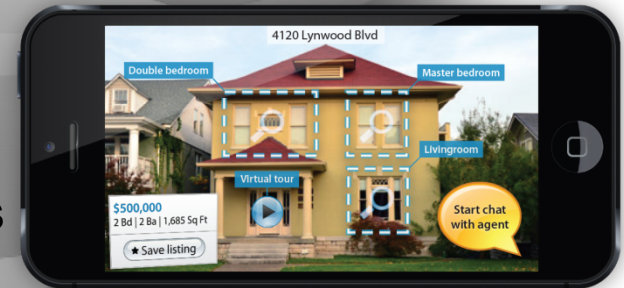
Summary of My Research Area

Cloud Computing – Optimization/Application
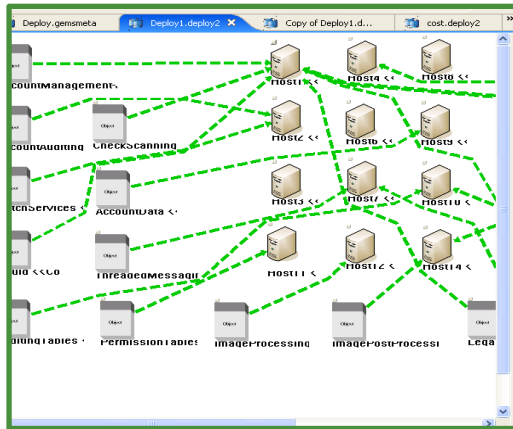
Software Engineering - Model-Driven Engineering/ End-User Programming

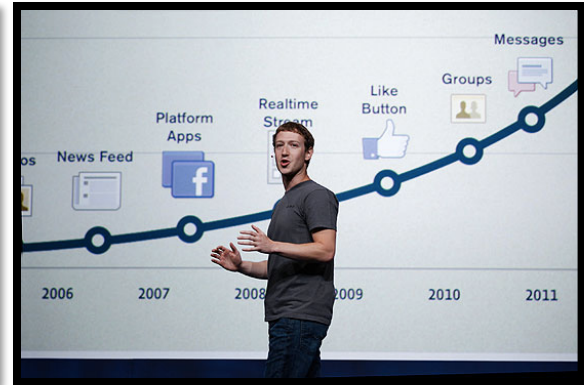Mobile Computing – Augmented Reality/ Any Cool Applications

My work focuses on using **modeling**, **optimization**, **automation & cloud services** to deal with the complexity of domain-specific problems.

