

Introduction to CS480

CS480 Software Engineering

Yu Sun, Ph.D.

<http://yusun.io>

yusun@cpp.edu



CAL POLY POMONA

About Myself



Year
4

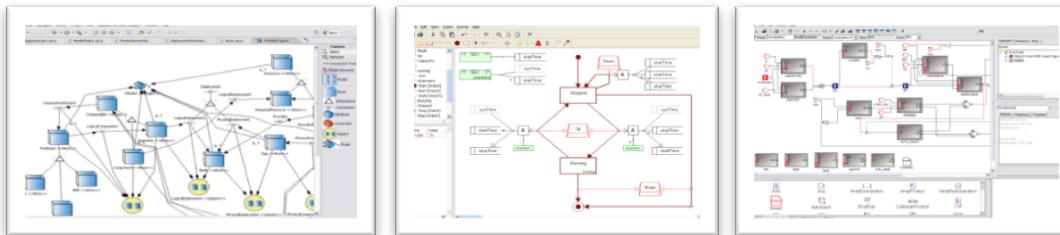
Research in Software Engineering

Problem Domains



Represent the System

Domain-Specific Modeling Languages



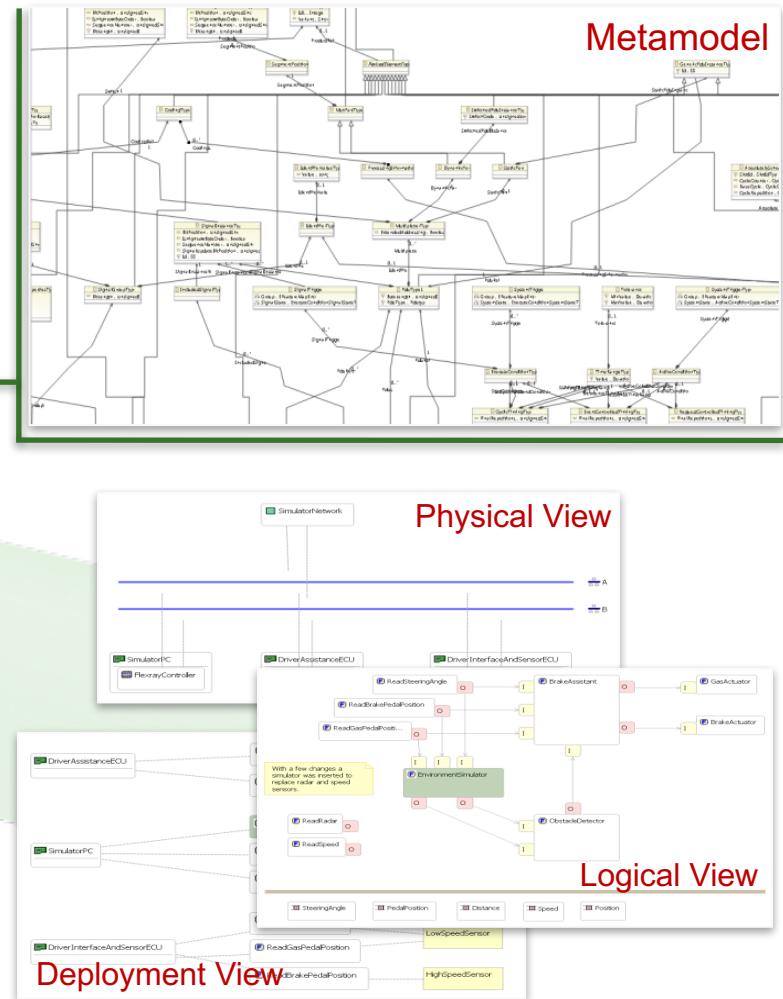
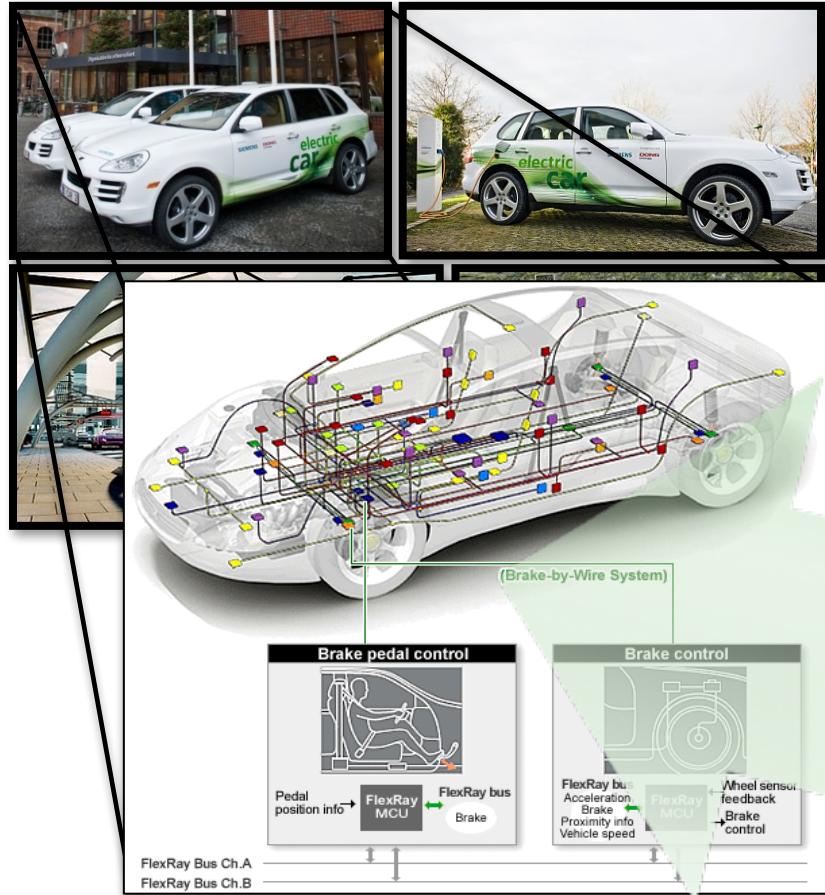
Generate the Code

Low-Level Software Artifacts



Embedded Software Systems

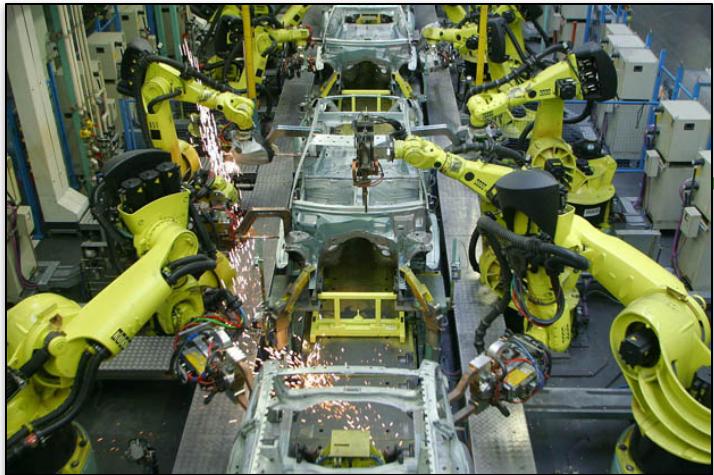
SIEMENS



Embedded Software Systems

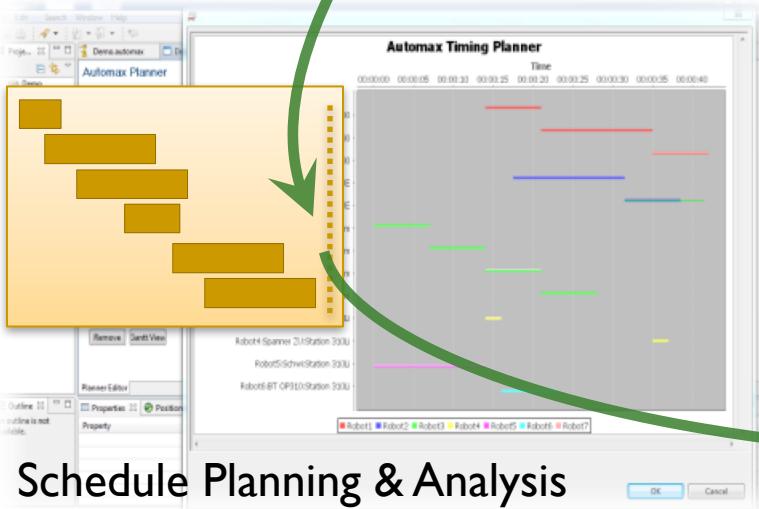


Mercedes-Benz

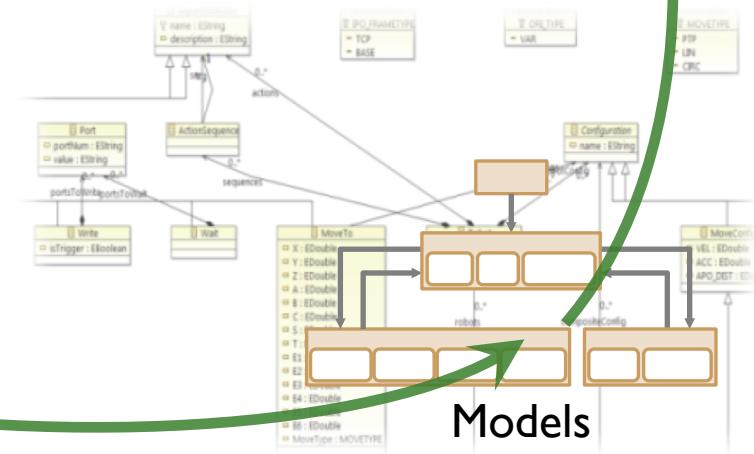


Control Code

```
;FOLD PTP LHP110 CONT Vel= 100 % PDA133 Tool[9]:GR01_HC_M Base[0];%(PE)R 5.2.34,%MKUKATPBASIS,%COUT, %P 1:PTP, 2:LHP110
;ENDSTART = FALSE
;PDA_ACT=PDA133
;PDA_ACT=LHP110
BAS(#PTP_PARAMS,100)
PTE NAME=LHP110
;ENDFOLD
;FOLD : Bauteil Entnommen ST300;%(PE)R 5.2.34,%MKUKATPBASIS,%COUT, %P 1:PTP, 2:LHP110
;ENDFOLD
;FOLD SYN OUT 3250 ;A32501:-IRM Bau
;TRIGGER WHEN DISTANCE>0 DELAY=0 DO
;ENDFOLD
;FOLD : Aussen Bereich ST300;%(PE)R 5.2.34,%MKUKATPBASIS,%COUT, %P 1:PTP, 2:LHP110
;ENDFOLD
;FOLD PTP LHP120 CONT Vel= 100 % PDA133 Tool[9]:GR01_HC_M Base[0];%(PE)R 5.2.34,%MKUKATPBASIS,%COUT, %P 1:PTP, 2:LHP120
;ENDSTART = FALSE
;PDA_ACT=PDA133
;PDA_ACT=LHP120
BAS(#PTP_PARAMS,100)
PTP XLMHP120_C_PTP
;ENDFOLD
;FOLD PTP LHP130 CONT Vel= 100 % PDA133 Tool[9]:GR01_HC_M Base[0];%(PE)R 5.2.34,%MKUKATPBASIS,%COUT, %P 1:PTP, 2:LHP130
;ENDSTART = FALSE
;PDA_ACT=PDA133
;PDA_ACT=LHP130
BAS(#PTP_PARAMS,100)
PTP XLMHP130_C_PTP
;ENDFOLD
```



