01/09: **Capstone Overview**

**The Capstone Experience**

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Spring 2011
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, 1225 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
• Professor
• Teams
  ▪ Status Reports
  ▪ Formal Presentations
    o Project Plan
    o Alpha
    o Beta
  ▪ Project Videos
• Guest Speakers
All-Hands Meeting Agendas

- 01/09: Course Overview
- 01/11: Project Plan
- 01/16: (Martin Luther King Day, No Meeting)
- 01/18: Project Schedule and Risk
- 01/23: Team Status Report Presentations
- 01/25: Prototyping
- 01/30: Team Project Plan Presentations
- 02/01: Team Project Plan Presentations
- 02/06: Team Project Plan Presentations
- 02/08: Team Project Plan Presentations
- 02/13: Resume Writing and Interviewing
- 02/15: Creating and Giving Presentations
- 02/20: Team Alpha Presentations
- 02/22: Team Alpha Presentations
- 02/27: Team Alpha Presentations
- 02/29: Team Alpha Presentations
- 03/05: (Spring Break, No Meeting)
- 03/07: (Spring Break, No Meeting)
- 03/12: Design Day and the Project Videos
- 03/14: Camtasia Demo
- 03/19: Team Status Reports
- 03/21: Team Status Reports
- 03/26: Team Status Reports
- 03/28: Team Status Reports
- 04/02: Team Beta Presentations
- 04/04: Team Beta Presentations
- 04/09: Team Beta Presentations
- 04/11: Team Beta Presentations
- 04/16: Ethics and Professionalism
- 04/18: Intellectual Property
- 04/23: Project Videos
- 04/25: Project Videos and All Deliverables
- 04/26: Design Day Setup
- 04/27: Design Day
- 05/01: Project Videos
CSE498 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...

The Capstone Experience

Capstone Overview
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 Dow
- Team GE Aviation
- Team Meijer
- Team Motorola Mobility
- Team Mozilla
- Team Plex Systems
- Team Raytheon
- Team Spectrum Health
- Team TechSmith
- Team Urban Science
Team Auto-Owners

Project Overview

Enterprise Learning Management System

• Functionalities
  ▪ Manage Continuing Education and Certification
  ▪ For Auto-Owners Associates Throughout the Enterprise
  ▪ Customize and Extend Moodle LMS

• Features
  ▪ Show Complete Catalog of Courses
  ▪ View Transcripts by Associate
  ▪ Support Registration with Waiting Lists
  ▪ Suggest Courses and Certifications
  ▪ Support Various User Roles
  ▪ Track Resources Checked Out to Associates
  ▪ Integrate with External Vendors (Kaplan, AICPCU)

• Technologies
  ▪ Moodle Learning Management System
  ▪ PHP 5, JavaScript
  ▪ Microsoft SQL Server or MySQL
  ▪ Microsoft Access
Team Boeing

Project Overview

Design, Fly and Battle Flight Simulator

• Functionalities
  ▪ Flight Simulator Game
  ▪ Players Compete on Obstacle Courses
  ▪ With Airplanes Designed by Players

• Features
  ▪ Allow 2 to 5 Players Per Team
  ▪ Ability to Trade Off Various Airplane Features
  ▪ Support Joystick, Keyboard and Mouse
  ▪ Accurate Aerodynamic Physics of Flight
  ▪ Ability to Shoot Paintballs and See Damage
  ▪ Secure with Encrypted Networking

• Technologies
  ▪ C++, Python
  ▪ Jenkins, QT Creator
  ▪ Open Scene Graph (OSG)
  ▪ Blender (3D Modeling)
  ▪ Secure Internetworking, Encryption
Global Emissions Inventory Water Dashboard

• Functionalities
  - Visualize Global Emissions Inventory Water Data
  - Interactive World Map
  - Dual Display
    - Tabular Data
    - Graphical Mapping

• Features
  - Web-Based Dashboard
  - Display Water Data, Basin Names and Stressed Areas
  - View by Sites or Geographical Regions
  - Filter by Water Stressed Basins
  - Drill Down by Water Intake Type

• Technologies
  - Microsoft Visual Studio 2010
  - Microsoft SharePoint 2010
  - SQL Server Reporting Services
Team GE Aviation

