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**U N I V E R S I T Y**

# 01/23: Team Status Reports

## The Capstone Experience

Dr. Wayne Dyksen  
James Mariani  
Luke Sperling  
Griffin Klevering  
Sam Kessel

Department of Computer Science and Engineering  
Michigan State University  
Spring 2024



*From Students...  
...to Professionals*

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# Status Report Presentation

## Shareholder Engagement Chatbot

### The Capstone Experience

Team Ally

George Hunt  
Marshal DiGiovanni  
Juan Sabogal Olarte  
Will Feddern  
Treasure Puso

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Michigan State University

Spring 2024



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# Team Ally

## Status Report

[1 of 4]

### Shareholder Engagement Chatbot

- Sponsor Overview
  - Financial services company
  - Nation's largest all-digital bank
  - HQ in Detroit, MI
- Project Overview
  - Create Interactive Chatbot
  - Improve Investor Engagement
  - Answer Shareholder Questions
  - Train LLM on Ally's Public Filings



# Team Ally

## Status Report

[2 of 4]

### Shareholder Engagement Chatbot

- Server Systems / Software
  - OpenAI – Formulated ask
  - AWS – Researched and formulated ask
  - Kubernetes – Researching for deployment
- Development Systems / Software
  - WebStorm (React) – Installed and working for all
  - PyCharm (Flask) – Installed and working for all
  - GitLab – Created prototype repository (cloned by all)
- Project Plan Document
  - Created outline and format
  - Split up workload
  - ~10% Complete



# Team Ally

## Status Report

[3 of 4]

### Shareholder Engagement Chatbot

- Client Contact
  - Set up weekly meetings: Wednesday 9:15am – 10:00am
  - We have met 2 times
- Team Meetings
  - Wednesday 6pm, Thursday 4:30pm (weekly)
  - We have met 8 times
- Team Organization (Tentative)
  - Data engineering - George
  - ML engineering - Juan
  - Frontend - Marshal
  - Backend - Treasure
  - DevOps - Will



# Team Ally

## Status Report

[4 of 4]

### Shareholder Engagement Chatbot

#### Risks

- Risk 1
  - Developing a context-aware LLM
  - Researching OpenAI, PostgreSQL (pgvector) and LangChain ecosystem
- Risk 2
  - Deployment Pipeline to Kubernetes
  - Researching GitLab CI/CD to AWS EKS
- Risk 3
  - Privacy and Authentication
  - Researching / choosing between AWS Cognito or IAM
- Risk 4
  - Data acquisition
  - Researching methods to collect data via web scraping and APIs



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**U N I V E R S I T Y**

# Status Report Presentation

## Employee Badge Image Validation Tool

The Capstone Experience

Team Amazon

Jack Hammond

Khloe Hayes

Katelyn Hurst

Arul Srivastava

Timmy Wu

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# Team Amazon

## Status Report

[1 of 4]

### Employee Badge Image Validation Tool

- Sponsor Overview
  - Based in Seattle, Washington
  - eCommerce and cloud computing
- Project Overview
  - Validate new employee badge photos for requirements
  - Increases efficiency for employee onboarding
    - New employees
    - Badge verification team
  - Web application





# Team Amazon

## Status Report

[2 of 4]

### Employee Badge Image Validation Tool

- Server Systems / Software
  - Everyone has access to AWS accounts
  - Created S3 buckets on AWS for data storage
  - Completing AWS tutorials for different services
- Development Systems / Software
  - Skeletal website using react js
  - Implemented Amazon styling to website
  - Everyone has successfully pushed to GitLab via VSCode
- Project Plan Document
  - Created project plan skeleton
  - 15% Complete



# Team Amazon

## Status Report

[3 of 4]

### Employee Badge Image Validation Tool

- Client Contact
  - Two meetings (introduction, AWS setup)
  - Scheduled weekly meetings on Tuesdays at 4:45pm
  - Two of our clients presented themselves as mentors for the technical side of this project
- Team Meetings
  - Met 8 times
  - Scheduled weekly meetings on Monday at 6pm
    - Usually have unscheduled meetings throughout the week
- Team Organization
  - Client contact: Khloe
  - Research and tested AWS services: everyone
  - Web app skeleton: everyone



# Team Amazon

## Status Report

[4 of 4]

### Employee Badge Image Validation Tool

#### Risks

- Unfamiliar with AWS image recognition tools
  - Abundance of models, don't know which one to use for our project
  - Consulting with our sponsors, completing tutorials, and creating small projects using the services to get familiar with AWS
- Having a robust enough dataset
  - We would like to have 95% confidence in our results
  - Start collecting data and fine tuning our models
- Unaware of complete architecture needed
  - Due to AWS providing so many services, we have multiple options, but need to figure out only one
  - Consulting with our sponsors
- Embedding our learning model into our project
  - We are unsure about how we will implement our learning model from AWS into our web application
  - Trial and error based off previous experience and consulting with our sponsors



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**U N I V E R S I T Y**

# Status Report Presentation

## Optimizing Electric Motors Using ML

The Capstone Experience

Team Anthropocene Institute

Paulina Bies  
Connor Horton  
Cedric Emmanuel  
Jacob Robert Stacy  
Jared Singh Sekhon

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# Team Anthropocene Institute

## Status Report

[1 of 4]

### Optimizing Electric Motors Using ML

- Sponsor Overview
  - Firm interested in exploring solutions for climate change
  - Assess research claims, results and maturity
  - Connects Investors, policy makers and researchers
- Project Overview
  - Improve economic, environmental and power efficiency of motors
  - Train an ML model to output most powerful motor with least impact
  - Web front-end for ease of use



# Team Anthropocene Institute

## Status Report

[2 of 4]

### Optimizing Electric Motors Using ML

- Server Systems / Software
  - MySQL server
  - Hosted on G-Cloud
  - Placeholder site running
- Development Systems / Software
  - Python (Pandas, Pytorch and Flask libraries)
  - Javascript
- Project Plan Document
  - Outline created
  - 5% Complete





# Team Anthropocene Institute

## Status Report

[3 of 4]

### Optimizing Electric Motors Using ML

- Client Contact
  - Met with client twice
  - Meetings every Friday at 4pm
- Team Meetings
  - Tuesday and Thursday after Capstone Class
  - Met 5 times
- Team Organization
  - Currently split into data acquisition and research
  - Jacob, Connor on Web-development later on
  - Paulina, Cedric and Jared on ML.





# Team Anthropocene Institute

## Status Report

[4 of 4]

### Optimizing Electric Motors Using ML Risks

- Risk 1
  - Uploading Trained Model to Website
  - Finding and following guides on machine learning
- Risk 2
  - Defining classes (what is a 'good' motor)
  - Discussing with sponsor what they consider a good example
- Risk 3
  - Limited access to motor databases
  - Ask sponsors for access to data



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**U N I V E R S I T Y**

# Status Report Presentation

## PIG: Policyholder's Interactive Guide

### The Capstone Experience

Team Auto-Owners

Jake Rhodes

Daniel Sohn

John Landers

Cole Tackett

Chase Hawley

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# Team Auto-Owners

## Status Report

[1 of 4]

### PIG: Policyholder's Interactive Guide

- Sponsor Overview
  - Headquartered in Lansing, Michigan
  - Nationally recognized independent insurance authority
  - Offers home, life, auto, and business policies
- Project Overview
  - Enhance customer understanding of auto insurance
  - Display detailed policy information in AR
  - Visualize policy information on fully virtual vehicle models
  - View insurance information on real-life vehicles



# Team Auto-Owners

## Status Report

[2 of 4]

### PIG: Policyholder's Interactive Guide

- Server Systems / Software
  - GitLab – Setup and included .gitignore for Unity
- Development Systems / Software
  - Unity – Project space setup and pushed to GitLab
  - Visual Studio – Setup and integrated with Unity project
  - Hololens2 – Reimaged, setup, and logged in
  - Hololens Emulator – Installed and setup on lab computer
- Project Plan Document
  - Document skeleton created – including sections
  - Sections assigned for completion
  - 10% Completed



# Team Auto-Owners

## Status Report

[3 of 4]

### PIG: Policyholder's Interactive Guide

- Client Contact
  - Met twice and scheduled weekly meetings
  - Arranged meeting expectations and agenda
- Team Meetings
  - Setup flexible meeting points on Monday or Tuesday
  - Determined meeting location for team and client meetings
- Team Organization
  - Menu Functionality – display and interaction: Chase
  - Item System – integrating items within systems modes: Jake and Daniel
  - Object Detection Mode – detecting real-life vehicles: Cole and John



# Team Auto-Owners

## Status Report

[4 of 4]

