The Capstone Experience

Dr. Wayne Dyksen
Department of Computer Science and Engineering
Michigan State University
Spring 2018
Course Goals

• Build a Significant Software System
• Work in a Team Environment
• Learn New Tools and Environments
• Build and Administer Systems
• Develop Communication Skills
• Develop Interview Talking Points
• Consider Issues of Ethics and Professionalism
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

- TTh, 3:00-4:20 p.m., 1279 Anthony Hall
- Presentations By
  - Professor
  - Teams
    - Status Report Presentations
    - Formal Presentations
      - Project Plan
      - Alpha
      - Beta
    - Project Videos
  - Guest Speakers
All-Hands Meetings

- 01/09: Capstone Overview
- 01/11: Project Plan
- 01/16: Risks and Prototypes
- 01/18: Schedule and Teamwork
- 01/23: Team Status Report Presentations
- 01/25: Team Status Report Presentations
- 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
- 03/01: Team Alpha Presentations
- 03/06: (Spring Break, No Meeting)
- 03/08: (Spring Break, No Meeting)
- 03/13: Team Status Report Presentations
- 03/15: Team Status Report Presentations
- 03/20: Design Day and the Project Videos
- 03/22: Camtasia Demo
- 03/27: Intellectual Property
- 03/29: Ethics and Professionalism
- 04/03: Team Beta Presentations
- 04/05: Team Beta Presentations
- 04/10: Team Beta Presentations
- 04/12: Team Beta Presentations
- 04/17: Status Report Presentations
- 04/19: Status Report Presentations
- 04/24: Project Videos
- 04/26: Project Videos and All Deliverables
- 04/26: Design Day Setup
- 04/27: Design Day
- 05/03: Project Videos
The Capstone Experience

Team Accenture

Department of Computer Science and Engineering
Michigan State University
Spring 2018
accenture
NEW ISN’T ON ITS WAY.
WE’RE APPLYING IT RIGHT NOW.

Accenture is answering real business challenges for our clients through innovation and deep industry knowledge. Here’s how.
AMAP: Automated Malware Analysis Platform

• Functionalities
  ▪ Automate Analysis of Malware
  ▪ Provide All-Inclusive Platform

• Features
  ▪ Ingest Malware Samples
  ▪ Decode Configuration Settings
  ▪ Recover Malware Artifacts
  ▪ Create Relationships in iDefense Platforms
  ▪ Save Payloads in Malware Repository

• Technologies
  ▪ Accenture iDefense Malware Repository
  ▪ Accenture iDefense IntelGraph
  ▪ Database Technologies
    ○ MongoDB
    ○ mySQL
  ▪ Python
Team Accenture
Griffin Metevia, Sam Kling, Julian Ellis, Andrew Mitchell, Teng Xu
Team Accenture
Project Plan Presentation

Screen Mockup: Malware Search

AMAP: Automated Malware Analysis Platform

Malware Sample Search

- Sample ID
- Strong Password
- File Test
- Slack Install
- Custom Foo
- api-manual

File Name: 040d71e56512a0786bcs.xls
File Size: 77824 bytes
File Mime: application/vnd.ms-excel
File Type: Composite Document File V2 Document
MD5: 040d71e56512a0786b
SHA1: a4jn43kn34mk34kmk343mk3443mk
Notes:
Team Accenture
Project Plan Presentation

Architecture Diagram

AMAP Modules

iDefense
Part of Accenture Security
Malware Database

Data Server

AMAP Dashboard

python

mongoDB, django

amazon web services

HTML, CSS, JS
Team Accenture
Project Plan Presentation
Team Accenture
Project Plan Presentation

Screen Mockup: AMAP Dashboard

Container Status

Malware Processed Per Hour

- Starting Up: 4%
- Running: 18%
- Idle: 2%
The Capstone Experience

Team Amazon

Department of Computer Science and Engineering
Michigan State University
Spring 2018
AMPED: Amazon Marketplace Podcast Earnings Detection

• Functionalities
  ▪ Play Podcasts
  ▪ Show Listeners Related Amazon Products
  ▪ Support Listener’s Favorite Content Producer

• Features
  ▪ Create Integrated Audio Player
  ▪ Enable Uploading of Podcast by Producer
  ▪ Transcribe Speech to Text
  ▪ Comprehend Content
  ▪ Find Related Amazon Products
  ▪ Package Results Into API for Player

• Technologies
  ▪ AWS Compute & Database Services
  ▪ Amazon Transcribe
  ▪ Amazon Comprehend
  ▪ Amazon Item Search
  ▪ Amazon Queuing and Notification Services
  ▪ Amazon Elastic Beanstalk and API Gateway
Team Amazon
Chess Luo, Zach Whitener, Dillon Stock, Cam Korzecke, Hansheng Zhao
The Capstone Experience

Team Aptiv

Department of Computer Science and Engineering
Michigan State University
Spring 2018
Automotive Gateway Security Analysis

• Functionalities
  ▪ Evaluate Security of Automotive Gateway Module (CyberSecure Gateway)
  ▪ Determine Vulnerabilities via Wireless Connectivity
    □ Cellular WAN
    □ WiFi
    □ Bluetooth

• Features
  ▪ Provide Software for Automated Testing
  ▪ Determine Vulnerabilities
    □ Injecting and Running Code
    □ From Open Source Software Components
    □ HIPS (Host Intrusion Prevention Systems) vs non-HIPS Systems
  ▪ Produce Design and Requirements Documentation
  ▪ Create Software Component List with Version Control