Project Overview

Mobile Avionics Weather

• Functionalities
  ▪ Display Weather Maps
  ▪ For Aviation Industry
  ▪ On Mobile Devices
    o Apple iPad
    o Google Android Tablets

• Features
  ▪ Intuitive, Easy to Use Interface
  ▪ Visualize Complex Weather Data
  ▪ Support Multiple Users
    o Pilots
    o Air Traffic Controllers
    o Ground Controllers

• Technologies
  ▪ Apple iOS iPhone/iPad SDK, C, Objective-C
  ▪ Google Android SDK, Java
Team Meijer

Project Overview

Food Safety Audits and Reports

• Functionalities
  ▪ Food Safety Inspection System
  ▪ Used by Meijer Team Members
  ▪ For Meijer Stores

• Features
  ▪ HTML5-Based Web App
  ▪ Support Touchscreen Tablets
    o iPad
    o Android
  ▪ Various User Levels
    o Store Director Audit
    o Store Assessment
    o Store Audit

• Technologies
  ▪ Microsoft SQL Server 2008 R2, SQL Server Reporting Services
  ▪ Microsoft C#/.NET
  ▪ CSS, HTML 5
  ▪ XML (Extensible Markup Language)
  ▪ SOAP (Simple Object Access Protocol)
Team Motorola Mobility

Project Overview

Context Driven Content Delivery

• Functionalities
  ▪ Provide Enhanced Television Program Information
    o Actor Biographies
    o Upcoming Actor Appearances on Talk Shows
    o Merchandise Seen on Show
  ▪ Pushed to Mobile Devices
    o While Consumer Watches Content
    o Presented in Non-Intrusive Manner

• Features
  ▪ End-to-End Framework
  ▪ Extend Existing Sync Framework
    o Collect and Persist Contextual Data
    o Collect and Resolve Location Context and Content
    o Present Secondary Content to End User
    o Permit Authoring of Rules
    o Collect and Persist Application Usage

• Technologies
  ▪ Android Development (Java)
  ▪ Java (Servlets, JEE, JSE)
  ▪ Web Development (RESTful, XML, JSON, JavaScript, jQuery)
  ▪ Database (iBatis, Hibernate, MySQL)
  ▪ Messaging using Active MQ
  ▪ Hbase, Hadoop
  ▪ Synchronized Program Content Delivery, Fall 2011
Team Mozilla
Project Overview

In-Content Preferences for Firefox

• Functionalities
  ▪ Set Firefox Preferences
  ▪ Within Firefox Tab
    o Eliminate Popup Window
    o Use Content Area

• Features
  ▪ Seamless User Experience Across Devices
  ▪ Improve User Interface
  ▪ Integration of all Customizations into Preferences
    o Add-On Manager
    o Toolbar Layout

• Technologies
  ▪ CSS, HTML
  ▪ XML User Interface Language (XUL)
  ▪ JavaScript (Including New Language Features)
  ▪ Mercurial
  ▪ Bugzilla
Team Plex Systems

Project Overview

HTML5-Based WYSIWYG Label Designer

• Functionalities
  ▪ Design Labels
  ▪ For Manufacturing Companies
  ▪ To Label Products For End-Customers

• Features
  ▪ What You See Is What You Get (WYSIWYG)
  ▪ Web and Cloud-Based
  ▪ Support
    o Text Labels and Data
    o Barcoded Data
      ❖ 3 of 9
      ❖ 2D
      ❖ Code-128
    o Lines and Images

• Technologies
  ▪ CSS, HTML5 JavaScript, AJAX
  ▪ JQuery
  ▪ Microsoft SQL Server 2008
  ▪ Microsoft C#/.NET, ASP.NET
Team Raytheon
Project Overview

Android Secure VOIP Communications System

• Functionalities
  ▪ Command and Control Communications
  ▪ Group Voice Collaboration
  ▪ On Android-Based Handheld Devices
  ▪ Via Secure Voice Over Internet Protocol (VOIP)

