08/29: Capstone Overview

The Capstone Experience

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Fall 2012
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

• 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

• 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
    o Project Plan
    o Alpha
    o Beta
  ▪ Project Videos

• Guest Speakers
All-Hands **Meeting Agendas**

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<td>12/07</td>
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<td>12/11</td>
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*The Capstone Experience*
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
- **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
- **Books**
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...
    o Languages
    o Environments
    o API’s
    o SDK’s
    o Processes
    o Protocols
    o Etc.
  ▪ Project Management
  ▪ Etc...
Project Specifics

• Vary
  ▪ Type
  ▪ Current State of Specificity

• Challenge
  ▪ Connect with Client
  ▪ “Nail Down” the Project
    o Hard Enough
    o Not too Hard
    o 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
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
Mobile Avionics Satellite Imagery

• Functionalities
  ▪ Display and Manipulate Satellite Imagery
    o Geo-Referenced
    o Ultra-High Resolution
  ▪ Via iPhone and iPad Apps

• Features
  ▪ Intuitive, Easy-to-Use Interface
  ▪ Interactions
    o Translation, Scaling and Rotation
    o Geo-Located Touch Sensitivity
  ▪ Fast and Efficient Image Processing
    o Manipulation Algorithms
    o Data Caching

• Technologies
  ▪ C, Objective-C
  ▪ Apple iOS iPhone/iPad SDK
  ▪ ESRI Geo-Tiff Image Specification
  ▪ Ultra-High-Resolution Image Manipulation
Team Google

Project Overview

Indexing System Mobile Dashboard

• Functionalities
  ▪ Existing Indexing System Dashboard
    o Displays State of Google’s Indexing System
    o Used to Identify, Debug and Solve Problems
    o Limited to Desktops and Laptops
  ▪ Indexing System Mobile Dashboard
    o Mobile Version of the Indexing System Dashboard
    o Android-Based, Version ≥ 4.0
    o Both Phones and Tablets

• Features
  ▪ Google App Engine Back End
    o Stores Indexing Data
    o Pushes Indexing Data to Mobile Devices
  ▪ Tool to Update Back End Indexing Data
  ▪ Mobile Dashboards
    o Pulls Data from the Back End
    o Displays Indexing System Performance Graphs

• Technologies
  ▪ Java
  ▪ Android SDK
  ▪ Google App Engine
  ▪ Google Chart Tools
  ▪ Google Protocol Buffers
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
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
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
    o On-Screen Keyboard
    o Free Form Drawing
    o Photo and/or Camera
    o 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
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 Talyst 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
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

Okemos, Michigan
Team Urban Science

Project Overview

Web-Based Geography Management

• Functionalities
  ▪ Display and Edit Detailed Maps
  ▪ Based on Census Tracks or Zip Codes
  ▪ Via Any Modern Browser

• Features
  ▪ Handle Very High Resolution Maps
    ▪ Political Boundaries, Cities, Etc.
    ▪ Water, Roads, Etc.
    ▪ Census Tracks 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
Team Whirlpool

Project Overview

Connected Appliances Analytics Dashboard

• Functionalities
  ▪ Analytics Dashboard
    o “Connected Appliances” Information
    o Consumer Data
  ▪ Used For
    o Predictive Analytics
    o Customer Service
    o Marketing and Sales

• Features
  ▪ Cloud-Based Database Backend
    o Generated from Daily Log Files
    o 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
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
    o Connected to the Outside World
    o Keep Secure
  ▪ 27” iMac
  ▪ 13” MacBook Pro

• Operating Systems
  ▪ Run OSX
  ▪ Install VMware Fusion (from here)
  ▪ Create Virtual Machines
    o Windows XP, Vista, 7
    o 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

## Team (70%)
- Project Plan Document & Presentation: 10
- Alpha Presentation: 10
- Beta Presentation: 10
- Project Video: 10
- Project Software & Documentation: 25
- Design Day: 05
- Total: 70

## Individual (30%)
- Technical Contribution: 10
- Team Contribution: 10
- Team Evaluation: 05
- Meeting Attendance: 05
- Total: 30
Grading

• Final Grade Sum Of...
  ▪ Individual Total
  ▪ % of Team Total Based on Team Contribution

• Grand Total =
  (Individual Total)
  +
  (Team Total) * (Team Contribution) / 10.0

• Nota Bene: Your Team Contribution will have a very significant effect on your final grade.
Grading

• 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
    o Right to Use
    o Assignment of Ownership
    o Etc.

• NDA: Non-Disclosure Agreement
  ▪ May Be Required by Client
  ▪ You will...
    o ...respect/protect intellectual property.
    o ...respect/protect source code.
    o ...etc.

• Normally Not an Issue
• Always Contact Dr. D. Before Signing Anything

In flux
Using Resources

• Ok For “Help”
  ▪ People
    o Past Capstone Teams
    o Other Capstone Teams
    o 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
- Course Logistics (Continued)

Questions?
09/05: Project Plan

The Capstone Experience

Dr. Wayne Dyksen
Department of Computer Science and Engineering
Michigan State University
Fall 2012