MICHIGAN STATE
U N I V E R S I T Y

08/31: Capstone Overview

The Capstone Experience

Dr. Wayne Dyksen
Department of Computer Science and Engineering
Michigan State University
Fall 2011

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, 2245 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
    - Project Plan
    - Alpha
    - Beta
  - Project Videos
- Guest Speakers

All-Hands Meeting Agendas

- 08/31: Capstone Overview
- 09/05: (Labor Day, No Meeting)
- 09/07: Project Plan
- 09/12: Project Schedule and Risk
- 09/14: Team Status Reports
- 09/19: Resume Writing and Interviewing
- 09/21: Team Project Plan Presentations
- 09/26: Team Project Plan Presentations
- 09/28: Team Project Plan Presentations
- 10/03: Team Project Plan Presentations
- 10/05: Career Gallery
- 10/10: Prototyping
- 10/12: Creating and Giving Presentations
- 10/17: Team Alpha Presentations
- 10/19: Team Alpha Presentations
- 10/24: Team Alpha Presentations
- 10/26: Team Alpha Presentations
- 10/31: Design Day and the Project Videos
- 11/02: Camtasia
- 11/07: Team Beta Presentations
- 11/09: Team Beta Presentations
- 11/14: Team Beta Presentations
- 11/16: Team Beta Presentations
- 11/21: Team Status Reports
- 11/23: Team Status Reports
- 11/28: Ethics and Professionalism
- 11/30: Intellectual Property and Copyright
- 12/05: Team Project Videos
- 12/07: Team Project Videos and All Deliverables
- 12/08: Design Day Setup
- 12/09: Design Day
- 12/15: Team Project Videos

CSE498 Lab

- 3352 EB
- Door Lock
  - Electronic Keypad
  - Code = ####
- Systems
  - Two PC's per Team
    - Server
    - Development Machine
  - 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 Labels
  - 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

Dr. Wayne Dyksen
Professor of Computer Science and Engineering

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Michigan State University
East Lansing, Michigan 48824

Team / Project Generalities

- Project Level of Difficulty
  - Hard Enough
  - But Not too Hard
- Deliverable
  - To the Client
  - By the Due Date
- Documentation
  - Administrator Manual
  - User Manual

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 Meijer
- Team Motorola Mobility
- Team Sparrow
- Team Spectrum Health
- Team TechSmith
- Team Urban Science

Team Auto-Owners
Project Overview

24-Hour Road Service Mobile Apps
- Functionalities
  - Request Road Service via Mobile Apps
  - GPS-Based Local Searches
    - Service Centers
    - Restaurants
    - Hotels
- Features
  - iPhone, iPad, and Android User Apps
  - Web Administrator App
  - Interface with Vendor, Quest
  - Process Insured Policy Information
    - Pulled from Auto-Owners Database
    - Pushed to Quest
- Technologies
  - Apple iOS iPhone and iPad SDK, C, Objective-C
  - Google Android SDK, Java
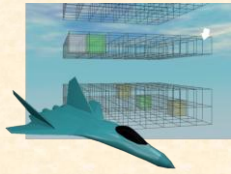 - CSS, HTML5, JavaScript

Auto-Owners Insurance
Life Home Car Business
Lansing, Michigan

Team Boeing
Project Overview

BAPS 2: Battle Aircraft Position Share 2
- Functionalities
  - Two-Player Game
    - Destroy Targets of Opposing Team
    - Use Aircraft with Various Capabilities
  - Integrated with Battle Aircraft Position Share
  - Based on Cyber Attacks
    - Gain Information
    - Disrupt Operations
- Features
  - Playable on iPhone and Android
  - Supports Both 1-Player and 2-Player Modes
  - Integration of Remote Cyber Attacks
- Technologies
  - iPhone and Android App Development
  - HTML5, JavaScript, WebGL
  - Blender (3D Modeling)
  - Internetworking
  - Data Encryption and Cyber Security
  - BAPS: Battle Aircraft Position Share, Spring 2011