• Technologies
  ▪ Cyber Security
    □ Threat Analysis
    □ Open Source Analysis
    □ Host Intrusion Prevention System (HIPS)
  ▪ Networking (TCP/IP, Routing, Firewalls)
  ▪ Wireless Security and Vulnerabilities
  ▪ CyberSecure GateWay (CSGW)
  ▪ Linux Security
  ▪ Embedded Linux
Team Aptiv
Dillon Brown, Clayton Peters, Ashtaan Rapanos, Winton Qian, Wei Jiang
The Capstone Experience

Team Auto-Owners

Department of Computer Science and Engineering
Michigan State University
Spring 2018
Auto-Owners
INSURANCE
LIFE • HOME • CAR • BUSINESS
For What Matters Most

Insurance built around your needs by a local independent agent

FIND AN AGENT FOR A QUOTE

Why choose an independent agent?

Pay Your Bill

Report a Claim

Policies to Meet Your Needs
Team Auto-Owners
Project Overview

IMAGINE: IMAGe INtake Experience

• Functionalities
  ▪ Evaluate Physical Environments (for Insurance Purposes)
  ▪ Leverage Virtual Reality
  ▪ Create Virtual Environments Using Spherical Camera

• Features
  ▪ Support Image Import From Spherical Camera
  ▪ Classify the Environment
  ▪ Detect and Identify Objects
  ▪ Create Virtual Environment
  ▪ Provide Playback, Navigation and Inspection
  ▪ Build and Display Inventory View

• Technologies
  ▪ Unity Game Engine
  ▪ Oculus Rift and Touch Controllers
  ▪ Oculus Rift Sensor
  ▪ Ricoh Theta V Spherical Camera
  ▪ Image Processing and Recognition
Team Auto-Owners
Sean Larabell, Zack Geizer, Xinyun Zhao, Nick Frederick, Reece Cole
The Capstone Experience

Team Dow

Department of Computer Science and Engineering
Michigan State University
Spring 2018
Solutions for Human Progress

News & Features
Dow to Expand Propionic Acid Facility in Texas
Dow COO Jim Fitterling Presented the “Doing a World of Good” Medal for Advancing the Societal Contributions of

Stay Up-To-Date
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Subscribe To DowDuPont Alerts
www.dow.dupont.com
Team Dow
Project Overview

Virtual Reality Simulation for Railcar Loading

• Functionalities
  ▪ Teach How to Load a Railcar Safely
  ▪ Via First Person Virtual Reality Game

• Features
  ▪ Support Two Levels of Difficulty
    o Non-Certified
    o Certified
  ▪ Handle Various Scenarios
    o Normal Filling
    o Response to Spills
  ▪ Manage Player Points
    o Award for Positive Actions
    o Deduct for Negative Actions
  ▪ Enable Interaction with Game Objects
    o Personal Protective Equipment (PPE)
    o D-Rails
    o Slide Valves
  ▪ Use Audio to Indicate When Action Needed
  ▪ Simulate Different Weather Conditions
  ▪ Provide Feedback to Player at Game End

• Technologies
  ▪ Unity Game Engine
  ▪ Vive and Touch Controllers
  ▪ Vive SDK
  ▪ Microsoft .NET / C#
  ▪ Xamarin
Team Dow
David Wang, Matthew Smith, Kyle White, JD Hayward, John Yoo
The Capstone Experience

Team DRIVEN-4

Department of Computer Science and Engineering
Michigan State University
Spring 2018
Driven To Enable Your Success!

We are technology leaders who were in your shoes yesterday. We can help you achieve your PLM, IoT & CyberSecurity journey like no-one else.
Team DRIVEN-4
Project Overview

2020 Business in a Box

• Functionalities
  ▪ Develop Futuristic Business Environment
  ▪ Base on Internet of Things (IoT) Architecture
  ▪ Target 2020 and Beyond

• Features
  ▪ Model Five to Ten Components
  ▪ Connect Components via WiFi
  ▪ Validate and Verify Design via Simulation
  ▪ Develop Manufacturing Processes and Artifacts
  ▪ Demonstrate Capabilities for Collaboration and Integration
  ▪ Utilize Various Product Development Software Systems

• Technologies
  ▪ Computer Aided Design (CAD) / Siemens NX and PTC CREO
  ▪ Product Lifecycle Management (PLM) / Siemens Teamcenter and PTC Windchill
  ▪ Design Simulation Tools / PTC and Siemens
  ▪ Factory Floor Simulation / Siemens
  ▪ IoT Platforms / PTC ThingWorx and Siemens MindSphere
  ▪ 3D Printing
  ▪ Conveyor and Sight System
  ▪ Augmented and Virtual Reality (VR/VR) / PTC Thingworx Studio
Team DRIVEN-4
Sam Coffey, Betty Wu, Charles Carroll, Nick Mikelsavage, Brian Pinsky
The Capstone Experience

Team GM

Department of Computer Science and Engineering
Michigan State University
Spring 2018
Your new vehicle is waiting

SHOP OUR VEHICLES →

Shop Chevrolet.com  Shop Buick.com  Shop GMC.com  Shop Cadillac.com
Artificially Intelligent Dev Bot for Microsoft Teams

- Functionalities
  - Create and Manage Virtual Machines
  - Manage and Run Test Cases
  - Target GM Developers

- Features
  - Provide Single Unified Environment
  - Integrate with Microsoft Teams
  - Design Simplified User Controls
  - Use Natural Language Processing

