

Introduction to CS480

CS480 Software Engineering

<http://cs480.yusun.io>

January 5, 2014

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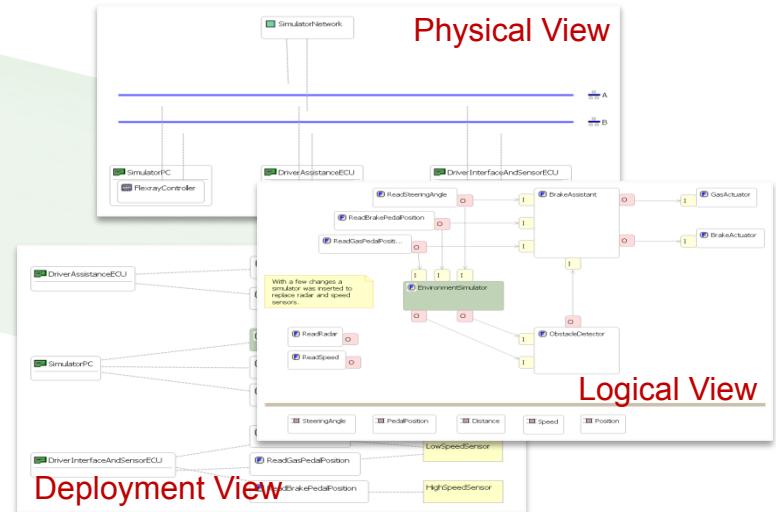
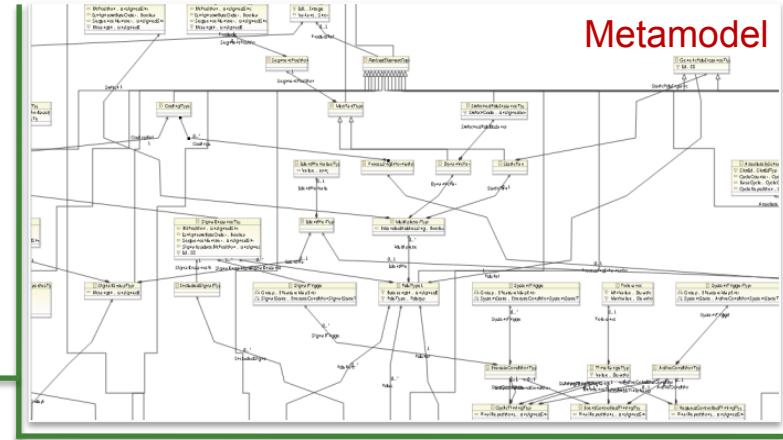
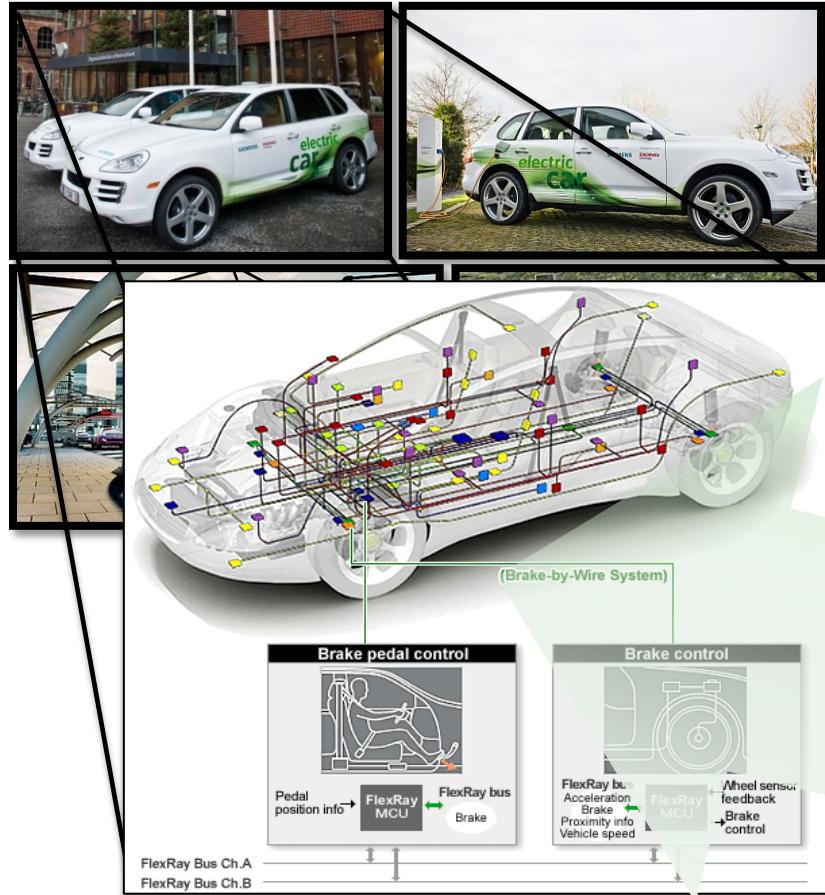
CAL POLY POMONA

