

08/29: Capstone Overview

The Capstone Experience

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Fall 2012



*From Students...
...to Professionals*

Capstone Overview

➤ Course Logistics

- Client Projects
- Course Logistics (Continued)

CSE 498, Collaborative Design

- “The Capstone Experience”
- Instructors
 - Dr. Wayne Dyksen (“Dr. D.”)
 - Meredith Schmidt
- Class Meetings
MW, 3:00-3:50pm, 1145 EB
- Syllabus
- Web Site
 - capstone.cse.msu.edu
 - Check it often.



Course Goals

(1 of 2)

- Build a Significant Software System
- Work in a Team Environment
- Learn New Tools and Environments
- Build and Administer Systems
- Develop Your Communication Skills
- Develop Interview Talking Points
- Etc...



Course Goals

(2 of 2)

- Teams of Students
- Build Significant Software System
 - Design
 - Develop
 - Debug
 - Document
 - Deliver
- For Corporate Clients
- In 15 (Short) Weeks



Project Deliverables

- Project Plan Document & Presentation
- Alpha Presentation
- Beta Presentation
- Project Software & Documentation
- Project Video
- Design Day

See [Major Milestones](#).



All-Hands Meetings

- Presentations By
- Dr. D.
- Teams
 - Status Reports
 - Formal Presentations
 - Project Plan
 - Alpha
 - Beta
 - Project Videos
- Guest Speakers



All-Hands Meeting Agendas

08/29: Capstone Overview
09/03: (Labor Day, No Meeting)
09/05: Project Plan
09/10: Risks and Prototyping
09/12: Team [Status Report Presentations](#)
09/17: Team [Project Plan Presentations](#)
09/19: Team [Project Plan Presentations](#)
09/24: Team [Project Plan Presentations](#)
09/26: Team [Project Plan Presentations](#)
10/01: Resume Writing and Interviewing
10/03: [Career Gallery](#)
10/08: Schedule and Teamwork
10/10: Creating and Giving Presentations
10/15: Team [Alpha Presentations](#)
10/17: Team [Alpha Presentations](#)
10/22: Team [Alpha Presentations](#)
10/24: Team [Alpha Presentations](#)

10/29: [Design Day](#) and the [Project Videos](#)
10/31: Camtasia
11/05: Team [Beta Presentations](#)
11/07: Team [Beta Presentations](#)
11/12: Team [Beta Presentations](#)
11/14: Team [Beta Presentations](#)
11/19: Team Status Reports
11/21: Team Status Reports
11/26: Ethics and Professionalism
11/28: Intellectual Property and Copyright
12/03: [Project Videos](#)
12/05: [Project Videos](#) and [All Deliverables](#)
12/06: [Design Day Setup](#)
12/07: [Design Day](#)
12/11: [Project Videos](#)



Urban Science Capstone Lab

- 3352 EB
- Door Lock
 - Electronic Keypad
 - Code = #####
- Systems
 - Three PC's per Team
 - Dell Rack-Mounted Server
 - Two Development Machines
 - ❖ 27" iMac
 - ❖ 13" MacBook Pro
 - Team 100% Responsible
 - Building
 - Maintaining
 - Securing
 - Backing Up
- Books
- Conference Area
 - Team Meetings
 - Client Conference Calls
 - Google [Conference Calendar](#)
- Appliances
 - Water Cooler/Heater
 - Refrigerator
 - Microwave
 - Keurig Coffee Maker
- Lockable Storage
 - One Drawer Per Team
 - Assigned and Labeled
 - Obtain Keys from CSE Office



Scheduled Lab Times

- No Formal Lab Sessions
- “Credit” for Scheduled Weekly Meetings
 - Team Meeting
 - Client Conference Call
 - Triage Meeting with Meredith
- Meeting Times TBA With
 - Team
 - Client
 - Meredith
- Students must be available to meet.

