MICHIGAN STATE UNIVERSITY

01/08: Capstone Overview

The Capstone Experience

Dr. Wayne Dyksen

Department of Computer Science and Engineering
Michigan State University

Spring 2019

From Students…
…to Professionals

CSE 498, Collaborative Design

- "The Capstone Experience"
- Instructors
  - Dr. Wayne Dyksen ("Dr. D.")
  - James Mariani
  - Ryan Johnson
- Class Meetings
  MW, 3:00-4:20pm, 1279 Anthony
- Syllabus
- Web Site
  - capstone.cse.msu.edu
  - Check it often.
- Email
  - Check your email often.
  - Read my email thoroughly and carefully!

Professional Meeting Expectations

- Seated, Ready to Go by 3:00 p.m.
- No…
  - Electronic Devices
  - Hats or Hoods
  - Coats
  - Eating
  - Sleeping
  - “Breaks”

Capstone Overview

- Course Logistics

- Client Projects

- Course Logistics (Continued Next Meeting)

Course Goals

[1 of 3]

- Give You Experience In
  - Real World
  - Corporate Setting
- Start Your Transition
  - From Student…
  - …To Professional

Course Goals

[2 of 3]

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

Course Goals

[3 of 3]

- 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
- Learn to Do Stuff on Your Own
- Etc…

Project Deliverables

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

See Major Milestones.

All-Hands Meetings

Presentations By

- Dr. D.
- TAs
- Teams
  - Status Reports
  - Formal Presentations
    - Project Plan
    - Alpha
    - Beta
  - Project Videos
- Guest Speaker(s)

All-Hands Meetings Agendas

- 01/08: Capstone Overview
- 01/10: Project Plan
- 01/15: Risks and Prototypes
- 01/17: Team Status Report Presentations
- 01/22: Schedule and Teamwork
- 01/24: Team Status Report Presentations
- 01/29: Team Project Plan Presentations
- 01/31: Team Project Plan Presentations
- 02/05: Team Project Plan Presentations
- 02/07: Team Project Plan Presentations
- 02/12: Resume Writing and Interviewing
- 02/14: Creating and Giving Presentations
- 02/19: Team Alpha Presentations
- 02/21: Team Alpha Presentations
- 02/26: Team Alpha Presentations
- 02/28: Team Alpha Presentations
- 03/05: (Spring Break, No Meeting)
- 03/07: (Spring Break, No Meeting)
- 03/12: Team Status Report Presentations
- 03/14: Intellectual Property
- 03/19: Design Day and the Project Videos
- 03/21: Camtasia Demo
- 03/26: Ethics and Professionalism
- 03/28: Team Status Report Presentations
- 04/02: Team Beta Presentations
- 04/04: Team Beta Presentations
- 04/09: Team Beta Presentations
- 04/11: Team Beta Presentations
- 04/16: Team Status Report Presentations
- 04/18: Team Status Report Presentations
- 04/23: Project Videos
- 04/25: Project Videos and All Deliverables
- 04/25: Design Day Setup
- 04/26: Design Day
- 05/02: Project Videos

Schedules

- Schedules > All-Hands Meeting
- Schedules > Major Milestones
  - 01/17: Status Report Presentations
  - 01/29: Project Plan Presentations
  - 02/19: Alpha Presentations
  - 04/02: Beta Presentations
  - 04/23: Project Videos
  - 04/24: All Deliverables
  - 04/25: Design Day Setup
  - 04/26: Design Day
  - 05/02: Project Videos

- Attendance is required.
- No excuses are accepted.
- Do not schedule anything during these times including interviews, travel home, etc.
- Will coordinate with your interviews.

Urban Science Capstone Labs

- 3322EB , 3340EB, 3352EB, 3358EB
- Door Lock
  - Electronic Keypad
  - Code = ########
  - Do Not Give Out to Other Students
- Systems
  - Up to Four per Team
    - Two 27” iMacs
    - One Dell Rack-Mounted Server (Optional)
    - One Mac Book Pro (Optional)
  - Team 100% Responsible
    - Building
    - Maintaining
    - Securing
    - Backing Up
- Books
- WiFi
  - SSID: CSE498, CSE498 5MHz
  - Key: ???????
- Conference Room (3322EB)
  - Team Meetings
  - Client Conference Calls
  - Google Conference Calendar
- Appliances
  - Water Cooler/Heater
    Nota Bene: The water cooler is not connected to a drain. Do not pour things into it, like rinsing out your water container.
  - Whirlpool Refrigerator
    - Cold Water From Bottled Water
    - Ice From Bottled Water
  - Microwave
  - Keurig Coffee Maker
- Lockable Storage
  - One Drawer Per Team
  - As Needed
  - Assigned by Dr. D. and TAs
  - Obtain Keys from CSE Office

Scheduled Lab Times

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

CSE498 Prerequisites

Must Have Successfully Completed

- Tier I Writing Requirement
- CSE335
- CSE410
- Another 400-Level CSE Course Other Than CSE491

Capstone Overview

✓Course Logistics

➢Client Projects

- Course Logistics (Continued)

Team / Project Generalities [1 of 3]

- 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 [2 of 3]

- 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 [3 of 3]

- Challenges
  - Very Short, Unforgiving Time Line
  - Client Contact
  - Team Dynamics
  - Project Plan (in ~3 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

Intellectual Property and Non-Disclosure Agreements

- Intellectual Property Agreement
  - You agree to assign ownership of intellectual property that may be created as a result of your project to your client.
    - Copyrightable Program Code
    - Patentable “Ideas”
  - Most clients will require an IP agreement.
- Non-Disclosure Agreement
  - You agree not to disclose client confidential information.
  - Most clients will require an NDA.
- To date…
  - Most code has not gone directly into production.
  - No patents have resulted.
- Use agreements provided by MSU.
- Always Contact Dr. D. Before Signing Anything

