

MICHIGAN STATE

U N I V E R S I T Y

Project Plan

Technology Peripheral Inventory Predictor

The Capstone Experience

Team Humana

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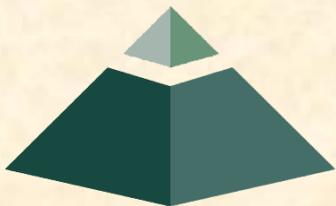
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*From Students...
...to Professionals*

Functional Specifications

- Peripheral vending machines
- How to efficiently stock them?
- Machine learning to optimize purchases
- Metrics to inform purchasers of purchase history
- Cost analysis to see expected purchase cost



Design Specifications

- Web app split into frontend/backend
- Item selection interface to filter peripherals to only what the user wants to see
- Analysis/Prediction interface for seeing what the algorithm has predicted for future purchases
- New Purchase interface to incorporate new purchases into the system



Screen Mockup: Item Selection

The mockup shows a web browser window with the URL `www.humana.com/TechnologyPeripheralInventoryPrediction`. The page title is "Item Selection".

Item Details

- Item Category: Input Text
- Item Description: Input Text
- Invoiced Amount: Input Text

Location Information

- Facility: Input Text
- Facility Zipcode: Input Text
- Parent Department: Input Text
- Department: Input Text

Supplier Information

- Company #: Input Text
- Supplier Type Code: Input Text
- Supplier Name: Input Text

Timeframe

- Month/Year: Input Text with calendar icon
- Invoice Date: Input Text with calendar icon

Buttons: CLEAR (blue), SUBMIT (green)

Message box: "Enter item information in order to view desired analytics." with a CLOSE button.