Schedule Planning & Analysis



Models

Amazon Silk



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



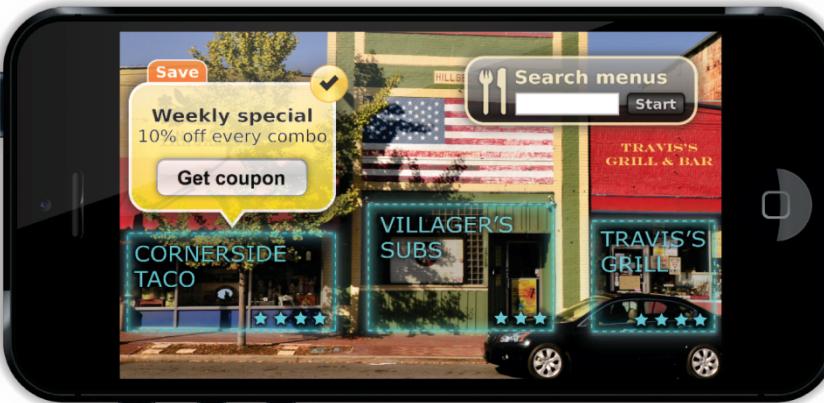
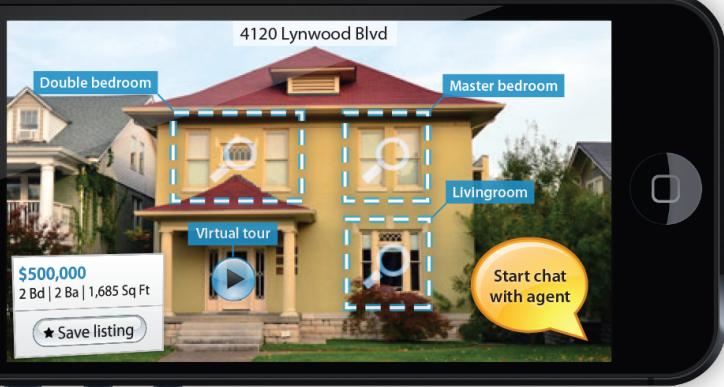
Cloud-based Mobile Software Systems



Mobile Augmented Reality



Mobile Augmented Reality

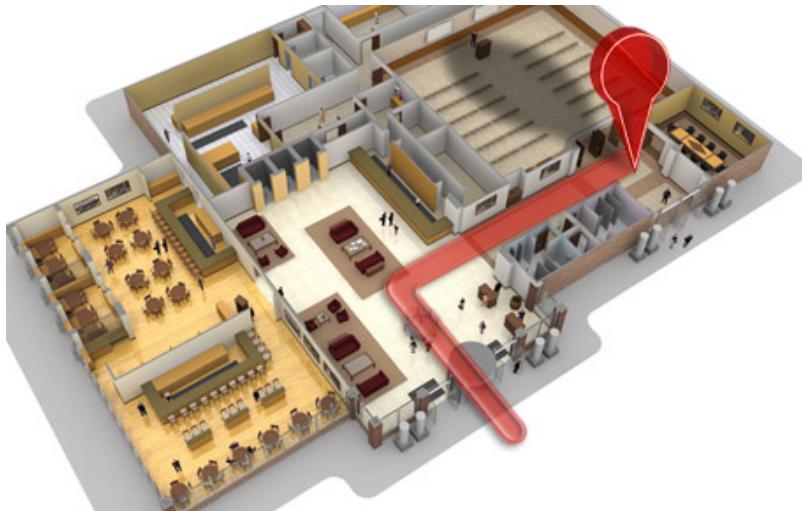
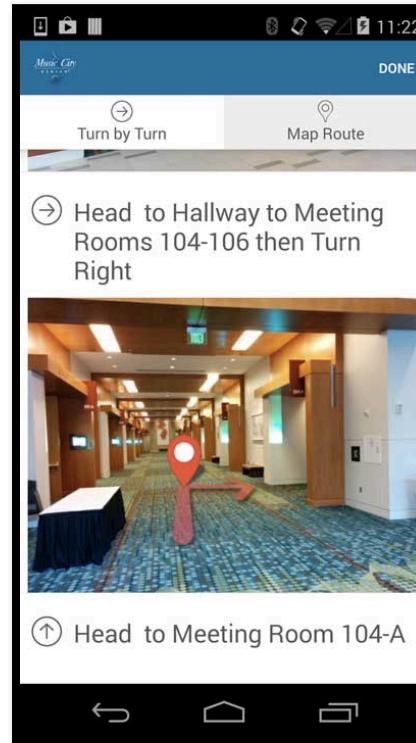


- For more info and demos: <http://www.cloudpoint.io/>

Mobile Security



Ziiio – Indoor Navigation System



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



Ziiio – Indoor Navigation System



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

Ziiio – Indoor Navigation System



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

Ziiio – Indoor Navigation System



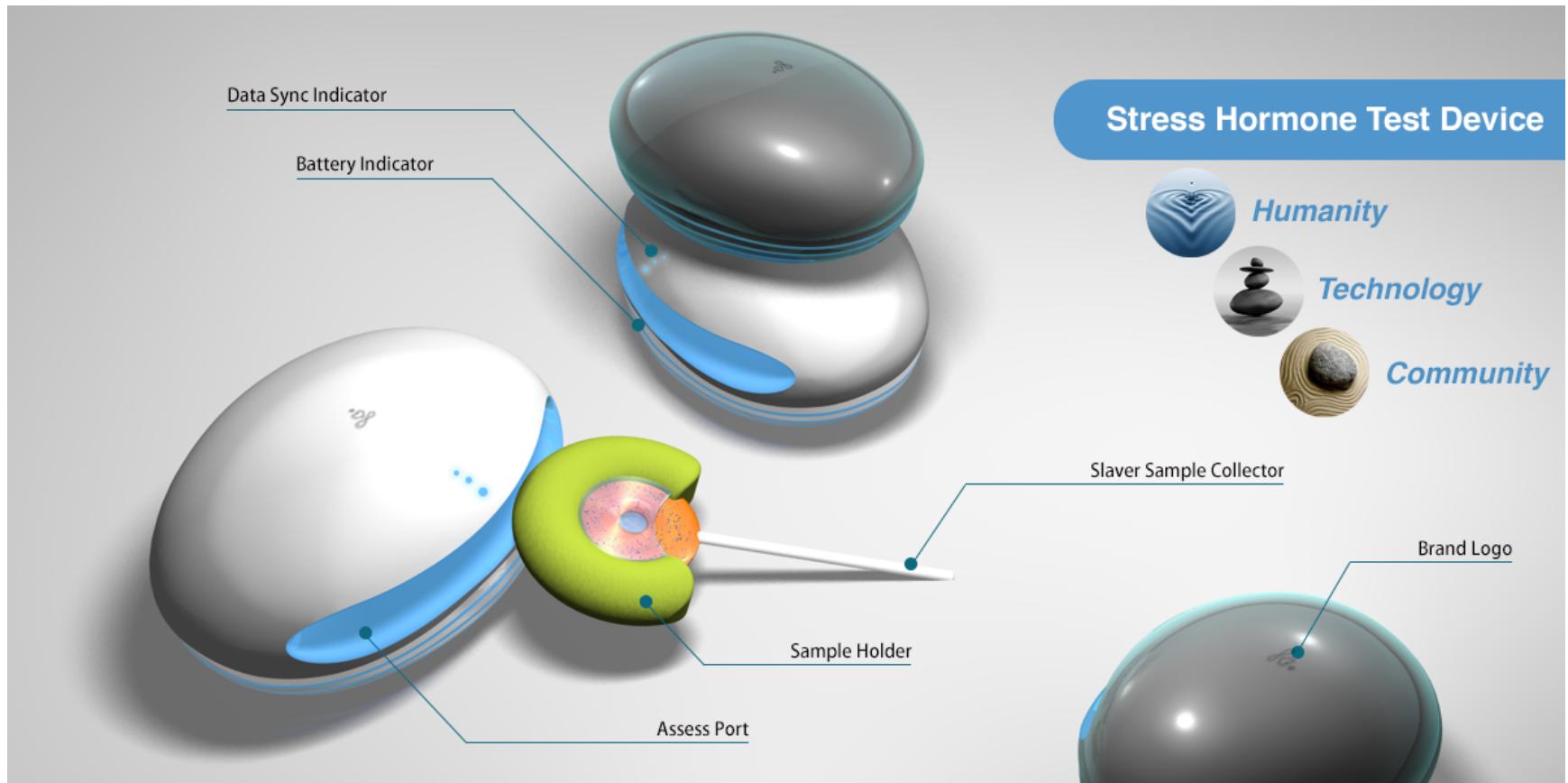
- Indoor Navigation System
- <http://zii.io>