Project Teams

- Amazon
- Aptiv
- Auto-Owners
- Consumers Energy
- Dow
- Driven-4
- Evolutio
- Ford
- Google
- Herman Miller
- Humana
- Meijer
- Michigan State University HPCC
- Michigan State University ITS
- Mozilla
- MSUFCU
- Principal
- Proofpoint
- Spectrum Health
- Surge Solutions
- Technology Services Group
- TechSmith
- Union Pacific
- United Airlines
- Urban Science
- Volkswagen

Team Amazon

Project Overview

Browser Sharing for Customer Support

- Functionalities
  - Provide Customer Support
  - Utilize Collaborative Browser Sharing
- Features
  - Share Only Browser View
  - No Download or Plugin Required
  - Pass and Maintain Data Securely
  - Offer Chatting and Annotating
  - Provide Session Logging
- Technologies
  - Amazon Web Services Elastic Cloud 2 (AWS EC2)
  - Amazon Web Services Command Line Interface (AWS CLI)
  - HTML / JavaScript / AJAX
  - React / Angular / Vue
  - REST Web Services / XML
  - Database / SQL

amazon

Seattle, Washington
Detroit, Michigan

Team Aptiv

Project Overview

Analysis of Autonomous Vehicle Testing Video

- Functionalities
  - Analyze Autonomous Vehicle Testing
  - Post-Process On-Road Video Logs
- Features
  - Identify Various Environmental Features
    - Other Vehicles
    - Overpasses
    - Tunnels
    - Bridges
    - Overhanging Trees
  - Scan and Tag All Video Logs
  - Synchronize Metadata with Video
  - Support Video Formats from US, Europe and Asia
  - Leverage Machine Learning
  - Integrate into Aptiv's Servers
- Technologies
  - Video and Image Processing
  - Machine Learning (ML)
  - Database Technologies

APTIV

Troy, Michigan

Team Auto-Owners

Project Overview

Secretary of State (SoS) Software Robot

- Functionalities
  - Expedite Worker's Compensation Insurance Claim Submission
  - Reconcile Business Name Against Secretary of State
  - Utilize Software Robots (Soft Bots)
- Features
  - Build Web Application
    - Accept Input with Business Information
    - Search Relevant SoS Website Using RPA
    - Present Results for Validation by Underwriter
    - Record Statistics
  - Leverage Robotic Process Automation (RPA)
  - Handle All 50 Secretary of State Websites
  - Design and Implement Matching Algorithm
    - Exact or Partial
    - Synonym or Alternate Spelling
  - Provide Reporting Dashboard with Metrics
- Technologies
  - Robotic Process Automation (RPA)
  - UiPath Go!
  - CSS / HTML / JavaScript / PHP
  - Database Technologies

Auto-Owners INSURANCE

LIFE • HOME • CAR • BUSINESS

Lansing, Michigan

Team Consumers Energy

Project Overview

New Customer Service Channel

- Functionalities
  - Improve Customer Call Experience
  - Provide New Channel to Interact with Consumers Energy
- Features
  - Enable Callers to Use Smart Phone Capabilities
    - Text Link to Responsive Web App
    - Interactive Version of Phone Tree or Chatbot
  - Handle All Phone Tree Options with Smart Phone
    - Billing Inquiries
    - Making Payments
    - Setting Up Payment Plans
    - Etc.
  - Maintain Phone Call Connection
  - Support Transition to CE Live Agent
- Technologies
  - CSS / HTML / JavaScript / PHP
  - Chatbot Technologies
  - Consumers Energy APIs
  - Customer Journey Tracking
  - SOAP Web Services

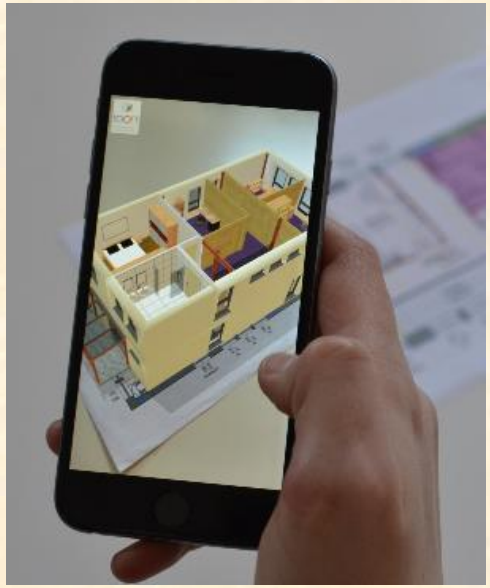
Consumers Energy
Count on Us
Jackson, Michigan

Team Dow

Project Overview

VR Model Management Platform

- Functionalities
  - Market Products using Virtual Reality
  - Support Entirety of Dow Chemical
- Features
  - Architect and Build Universal Dow Platform
    - Upload and View 3D Models Easily
    - Support Various Mobile Devices
    - Eliminate “One-and-Done” Solutions
  - Target Dow Stakeholders
    - Sales and Marketing Professionals
    - Customers
  - Build Cloud-Hosted Backend
    - Handle Role-Based Security
    - Manage 3D Models
- Technologies
  - Apple iOS / Swift
  - Google Android / Java
  - Unity Pro / Collab
  - ARKit / Vuforia
  - App Center / TestFlight
  - Microsoft Azure



