



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 6 Recap
- Product Backlog & Sprint 7 Backlog
- Metrics
- Retrospective
- Sprint 8 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

- Relink wiki to new repository

Improvements

- Fixed the URL

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

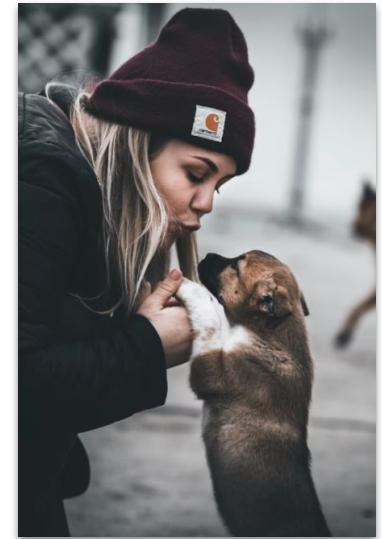
Alexis:

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.

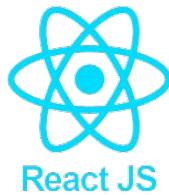


MVP Design

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		

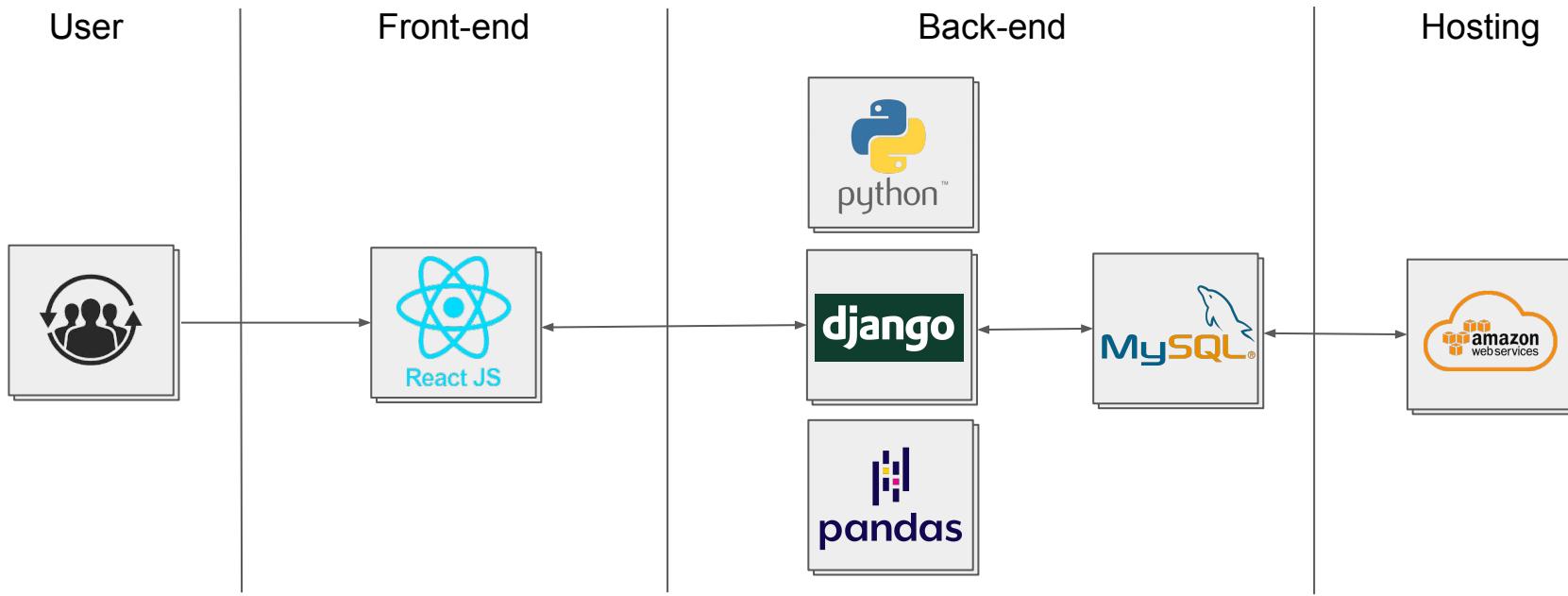
Technologies



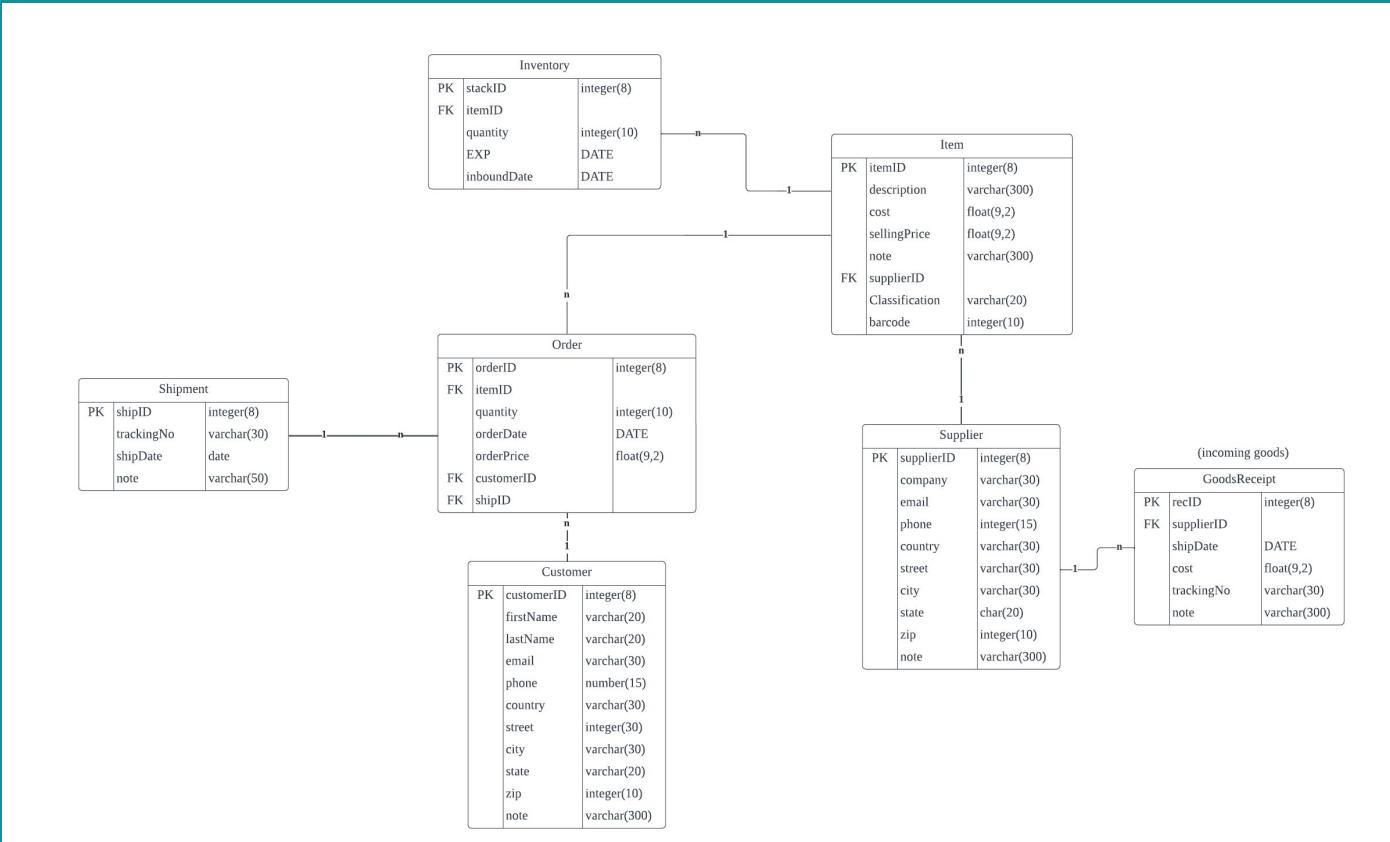
The Purpose of the Technologies

- 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
- Discord - Team Communication