About Myself



Embedded Software Systems

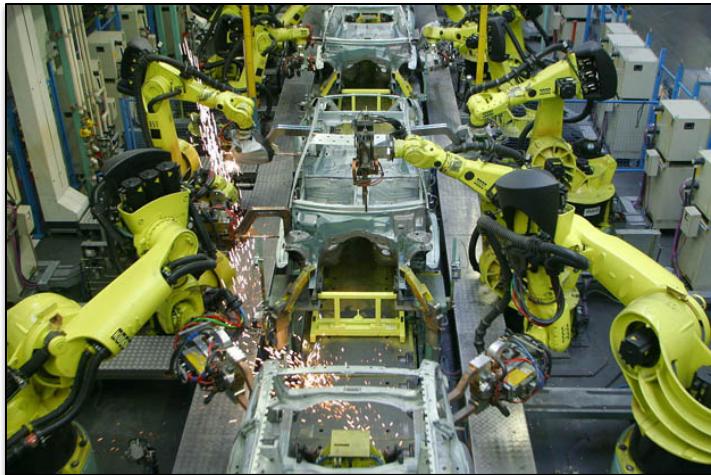
SIEMENS



Embedded Software Systems

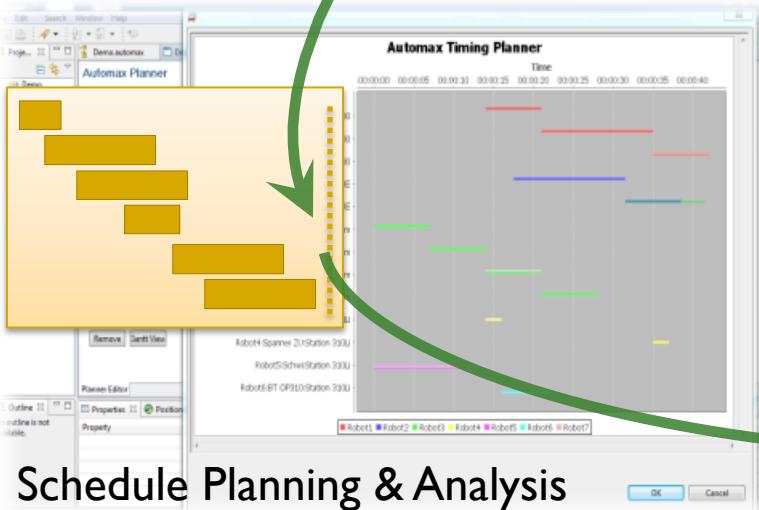


Mercedes-Benz

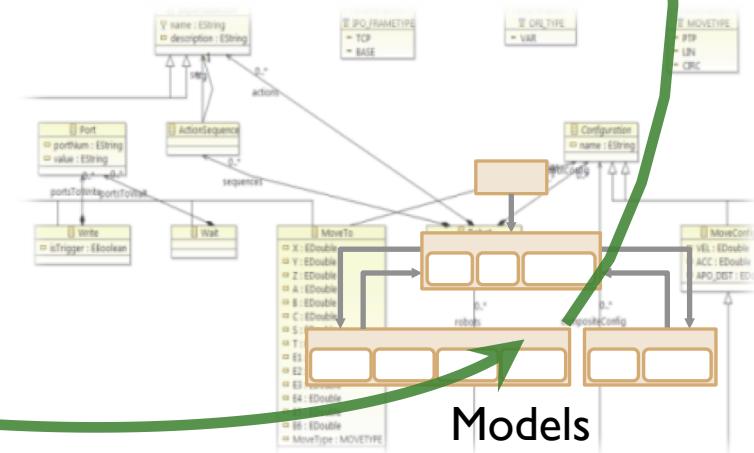


```
;FOLD PTP LHM110 CONT Vel= 100 % PDA133 Tool[9]:GR01_HC_M Base[0];%(FE)%R 5.2.34,%MKUKATPBASIS,%MOVE,VPTP,%P 1:PTP, 2:LHM110
;SWDOSTART = FALSE
;PDAJ_ACT=PDA133
;PDAJ_ACT=LHM110
;BAS (#PTP_PARAMS,100)
;PTP VPTP
;ENDFOLD
;:FOLD : Bauteil Entnommen ST300:(PE)
;ENDFOLD
;:FOLD SYN OUT 3250 "A32501--IRM Bau
;TRIGGER WHEN DISTANCE>0 DELAY>0 DO
;ENDFOLD
;:FOLD : Ausser Bereich ST300:(PE)
;ENDFOLD
;:FOLD SYN OUT 3281 "A32811--Ausser
;TRIGGER WHEN DISTANCE>0 DELAY>0 DO
;ENDFOLD
;:FOLD PTP LHM120 CONT Vel= 100 % P
;SWDOSTART = FALSE
;PDAJ_ACT=PDA132
;PDAJ_ACT=LHM120
;BAS (#PTP_PARAMS,100)
;PTP XLMH120_C_PTP
;ENDFOLD
;:FOLD PTP LHM130 CONT Vel= 100 % P
;SWDOSTART = FALSE
;PDAJ_ACT=PDA124
;PDAJ_ACT=LHM130
;BAS (#PTP_PARAMS,100)
;PTP XLMH130_C_PTP
;ENDFOLD
```

Control Code



Schedule Planning & Analysis



Models

Amazon Silk



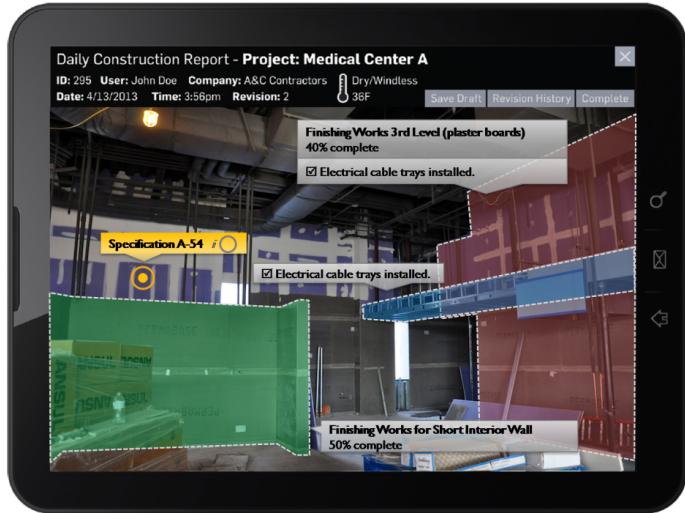
- Amazon Silk
- Cloud-Based Web Browser
for Amazon Kindle Devices



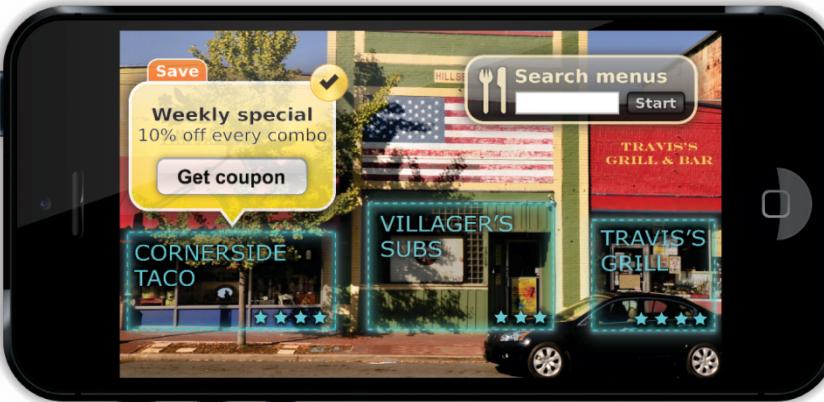
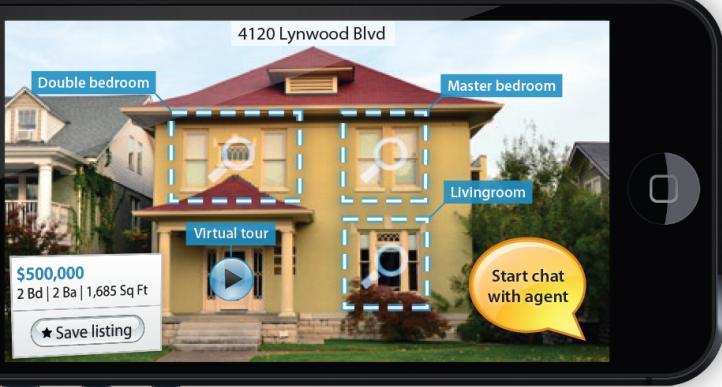
Cloud-based Mobile Software Systems



