



SkyNet

– A business management system



Present by:

CS 691 Capstone Project Team Three



Josh Krinsky, Kai Wang,
Peter McKechnie, Peter Torrente,
Houqi Zhan, Jincheng Zou

Agenda

- Feedback & Improvements
- Team Intro
- Problem Statement & Project Description & Personas
- Team working Agreement
- MVP (Minimal Viable Product): Design & Functions
- Technologies & Algorithms
- Architecture Diagram
- Sprint 5 Recap
- Product Backlog & Sprint 6 Backlog
- Metrics
- Retrospective
- Sprint 7 Plan

Team Members

SkyNet

Josh Krinsky

Scrum Master
Back-end Developer



Peter Torrente

Front-end Developer



Kai Wang

Database Admin
Back-end Developer



Peter McKechnie

Front-end Developer
Project Consultant



Jincheng Zou

Front-end Developer



Houqi Zhan

Database Developer



Improvements From Feedback

Feedback

- Add a User Sequence Diagram to explain the idea of the project better
- Even if a user story haven't been completed yet, still show the work we done (debugs, fixes, etc.)
- Don't overcommit to stories, work within reasonable capacity

Improvements

- Learned and created more diagrams
- Plan the sprint better and aimed to complete an number of story points in line with previous sprints
- Report the work done outside of completed stories

Problem Statement

What problem is our project aiming to solve?

- Companies rely heavily on CRM and POS software to control the customer experience.
- These are sold as complex software platforms offering a variety of features.
- Large and expensive packages dominate the market and are tailored to larger companies.
- Many customers do not have the budget, nor the technological aptitude, to effectively employ popular CRM and POS platforms.

Project Description

What are we building?

- We aim to design a POS styled system with greater simplicity for customers.
- We will prioritize fundamental services for day to day operations of a small business.
- Users will be able manage inventory, track sales, compare vendors, analyze production output, organize contact info, track orders/deliveries. Record order, shipping, and vendor history.
- Easy-to-use interface means even the most novice users are capable of creating custom data visualizations and analysis.

Team working agreement (1/3)



Introduction:

Team Information can be found at GitHub: <https://github.com/htmw/Skynet/>

This agreement outlines the expectations and responsibilities for our graduate computer science project team, consisting of 6 members, using an Agile approach.

Team Values:

Open and honest communication

Respect for each other's time and commitments

Collaboration and teamwork

Continuous improvement and learning

High-quality work that meets project requirements

Agile Approach:

Our team will follow an Agile methodology, which emphasizes iteration, collaboration, and flexible planning. We will hold regular stand-up meetings, sprint retrospectives, and sprint planning sessions.

Team working agreement (2/3)



Responsibilities:

- Attend all team meetings and events on time and prepared.
- Complete assigned tasks and deliverables within the agreed-upon timeline.
- Communicate progress, issues, and concerns in a timely manner.
- Provide constructive feedback to improve the project and team processes.
- Respect each other's opinions and ideas.
- Take responsibility for the success of the project and team.

Decision Making:

Decisions will be made through a consensus-building process that involves all team members. In the event of a disagreement, the team will engage in productive and respectful discussions to reach a solution.

Meeting time:

Major meeting on Monday, Thursday, at 13:00

Daily meeting: Implemented via Discord, each group member reports daily on their work progress. If needed, a quick meeting is scheduled via Zoom.

Team working agreement (3/3)



Conflict Resolution:

In the event of a conflict, team members will follow a structured conflict resolution process that involves open communication, active listening, and a focus on finding a mutually acceptable solution.

Commitment:

By signing this agreement, each team member commits to following the expectations and responsibilities outlined above. We all hope to learn development experience close to the workplace through this hands-on project, and to become familiar with software development and working with teams with the help of our mentor professor.

Team members (A–Z):

Houqi Zhan, Jincheng Zou, Josh Krinsky (Scrum Master),

Kai Wang, Pete McKechnie, Peter Torrente.

Personas - 1

David:

Who is he?

- A 43-year-old man, the owner of the retail store.
- Has a happy family: his wife has just given birth to his third child.
- Currently on sabbatical; His oldest daughter just entered college to study nursing, while his son just entered high school and is the point guard for the school's basketball team.
- To make his family's financial situation better, he started to expand his retail business last year.

Issue:

- Spends a huge amount of time each week comparing offers from different suppliers.
- Needs to do a lot of calculations and comparisons based on stock availability and expectations of sales
- Has very little free time to spend with his wife and children, despite his off-hours.



Personas - 2

Mike:

Who is he?

- A 26-year-old production manager, responsible for several different production lines
- He and his accountant fiancée got engaged this spring and the wedding is being planned!
- He and his fiancée are both hikers and usually go on weekend excursions to the countryside

Issue:

- The traditional forms (for example, Excel or the printed forms) makes him tired of calculating the efficiency of the different lines
- Needs to provide more rational and useful advice for each quarter of production
- His factory is a traditional manufacturing factory, in the cost-effective consideration, did not use the popular production management software



Personas - 3

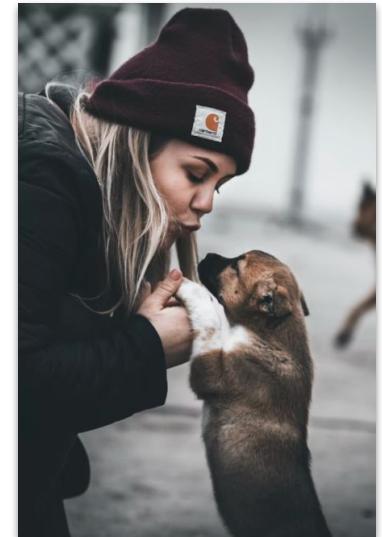
Alexis:

Who is she?

- A 23-year-old girl, with her college friends, founded a pet transport company
- She likes to travel with her pets. A few years ago she traveled abroad with a friend and due to the negligence of her pet transport company, her shepherd became ill upon her return.
- She is a girl who is good at dealing with people and knows many friends who are in pet services.

Issue:

- Alexis's company needed a low-cost management software to help them calculate costs and compare suppliers.
- She needs to manage different service providers, such as transportation companies, pet nail technicians, etc.