- Technologies
  - CSS / HTML5 / JavaScript
  - Microsoft
    - .NET / C#
    - Bot Framework
    - Language Understanding Intelligent Services (LUIS)
    - Team Foundation Server
    - Teams / O365
    - Azure
  - Natural Language Processing (NLP)
  - RESTful Web Services and JSON

Team GM
Project Overview

Artificially Intelligent Dev Bot for Microsoft Teams

- Functionalities
  - Create and Manage Virtual Machines
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    - Team Foundation Server
    - Teams / O365
    - Azure
  - Natural Language Processing (NLP)
  - RESTful Web Services and JSON

Detroit, Michigan
Team GM
Alex Lepird, Tao Tao, Simeon Goolsby, Matthew Eaton, Colin Coppersmith
Team GM
Project Plan Presentation

Screen Mockup: VM Creation
Team GM
Project Plan Presentation
Team GM
Project Plan Presentation
Team GM
Project Plan Presentation

Screen Mockup: Web Dashboard

- Microsoft Azure
- Microsoft Azure
- Visual Studio Team Foundation Server
- Azure Bot Service
- .NET Framework
- Microsoft Teams
The Capstone Experience

Team Herman Miller

Department of Computer Science and Engineering
Michigan State University
Spring 2018
Team Herman Miller
Project Overview

Chair Adjustment Chatbot

• Functionalities
  ▪ Simplify Adjusting High Performance Office Chair
    o Ergonomic
    o “Developer Chair”
  ▪ Use Chatbot to Explain How

• Features
  ▪ Automatically Identify Chair via Photo
  ▪ Provide Step-by-Step Instructions
  ▪ Customize to User’s Ergonomic Needs
  ▪ Support Apple iOS and Google Android Devices
  ▪ Leverage Facebook Messenger

• Technologies
  ▪ Apple iOS / Swift
  ▪ Google Android / Java
  ▪ Image Processing and Recognition
  ▪ Natural Language Processing (NLP)
  ▪ Facebook Messenger
Team Herman Miller
Han Huang, Kevin Gaban, Kyle Kinsey, Mike Bremiller, Jacob Weber
The Capstone Experience

Team Meijer

Department of Computer Science and Engineering
Michigan State University
Spring 2018
Santa Bucks are back!
last time this year!

save over $50
Team Meijer
Project Overview

Personal Shopping Assistant

• Functionalities
  ▪ Streamline Shopping Experience
  ▪ Leverage Mobile App
  ▪ Interact by Voice or Chatting

• Features
  ▪ Create Mobile Apps
    o Apple iOS
    o Google Android
  ▪ Determine Product Information
    o Location in Store
    o Stock
    o Sale
    o Coupon
  ▪ Compare Prices to Other Stores
  ▪ Integrate with mPerks
  ▪ Send Notifications to In-Store Team Members

• Technologies
  ▪ Microsoft
    o .NET Framework (C# / ASP.NET)
    o Bot Framework
    o Language Understanding Intelligent Service (LUIS)
    o Azure
    o Application Insights
    o Visual Studio
  ▪ Xamarin
  ▪ Meijer Web Services
  ▪ SQL Server / MongoDB

Grand Rapids, Michigan
Team Meijer
Zach Richardson, Emerson Chen, Megan Lippert, Jacob Bonesteel, Aaron Carlson
The Capstone Experience

Team Michigan State University

Department of Computer Science and Engineering
Michigan State University
Spring 2018
Michigan State University Web Site

Happy Holidays!

VIEW GREETING

MSUVIEW
Detroit Food Academy and

MSUTODAY
How race and gender shape the American dream.

EVENTS
DEC. 15
Fall 2017 advanced

STUDENTS
FACULTY & STAFF
ALUMNI & DONORS
BUSINESSES
VISITORS

OUR COMMITMENT
A-Z INDEX
FIND PEOPLE
MAPS
Classroom Engagement App

• Functionalities
  ▪ Provide Real-Time Feedback and Communication During Class
  ▪ Keep Track of Student Attendance

• Features
  ▪ Provide Web App for Instructors
    o Create Questions, Surveys and Quizzes
    o Open Questions and Quizzes at Specific Times
    o View and Save Results in Real Time
      ➢ Class Results with Charts and Graphs
      ➢ Individual Results
    o Push Content to Student Devices
    o View Student Questions and Comments
    o Track and View Class Attendance
  ▪ Provide Mobile App for Students
    o Answer Survey and Quiz Questions During Class
    o View Instructor-Posted Content
    o Post Questions and Comments
  ▪ Take Attendance with Mobile Devices via iBeacons

• Technologies
  ▪ Apple iOS / Swift
  ▪ Google Android / Java or Kotlin
  ▪ Amazon Web Services (AWS)
  ▪ iBeacons
Team Michigan State University
Owen McMahon, Adam Blaida, Lauren Malik, Yaqeen Al-Marhoon, David York, Andrew Schafer
Team Michigan State University
Project Plan Presentation

Android and iOS Design

Project Plan Presentation

Android and iOS Design

Team Michigan State University
Project Plan Presentation

Android and iOS Design

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Project Plan Presentation

Android and iOS Design

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Project Plan Presentation

Android and iOS Design

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Project Plan Presentation

Android and iOS Design

Team Michigan State University
Project Plan Presentation

Android and iOS Design
Team Michigan State University
Project Plan Presentation

Architecture Diagram

- Estimote Beacons
- Mobile Student Client
- Sockets
- Instructor Web Client
- API Gateway
- Node
- EC2
- SNS
- RDS
- Amazon Web Services

The Capstone Experience
Team Michigan State University
Project Plan Presentation

Screen Mockup: Forums - Web
From Students…
…to Professionals

The Capstone Experience

Team Mozilla

Department of Computer Science and Engineering
Michigan State University
Spring 2018
The new Firefox

Fast for good.