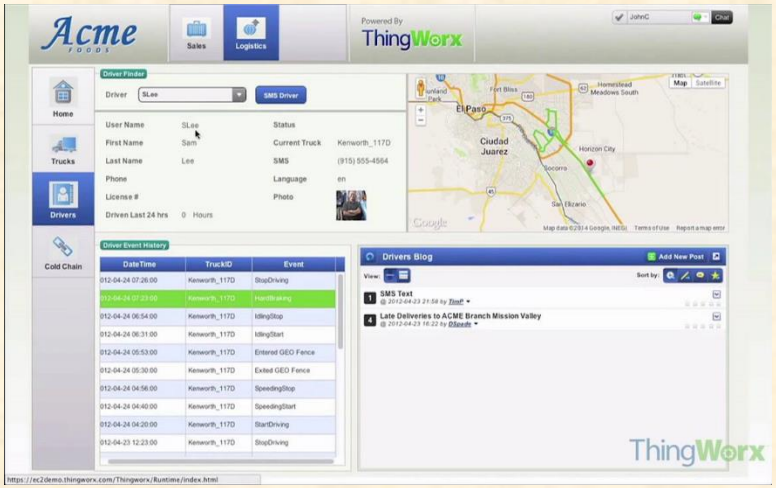
Midland, Michigan

Team DRIVEN-4

Project Overview

Product Development Portfolio and Planning

- Functionalities
  - Forecast and Track Execution of Annual Product Development Budget
  - Utilize Capacity-Planning Planning Technique
- Features
  - Enable
    - Portfolio Planning for 1, 3 or 5-Year Terms
    - Portfolio Execution with Role-Based Forecast
    - Product Planning for 10-Year Gantt View
  - Provide Web Interface and Visualization
    - Responsive
    - Target End-User
    - Include Administrative Features
  - Deliver Cross-Platform Mobile App
- Technologies
  - CSS / HTML / JavaScript / React
  - PTC Thingworx
  - Xamarin
  - RESTful Web Services



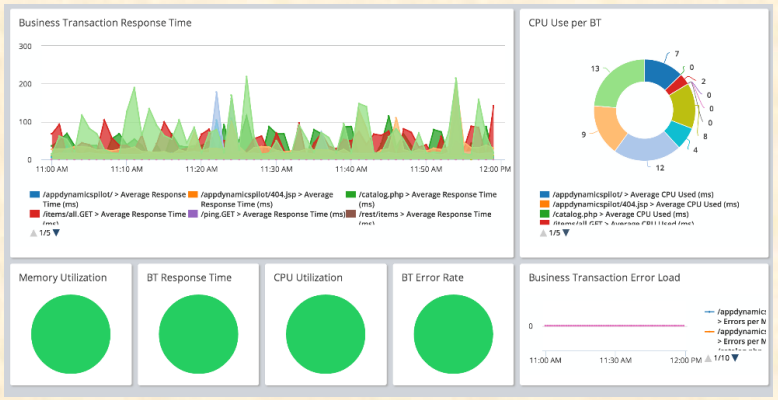
DRIVEN-4
St. Joseph, Michigan

Team Evolutio

Project Overview

AppDynamics Platform Configuration Tool

- Functionalities
  - Empower Evolutio Clients to Utilize Cisco AppDynamics
  - Easily Configure, Deploy and Manage Environments
- Features
  - Build a User-Friendly Web Application
    - Configure, Deploy and Manage Environments
    - Easily with “Push of a Button”
  - Support Export and Import of Configurations
  - Provide Environment Migration Utility
  - Support Both New and Existing Environments
  - Explore Use of Natural Language Processing
- Technologies
  - Application Performance Management (APM) Software
  - Cisco AppDynamics
  - CSS / HTML / JavaScript / PHP
  - Angular / React / Web Frameworks
  - Java



Indianapolis, Indiana

Team Ford

Project Overview

Greenfield Labs SHARED Locker System

- Functionalities
  - Encourage Use of Shared High-Value Assets (Devices)
    - Showcase Existence
    - Track via Easy Check-Out / Check-In
  - Target Ford's Greenfield Labs (Palo Alto)
- Features
  - Build
    - SHARED Mobile Apps
    - Web Administrator Portal
  - Implement Various APIs
    - Reservations
    - Metrics
    - Push Notifications
  - Create Event (Check-In/Check-Out) Stream
  - Develop Raspberry PI Event Listener
    - Lock/Unlock Cabinet
    - Adjust RGB Lighting
- Technologies
  - OAuth 2.0
  - Amazon Cognito
  - Apple iOS and Google Android
  - CSS / HTML / JavaScript / PHP
  - Snipe-IT
  - Raspberry Pi
  - Apache Kafka
  - Amazon Web Services (AWS) Kinesis
  - RGB Light Strip
  - 12V Actuated Lock

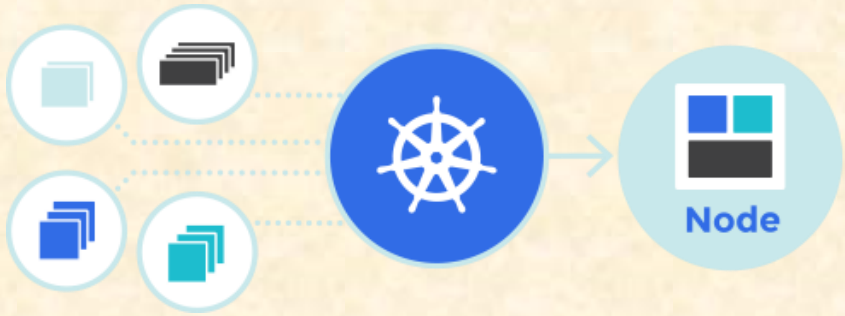
Dearborn, Michigan

Team Google

Project Overview

Kubernetes Cluster Inspection Tool

- Functionalities
  - Diagnose Architecture of Kubernetes Cluster
  - Provide Robust Inspection Tool
  - Include Both Current and Historical State
- Features
  - Gather All Cluster Data into Single View
  - Provide Various Insights
    - Health
    - Performance
    - Resource Changes
  - Support Configurable Set of Filters
  - Ingest with K8s Stackdriver Agent
  - Trace Lifecycle of Nodes, Pods and Other Objects
  - Visualize Results Using Default Kubernetes APIs
  - Implement Easily on Any Kubernetes Distribution
- Technologies
  - Kubernetes
  - K8s API
  - Fluentd
  - Stackdriver
  - Prometheus