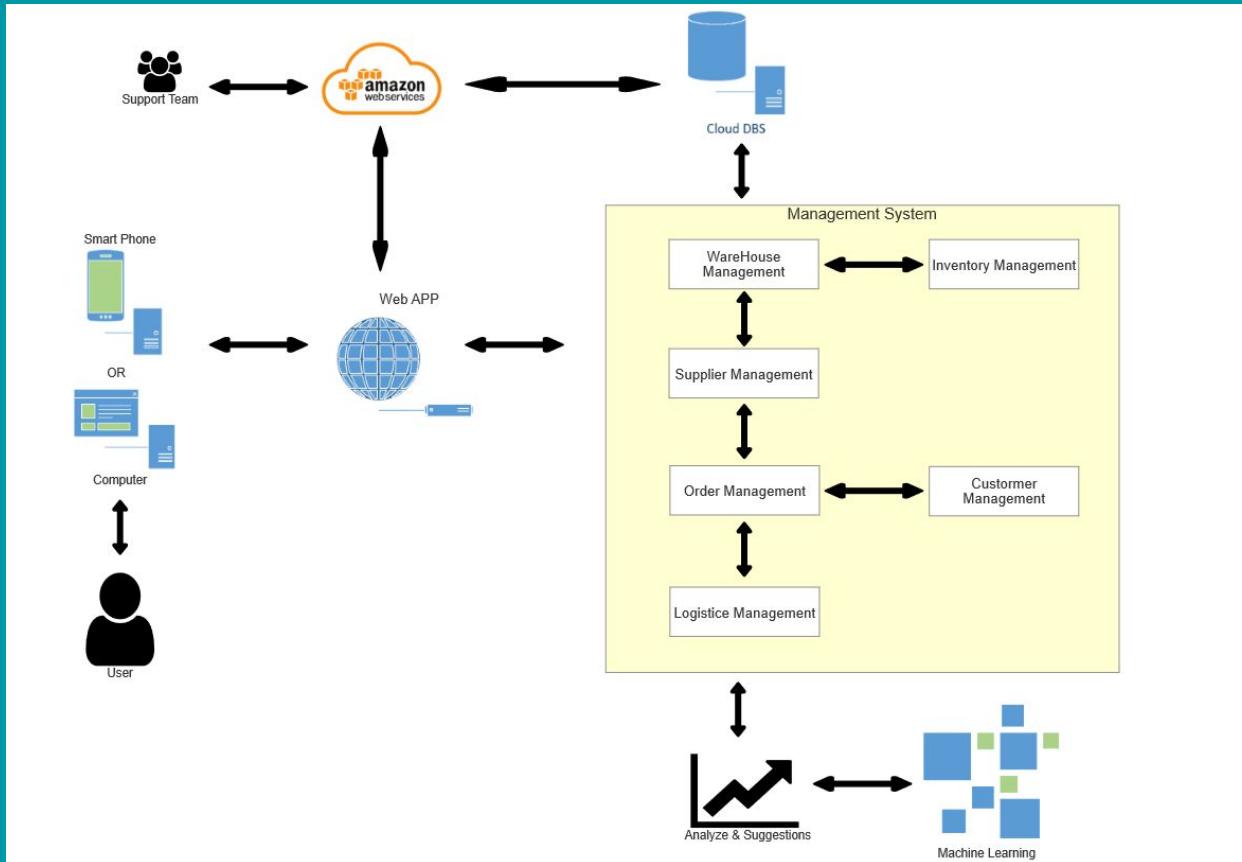
Technologies - continue



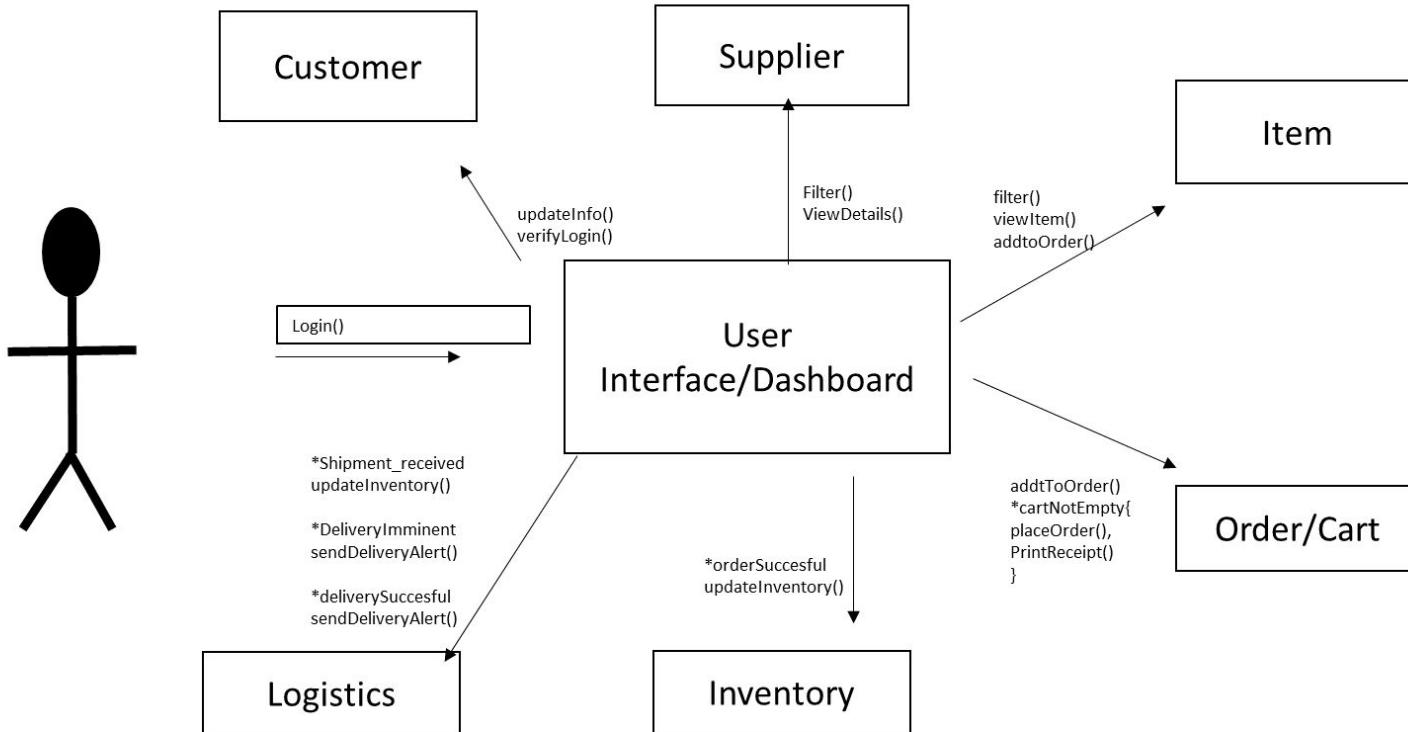
Database ER-diagram



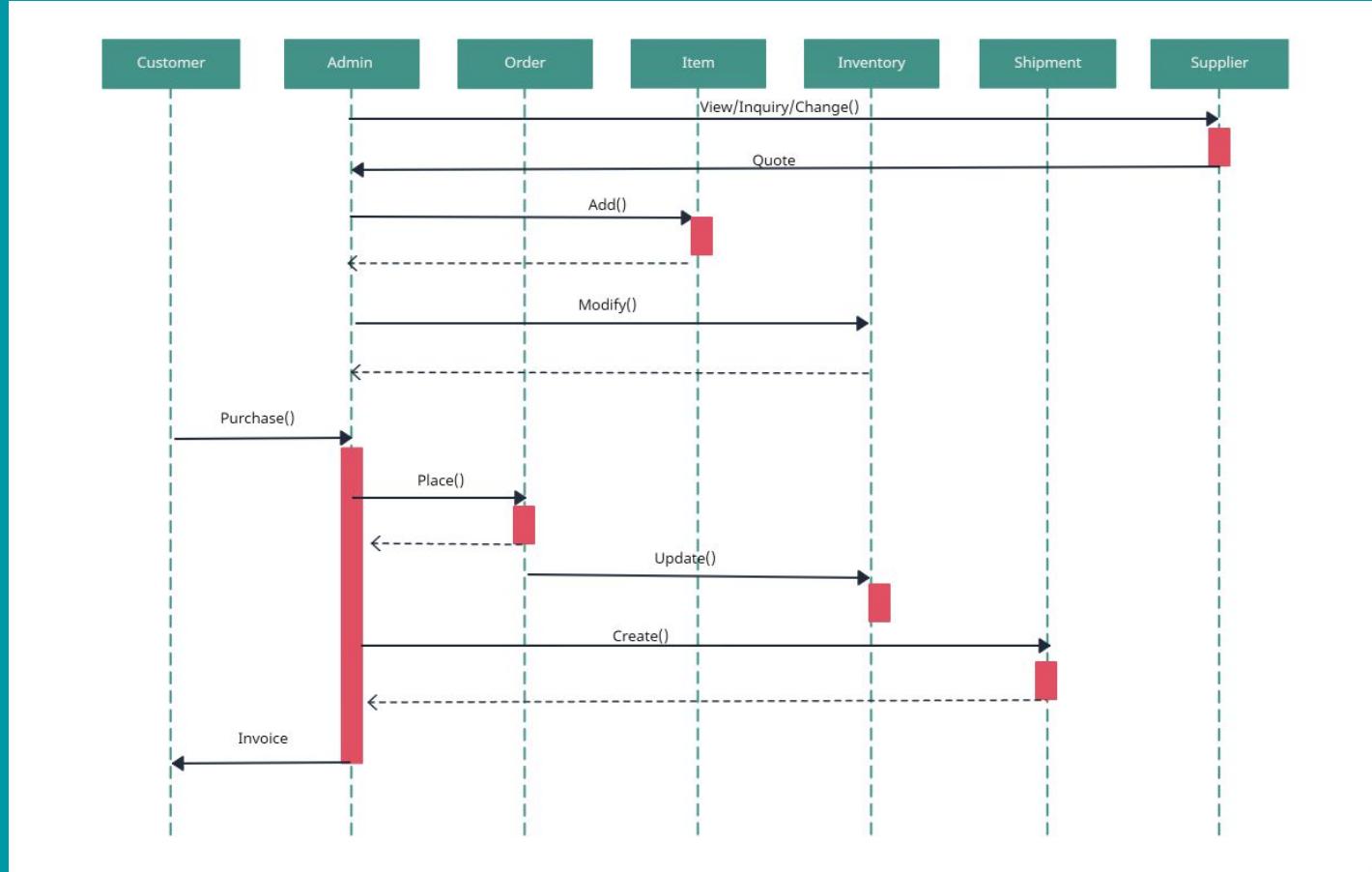
Conceptual Architecture Diagram



UML Diagram



User Sequence Diagram



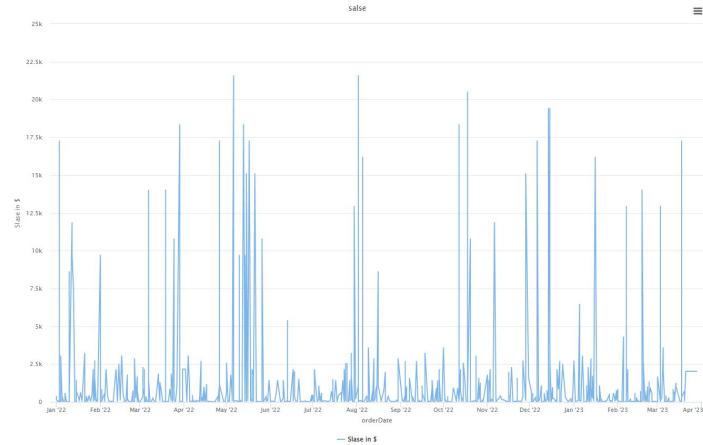
Apriori Algorithm

- a machine learning algorithm used for association rule mining in data mining.

The Apriori algorithm is a classic algorithm used in data mining to identify frequent item sets (items that frequently occur together) in a dataset and generate association rules based on these item sets. These association rules can be used to identify patterns and relationships between different items in the dataset.

The algorithm works by iteratively scanning the dataset and generating candidate itemsets that meet a minimum support threshold. The support of an item set is defined as the