ZynBit – Email Tracking



- <http://zynbit.com>

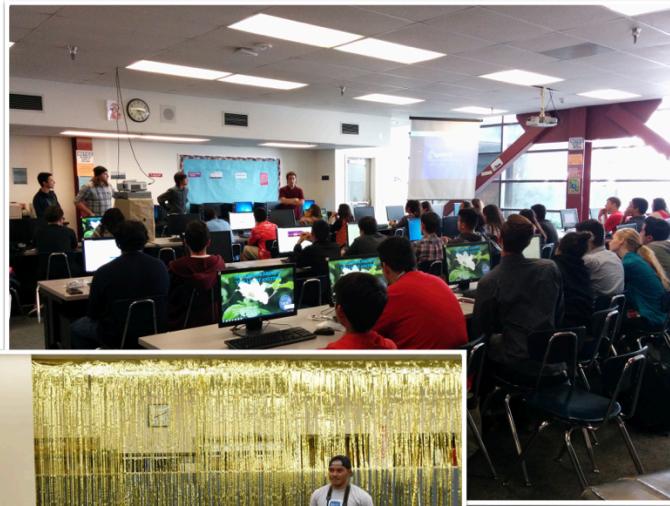
Emolance – Stress Management



- <http://emolance.com>

CS Education for K-12

Google IgniteCS



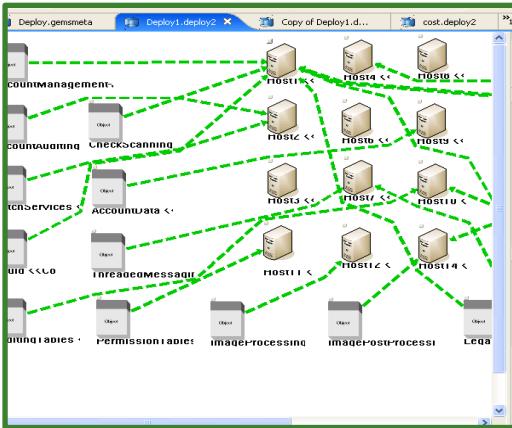
SoftCom Lab

Software Engineering, Cloud and Mobile Computing Lab

<http://softcom.io>

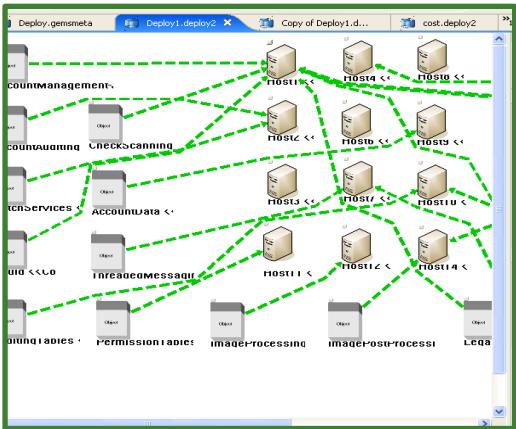


Summary of My Research Area



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

Summary of My Research Area

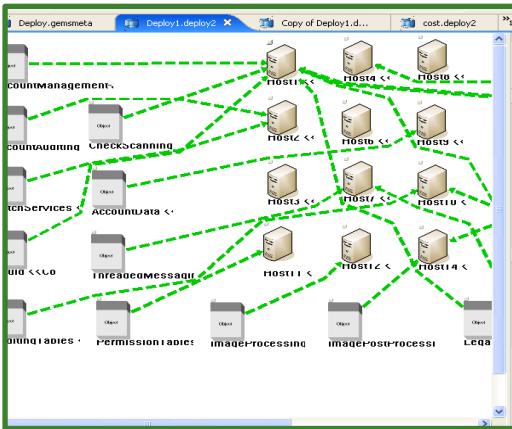


Software Engineering -
Model-Driven Engineering/
End-User Programming

Cloud Computing –
Optimization/Application



Summary of My Research Area



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

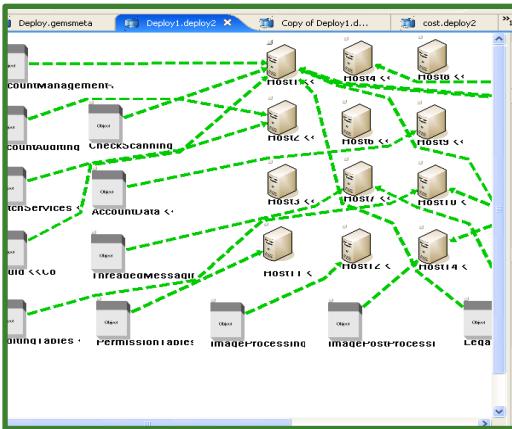
Cloud Computing –
Optimization/Application



Mobile Computing –
Augmented
Reality/Any Cool
Applications



Summary of My Research Area



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

Cloud Computing –
Optimization/Application

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.

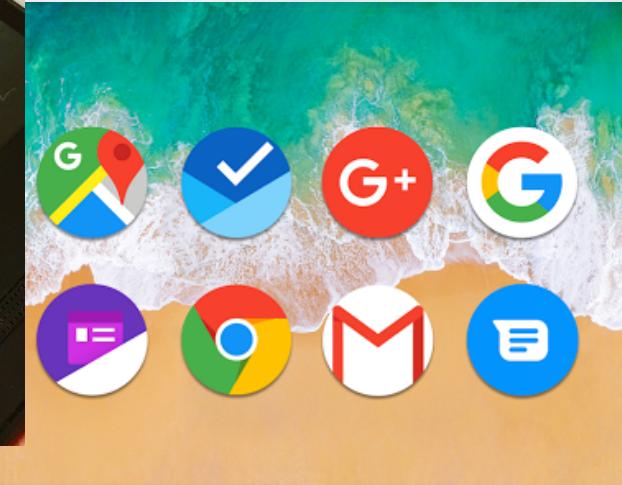
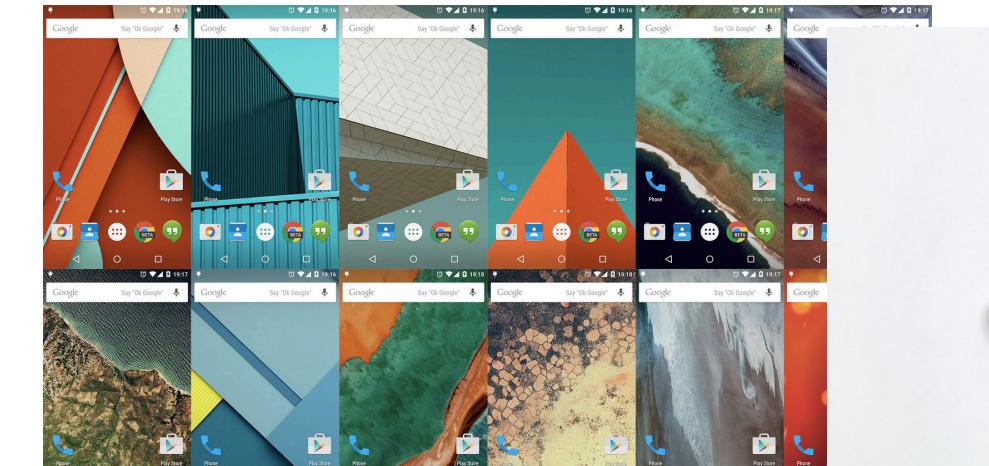
Software Industry in 2017



iPhone 8 & X



Android 8.0 – Oreo & Pixel 2



Amazon Echo & Amazon Go

amazon echo



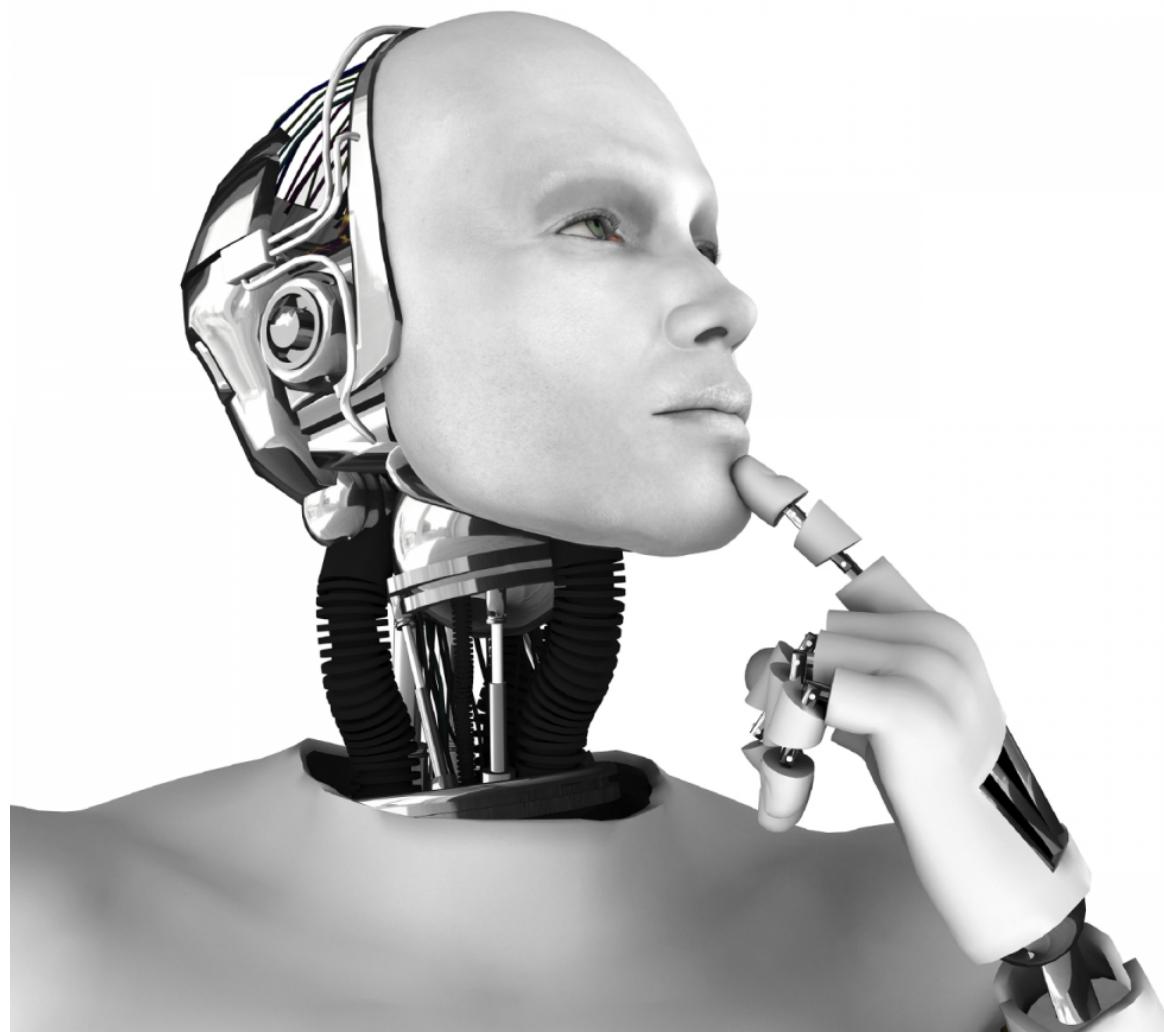
INTRODUCING
amazon go



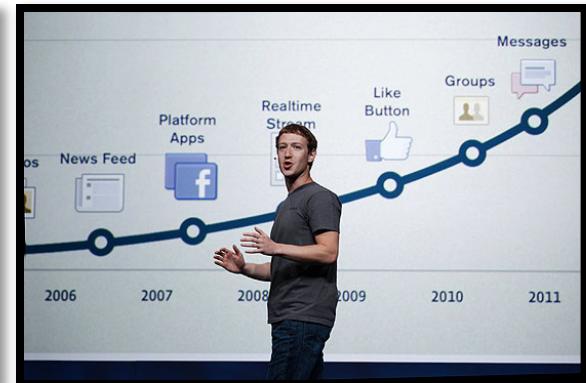
PrimeAir



AI & Machine Learning



Fast Growing Software Industry



- NASDAQ Composite



Fast Growing Software Industry

Zoom: [1d](#) [5d](#) [1m](#) [3m](#) [6m](#) [YTD](#) [1y](#) [5y](#) [10y](#) All

Oct 20, 1995 - Aug 05, 2014 +3334.77 (327.46%)



Zoom: [1d](#) [5d](#) [1m](#) [3m](#) [6m](#) [YTD](#) [1y](#) [5y](#) [10y](#) All

Apr 13, 1995 - Sep 21, 2017 +5604.13 (687.88%)

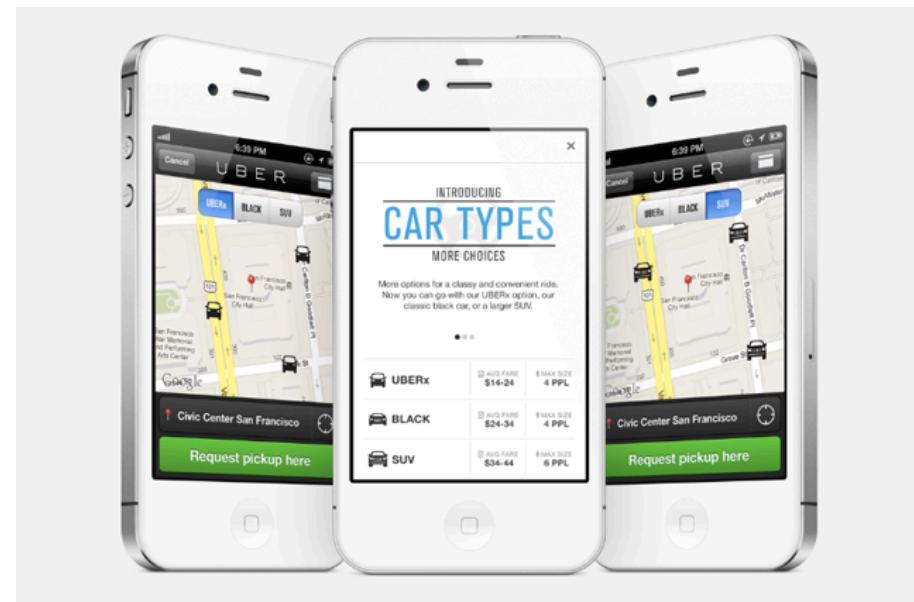


Uber - \$1.2 Billion Raise

BREAKING 3 Big European Oil Companies Get Negative Outlook From S&P Over Price of Crude [TWEET](#)