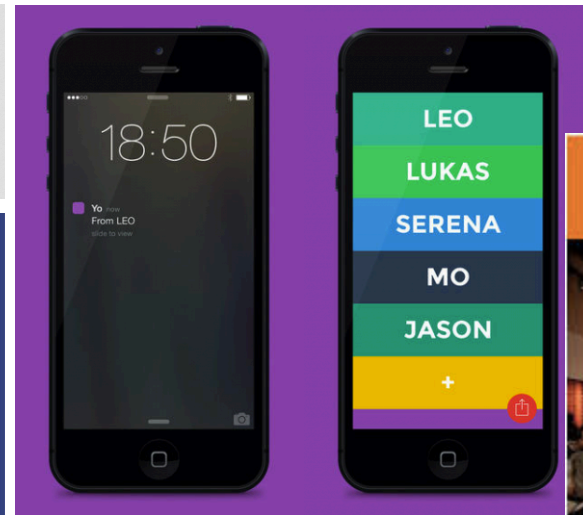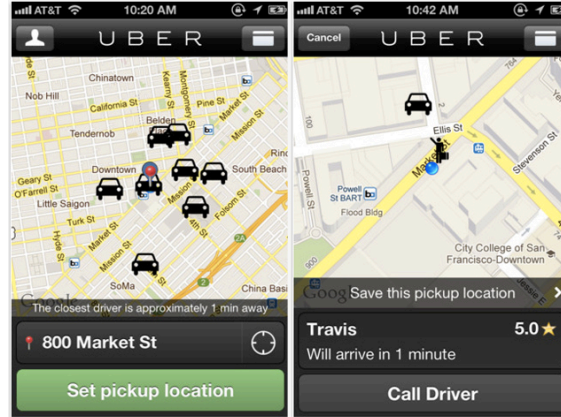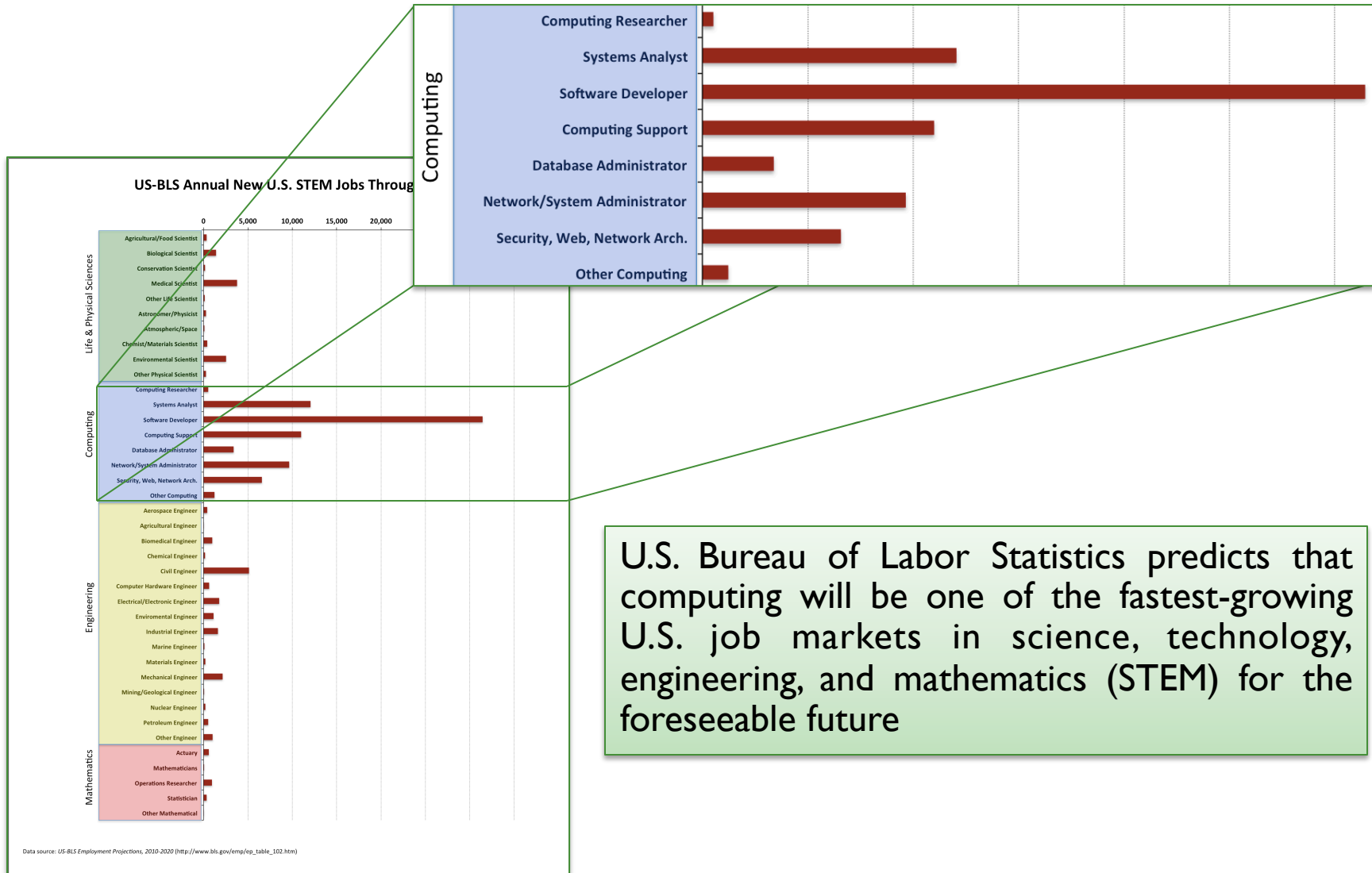# Fast Growing Software Industry