proportion of transactions in the dataset that contain the item set. The algorithm then prunes the candidate itemsets that do not meet the minimum support threshold and repeats the process until no more frequent item sets can be generated.

Overall, the Apriori algorithm is a powerful tool for discovering interesting patterns and relationships in large datasets, and it has many applications in areas such as market basket analysis, recommendation systems, and web mining.



(Sales of our dummy data)

Apriori Algorithm

- a machine learning algorithm used for association rule mining in data mining.

antecedents	consequents	antecedent support	consequent support	support	confidence	lift	leverage	conviction	
0	(0)	(1)	0.980769	0.557692	0.557692	0.568627	1.019608	0.010725	1.025350
1	(1)	(0)	0.557692	0.980769	0.557692	1.000000	1.019608	0.010725	inf
2	(2)	(0)	0.019231	0.980769	0.019231	1.000000	1.019608	0.000370	inf
3	(0)	(2)	0.980769	0.019231	0.019231	0.019608	1.019608	0.000370	1.000385
4	(3)	(0)	0.596154	0.980769	0.596154	1.000000	1.019608	0.011464	inf
5	(0)	(3)	0.980769	0.596154	0.596154	0.607843	1.019608	0.011464	1.029808
6	(4)	(0)	0.480769	0.980769	0.480769	1.000000	1.019608	0.009246	inf
7	(0)	(4)	0.980769	0.480769	0.480769	0.490196	1.019608	0.009246	1.018491
8	(5)	(0)	0.634615	0.980769	0.634615	1.000000	1.019608	0.012204	inf
9	(0)	(5)	0.980769	0.634615	0.634615	0.647059	1.019608	0.012204	1.035256
10	(0)	(6)	0.980769	0.519231	0.519231	0.529412	1.019608	0.009985	1.021635
11	(6)	(0)	0.519231	0.980769	0.519231	1.000000	1.019608	0.009985	inf
12	(7)	(0)	0.557692	0.980769	0.557692	1.000000	1.019608	0.010725	inf
13	(0)	(7)	0.980769	0.557692	0.557692	0.568627	1.019608	0.010725	1.025350
14	(0)	(8)	0.980769	0.538462	0.538462	0.549020	1.019608	0.010355	1.023411