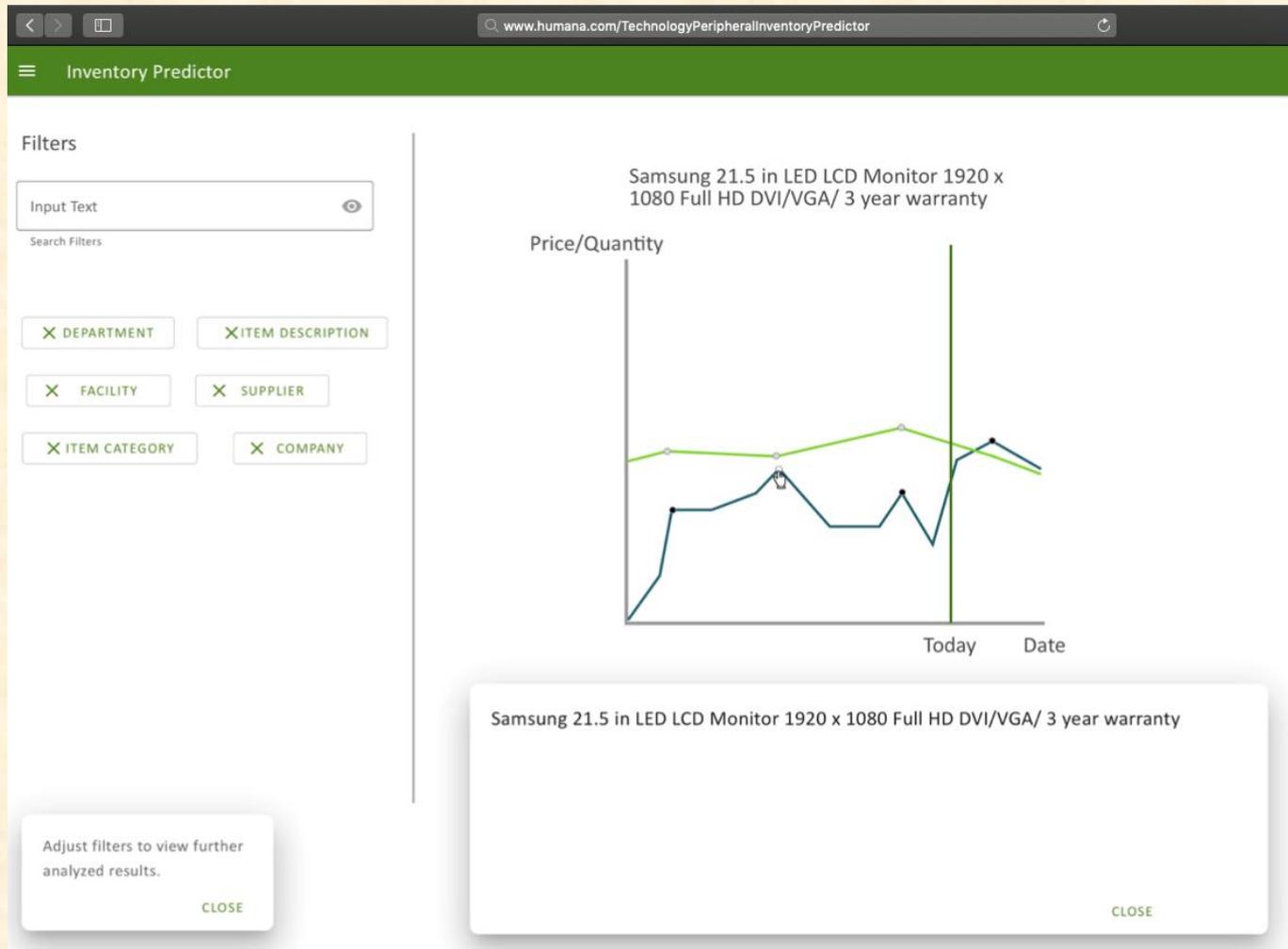
Screen Mockup: Sidebar Navigation

The mockup shows a browser window with the URL `www.humana.com/TechnologyPeripheralInventoryPredictor`. The sidebar on the left contains the Humana logo and three menu items: 'Item Selection' (highlighted), 'Inventory Predictions', and 'New Purchases'. The main form area includes the following fields:

- Item Description (Input Text)
- Invoiced Amount (Input Text)
- Facility Zipcode (Input Text)
- Parent Department (Input Text)
- Department (Input Text)
- Supplier Type Code (Input Text)
- Supplier Name (Input Text)
- Month/year (Input Text with calendar icon)
- Invoice Date (Input Text with calendar icon)

At the bottom right, there are two buttons: 'CLEAR' and 'SUBMIT'.