Fast Growing Software Industry

· NASDAQ Composite

Fast Growing Software Industry - Startups

Software Job Market

Computing

Computing Researcher	
Systems Analyst	
Software Developer	
Computing Support	
Database Administrator	
Network/System Administrator	
Security, Web, Network Arch.	
Other Computing	

US-BLS Annual New U.S. STEM Jobs Throug...

Data source: *US-BLS Employment Projections, 2010-2020 (http://www.bls.gov/emp/ep_table_102.htm)*
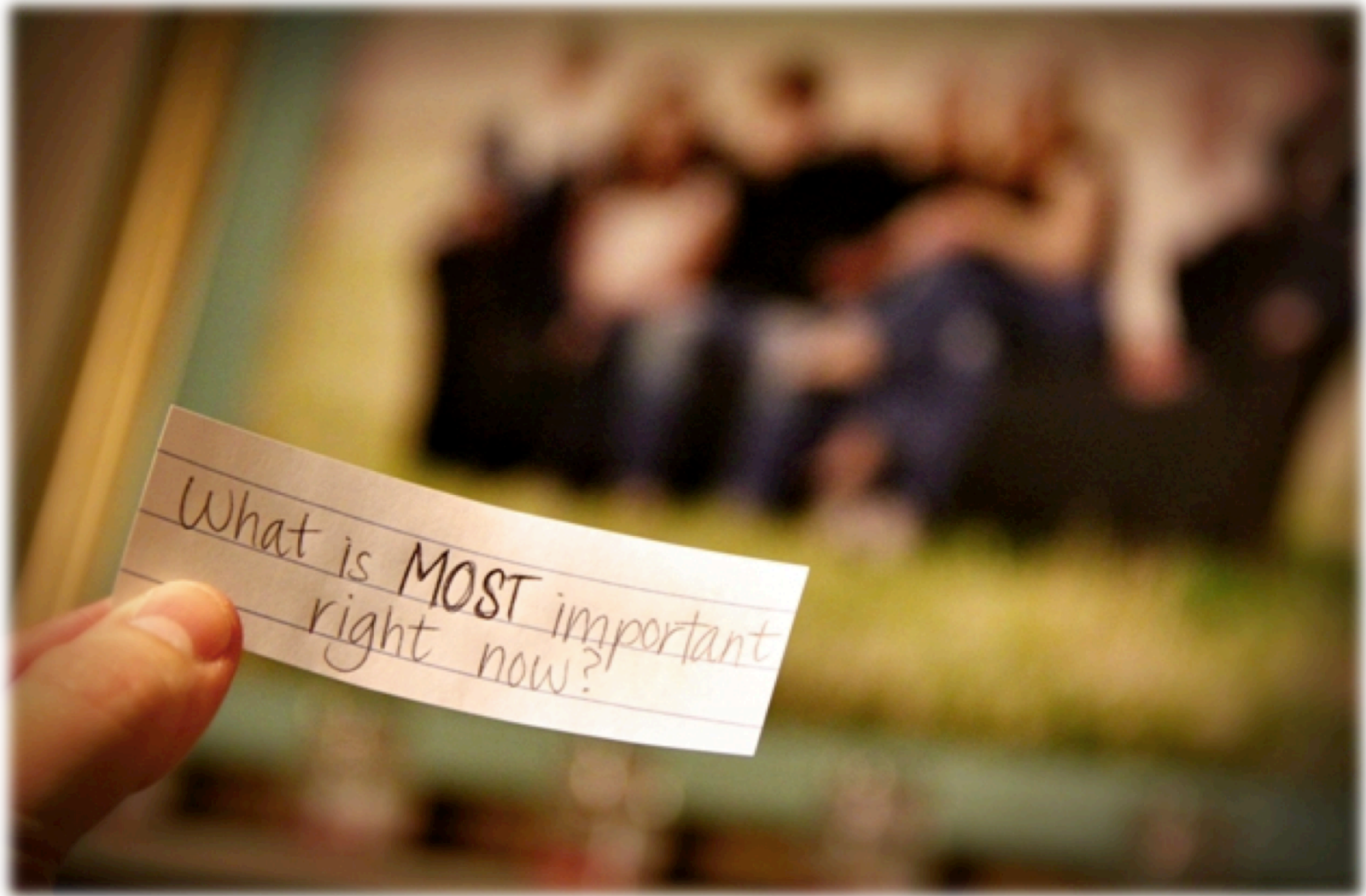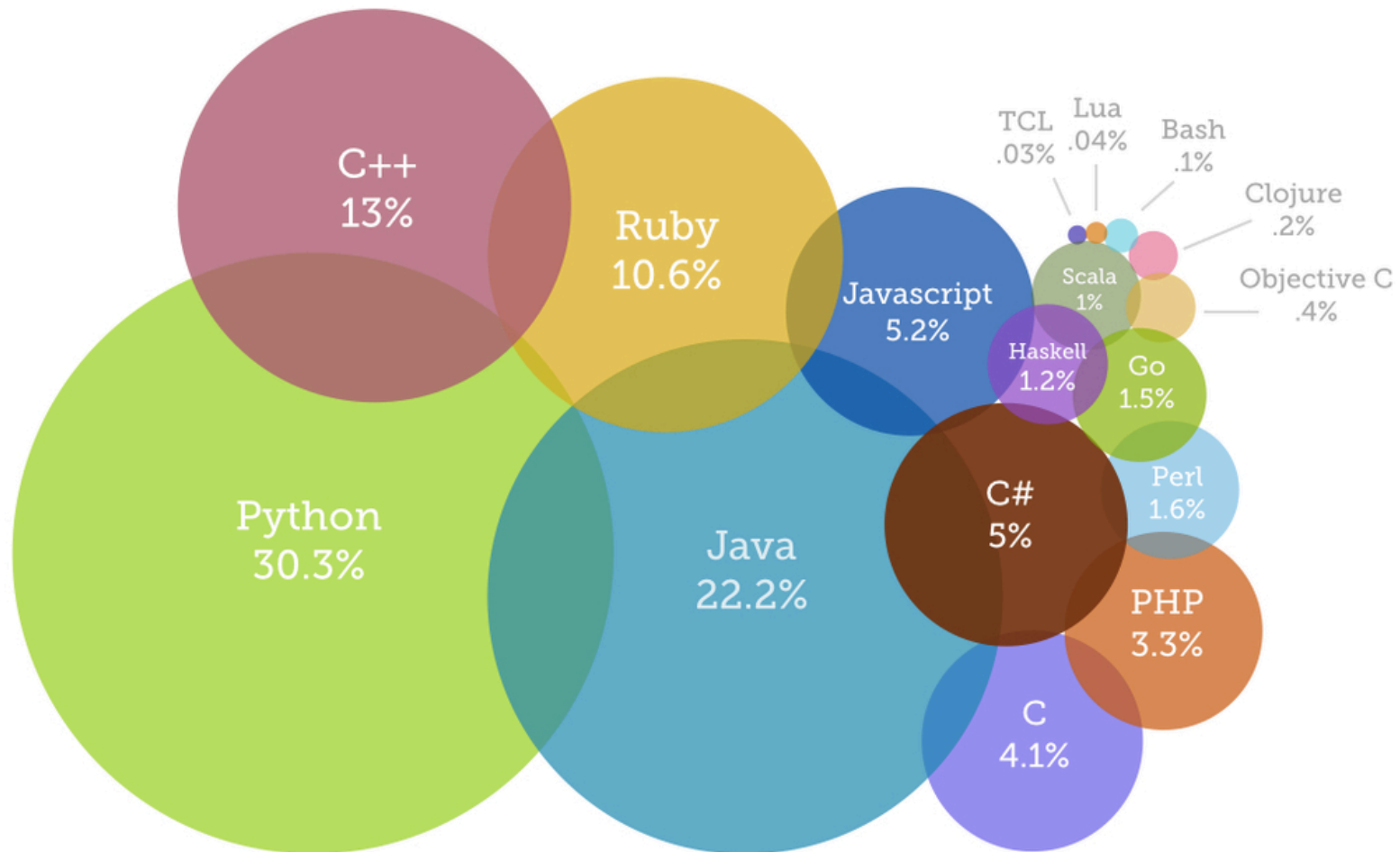
U.S. Bureau of Labor Statistics predicts that computing will be one of the fastest-growing U.S. job markets in science, technology, engineering, and mathematics (STEM) for the foreseeable future