### PIG: Policyholder's Interactive Guide

#### Risks

- Hololens2 Memory Limitations
  - Low memory on the Hololens could limit virtual vehicle models
  - Use low-poly models for the vehicles
- Lab Computer Memory Limitations
  - Limited by memory when using Unity and Hololens Emulator concurrently
  - Minimize background tasks and use Unity and Emulator individually
- Asset Limitations
  - Only using royalty free models
  - If better assets needed, ask client if they are willing to pay
- Developing AR in Unity
  - Lack of experience developing AR in Unity
  - Read documentation and complete tutorial courses for AR development



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# Status Report Presentation

## Driven-4 Web Application

### The Capstone Experience

Team Driven-4

Ajuisiwon Azantilow (Tilow)

Zhiqiang Ni (James)

Will Skaggs

Zachary Morris

Parker Morgan

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# Team Driven-4

## Status Report

[1 of 4]

### Driven-4 Web Application

- Sponsor Overview
  - Proficiency in PLM, cloud services, and cybersecurity
  - IoT Consulting
  - Custom solutions to company's problems
- Project Overview
  - Improving/Implementing website features
  - Enhance security
  - Migrating MySQL to SQLAlchemy
  - Make builder for query sections



# Team Driven-4

## Status Report

[2 of 4]

### Driven-4 Web Application

- Server Systems / Software
  - Able to run website using flask
  - Access to databases
- Development Systems / Software
  - Gitlab is setup
  - Local machines running code
  - Extend SQLAlchemy integration
- Project Plan Document
  - Added technology requirements
  - Working on schedule
  - 10% Complete



# Team Driven-4

## Status Report

[3 of 4]

### Driven-4 Web Application

- Client Contact
  - Weekly meetings on Thursday 4:45pm EST
  - 2 meetings with client
- Team Meetings
  - Weekly In-Person on Monday 5:30pm EST
  - 6 meetings so far
- Team Organization
  - Back End – Database, SQLAlchemy, Pandas (James, Tilow)
  - Front End – Flask, JavaScript, HTML (Will, Parker, Zach)



# Team Driven-4

## Status Report

[4 of 4]

### Driven-4 Web Application Risks

- Risk 1
  - Bloated code base
  - Refactoring code
- Risk 2
  - Configuring connecting to external systems
  - Setting up prototype
- Risk 3
  - How to save Custom Dashboard
  - Design a Schema/Data structure



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**U N I V E R S I T Y**

# Status Report Presentation

## Automotive Software Integration In Virtual 3D

### The Capstone Experience

Team Elektrobit

Fierro, Alan  
Austin, Joshua  
Kania, Logan  
Dutton, Brandon  
Wojan, Tommy  
Le, Duy

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# Team Elektrobit

## Status Report

[1 of 4]

## Automotive Software Integration In Virtual 3D

- Sponsor Overview
  - Specializes in advanced automotive software
  - Maintains a global presence, powering over 5 billion devices on over 600 million vehicles
  - Elektrobit focuses largely on AUTOSAR
- Project Overview
  - Simulate vehicle hardware inputs (GPS, Acceleration, Velocity, Obstacles) using CARLA; processes this data, and visualize it through a GUI
  - Provide a platform for testing and developing automotive software
  - Engineers in the automotive industry focusing on system testing
  - Interact with the system through a GUI, inputting commands and viewing simulated sensor data



# Team Elektrobit

## Status Report

[2 of 4]

### Automotive Software Integration In Virtual 3D

- Linux Server / Software
  - Server is up and running
  - Docker container running and accessible
  - Provided test UI interface compiles and works
- Carla Simulation
  - Working on some PCs
- Project Plan Document
  - Started wireframe
  - 10% Complete





# Team Elektrobit

## Status Report

[3 of 4]

### Automotive Software Integration In Virtual 3D

- Client Contact
  - Weekly meetings every Friday at 2 p.m.
  - Two meetings so far, initial project description and questions.
- Team Meetings
  - Weekly meetings every Friday at 4 p.m.
  - Try to do in-person when everyone is available.
- Team Organization
  - No official organization as of yet.
  - Everyone “claims” tasks that fall into their areas of skill.



# Team Elektrobit

## Status Report

[4 of 4]

### Automotive Software Integration in Virtual 3D Risks

- Only some team members can run CARLA simulator
  - CARLA cannot run on virtual machines, other hardware limitations
  - Create a mock CARLA, send dummy data to Linux server
- Remote connection to a GUI
  - Inability to run remotely, only one machine can be used to test
  - Create a remote desktop, show it can be run on WSL



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**U N I V E R S I T Y**

# Status Report Presentation

## Evo Project Reporting Tool

### The Capstone Experience

Team Evolutio

Ammar Elkafrawy

Satya Byreddy

Rushil Mantripragada

Arjun Gupta

Juan Carlos Faure

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# Team Evolutio

## Status Report

[1 of 4]

### Evo Project Reporting Tool

- Sponsor Overview
  - Evolutio is a software consulting company
  - Works on projects involving cloud management, Data Science and AI and automation
  
- Project Overview
  - Creates transparency between evolutio and the client
  - Increases efficiency of consultants at Evolutio
  - Allows for less communication delays between the two entities
  - Minimizes timeline slippage



# Team Evolutio

## Status Report

[2 of 4]

### Evo Project Reporting Tool

- Server Systems / Software
  - Docker Container – up and running
  - Potentially SQL data base
  - Framework is also up and running in conjunction with Docker
- Development Systems / Software
  - Next.JS(frontend) and Node.JS(backend)
  - Either PostgreSQL or MySQL for database
- Project Plan Document
  - Project Plan Document hasn't been written out
  - We have rough outlines of plans on what to write, but know what we want to do
  - 15% Complete



# Team Evolutio

## Status Report

[3 of 4]

### Evo Project Reporting Tool

- Client Contact
  - Have met with client twice
  - Weekly conference calls are set up and ready
  - A slack is set up for open communication between Team Evolutio and Evolutio
- Team Meetings
  - Team Evolutio has met 6 times
  - Official Team meetings scheduled for Tuesdays 5:00-7:00 PM but frequent meetings occur outside of these times as well when availability comes.

#### Team Organization

- Juan is the lead to communicate between the team and Evolutio
- Arjun and Rushil are focusing on frontend while Satya, Juan and Ammar focusing on backend





# Team Evolutio

## Status Report

[4 of 4]

### Evo Project Reporting Tool

#### Risks

- API implementation
  - Sorting through documentation to receive the information in Asana using the core API
  - Plan to mitigate is to analyze developer examples that utilize the API we intend on implementing
- Database integration
  - Traversing and storing the data in the manner that we need in order to display it
  - Picking the appropriate server-side language that is applicable to our needs and creating tables that allow us to pull data as needed
- Okta Integration
  - Need to make sure that our reporting tool is able to be infused with Evolutio's existing Okta SSO infrastructure
  - Plan to look into OAuth API's Okta provides and look into other examples of code that accomplish the same goal
- Custom API
  - Need to connect our frontend to our database Systems utilizing a custom API
  - Plan to look into Express and RestAPI to design and produce the API





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**U N I V E R S I T Y**

# Status Report Presentation

## Dealer Experience Dashboard

### The Capstone Experience

Team Ford

Aparna Anand

Phillip DesRochers

Abel Diaz-Valdez

Fangjun Huang

Andrew Naumoff

Aditya Venkatakrishna

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Michigan State University

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# Team Ford

## Status Report

[1 of 4]

### Dealer Experience Dashboard

- Sponsor Overview
  - Automotive Industry Leader
  - Technological Innovations to Increase Production Efficiency
  - Global Presence
- Project Overview
  - Modernize the Current Dashboard
  - Make use of a Technology Stack
  - Ensure consistency in vehicle servicing across all dealerships for customer convenience



# Team Ford

## Status Report

[2 of 4]

### Dealer Experience Dashboard

- Server Systems / Software
  - Google Cloud Platform
  - Up and running – We have added sample data to the database and have API's enabled
- Development Systems / Software
  - Node.js/React.js/Express.js/Google Cloud Platform/Python
  - Set up a base app and connected it to GCP
  - Made a basic UI for the website
  - Have database data in GCP
- Project Plan Document
  - Have a start on the document, and are waiting on more information from Ford to finalize
  - Right now we have broad ideas for the project, but are making good progress
  - 15% Complete



# Team Ford

## Status Report

[3 of 4]

### Dealer Experience Dashboard

- Client Contact
  - 2 Meetings with Client
  - Meet every Friday
- Team Meetings
  - 5 Meetings with Team
  - Meet on Tuesday and Friday
- Team Organization
  - Established Customer Liaison and Gitlab
  - Use Trello and Microsoft Teams to Delegate Tasks



# Team Ford

## Status Report

[4 of 4]