Capstone Overview

✓ Course Logistics

➤ Client Projects

- Course Logistics (Continued)

Team / Project Generalities

- Clients
 - Vary in Size and Type
 - Client contacts/mentors are “volunteers”.
- Team Contact Person
 - Picked By Team
 - Main Point of Contact for Client

Team / Project Generalities

- Project Types
 - All Significant Software Development
 - Vary in Specifics
- Project Level of Difficulty
 - Hard Enough
 - But Not too Hard
- Deliverable
 - To the Client
 - By the Due Date



Team / Project Generalities

- Challenges
 - Very Short, Unforgiving Time Line
 - Client Contact
 - Team Dynamics
 - Project Plan (in Three Weeks)
 - Entirely New...
 - Languages
 - Environments
 - API's
 - SDK's
 - Processes
 - Protocols
 - Etc.
 - Project Management
 - Etc...



Project Specifics

- Vary
 - Type
 - Current State of Specificity
- Challenge
 - Connect with Client
 - “Nail Down” the Project
 - Hard Enough
 - Not too Hard
 - Avoid Feature Creep
 - Course Feature, Not Bug



Project Teams/Clients

- Team Auto-Owners
- Team Boeing
- Team Ford
- Team GE Aviation
- Team Google
- Team Meijer
- Team Mozilla
- Quicken Loans
- Team Spectrum Health
- Team TechSmith
- Team Urban Science
- Team Whirlpool



Team Auto-Owners

Project Overview

Pig “E” Bank

- Functionalities
 - Make Electronic Deposits Into Annuity Accounts
 - By Annuity Policyholder, Family, and Friends
 - Via Web Apps, Both Classic and Mobile
- Features
 - Secure Account Management
 - Deposits Based On Policyholder Name and DOB
 - By Policy Holder and Non-Policy Holders
 - Via Credit Cards, PayPal, and EFTs
 - Special Events Gift Selection
 - Birthday, Graduation, Retirement, Etc.
 - Send Card with Deposit Amount to Annuity Policy Holder
 - Support Various Mobile Devices
 - Print and Email Confirmations for Customers and Agents
 - Display Agent Contact Information
 - Administrative Application for Report Generation
- Technologies
 - Microsoft C#, ASP.NET 4.0
 - Microsoft SQL Server 2012
 - jQuery Mobile
 - Ember.js
 - QUnit



Lansing, Michigan



Team Boeing

Project Overview

Design, Fly and Compete Sim Suite, V 2.0

- Functionalities
 - Flight Simulation Product Suite
 - Players Compete on Obstacle Courses
 - Five Modes of Play
 - State-of-the-Art Visualization and Networking
 - Accurate Aerodynamic Physics of Flight
- Features
 - Enhancements of Design, Fly and Compete Simulator
 - DIS (Distributed Interactive Simulation)
 - HLA (High Level Architecture) Networking
 - JSON (JavaScript Object Notation)
 - Web Version of Design, Fly and Compete Simulator
 - Compatible with All Modern Browsers
 - Implemented in HTML5, JavaScript, JSON and WebGL
- Technologies
 - HTML5
 - JavaScript and JSON (JavaScript Object Notation)
 - Blender (3D Modeling)
 - OpenGL and WebGL
 - DIS (Distributed Interactive Simulation) and WebSockets
 - Design, Fly and Compete Simulator, Spring 2012