Why is OOPD important?

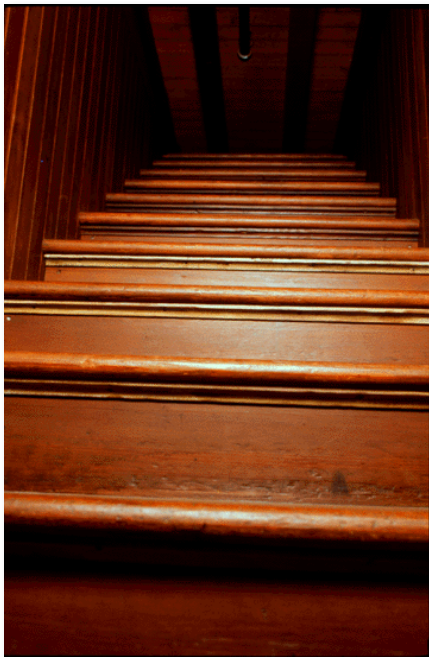# Programming Languages Statistics

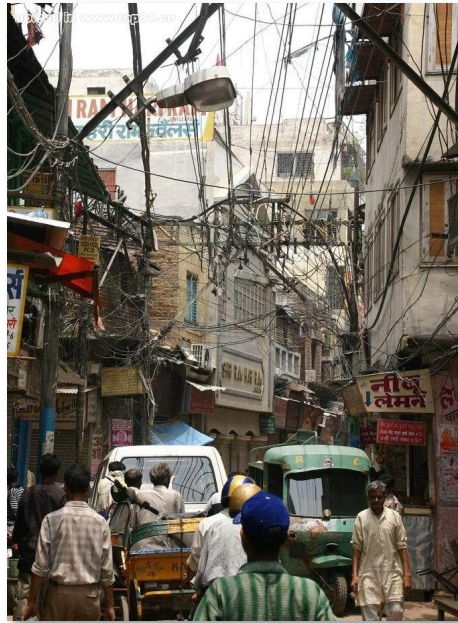Most Popular Coding Languages of 2014

Poor Design Leads to Ad-hoc Structures

- ◆ Winchester Mystery House
  - ◆ The result of continuous building without any thought toward design
- ◆ Result:
  - ◆ Stairs leading to ceiling
  - ◆ Windows in the middle of room
  - ◆ Doors opening to wall
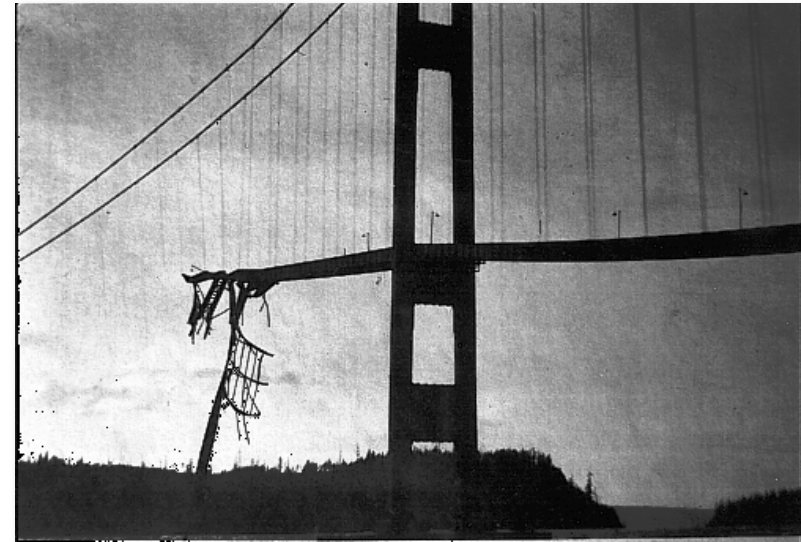 - ◆ Non-intuitive floor plan

Poor Design Leads to Ad-hoc Structures

- ◆ The result of continuous building without any thought toward design
- ◆ Problems:
  - ◆ How would you maintain this if something went wrong?
  - ◆ How would you extend this to add more connections or features?

Poor Design Has Disastrous Consequences

Tacoma Narrows Bridge (July 1, 1940)