### Dealership Experience Dashboard

#### Risks

- Integration Challenges
  - React front-end cannot directly fetch data from GCP BigQuery
  - Utilize Express back-end to interface with BigQuery
- Data Processing Delay
  - Slow data processing due to inefficient BigQuery queries
  - Simplify SQL queries and use BigQuery's query planner
- Uncontrolled Query Costs
  - High costs from unoptimized BigQuery queries
  - Set budget alerts in GCP console, regular review and refine query patterns
- Security Question
  - Security risks from improper API use
  - Secure API endpoints and use HTTPS for data transfer



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# Status Report Presentation

## Recovery of Lost and Stolen IT Assets

The Capstone Experience

Team General Motors (GM)

Auden Garrard

Hunter Jones

Seth Youngstrom

Jemin Han

Joel Marshall

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# Team General Motors

## Status Report

[1 of 4]

### Recovery of Lost and Stolen IT Assets

- General Motors Overview
  - International company employing 165,000 employees
  - Manufactures automotive parts
  - Parent company of Buick, Cadillac, GMC, etc.
- Project Overview
  - Security of GM assets
  - Lock down stolen/lost computers
  - Used by GM's security department
  - Read-Access for IT support





# Team General Motors

## Status Report

[2 of 4]

### Recovery of Lost and Stolen IT Assets

- Server Systems / Software
  - PostgreSQL – Running
  - Microsoft Azure – Testing
  - Electron – Running
- Development Systems / Software
  - Front end – Relevant software downloaded and running
  - Back End – Environment set up and test scripts written
  - Database – PostgreSQL tested
- Project Plan Document
  - Created mockups
  - Completed initial outline
  - 30% Complete



# Team General Motors

## Status Report

[3 of 4]

### Recovery of Lost and Stolen IT Assets

- Client Contact
  - Met with client twice
  - Weekly Teams meetings
- Team Meetings
  - Met 8 times
  - Tri-weekly meetings
- Team Organization
  - Front End – Jemin, Joel
  - Back End – Auden, Seth, Hunter
  - Database – Hunter, Joel



# Team General Motors

## Status Report

[4 of 4]

### Recovery of Lost and Stolen IT Assets

#### Risks

- Scalability
  - System needs to support 10,000+ employee computers.
  - Use SQLAlchemy to test using dummy computers
- Operability 1
  - How do we integrate Azure into the system.
  - Research and create prototypes
- Operability 2
  - How to get the client's laptop to lock down.
  - Run test scripts through VMWare
- Reliability
  - How do we make sure the computer stays locked after reboot.
  - Research on potential bypasses



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**U N I V E R S I T Y**

# Status Report Presentation

## Android Vulnerability Database

### The Capstone Experience

Team Google

Alessandro Bocchi

Brendan Wieferich

Seth Darling

Omay Dogan

Frederick Fan

Trey Cosnowski

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# Team Google

## Status Report

[1 of 4]

### Android Vulnerability Database

- Sponsor Overview
  - Shailesh Saini, Head of Android Platform Security & Assurance
  - Google maintains the Android Security Bulletin
  - Partner with numerous customers to provide vulnerability patches for Android
- Project Overview
  - Database of Monthly Security Bulletin and NVD Android vulnerabilities
  - Web facing interface using our database API
  - Helps Google's partners keep up to date with Android vulnerability patches
  - Help developers to flag vulnerabilities actively being exploited



# Team Google

## Status Report

[2 of 4]

### Android Vulnerability Database

- Server Systems / Software
  - Google Cloud SQL Database Instance is active
  - Flask web application is active on the Google Cloud
  - Flask API is in production
- Development Systems / Software
  - Scripts for webscraping and data collection are working
  - Data pipelines are hosted on Google Cloud Services, trying different methodologies which best suits our needs
  - Everyone's environments have been set up and connect to Google Cloud
- Project Plan Document
  - Everyone has a assigned section
  - Skeleton for the document has been set up, internal deadline of Wednesday to complete the first draft
  - 50% Complete





# Team Google

## Status Report

[3 of 4]

### Android Vulnerability Database

- Client Contact
  - Weekly Meeting on Fridays at 4pm EST
  - Met Twice on Google Hangout
- Team Meetings
  - Team meeting on Friday at 3pm EST
  - Ad Hoc meetings Monday morning and after class
- Team Organization
  - Trey and Omay: Data collection from Android Security Bulletin
  - Brendan and Fred: Data collection from NVD
  - Seth: Customer Liaison
  - Alex and Seth: Setting up Google Cloud database and Web Interface





# Team Google

## Status Report

[4 of 4]

### Android Vulnerability Database

#### Risks

- Risk 1
  - None of us have experience in creating an API
  - Experimenting with building a Flask based API using a tutorial
- Risk 2
  - Don't know which of Google Cloud's many API's will best suit our needs
  - Google has first party documentation on their APIs that we can read
- Risk 3
  - We don't know how to validate our data
  - Google Cloud has a data validation tool that may be possible for us to set up and use
- Risk 4
  - Don't know if GitLab is compatible with Google Cloud Services
  - Looking into a CI/CD pipeline using GitLab's built in pipeline service



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# Status Report Presentation

## Artificial Intelligence (AI) Training Course

### The Capstone Experience

Team HAP

Advait Paliwal  
Ashley Arciniega  
Caleb Story  
Joey Morrison  
Vetri Vijay

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# Team HAP

## Status Report

[1 of 4]

### AI Training Course

- Sponsor Overview
  - HAP: A Michigan-based, nonprofit health plan that provides health coverage to individuals
  - Contacts:
    - Steve Neubecker
      - ❖ VP of Digital Self Service
      - ❖ MSU Alum
    - Angela Endres
      - ❖ Associate VP
      - ❖ MSU Alum
- Project Overview
  - Internal AI Training Course
    - For use of all employees
  - To train employees on how to incorporate AI in their workflows



# Team HAP

## Status Report

[2 of 4]

### AI Training Course

- Server Systems / Software
  - Google Cloud Platform (Open AI)
    - Up and Running for everyone
  - Pinecone (Vector Store)
    - Up and Running for everyone
- Development Systems / Software
  - Visual Studio Code
    - Installed on all devices
  - Github Repository
    - All member have access to repository and have cloned the code
  - Trello
    - All members have joined and been assigned tasks
- Project Plan Document
  - 25% Complete
  - Completed:
    - Plan Outline
    - Design Specifications
      - ❖ Landing Screen Mockup
  - In Progress:
    - System Architecture
    - Project Specifications
    - Risks



# Team HAP

## Status Report

[3 of 4]

### AI Training Course

- Client Contact
  - Meetings scheduled for every Friday
    - Two completed: 1/12, 1/19
  - Constant email communication with two members of HAP
- Team Meetings
  - Team Meeting every Friday
    - Two completed: 1/12, 1/19
  - Split meetings every Monday & Wednesday
- Team Organization
  - Front-End Development: Joey
  - Avatar Integration: Vetri
  - Back-End Development: Advait
  - Cloud/DevOPS: Caleb
  - UI/UX: Ashley



# Team HAP

## Status Report

[4 of 4]

### AI Training Course

#### Risks

- Avatar Cost
  - Not being provided a budget for the avatar when most services are costly
  - Cache the avatar with a generic talking/ idle animation and using chat responses instead of avatar responses in the Q & A
- Determining Course Content
  - Being given free range and not much direction for what content will be shown in the course
  - View YouTube videos and popular existing courses to get an idea of what to put in the curriculum. Consistently receive feedback from clients on our ideas, using polls and surveys to determine what content should be chosen.
- Latency of Product
  - How to accommodate the latency when generating responses because it will affect the UX of the user
  - Try to optimize the entire pipeline, from the generation of the text, to the avatar speaking. Caching the course content and avatar is another option as well.
- Portability of Application
  - How to meet our clients request of having this application be a portable exe file
  - Get a hold of a technology representative at HAP that knows how the company's IT works to create a plan for deployment once we are finished with our project.