Mobile Augmented Reality

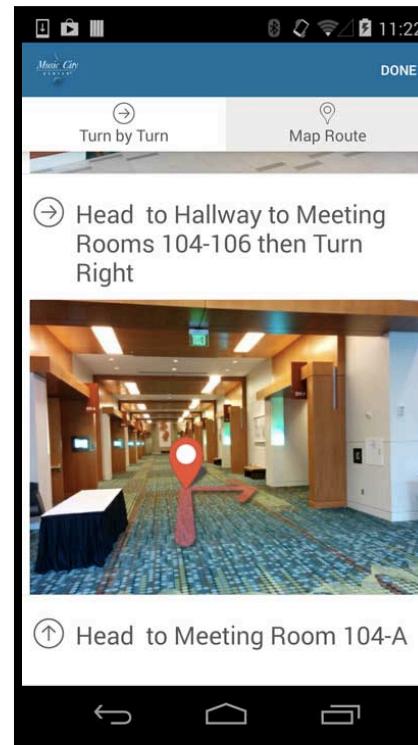
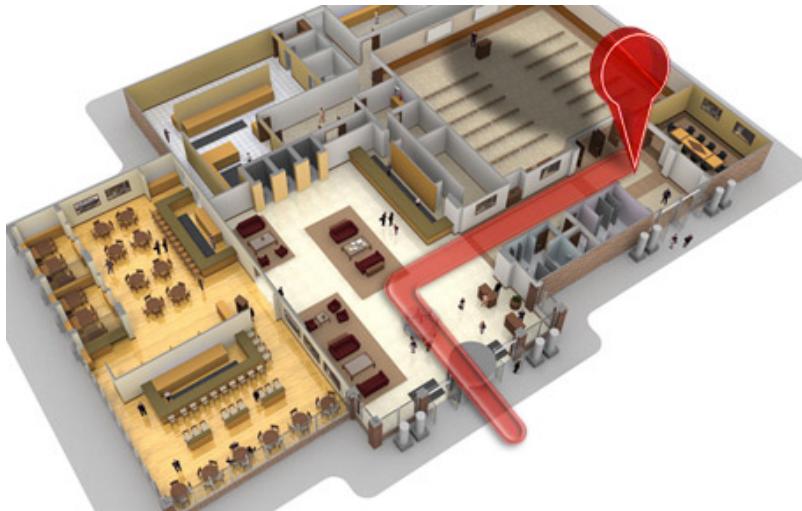


Mobile Augmented Reality



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

Ziiio – Indoor Navigation System



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

iVote – Web-Based iClicker



ivote.io
7:01 PM
© 2014 Dr. Daisy Sang @ Cal Poly Pomona

CS 140
7:02

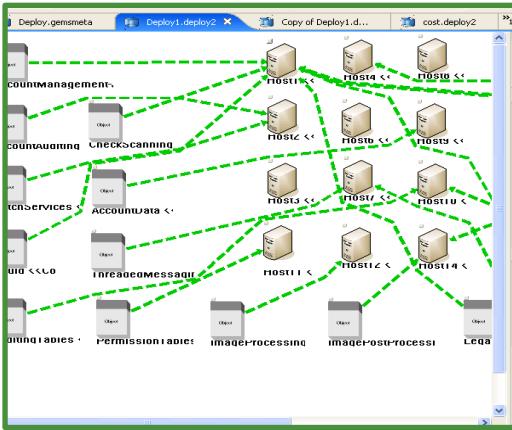
The Class of CS140

Total Submission: 3

Category	Total Submission
A	2.0
B	1.0
C	2.0
D	0.0
E	2.0
F	0.0
G	2.0
H	0.0
I	2.0

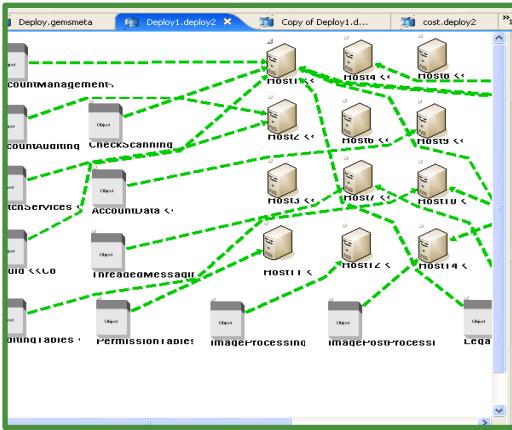
▪ <http://ivote.io>

Summary of My Research Area



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

Summary of My Research Area

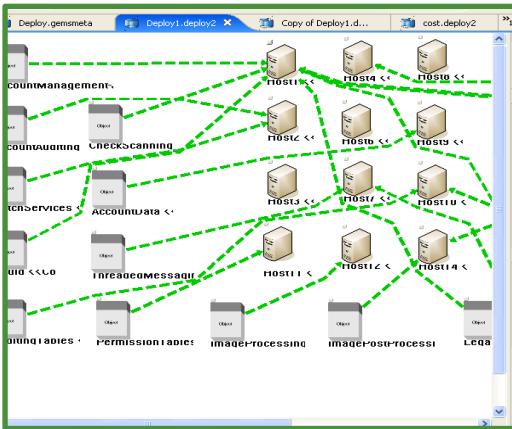


Software Engineering -
Model-Driven Engineering/
End-User Programming

Cloud Computing –
Optimization/Application



Summary of My Research Area



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

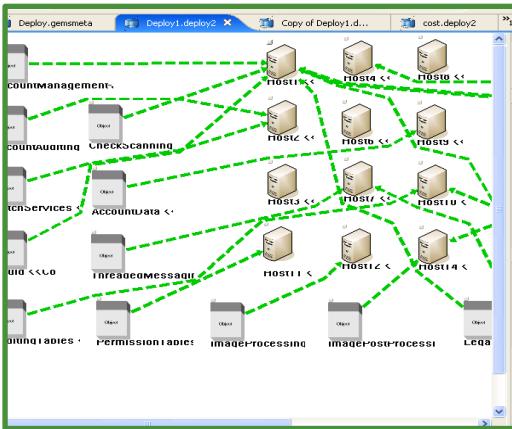
Cloud Computing –
Optimization/Application



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.

