



# Beta Presentation

## Global Waste Management System

### The Capstone Experience

Team GM

Ben Blanchard

Hassan Maklai

Joseph Khalaf

Manh Tran

Nathan Shammami

Department of Computer Science and Engineering

Michigan State University

Spring 2025



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

# Project Overview

---

- Waste Management System For Waste Data At GM's Manufacturing Plants
- Detect Anomalies Within Shipments
- Visualize Trends In The Data
- Convenient Data Entry and Management

# Team Member's Technical Tasks

## Technical Tasks Assigned

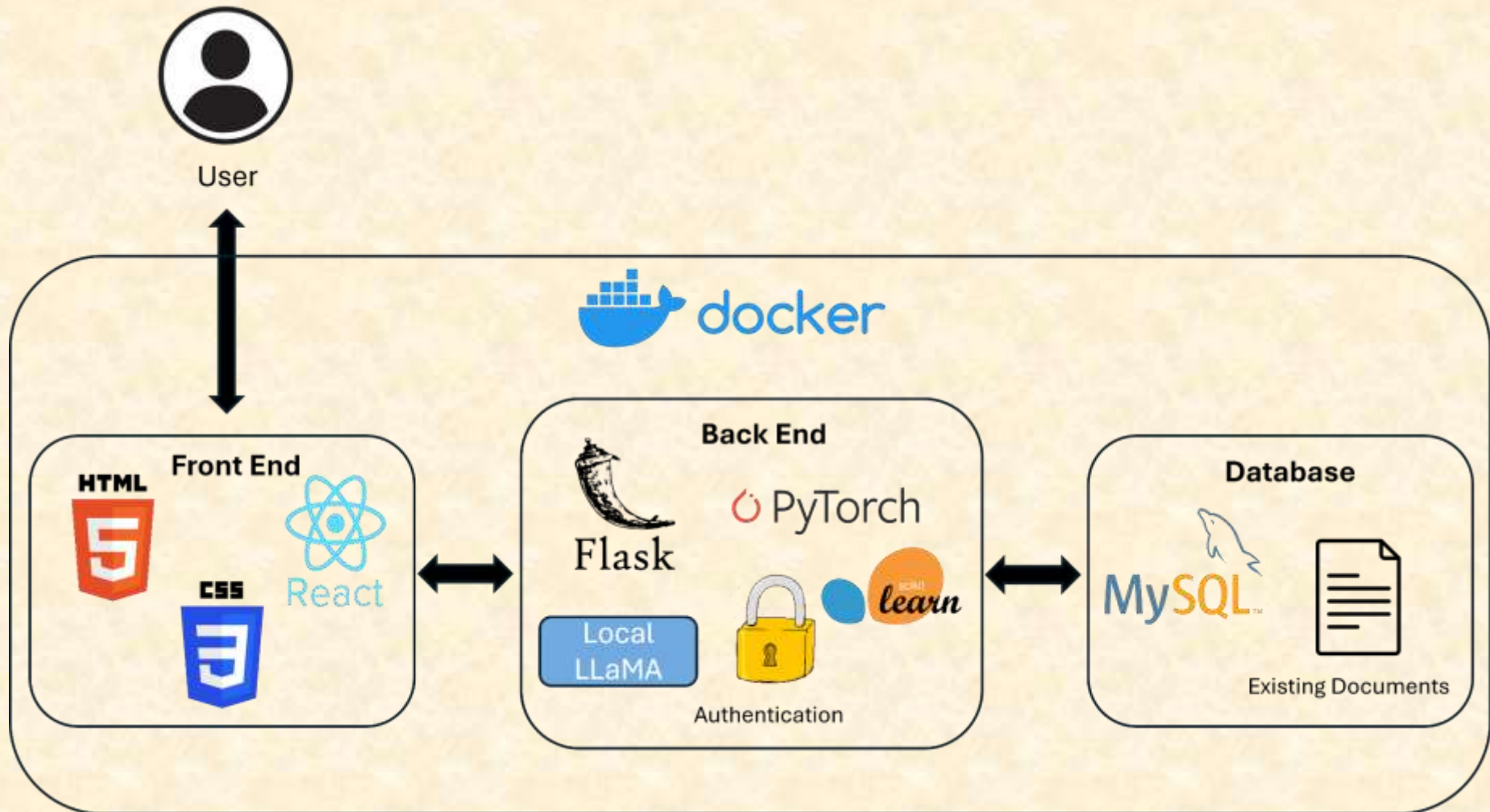
- Joseph Khalaf
  - User Authentication
  - Encryption Algorithm
  - Future Prediction Algorithm
  - Graph and Pie Chart Images/Modal
  - Anomaly Detection Related to Missing Shipments
- Nathan Shammami
  - Database Schema and Encryption
  - Docker Files and Initialization Sequence
  - All Data Page Functionality
  - Generating Reports
  - Nginx Web Hosting
  - Global Site Selector
- Ben Blanchard
  - Front End Filter Design
  - Back End Filter Design
  - Sorting of Graphs
  - Filter Dropdowns
- Manh Tran
  - Quantity-Based Anomaly Detection Using Isolation Forest
  - LLaMA Implementation and Design
  - Anomaly Dashboard Functionality
  - Update Anomalies With New/Edited Data
- Hassan Maklai
  - New Ticket Page
  - Upload CSV
  - Update Graphs With New/Edited Data
  - Autofill New Ticket