Uber Valued at \$40 Billion in \$1.2 Billion Equity Funding

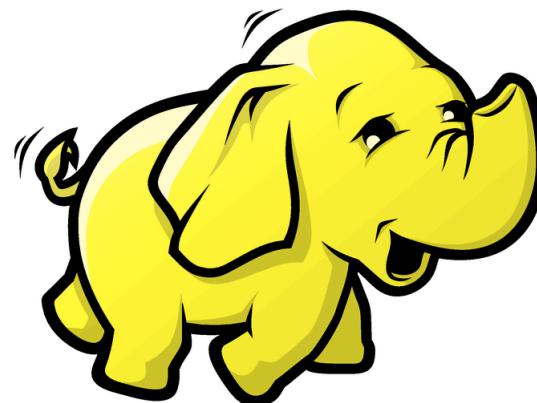
Save + By Serena Saitto | Dec 4, 2014 1:08 PM PT | - [Comments](#) [Email](#) [Print](#)



Cloudera - \$4 Billion Valuation



cloudera®
Ask Bigger Questions



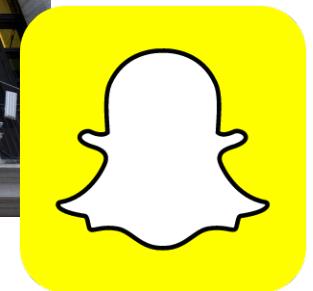
Airbnb - \$10 billion Valuation

The screenshot shows the Airbnb search interface for "Queens, NY". On the left is a map of New York City with numerous pink location pins in the Queens area. To the right is a grid of nine Airbnb listing cards for Queen rentals. Each card includes a thumbnail image, a title, a description, a price per night, and a "Per night" label.

Image	Title	Description	Price (\$)	Comments
	INCREDIBLE Deal in HEART of NYC!!!	Private room Ridgewood, Queens	\$84	48
	Large private bedroom and bath	Private room Astoria, Long Island City	\$95	33
	Affordable, private bedroom for you	Private room Jackson Heights, Queens	\$75	3
	15 MINUTES to TIMES SQUARE	Private room Astoria, Queens	\$65	12



