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

09/01: Capstone Overview

The Capstone Experience

Dr. Wayne Dyksen
Department of Computer Science and Engineering
Michigan State University
Fall 2010

From Students…
…to Professionals

Capstone Overview

➢Course Logistics

• Client Projects

• Course Logistics (Continued)

CSE 498, Collaborative Design

• "The Capstone Course"
• Instructors
  ▪ Dr. Wayne Dyksen ("Dr. D.")
  ▪ Stephen Paslaski
• Class Meetings
  MW, 3:00-3:50pm, 2245 EB
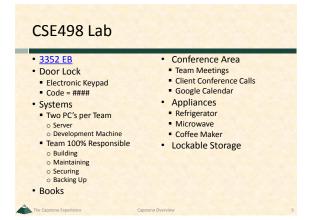• Course Web Site
  ▪ capstone.cse.msu.edu
  ▪ Check it often.

Course Goals

• Work in a Team Environment
• Build a Significant Software System
• Use (New) Tools and Environments
• Build and Administer Systems
• Develop Your Communication Skills
• Develop Interview Talking Points
• Etc…

Team Course Goal

• Build Large Software Project
  ▪ Design
  ▪ Architect
  ▪ Develop
  ▪ Test
  ▪ Document
  ▪ Deliver
• For Client
• *Ex Nihilo* (Out of Nothing)
• In 15 (Short) Weeks

Project Deliverables

• Project Plan Presentation & Document
• 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

- 09/01: Capstone Overview
- 09/06: (Labor Day, No Meeting)
- 09/08: Project Plan
- 09/13: Project Schedule and Risk
- 09/15: Team Status Reports
- 09/20: Prototyping
- 09/22: Resume Writing and Interviewing
- 09/27: Team Project Plan Presentations
- 09/29: Team Project Plan Presentations
- 10/04: Team Project Plan Presentations
- 10/06: Career Gallery
- 10/11: Creating and Giving Presentations
- 10/13: Design Day and the Project Videos
- 10/18: Team Alpha Presentations
- 10/20: Team Alpha Presentations
- 10/25: Team Alpha Presentations
- 10/27: Team Alpha Presentations
- 11/01: Camtasia
- 11/03: Team Status Reports
- 11/08: Team Beta Presentations
- 11/10: Team Beta Presentations
- 11/15: Team Beta Presentations
- 11/17: Team Beta Presentations
- 11/22: Team Status Reports
- 11/24: Team Status Reports
- 11/29: Ethics and Professionalism
- 12/01: Intellectual Property and Copyright
- 12/06: Team Project Videos
- 12/08: Team Project Videos and All Deliverables
- 12/09: Design Day Setup
- 12/10: 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 Calendar
- Appliances
  - Refrigerator
  - Microwave
  - Coffee Maker
- Lockable Storage

Scheduled Lab Times

- No Formal Lab Sessions
- "Credit" for Scheduled Weekly Meetings
  - Team Meeting
  - Client Conference Call
  - Triage Meeting with Stephen
- Meeting Times TBA With
  - Team
  - Client
  - Stephen
- 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
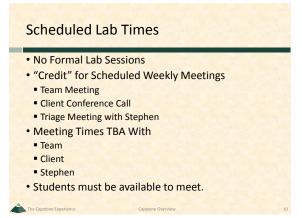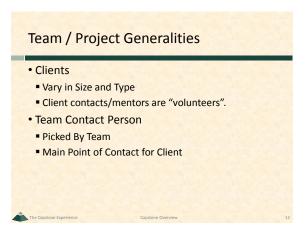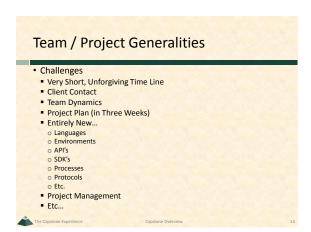 - Main Point of Contact for Client

Team / Project Generalities

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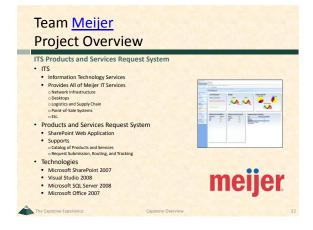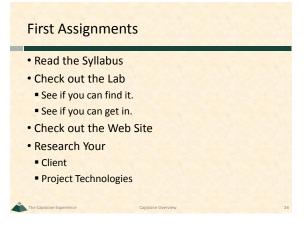- Documentation
  - System Administrator Manual
  - User Manual