With 2x the speed, built-in privacy protection and Mozilla behind it, the new Firefox is the better way to browse.

Download Firefox

Firefox Privacy Notice
Team Mozilla
Project Overview

Dark Theme Darkening

• Functionalities
  ▪ Increase Customizability of Firefox
  ▪ Leverage Firefox Quantum Theming API

• Features
  ▪ Provide Ability to Customize New Areas
    ○ Menus
    ○ Sidebars
    ○ In-Product Pages
  ▪ Apply CSS Custom Variables and JavaScript
  ▪ Leverage Inter-Process Communication
    ○ Pass Messages
    ○ Between Privileged and Unprivileged Code
  ▪ Support Apple macOS, Microsoft Windows and Linux
  ▪ Ship with Future Release of Firefox

• Technologies
  ▪ CSS
  ▪ JavaScript
  ▪ Python
  ▪ XUL / XBL / HTML
  ▪ Mercurial
  ▪ IRCCloud
  ▪ Bugzilla
  ▪ Review Board
  ▪ Microsoft Windows
  ▪ Apple macOS
  ▪ Linux
Team Mozilla
Vivek Dhingra, Connor Masini, Dyl Stokes, Bogdan Pozderca, Zhengyi Lian
Team Mozilla
Project Plan Presentation

Screen Mockup: In-Product Page
Team Mozilla
Project Plan Presentation
Team Mozilla

Project Plan Presentation

Architecture Diagram

Firefox Theme

Chrome Theme
Team Mozilla
Project Plan Presentation

Screen Mockup: Menus
The Capstone Experience

Team MSUFCU

Department of Computer Science and Engineering
Michigan State University
Spring 2018
Michigan State University Federal Credit Union

Building Dreams Together
Team MSUFCU
Project Overview

Digital Assistant and Personal Financial Coach

• Functionalities
  ▪ Offer Personalized Financial Coaching Services
  ▪ Use Digital Assistant

• Features
  ▪ Answer Questions and Provide Recommendations
    ○ Can I afford to buy that?
    ○ How much can I spend at the store today?
    ○ What do people like me spend on rent?
  ▪ Take Actions and Provide Services
  ▪ Handle Text and Voice Input
  ▪ Create Middleware API to MSUFCU
  ▪ Analyze Anonymized Account and Transaction Data
  ▪ Support Apple iOS and Google Android Devices
  ▪ Integrate with Various Services
    ○ Facebook Messenger
    ○ Apple iMessage
    ○ Amazon Alexa
  ▪ Provide Administrative Web Portal

• Technologies
  ▪ CSS / HTML / PHP / JavaScript
  ▪ Apple iOS / Swift
  ▪ Google Android / Java
  ▪ Facebook Messenger API
  ▪ Apple iMessage
  ▪ Amazon Echo / Alexa Skills Kit
  ▪ Machine Learning (ML)
  ▪ Natural Language Processing (NLP)
  ▪ MySQL / Encryption Based on SQL Standards
Team MSUFCU
Patrick Dame, Dallas Nowak, Michael Carter, Rachel Beard, Dane Holmberg
Team MSUFCU
Project Plan Presentation

Screen Mockups: Android App
Team MSUFCU
Project Plan Presentation
Team MSUFCU
Project Plan Presentation

Architecture Diagram

Admin Portal

Middleware

MSUFCU SQLite Database

Amazon Alexa

iOS App, Android App, Amazon Alexa, Facebook Messenger, and iMessage
The Capstone Experience

Team Phoenix Group

Department of Computer Science and Engineering
Michigan State University
Spring 2018
Welcome to The Phoenix Group

Rising to new levels in POS deployment

Browse Products

Our Services
Team Phoenix Group
Project Overview

Customer Service System with Chatbot

• Functionalities
  ▪ Enhance Customer Service Experience
  ▪ Ensure Easy Access to Product User Manuals
  ▪ Answer Customer Questions via Chatbot

• Features
  ▪ Create Web and Android Apps
  ▪ Manage Quick Reference Guides (QRCs)
    o Ingest by Photo or PDF
    o Determine Keywords via OCR
    o Search via Text and Voice
    o Display Like E-Book
  ▪ Provide Companion Administrative App
  ▪ Implement Chatbot on Corporate Website
    o Product Inventory
    o Available QRCs
    o Various Frequently Asked Questions (FAQs)
  ▪ Drive Customers to Contact Sales Reps

• Technologies
  ▪ CSS / HTML / PHP / JavaScript
  ▪ Google Android Tablets and Phones / Java
  ▪ Microsoft Bot Framework
  ▪ Microsoft Language Understanding Intelligent Service (LUIS)
  ▪ Docker
  ▪ Kubernetes
  ▪ MongoDB
  ▪ Optical Character Recognition (OCR)
Team Phoenix Group
James Finch, Sarah Fillwock, Dan Shumaker, Fatema Alsaleh, Aman Goshu
Team Phoenix Group
Project Plan Presentation

Quick Reference Guide Viewer

Search for QRG ...