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# Status Report Presentation

## SmartSat™ AI Acceleration in Space

The Capstone Experience

Team Lockheed Martin Space

Sussanne Constantakis

Benjamin Kavara

Josiah Klann

Kellen Lear



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# Team Lockheed Martin Space

## Status Report

[1 of 4]

### SmartSat™ AI Acceleration in Space

- Sponsor Overview
  - Team of 4 sponsor contacts
  - Meet every Thursday
  - Main Contact is Out of Office until January 29th
- Project Overview
  - Enhance Satellite Capabilities
  - Improve Current Satellite Software Kits
  - Integrate Machine Learning on Satellite Software
  - Deploy Software onto Satellite Hardware



# Team Lockheed Martin Space

## Status Report

[2 of 4]

### SmartSat™ AI Acceleration in Space

- Server Systems / Software
  - Xilinx ZCU102 Board running and connected
  - Prospecting GPU Server for dedicated ML processing
- Development Systems / Software
  - PetaLinux OS operating on an SD card
  - Python Application “Hello Worlds” created
  - C++ Application “Hello Worlds” created
- Project Plan Document
  - Layout complete
  - Parts to complete delegated
  - 10% Complete



# Team Lockheed Martin Space

## Status Report

[3 of 4]

### SmartSat™ AI Acceleration in Space

- Client Contact
  - Met with client twice and the team to help trouble shoot
  - Weekly meeting Thursdays at 1pm
- Team Meetings
  - 5 team meetings
  - Planned meetings before and after class
- Team Organization
  - Kellen is working on the VitisAI install and getting it running
  - Benny is researching machine learning implementation
  - Josiah and Susanne are researching past project



# Team Lockheed Martin Space

## Status Report

[4 of 4]

### SmartSat™ AI Acceleration in Space

#### Risks

- Integrating application with previous semester's project
  - We are tasked with updating the AI development tooling and AI deployment environment with Fall 2023 capstone SmartSat capabilities.
  - Mitigation: Maintaining an open line of communication with our sponsors to gain understanding of last semester's project. We will have more frequent team meetings to make sure we are making progress at an efficient pace.
- Embedded Systems
  - No team members have prior experience with embedded systems or have worked with an FPGA Xilinx board.
  - Mitigation: We will use resources from our sponsors such as the Xilinx board documentation as well as personal research.
- Machine Learning and Vitis AI Description
  - Most of our group is unfamiliar with machine learning processes as well as Vitis AI. This will be a large risk for understanding last semester's code, and for writing proper tests.
  - Mitigation: We will request external resources for specific tasks from our sponsors when needed. We will also do personal research with online courses.



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**U N I V E R S I T Y**

# Status Report Presentation

## Digital Playbill Builder

### The Capstone Experience

Team Ludus

Yufan Ai

Joseph Davis

Swetha Jagannathan

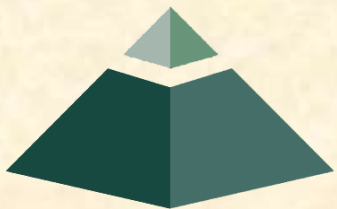
Alayna Johnson

Courtney Thang

Department of Computer Science and Engineering

Michigan State University

Spring 2024



*From Students...  
...to Professionals*

# Team Ludus

## Status Report

[1 of 4]

### Digital Playbill Builder

- Sponsor Overview
  - SaaS Company for Performing Arts Organizations
  - Online Ticketing Platform
  - Also Manages Marketing, Fundraising, and More
- Project Overview
  - Advance Paper Playbills/Programs
  - Immersive Digital Experience
  - Theaters and Orchestras
  - Design, Host, and Share





# Team Ludus

## Status Report

[2 of 4]

### Digital Playbill Builder

- Server Systems / Software
  - Nginx & Linux: Waiting for access from Ludus
  - MySQL
- Development Systems / Software
  - Visual Studio Code: Installed
  - PHP Laravel Framework: Configured and running
  - GitLab & GitHub: Set up and synced
- Project Plan Document
  - Schedule set up; Outline completed
  - Assigned Roles
  - 6% Complete





# Team Ludus

## Status Report

[3 of 4]

### Digital Playbill Builder

- Client Contact
  - Initially met with 1/11
  - Weekly on Thursdays at 1:00 pm
- Team Meetings
  - Tuesdays and Thursdays after class and Saturday mornings
- Team Organization
  - Front-end: Courtney, Swetha, Alayna
  - Back-end: Yufan, Joe, Alayna
  - Client Contact: Courtney



# Team Ludus

## Status Report

[4 of 4]

### Digital Playbill Builder

#### Risks

- Risk 1
  - Displaying all projects and folders on the user's main dashboard
  - Developing a file management system mock
- Risk 2
  - Dynamically publishing playbill to their own URL
  - Researching how similar websites are implementing a 'published' page
- Risk 3
  - Utilizing AI to generate unique designs given user input descriptions
  - Researching OpenAI API's i.e., ChatGPT Turbo & DALL-E
- Risk 4
  - Enabling upload and storage of photos, videos, and gifs
  - Researching and practicing uploading, storing, and retrieving different media formats



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**U N I V E R S I T Y**

# Status Report Presentation

## 3D Model for Factory Digital Twin

### The Capstone Experience

Team Magna

Alan Feng  
Cody Girard  
Gabe Kubiak  
Jacob Yax  
Joey Vesche  
Logan Gillis

Department of Computer Science and Engineering  
Michigan State University

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# Team Magna

## Status Report

[1 of 4]

### 3D Model for Factory Digital Twin

- Sponsor Overview
  - Global automotive supplier founded in 1957
  - Focus on innovation & sustainability
  - Produce parts in Body Exteriors and Structures, Power and Vision, Seating Systems, and Complete Vehicles
- Project Overview
  - Visual model showing state of Magna factory in real time
  - Keep track of and display live data from their factories
  - Update current UI and object interactivity
  - Restructure existing code infrastructure



# Team Magna

## Status Report

[2 of 4]

### 3D Model for Factory Digital Twin

- Server Systems / Software
  - Existing NoSQL (MongoDB) database with GeoJSON tested
  - GitLab set up and in use
  - Mock data and database restructuring in planning phase
- Development Systems / Software
  - Quick and dirty proof of concept from CAD to Three.js
  - Shown that inputs can change model attributes in real time
  - Looking into Vite.js for Mastermodel managing and changes
- Project Plan Document
  - Project sponsor overview and specifications completed
  - Rest split up and assigned between us

# Team Magna

## Status Report

[3 of 4]

### 3D Model for Factory Digital Twin

- Client Contact
  - Meetings via Teams - Friday's at 9am
  - Met with client 2 times
- Team Meetings
  - Meetings via Teams and in person - after class
  - Met 4 times
- Team Organization
  - Front end: Alan, Joey, Logan
  - Back end: Cody, Gabe, Jake





# Team Magna

## Status Report

[4 of 4]

### 3D Model for Factory Digital Twin

#### Risks

- Previous Project Source Code isn't really usable
  - Majority of code given is inefficient, no documentation
  - Identify strengths and weaknesses of code and reassemble
- Little to no understanding of MQTT message protocol
  - We must create accurately reflect the state changes in real world cyber physical systems using MQTT protocol to receive near real time messages from cloud systems
  - Reading up through documentation and looking through video guides
- Database management
  - No actual data yet
  - Research different databases and how to add to said database
- Limited knowledge on what is expected
  - Unsure of what exactly they are looking for visually
  - Ask sponsor for a demo





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**U N I V E R S I T Y**

# Status Report Presentation

## Supply Chain Induction Visibility Using Witron

### The Capstone Experience

Team Meijer

Paul Williams

Soham Sonar

Nick Marshall

Nick Noga

Le An

Department of Computer Science and Engineering  
Michigan State University

Spring 2024



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# Team Meijer

## Status Report

[1 of 4]

### Supply Chain Induction Visibility Using Witron

- Sponsor Overview
  - Top American Shopping Center
  - Founded in 1934 in Greenville, Michigan
  - 14th largest private company in the United States
- Project Overview
  - Warehouse dashboard
  - Displays pallet information
  - Utilizes two data sources
  - Automates current system



# Team Meijer

## Status Report

[2 of 4]

### Supply Chain Induction Visibility Using Witron

- Server Systems / Software
  - Global Protect VPN – Accessible
  - Microsoft Azure – Logged in, no prototype hosted
  - Oracle Database – Need further direction
- Development Systems / Software
  - Visual Studio Code – Git with CLI
  - React w/ Node.js
  - Meijer API – Working on getting access
- Project Plan Document
  - Skeleton Document created
  - Table of Contents laid out
  - 5% complete



# Team Meijer

## Status Report

[3 of 4]

### Supply Chain Induction Visibility Using Witron

- Client Contact
  - Weekly meeting - Friday
  - Open communication via email
  - Met with client twice
- Team Meetings
  - Weekly meeting – Tuesday/Friday
  - Frequent communication via Teams & SMS
- Team Organization
  - Trello – Designate tasks
  - Office365 Calendar – Organize meetings



# Team Meijer

## Status Report

[4 of 4]

### Supply Chain Induction Visibility Using Witron

#### Risks

- Hosting
  - Azure authorization needed from Meijer
  - Coordinated communication with individuals at Meijer
- Integrating Databases
  - Witron Database and MWS Database
  - Creating prototype database/backend to test
- Real-time Dashboard Updates
  - Warehouse dashboard needs real-time updates of data
  - Researching/testing how real-time updates can be achieved
- API/Database access from team Meijer
  - API and database access will be pivotal for our project to succeed
  - Work with sponsor to figure out who needs to provide us with access/assistance



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# Status Report Presentation

## clUML: A Browser Based UML Editor

### The Capstone Experience

Team MSU CSE

Benny Schulz

Derek Hubler

Luke Soumis

Isabella Engelman

Colin Davidson

Cam O'Connor

Department of Computer Science and Engineering

Michigan State University

Spring 2024



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# Team MSU CSE

## Status Report

[1 of 4]