Google

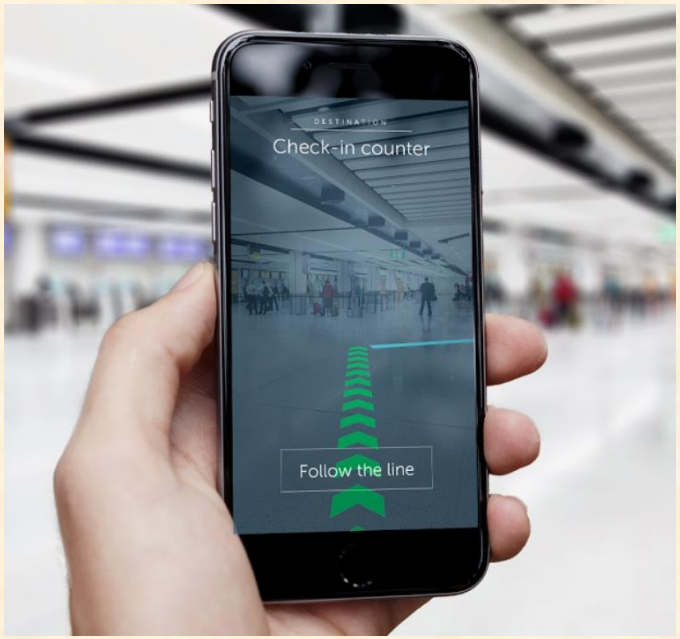
Kirkland, Washington
Mountain View, California

Team Herman Miller

Project Overview

Office Navigation Using Augmented Reality

- Functionalities
  - Navigate Large Complex Buildings
  - Utilize Augmented Reality
- Features
  - Develop Augmented Reality Mobile App
  - Search for Various Spaces
    - Open Offices
    - Available Conference Rooms
    - Cafeterias
  - Give Turn-by-Turn Instructions
  - Leverage Machine and Deep Learning
  - Build on Open Framework with Exposed APIs
  - Be Trainable, Scalable and Flexible
  - Provide Configuration Interface for Building Managers
- Technologies
  - Apple iOS / Swift
  - Apple ARKit
  - Apple Location Services
  - Machine Learning
  - Deep Learning



HermanMiller
Zeeland, Michigan

Team Humana
Project Overview

Technology Peripheral Inventory Predictor

- Functionalities
  - Improve Availability of Computer Peripherals
  - Predict Demand Based on History
- Features
  - Build Responsive Web App
  - Target End User Technology Staff
  - Leverage Machine Learning
    - Develop Key Predictive Model Attributes
    - Include Ability to Tune Key Parameters
  - Incorporate Feedback Loop
  - Visualize Data Effectively
- Technologies
  - CSS / HTML / JavaScript
  - Machine Learning
    TensorFlow / sciikit-learn / Spark MLLib
  - Data Visualization
    D3 / Chart.js

Humana

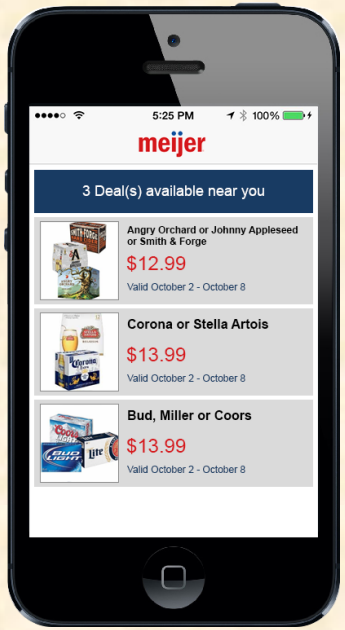
Louisville, Kentucky

Team Meijer

Project Overview

Location-Based Personalized Shopping

- Functionalities
  - Make Customers Aware of On-Sale Items
  - Provide Personalized mPerks Offers
  - Based on Customer's Affinity and Location In Store
- Features
  - Provide In-Aisle Engagement Experience
  - Leverage Mist Wireless Network for Location
  - Model Customer Shopping Tendencies Using AI and ML
  - Drive Sales of Additional Items
  - Support Apple iOS and Google Android
  - Implement Customer Customization
- Technologies
  - Apple iOS and Google Android
  - Xamarin
  - MIST WLAN / SDK
  - Microsoft
    - .NET Framework / C# / ASP.NET,
    - Azure Mobile Services (Deployment and Notifications)
    - Visual Studio Team Server
  - Artificial Intelligence (AI)
  - Machine Learning (ML)
  - App Insights for Analytics
  - SQL Server / DocumentDB
  - Meijer Web Services



meijer®

Grand Rapids, Michigan

Team Michigan State University HPCC

Project Overview

Simplifying High Performance Computing

- Functionalities
  - Make HPC Resources Simpler to Use
  - Target Non-Programmer Researchers
- Features
  - Build Responsive Web App
    - Create Job Scripts
    - Observe Job Progress
    - Observe Group Behavior
  - Create Testing “Playground”
    - Test Job Scripts
    - Understand Resource Requirements
    - Tune Job Submissions
  - Provide Dashboard for HPCC Administrators
  - Mine Years of HPCC Data
- Technologies
  - CSS / HTML / JavaScript / PHP
  - JavaScript / AngularJS / JSON
  - SLURM Workload Manager
  - RESTful Web Services
  - Machine Learning (ML)
  - Data Mining

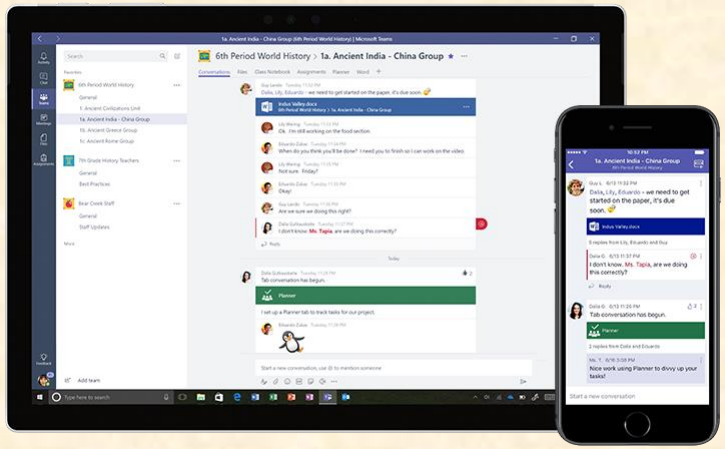
High Performance Computing Center
East Lansing, Michigan