St. Louis, Missouri

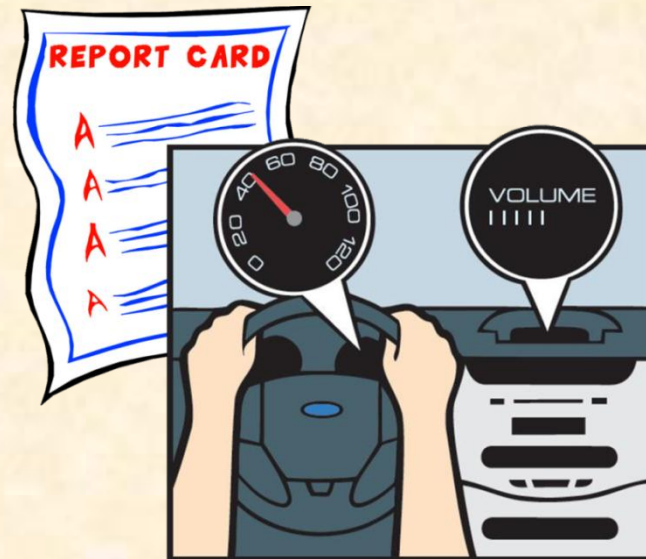


Team Ford

Project Overview

MyKey Report Card

- Functionalities
 - Existing Ford MyKey® Technology
 - Customized Car Key
 - Controls and Monitors Vehicle Operation
 - ❖ Maximum Speed
 - ❖ Maximum Audio Volume
 - ❖ Etc.
 - MyKey Report Card
 - Evaluation of Driver's Driving Habits
 - Four Usage Scenarios
 - Real Time Notifications In Case of Emergency
- Features
 - Report Card Templates
 - Methods for Emergency Notifications
 - Set Cadence of Reports
 - Four Usage Scenarios
 - Remote Parental Supervision
 - Monitoring Employee Driving Habits
 - Insurance Company Collaboration
 - Theft Reporting
- Technologies
 - CSS, HTML5, JavaScript, AJAX
 - Android SDK
 - J2EE (Java 2 Platform Enterprise Edition)
 - OpenXC Platform
 - CAN (Controller Area Network) Bus
 - Microsoft SQL Server



Dearborn, Michigan

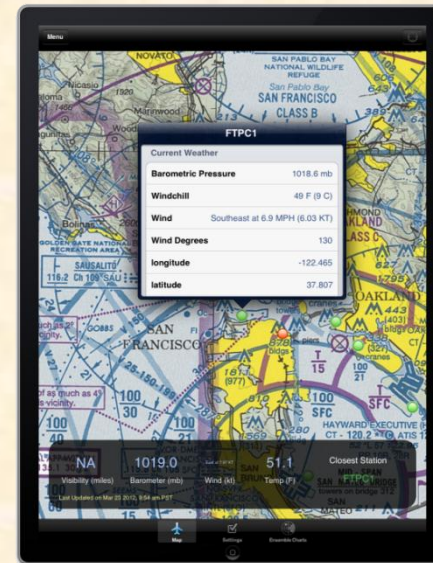


Team GE Aviation

Project Overview

Mobile Avionics Satellite Imagery

- Functionalities
 - Display and Manipulate Satellite Imagery
 - Geo-Referenced
 - Ultra-High Resolution
 - Via iPhone and iPad Apps
- Features
 - Intuitive, Easy-to-Use Interface
 - Interactions
 - Translation, Scaling and Rotation
 - Geo-Located Touch Sensitivity
 - Fast and Efficient Image Processing
 - Manipulation Algorithms
 - Data Caching
- Technologies
 - C, Objective-C
 - Apple iOS iPhone/iPad SDK
 - ESRI Geo-Tiff Image Specification
 - Ultra-High-Resolution Image Manipulation



Grand Rapids, Michigan



Team Google

Project Overview

Indexing System Mobile Dashboard

- Functionalities
 - Existing Indexing System Dashboard
 - Displays State of Google's Indexing System
 - Used to Identify, Debug and Solve Problems
 - Limited to Desktops and Laptops
 - Indexing System Mobile Dashboard
 - Mobile Version of the Indexing System Dashboard
 - Android-Based, Version ≥ 4.0
 - Both Phones and Tablets
- Features
 - Google App Engine Back End
 - Stores Indexing Data
 - Pushes Indexing Data to Mobile Devices
 - Tool to Update Back End Indexing Data
 - Mobile Dashboards
 - Pulls Data from the Back End
 - Displays Indexing System Performance Graphs
- Technologies
 - Java
 - Android SDK
 - Google App Engine
 - Google Chart Tools
 - Google Protocol Buffers



Mountain View, California



Team Meijer

Project Overview

IT ePager System

- Functionalities
 - Page IT Team Members
 - Via Web App
 - To Address Computer System Issues
- Features
 - Intuitive, Easy-to-Use User Interface
 - Role-Based/Password-Protected Access
 - Page Individuals or Groups
 - Create and Edit Paging Groups
 - Broad Paging Support
 - Devices
 - ❖ Pagers
 - ❖ Smart Phones
 - Service Providers
 - Back End Tools
 - Administrative
 - Reporting
- Technologies
 - C#
 - Microsoft .NET, ASP.NET
 - JavaScript, jQuery, jQuery UI
 - Visual Studio 2010
 - Microsoft SQL Server 2008



meijer[®]