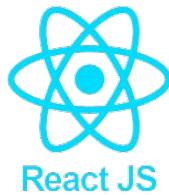


MVP Design

MVP Design

Features	Manage items	Manage Inventory	Manage Order	Manage Shipment	Manage Supplier	Cash registers
	Add item	Add record	Add order	Add log	Add supplier	Calculation of receivables
	Edit item	Edit record	Edit order	Edit log	Edit supplier	Calculate change
	Delete item	Delete record	Delete order	Delete log	Delete supplier	Automatic order generation
	Use barcode to get item INFO	Filtering	Link to shipment	Link to order	Filtering	Use barcode to get item
	Filtering		Filtering	Track a shipment		Print the receipt
				Filtering		

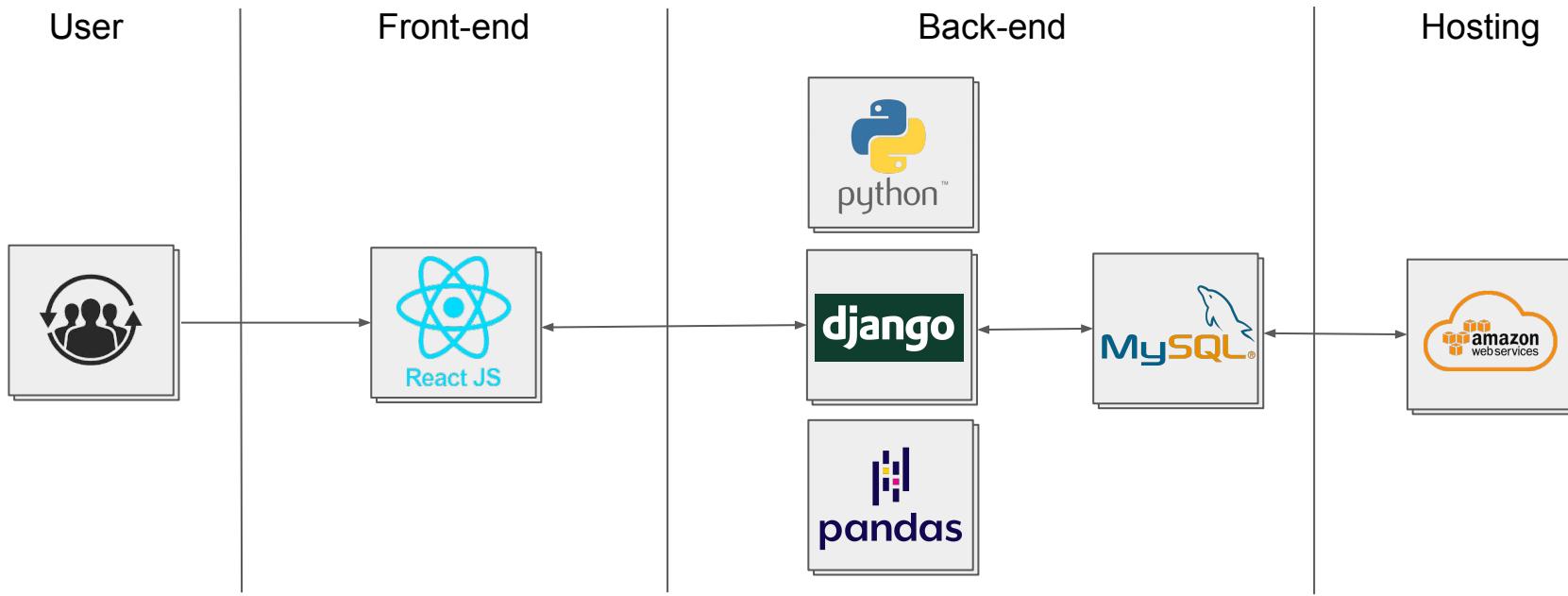
Technologies



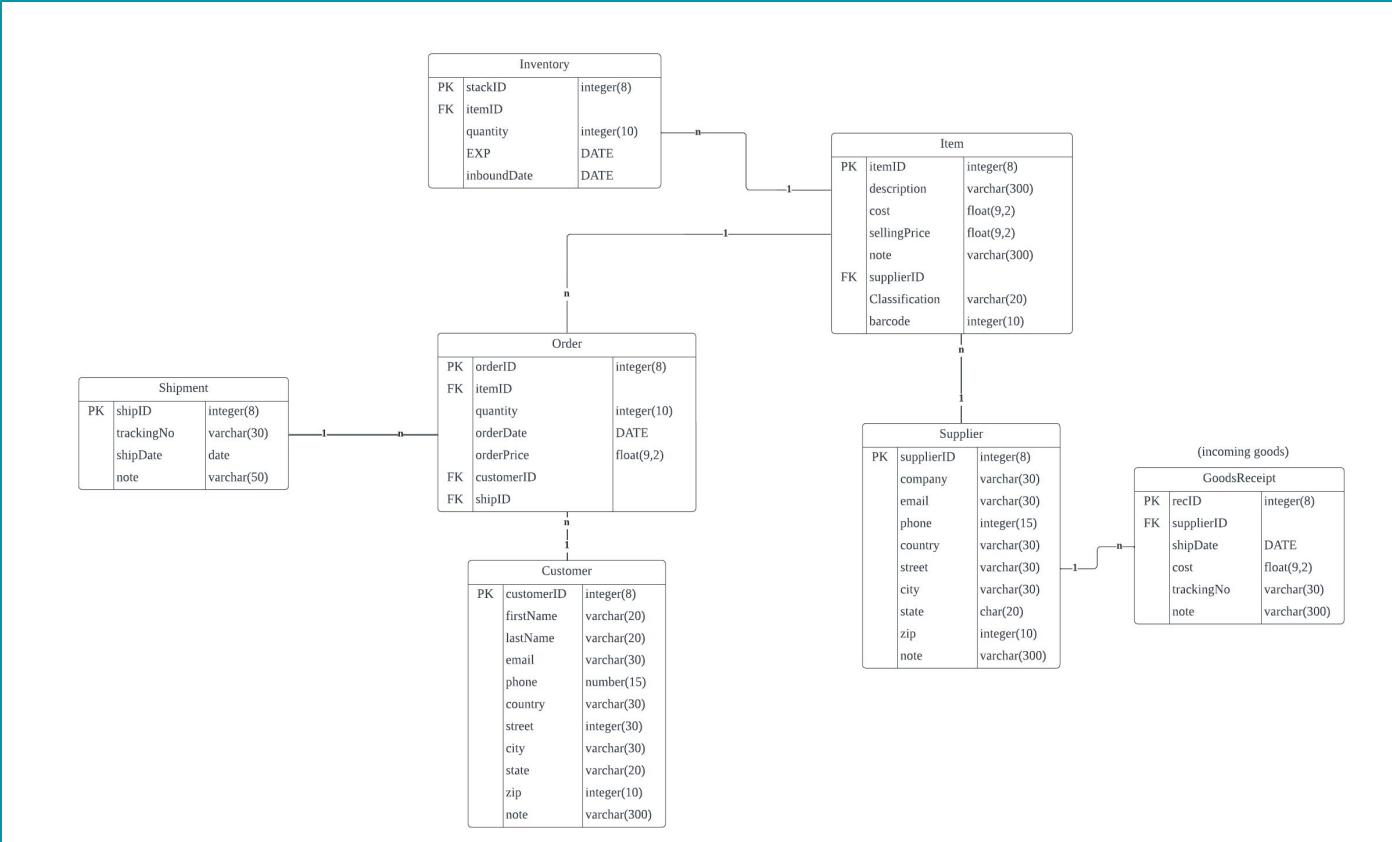
The Purpose of the Technologies

- React - Front-end JavaScript library for building UI
- Django - Back-end Python framework that implements a restful API
- Pandas - Python based data structure & data analysis tools
- MySQL - Database Management
- AWS (Amazon Web Services) - Hosting, Relational Database Service, and Machine Learning
- Discord - Team Communication