Hello, Amanda

Add QRG

advanced QRG search

VERIFONE VX 680
XEVA440
RETAIL

First Data FD130
750FD130
RETAIL

VERIFONE VX 520
XEVA440
RESTAURANT

showing top viewed
Team Phoenix Group
Project Plan Presentation
Team Phoenix Group
Project Plan Presentation

Architecture Diagram

Chatbot

Microsoft Bot Framework

LUIS NLP

MongoDB Server

MongoDB Driver

Windows ASR

Desktop

Windows App

Windows OCR

Tablet
Team Phoenix Group
Project Plan Presentation
Team Phoenix Group
Project Plan Presentation

Screen Mockup: QRG Edit Screen

Quick Reference Guide Viewer

manufacturer
Verifone

terminal type
VX 680

application type
Retail

product number
0300034

version
XEVA440

Add comment ...
The Capstone Experience

Team Proofpoint

Department of Computer Science and Engineering
Michigan State University
Spring 2018
Team Proofpoint
Project Overview

Next Generation Malware Detection, Clustering and Heuristics

• Functionalities
  ▪ Process Millions of Malware Samples Daily
  ▪ Develop New and Innovative Techniques

• Features
  ▪ Build Lifecycle Processing Dashboard
  ▪ Leverage Many Malware Tools
  ▪ Create Malware Signatures Automatically
  ▪ Identify “Like” Samples and Clusters
  ▪ Visualize Malware Clusters
    o Provide Drill Down Capability
    o Show Signatures Created
  ▪ Prioritize Samples for Further Analysis

• Technologies
  ▪ Malware Sandboxing
  ▪ Network Intrusion Detection Systems (IDS)
  ▪ Statistical Analysis
Team Proofpoint
Graham Thomas, Yash Patel, Crystal Lewis, Brad Doherty, George Zhao
Team Proofpoint
Project Plan Presentation

Screen Mockup: Nodal Graph

Batch Information
Files Processed: 103/250
Time Elapsed: 00:15:23
Flagged Files: 15

Flagged Files
TMP1CE2.TMP
Memo.pdf
DriverPack.exe
Virus.exe
NotSpyware.jar
See VB Module UTL_PresentationSlidesSend2FB.
Team Proofpoint
Project Plan Presentation

Architecture Diagram
Team Proofpoint
Project Plan Presentation
Team Proofpoint
Project Plan Presentation

Screen Mockup: File Analysis

Batch Information
Files Processed: 103/250
Time Elapsed: 00:15:23
Flagged Files: 15

File Analysis
File Name: WannaCry.exe
File Signature: File matched known signature of Ransom:WannaCry
Behavior Profile: Behaves like a trojan and a worm
File Size: 5.65MB

Flagged Files
TMP1CE2.TMP
Memo.pdf
DriverPack.exe
Virus.exe
NotSpyware.jar
The Capstone Experience

Team Quicken Loans

Department of Computer Science and Engineering
Michigan State University
Spring 2018
Quicken Loans
Engineered to Amaze™
Providing Affordable Mortgages and Award-Winning Client Service for More than 30 Years
Team Quicken Loans
Project Overview

Fundamenta: Trust in New Home Construction

- Functionalities
  - Enable Collaborative New Home Construction
  - Include All Players

- Features
  - Create Responsive Web App
  - Allow Choice of Home Model, Exterior and Interior
  - Support Various Roles
    - Home Buyer
    - Builder
    - Multiple Contractors
    - City Inspector
  - Use Dynamic Workflow
  - Alert Players When Action Assigned or Due
  - Provide Full Transparency
    - Deliverables
    - Milestones
    - Workflow
    - Complete Transaction History
  - Utilize Blockchain for Storage
    - Home Buyer’s Build Requirements
    - Workflow Tasks

- Technologies
  - CSS / HTML / JavaScript / AngularJS
  - Microsoft .NET
  - Blockchain
  - Hyperledger
  - Microsoft Azure or Amazon Web Services (AWS)
Team Quicken Loans
Turner Anderson, Vishal Adusumilli, Erin O'Hara, Riley Annis, Jaiwant Bhushan
The Capstone Experience

Team Rook

Department of Computer Science and Engineering
Michigan State University
Spring 2018
Optimize Security Operations

Force is a Security Operations Management Platform that equips your team for success by optimizing security resource workflows, metrics, and outcomes.
Team Rook
Project Overview

Endpoint Data Monitoring and Analysis Agent

• Functionalities
  ▪ Detect and React to Security Threats
  ▪ Capture and Analyze Agent Health Metrics and Log Files

• Features
  ▪ Create Endpoint Dashboard
    ○ Enable Remote Agent Configuration
    ○ Do Health Checks and Data Analysis
    ○ Display Health Check Information
    ○ Create Alert Thresholds.
  ▪ Store Metrics and Log Files
    ○ RESTful Endpoint
    ○ Amazon Simple Storage Service (S3)
    ○ Locally
  ▪ Implement State Awareness
  ▪ Support Cross Platform Compatibility
  ▪ Integrate with Rook’s Force Platform

• Technologies
  ▪ Force Platform
  ▪ Go
  ▪ JavaScript / JSON
  ▪ Python / Django
  ▪ React / Redux
  ▪ Ubuntu 16.04
  ▪ Amazon Simple Storage Service (S3)
  ▪ RESTful Web Services
Team Rook
Vikram Thakur, Bohao Gao, Jeremy Specht, Drew Gilbertson, Jared Clark
The Capstone Experience