Team Michigan State University ITS

Project Overview

Group Project Organization and Scheduling

- Functionalities
  - Facilitate Student Group Projects
  - Automate Organizing and Scheduling
  - Utilize Various Technologies
- Features
  - Organize Groups Based on Calendars
  - Find Available Meeting Times
  - Support Various Messaging Platforms
  - Provide Cloud Storage for Collaboration
  - Build Infrastructure Using Amazon Web Services
  - Deliver Production Ready System
- Technologies
  - OAuth 2.0
  - Calendars (O365, Google)
  - Cloud Storage (OneDrive, Google, Dropbox)
  - Messaging (Slack, Teams, Discord)
  - Version Control (GitLab, GitHub)
  - Amazon Web Services (AWS)



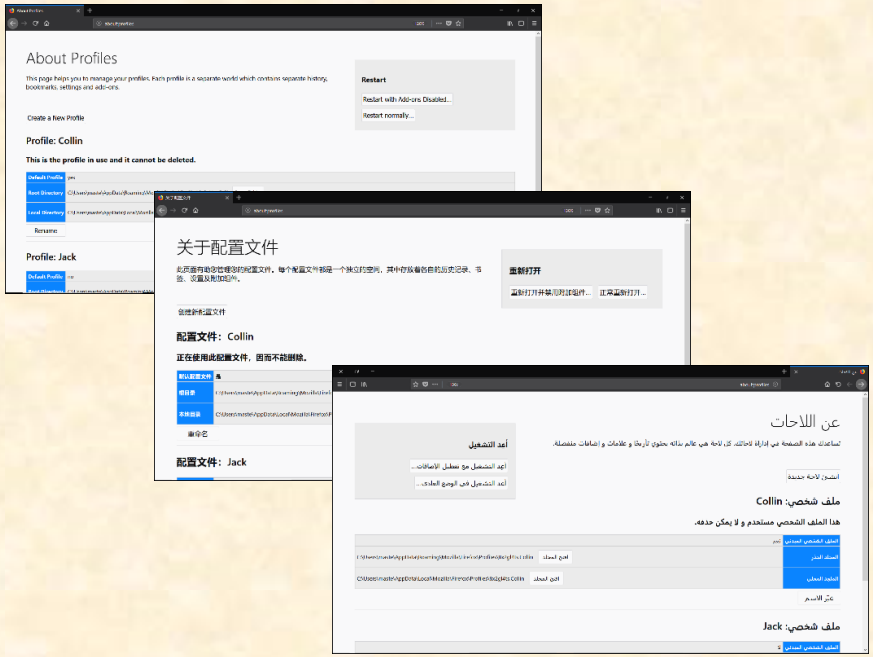
Information Technology Services
East Lansing, Michigan

Team Mozilla

Project Overview

Optimizing Firefox Localization

- Functionalities
  - Make Firefox Available in 98 Languages
  - Optimize Localization
    - Streamline
    - Speed Up
- Features
  - Convert Synchronous Code to Asynchronous Code
  - Improve Tooling Around Fluent
  - Investigate Use of Wasm and Rust
  - Support Windows, macOS and Linux
  - Deliver Production Code for Firefox
- Technologies
  - Fluent
  - DTD / .properties Files
  - JavaScript / Wasm (Web Assembly)
  - XUL / XBL / HTML
  - Rust
  - Mercurial
  - IRCCloud (IRC)
  - Bugzilla
  - Phabricator
  - Windows /macOS /Linux



Nota Bene:

- Team members are required to meet with the project sponsors for all day meetings on January 26 & 27.
- Team Members must agree to Open Source licensing.

Firefox

Mountain View, California

Team MSUFCU

Project Overview

AutoBudget Chatbot

- Functionalities
  - Provide Budgeting Assistance
  - Utilize Chatbot Technologies
- Features
  - Auto-Categorize Transactions
    - Predefined System Categories
    - User Defined Categories
  - Analyze Spending Patterns
  - Suggest Budget
  - Visualize Spending Habits
  - Provide Natural Language Interface
  - Support Various Devices
    - Smart Display (Amazon Spot, Amazon Show, Google Home Hub)
    - Mobile Devices (Apple iOS and Google Android)
- Technologies
  - CSS / HTML / JavaScript / PHP
  - Apple iOS / Swift
  - Google Android / Java
  - Amazon Alexa and Echo
  - Amazon Alexa Skills Kit
  - RESTful Web Services / JSON
  - MySQL

MICHIGAN STATE UNIVERSITY FEDERAL CREDIT UNION
Building Dreams Together
East Lansing, Michigan

Team Principal

Project Overview

Integrated Analyst Ratings and Notes

- Functionalities
  - Create Robust Ratings and Notes Capabilities
  - Target Principal Analysts
  - Leverage Cloud Computing
- Features
  - Design and Develop Web App
    - Manage Ratings and Notes
    - Present Unified Software Platform and User Experience
    - Utilize Amazon Web Services
  - Handle Various Numerical Ratings
    - Companies
    - Industries
    - Products
    - Securities
    - Fund Managers
  - Create Prose Notes with Additional Media
    - Links to Web Pages
    - Attachments
    - Video
    - Audio
  - Customize User Experience Based on Analyst Context
    - Stock Analyst
    - Fund Manager Analyst
    - Etc.
  - Maintain Current and Historical Data
- Technologies
  - CSS / HTML / JavaScript / PHP
  - Amazon Web Services (AWS)
  - Microsoft Windows Authentication
  - PostgreSQL Database