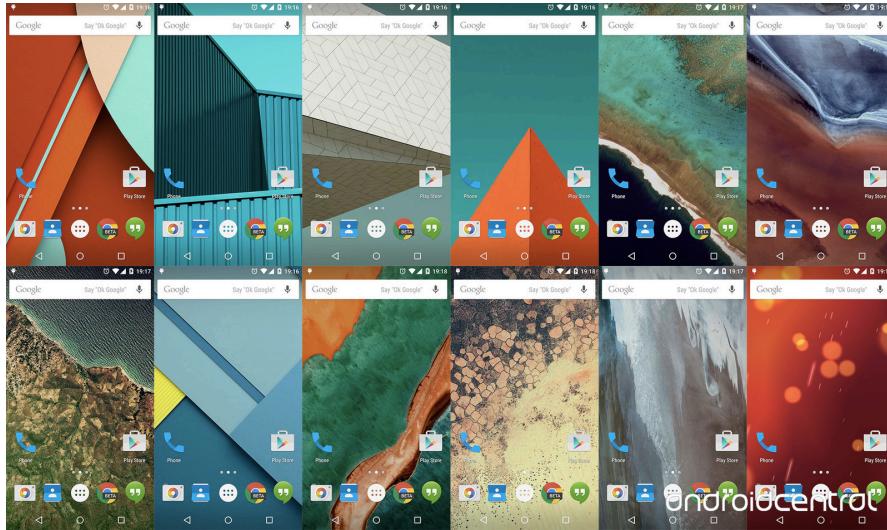
Fast Growing Software Industry



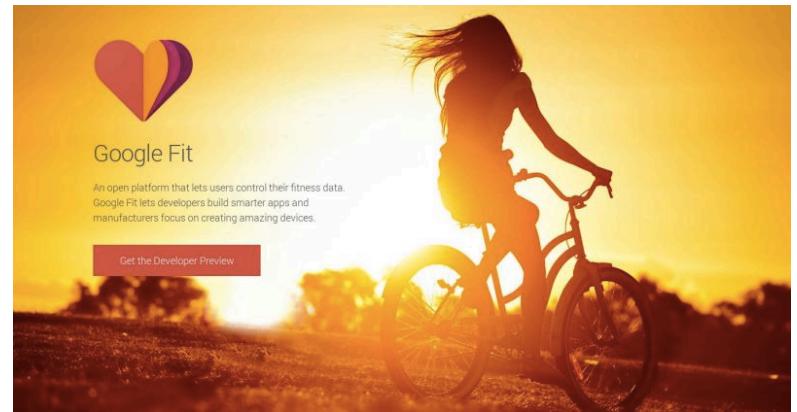
iPhone 6 & iOS 8



Android 5.0 & Google Fit & Android Auto



ANDROID
5.0



Amazon Fire Phone & Echo & I-Hour

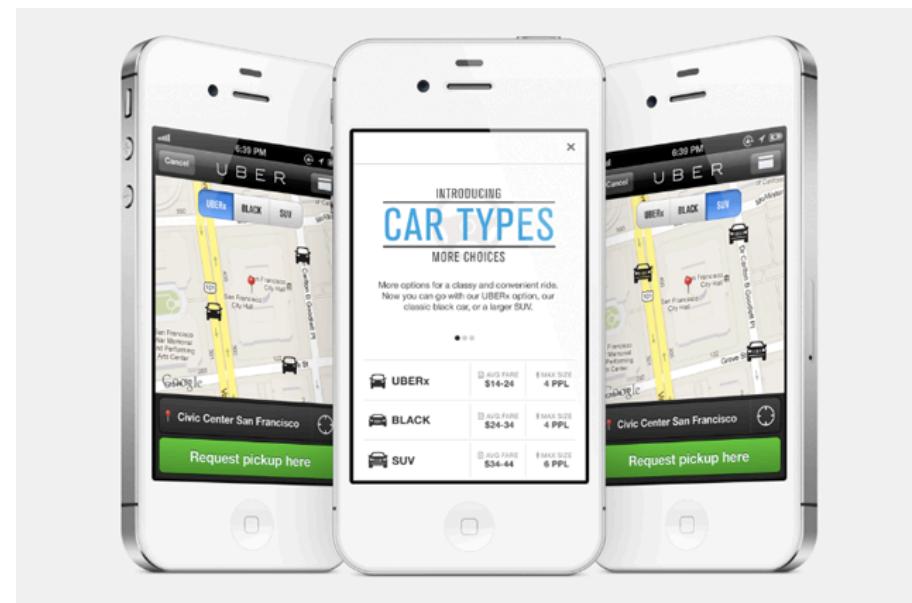


Uber - \$1.2 Billion Raise

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

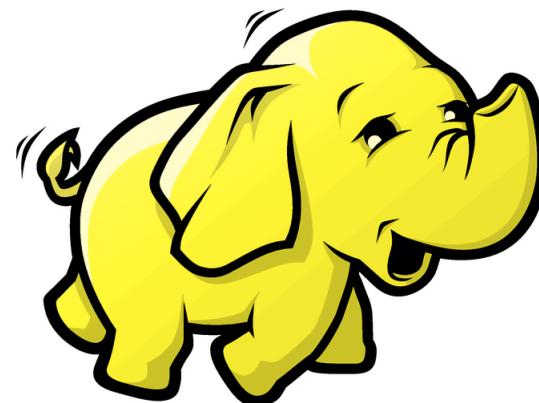
Save + By Serena Saitto | Dec 4, 2014 1:08 PM PT | - [Comments](#) [Email](#) [Print](#)



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.

Map View: Shows the locations of Airbnb rentals in Queens, NY, marked with pink pins on a map of the New York City area.

Search Results: 75 Rentals · Queens

Listing 1: INCRIDIBLE Deal in HEART of NYC!!!
Private room
Ridgewood, Queens
\$84 Per night

Listing 2: Large private bedroom and bath
Private room
Astoria, Long Island City
\$95 Per night

Listing 3: Instant Book
Affordable, private bedroom for you
Private room
Jackson Heights, Queens
\$75 Per night

Listing 4: 15 MINUTES to TIMES SQUARE
Private room
Astoria, Queens
\$65 Per night