SnapChat IPO



Startup Accelerators



500 startups



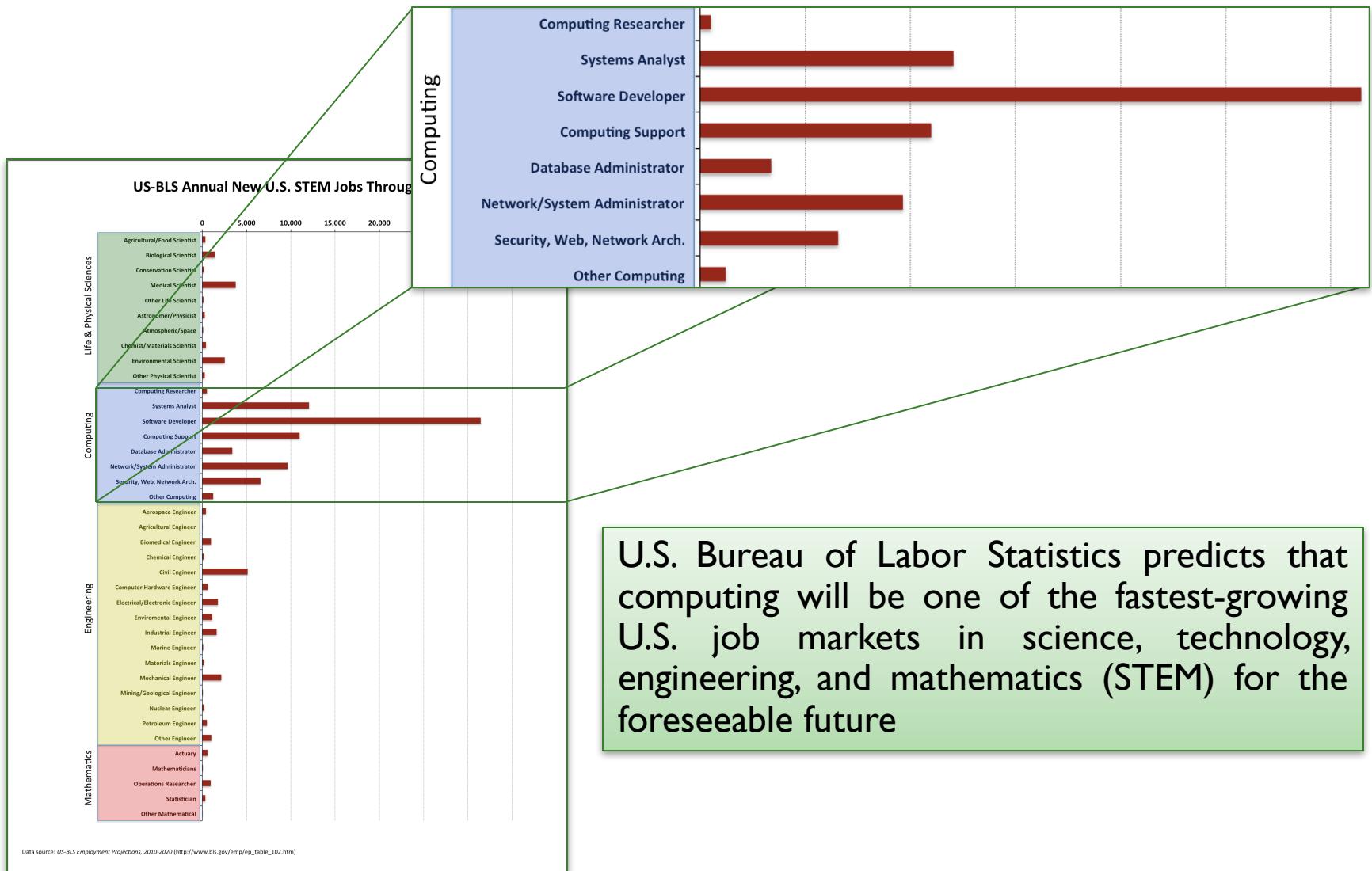
Combinator

Blueprint for Business

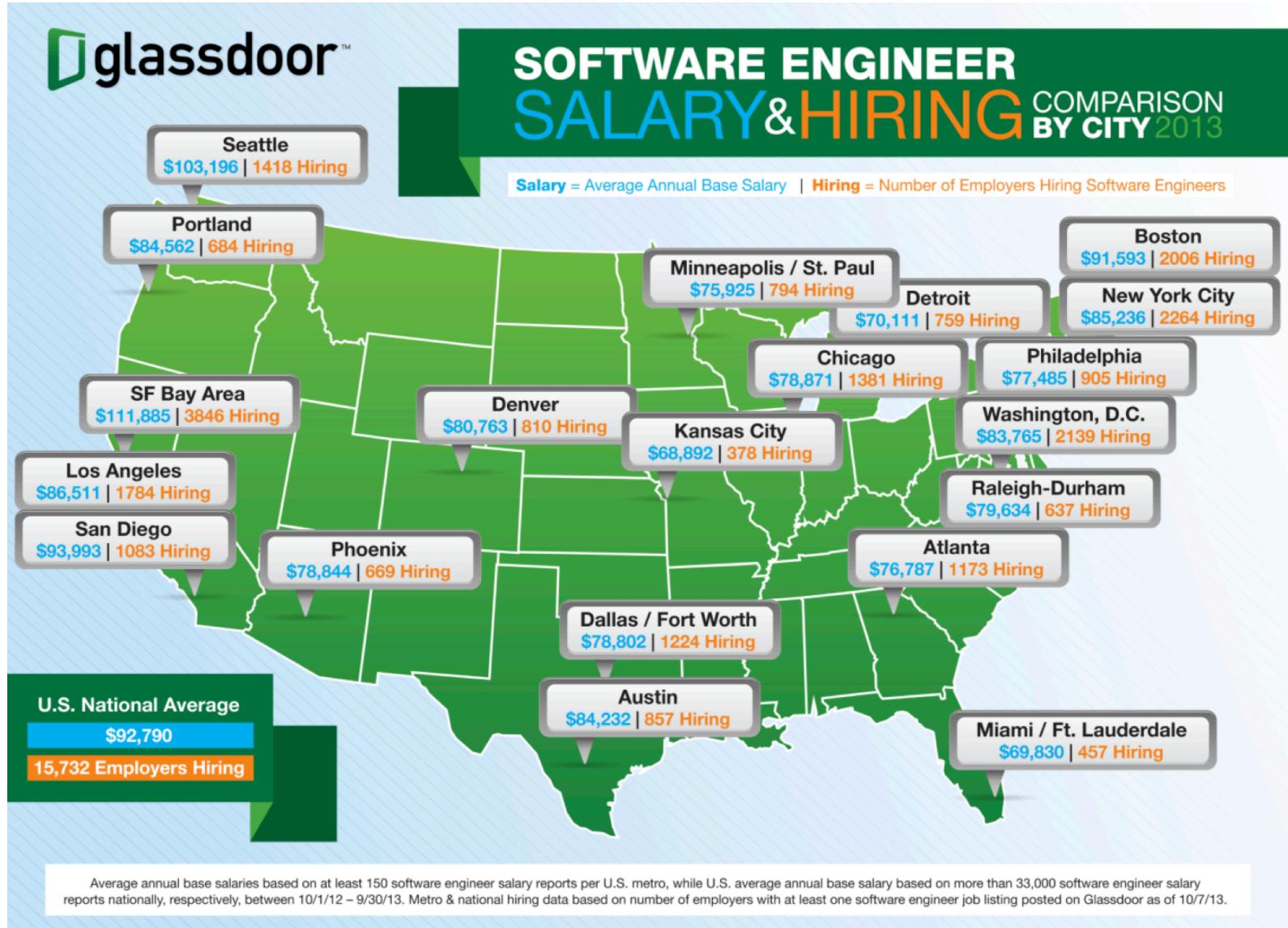


AngelPad

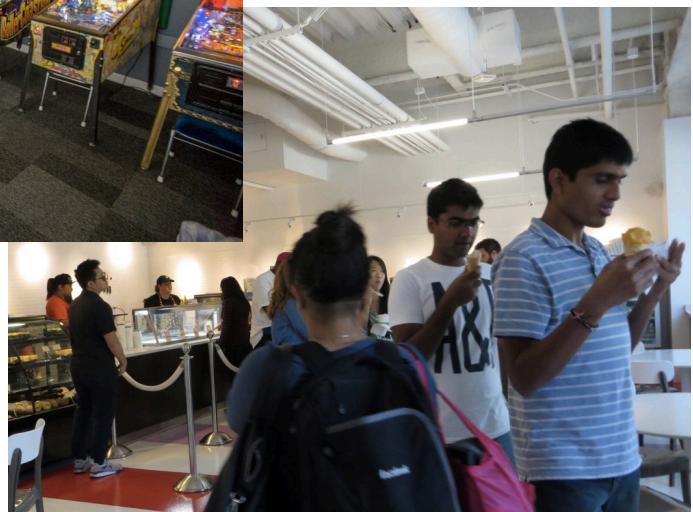
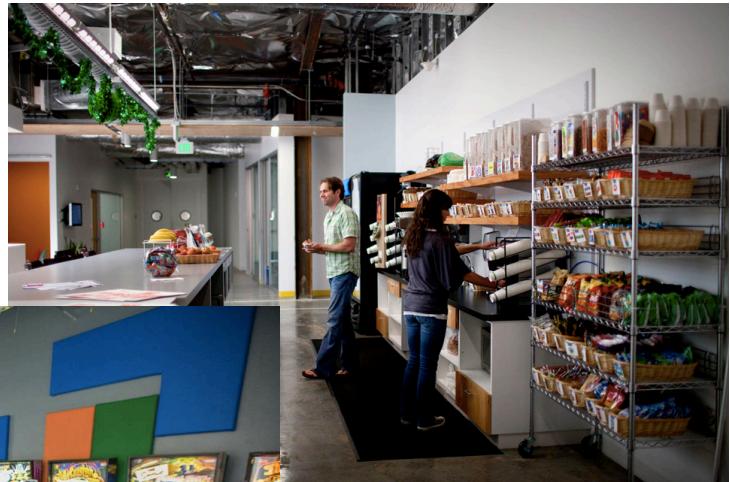
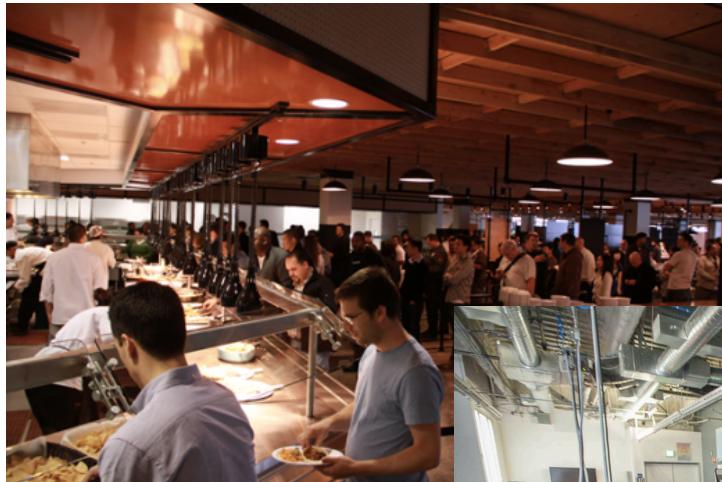
Software Job Market



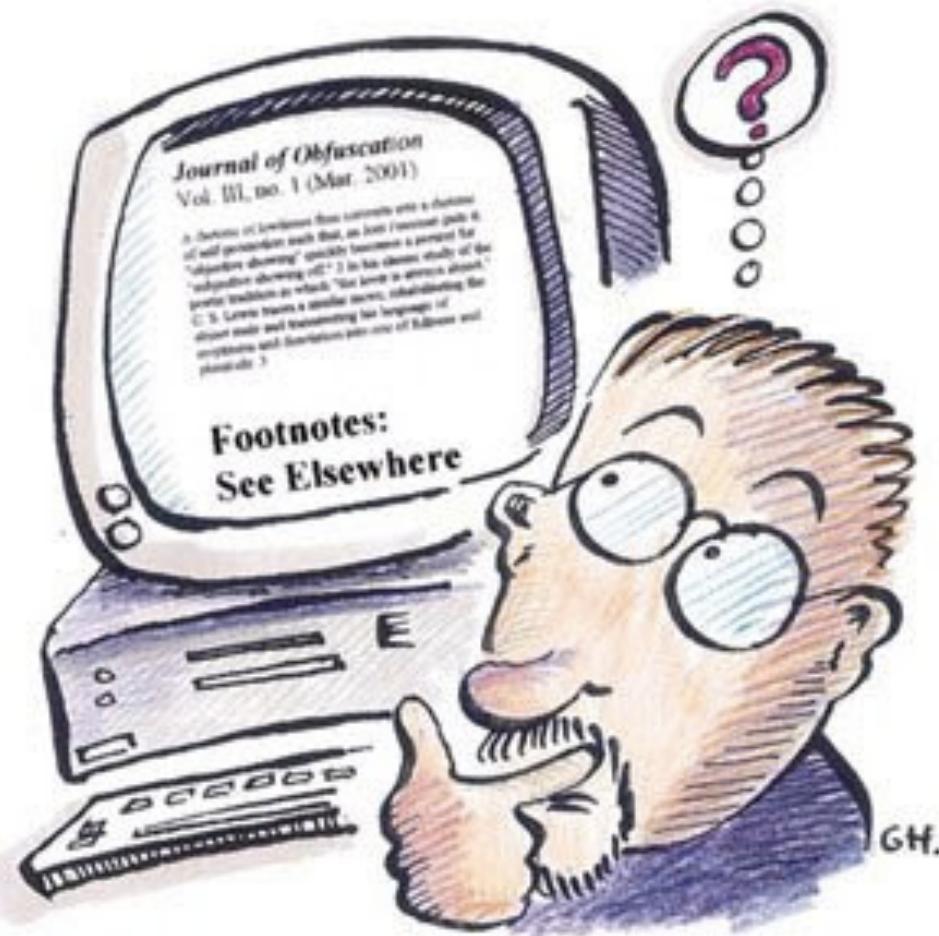
Software Job Market



Fun Place to Work



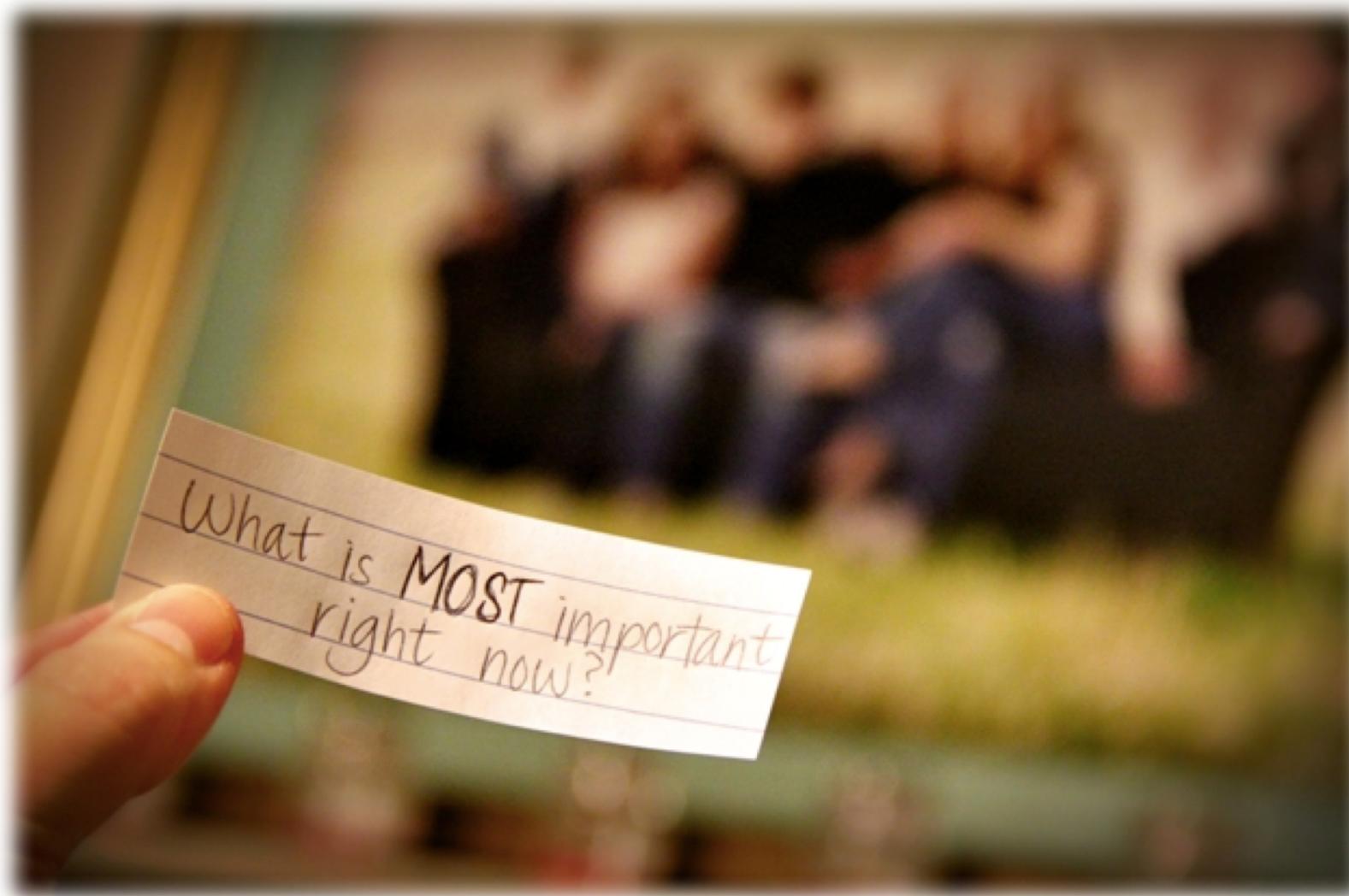
What is SE?



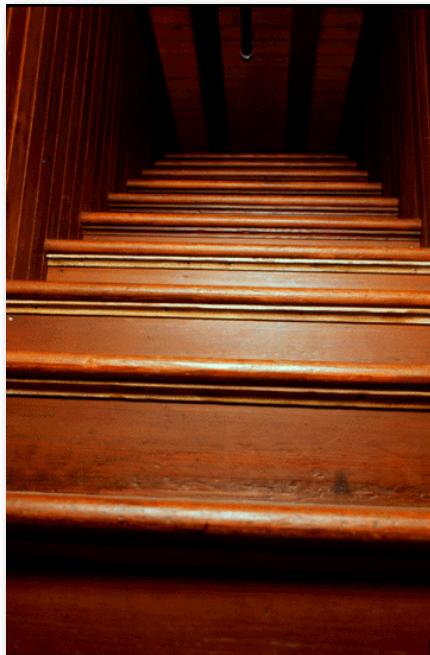
Basic Definitions of SE

- ◆ “Software engineering is a discipline whose aim is the production of **fault-free** software, delivered **on time** and **within budget**, which **satisfies the users needs.**” – [Schach]
- ◆ “ (1) The application of a systematic, disciplined, quantifiable approach to the development, operation, and maintenance of software; that is, the application of engineering to software. (2) The study of approaches as in (1).” [IEEE Computer Society]

Why is SE so important?