Team SpartanNash

Department of Computer Science and Engineering
Michigan State University
Spring 2018
Team SpartanNash
Project Overview

Volunteer Tracking App

• Functionalities
  ▪ Simplify Tracking of Associate Volunteer Hours
  ▪ Use Web and Mobile Apps

• Features
  ▪ Create Apps for Volunteer Reporting
    o Web
    o Apple iOS
    o Google Android
  ▪ Handle Various Inputs
    o Associate ID
    o Name and Location of Place
    o Type of Service
    o Number of Hours
  ▪ Track Hours
  ▪ Enable Photo and Video Uploading
  ▪ Utilize Geolocation for Easy Location Reporting
  ▪ Gamify with Badging and Leader Board
  ▪ Send Notifications
    o Volunteers
    o Program Facilitators
  ▪ Build Companion Web Administrative App

• Technologies
  ▪ CSS / HTML / JavaScript
  ▪ Apple iOS / Swift
  ▪ Google Android / Java
  ▪ React Native
  ▪ MySQL

Grand Rapids, Michigan
Team SpartanNash
Denis Andreev, Abbott Wang, Aleks Bonev, Nino Candela, Tianyi Li
The Capstone Experience

Team Spectrum Health

Department of Computer Science and Engineering
Michigan State University
Spring 2018
Spectrum Health Go

• Functionalities
  ▪ Improve Patient and Visitor Experience
  ▪ Help Navigate Spectrum Health Facilities

• Features
  ▪ Create Apple iOS and Google Android Apps
  ▪ Provide Real-Time On-Screen Directions
  ▪ Guide via Pre-Configured Waypoints
  ▪ Use Optical Character Recognition (OCR)
  ▪ Collect Anonymous Route Data
  ▪ Provide Administrative Web App
    ○ Create and Print Waypoints
    ○ Configure and Improve Routes
    ○ Add New Locations and Routes

• Technologies
  ▪ CSS / HTML / JavaScript
  ▪ Apple iOS / Swift
  ▪ Google Android / Java
  ▪ Microsoft .NET / C#
  ▪ Microsoft SQL Server
  ▪ Microsoft Azure
  ▪ GitHub / ZenHub
  ▪ Optical Character Recognition (OCR)
  ▪ Identity Server
Team Spectrum Health
Andrew Astakhov, Collin Skonieski, Rachel Polus, Pierce Neal, Xin Zhao
Team Spectrum Health
Project Plan Presentation

Screen Mockup: Android App
Team Spectrum Health Project Plan Presentation
Team Spectrum Health
Project Plan Presentation

Architecture Diagram

Web Application
- ASP.NET
- REST API

SQL Database

iOS Application
- ALAMOFIRE

Android
- Retrofit
Team Spectrum Health
Project Plan Presentation
SpectrumGO LOBBY Waypoint

Paths

- To Operating Room
  - Directions: Turn left. Walk forward until
  - Angle: 90

- To Nursing Ward

- To Cardiology
  - Directions: Turn around. Take the first
  - Angle: 180

- To Pharmacy
  - Directions: Take the staircase on your
  - Angle: 45

Add, Delete
The Capstone Experience

Team Symantec

Department of Computer Science and Engineering
Michigan State University
Spring 2018
Securing the Cloud Generation

Fueled by the world's largest civilian threat intelligence network

LEARN MORE
Detecting Security Threats from User Authentication Patterns

- **Functionalities**
  - Detect Security Threats
  - Use Symantec Validation and ID Protection (VIP)
  - Visualize VIP Authentication Patterns

- **Features**
  - Ingest VIP Reporting Service Log Data
  - Create Operational Dashboard with Alerting
    - Number of Authentications Per Time Unit
    - Successful vs Failed Authentications
    - Unique Users Per Time Unit
    - Distribution of Risk Reasons
  - Create Security Dashboard and Alerting
    - Trends of Failed Authentications
    - Find Risky Users
    - Flag Increases in Credential Use
  - Integrate with Splunk Enterprise and Splunk Cloud

- **Technologies**
  - Symantec VIP Reporting Service
  - Splunk
  - Amazon Web Service (AWS)
  - RESTful Web Services
  - Elastic Search, Kibana, Logstash
  - Apache Spark
Team Symantec
Robert Novak, Abby Urbanski, Stephen Alfa, Keerthana Kolisetty, Echo Wu
Project Plan Presentation

Screen Mockup: Dashboard in Splunk

Operational Trends
Panels that display basic statistics of VP authentications

- Authentications Across Different Device Types
- Total Number of Authentications: 19,809
- Success vs. Failure Authentications

Number of Authentications Over Last Seven Days

Success vs Fall Attempts For Each Device Type

Team Symantec
Do not delete this textbox. It's used as a marker in VB code. See VB Module UTL_PresentationSlidesSend2FB.

Team Symantec Project Plan Presentation
Team Symantec
Project Plan Presentation

Architecture Diagram

Two-factor authentication

Powered by Symantec

Symantec VIP services

Data & Event Logs

VIP Reporting Client

Splunk

Data Documents

ELK

Establish

Customers

Internet

AWS

Powered by MSU Team Symantec

The Capstone Experience
Team Symantec
Project Plan Presentation

Screen Mockup: Dashboard in ELK
The Capstone Experience

Team TechSmith

Department of Computer Science and Engineering
Michigan State University
Spring 2018
Create Powerful Visuals. No Design Skills Needed.

TechSmith makes it simple for everyone to create high-quality screenshots, screencasts, and videos.