Language and Currency: LANGUAGE AND CURRENCY



Startup Accelerators



500 startups

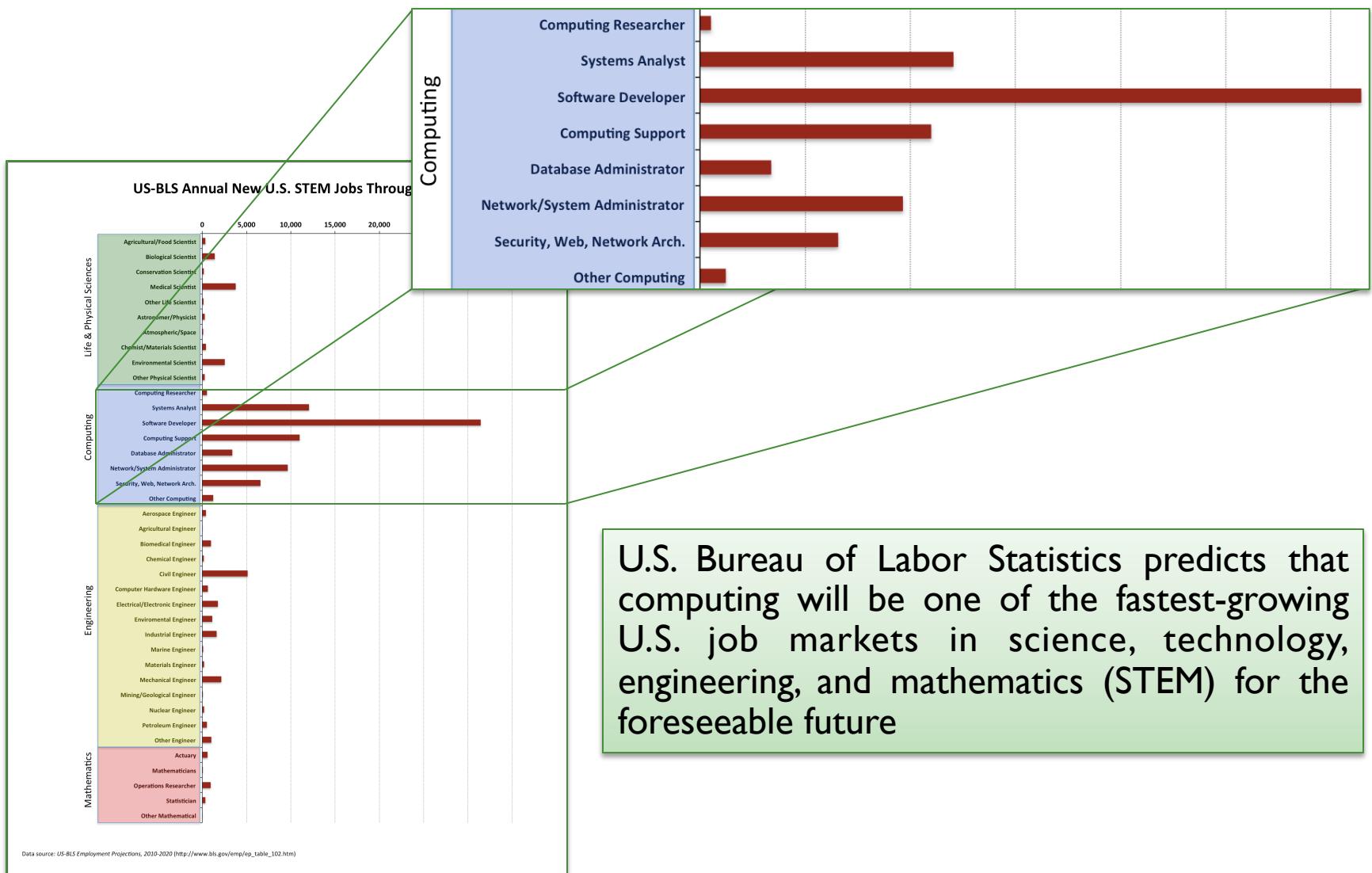


Blueprint for Business

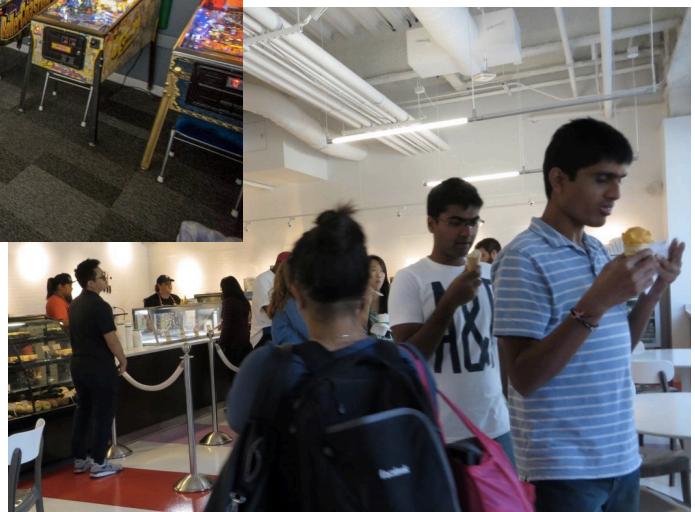
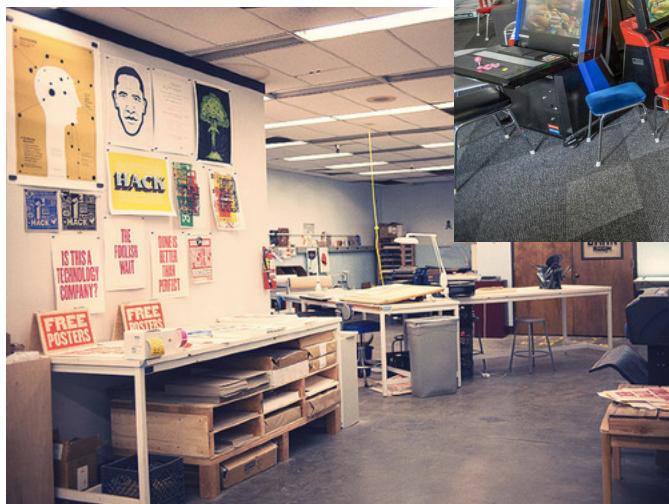


AngelPad

Software Job Market



Fun Place to Work



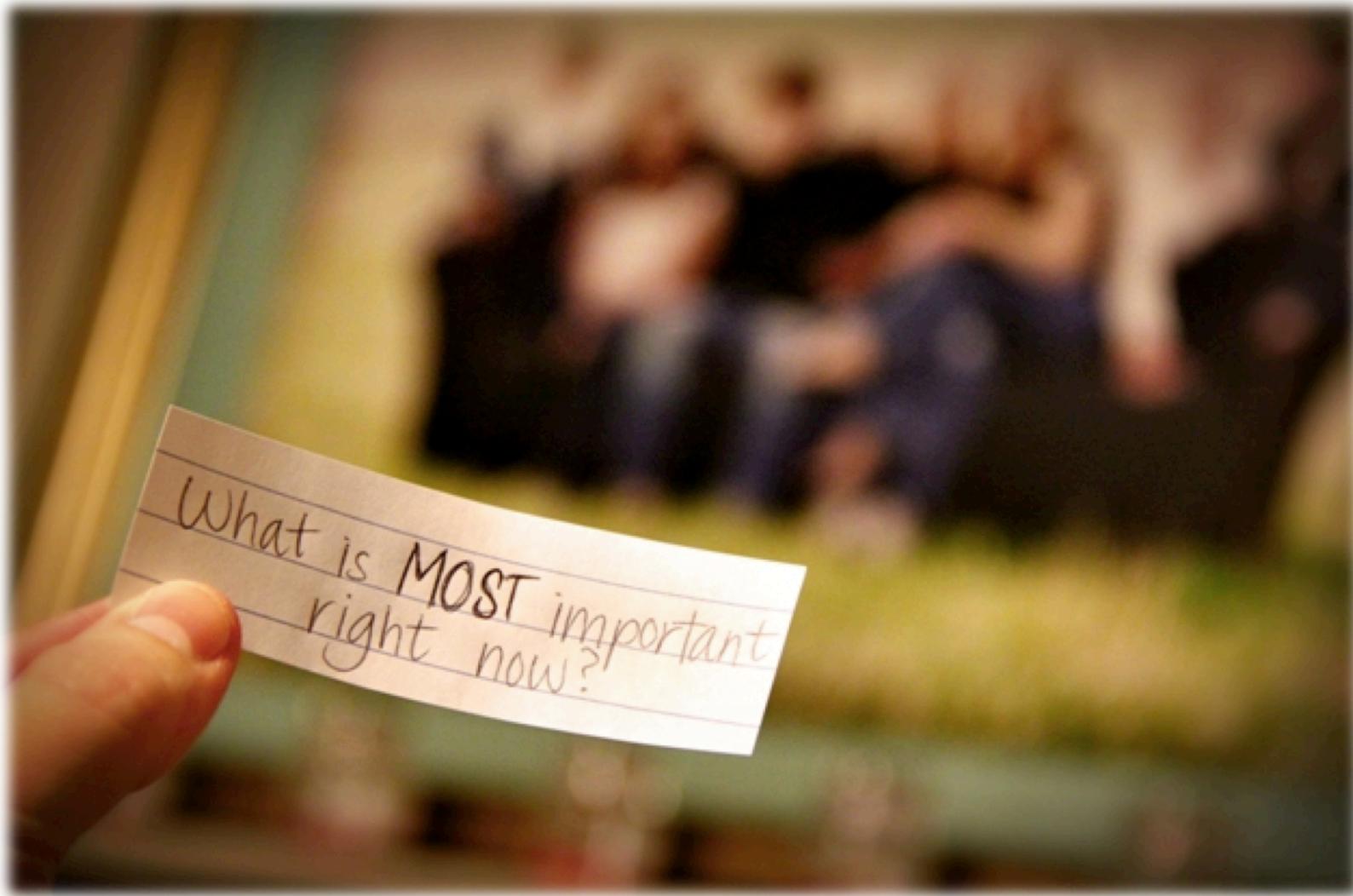
What is SE?