A demo of applying apriori algorithms in our database with orders' data. Showing the interesting patterns and relationships

Sprint 6 Recap

This is what we delivered 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)

What is new in Sprint 7:

- Changed the Algorithms for sales forecasting to “apriori”, and finished the modeling with some test data.
- Changes in the backlog
- Bugs fixed, and UI improved

				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 1/2(changed)

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	8	Medium	Done	7	Not finished in sprint6, move to sprint 7
US16	Marketing Manager	Manage supplier performance	Quickly and easily track supplier performance with key performance metrics that are already established for me		SRM_kpi	5	Medium	Canceled	8	New US replacement redesigned to meet demand
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	13	High	Canceled	7	New US replacement redesigned to meet demand

Sprint Backlog 2/2 (changed)

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
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	13	low	Canceled	7	New US replacement redesigned to meet demand
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	13	low	Canceled	7	New US replacement redesigned to meet demand
US28	Marketing Manager	I want to have a simple statistic for my customers	Better understanding of the people I sell to and their spending habits	Given a overall statistic of the top customers	DM_cus	8	Medium	Done	7	redesigned US, added in Mar.13
US29	Marketing Manager	I would like to have a simple statistic for historical sales data	Better understanding of the overall sales situation each month	Given a overall statistic of the each months	DM_mm	5	Medium	Done	7	redesigned US, added in Mar.13
US30	Marketing Manager	I want to find the customer's preferred product mix, and some potential patterns	Improve marketing strategy and merchandise placement layout	Given Provide common item pairings, including statistically significant potential patterns	DM_sales	13	Medium	Done	7	redesigned US, added in Mar.13

Total Story Points: 34

Sprint 7



Stories completed:

ID	Story Name	Size	Status	Date
US7	DBS_analyze	8	Done	3/28
US28	DM_cus	8	Done	3/28
US29	DM_mm	5	Done	3/28
US30	DM_sales	13	Done	3/28

Stories incompletely:

ID	Story Nme	Size	Reason	Note
			None	

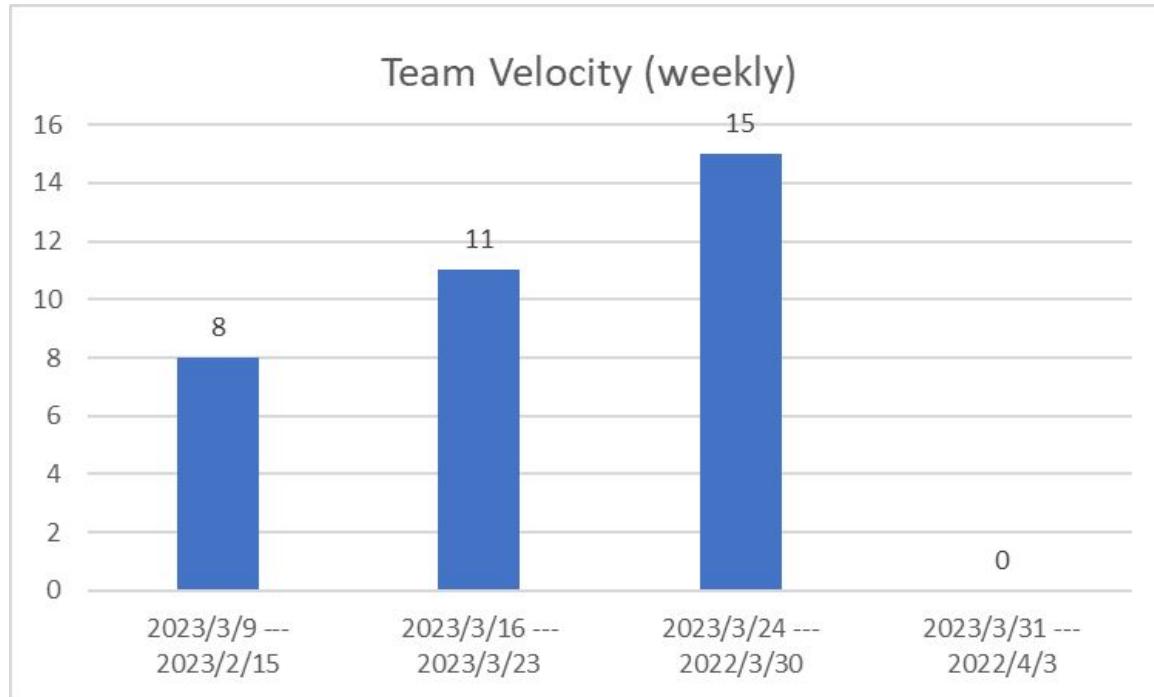
Additional work outside of stories

UPS is changing their API tools, so we had to rebuild some parts

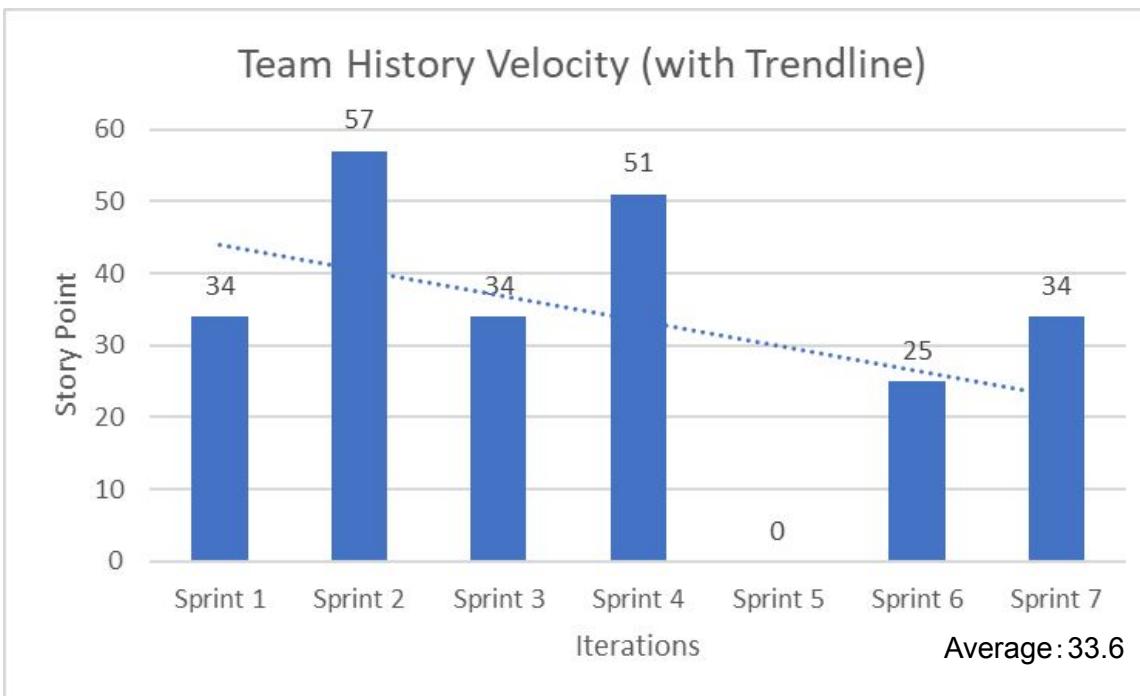
Test Cases

ID	User Story	Test Description	Test Date	Action	Expected Output	Actual Output	Test Result (Pass/Total)	Comments
T31	US7	Evaluate whether the results of machine learning are meaningful		Provide it with different categories of sales data (random numbers and non-random records) and observe the output	Scatter plot and the data frame that was processed correctly	Scatter plot and the data frame that was processed correctly	3 of 3	
T32	US28	Observe whether the statistics of TOP customers are correct.		Provide it with different categories of sales data (random numbers and non-random records) and observe the output	Statistics about customers are correctly calculated and displayed	Correctly processed data frames and conclusions	2 of 2	
T33	US29	Observe whether the statistics of each month are correct.		Provide it with different categories of sales data (random numbers and non-random records) and observe the output	Statistics about each months are correctly calculated and displayed	Correctly processed data frames and conclusions	2 of 2	
T34	US30	Observe the performance of the apriori algorithm and whether our data preprocessing is correct.		Provide it with different categories of sales data (random numbers and non-random records) and observe the output	Observe the performance of the apriori algorithm and whether its output can find some potential patterns and relationships with a high degree of support	Some potential patterns and relationships were found with high support; when random data were provided, no RULE had high support.	3 of 3	