Grand Rapids, Michigan



Team Mozilla

Project Overview

Reader Mode for Desktop Firefox

- Functionalities
 - Firefox Viewing Mode
 - Designed for the Reading Experience
 - Optimized for Long Reading Sessions
- Features
 - Decluttered View
 - Dimmed or Removed Irrelevant Content
 - Styled Reading Content
- Technologies
 - CSS, HTML5
 - XML/XUL (XML User Interface Language)
 - JavaScript
 - Mercurial
 - Bugzilla



Mountain View, California



Team Quicken Loans

Project Overview

Secure Note Taking and Collaboration Tools

- Functionalities
 - Mobile Note Taking Tool
 - Apple iOS and Google Android Devices
 - Collaborative
 - Internal and Secure
- Features
 - Multimedia Notes
 - Four Primary Inputs
 - On-Screen Keyboard
 - Free Form Drawing
 - Photo and/or Camera
 - Audio
 - Incorporate Metadata
- Technologies
 - CSS, HTML5, JavaScript
 - Apple iOS
 - Google Android
 - Microsoft SQL Server
 - C#, ASP.Net
 - Microsoft Active Directory
 - Encryption Based on QL Standards



Quicken Loans
Engineered to **Amaze**
Detroit, Michigan



Team Spectrum Health

Project Overview

Medication Shortages Dashboard

- Functionalities
 - Manage Shortages of Key Medications
 - Chose Best Course of Action
 - Weather the Shortage
 - Seek Additional Stock from the Grey Market
 - Swap the Medication for an Alternative
- Features
 - Create Comprehensive View of Industry Shortages
 - XML/RSS Feeds
 - ❖ American Society of Hospital Pharmacists
 - ❖ FDA (Food and Drug Administration)
 - Formulary Information from PharmNET
 - Inventory Levels of Lawson, the Pyxis and Tally Machines
 - Spectrum Pharmacies and Store Rooms
 - Identify and Handle Specific Shortages
 - Record, Monitor and Track
 - Log Comments, Plans of Action and Status
 - Integrate into Spectrum's InSite System
- Technologies
 - CSS, HTML5
 - JavaScript
 - Web Services
 - RSS (Rich Site Summary) Feeds
 - XML (eXtensible Markup Language)
 - Data Warehousing/Aggregation



SPECTRUM HEALTH 

Grand Rapids, Michigan

Team TechSmith

Project Overview

Snagit Power Tools

- Functionalities
 - Existing Snagit Software
 - Screen Capture
 - Customizable and Extensible
 - Snagit Power Tools
 - Suite of Snagit Apps
 - Demonstrate the Extensibility of Snagit
- Features
 - Easy and Fun to Use
 - Publishable Code
 - Well Designed and Commented
 - Easy to Understand
 - Possible Power Tools
 - Scheduled Image Capture
 - Screen Recording DVR
 - Social Network Image Stream
 - Map Maker
- Technologies
 - Windows COM (Component Object Model)
 - Snagit SDK, Snagit COM Server
 - COM Languages Like C#, .NET and WPF
 - Web Services
 - Google Maps
 - Google Docs
 - Facebook
 - Twitter/Twitpic
 - RESTful API