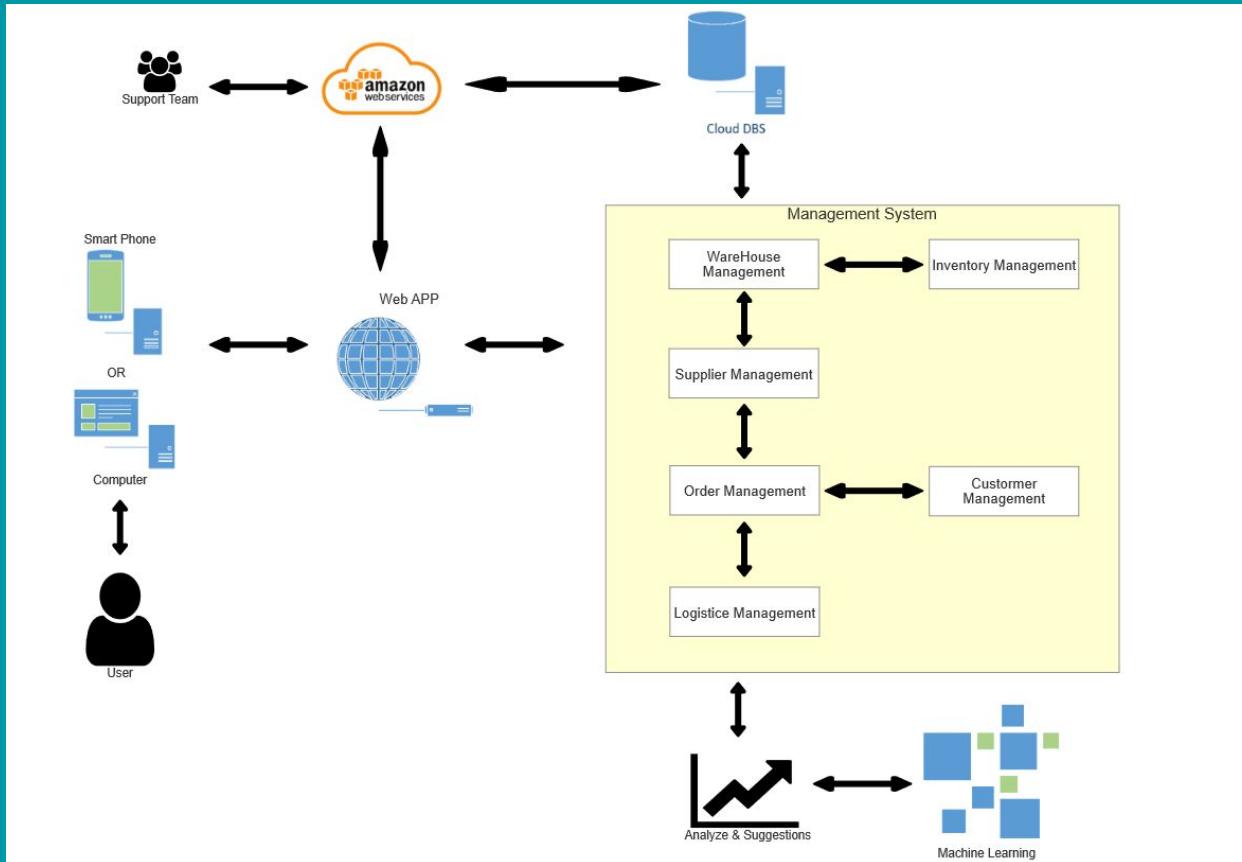
Technologies - continue



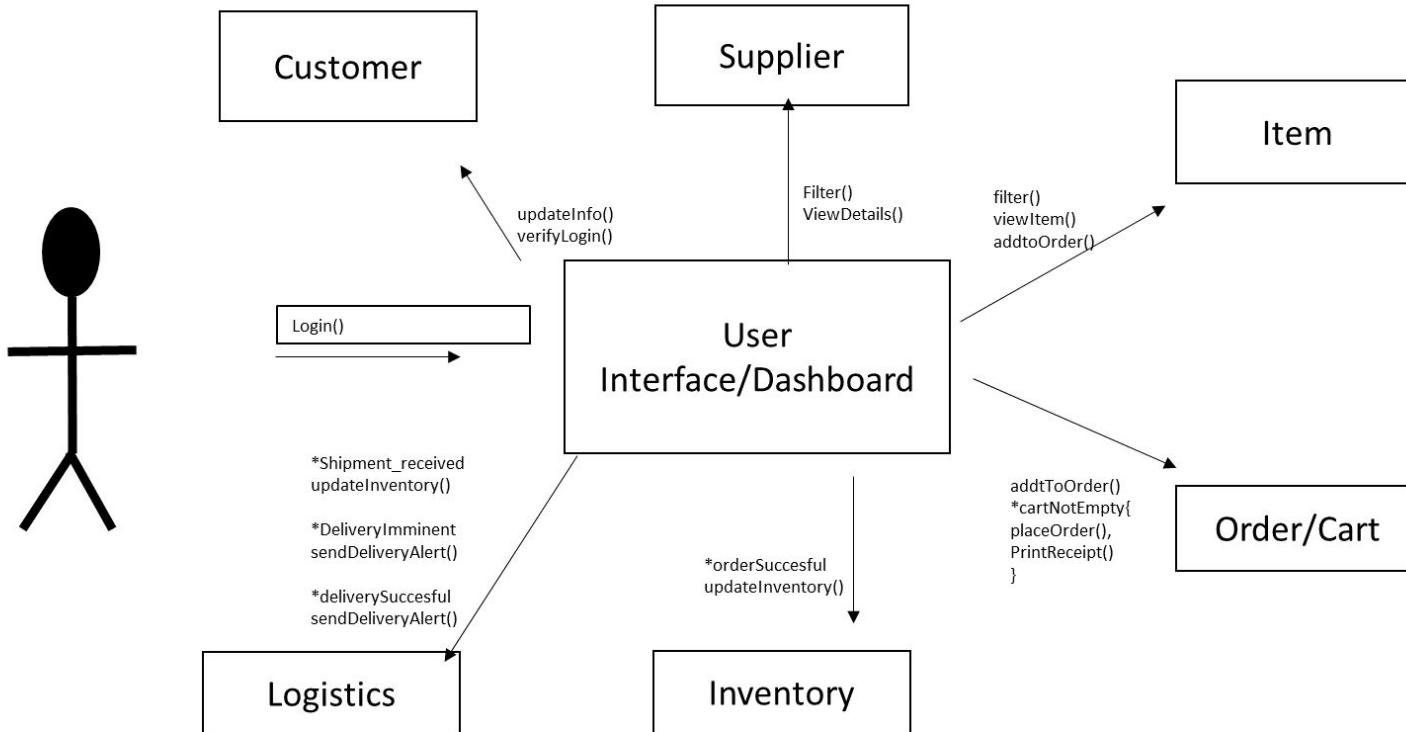
Database ER-diagram



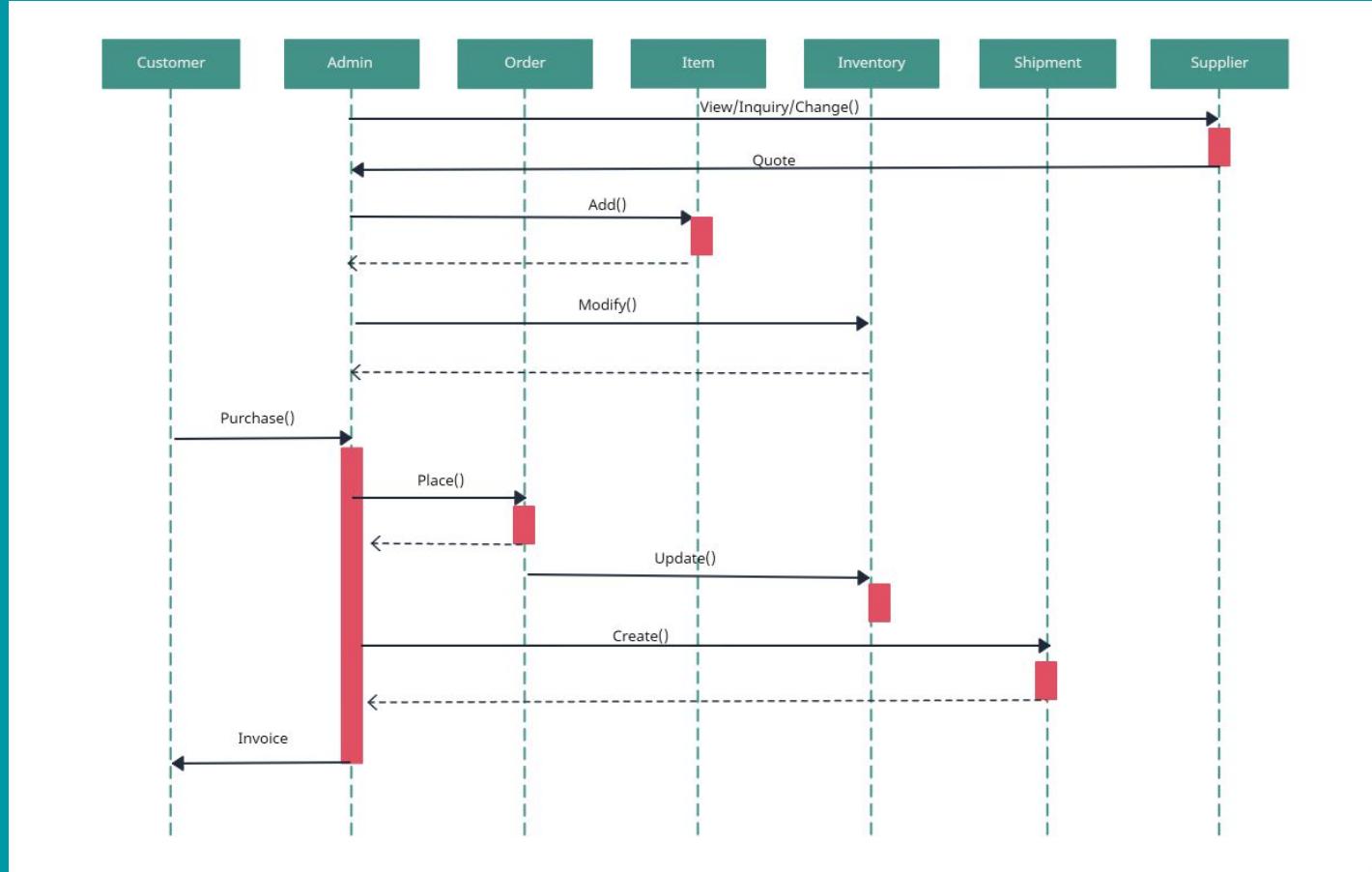
Conceptual Architecture Diagram



UML Diagram



User Sequence Diagram



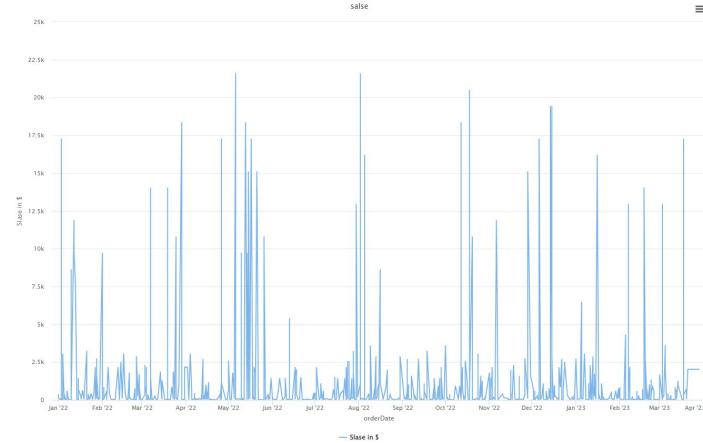
Algorithms

Autoregressive Integrated Moving Average (ARIMA)