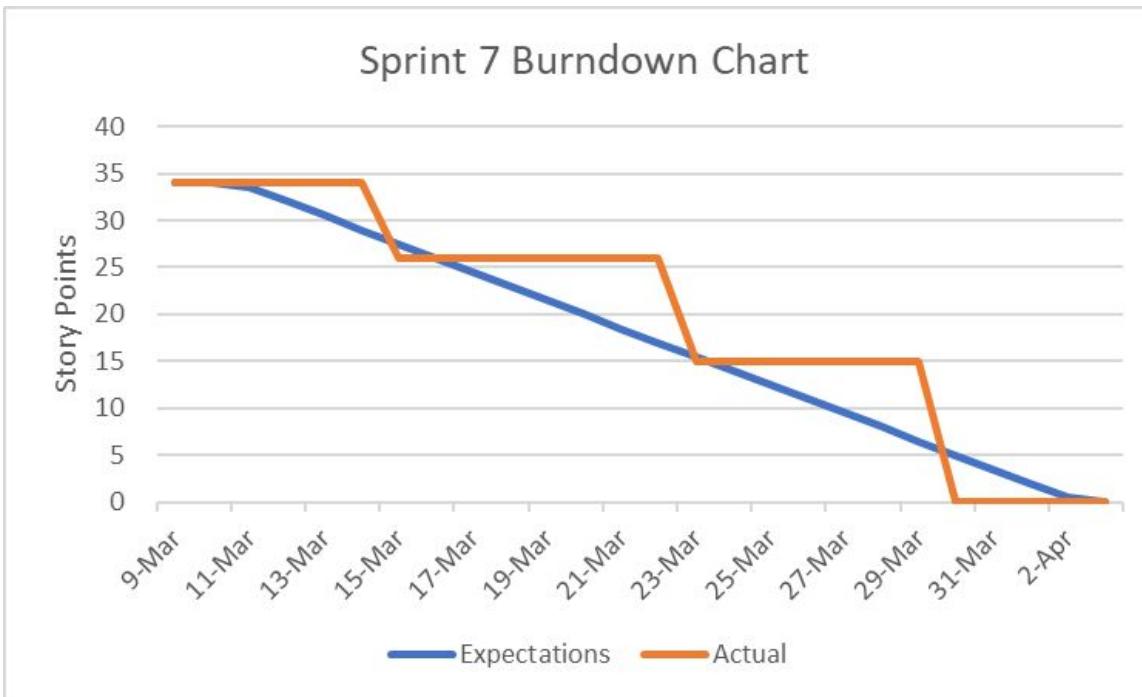
Metrics - Team Velocity of Sprint 7



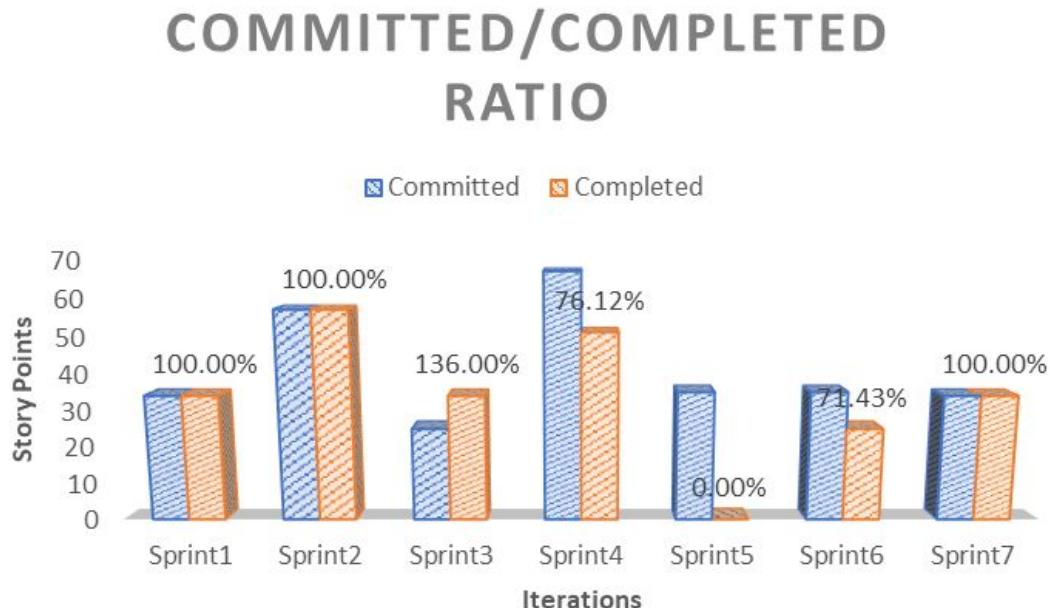
Metrics - Team History Velocity



Metrics - Burndown Chart



Metrics - Committed/Completed Ratio



Retrospective - What Went Well

What went well in Sprint 7?

- We have a better understanding of our data and how we plan to visualize it to the user
- Each feature of the MVP was completed
- Good communication throughout the sprint
- We helped each other when it was needed
- The front-end and back-end codes are used in combination, rather than blindly using only one method.

Retrospective - What Did Not Go Well

What did not go well in Sprint 7?

- Due to spring break, we canceled two regular meetings. We missed another the following week due to last minute changes to availability.
- We spent a lot of time on data transformation and pre-processing. Perhaps in the future we should consider whether we have access to suitable test data when we design our database.
- Two separate API related issues affected the tracking feature success testing. Both were not noticed until the end of the sprint

Retrospective - Action Plan

What we need to improve for next Sprint?

- Resume frequency of meetings (meetings were cancelled for a variety of reasons, Spring break, etc.)
- Check the continuing functionality of features at the end of each week of the sprint
- Fix API Key related issues

Sprint 8 - Plan

We finished all the user stories!

Task outside of stories

We may need more reasonable data for testing our ML feature.