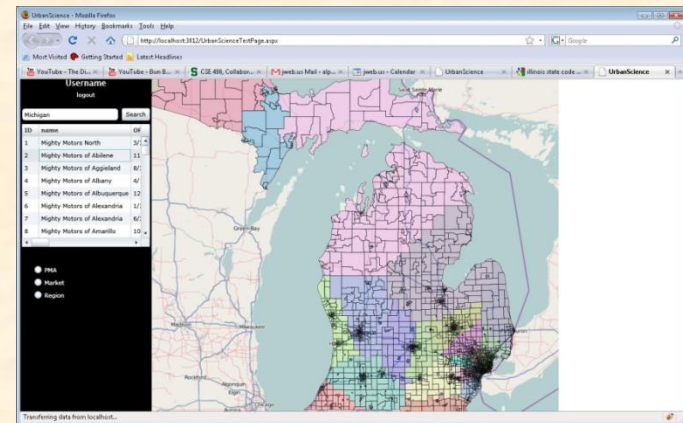


Team Urban Science

Project Overview

Web-Based Geography Management

- Functionalities
 - Display and Edit Detailed Maps
 - Based on Census Tracts or Zip Codes
 - Via Any Modern Brower
- Features
 - Handle Very High Resolution Maps
 - Political Boundaries, Cities, Etc.
 - Water, Roads, Etc.
 - Census Tracts or Zip Codes
 - Edit Geographic Structures
 - Aggregate Into Regions or PMAs (Primary Market Areas)
 - Add, Remove, Edit, Combine, Split, Etc.
- Technologies
 - CSS, HTML5
 - Microsoft Bing Maps
 - ASP.net
 - JavaScript, AJAX (Asynchronous JavaScript and XML)
 - WMS (Web Map Service)
 - US Census Bureau TIGER (Topologically Integrated Geographic Encoding and Referencing)
 - Web-Based Geography Management, Spring 2009



URBAN SCIENCE.

Detroit, Michigan



Team Whirlpool

Project Overview

Connected Appliances Analytics Dashboard

- Functionalities
 - Analytics Dashboard
 - “Connected Appliances” Information
 - Consumer Data
 - Used For
 - Predictive Analytics
 - Customer Service
 - Marketing and Sales
- Features
 - Cloud-Based Database Backend
 - Generated from Daily Log Files
 - Via JSON
 - Role-Based Security
 - Anonymized Customer Data
 - Report Generator
- Technologies
 - CSS, HTML
 - PHP or .NET
 - JavaScript, JSON (JavaScript Object Notation)
 - Java
 - Microsoft SQL Server
 - RESTful Web Services



Benton Harbor, Michigan

First Assignments

- Read the Syllabus.
- Check out the Lab (3352 EB).
 - See if you can find it.
 - See if you can get in.
- Check out the Web Site.
- Research Your Project.
 - Client
 - Technologies

What's Next?

- Teams
 - Assignments by Email Tonight
 - Meet Initially by Thursday Afternoon
 - Lab Machine Assignments in Lab
 - Start Configuring Lab Machines
 - Team Photos
 - Next Wednesday 09/05, After All-Hands Meeting
 - Dress Casual (But Appropriate)
- Client
 - Contact by Email by Thursday COB
 - Conference Call by Phone Thursday or Friday
 - Review Project Proposal

Capstone Overview

✓ Course Logistics

✓ Client Projects

➤ Course Logistics (Continued)

Urban Science Capstone Lab Machines

- Three Per Team
 - Rack-Mounted Dell Server
 - Connected to the Outside World
 - Keep Secure
 - 27" iMac
 - 13" MacBook Pro
- Operating Systems
 - Run OSX
 - Install VMware Fusion (from [here](#))
 - Create Virtual Machines
 - Windows XP, Vista, 7
 - Linux



Urban Science Capstone Lab Miscellany

- Security
 - Keep Lab Doors Closed
 - Do Not Open Doors For Strangers
 - Email Dr. D. if Door Becomes Unlocked
- Wireless
 - SSID: CSE498
 - Key:
- Coffee
 - Some Provided by Dr. D.
 - Bed, Bath & Beyond (Get 20% Off Coupon)
- Game Playing
 - Not On Monitors Facing Hallway
 - Not If Other Team Members Need Machine



Expectations & Workload

- Extremely High For Both
- Your MSU Career Capstone
- Addition to Your Personal Portfolio
- Experience Viewed Like an Internship
- Interview Talking Points
- Leverage Into a Job Offer



Major Milestones

- 09/12: Status Report Presentations
- 09/17: Project Plan Presentations
- 10/15: Alpha Presentations
- 11/05: Beta Presentations
- 12/03: Project Videos
- 12/05: All Deliverables
- 12/06: Design Day Setup
- 12/07: Design Day