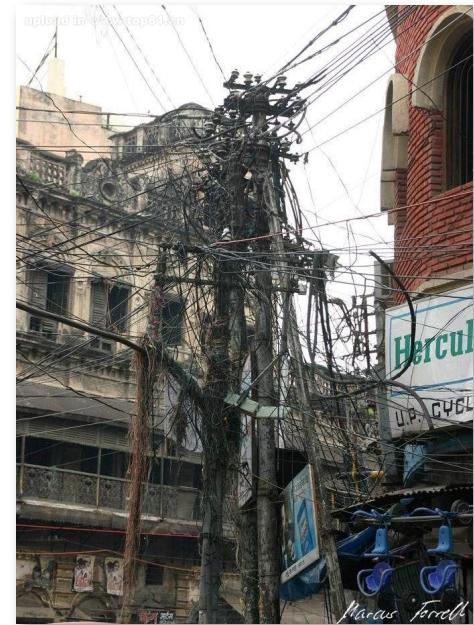
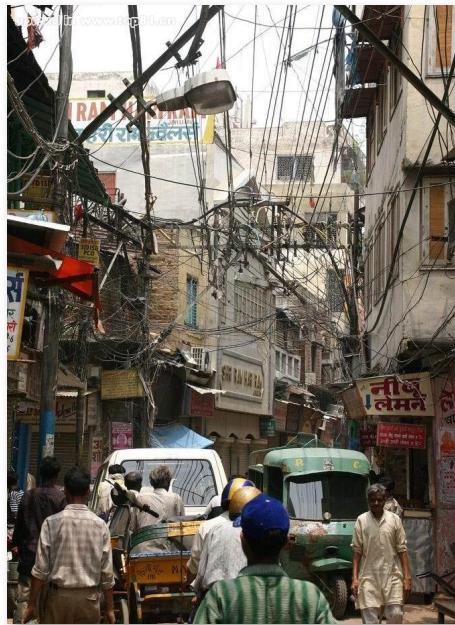


Poor Engineering Leads to Ad-hoc Structures



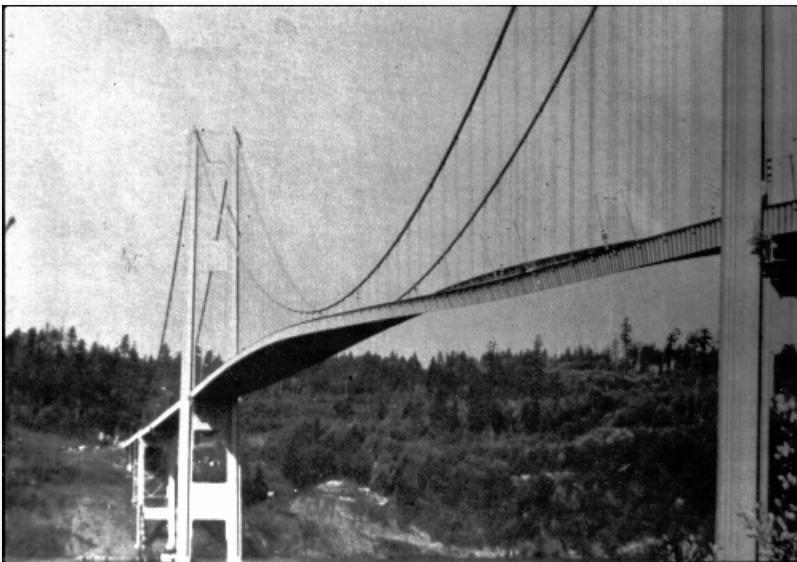
- ◆ Winchester Mystery House
 - ◆ The result of continuous building without any thought toward design
- ◆ Result:
 - ◆ Stairs leading to ceiling
 - ◆ Windows in the middle of room
 - ◆ Doors opening to wall
 - ◆ Non-intuitive floor plan

Poor Engineering 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 Engineering Has Disastrous Consequences



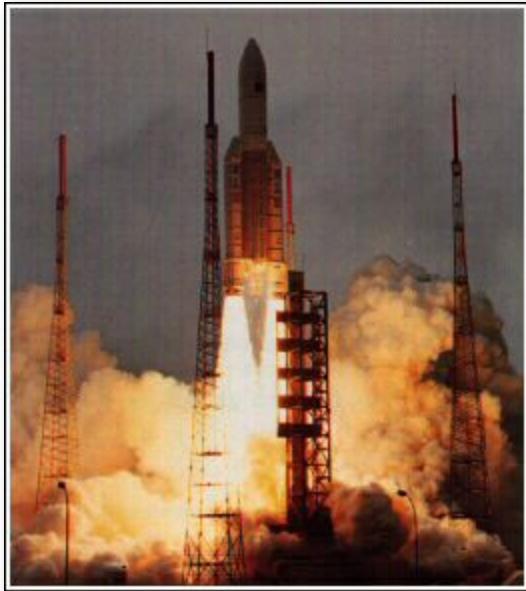
Tacoma Narrows Bridge (July 1, 1940)

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**.



Poor Engineering Has Disastrous Consequences

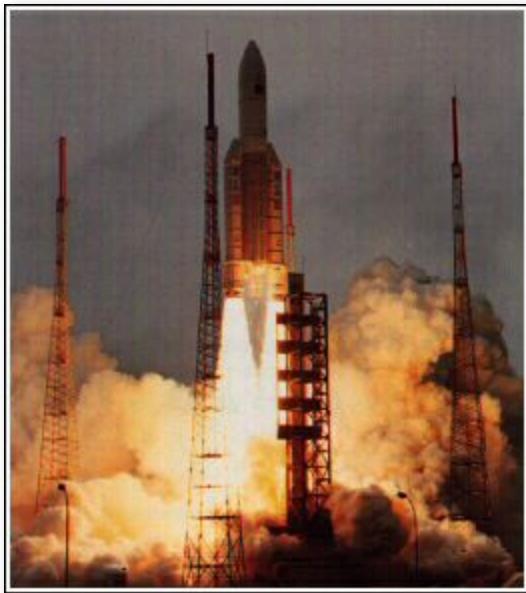


\$7 Billion Fire Works – One Bug, One Crash

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.

Poor Engineering 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

“The internal SRI software exception was caused during execution of a data conversion from 64-bit floating point to 16-bit signed integer value. The floating point number which was converted had a value greater than what could be represented by a 16-bit signed integer. This resulted in an Operand Error. The data conversion instructions (in Ada code) were not protected from causing an Operand Error, although other conversions of comparable variables in the same place in the code were protected.”

ignition
loss of
design
reference

healthcare.gov

HealthCare.gov Learn Get Insurance Log in Español

Individuals & Families Small Businesses All Topics ▾

Search SEARCH

The System is down at the moment.

We're working to resolve the issue as soon as possible. Please try again later.

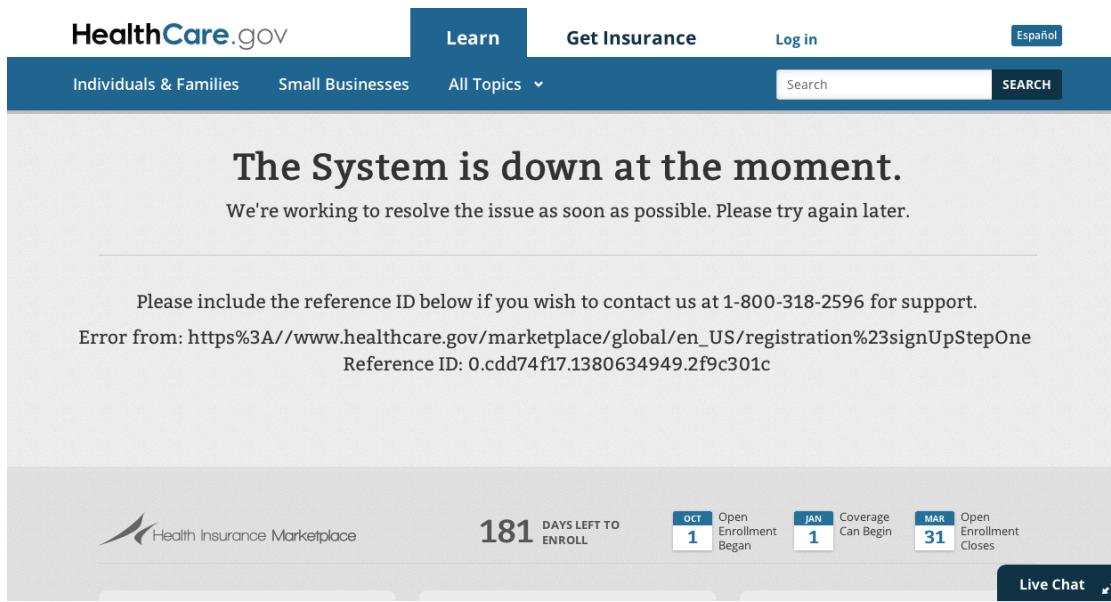
Please include the reference ID below if you wish to contact us at 1-800-318-2596 for support.

Error from: https://www.healthcare.gov/marketplace/global/en_US/registration%23signUpStepOne
Reference ID: 0.cdd74f17.1380634949.2f9c301c

181 DAYS LEFT TO ENROLL

OCT 1 Open Enrollment Began JAN 1 Coverage Can Begin MAR 31 Open Enrollment Closes

Live Chat



- ◆ Estimates that the overall cost for building the website had reached over \$500 million by October 2013
- ◆ Only 1% of people managed to successfully enroll with the site in its first week of operation
- ◆ "There's no sugar coating: the website has been too slow, people have been getting stuck during the application process and I think it's fair to say that nobody's more frustrated by that than I am."

What's SE in Practice?



A Typical Software Development Cycle



2011/9 Kindle Fire



2012/9 Kindle Fire HD



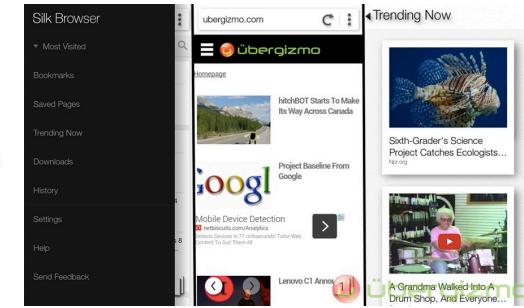
2014/6 Fire Phone



Silk Browser 1.0



Silk Browser 2.0

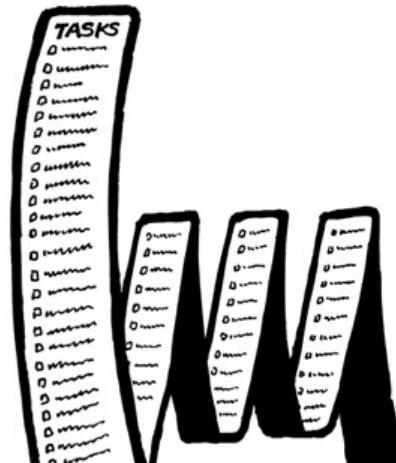


Silk Browser 3.0

Collect the Requirements



- Make it faster
- Private browsing mode
- Reading mode
- Trending web pages
- Easy to share/save pages
- Cooler UI
-



**LONG
LISTS
don't
GET
DONE**

Prioritize and Finalize the Features



Team Meeting (Business)

- Make it faster
- Reading mode
- Trending web pages
- ~~Easy to share/save pages~~
- Cooler UI
- Private browsing mode
-