### clUML: A Browser Based UML Editor

- Sponsor Overview
  - Dr. Charles B. Owen, Michigan State University Computer Science Department
- Project Overview
  - Teach Students about software architecture and design using UML diagrams
  - Used in CSE 335
  - Software integrated into the class website that allows for easier work/submission for students and grading for staff.
  - Embedded examples for instruction





# Team MSU CSE

## Status Report

[2 of 4]

### clUML: A Browser Based UML Editor

- Server Systems / Software
  - Given backend repositories for the CSE 335 website to use for local testing with a local host
  - Was able to get running on one personal machine and one of the lab machines
- Development Systems / Software
  - Front end completely set up using PhpStorm connected to a cloned GitLab repo of last semesters project
  - Runs on local host which allows team members to debug work
  - JavaScript and SASS
- Project Plan Document
  - Document has been started and main fields have been entered
  - Screen Mockups and System Architecture design are in development
  - 15% Complete



# Team MSU CSE

## Status Report

[3 of 4]

### clUML: A Browser Based UML Editor

- Client Contact
  - Weekly in-person client meetings: Fridays – 11:30am
  - 2 meetings thus far
- Team Meetings
  - After capstone meetings on Tuesday and Thursday
  - 4 meetings thus far
- Team Organization
  - Front end = Benny, Luke, Derek, Cam
  - Backend = Colin, Isabella, Benny



# Team MSU CSE

## Status Report

[4 of 4]

### clUML: A Browser Based UML Editor

#### Risks

- Back-end Programming
  - Some team members have little to no experience with backend systems and interfacing a web app with an existing database
  - Mitigated by - our sponsor has provided existing code for another similar program used in CSE 320 which our program was based on
- Integration with other browsers
  - Our project is expected to work with multiple browsers
  - Mitigated by – observing and testing behavior on multiple browsers
- Working from an existing project
  - We need to understand the system architecture from the previous team and fix bugs left
  - Mitigated by – reverse engineering existing codes data flow
- Security
  - Features depend on access level of the user. Students shouldn't have access to the same features as course staff
  - Search through existing database code from older given project to see if its code can be repurposed.



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**U N I V E R S I T Y**

# Status Report Presentation

## Enviroweather Mobile

### The Capstone Experience

Team MSU Enviroweather

Malachi Hollins

Michael Moss

Frederick Pagadam

James Noh

Haoxiang Zhang

Emily Dubuque

Department of Computer Science and Engineering  
Michigan State University

Spring 2024



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# Team MSU Enviroweather

## Status Report

[1 of 4]

### Enviroweather Mobile

- Sponsor Overview

- Enviroweather is a collaborative project between the Michigan Climatological Resources Program and the MSU Integrated Pest Management Program.
- Their goal is to create a weather-based information system that helps users make pest, plant production, and natural resource management decisions in Michigan.

- Project Overview

- Improve the mobile viewing of Enviroweather data models by creating a prototype mobile application for IOS and Android



# Team MSU Enviroweather

## Status Report

[2 of 4]

### Enviroweather Mobile

- Server Systems / Software
  - Enviroweather Server: Developers have connected to client's endpoints
- Development Systems / Software
  - React Native: Node.js, Npm, and Expo are installed on every machine
  - Postman: Developers are testing different API responses
- Project Plan Document
  - Created skeleton document
  - Designated sections for team members to work on
  - 10%





# Team MSU Enviroweather

## Status Report

[3 of 4]

### Enviroweather Mobile

- Client Contact
  - We have meet with the client and scheduled weekly meetings for Tuesdays @ 1pm
  - An in-person meeting scheduled for January 26<sup>nd</sup>
- Team Meetings
  - We have meet four times
  - We plan to meet at least once a week every Tuesday
- Team Organization
  - Michael Moss, Frontend Developer
  - Haoxiang Zhang, UI/UX, Frontend Developer
  - Frederick Pagadam, Frontend Developer
  - Emily Dubuque, UI/UX, Mobile Developer
  - James Noh, Mobile Developer
  - Malachi Hollins, Mobile Developer





# Team MSU Enviroweather

## Status Report

[4 of 4]

### Enviroweather Mobile

#### Risks

- Mobile compatibility of React Native
  - Features of IOS app may not be compatible on Android
  - Testing and optimizing app on both Android and IOS
- Integrating Map API into React Native
  - Latest Observation Map needs to be integrated into react native
  - Deciding with client which API and content for this feature on mobile
- Offline support of application
  - Application will be used in areas with limited cell phone service
  - The app should cache and show previously loaded data
- Integrating client's API
  - Establishing connection between mobile app and client's backend
  - Learning postman and decoding client's JSON objects.



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# Status Report Presentation

## The Capstone Experience

Team MillerKnoll

Keshav Babu

Ashley Jarria

Felix Liang

David Xiong

Mohammad Zaman

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Michigan State University

Spring 2024



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# Team MillerKnoll

## Status Report

[1 of 4]

### Product Lifestyle Tracing System

- Sponsor Overview
  - Previously Herman Miller
  - Made-to-Order Customisable Home Furnishing and Goods
  - Headquartered in Zeeland, MI
- Project Overview
  - Identify what products a specific part is used in and vice versa
  - Track supply chain of parts and products
  - Classify products/parts by supplier, material, etc.



# Team MillerKnoll

## Status Report

[2 of 4]

### Product Lifestyle Tracing System

- Server Systems / Software
  - Baan (Oracle-based DB)
  - Alteryx (data processing/analytics)
  - Snowflake (SQL-based DB)
- Development Systems / Software
  - NextJS (full-stack framework)
  - VSCode (IDE) - Working Repo
  - Figma (UI/UX design) - Shared
- Project Plan Document
  - Started and spoke to client about it
  - Written outline and portions of each section
  - 20% complete



# Team MillerKnoll

## Status Report

[3 of 4]

### Product Lifestyle Tracing System

- Client Contact
  - Three one-off calls meeting team and business owners
  - Weekly online syncs Thursdays @ 10AM
- Team Meetings
  - In person Tue/Thurs after class + as needed online
  - Met 6 times so far
- Team Organization
  - Frontend – David, Mohammad
  - Full-stack – Felix, Ashley
  - Backend – Keshav



# Team MillerKnoll

## Status Report

[4 of 4]

### Product Lifestyle Tracing System

#### Risks

- Complexity of the data
  - Lots of complex and unlabeled data
  - Limiting to North America, Herman Miller Brand, and Contract Sales
  - Data scientist is available for consultation
- Lack of access to platforms/data
  - Giving contractors permissions and accounts take time for approval
  - Possibly EOW, frontend framework in meantime
- Unable to integrate with existing workflows
  - API for dependent platform might not exist
  - Exploring alternative options to build from existing data sources
- Missing data in existing data sources
  - Data filtering may not be querying all necessary information for project
  - Step into raw data and move into database ourselves



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# Status Report Presentation

## Personalized AR Experience

### The Capstone Experience

Team MSUFCU

Matthew Wright

Matthew Whyte

Berkay Aydin

Becca Winkler

Joanna Zhan

Department of Computer Science and Engineering  
Michigan State University

Spring 2024



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# Team MSUFCU

## Status Report

[1 of 4]

### Personalized AR Experience

- Sponsor Overview

- MSUFCU is a federal credit union based out of East Lansing
- Committed to superior banking and betterment of local communities
- As of 2024, MSUFCU serves 361,000 members and has \$7.71 billion in assets.