Shop Now
Team TechSmith
Project Overview

Snagit and Camtasia Output Extensibility

• Functionalities
  ▪ Simplify Sharing of Media Produced by TechSmith Products
  ▪ Extend Output Capabilities of Snagit and Camtasia

• Features
  ▪ Use TechSmith Extensibility Framework
  ▪ Build Three Plugins
    o TechSmith Video Review
    o Wistia
    o Student Choice
  ▪ Design Highly Polished User Experience (UX)
  ▪ Provide Media Upload Service with Link
  ▪ Create Independent Test Harness

• Technologies
  ▪ Microsoft .NET / C#
  ▪ Windows Presentation Foundation (WPF)
  ▪ TechSmith Cloud SDK
  ▪ TechSmith Extensibility Framework (TEF)
  ▪ Managed Extensibility Framework
Team TechSmith
Ryan Schiller, Logan Arent, Collin Dillinger, Carter Chamberlain
Team TechSmith
Project Plan Presentation

Screen Mockup: Output Mockups
Team TechSmith
Project Plan Presentation
Team TechSmith
Project Plan Presentation

Architecture Diagram

- Snagit®
- Camtasia®
- TechSmith Desktop Applications
- TechSmith Extensibility Framework
- Test Harness
- Windows Desktop
- WISTIA
- TechSmith Video Review™
- imgur
- Media Hosting APIs
Team TechSmith
Project Plan Presentation

Screen Mockup: Test Harness
The Capstone Experience

Team Union Pacific

Department of Computer Science and Engineering
Michigan State University
Spring 2018
The Spirit Locomotive Honors U.S. Armed Forces

Locomotive No. 1943, The Spirit, spotlights Union Pacific's relationship with thousands of veterans who helped build America after defending the United States - a tradition dating back to the company's founding. Find out more.
Team Union Pacific
Project Overview

Alexa, what’s my work schedule look like?

• Functionalities
  ▪ Provide Information About Upcoming Work Assignments
  ▪ Utilize Voice Activated Digital Assistant
  ▪ Target Trainmen, Yardmen and Enginemen (TY&E)

• Features
  ▪ Create Suite of Mobile Apps
    o Responsive Design
    o Support Apple iOS and Google Android Devices
  ▪ Manage Users
    o Register
    o Identify
    o De-Activate
  ▪ Support All Major Voice Interfaces
    o Amazon Echo
    o Google Home
    o Apple Siri
    o Microsoft Cortana
  ▪ Use JSON Web Services
  ▪ Write Documentation for Each System

• Technologies
  ▪ Java
  ▪ JavaScript / AngularJS
  ▪ Amazon Echo
  ▪ Google Home
  ▪ Apple Siri
  ▪ Microsoft Cortana
  ▪ Natural Language Processing (NLP)
Team Union Pacific
Jared McMillan, Daniel Agbay, M Kim, David Hubble, Austin McGee
The Capstone Experience

Team Urban Science

Department of Computer Science and Engineering
Michigan State University
Spring 2018
EVERYONE HAS AN OPINION.
WE HAVE SCIENCE.

Since the day we started, we’ve been a force for change. We started with a problem to solve. We scrutinized it, developed a theory, tested it and applied the solution. And we have the same approach today, we listen to our clients’ needs and find a solution. We’re curious, objective, empirical and determined. Through this spirit, we invented The Power of 4™ formula to bring scientific discipline to the business world. It’s how we are Guiding Business Through Science.
Team Urban Science
Project Overview

Mobile Maestro

• Functionalities
  ▪ Control Maestro Exoskeletal Arm
  ▪ Use Mobile App with Voice Input

• Features
  ▪ Handle Various Arm Controls
    o Up, Down, Lock
    o Lock, Standby
  ▪ Provide Voice Control
    o Safe Word for Home/Reset Position
    o All Functions
  ▪ Implement Self-Leveling with Calibration
  ▪ Support Apple iOS and Google Android
  ▪ Collect Usage Statistics

• Technologies
  ▪ Maestro Exoskeletal Arm
  ▪ CSS / HTML / JavaScript
  ▪ Microsoft .NET / C#
  ▪ Apple iOS / Swift
  ▪ Google Android / Java
  ▪ Bluetooth Low Energy (BLE)
  ▪ Natural Language Processing (NLP)
Team Urban Science
Shun Ran, Samantha Oldenburg, Alex Wuillaume, Dane Rosseter, Mustafa Jebara
The Capstone Experience

Team USAA

Department of Computer Science and Engineering
Michigan State University
Spring 2018
WE PROUDLY SERVE MILITARY MEMBERS AND THEIR FAMILIES

Since 1922, we have stood by our members. We've provided years of guidance and assistance — from helping establish financial independence, to raising a family, to retirement.