BOEING
St. Louis, Missouri

Team Ford
Project Overview

Ford Qwikboard
- Functionalities
  - Virtual "Sticky" Note Boards
  - Share Ideas, Plans, Announcements, Etc.
  - Use Cases
    - Connect Geographically Dispersed Teams
    - Support War Room Processes and Methods
    - Enable Virtual Team Brainstorming
- Features
  - Organized by Teams, Projects and Purposes
  - Dividable into Panels
  - Support Rich Content, #Hashtags and @UserID
  - Accessible via Web, Tablets and Mobile Devices
  - Integrated with Microsoft Office and SharePoint
- Technologies
  - HTML5, JavaScript/AJAX, CSS
  - Microsoft Office and SharePoint
  - Microsoft SQL Server 2008
  - Ford Directory Services (FDS)
  - Lightweight Directory Access Protocol (LDAP)

Dearborn, Michigan

Team GE Aviation
Project Overview

NextGen Aircraft Taxi Assistance
- Functionalities
  - Airplane Ground Taxi Assistance
  - Safely Guide Pilots During Low Visibility
    - From Current Ground Position
    - To Point of Arrival or Departure
- Features
  - Three-Dimensional Visualization
  - Designed for Next Generation Flight Deck
  - Path Based On
    - Surface Route Information
    - Surface and Air Movement Information from Aircraft
  - X-Plane NOAA RUC Plug-In
- Technologies
  - X-Plane
  - Open GL, GL Studio, GLUT, GLEW
  - ARINC424 Data Streams
  - NOAA RUC (Rapid Update Cycle)
  - 4D Path Predictions
  - MSU Next Generation Flight Deck

Grand Rapids, Michigan

Team Meijer
Project Overview

Tablet-Based Point-of-Sale System
- Functionalities
  - Tablet-Based Self-Checkout System
  - For Use by Customers and Employees
  - Supports Various UPC Barcode Scanners
  - Interfaces with Meijer's Virtual Point-of-Sale Subsystem
- Features
  - HP Slate 500 Web Apps
  - SOAP 1.1-Based .NET Service for VPOS Transactions
  - Common Extensible .NET Service for UPC Scanners
  - Employee Monitoring of Customer
  - Transaction Totals and Item Exceptions
- Technologies
  - Micrsoft Windows Server 2008 R2
  - Microsoft Visual Studio 2010
  - Microsoft .NET, C# 4.0
  - CSS, HTML 5
  - XML
  - SOAP (Simple Object Access Protocol)

Grand Rapids, Michigan

Team Motorola Mobility
Project Overview

Synchronized Program Content Delivery
- Functionalities
  - Provide Enhanced Television Program Information
    - Actor Biographies
    - Upcoming Actor Appearances on Talk Shows
    - Merchandise Seen on Show
    - Etc.
  - Pushed to Mobile Devices
    - While Consumer Watches Content
    - Presented in Non-Intrusive Manner
- Features
  - Triggered at Specific Times in Program
  - Synchronized Between TV and Mobile Device
  - Displayed in Customizable Selectable Layers
- Technologies
  - iPhone, iPad Development (Objective-C)
  - Android Development (Java)
  - Java (Servlets, JEE, JSE)
  - Web Services (RESTful)
  - Web Development (XML, JSON, JavaScript, GWT)
  - Database (iBatis, Hibernate, MySQL)
  - Enhanced Program Guides for Mobile Devices, Fall 2010
  - Enhanced Content Authoring Services, Spring 2011

Libertyville, Illinois

Team Sparrow
Project Overview

iSupport Device Management System
- Functionalities
  - Manage Devices Throughout Hospital
    - Desktop Computers
    - Printers, Faxes, Scanners and Copiers
    - Over 2,000 Devices
  - Improve Reliability and Response Time
  - Location Aware via Facility Maps
  - Suggest Alternate Devices
- Features
  - Configurable Dashboard Interface
  - Web, iPhone and iPad Apps
  - Generate Helpdesk Tickets
  - Produce Reports
- Technologies
  - CSS, HTML5, JavaScript
  - Apple iOS iPhone and iPad SDK, C, Objective-C
  - Microsoft SharePoint and SQL Server
  - Microsoft .NET