— a Prediction Model

An autoregressive integrated moving average, or ARIMA, is a statistical analysis model that uses [time series data](#) to either better understand the data set or to predict future trends.

A statistical model is autoregressive if it predicts future values based on past values. For example, an ARIMA model might seek to predict a stock's future prices based on its past performance or forecast a company's earnings based on past periods.



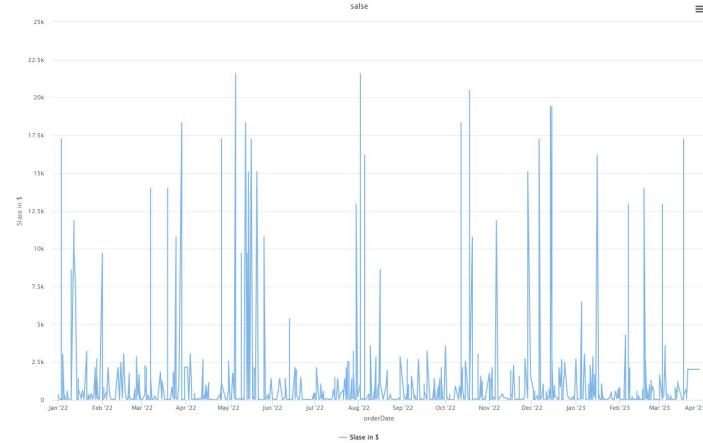
(Sales of our dummy data)

Algorithms

Autoregressive Integrated Moving Average (ARIMA)

— a Prediction Model

- Autoregressive integrated moving average (ARIMA) models predict future values based on past values.
- ARIMA makes use of lagged moving averages to smooth time series data.
- They are widely used in technical analysis to forecast future security prices.
- Autoregressive models implicitly assume that the future will resemble the past.
- Therefore, they can prove inaccurate under certain market conditions, such as financial crises or periods of rapid technological change.



(Sales of our dummy data)

Sprint 5 Recap

This is what we delivered in Sprint 5:

- Almost nothing... because it was a very short sprint. We delivered why we haven't completed any user stories in sprint 5

What is new in Sprint 6:

- Algorithms choice for sales forecasting
- Fixed issues which prevented progress in sprint 5
- Data Visualization graph
- Cash register stories(total the order, record sale, create receipt)

				When, And, Then)				
US1	user	I want to be able to add new inventory to my database	Keep my database accurate to my changing inventory	When a user adds data, Then the database will add a new row.	DBS_add	4	High	Done
US2	user	I want to be able to edit inventory items in my database	Make changes to inventory details and correct typos	When a user delete data, Then the database will delete the row.	DBS_edit	4	High	Done
US3	user	I want to be able to delete inventory items in my database	Effeciently utilize server space and keep data accurate	When a user edit data, Then the database will edit the row	DBS_delete	4	High	Done
US4	user	I need to sort the data in my database	analyze and track my inventory my different metrics	Given different categories, When the user selects a category, Then show the products undere that category.	DBS_sort	4	Medium	Done
US5	user	I want to be able to check my inventory with a visual chart	Get a clearer picture of my inventory	Given automatically generated charts, When the user changes the chart options or changes the date range, Then the chart is regenerated based on user behavior	DBS_visualization	7	High	Waiting
US6	user	I would like to be alerted when some items are out of stock	Replenish my inventory in a timely manner	When an item is about to expire, Then the system will automatically send a reminder.	DBS_alert	5	Medium	Waiting
US7	user	I want the system to record my sales and analyze them	Keep track of my sales and change sales strategies	Given users the option of AI analysis, When the user chooses to use this feature, Then the user's data is used as input for his analysis fuciton, Then provides analysis of the data such as the history of sales for	DBS_analyze	10	Medium	Waiting
US8	user	I want to be able to enter data via cell phone camera or			DBS_modelInput	3	Low	Waiting
US9	user	I want to be able to scan items				5	Medium	Waiting
US10	user	I want to be able to calculate the amount of money owed	Know the total amount of money owed	When there are no items remaining to be added, Then the total amount of payment due will be correctly reported	CR_amountowed	3	High	Waiting
US11	user	I want to be able to record a payment	Collect money from the customer	When payment is tendered, Then the status of the order will change from "Payment Outstanding" to "Paid"	CR_deposit	3	High	Waiting
US12	user	I want to keep track of what items the customer wants to purchase	Analyze consumer preferences	Given a list of custmore, When select a customer, Then show the history of the customer	CR_trackCusnsumer	3	High	Waiting
US13	user	I want to record and offer a receipt of the customer's purchase	Have an itemized list of items purchased by the customer	When an order is paid, Then a formatted record of the sale will be created	CR_receipt	3	Low	Waiting
US14	user	Evaluate suppliers	Create relationships with the best possible suppliers for my industry	Given a list of all suppliers, When a user filters on a detail, Then the relevant data will be shown	SRM_eval	6	High	Done
US15	user	Streamline onboarding with suppliers	Quickly establish working supply chains	Given a new supplier, When new data needs to be collected, Then a standard template will be sent and uploaded to the database	SRM_select	3	High	Done
US16	user	Manage supplier performance	Quickly and easily track supplier performance with key performance metrics that are already established for me	Given a supplier ID, When the metrics are requested, Then the database returns accurate data	SRM_kpi	6	Medium	Done
				When upload sales data, Then the				