- Project Overview

- Increase efficiency and experience of in-person banking
- Seamless personalized on-site banking
- Facial recognition sign-in process based on geolocation
- On-site display that changes upon user input



# Team MSUFCU

## Status Report

[2 of 4]

### Personalized AR Experience

- Server Systems / Software
  - Ubuntu 22.04.3 server hosted in lab
  - Configured Macs and downloaded necessary software
  - Acquired testing devices for IOS development
- Development Systems / Software
  - Xcode on lab Macs connected to a remote repository
  - Initial application has been pushed to a GitLab repository
  - VSCode used for Flask development and Docker for environment management/deployment
- Project Plan Document
  - Established project overview and required contents
  - Designed initial prototype and confirmed client's needs
  - 10% Complete



# Team MSUFCU

## Status Report

[3 of 4]

### Personalized AR Experience

- Client Contact
  - Established client requirements and signed NDA/IPA
  - Weekly meetings every Friday at 2pm
- Team Meetings
  - Required meetings every Wednesday at 7pm
  - Unofficial meetings during week as needed (Nine meetings thus far)
- Team Organization
  - Trello used for tracking meetings
  - Front-end: Matt Whyte, Joanna, Becca (client contact)
  - Back-end: Matt Wright and Berkay



# Team MSUFCU

## Status Report

[4 of 4]

### Personalized AR Experience

#### Risks

- Syncing phone to external screen in realtime
  - Ensuring a fast and effective connection is established between device and screen
  - Utilizing WebSockets through Flask-SocketIO backend
- Accurate geofencing
  - Confirming user is only notified to authenticate upon entering branch
  - Accessing user's location through Google Maps API
- Privacy with two-factor authentication
  - User can't access private banking information until location and facial recognition have been confirmed
  - Using Apple's secure facial recognition API
- Tailored options on display to user
  - Options displayed to user based on prior activities
  - User info stored in MySQL database



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**U N I V E R S I T Y**

# Status Report Presentation

## Microsoft Excel Data Extractor/Modeler

### The Capstone Experience

### Team Roosevelt Innovations Knowledge Science

Het Patel

Rithwik Pulicherla

Kathryn Nagy

Adrian Self

Brendan Bushbaker

Department of Computer Science and Engineering

Michigan State University

Spring 2024



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# Team Roosevelt Innovations

## Knowledge Science Status Report

[1 of 4]

### Microsoft Excel Data Extractor/Modeler

- Sponsor Overview
  - A software solutions company
  - Child company of Delta Dental of Michigan
  - Provides SaaS for Insurance Analysts
  - Headquartered in Okemos, Michigan
- Project Overview
  - Microsoft Excel spreadsheet data extractor and modeler
  - Current data modeler is unintuitive and hard to use
  - An easy-to-use web interface for data modeling
  - Custom labeling and organization for spreadsheets



# Team Roosevelt Innovations

## Knowledge Science Status Report

[2 of 4]

### Microsoft Excel Data Extractor/Modeler

- Server Systems / Software
  - Access to internal resources provided by RIKS
  - Development system isolated in Docker container
  - MongoDB cluster configured
- Development Systems / Software
  - Received access to testing data
  - Received access to project repository
  - Local environment configuration complete
- Project Plan Document
  - Risks and technical specifications of our project plan are being discussed
  - Screen mockup has been started
  - 20% Complete





# Team Roosevelt Innovations

## Knowledge Science Status Report

[3 of 4]

### Microsoft Excel Data Extractor/Modeler

- Client Contact
  - We have contacted our client teams and discussed project details
  - We have received access to files and information
- Team Meetings
  - Weekly client meetings scheduled (9:30AM, Fridays)
  - Internal weekly team meetings scheduled (10:30AM, Mondays)
- Team Organization
  - We have decided on a dynamic approach to our individual tasks
  - Internal Trello board and Discord server configured

# Team Roosevelt Innovations

## Knowledge Science Status Report

[4 of 4]

### Microsoft Excel Data Extractor/Modeler

#### Risks

- Data extracting Libraries for Angular Framework
  - Specific library has not been selected for handling spreadsheets with Angular
  - Client recommended x-data-spreadsheet, but more research needed
- DSL Conversion
  - Project uses Grace, an internal domain specific language from RIKS
  - Research provided documentation and maintain client communication
- MongoDB
  - None of us have experience connecting MongoDB cluster to web applications
  - Consult official developer's platform and conduct research
- Parsing Excel Spreadsheets
  - None of us have experience parsing their specific formatted excel spreadsheets
  - Conduct general Excel research and maintain client communication



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# Status Report Presentation

## Voice Transcription API

The Capstone Experience

Team RPM

Blake Garvin

Baran Manti

Karthik Kandikonda

Joel Nataren Moran

Al Al-Hassan

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Spring 2024



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# Team RPM

## Status Report

[1 of 4]

### Voice Transcription API

- Sponsor Overview
  - International logistics and supply chain solutions
  - Connect client and carrier
- Project Overview
  - Problem: call centers backed up with easy logistics questions
  - Interactive voice assistant
  - View and modify client information
  - Multilanguage capability



# Team RPM

## Status Report

[2 of 4]

### Voice Transcription API

- Server Systems / Software
  - Flask
  - SQL Database
- Development Systems / Software
  - VS Code
  - AzureAI/OpenAI
  - Twilio
  - React
- Project Plan Document
  - Made template
  - 10% Complete



# Team RPM

## Status Report

[3 of 4]

### Voice Transcription API

- Client Contact
  - Monday @ 2pm & Thursday @ 5pm weekly meetings
  - Use Teams
- Team Meetings
  - Sunday @ 3pm & Wednesday @ 6pm weekly meetings
  - In-Person and Discord
- Team Organization
  - Blake – Client contact
  - Front-end: Blake and Karthik
  - Backend-end: Al, Joel, Baran



# Team RPM

## Status Report

[4 of 4]

### Voice Transcription API

#### Risks

- Voice interactions
  - When to speak
  - Twilio documentation
- Voice Commands
  - Voice to code translation
  - OpenAI functions
- Speaker identification
  - Identifying speaker by voice
  - Azure AI documentation
- Security
  - Prevent leaking sensitive information through ChatGPT
  - Proper prompt engineering





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**Status Report Presentation**  
**Dynamic Visualization of Architecture**  
**Diagrams**  
**The Capstone Experience**

**Team Stryker**

Elaina Frydel  
Marla Whitfield  
Evan Stanislaw  
Yaxuan Tang  
Aron DuBois

Department of Computer Science and Engineering  
Michigan State University

Spring 2024



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# Team Stryker

## Status Report

[1 of 4]

### Dynamic Visualization of Architecture Diagrams

- Sponsor Overview
  - Leading medical technology company
  - Markets their products to doctors, hospitals, and healthcare facilities
  - Produces surgical equipment, implants, and other medical supplies
- Project Overview
  - Automizing the creation of architecture diagrams
  - Stryker has developers who make the diagrams, from very simple to extremely complex
  - Save on time
  - Help mitigate mistakes that could be made



# Team Stryker

## Status Report

[2 of 4]

### Dynamic Visualization of Architecture Diagrams

- Server Systems / Software
  - Microsoft Azure
  - VMware Virtual Machine
  - GitLab
- Development Systems / Software
  - Created GitLab repository and checked that all team members have push/pull access
  - Created our React front-end and Flask backend and ensured communication between front-end and backend
  - Made a simple navigation bar to navigate the three pages of the website and created page 1
- Project Plan Document
  - Functional Specs underway
  - Document Structure complete
  - Architecture diagram complete
  - 20% Complete



# Team Stryker

## Status Report

[3 of 4]

### Dynamic Visualization of Architecture Diagrams

- Client Contact
  - Initial meeting 1/12/2024
  - Plan to meet Wednesdays at 1:30pm with clients
- Team Meetings
  - Weekly meeting day and time: Tuesday 4:30pm – 7:00pm
  - Meet and work together in the lab as much as possible
- Team Organization
  - Assigned Roles
  - Learned each others' strengths and weaknesses
  - Looking at resources to understand new technology



# Team Stryker

## Status Report

[4 of 4]

### Dynamic Visualization of Architecture Diagrams

#### Risks

- Visio file integration
  - Export diagrams to a specific Visio file type (vsdx)
  - Currently exploring available tools, python library and MS tools
- Diagram organization
  - Diagrams with complicated structures must be easy to read
  - Experimentation of existing orthogonal drawing algorithms
- Excel file integration
  - Data within diagrams must be exported to excel
  - Currently exploring available tools, PowerBI and jQuery
- Connection to existing Stryker database
  - Access to existing database has been slow
  - Analysis of a sample table from the Database



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**U N I V E R S I T Y**

# Status Report Presentation

## Enhanced Video Assistant

### The Capstone Experience

Team TechSmith

Emmett Barrett

Kyle Nowak

Chirag Rudrangi

Kwonyeong Cho

Carter Salna

Sriram Seelamnei

Department of Computer Science and Engineering

Michigan State University

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# Team TechSmith

## Status Report

[1 of 4]

### Enhanced Video Assistant

- Sponsor Overview
  - Camtasia
  - SnagIt
  - Audiate
- Project Overview
  - Video Editor
  - Video Streamliner
  - AI Focus Group
  - Narration Improvement





# Team TechSmith

## Status Report

[2 of 4]

### Enhanced Video Assistant

- Server Systems / Software
  - Azure App Service
  - Azure SQL Database
  - OpenAI
- Development Systems / Software
  - React
  - Python
  - JavaScript
- Project Plan Document
  - Document has been started
  - Headers and page numbers
  - 20% Complete



# Team TechSmith

## Status Report

[3 of 4]

### Enhanced Video Assistant

- Client Contact
  - Weekly meeting w/ client
  - Often email correspondence
- Team Meetings
  - Scheduled meetings
  - Twice a week
- Team Organization
  - Split research groups
  - Split implementation groups



# Team TechSmith

## Status Report

[4 of 4]