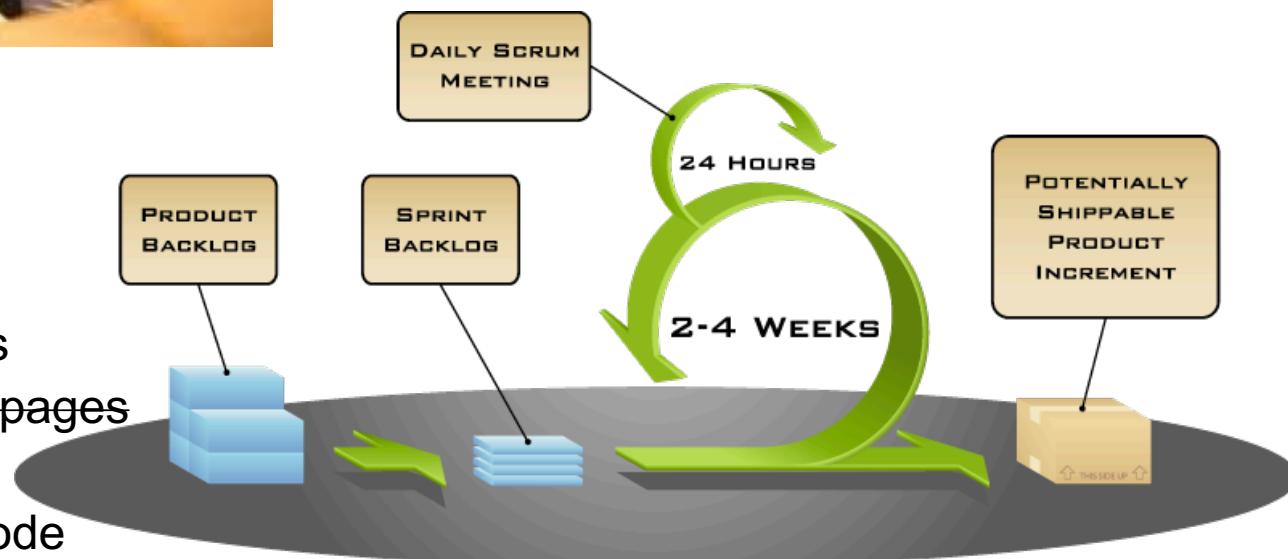


Dev Planning Meeting

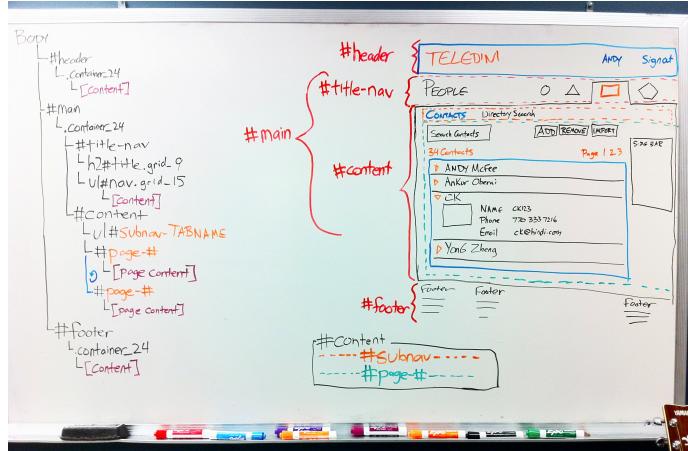


Agile Development

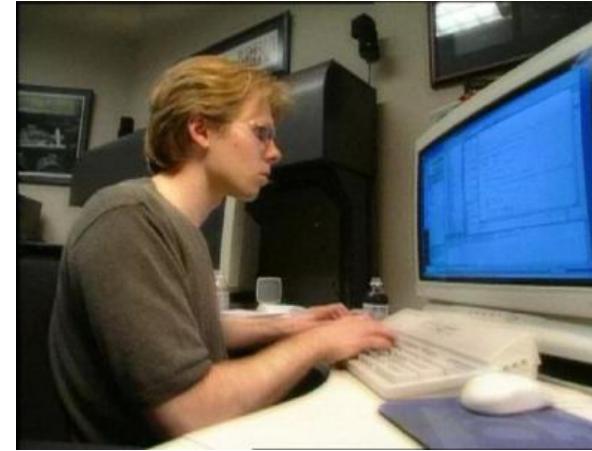
- Make it faster
- Reading mode
- Trending web pages
- Easy to share/save pages
- Cooler UI
- Private browsing mode
-



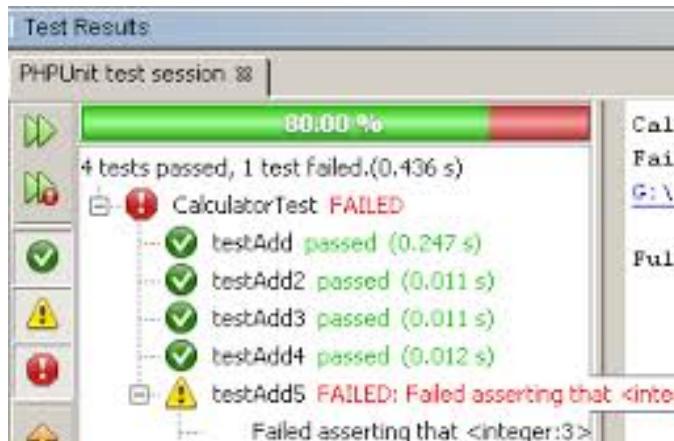
Make the Code Change



- Design



- Implementation



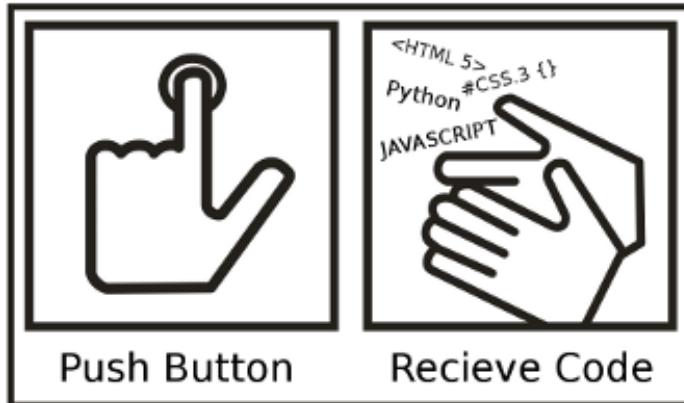
- Testing

```
public function geocode() {
    $address = $this->address . " " . $this->city . " " . $this->state . " " .
    if ($geocode_contents = file_get_contents("http://50.218.115.maps/api/
geocode.json?sensor=false&address=".rawurlencode($address))) {
        $geocode_json = json_decode($geocode_contents, true);
        if (isset($geocode_json["results"]) && isset($geocode_json["results"][0])
            && isset($geocode_json["results"][0]["geometry"] && !empty($geocode_json["results"][0]["geometry"]))
            && !empty($geocode_json["results"][0]["geometry"]["location"])) {
            $this->latitude = $geocode_json["results"][0]["geometry"]["location"]
                ["lat"];
            $this->longitude = $geocode_json["results"][0]["geometry"]["location"]
                ["lng"];
        }
    }
}

// If DUNS number is updated, search for related DSBS and SAM and EPLS records.
if ($model->changed("duns") || ($model->duns && (!$model->sam_entity_name || !
$model->dssb_user_id))) {
    $model->sync_with_dssb_and_sam_and_epls();
}
if ($model->sync_with_dssb_and_sam_and_epls()) {
    if ($model->duns && ($model->changed("duns")) || ($model->duns && (!$model-
>sam_entity_name || !$model->dssb_user_id))) {
        $model->sync_with_dssb();
        $model->sync_with_sam();
        $model->sync_with_epls();
    }
}
if ($model->changed("address")) {
    $model->geocode();
}
```

- Code Review

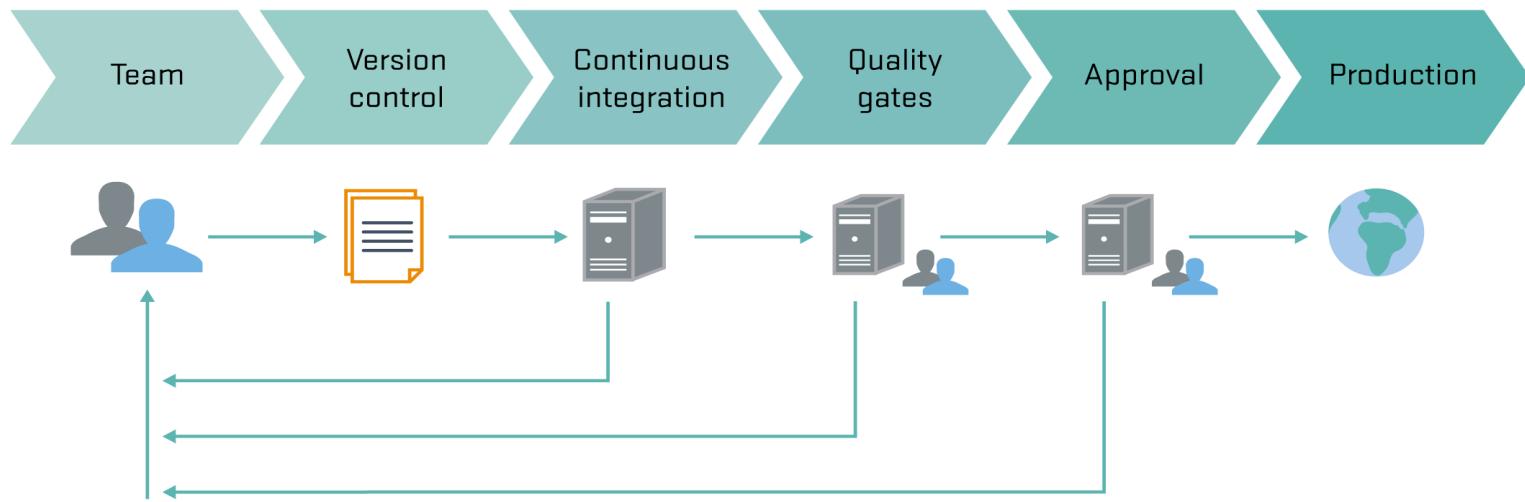
Make the Change Available to Customers



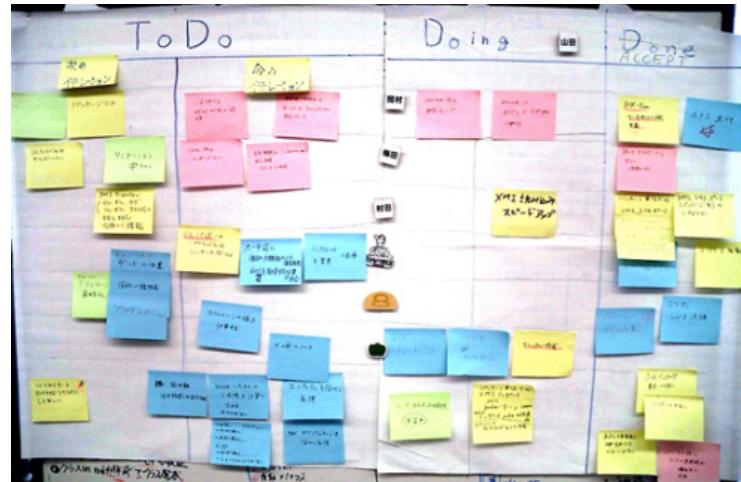
- Push the Change



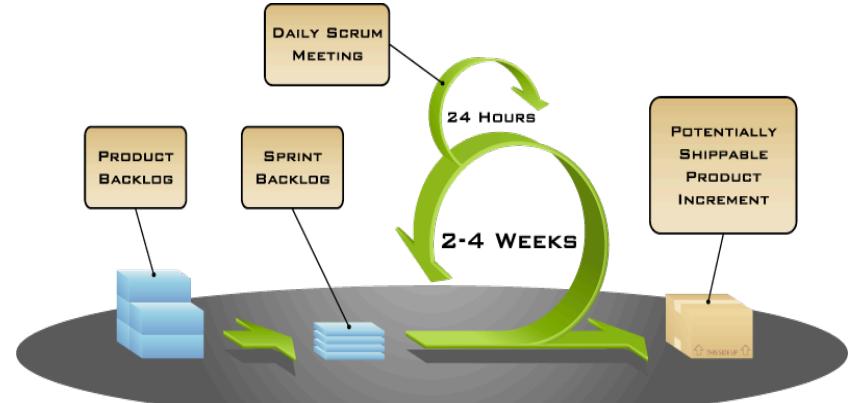
- Build & Deploy



Track the Development Progress



- Daily Scrum



- Sprint Meeting

COPYRIGHT © 2005, MOUNTAIN GOAT SOFTWARE

Product Release



No Ending – A Lot More To Do

- Monitoring



- Bug Fixes



- Maintenance



- Next Release



About CS480

The Syllabus

Goals

- ◆ Be ready for a Software Engineer
 - ◆ Learn the right skills
 - ◆ Gain practical experiences
 - ◆ Help you get the job

Your Resume

Emily Ima Dancer

Campus Address:
First Campus Center Box 9999
Princeton, NJ 08544

646-111-9999
edancer@princeton.edu

Permanent Address:
215 East 95th Street, Apt 5Z
New York, NY 10029

EDUCATION

Princeton University, Princeton, NJ
A.R. in Art and Archaeology; Certificate in Dance
Coursework includes Modern Repertory and Choreography; Topics in Dance History, Criticism, and Aesthetics; The Russian Avant-Garde; Behind the Scenes of the University Art Museum

Sorbonne University of Paris, Paris, France
Six-week summer study abroad in intermediate French

EXPERIENCE

The Daily Meal, online food blog, New York, NY
Editorial Intern
• Conduct research on topics ranging from nutrition to cooking tips and pitch story ideas in regard to the college student demographic to editor
• Contribute to online stories for food and beverage category
• Utilize social media such as TH students for the Campus Eat!