Lansing, Michigan

Team Spectrum Health
Project Overview

Log Monitoring Compliance
- Functionalities
  - Automate Log Monitoring
  - Improve Compliance
  - Provide Automated
    - Alerts to Management
    - Forensic Evidence
- Features
  - Configurable Dashboard User Interface
  - Aggregation of Disparate Event Logs
  - Drill Down to Root Causes
  - Correlation Between Events and Problems
  - Reports for Action and Compliance
- Technologies
  - Microsoft SharePoint 2010
  - Epic, Cerner (Electronic Medical Record Systems)
  - Health Quest, Lawson (Financial Systems)
  - CA Service Desk (Ticketing System)
  - Syslog, P2Sentinel (Logging Systems)

SPECTRUM HEALTH
Grand Rapids, Michigan

Team TechSmith
Project Overview

Mobile Web Reporter
- Functionalities
  - Enable "Citizen Journalists"
  - Create Video Content in the Field
  - Publish to YouTube, Facebook and Screencast.com
- Features
  - Mobile App
    - iPhone and iPad
    - Android Phone and Tablet
  - Capture Content from Camera and Web Browser
  - Add Voice Narrations and Annotations
  - Support
    - Reusable Content
    - Geotagging
    - History of Shared Content
    - Notifications of Likes, Replies and Comments
- Technologies
  - Apple iOS iPhone and iPad SDK, C, Objective-C
  - Google Android SDK, Java
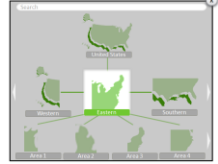 - YouTube, Facebook and Screencast .com APIs

TechSmith
Okemos, Michigan

Team Urban Science
Project Overview

Visual Hierarchy Selection
- Functionalities
  - Visual Control for n-Level Hierarchy
    - Navigation
    - Selection
    - Search
  - Examples
    - Geography (United States > Eastern > Area 2 > Michigan)
    - Lead Source (Brand > Audi USA > Audi A8)
    - Vehicle Model (Audi A6 > Audi A6 3.0T)
- Features
  - Visually Appealing and User Friendly
  - Hierarchy Nodes
    - Include Image and Text
    - May Have Multiple Parents
  - Supports Web and Mobile Devices
- Technologies
  - HTML5
  - ASP.NET
  - JavaScript
  - SQL Server

URBAN SCIENCE
Detroit, Michigan

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 Thursday Afternoon
  - Lab Machine Assignments in Lab
  - Start Configuring Lab Machines
  - Team Photos Wednesday After All-Hands Meeting
- 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)

Lab Miscellany

- Security
  - Keep Lab Doors Closed
  - Do Not Open Doors For Strangers
  - Email Dr. D. if Door Becomes Unlocked
- Wireless
  - SSID: Capstone
  - Password:
- Coffee
  - Bed, Bath & Beyond
  - Get 20% Off Coupon
- Game Playing
  - Not On Monitors Facing Hallway
  - Maybe on Unassigned Machines (But Later)

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

- 09/14: Status Reports
- 09/21: Project Plan Presentations
- 10/17: Alpha Presentations
- 11/07: Beta Presentations
- 12/05: Project Videos
- 12/07: All Deliverables
- 12/08: Design Day Setup
- 12/09: 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   Do NOT Schedule Interviews
  - Design Day   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	05
Total	70
Individual (30%)	
Technical Contribution	10
Team Contribution	10
Team Evaluation	05
Meeting Attendance	05
Total	30

Grading (2 of 3)

- 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 (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

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 9, 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
    - 3149 EB
    - 411 Nat Sci
  - Call
    - EB: 353-5573
    - Nat Sci: 884-2469
  - Send Email (dyksen@cse.msu.edu)
- Make Appointment

Capstone Overview

✓Course Logistics

✓Client Projects   Questions?

✓Course Logistics (Continued)

MICHIGAN STATE
UNIVERSITY

09/07: Project Plan

The Capstone Experience

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