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 GE Aviation
- Team Ford
- Team Medtronic
- Team Meijer
- Team Motorola
- Team TechSmith
- Team Urban Science

Team Auto-Owners Insurance
Project Overview

Agent Multimedia Ad Builder
- Build Auto-Owners Advertisements
  - Customized By and For Independent Agents
  - Utilize Corporate Templates
- Support Multimedia
  - Print
  - Radio
  - Television
  - Web
- Features
  - Upload Text, Photos, Images, Video
  - Save / Open
  - Edit
  - Preview / Produce
- Technologies
  - ASP.NET, 4.0 Framework
  - Microsoft Visual Studio 2010
  - Multimedia

QUALITY COVERAGE IN
26 States

Auto-Owners Insurance
Life Home Car Business

Team Boeing
Project Overview

O-Show for Simulation Software
- Simulation Software
  - Used For Training
  - Examples Include Flight and Urban Combat
  - Ultimate "Games"
- Optimize (O)
  - Use of Limited Resources in Simulation
  - Based on Weighted Priorities
  - Apply Mixed Integer Linear Programming
- Show
  - Visualize Resources and Priorities
  - Interface to Simulation Software
  - Visualize Results of Optimization
- Technologies
  - Linux
  - C++ / Perl
  - lpsolve (MILP)
  - OpenSceneGraph (OSG)

BOEING

Team Ford
Project Overview

Ford Idea Place Mobile Edition
- Ford Idea Place
  - Collect Innovative Ideas from Ford Employees
  - SharePoint Based Intranet Site
- Mobile Edition
  - Collect Ideas Anytime from Anywhere
  - iPhone, Android Apps
  - Leverages GPS, Camera, and Video
- Innovative Ideas App Features
  - Submit, View, Search, Rate, Comment
  - Share (Push to Users, Categories, Etc.)
  - Subscribe (Pull from Users, Categories, Etc.)
  - Show Context (Location, Photo, Video)
- Technologies
  - iPhone (Objective C) Software Development Environment
  - Android Software Development Environment
  - Microsoft SharePoint Services

Team GE Aviation
Project Overview

Super Synoptics
- Pilot Tasks
  - Aviate
  - Navigate
  - Communicate
  - Manage Systems
- Develop Innovative Management System
  - Show Aircraft Systems Status and Performance
  - Leverage Graphics and Graphical Displays
- Sample Synoptics
  - Engine Parameters
  - Fuel, Hydraulic, and Electrical Systems
  - Lifting, Trimming, and Airframe Configuring Systems
  - Environmental Control Systems
  - Pneumatic and Anti-ice Systems
- Technologies
  - X-Plane
  - Capstone Synthetic Vision Display, Fall 2009
  - Capstone Lateral Map Display, Spring 2010
  - Open GL, GL Studio

Team Medtronic
Project Overview

Wellness Applications for Medtronic Patients
- Help Patient Manage Health
  - Monitors Objective Measurements
  - Shows Effect of Behaviors and Choices
- Web App
  - Create and Track Goals
  - Provide Feedback on Health and Wellness
- iPhone App
  - Track Calorie Intake and Expenditure
  - Suggest Exercise and/or Food Consumption
  - Accept Input from Medtronic Monitoring Devices
    - Glucose Monitor
    - Cardiac Monitor
- Technologies
  - iPhone (Objective C) Software Development Environment
  - HTML / JavaScript / Ajax
  - Grails (Java-Based Framework)
  - Web Services with Microsoft HealthVault
  - Capstone Mobile Health Management System, Spring 2010

Team Meijer
Project Overview

ITS Products and Services Request System
- ITS
  - Information Technology Services
  - Provides All of Meijer IT Services
    - Network Infrastructure
    - Desktops
    - Logistics and Supply Chain
    - Point-of-Sale Systems
    - Etc.
- Products and Services Request System
  - SharePoint Web Application
  - Supports
    - Catalog of Products and Services
    - Request Submission, Routing, and Tracking
- Technologies
  - Microsoft SharePoint 2007
  - Visual Studio 2008
  - Microsoft SQL Server 2008
  - Microsoft Office 2007

Team Motorola
Project Overview

Enhanced Program Guides for Mobile Devices
- Program Guides
  - For TV and Internet Content
  - Provide Limited Information
- Enhanced Program Guides
  - For Same TV and Internet Content
  - Provide Enhanced Information
    - Actor Biographies
    - Appearances of Actors on Talk Shows
    - Merchandise Seen on Show
    - Etc.
- Mobile Devices
  - Enhanced Information
    - Pushed to Device While Consumer Watches Content
    - Accessible in Selectable Layers
  - Non-Intrusive
- Technologies
  - iPhone, iPad (Objective C) Software Development Environment
  - Android Droid Software Development Environment
  - RESTful Web Services
  - Java
  - Web Development (XML, JavaScript, Google Web Toolkit)