We need to improve our UI

There are still few bugs to be fixed and testing to be completed



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

SkyNet

- Dashboard
- Supplier
- Item
- Inventory
- Order
- Cash Registers
- Tracking

INVOICE

One Pace Plaza
New York, NY 10038

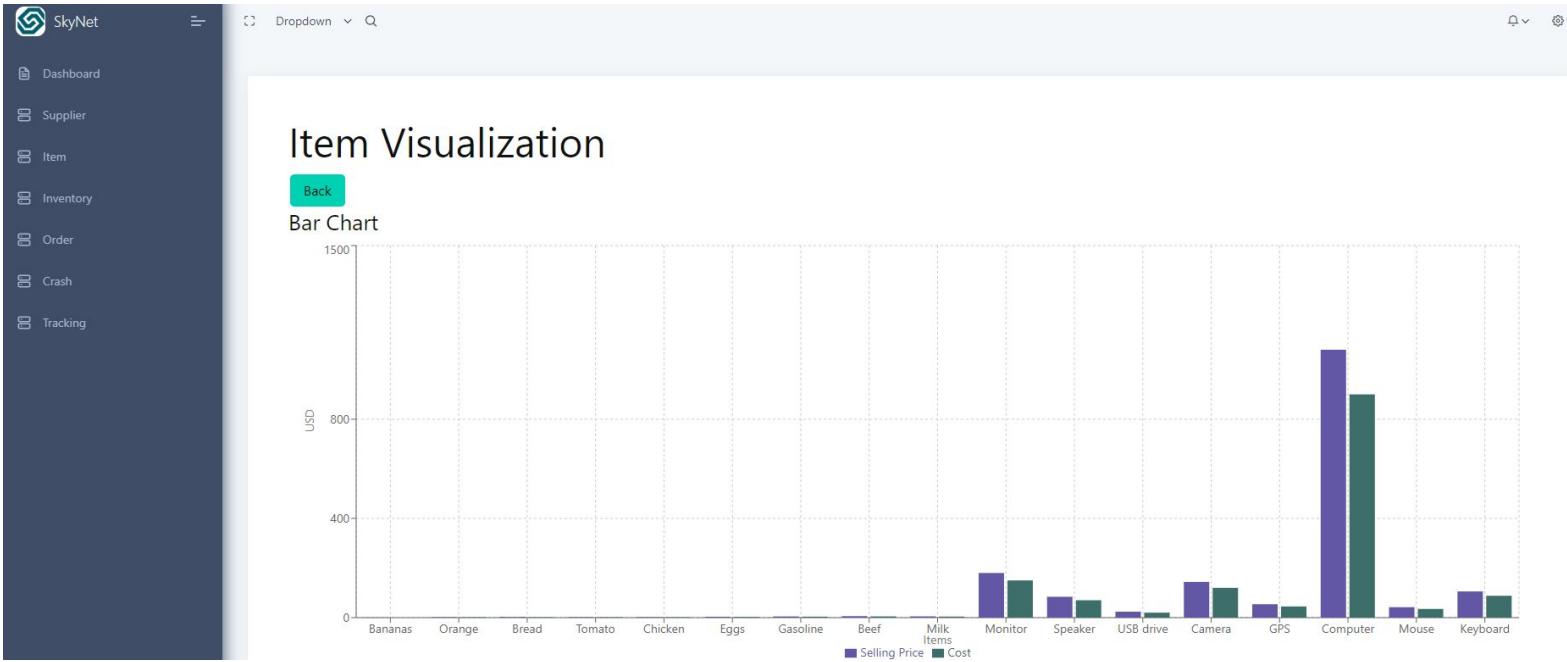
Some Company
c/o Some Guy

Invoice #	101138
Date	Thu, 30 Mar 2023 13:27:00 GMT
Amount Due	\$5439

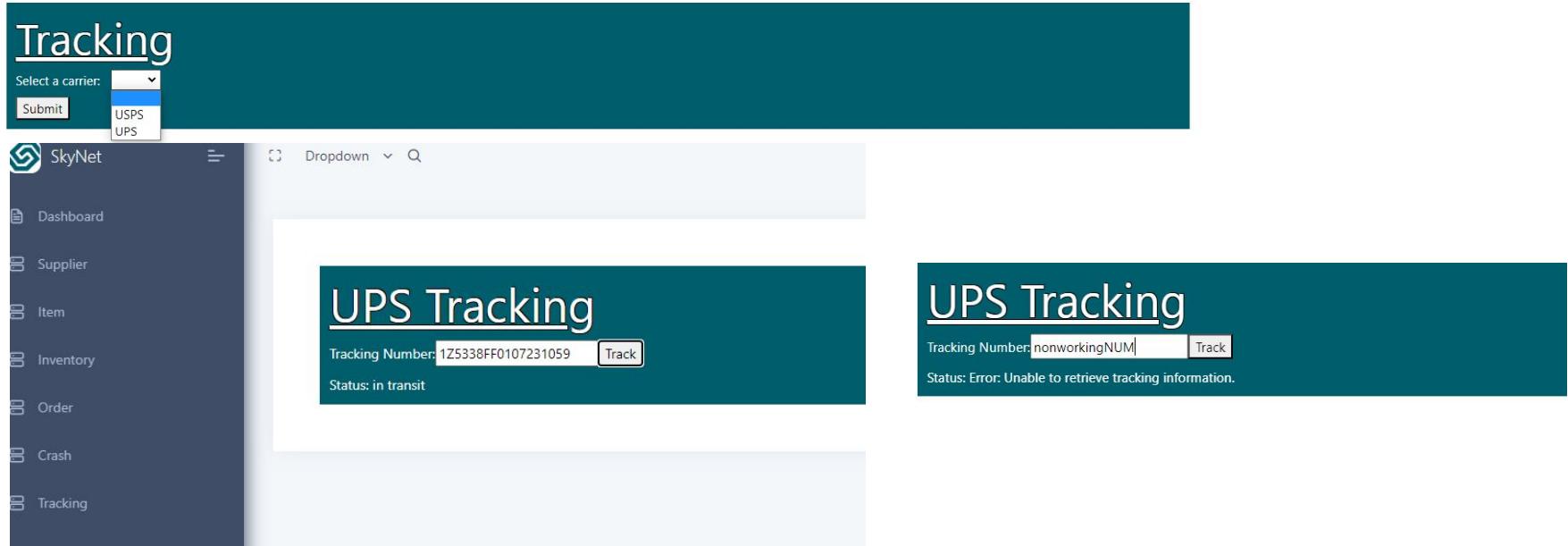
	Item	Description	Rate	Quantity	Price
+	A ▾	0001	\$333.00	6	\$1998
-	C ▾	0003	\$999.00	3	\$2997
+	D ▾	0004	\$111.00	4	\$444

Total	\$5439
Amount Paid	\$0.00
Balance Due	\$5439

Project Demo - Screenshot



Project Demo - Screenshot



The screenshot displays a web application interface for tracking packages. On the left, a sidebar menu lists various categories: Dashboard, Supplier, Item, Inventory, Order, Crash, and Tracking. The Tracking item is currently selected, indicated by a blue background. The main content area has a teal header with the title "Tracking". Below the header, there is a dropdown menu labeled "Select a carrier:" with options "USPS" and "UPS" visible. A "Submit" button is located next to the dropdown. The central part of the screen shows a "UPS Tracking" section. It contains a tracking number input field with the value "1Z5338FF0107231059" and a "Track" button. Below this, the status is displayed as "Status: in transit". In the bottom right corner of the main content area, there is a smaller "UPS Tracking" section with a tracking number input field containing "nonworkingNUM" and a "Track" button. The status for this section is "Status: Error: Unable to retrieve tracking information."

Tracking

Select a carrier:

Submit

USPS

UPS

SkyNet

Dashboard

Supplier

Item

Inventory

Order

Crash

Tracking

UPS Tracking

Tracking Number: 1Z5338FF0107231059

Track

Status: in transit

UPS Tracking

Tracking Number: nonworkingNUM

Track

Status: Error: Unable to retrieve tracking information.

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

Axios library - used to handle the Javascript HTTP requests

Github Link

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

Live Demo



Thank you for watching!