Backlog

Sprint Backlog

User Story									
ID	As a...	I want to...	So that I can...	Acceptance Criteria (format: use keywords Given, When, Then)	Task Name	Size	Priority	Status	Sprint
US5	Retailers Manager	I want to be able to check my inventory with a visual chart	Get a clearer picture of my inventory	Given automatically generated charts, When the user changes the chart options or changes the data range, Then the chart is regenerated based on user behavior	DBS_visualization	7	High	Done	6
US7	Inventory Manager	I want the system to record my sales and analyze them	Keep track of my sales and change sales strategies	Given users the option of AI analysis, When the user chooses to use this feature, Then the user's data is used as input for his analysis function, Then provides analysis of the data, such as the history of sales for each item.	DBS_analyze	10	Medium	Pending	6
US10	Cashier	I want to be able to calculate the amount of money owed	Know the total amount of money owed	When there are no items remaining to be added, Then the total amount of payment due will be correctly reported	CR_amount owed	3	High	Done	6
US11	Retailers Manager	I want to be able to record a payment	Collect money from the customer	When payment is tendered, Then the status of the order will change from "Payment Outstanding" to "Paid"	CR_deposit	3	High	Done	6
US13	Cashier	I want to record and offer a receipt of the customer's purchase	Have an itemized list of items purchased by the customer	When an order is paid, Then a formatted record of the sale will be created	CR_receipt	12	Low	Done	6

Total Story Points: 35

Sprint 6



Stories completed:

ID	Story Name	Size	Status	Date
US5	DBS_visualization	7	Done	2/27
US10	CR_amountowed	3	Done	3/2
US11	CR_deposit	3	Done	3/2
US13	CR_receipt	12	Done	3/2

Stories incompletely completed:

ID	Story Nme	Size	Reason	Note
US7	DBS_analyze	10	Failed to apply ML on time	Move to sprint 7

Additional work outside of stories

Fixed issue where inventory & order pages were directing to the item page

Fixed issue where the order page was pulling item data

Fixed issue where login page would lead to a blank screen

Fixed an issue on the item page where the "edit" button would pull up the "add" button

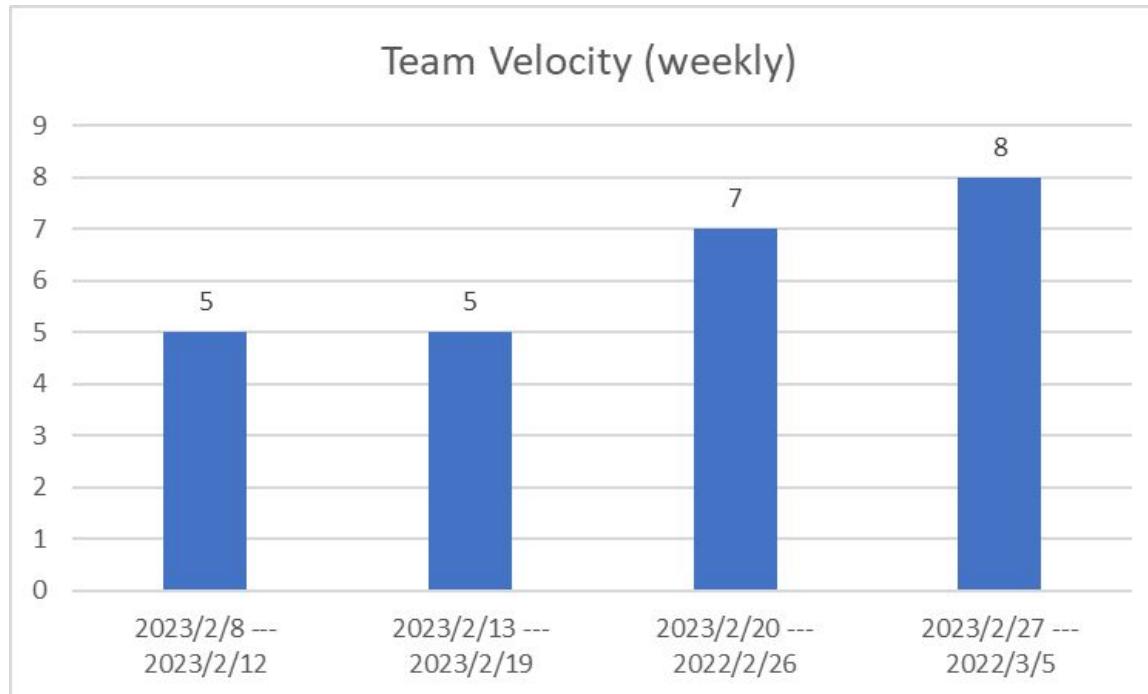
Fixed issue with UPS tracking API not sending a proper JSON request