Aerodynamic phenomena in suspension bridges were not adequately understood in the profession nor had they been addressed in this design. New research was necessary to understand and predict these forces.

The remains, located on the bottom of the Sound, are a permanent record of man's capacity to build structures without fully understanding the implications of the design.
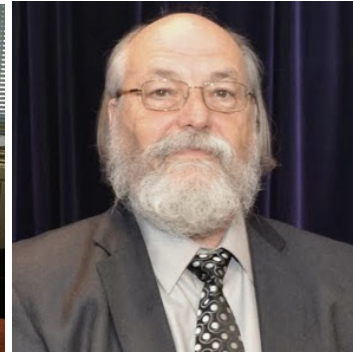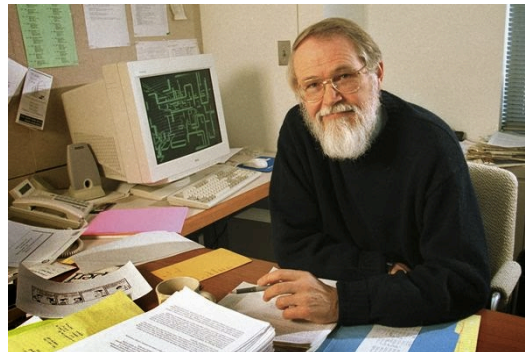
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Poor Design Has Disastrous Consequences

$7 Billion Fire Works – One Bug, One Crash

On 4 June 1996, the maiden flight of the Ariane 5 launcher ended in a failure. Only about 40 seconds after initiation of the flight sequence, at an altitude of about 3700 m, the launcher veered off its flight path, broke up and exploded.