### Enhanced Video Assistant

#### Risks

- Risk 1
  - Cost of Azure AI Indexer.
  - Exploring alternative options or reducing computation.
- Risk 2
  - Discerning important parts of video.
  - Azure Video Retrieval and Summary; Azure AI Video Indexer + OpenAI;
- Risk 3
  - Process Videos that don't have audio
  - Azure AI Vision Studio
- Risk 4
  - Processing Time too long
  - User pre-defined expectations; Compressing video



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# Status Report Presentation

## Rules Test Practice Tool

### The Capstone Experience

Team Union Pacific

Hailey Cohen

Matthew Dunn

Manav Singh

Timothy Sung

Xuerun Wang

Department of Computer Science and Engineering

Michigan State University

Spring 2024



*From Students...  
...to Professionals*

# Team Union Pacific

## Status Report

[1 of 4]

### Rules Test Practice Tool

- Sponsor Overview
  - Largest railroad network in the United States, headquartered in Omaha, Nebraska
  - UP locomotives are found throughout the U.S., Canada and Mexico
  - Transport bulk, premium, and industrial goods
  - More than 30,000 employees, \$20.2 billion in revenue
- Project Overview
  - Web/mobile app, License exam practice
  - Current apps not modern/engaging



# Team Union Pacific

## Status Report

[2 of 4]

### Rules Test Practice Tool

- Server Systems / Software
  - Firebase, MySQL
  - SCORM Cloud
  - React JS, React Native
- Development Systems / Software
  - Visual Studio Code
  - GitLab
  - Virtual Machines
- Project Plan Document
  - Discussing certain topics and gaining information for document with client contact. Have not started diagrams
  - Completed sections 1, 2, and 3
  - 35% Complete



# Team Union Pacific

## Status Report

[3 of 4]

### Rules Test Practice Tool

- Client Contact: Hailey Cohen
  - Meeting 4:00 PM, Friday January 12th
  - Weekly Client Meeting 1:00 PM on Mondays
- Team Meetings
  - Weekly Client Meeting 1:00 PM on Mondays
- Team Organization
  - Front End Development: Manav, Timothy, Hailey
  - End Development: Xuerun and Matthew





# Team Union Pacific

## Status Report

[4 of 4]

### Rules Test Practice Tool

#### Risks

- Database Management
  - Deciding on, storing, organizing, and accessing information
  - Firebase as private server, using past front-end experience, learning SCORM
- Common Codebase
  - Sample hybrid application optimized (for SCORM package, website, and hybrid)
  - Build basic shared features, then add unique features (Mobile and SCORM)
- SCORM Test Environment
  - Description Need LMS (Learning Management System) as a testing environment
  - Set up SCORM Cloud as a test LMS system and create a prototype app
- Building Custom Exams
  - Must support multiple standardized formats for importing questions from other applications
  - Static CSV and Static JSON for SCORM and Mobile, JSON via REST Service for all formats
  - Work in conjunction with Union Pacific to create sample formats



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**U N I V E R S I T Y**

# Status Report Presentation

## AWR Form Automation

### The Capstone Experience

Team United Airlines Training

Austin Mills  
Calisa Stevens  
Connor Chapman  
Rossi Palomba  
Yash Gautam

Department of Computer Science and Engineering  
Michigan State University

Spring 2024



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# Team [Team Name]

## Status Report

[1 of 4]

### AWR Form Automation

- Sponsor Overview
  - Third largest airline in the world
  - 4,500 flights a day reaching over 300 cities
- Project Overview
  - A website that holds automated checking, ability to track progress, send notifications, and updating of records to supervisors and technicians
  - A website that holds automated checking, ability to track progress, send notifications, and updating of records to supervisors and technicians
  - Digital signatures are utilized to authenticate and monitor technician progress



# Team [Team Name]

## Status Report

[2 of 4]

### AWR Form Automation

- Server Systems / Software
  - We are waiting for access to United's servers and databases.
  - These include SharePoint and MTISe.
- Development Systems / Software
  - CLion and PyCharm installed on our machines
  - Cloud Service to host the website (AWS, Azure, or GCloud)
  - PowerBI for implementing the progress tracker
- Project Plan Document
  - We have written none of it
  - 0% Complete



# Team [Team Name]

## Status Report

[3 of 4]

### AWR Form Automation

- Client Contact
  - We have met with our client twice already.
  - We have weekly calls with them every Friday at 2:15 pm.
- Team Meetings
  - Our team meets after every class, and on Fridays before our client meeting.
- Team Organization
  - Backend: Austin, Rossi, Yash
  - Frontend: Calisa, Connor



# Team [Team Name]

## Status Report

[4 of 4]

### AWR Form Automation

#### Risks

- Automating Email Notifications
  - Need to send email reminders to complete forms
  - Working on creating mock email system
- Implementing Digital Signature
  - Need digital signatures to sign AWR forms
  - Watching YouTube videos and working through tutorials
- Interacting with United's Databases
  - Need to access MTISe training records
  - Setting up a dummy SharePoint to practice uploading/downloading documents.
- Using Internal Authentication Systems
  - Need to set up auth system that matches United's internal system for website
  - Client getting us vendor numbers so we can access and play with systems





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# Status Report Presentation

## Car Dealership Auditing Assistant

### The Capstone Experience

Team Urban Science

Ashley Tran

Aman Todi

Brendan Cleland

Jared Bloch

Matthew Wu

Department of Computer Science and Engineering

Michigan State University

Spring 2024



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# Team Urban Science

## Status Report

[1 of 4]

### Car Dealership Auditing Assistant

- Sponsor Overview

- Develops software and processes for automotive OEM to evaluate performance across key business operations
- Renaissance Center, Detroit, Michigan
- In over 70 countries, throughout 15 global offices

- Project Overview

- Determines if a dealership is compliant with given brand standards
- Solves a laborious task that assigns field representatives by utilizing AI to analyze video footage from dealerships
- Will be used by the Urban Science audit team through a web application



# Team Urban Science

## Status Report

[2 of 4]

### Car Dealership Auditing Assistant

- Server Systems / Software
  - Google Cloud Platform
  - MySQL
  - Flask/React
  - Docker
- Development Systems / Software
  - Google Vision AI / OpenCV
  - Visual Studio Code
  - Anaconda
- Project Plan Document
  - Laid out the skeleton
  - Divided sections among the team
  - 15% Complete



# Team Urban Science

## Status Report

[3 of 4]

### Car Dealership Auditing Assistant

- Client Contact
  - Met with Client twice (January 12<sup>th</sup>/18<sup>th</sup>)
  - Virtual Meeting on Teams: 11:00am Friday
- Team Meetings
  - 5 Team Meetings
  - Regular Team Meetings: 5:00pm Monday, 4:30pm Thursday
- Team Organization
  - Frontend:
    - Jared and Ashley
  - Backend:
    - Primary: Aman, Brendan, and Matthew
    - Secondary: Jared and Ashley



# Team Urban Science

## Status Report

[4 of 4]

### Car Dealership Auditing Assistant

#### Risks

- Risk 1
  - Assorted Computer Vision Tasks
  - Research OpenCV, YOLO, Google Vision API, and OpenAI API
- Risk 2
  - Clients have contradicting vision for basic tool functionality
  - Building a prototype to obtain client agreement
- Risk 3
  - Detection of cleanliness, damage, and spatial information
  - Learn from related open-source solutions and object detection APIs
- Risk 4
  - Storage capabilities and database selection
  - Research Firebase, Microsoft SQL Server, and Google Cloud Storage



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**U N I V E R S I T Y**

# Status Report Presentation

## IT Datamart Microservice for BitBucket

### The Capstone Experience

Team UWM

Kanden Cho

Ben Garvin

Leo Hoerdemann

Jacob Meier

Joe Tanquary

Department of Computer Science and Engineering

Michigan State University

Spring 2024



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...to Professionals*

# Team UWM

## Status Report

[1 of 4]

### IT Datamart Microservice for BitBucket

- Sponsor Overview
  - United Wholesale Mortgage – The Nation’s #1 Mortgage Lender
  - Founded in 1986 – Based in Pontiac, MI
  - \$1.73 Billion in Profit for 2023
- Project Overview
  - Data Consolidation – Specifically Git Metadata
  - Data Visualization
  - Using Kubernetes Microservice Architecture



# Team UWM

## Status Report

[2 of 4]

### IT Datamart Microservice for BitBucket

- Server Systems / Software
  - MSSQL – UWM already has server running and is working on opening connection
  - BitBucket/ Jira Suite – UWM is working on our data layer
  - Vault Wrapper – Access has been granted
- Development Systems / Software
  - Given company laptops during campus visit – complete access still in progress
  - Bitbucket – repo for project set up but certificate still being set up by UWM
  - Visual Studio – Custom VS and Docker integrations set up during campus visit
- Project Plan Document
  - Design elements have been started separately
  - Final documents have not been started
  - 20% Complete