Standardized our software versions and library addons

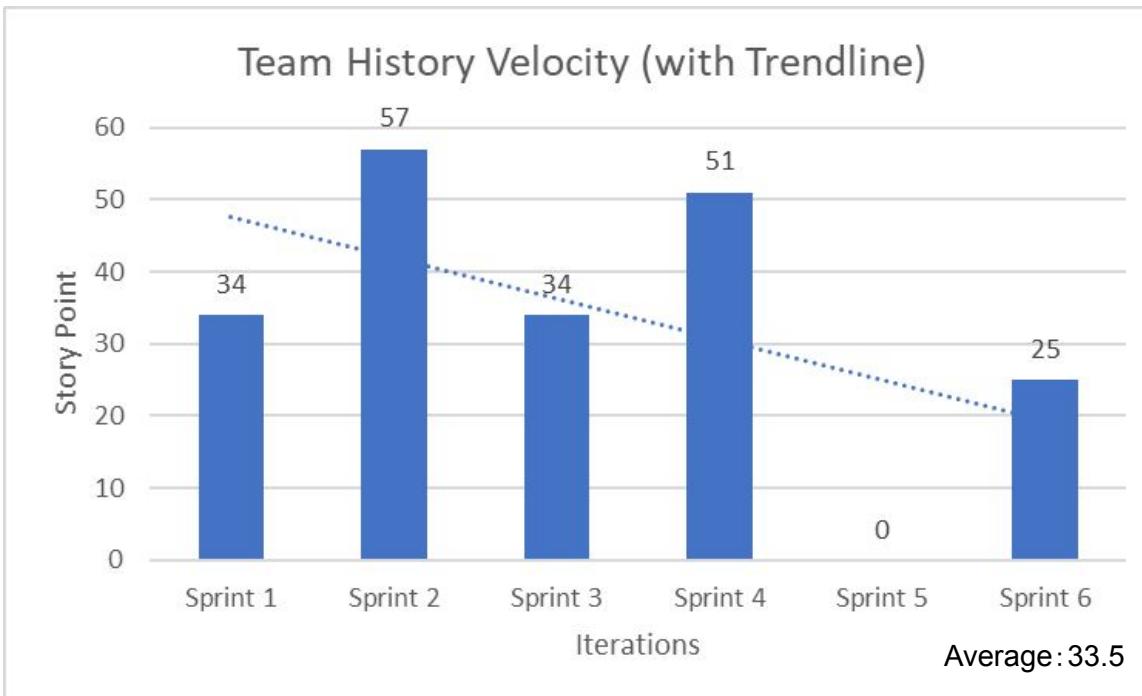
Test Cases

ID	User Story	Test Description	Test Date	Action	Expected Output	Actual Output	Test Result (Pass/Total)	Comments
T8	US5	Visualize data	2023/3/2	Renders the output page of the imported database combined with the graph	For example, a pie chart (the proportion of each product, the quantity is clearly marked)	The graph that present the data	3 of 3	
T13	US10	After stopping adding goods, produce a total price	2023/3/2	Calculate the sum of the total price after multiplying the unit price and quantity of each item	Total amount owed=Specific amount (40 \$)	Total amount owed	5 of 5	This feature still need to be improved in the future
T14	US11	Navigate to the record the payment	2023/3/2	Load the payment page, confirm the payment and display the payment	Load paid page	Load paid page	4 of 5	
T16	US13	Generate & print the invoice	2023/3/2	Input orders' detail	Generate a receipt for the orders	a receipt	5 of 5	This feature still need to be improved in the future

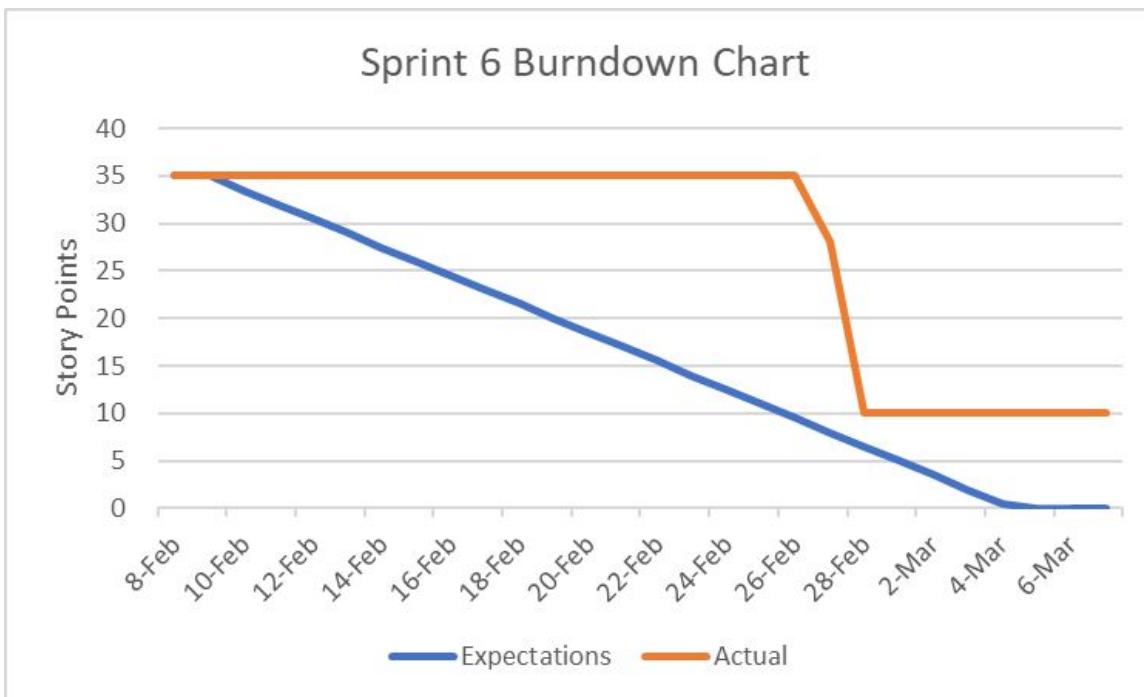
Metrics - Team Velocity of Sprint 6



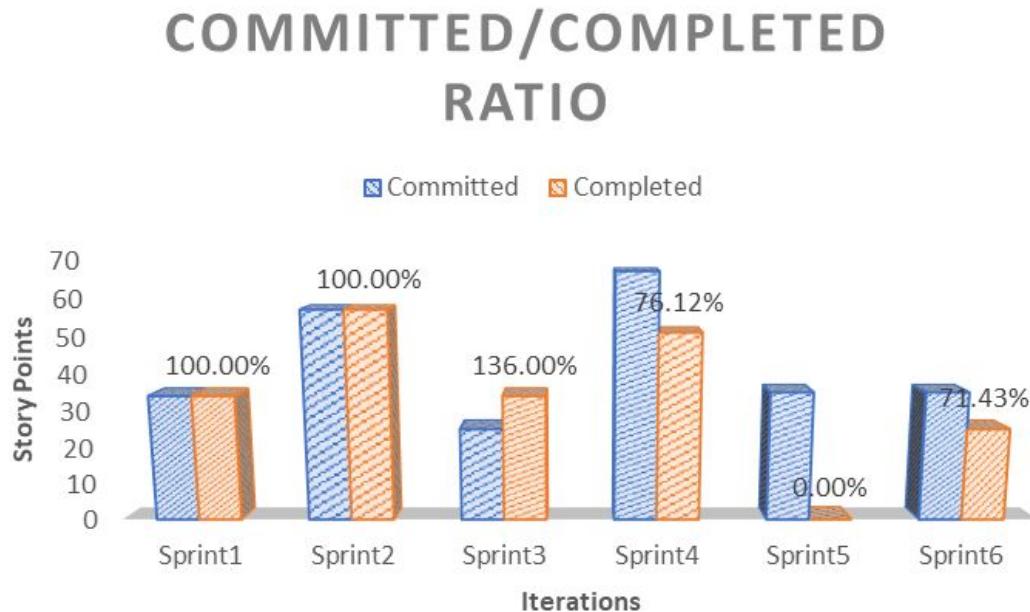
Metrics - Team History Velocity



Metrics - Burndown Chart



Metrics - Committed/Completed Ratio



Retrospective - What Went Well

What went well in Sprint 6?