WHO WE SERVE
LIMElight: Life Insurance Made Easy

- Functionalities
  - Obtain Life Insurance Quote
  - Improve the Experience
    - For Applicant
    - For Insurer
  - Decrease Duration, Complexity and Cost
- Features
  - Provide Smooth User Experience
    - Responsive Web
    - Native Apple iOS and Google Android Apps
  - Generate Personalized Quote
    - Use Minimal Inputs from Applicant
    - Leverage Machine Learning
    - Match Underwritten Premium Closely
  - Create Health Record Blockchain
    - Controlled by Applicant
    - Ensure Privacy and Security
    - Accessible via RESTful API
- Technologies
  - Apple iOS / Swift
  - Google Android / Java
  - Blockchain
  - Machine Learning / Python
  - Microsoft Azure
  - RESTful Web Services
  - JavaScript / REACT / Angular 2+ / Vue
Team USAA
Xingchi Zhou, Nathaniel Finley, Abe Ahmed, Mike Ronayne, Dong Lee
Team USAA
Project Plan Presentation

Screen Mockup: Quoting Process
Team USAA
Project Plan Presentation
Team USAA
Project Plan Presentation

Architecture Diagram

Frontend Web Application (Azure)
- React
- REST API
- User Input
- Quote

Blockchain Backend (Azure)
- Execute Smart Contract
- REST API
- Ethereum
- Data
- Execute Smart Contract

Machine Learning Backend (Azure)
- Azure Functions
- REST API
- Machine Learning
- Data
- Result
Team USAA
Project Plan Presentation
Team USAA
Project Plan Presentation

Screen Mockup: Patient Login

Manage Who Can View Your Health Records

<table>
<thead>
<tr>
<th>Entity</th>
<th>Permission</th>
</tr>
</thead>
<tbody>
<tr>
<td>USAA</td>
<td>Y</td>
</tr>
<tr>
<td>Sparrow Health</td>
<td>N</td>
</tr>
</tbody>
</table>
The Capstone Experience

Team Yello

Department of Computer Science and Engineering
Michigan State University
Spring 2018
yello
Humanize
The Candidate Experience

Provide unprecedented speed and transparency throughout the candidate journey.
Sentiment and Emotional Analysis of Video Interviews

- Functionalities
  - Evaluate Video Interview Automatically
  - Include Sentiment and Emotional Analysis

- Features
  - Design and Build Web App
    - Record Live Video
    - Support Prerecorded Video
    - Enable Viewing and Rerecording by Applicant
  - Transcribe All Recordings and Store with Video
  - Apply Sentiment Analysis on Transcription
  - Run Emotion Detection on Audio and Video
  - Provide Administrative Web App
    - To View Results
    - By Hiring Team

- Technologies
  - CSS / HTML / JavaScript / JSON
  - Ruby on Rails
  - Microsoft Azure Emotion API
  - Microsoft Language Understanding Intelligent Services (LUIS)
  - Machine Learning
    - TensorFlow
    - scikit-learn
Team Yello
Jonathon Zeitler, Leo Yao, Jenn Proos, Quan Zhou, Brian Wang
Team Yello
Project Plan Presentation

Screen Mockup: Staff Management Page

Create New Interview
Mange Interviews
Schedule a live interview

Yello Capstone
Michigan State University
CSE 498

Follow Us!
Team Yello
Project Plan Presentation
Team Yello
Project Plan Presentation

Screen Mockup: Interview Recording Page
The Capstone Experience Lab
The Capstone Experience Lab
The Capstone Experience Lab
The Capstone Experience Lab
The Capstone Experience

Design Day Award Winners

April 28, 2017
All-Hands Design Day, April 28, 2017
Auto-Owners Exhibition Award
Team TechSmith, Spring 2017
Teacher’s Virtual Toolbelt
Alex Crimin, Zeke Zandbergen, Yang He, Ryan Cornillie
Presented by Scott Lake of Auto-Owners Insurance
MSU Federal Credit Union Praxis Award
Team Union Pacific, Spring 2017
Learning New Train Routes
Matthew Schleusener, Kangjie Mi, Nick Summers, Jon Wild
Presented by Liam Petraska of MSU-Federal Credit Union
TechSmith Screencast Award
Team Amazon, Spring 2017
ACRA: Amazon Customer Review Analyzer
Jie Wan, Jason Liu, Ian Whalen, Ankit Luthra, Tess Huelskamp
Presented by Wendy Hamilton of TechSmith
Urban Science Sigma Award
Team Michigan State University, Spring 2017

CATAlyst: Mapping CATA Buses in Real-Time
Charlie Ward, Cathy Dinsmoor, Tom Beaver, Jimmy Mkude, James Dodge
Presented by Linda Koepppe and Luke Mercier of Urban Science
The Capstone Experience

Design Day Award Winners

December 8, 2017
Auto-Owners Exhibition Award
Team Amazon, Fall 2017

Faia: Fashion Artificial Intelligence Assistant
David He, Dominic Zottolo, Zizhen Wang, Danielle Schugars, Nikhil Ramu
Presented by Ross Hacker and Scott Lake of Auto-Owners Insurance
MSU Federal Credit Union Praxis Award
Team Yello, Fall 2017
Automatic Resume Verification
Brandon Burt, Ryan Nagy, Giorgio Maroki, Nathaniel Hagan, Wan Kim
Presented by April Clobes of MSU Federal Credit Union
TechSmith Screencast Award
Team Union Pacific, Fall 2017

RailBuilder: The Great Race to Promontory
Declan McClintock, Jacob Young, Zachary Brenz, Kyle Bush, Trever Daniels
Presented by Matt Dupuis of TechSmith
Urban Science Sigma Award
Team Michigan State University, Fall 2017
SEA: Spartan Experience App
Nayana Kodur, Patrick Pale, Roy Perryman, Ryan Johnson, Scott Swarthout
Presented by Elizabeth Klee of Urban Science
The Capstone Experience

Dr. Wayne Dyksen
Department of Computer Science and Engineering
Michigan State University
Spring 2018
Auto-Owners
INSURANCE
LIFE • HOME • CAR • BUSINESS
DRIVEN-4
yello