Moody's		S&P		Fitch		
Long-term	Short-term	Long-term	Short-term	Long-term	Short-term	
Aaa	P-1	AAA	A-1+	AAA	F1+	Prime
Aa1		AA+		AA+		High grade
Aa2		AA		AA		
Aa3		AA-		AA-		
A1		A+	A-1	A+	F1	Upper medium grade
A2		A		A		
A3	P-2	A-	A-2	A-	F2	
Baa1		BBB+		BBB+		Lower medium grade
Baa2	P-3	BBB	A-3	BBB	F3	
Baa3		BBB-		BBB-		
Ba1	Not prime	BB+	B	BB+	B	Non-investment grade speculative
Ba2		BB		BB		
Ba3		BB-		BB-		
B1		B+		B+		Highly speculative
B2		B		B		
B3		B-		B-		
Caa1		CCC+	C	CCC	C	Substantial risks
Caa2		CCC				Extremely speculative
Caa3		CCC-				Default imminent with little prospect for recovery
Ca		CC				
		C				
C		D	/	DDD	/	In default
/				DD		
/				D		

Principal

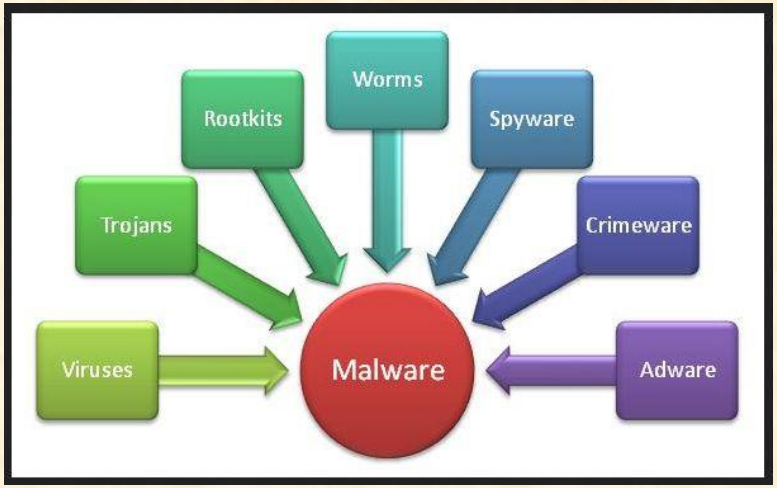
Des Moines, Iowa

Team Proofpoint

Project Overview

Defeating Malware Payload Obfuscation

- Functionalities
  - Identify Malware Payloads and Configuration Files
  - Handle Large Scale at Reasonable Cost
- Features
  - Utilize Existing Detonation Technologies
    - Reduce Run Times
    - Maintain High Efficacy
  - Leverage Machine Learning and Heuristics
  - Provide Dashboard
    - Monitor Processing
    - Drill Down
    - Reporting
- Technologies
  - Cuckoo (Malware Sandboxing)
  - Suricata (Intrusion Detection System)
  - Steganography
  - Malware Machine Learning
  - Operating Systems and Compilers
  - Reverse Engineering
  - CSS / HTML / JavaScript / PHP
  - Python
  - MySQL



proofpoint™

Sunnyvale, California

Team Spectrum Health

Project Overview

Patient Training Tool

- Functionalities
  - Improve Patient Experience
  - Educate Patient on Their Illness
  - Recommend Appropriate Spectrum Health Service
    - Video Chat with Doctor
    - Urgent Care
    - Emergency Room
- Features
  - Support Google Home
  - Ask Patient About Symptoms
    - Headache
    - Fever
    - Nausea
    - Etc.
  - Determine Best Matching Condition
  - Teach Patient About Condition
    - Easy to Understand
    - Suggest Appropriate Spectrum Health Service
- Technologies
  - Google Home SDK
  - Microsoft Azure DevOps
  - Natural Language Processing (NLP)
  - Machine Learning (ML)

SPECTRUM HEALTH

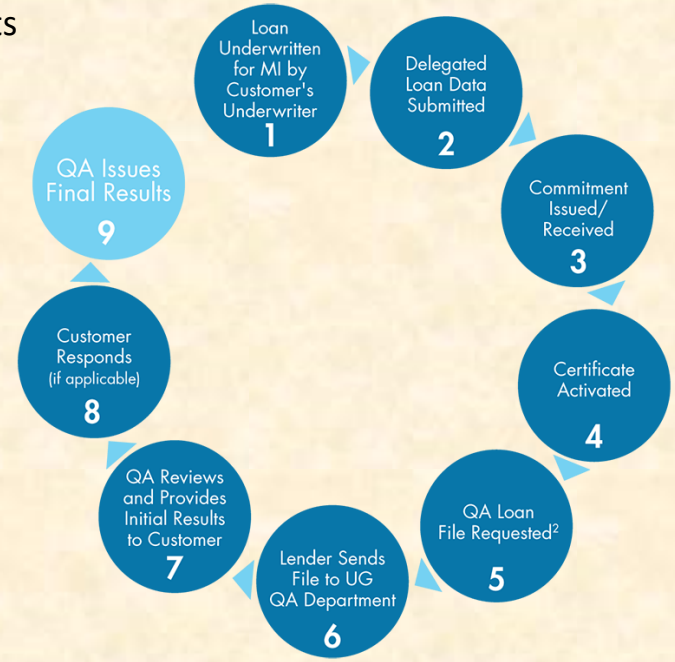
Grand Rapids, Michigan

Team Surge Solutions

Project Overview

xOS: Visualization of Automated Underwriting

- Functionalities
  - Make Loan Underwriting Process Fast and Accurate
  - Enable Lenders to Create and Visualize Financial Products
- Features
  - Design and Build Web App
    - Surge xOS Component
    - Displays Loan Decision Path Based on Product Policy
    - Enables Manipulation of Product Policy
    - Executes Monte Carlo Simulations
  - Create Surge xOS Embedded Decision Tree App
    - Embedded into Surge xOS Platform
    - Creates User-Friendly Decision Tree
    - Visualizes Underwriting Decision Paths
    - Assists Underwriter with Credit Risk Analysis
  - Leverage Salesforce
- Technologies
  - CSS / HTML / JavaScript
  - Salesforce (Lightning)
  - React / D3
  - Amazon Web Services (AWS)
  - Agile Software Delivery Methodology