Meeting Attendance

- Required
 - All-Hands (Class) Meetings
 - Team Triage Meetings
 - 5% of Final Grade
 - Late == Absent
 - Almost No Excuses Accepted
 - One or Two Excused Possible for Interviews
 - Must Provide Information In Advance
(Date, Company, Recruiter Name & Contact Info)
 - Must Attend (No Excuses Accepted)
 - Your Team Presentations
 - All Final Project Video Viewing
 - Design Day
- Do NOT Schedule Interviews
Do NOT Schedule ANYTHING



Team Organization

- Up to Each Team
- Organize into Roles
 - Client Contact
 - Program Manager
 - Developer
 - Tester
 - Systems Administrator
 - Etc...
- Everyone Must Make Technical Contributions



Team Dynamics

- Key to Success
- Significant Component of Course Grade
- Address Problems Immediately
 - Within Team
 - With Dr. D. and/or Meredith
- Be Ready to Discuss During Interviews



Grading

(1 of 3)

| | |
|--|-----------|
| • Team (70%) | |
| ▪ Project Plan Document & Presentation | 10 |
| ▪ Alpha Presentation | 10 |
| ▪ Beta Presentation | 10 |
| ▪ Project Video | 10 |
| ▪ Project Software & Documentation | 25 |
| ▪ Design Day | <u>05</u> |
| ▪ Total | 70 |
| • Individual (30%) | |
| ▪ Technical Contribution | 10 |
| ▪ Team Contribution | 10 |
| ▪ Team Evaluation | 05 |
| ▪ Meeting Attendance | <u>05</u> |
| ▪ Total | 30 |



Grading

(2 of 3)

- Final Grade Sum Of...
 - Individual Total
 - % of Team Total Based on Team Contribution
- Grand Total =
$$\begin{aligned} &(\text{Individual Total}) \\ &+ \\ &(\text{Team Total}) * (\text{Team Contribution}) / 10.0 \end{aligned}$$
- *Nota Bene*: Your Team Contribution will have a very significant effect on your final grade.



Grading

(3 of 3)

- We reserve the right to make changes with sufficient notice.
- No special consideration will be given for final grades including but not limited to
 - status in any academic program including CSE,
 - financial aid,
 - rank in the armed forces,
 - job,
 - graduation,
 - mortgage,
 - wedding,
 - visa status,
 - or anything else.



Integrity of Scholarship

- MSU's policies will be enforced.
- Individual and team work must be original.
- Violators...
 - ...will be referred to the appropriate deans.
 - ...may receive a grade of F in the course.



IP & NDA's

- IP: Intellectual Property
 - By Default, Owned by MSU
 - Client May Request
 - Right to Use
 - Assignment of Ownership
 - Etc.
- NDA: Non-Disclosure Agreement
 - May Be Required by Client
 - You will...
 - ...respect/protect intellectual property.
 - ...respect/protect source code.
 - ...etc.
- Normally Not an Issue
- Always Contact Dr. D. Before Signing Anything

} In flux



Using Resources

- Ok For “Help”
 - People
 - Past Capstone Teams
 - Other Capstone Teams
 - Faculty Members
 - Articles
 - Sample Code
 - Etc...
- Not Ok For “Entire” Project
- If Unsure, Ask Dr. D. and/or Meredith



Using Existing Code

- Ok
 - Examples
 - Prototypes
 - Open Source Code
 - Fragments
 - Libraries
 - Utilities
- Not Ok
 - Vast Amounts of Your Project
 - Not Open Source
- Document and Report All Existing Code Used
- Be Careful!
- If Unsure, Ask Dr. D. and/or Meredith



Design Day

- College of Engineering Event
 - MSU Union
 - Friday Morning, December 7, 2012
- Displays (Booths) of Design Projects
 - CSE Capstone
 - ECE Capstone
 - ME Capstone
 - Etc...
- Presentations and Awards
 - Panel of Judges
 - CSE Team Project Videos



VISA

- Verified Individualized Services and Accommodations
- Let us know immediately.
- We will work with you.



Office Hours

- Any Time...
 - Visit: 3149 EB
 - Call: 353-5573
 - Email: (dyksen@cse.msu.edu)
- Make Appointment



Capstone Overview

✓ Course Logistics

✓ Client Projects

Questions?

✓ Course Logistics (Continued)



09/05: Project Plan

The Capstone Experience

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