# Team UWM

## Status Report

[3 of 4]

### IT Datamart Microservice for BitBucket

- Client Contact
  - Met with client, and had campus visit on 1/19
  - Conference calls every Friday at 3:30
- Team Meetings
  - Team has met 5 times so far
  - Organized meeting time for Fridays at 2:30
- Team Organization
  - Rough Ideas for who is doing what
  - Leo, Joe, Ben – Script Backend; Jacob - SQL; Kanden – Data Visualization



# Team UWM

## Status Report

[4 of 4]

### IT Datamart Microservice for BitBucket

#### Risks

- Subset of a Larger Project at UWM
  - We are one branch of a larger system that is being worked on and because of that we have strict design requirements
  - Closely coordinating with UWM team and requesting and reviewing documentation
- UWM Technology Requirements
  - Due to the nature of UWM's workflow we have to use and stay completely within their systems and internal tools.
  - Campus visit and subsequent communications to establish and fully integrate our tools
- Scale
  - UWM is a massive company that handles massive amounts of money, there is no room for error
  - Design check-ins and approvals making sure UWM is aware of what we are doing and can give us systems that reduce harm that can be caused
- Security
  - UWM deals with people's personal financials which need to be away from public view or access at all times.
  - Security check-ins and documentation on how other teams at UWM operate to keep secure. As well using only internal tools and systems to prevent any possible issues



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# Status Report Presentation

## Hybrid Cyberattack Simulator

### The Capstone Experience

Team Vectra AI

Henry Barton

Alisha Brenholt

Nathan Motzny

Campbell Robertson

Andrew Talbott

Department of Computer Science and Engineering

Michigan State University

Spring 2024



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# Team Vectra AI

## Status Report

[1 of 4]

### Hybrid Cyberattack Simulator

- Vectra AI
  - Leader in Cybersecurity
  - Focus on network security
  - Utilizes AI to detect malware
  - Modular security to provide customized coverage
- Project Overview
  - Enhance Cyber Attack Simulation Software
  - To Enable Simulations of Hybrid Attacks
  - To Train AI Models that Detect Malicious Behavior



# Team Vectra AI

## Status Report

[2 of 4]

### Hybrid Cyberattack Simulator

- Server Systems / Software
  - MySQL – ran locally
- Development Systems / Software
  - VSCode, Python3
  - Python Flask Framework
  - Wireshark
  - Development environments have been set up
- Project Plan Document
  - Divided up responsibilities
  - Began drafting document
  - 20% Complete



# Team Vectra AI

## Status Report

[3 of 4]

### Hybrid Cyberattack Simulator

- Brad Woodberg – Client Contact
  - Weekly meeting Fridays
  - In-person meeting this Sunday
- Team Meetings
  - Met ~10 times
  - Meet twice a week (T&Th)
- Team Organization
  - Advanced C2: Campbell & Andrew & Nathan
  - Hybrid Attack: Alisha
  - Capability Enhancement: Henry



# Team Vectra AI

## Status Report

[4 of 4]

### Hybrid Cyberattack Simulator

#### Risks

- MAAD Attack Framework
  - Integrate MAAD-AF support on client and server side
  - Studying Github examples client provided & reading company documentation
- DeRF
  - Integrate DeRF support on client and server side
  - Studying Github examples client provided & reading company documentation
- Advanced C2 Techniques
  - Webshells & Beaconless servers
  - Company documentation & meeting with company experts
- Capability Enhancements
  - Integrate LLM to generate traffic data
  - Studying OpenAI API





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**U N I V E R S I T Y**

# Status Report Presentation

## Personalizing the Culinary Experience

### The Capstone Experience

Team Whirlpool

Sifatul Anindho

Sai Byrraju

Drew Peterson

Jasmine Richardson

Christina Tagay

Department of Computer Science and Engineering

Michigan State University

Spring 2024



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# Team Whirlpool

## Status Report

[1 of 4]

### Personalizing the Culinary Experience

- Sponsor Overview
  - Global household appliance manufacturer
  - HQ: Benton Harbor, MI
  - Strong emphasis on user-centric design
- Project Overview
  - Personalizes user's culinary experience with the help of machine learning
  - Track and analyze user interactions with appliance/mobile app
  - Offer customized recipe/cooking suggestions



# Team Whirlpool

## Status Report

[2 of 4]

### Personalizing the Culinary Experience

- Server Systems / Software
  - MongoDB Status: Researching and account set up
  - Python Status: Deciding on implementation of ML model
  - Fast API Status: Researching and setting up for backend
- Development Systems / Software
  - Android Studio, set up, requested Android device for testing
  - VS Code set up on all remote devices
  - Flutter, installed plugin to Android Studio
- Project Plan Document
  - Created template
  - Created system architecture diagram
  - 10% Complete



# Team Whirlpool

## Status Report

[3 of 4]

### Personalizing the Culinary Experience

- Client Contact
  - Met twice with client
  - Weekly meetings Fridays 9am
- Team Meetings
  - Met 5 times
  - Weekly meetings Tuesday 5-7pm
- Team Organization
  - Frontend – Sai, Drew, Backend – Christina, Sifat, Jasmine
  - Set up Trello



# Team Whirlpool

## Status Report

[4 of 4]

### Personalizing the Culinary Experience

#### Risks

- No training data – How do we train our ML model
  - We are tasked to create a ML model but have no training data to train the model.
  - We will have to simulate our own training data
- Potential bias in machine learning model – How to mitigate it
  - There could be bias in the ML model we use during training.
  - Diversify the data, consistently evaluate the ML model, and ask for user feedback.
- Cold Start problem – What to recommend to new users
  - We do not know the best way to recommend new users
  - Work with client and develop a strategy to best recommend new users with no history.
- User Privacy/ Data Security – How do I make the user information secure
  - Make sure that the user's information is visible and accessible only to the user accessing the program
  - Implement a secure authentication login within the UI for user



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**U N I V E R S I T Y**

# Status Report Presentation

## Next Gen Smart Factory

The Capstone Experience

Team WK Kellogg Co

Thomas Sheehy

Abhishek Koka

Kaiwen Jiang

Eric Wen

Will Morant

Vishal Chava

Department of Computer Science and Engineering

Michigan State University

Spring 2024



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# Team WK Kellogg Co

## Status Report

[1 of 4]

### Next Gen Smart Factory

- Sponsor Overview
  - Food company specializing in cereals such as froot loops
  - WK Kellogg Co was split from Kellogg's
  - Owns the North American Cereal Division of Kellogg's
- Project Overview
  - Replace and innovate existing software that is reaching end-of-life
  - Make factory logistics easier for operators and administrators
    - Allows administrators to create checklists for operators
    - Allows operators to complete checks and tasks
    - Store all checklist and completed check data
    - View stored data in clean format





# Team WK Kellogg Co

## Status Report

[2 of 4]

### Next Gen Smart Factory

- Server Systems / Software
  - SQL Server – Will be hosted with MSU
  - .Net – Installed with “Hello World” program
  - Visual studio code with C# extension installed
- Development Systems / Software
  - Microsoft power apps – setup complete
  - Docker – Installed
  - GitLab – Set-up complete, all team members and TM joined
- Project Plan Document
  - All sections have been assigned to team members
  - Rough draft of all sections have been completed
  - Screen mock-ups needed
  - 50% Complete



# Team WK Kellogg Co

## Status Report

[3 of 4]

### Next Gen Smart Factory

- Client Contact
  - Met with our client twice discussed basics of project and what potential risks or challenges we may encounter
  - Meet weekly on Tuesdays at 1:00pm ET
- Team Meetings
  - Met in-person three times in the Capstone Lab and two times online
  - Scheduled weekly team meetings after client and triage meetings
    - Client: Tuesdays at 1:00pm ET, Triage: Thursdays at 12:40pm ET
- Team Organization
  - Client Contact: Thomas
  - .Net Front-End : Thomas, Kaiwen, Eric
  - Back-End: Will, Abhishek, Vishal



# Team WK Kellogg Co

## Status Report

[4 of 4]

### Next Gen Smart Factory

#### Risks

- 1 - Real World Usability
  - Ensure our software is usable in-practice by operators and administrators in factory
  - Learn detailed perspectives of users by visiting factory and using the existing app ourselves
- 2 - Data Security
  - Ensure data cannot be accessed in unintended way
  - Data should be properly passcode protected, and potential data security risks must be discussed with client based on how they currently utilize and protect the data
- 3 - Database Integration
  - Ensure database can be integrated with data format from our client's existing software
  - Create a snapshot of the old database that has the same format and first try to integrate the duplicate with our new database, ensuring preservation of the original data schema during development
- 4 - Balance Simplicity and Cost with Functionality
  - Ensure that our software is simple and cost-effective without losing key functionality
  - Clarify "must-have" features, so that UI is not cluttered with unwanted and costly features like the existing software