- Before members start their work, they shared their detailed designs and get suggestions from others to improve them.
- Suggestions and feedback was given in a constructive and positive way
- We have a new consensus on what to expect from MVP, which helps us better coordinate the development of the project
- We had the most collaboration this sprint as our project gets more complex and features interact
- We planned everyone's tasks at the start of the sprint and
- Good communication, constantly updated each other on the status of our work

Retrospective - What Did Not Go Well

What did not go well in Sprint 6?

- We had a lot to learn before we could implement user stories, which delayed our development progress
- The team members have become busier than last semester and have less time to devote to this project outside of planned working hours
- A lot of the work was done toward the end of the sprint, not leaving much time for any issues that may have come up
- Weekly planned meetings were missed without any notice ahead of time,
- Version control is still an issue, we've had trouble merging production versions of frontend and backend code

Retrospective - Action Plan

What we need to improve for next Sprint?

- Merge the backend and frontend production code
- Account for and better plan for a more reasonable weekly load
- Delay or perhaps cancel the machine learning story, we are spending a lot of time to learn and figure out how to implement
- Assign a second member to learn each feature, decreasing reliance on one person
- Schedule weekly times to work together during our Monday meeting to overcome everyone's busier schedule

Sprint 7 - Plan

User Story										
ID	As a...	I want to...	So that I can...	Acceptance Criteria (format: use keywords Given, When, Then)	Task Name	Size	Priority	Status	Sprint	Notes
US7	Inventory Manager	I want the system to record my sales and analyze them	Keep track of my sales and change sales strategies	Given users the option of AI analysis, When the user chooses to use this feature, Then the user's data is used as input for his analysis function, Then provides analysis of the data, such as the history of sales for each item.	DBS_analyze	10	Medium	Pending	5 & 6	Not finished in sprint6, move to sprint 7
US18	Marketing Manager	I want the model to forecast prices for items in my inventory	Reduce the uncertainty and guesswork in my pricing	Given a data set, When a forecast is run, Then a best fit price will be calculated	ML_predict	12	High	Waiting	7	
US19	Marketing Manager	I want the model to predict total sales revenue by time period	Best serve my customers and maximize seasonal consumer trends	Given a data set in a time range, When a forecast is run, Then total projected sales will be calculated	ML_timepredict	10	low	Waiting	7	
US20	Marketing Manager	I want the model to recommend quantities of products for sale	Be leaner in my logistics and maximize profits	Given a data set in a time range, When a forecast is run, Then suggested total quantity of inventory will be calculated	ML_pricequantity	12	low	Waiting	7	

Total Story Points: 44

Project Demo - Screenshot

SkyNet

Dropdown Q

Dashboard

Supplier

Item

Inventory

Order

Sales Overview

Daily Sales

↑ \$ 249.95

67%

Monthly Sales

↓ \$ 2,942.32

36%

Yearly Sales

↑ \$ 8,638.32

80%

Recent Purchases

	Order 1	● 11 DECEMBER 12:56	View Order
	Order 2	● 11 DECEMBER 10:35	View Order
	Order 3	● 9 DECEMBER 17:38	View Order

Low Inventory Reminders

0 Items have low inventory

No items are low are inventory!

Project Demo - Screenshot

SkyNet

Dashboard

Supplier Management

Dropdown ▾ Q

Suppliers

Supplier Management

Add Supplier

#	Company	Email	Phone Number	Country	Street	City	State	Zip	Note	Actions
1	3M Company	manager@gmail.com	809-815-6322	USA	Albany St	New York	New York	10001		<button>Edit</button> <button>Delete</button>
2	The Alpine Group, Inc.	manager@office.com	536-459-2355	USA	Allen St	Los Angeles	California	57586		<button>Edit</button> <button>Delete</button>
3	Avnet, Inc.	manager@avnet.org	174-285-8907	USA	Amsterdam Ave	Chicago	Illinois	15227		<button>Edit</button> <button>Delete</button>
4	Avon Products, Inc.	manager@Avon.com	102-564-7978	USA	Canal St	Houston	Texas	18506		<button>Edit</button> <button>Delete</button>

Project Demo - Screenshot

Item

Add Item

#	Description	Cost	Selling Price	Note	Supplier ID	Classification	Actions
1	Bananas	0.06	0.77	per lb	1		<button>Edit</button> <button>Delete</button>
2	Orange	1.73	2.08	per lb	2		<button>Edit</button> <button>Delete</button>
3	Bread						<button>Edit</button> <button>Delete</button>
4	Tomato						<button>Edit</button> <button>Delete</button>
5	Chicken		3.49				<button>Edit</button> <button>Delete</button>
6	Eggs			Note			<button>Edit</button> <button>Delete</button>
7	Gasoline			Supplier ID			<button>Edit</button> <button>Delete</button>
8	Beef			Classification			<button>Edit</button> <button>Delete</button>

Add Item

Description
CVS Health Isopropyl 91% Alcohol First Aid Antiseptic Spray - 10 Oz

Cost
Cost

Selling Price
3.49

Note
CVS Health Isopropyl 91% Alcohol First Aid Antiseptic Spray | CVS Health Isopropyl 91% Alcohol First Aid Antiseptic Spray - 10 Oz

Supplier ID
Supplier ID

Classification
Health & Beauty - Health Care - First Aid

Scan Save changes Cancel

Project Demo - Screenshot

Tracking Number Lookup

Select a carrier:

Enter input:

Status: Delivery Attempted

Tracking Number Lookup

Select a carrier:

Enter input:

Error: Please enter valid tracking number

Project Demo - APIs

Bootstrap

Django rest framework

Django CORS(Cross-origin resource sharing)

Django also comes equipped with many APIs in its standard library, some examples include a Database API, Model-View-Template APIs, HTTP request and Response, and URL utility API.

Barcode lookup - item information database which matches barcodes to known inventory items

Quagga - a barcode-scanner entirely written in JavaScript supporting real-time localization and decoding of various types of barcodes

FedEx & UPS package track and address verification APIs

Github Link

<https://github.com/htmw/Skynet/wiki>

Live Demo



Thank you for watching!