## Technical Tasks Completed

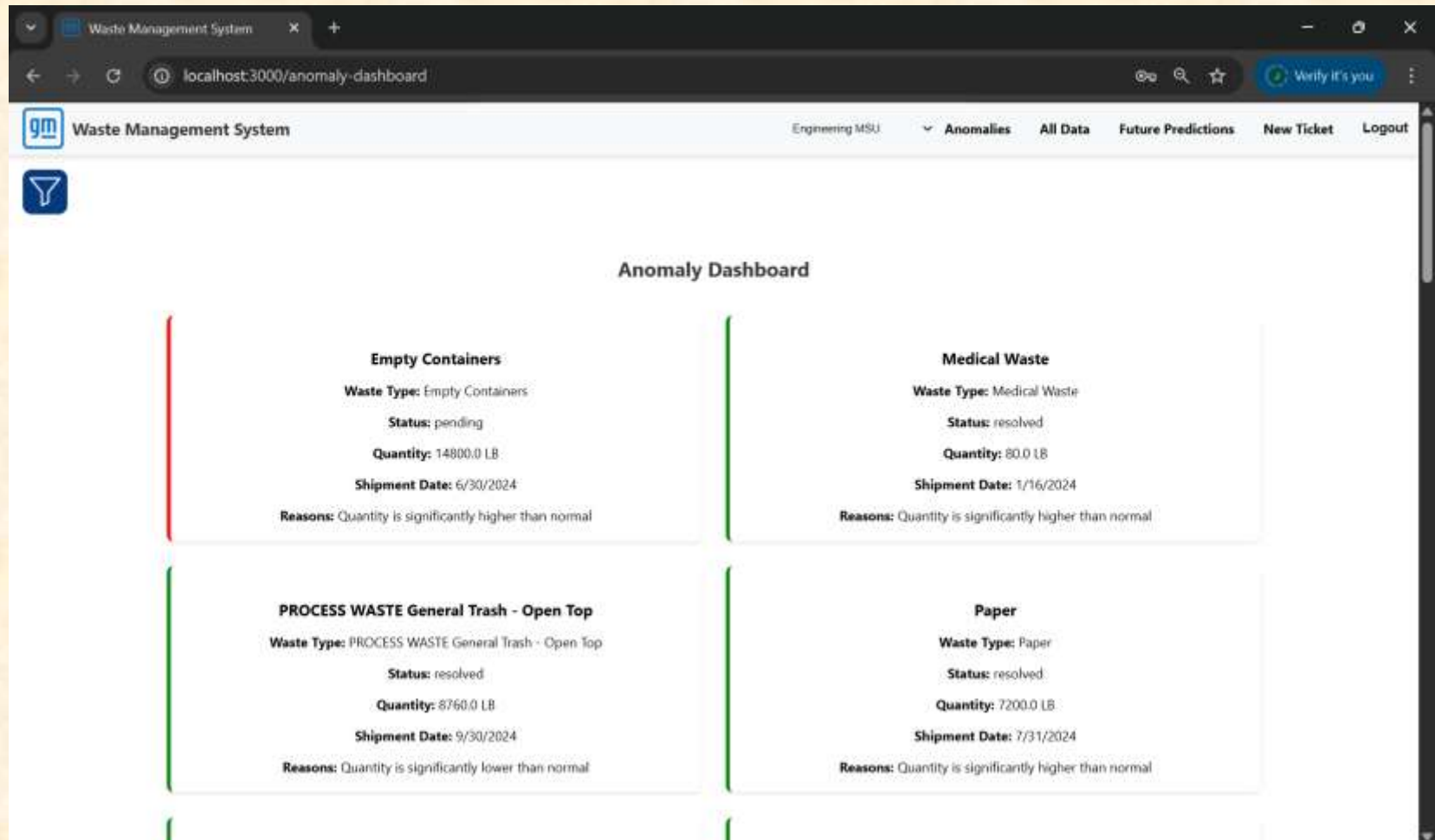
- Joseph Khalaf
  - User Authentication
  - Encryption Algorithm
  - Future Prediction Algorithm
  - Graph and Pie Chart Images/Modal
  - Anomaly Detection Related to Missing Shipments
- Nathan Shammami
  - Database Schema and Encryption
  - Docker Files and Initialization Sequence
  - All Data Page Functionality
  - Generating Reports
  - Nginx Web Hosting
  - Global Site Selector
- Ben Blanchard
  - Front End Filter Design
  - Back End Filter Design
  - Sorting of Graphs
  - Filter Dropdowns
- Manh Tran
  - Quantity-Based Anomaly Detection Using Isolation Forest
  - LLaMA Implementation and Design
  - Anomaly Dashboard Functionality
  - Update Anomalies With New/Edited Data
- Hassan Maklai
  - New Ticket Page
  - Upload CSV
  - Update Graphs With New/Edited Data
  - Autofill New Ticket