• Features
  ▪ Select Users or Groups
  ▪ Capture Recordings in Case Folder
  ▪ Integrate with Total Battle Space Awareness (TBSA)
  ▪ Configure MX4025 Radios with Voice Commands
  ▪ Secure with AES 256 Encryption

• Technologies
  ▪ Voice over Internet Protocol (VOIP)
  ▪ Google Android SDK, Java
  ▪ Voice XML, Adobe Flex
  ▪ Speech Recognition
  ▪ Secure Internetworking, Encryption
  ▪ Bluetooth Interface Control
Web Applications for Healthier Communities

- **Functionalities**
  - Web-Based Mobile Evaluation System
  - For Spectrum’s Healthier Communities Program
    - Provides Health Care to Under-Served People
    - Throughout Western Michigan
  - Collect and Analyze Client Information

- **Features**
  - Support for Mobile Tablets (iPad and Android)
  - Adherence to HIPPA Guidelines
  - Encryption of Protected Health Information System
  - Integration with Spectrum’s Existing Systems
    - C-Trac
    - Enterprise Data Warehouse

- **Technologies**
  - Microsoft IIS, SharePoint, Active Directory
  - CSS, HTML, jQuery
  - Microsoft C#/.NET, ASP.NET MVC 3.0
  - Microsoft SQL Server, SQLMetal, LNQ
Team TechSmith

Project Overview

Mobile Smart Video Player

- Functionalities
  - Video Player for iPhone and iPad
  - Rich Playback Experience
    - Enhanced Navigation
    - Leverage Metadata

- Features
  - Table of Contents and Hotspots
  - User Settable Bookmarks
  - Timed Text Captions Displayed During Playback
  - Support For Panning and Zooming
  - Varied Playback Speeds with Audio Pitch Adjustments
  - Aggregation of Metadata from Multiple Viewers

- Technologies
  - Apple iOS iPhone /iPad SDK, C, Objective-C
  - TechSmith Camtasia Studio
  - Microsoft C#/ .NET, ASP.NET
  - Web Services (RESTful)
Team Urban Science

Project Overview

Infographic Generator

- Functionalities
  - Visualize Data and Information
    - Graphically
    - Compactly
    - Creatively
  - Based on Key Performance Indicators (KPIs)

- Features
  - Dynamic User Selections
    - Key Performance Indicators
    - Timeframes
  - Display Engaging Graphics
    - Scalable
    - Varied
  - Support Drill Down into KPIs

- Technologies
  - Microsoft C#/.NET, ASP.NET
  - JavaScript
  - CSS, HTML5
  - SQL Server
First Assignments

• Read the Syllabus
• Check out the Lab
  ▪ 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 Tuesday Afternoon
  ▪ Lab Machine Assignments in Lab
  ▪ Start Configuring Lab Machines
  ▪ Team Photos Wednesday After All-Hands Meeting

• Client
  ▪ Contact by Email by Tuesday COB
  ▪ Conference Call by Phone Tuesday or Wednesday
  ▪ Review Project Proposal
Capstone Overview

- Course Logistics

- Client Projects

- Course Logistics (Continued)
Lab Machines

• Three Per Team
  ▪ Rack-Mounted Dell Server
  ▪ 27” iMac
  ▪ 13” MacBook Pro

• Operating Systems
  ▪ Run OSX
  ▪ Install VMware Fusion (from here)
  ▪ Create Virtual Machines
    o Windows XP, Vista, 7
      (Windows 7 Professional SP1 DVDs in Lab)
    o Linux
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
  ▪ 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

• 01/23: Status Report Presentations
• 01/30: Project Plan Presentations
• 02/20: Alpha Presentations
• 04/02: Beta Presentations
• 04/23: Project Videos
• 04/25: All Deliverables
• 04/26: Design Day Setup
• 04/27: 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
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
    o Fragments
    o Libraries
    o 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, April 27, 2011
- 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
    o 3149 EB
    o 411 Nat Sci
  ▪ Call
    o EB: 353-5573
    o Nat Sci: 884-2469
  ▪ Send Email (dyksen@cse.msu.edu)

• Make Appointment
Capstone Overview

✔ Course Logistics

✔ Client Projects

✔ Course Logistics (Continued)

Questions?
01/11: Project Plan

The Capstone Experience

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