Quirk Gallery, Brooklyn, NY
Gallery Shop Intern
• Researched, wrote, and design
• Streamlined Gallery Shop for I and Perfected administrative and

Princeton University Bridge Year, Princeton
• Selected for freshman year exp
• Residents as well as developing
• Experience provided an unso

New York International Ballet Co, Summer Conservatory (Live in post
• Chosen to perform in competition
• Ensured fairness in competitio
• Coordinated daily delivery of i

• Communicated with judges at

CAMPUS ACTIVITIES

The Reviewer, Staff Writer for *On the Town Section*
• Contributed bi weekly stories or

Program in Dance, Selected Performer
• Performed solo in Susan Marie

HONORS, Princeton University: Outstanding High School; Member of the Nation

SKILLS, Proficient in Microsoft Word, Excel
Spanish; Proficient in French

CAREER SERVICES

AT PRINCETON COLLEGE

LORI MANSON

LORI MANSON

1234 South Overview Drive, San Ramon, California 94583, Phone (510) 555-1234

OBJECTIVE

A challenging teaching position utilizing creativity and a true desire to educate

EXPERIENCE

TEACHER/CENTER SUPERVISOR Oct. 1998 - Dec. 1999

Turkey Mountain Head Start, Belcourt, North Dakota
• Manage and train employees and evaluate job performance through biannual reviews.
• Complete comprehensive monthly reports to reflect inventory control, accounts payable/receivable, and adherence to federal health and safety regulations.

Languages and Skills:

- Java, C++
- Windows
- Microsoft Office

RESUME	
Jane M. Doe	1234 N. Main St., Rushville, Indiana
	cell: (555) 555 - 5555 email: jdoe@schoo
Career Objective	To teach choral or general music to K-12 students; computers, musical theater, show choir and jazz
Educational Preparation	B.M.E.; University Majored in music Anticipated graduat
2002 - 2003	University of Illinois Majored in music education (GPA 3.42)
2000	Diploma; Hug High School, San Antonio, TX
Teaching Experience	Indiana High School Student teacher All levels choir grades 8-12
Spring 2007	
2004 - 2006	Volunteer Teaching Assistant Rushville High School Beginning chorus; Mixed Glee Club President
Honors and Awards	Lila Belle Pitts Scholarship Recipient Dean's List University of Rush County Outstanding Sophomore Musician Semifinalist at the Midwest NATS Competition
2005 - 2007	
2003	
2002	
Performance Background	Soprano, University of Rush County Mixed Chorus (2003-2007) Concert Choir (2004) Opera Workshop (2006) Chamber Singers (2003-2004)
2005 - 2007	

Placement file with references available from University of Rush County Student Services.

Richard Green

Apt. 4 Main Street, Canton, NY 11111
(518) 555-5555 • green@canton.edu

EDUCATION

AAS, Air Conditioning Engineering Technology
SUNY Canton

AS, Manufacturing Technology
New York Community College

Certificate, Machine Trades
SUNY Tech School

ON
Minist. Programming Trainin
Computer Training

XX MARTIN LUTHER KING BLVD., APT. B-21 • CHAPEL HILL, NC 27514
PHONE 919.123.4567 • E-MAIL: email@email.unc.edu

NAME WITHHELD

EDUCATION

University of North Carolina at Chapel Hill
School of Journalism and Mass Communication

August 2008 to Present
GPA of 3.1
Bachelor of Arts - forthcoming in May 2008

Relevant Coursework

- Advertising Copy and Communication
- Advertising and Promotional Materials
- Concepts of Marketing
- Principles of Advertising
- Sports Marketing and Advertising
- News Writing
- History and Practice of Mass Communication
- Professional Problems and Ethics
- Current Issues in Mass Communication
- Introduction to Mass Communication Law

PROFESSIONAL CAPABILITIES

- Trade Skills:**
 - Media Planning and Research
 - Creative Testing
 - Layout
 - Production Techniques (Sponsorships and Merchandising)
 - Assembly
 - Performance
 - Message Construction and Dissemination
 - Computer Analysis
 - Laws re Advertising and Broadcast Regulation, Privacy, Libel, and Journalistic Privilege

Marketing & Advertising Genres

- Marketing Copy
- Newspaper/Magazine Articles
- Ad Copy
- Press Releases
- AP Style Guide
- Chicago Manual of Style
- MLA Style Guide

WORK EXPERIENCE

Childcare Service Provider - October 2006 to February 2007; February 2007 to Present
Private Families, Chapel Hill, NC

- Partnered with Bahi and Hickley families to take responsibility for safety and development of children
- Designed and implemented an after-school routine for the Bahi children (ages 10, five, and three) to manage their time and encourage extracurricular activities
- Provided an atmosphere of security for the Hickley children (a toddler and infant twins)
- Encouraged the Hickley children to take ownership and responsibility for their actions
- Regularly worked 15 to 25 hours/week while in school full-time

Camp Counselor - May to August 2005; May to August 2006

YMCA Camp Kerr, Wakefield, NC

- Created a reward program to promote campers' healthy eating habits
- Designed weekly bulletin board, handled registration paperwork, and completed daily incident and discipline reports
- Modeled camp values of flexibility, loyalty, and team work
- Prepared end-of-week update for parents of each of the 25 campers
- Encouraged campers to take ownership of their actions and learn from mistakes (marked by autistic tendencies and developmental delays); learned sign language to facilitate communication
- Interfaced with camp director, branch director, and social services to report a case of child abuse
- Worked 40 hour/week

Hands-on Experience

SE Practice

Requirements Analysis

Design

Coding

Version Control

Code Review

Build

Deployment

Maintenance



JUnit



Jenkins



<FreeMarker>

</>

HTML & CSS



Your Resume

Emily Ima Dancer

Campus Address: Princeton Center Box 9999
Princeton, NJ 08544

Permanent Address: 215 East 95th Street, Apt #2
New York, NY 10029

646-111-9999
eimancer@princeton.edu

June 2015
GPA: 3.0

EDUCATION Princeton University, Princeton, NJ
A.B. in Art and Archaeology, Certificate in Dance
Coursework includes: Modern Repertory and Choreography; Topics in Dance History, Criticism, and Aesthetics; The Russian Avant-Garde; Behind the Scenes of the University Art Museum

EXPERIENCE The Daily Meal, Princeton, NJ
Editorial Assistant, Food Columnist
• Conduct research on topics ranging from cooking tips to pitch story ideas in regards to column
• Student demographic to editor
• Contribute to online stories
• Read daily requests from Campus
• Utilize media such as TV students for the Campus Eats

Quirk Gallery, Brooklyn, NY
Gallery Shop Intern
• Researched, wrote, and edited
• Streamlined Catalog
• Performed administrative tasks

Princeton University, Princeton, NJ
Volunteer
• Selected for freshman year residents as well as upperclassmen
• Experience provided

New York International Ballet Co.
Summer Counselor (Live in position)
• Developed and taught classes
• Ensured fairness in competition
• Coordinated daily delivery of items
• Communicated with judges at auditions

CAMPUS ACTIVITIES The Reviewer
Staff Writer for *On the Town*
• Contribute to weekly school news

Program in Dance
Selected Performer
• Performed in numerous performances

HONORS Princeton University: Outstanding High School: Member of the National Merit Scholarship Program

SKILLS Proficient in Microsoft Word, Excel, Spanish; Proficient in French

CAREER SERVICES AT PRINCETON UNIVERSITY

LORI MANSON

1234 South Overview Drive, San Ramon, California 94583, Phone (510) 555-1234

OBJECTIVE A challenging teaching position utilizing creativity and a true desire to educate

EXPERIENCE TEACHER/CENTER SUPERVISOR
Tutor Motivation Start, Belcourt, North Dakota

- Maintained attendance and evaluate job performance reports to reflect in accordance with teacher/reach standards.
- Developed curriculum to meet educational needs of disabled and handicapped students in accordance with state and federal guidelines.
- Document parents, A.R.s, individual i's, Individual Participate IEPs, Screen, all areas of the classroom.

RESUME

Jane M. Doe
1234 W. Main Street
Rushville, Indiana
cell: (555) 555 - 5555
email: jdoe@school.edu

github **spring** **jQuery** **JS**

Richard Green
Appt. 4 Main Street, Canton, NY 11111
(555) 555-5555 • green@canton.edu

EDUCATION AAS, Air Conditioning Engineering Technology
SUNY Canton

EXPERIENCE Apache Maven Project
http://maven.apache.org

XX MARTIN LUTHER KING BLVD., APT. B-21 • CHAPEL HILL, NC 27514
PHONE 919.123.4567 • E-MAIL email@email.unc.edu

NAME WITHHELD

Jenkins

EDUCATION Bachelor of Arts – forthcoming in May 2008

RELEVANT COURSEWORK

Advertising Copy and Communication
Advertising Media
Contemporary Marketing
Principles of Advertising
Sports Marketing and Advertising

PROFESSIONAL CAPABILITIES

Trade Skills
• Media Planning and Research
• Content Management
• Web Development Techniques (Sponsorships, Content Management)

Writing Capabilities
• Message Construction and Dissemination
• Computer Analysis
• Laws re: Advertising and Broadcast Regulation, Privacy, Libel, and Journalistic Privilege

Software Proficiency
• Microsoft Office
• Microsoft Word, PowerPoint, Excel, Publisher
• Adobe Photoshop
• Press Releases

Style Guides
• AP Style Guide
• Chicago Manual of Style
• MLA Style Guide

WORK EXPERIENCE

ChildCare Service Provider - October 2006 to February 2007; February 2007 to Present
Private Families, Chapel Hill, NC
• Developed daily routines and schedules for children (ages 10, five, and three) to manage and responsibility for their actions

Completed daily incident and discipline report a case of child abuse

Languages and Skills:

- Java, C++, HTML/CSS, JavaScript, JQuery, AngularJS, Freemarker
- Git/GitHub, Maven, JUnit, Amazon Web Services (AWS), Jenkins

Course Project – Things to Know

- ◆ Java (**Recommended**)
- ◆ Web Services (Helpful to know)
 - ◆ HTTP
 - ◆ Java Servlet
 - ◆ Spring Framework
 - ◆ <http://spring.io/>
 - ◆ Spring Boot
 - ◆ <http://projects.spring.io/spring-boot/>
- ◆ MOOC Course
 - ◆ Programming Cloud Services for Android Handheld Systems
 - ◆ <https://class.coursera.org/mobilecloud-001>

TODO

- ◆ Form a team ASAP!
- ◆ Think about a cool project idea