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?

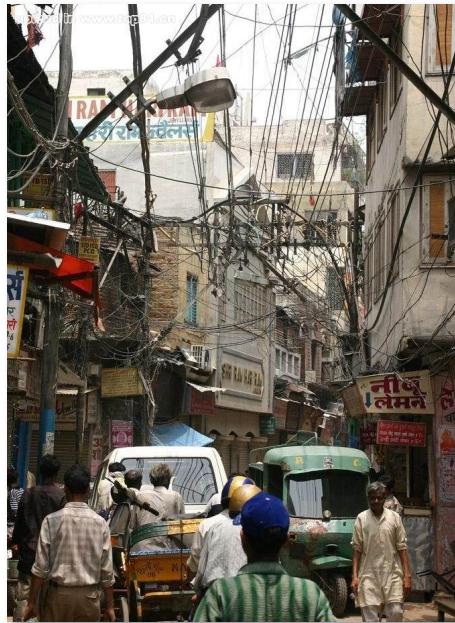


Poor Engineering Leads to Ad-hoc Structures



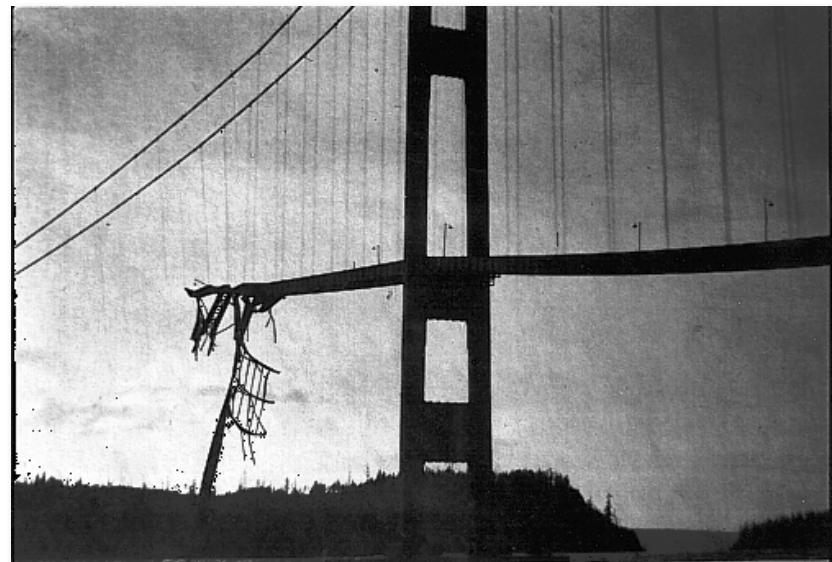
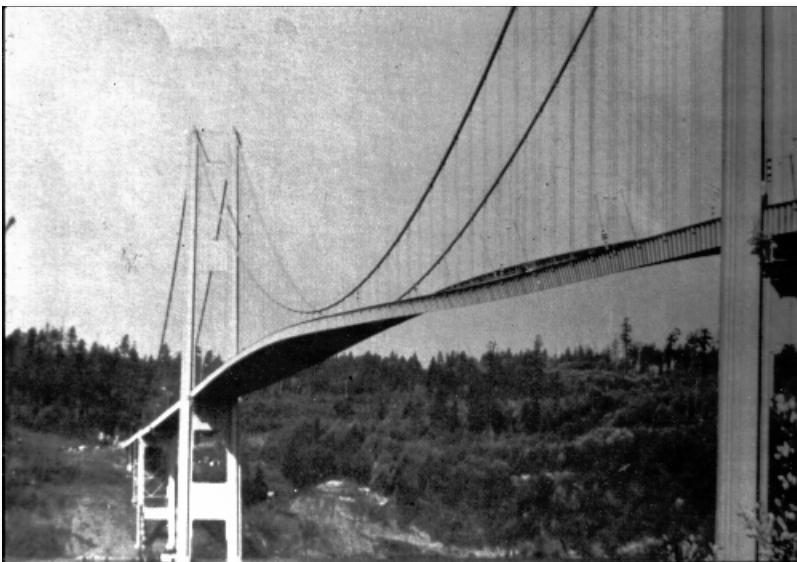
- ◆ Winchester Mystery House
 - ◆ The result of continuous building without any thought toward design
- ◆ Result:
 - ◆ Stairs leading to ceiling
 - ◆ Windows in the middle of room
 - ◆ Doors opening to wall
 - ◆ Non-intuitive floor plan

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

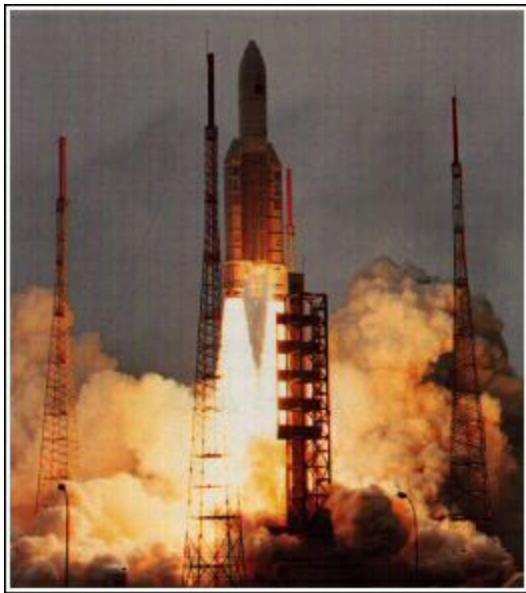


Tacoma Narrows Bridge (July 1, 1940)

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

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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.

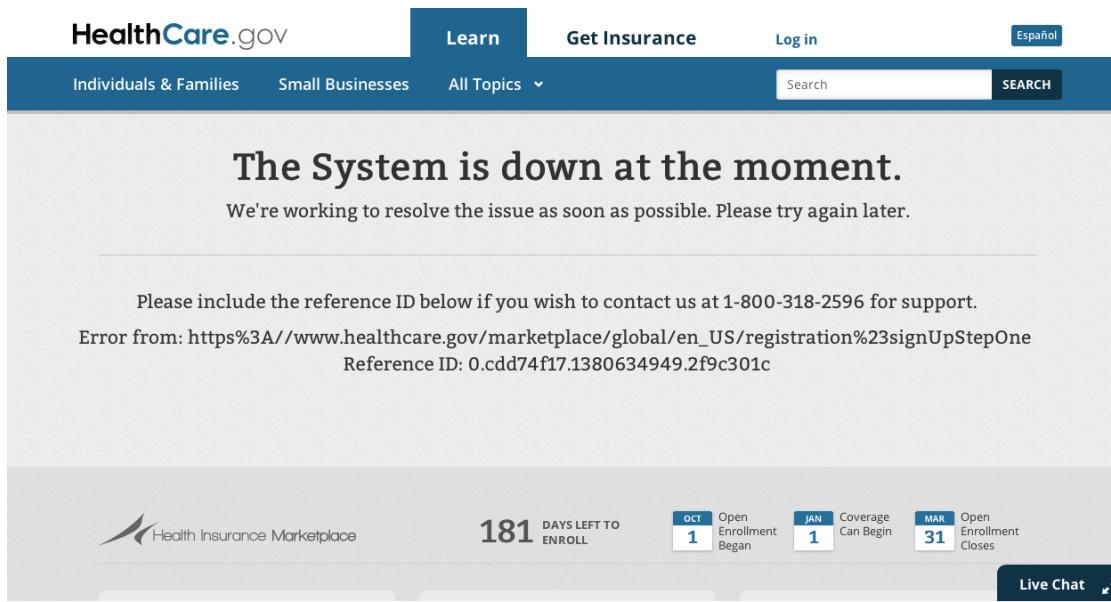
Please include the reference ID below if you wish to contact us at 1-800-318-2596 for support.