Screen Mockup: Predictor



Screen Mockup: New Purchase

http://www.humana.com/TechnologyPeripheralInventoryPredictor

New Purchases

Item Details

Input Text
Item Category

Input Text
Item Description

Input Text
Invoiced Amount

Supplier Information

Input Text
Company #

Input Text
Supplier Type Code

Input Text
Supplier Name

Location Information

Input Text
Facility

Input Text
Facility Zipcode

Input Text
Parent Department

Input Text
Department

Timeframe

Input Text
Month/Year

Input Text
Invoice Date

ADD PREDICT

Item Prediction

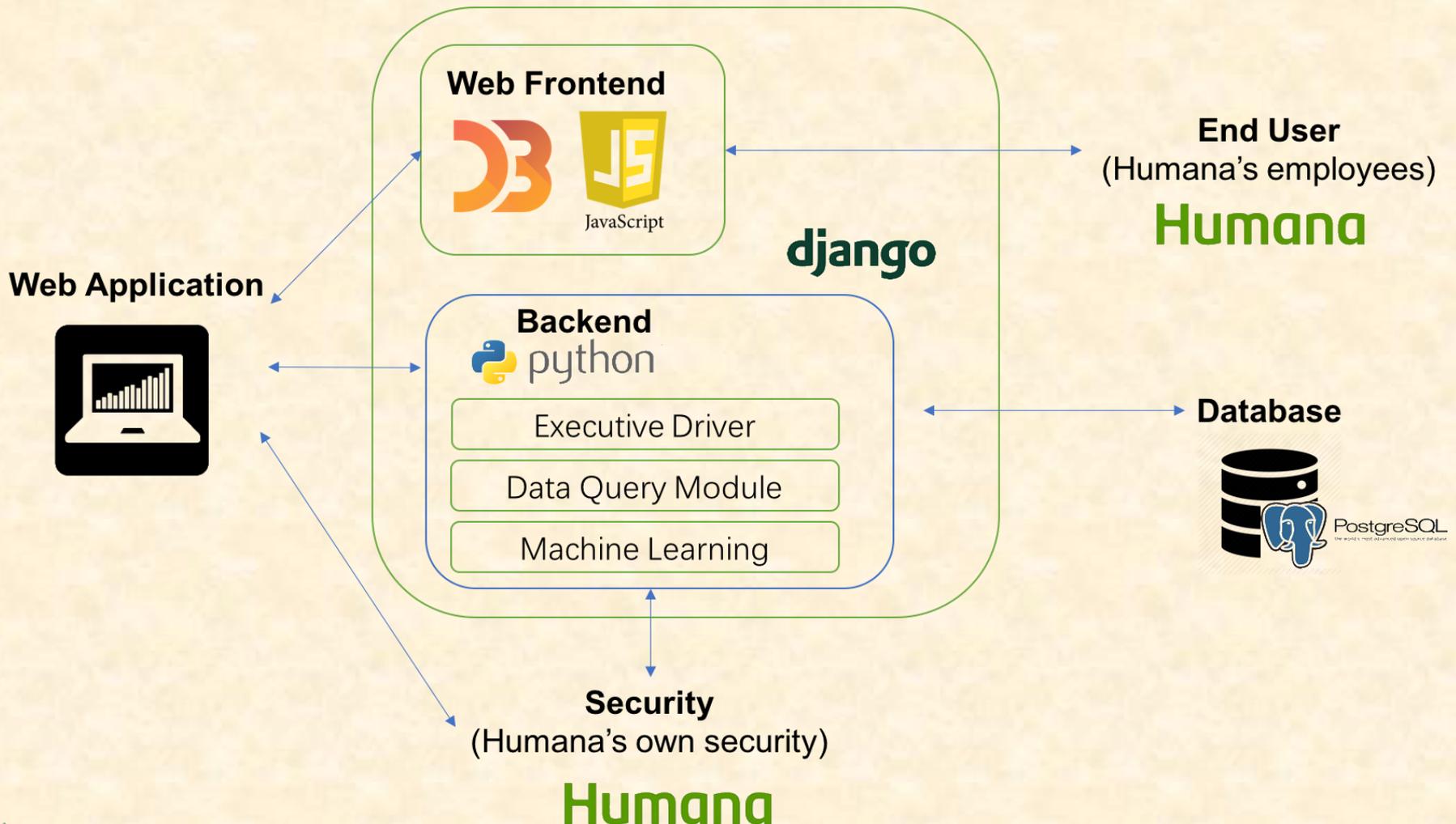
After inputting item information prediction results will appear based on past purchases. [CLOSE](#)

Technical Specifications

- Frontend and backend hosted on Django
- Backend connects to PostgreSQL database to access purchase history
- For machine learning, scikit-learn is used in the backend to create predictions
- The requested data is processed in the backend, then the response is visualized with D3.js



System Architecture



System Components

- Hardware Platforms
 - iMacs in lab
- Software Platforms / Technologies
 - Django for hosting web app
 - PostgreSQL for database
 - Scikit-learn for machine learning
 - D3.js for data visualization
 - Material.io for UI



Risks

- Prediction Format
 - Past purchase history cannot predict future demand; it only identifies past trends and extrapolates.
 - Discuss with client; present multiple ways of viewing the data and select whichever one is preferred.
- New Purchases
 - The format in which future Humana employees would like to upload bulk purchase history is unknown.
 - Create a flexible importer for bulk data, and discuss with client to find suitable data format
- Online Machine Learning
 - System must incorporate new data into predictions; our team has no experience with this
 - Discuss the technique with others who are knowledgeable; do research into which frameworks are best suited for the task
- Data Quality
 - The given data may have some duplicate entries and some peripherals are misspelled. This can significantly affect the performance of the algorithm.
 - Explore ways in which the data may be cleaned; isolate the low-quality parts of the data and see if they negatively affect the machine learning algorithm performance.



Questions?

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