Team TechSmith
Project Overview

Extending Apps using Cloud Asset Sharing
- TechSmith App Assets
  - Stored on "Local" Disk
  - Snagit
    - Stamps
    - Images
  - Camtasia Studio
    - Callouts
    - Title Sequences
    - Intro/Outro Segments
- Enable App Asset Sharing
  - Store in the Cloud
  - Share Between Users
    - Workgroup
    - Company
    - Global Community
- Technologies
  - Microsoft
    - Azure
    - .NET, C#, Windows Presentation Foundation
  - TechSmith
    - Snagit
    - Camtasia Studio

Team Urban Science
Project Overview

Modern Online Analytical Processing Cube
- OLAP Cube
  - Database Querying Tool
  - Enables Rapid
    - Database Field Selection
    - Multidimensional Data Analysis
    - Visualization and Report Generation
- Current Product Limitations
  - Usability
  - Scalability
  - Functionality
- Modern Cube Requirements
  - Easy-to-Use User Interface
  - Scalable Database Architecture
  - New Urban Science Specific Functionality
- Technologies
  - Contour Cube
  - Dundas OLAP Cube
  - SQL Databases
  - Microsoft Silverlight

URBAN SCIENCE

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
  - Client
  - Project Technologies

What's Next?

- Teams
  - Assignments by Email Tonight
  - Meet Initially by Friday Afternoon
  - Lab Machine Assignments in Lab
  - Start Configuring Lab Machines
  - Team Photos Wednesday After All-Hands Meeting
- Client
  - Contact by Email by Friday Afternoon
  - Contact by Phone Tuesday or Wednesday
  - Review Project Proposal

Capstone Overview

✓Course Logistics

✓Client Projects

➢Course Logistics (Continued)

Course Environment

- Business-Like
- Team
  - External Software Development Company
  - Internal Software Development Team
- Dyksen & Paslaski
  - Are Your
    - External Paying Clients
    - Internal Managers
  - Expect Results
    - On Time
    - No Excuses

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

- 09/15: Status Reports
- 09/27: Project Plan Presentations
- 10/11: Alpha Presentations
- 11/08: Beta Presentations
- 12/06: Project Videos
- 12/08: All Deliverables
- 12/09: Design Day Setup
- 12/10: 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 ⎦

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 Stephen
- 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   5
  - Total   70
- Individual (30%)
  - Technical Contribution   10
  - Team Contribution   10
  - Team Evaluation   5
  - Meeting Attendance   5
  - 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.
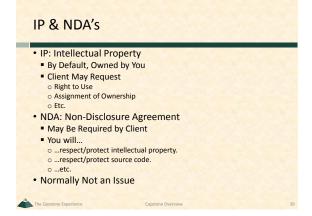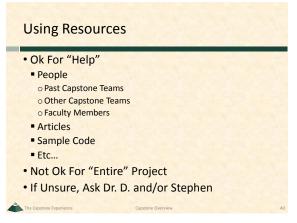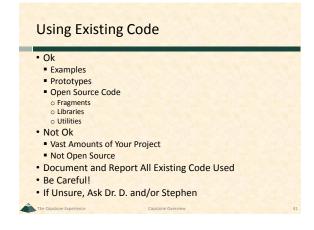
Grading (3 of 3)

- 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, or
  - visa status.

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 You
  - 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

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 Stephen

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 Stephen

Design Day

- College of Engineering Event
  - MSU Union
  - Friday Morning, December 10
- Displays (Booths) of Design Projects
  - CSE Capstone
  - ECE Capstone
  - ME Capstone
  - Etc…
- Presentations and Awards
  - Panel of Judges
  - CSE Team Project Videos

Dr. Wayne Dyksen
Professor of Computer Science and Engineering   7

Michigan State University
East Lansing, Michigan 48824

VISA

- Verified Individualized Services and Accommodations

- Let us know immediately.

- We will work with you.

Office Hours

- Any Time…
  - Visit
  - Call
  - Send Email
- Make Appointment

Capstone Overview

✓ Course Logistics

✓ Client Projects   Questions?

✓ Course Logistics (Continued)

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

09/08: Project Plan

The Capstone Experience

Dr. Wayne Dyksen
Department of Computer Science and Engineering
Michigan State University
Fall 2010

From Students…
…to Professionals