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



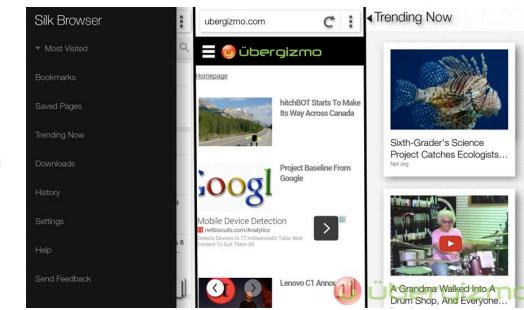
2014/6 Fire Phone



Silk Browser 1.0



Silk Browser 2.0

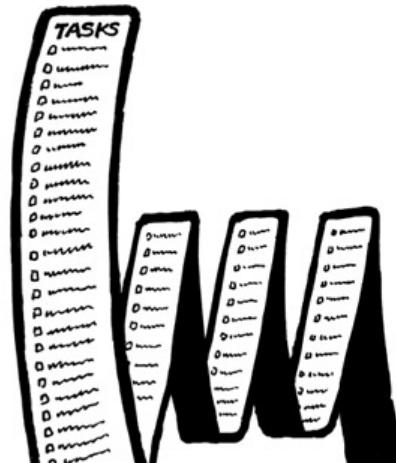


Silk Browser 3.0

Collect the Requirements



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



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
-

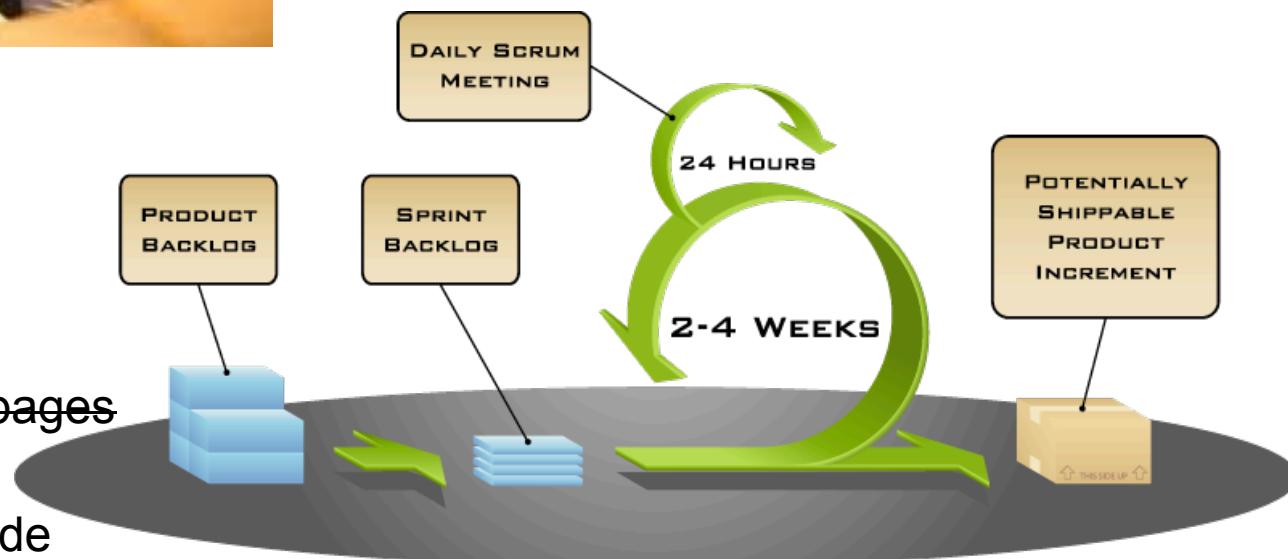


Dev Planning Meeting

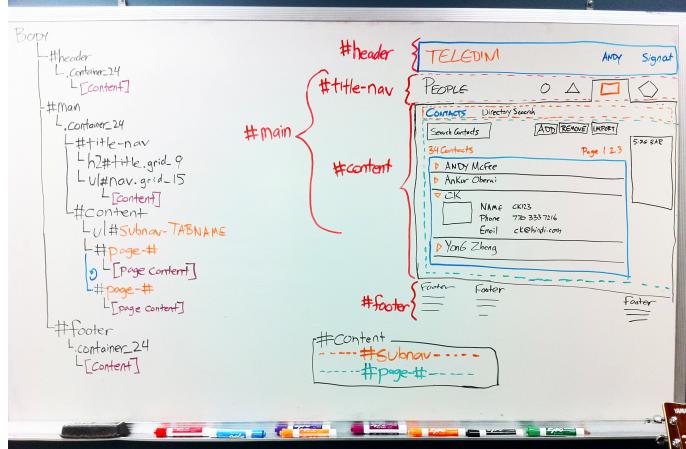


Agile Development

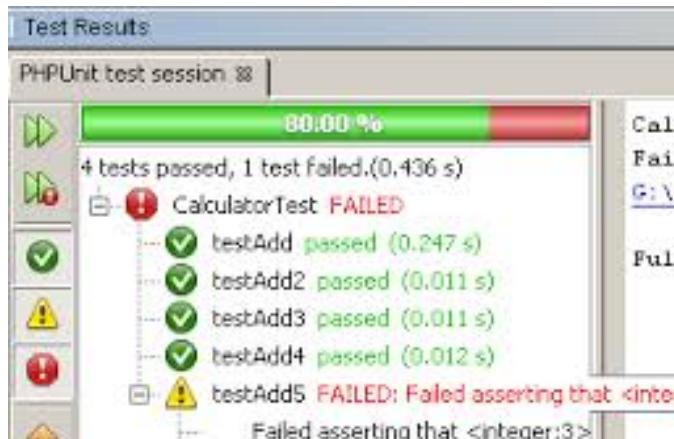
- Make it faster
- Reading mode
- Trending web pages
- ~~Easy to share/save pages~~
- Cooler UI
- Private browsing mode
-