SURGE
Rochester Hills, Michigan

Team Technology Services Group

Project Overview

Multi-Video Case Management

- Functionalities
  - Manage Security Video
  - Organize, Annotate and View Video
- Features
  - Handle Security Camera and Mobile Phone Video
  - View and Annotate Videos
    - By Timestamp
    - By Location
      - ❖ Corporate Campus Map
      - ❖ Building Map
  - Aggregate Multi-Video View into Single Event
    - Based on Annotations, Timestamp and Location
    - Summarize an Incident
  - Create OpenContent Management Suite Actions
- Technologies
  - TSG OpenContent Management Suite (OCMS)
  - TSG OpenAnnotate
  - Amazon Web Services (AWS)
  - DynamoDB / S3

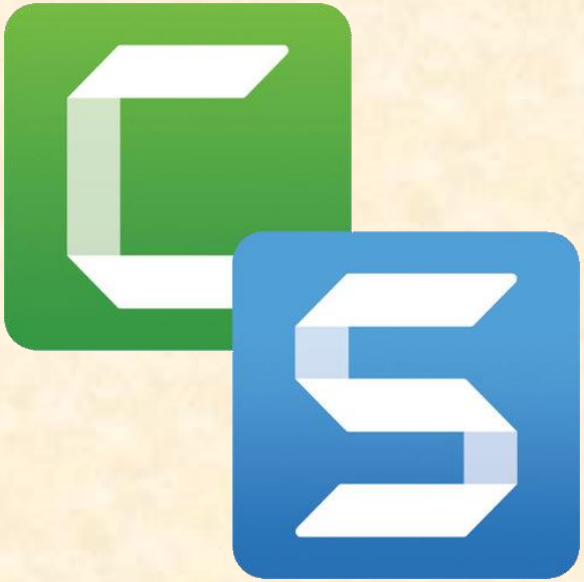
technology services group
Chicago, Illinois

Team TechSmith

Project Overview

Internal Telemetry for TechSmith Products

- Functionalities
  - Help TechSmith Developers Improve TechSmith Products
  - Create Telemetry Gathering System
- Features
  - Build Telemetry Framework
    - Integrate with Any Win32 App
    - Provide Simple API
  - Write Application Prototypes
    - Simulate Scenarios
    - Demonstrate Telemetry Framework
  - Provide Web Dashboard to View Telemetry
  - Integrate Into One TechSmith Product
- Technologies
  - Microsoft
    - Windows Presentation Foundation (WPF)
    - Windows Error Reporting APIs
    - Partner Center REST API
    - Visual Studio AppCenter
    - Azure
    - ASP .Net Core
  - C++ / C# / C++ / CLI
  - JavaScript
  - Docker
  - DirectX Diagnostic Tool (DxDiag)



TechSmith®
Okemos, Michigan

Team Union Pacific

Project Overview

Railroad Arcade

- Functionalities
  - Build Game Hosting System
  - Target Railroad Training Games
- Features
  - Create Three Sample Games
  - Provide Reusable Components
    - Login and Settings
    - Administration
    - Quizzes and Scoring
    - Leader Boards
    - Integrate Adobe Captivate
  - Support
    - Windows and WebGL
    - Mobile?
    - Virtual Reality (VR)?
- Technologies
  - Unity
  - Angular
  - Java / Spring / Tomcat
  - Adobe Captivate

BUILDING AMERICA®

Omaha, Nebraska
Okemos, Michigan

Team United Airlines

Project Overview

Training Scheduling and Optimization System

- Functionalities
  - Manage United Technical Operations Training
  - Schedule Classes and Instructors Optimally
- Features
  - Web and Apple iOS Apps
  - Enable Course Request by Location
  - Track
    - Instructor Times
    - Student Attendance
  - Provide Class List of Students
  - Optimize Course Scheduling
    - Number of Classes Per Location
    - Instructor Travel and Overtime
    - Fixed Courses
  - Implement Various Roles (Student, Instructor, Scheduler)
- Technologies
  - CSS / HTML / JavaScript / PHP
  - Apple iOS / Swift
  - Microsoft SQL Server
  - Optimization Software

UNITED

Chicago, Illinois

Team Urban Science

Project Overview

Dealer4U

- Functionalities
  - Create Marketplace for Used Vehicle Leads
  - Target Both Dealers and Customers
- Features
  - Build Native Apps or Responsive Web App
  - Provide
    - Customer User Interface
    - Dealer User Interface
    - Backend Data Storage and Processing
  - Include Capabilities
    - To Create or Ingest Leads
    - For Dealers to Bid on Leads
    - To Match Dealers to Leads
- Technologies
  - Apple iOS / Swift
  - Google Android / Java
  - Xamarin
  - CSS / HTML / JavaScript / PHP
  - Angular
  - WebAPI
  - Microsoft .NET Core
  - Mongo DB

URBAN SCIENCE

Detroit, Michigan

Team Volkswagen

Project Overview

Cognitive Enterprise Software Robots

- Functionalities
  - Automate Manual Computer Tasks
  - Utilize Software Robots (Soft Bots)
- Features
  - Teach Soft Bot
    - Set of Business Rules
    - Process Flow
  - Apply Deep Reinforcement Learning
    - Learn Human Behavior
    - Teach Soft Bot to Replicate Human Behavior
  - Enable Soft Bot to Interact with Humans
    - Email
    - Natural Language Processing
- Technologies
  - Python / NumPy / Matplotlib / PyAutoGUI
  - TensorFlow / Keras
  - Git
  - Windows 10
  - Graph Theory
  - Machine Learning

Auburn Hills, Michigan

Google Form

- www.capstone.cse.msu.edu
- + Other Links
- > Downloads
- > Team Member Survey: Google Form

First Assignments

- Read the Syllabus.
- Check out the Lab (3322EB, 3340EB, 3352EB, 3358EB).
  - See if you can find it.
  - See if you can get in.
- Check out the Web Site.
- Research your Project.
  - Sponsor
  - Technologies

What's Next?