The failure of the Ariane 501 was caused by the complete loss of guidance and attitude information 37 seconds after start of the main engine ignition sequence (30 seconds after lift-off). This loss of information was due to specification and design errors in the software of the inertial reference system.
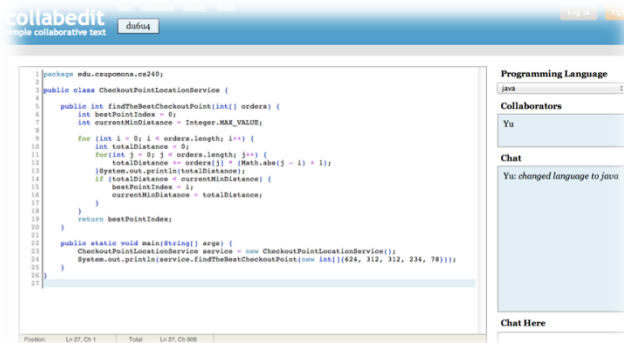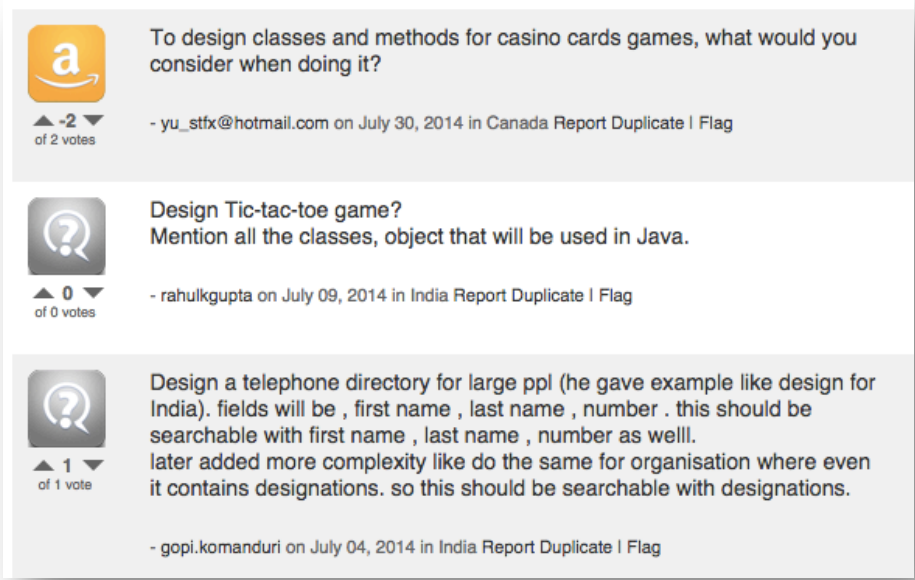
Differentiate Great Programmers

· The top 10 greatest programmers in the world of all time
· http://www.thecrazyprogrammer.com/2014/02/the-top-10-greatest-programmers-in-the-world-of-all-time.html
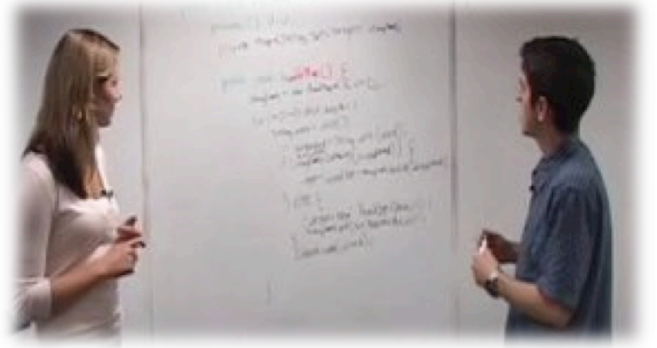
Tech Interviews

To design classes and methods for casino cards games, what would you consider when doing it?

▲ -2 ▼
of 2 votes

- yu_stfx@hotmail.com on July 30, 2014 in Canada Report Duplicate | Flag

Design Tic-tac-toe game?
Mention all the classes, object that will be used in Java.

▲ 0 ▼
of 0 votes

- rahulkgupta on July 09, 2014 in India Report Duplicate | Flag

Design a telephone directory for large ppl (he gave example like design for India). fields will be , first name , last name , number . this should be searchable with first name , last name , number as welll.
later added more complexity like do the same for organisation where even it contains designations. so this should be searchable with designations.

▲ 1 ▼
of 1 vote

- gopi.komanduri on July 04, 2014 in India Report Duplicate | Flag

· For sample tech interview questions on OOPD
· http://www.careercup.com/page?pid=object-oriented-design-interview-questions

About CS356

Course Goals

- Change the way you write code and build software
  - Make designs that are extensible, scalable and reusable
  - Write clean, efficient, extensible and reusable code

- Help you get *Software Engineer* jobs
  - Learn the right skills
  - Gain practical experiences

TODO

- Practice Java
- Setup GitHub Account
    - https://www.github.com
- Learn Git/Github
    - https://help.github.com/