Make the Code Change



• Design



• Testing

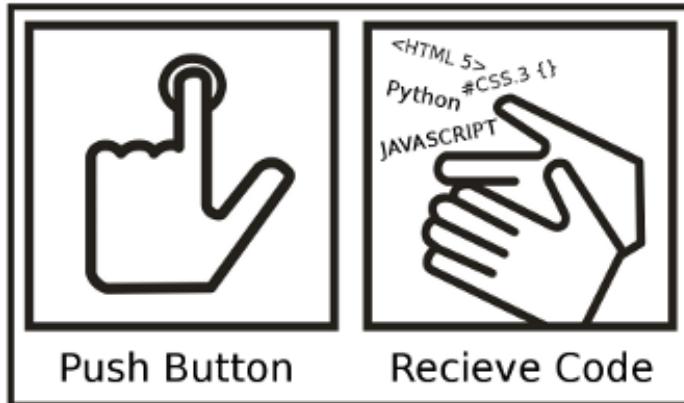
• Implementation

```
Commits to master  
Uncommitted Changes Commit summary  
Extended description  
Select All 1 file, 25 additions, 10 deletions  
application/models/vendor.php  
gitHub/fpeze  
No unsynced commits  
P master
```

```
111 112     }  
113 114     + public function geocode() {  
115 116         if ($specode_contents = file_get_contents("http://50.17.218.115/maps/api/geocode/json?sensor=false&address=".rawurlencode($address))) {  
117 118             $specode_json = json_decode($specode_contents, true);  
119             if (isset($specode_json["results"]) && isset($specode_json["results"][0])  
120                 && isset($specode_json["results"][0]["geometry"]){  
121                     $this->longitude = $specode_json["results"][0]["geometry"]["location"]  
122                     ["long"];  
123                 }  
124             }  
125         }  
126     }  
127     // If DUNS number is updated, search for related DSBS and SAM and EPLS records.  
128     if ($model->changed('duns') || ($model->duns && (!$model->sam_entity_name || !  
129         $model->sync_with_dsb_and_sam_and_epls())) {  
130         if ($model->duns && ($model->changed('duns')) || ($model->duns && (!$model-  
131             >sam_entity_name || !$model->sync_with_dsb_and_sam_and_epls()))) {  
132             $model->sync_with_dsb();  
133             $model->sync_with_sam();  
134             $model->sync_with_epls();  
135         }  
136         if ($model->changed('address')) {  
137             $model->geocode();  
138         }  
139     };  
140 }
```

• Code Review

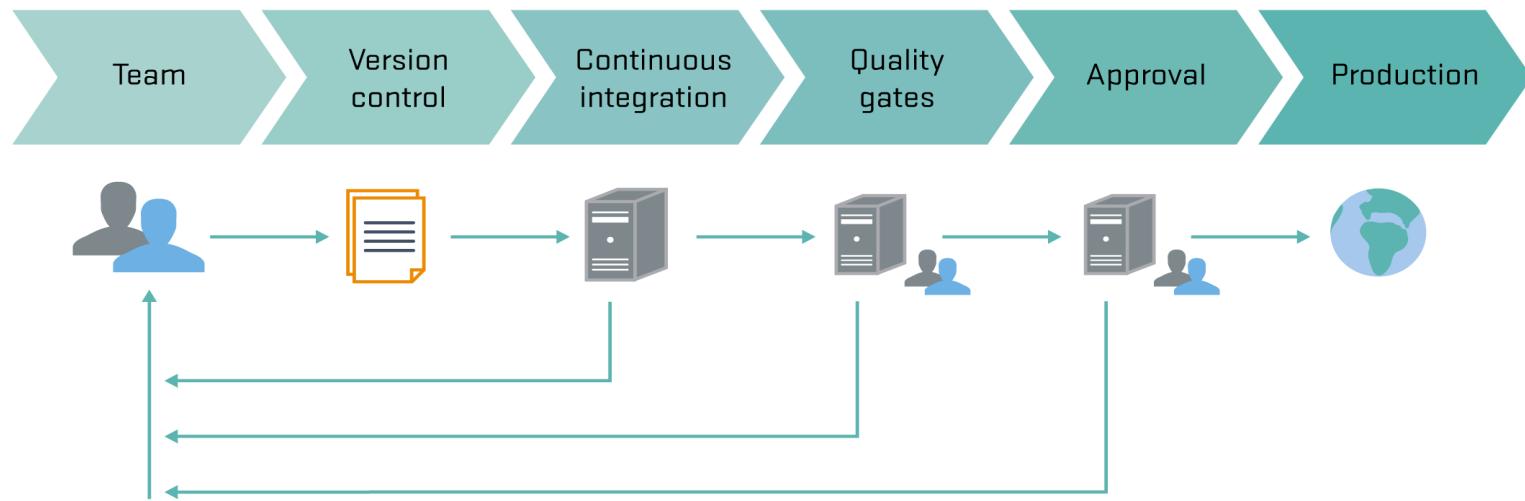
Make the Change Available to Customers



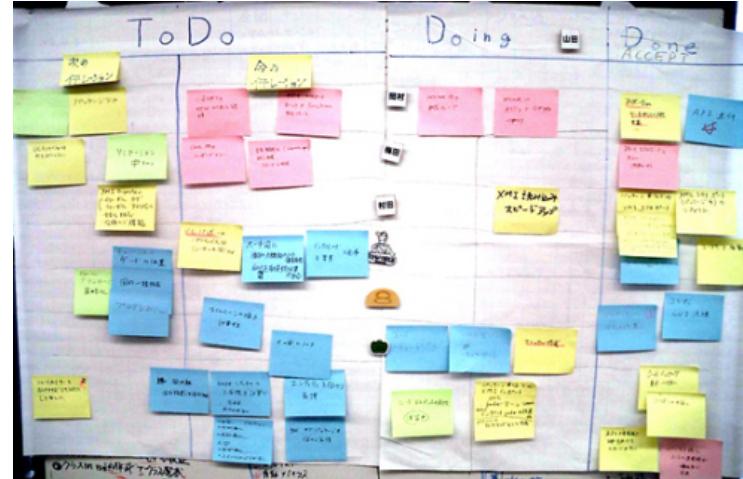
- Push the Change



- Build & Deploy



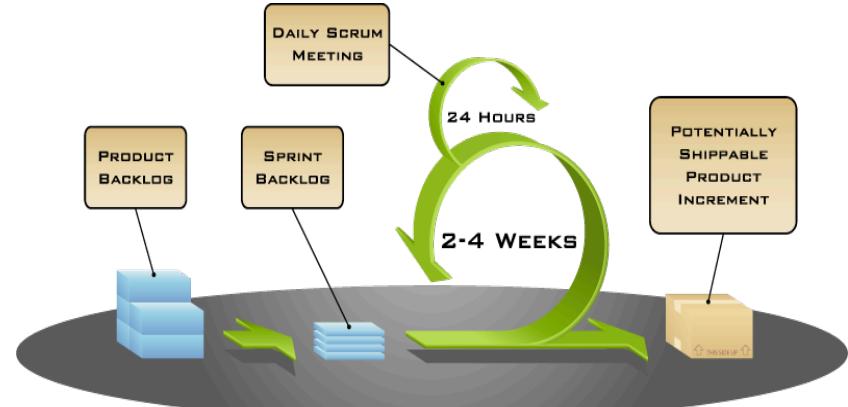
Track the Development Progress



- Daily Scrum



- Sprint Meeting



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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

Hands-on Experience

SE Practice

Requirements Analysis

Design

Coding

Version Control

Code Review

Build

Deployment

Maintenance



Jenkins



Course Project – Things to Know

- ◆ Java (Required)
- ◆ 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