- Teams
  - Assignments by Email Tomorrow Morning
  - Meet Initially by Tomorrow Afternoon
  - Lab Machine Assignments in Lab
  - Start Researching Technologies
  - Start Configuring Lab Machines
  - Team Photos
    - After All-Hands Meeting
      - Tu 01/10: Teams Amazon – Michigan State University HPCC
      - Th 01/15: Teams Michigan State University ITS – Volkswagen
    - Dress Casual (But Appropriate)
    - Schedule for it. (~75 Minutes)
- Client
  - Contact by Email by Tomorrow COB (Close of Business)
  - Conference Call or On-Site Meeting by Friday
  - Review Project Proposal

Capstone Overview

✓Course Logistics

✓Client Projects

➢Course Logistics (Continued)

Urban Science Capstone Lab Machines

- Up to Four per Team
  - Two 27” iMacs
  - Dell Rack-Mounted Server (Optional)
    - Connected to Outside World
    - Keep Secure
  - Mac Book Pro (Optional)
- Operating Systems on iMacs and MBPs
  - Run macOS High Sierra
  - Install VMware Fusion (from here)
  - Create Virtual Machines
    - Windows 10 VM from TAs
    - Allocate Sufficient Cores and Memory
    - Others as Needed
  - Don’t use Apple Boot Camp

Capstone Lab Miscellany [1 of 2]

- Security
  - Keep lab doors closed.
  - Do not open doors for strangers
  - Do not give out door key code to others.
  - Do not invite non-capstone students to work in the lab with you.
  - Email Dr. D. if door becomes unlocked.
- Wireless
  - SSID: CSE498
  - Key: ??????
  - Only for Mobile Devices Requiring Lab Subnet
- Coffee
  - Some Provided by Dr. D.
  - Bed, Bath & Beyond (Get 20% Off Coupon)
- Game Playing / Video Watching
  - Not On Monitors Facing Hallway
  - Not If Other Team Members Need Machine

Capstone Lab Miscellany [2 of 2]

- Do not “maniac” the wires and cables.
- Keep the lab neat and clean.
  - Lived In, Okay.
  - Messy, Not Okay.
- Respect…
  - …other teams’ spaces.
  - …shared spaces.
- Garbage Containers
  - Empty the small one by the coffee maker into a larger one.
  - Put larger ones out in the hall at night if near full.
  - Put back in the lab in the morning if empty.
- Turn the lights out if you’re the last one out.
- Close the windows if you open them.
- Be careful with cabinet drawers; don’t “maniac” them.

Mobile Devices Available

- For Capstone Project Use
- By Team for the Semester
- iOS
  - iPads
  - iPhones
  - iTouch
- Android
  - Tablet
  - Phone
- Surface Pro 3

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

Schedules

- Schedules > All-Hands Meeting
- Schedules > Major Milestones
  - 01/17: Status Report Presentations
  - 01/29: Project Plan Presentations
  - 02/19: Alpha Presentations
  - 04/02: Beta Presentations
  - 04/23: Project Videos
  - 04/24: All Deliverables
  - 04/25: Design Day Setup
  - 04/26: Design Day
  - 05/02: Project Videos

- Attendance is required.
- No excuses are accepted.
- Do not schedule anything including during these times interviews, travel home, etc.
- Will coordinate with your interviews.

Meeting Attendance

- Required
  - All-Hands (Class) Meetings
  - Team Triage Meetings
  - Team Meetings
  - Team Conference Call Meetings
- 5% of Final Grade
- Late == Absent
  - 1% of Final Grade for Each Unexcused Absence
  - Attendance Grade Can Be Negative (See Syllabus)
  - If > 5 Absences Team Contribution Grade Will Be Affected
- Almost No Excuses Accepted
  - One or Two Excused Possible for Interviews
  - Must Provide Information
    - Date, Company, Recruiter Name & Contact Info
    - In Advance
    - To Both Dr. D. and TAs
- Must Attend (No Excuses Accepted)
  - Your Team Presentations
  - All Project Video Viewing
  - Design Day

Do NOT schedule interviews.
Do NOT schedule ANYTHING.
Do NOT buy plane tickets.

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 TAs
- 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

[3 of 5]

Effect of Team Contribution					
Technical Contribution	Team Contribution	Team Evaluation	Meeting Attendance	Team Total	Grand Total
10	10	5	5	70	100
10	9	5	5	70	92
10	8	5	5	70	84
10	7	5	5	70	76
10	6	5	5	70	68
10	5	5	5	70	60
10	4	5	5	70	52
10	3	5	5	70	44
10	2	5	5	70	36
10	1	5	5	70	28
10	0	5	5	70	20
Nota Bene: Assumes Perfect Score In Every Other Category					

Grading

[4 of 5]

Unacceptable Excuses for Not Contributing

- They never asked me to do anything.
- They never let me do anything.
- I wrote 1000's of lines of code but they weren't included in the project.
- My features were not included in the project.
- I work 40 hours per week at my job.
- I live 60 minutes from MSU.
- I didn't want to work on this project team.
- I ranked this project 26 out of 26.
- I did a lot of research about stuff we never used.
- I was busy interviewing.
- Etc…

Grading

[5 of 5]

- 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 while a student at MSU,
  - job after anticipated graduation from MSU,
  - commute to MSU,
  - graduation,
  - mortgage,
  - wedding,
  - visa status,
  - ability to enroll in CSE498 next semester,
  - 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.

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 TAs

Using Existing Code

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

Design Day

- College of Engineering Event
  - Engineering Building
  - Friday, April 26, 2018
- Displays (Booths) of Design Projects
  - CSE Capstone
  - ECE Capstone
  - ME Capstone
  - Etc…
- Presentations and Awards
  - Panel of Judges
  - CSE Team Project Videos

Travel to Client

- Reimburse for Mileage for Personal Car
- Travel Within Michigan (Outside of Lansing)
  - Grand Rapids
  - Jackson
  - Midland
  - St. Joseph
  - Metro Detroit
- From East Lansing to Client and Back
- Two Cars Per Team Per Trip
- See Brenda in the CSE office in advance.

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@msu.edu)
- Make Appointment

Capstone Overview

✓Course Logistics

✓Client Projects

✓Course Logistics (Continued)

Questions?