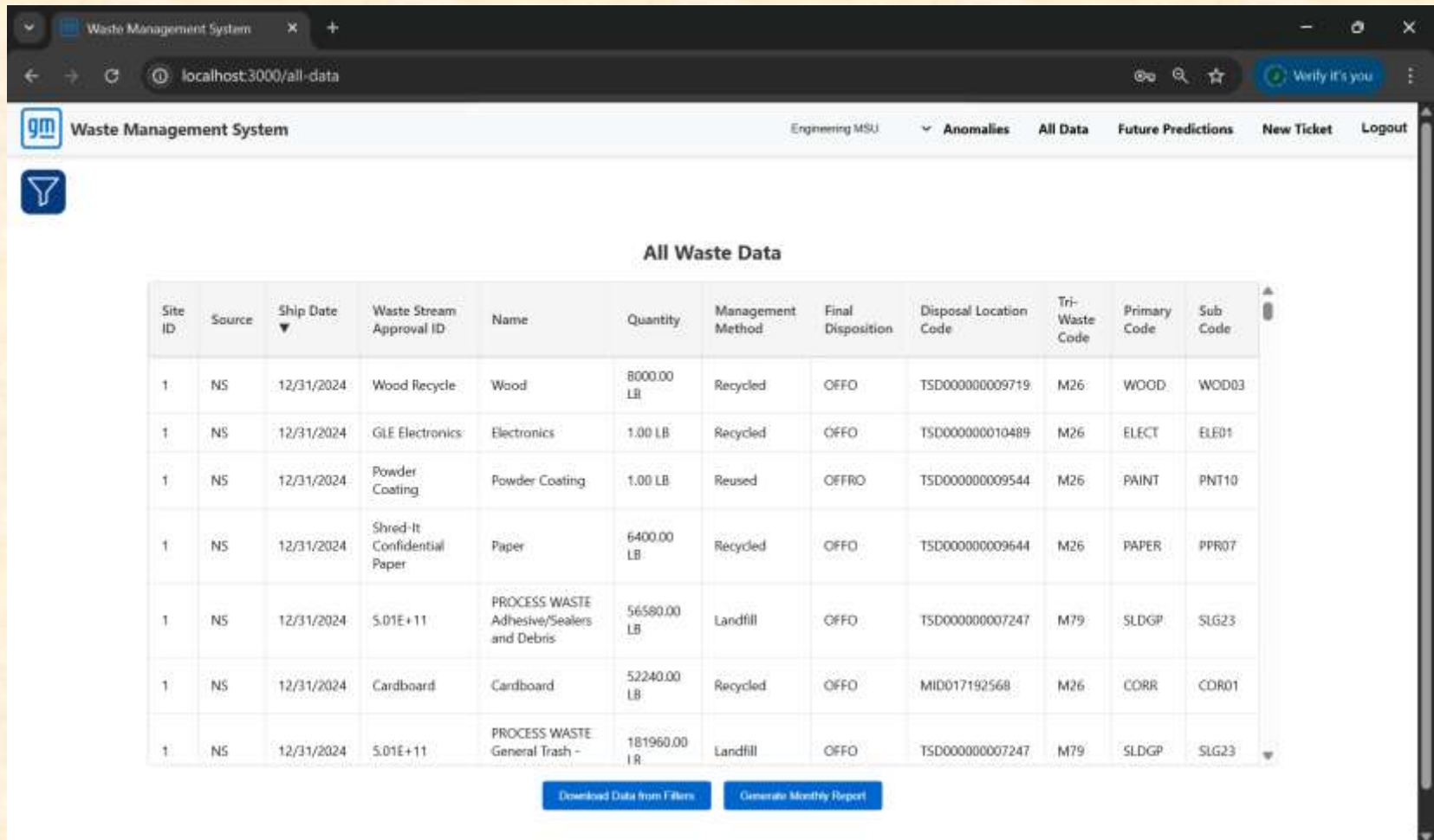
# System Architecture



# Anomaly Dashboard



# All Data



The screenshot displays a web browser window with the URL `localhost:3000/all-data`. The page title is "Waste Management System". The navigation bar includes links for "Engineering MSU", "Anomalies", "All Data" (which is active), "Future Predictions", "New Ticket", and "Logout". A filter icon is visible on the left. The main content area is titled "All Waste Data" and contains a table with 12 columns: Site ID, Source, Ship Date, Waste Stream Approval ID, Name, Quantity, Management Method, Final Disposition, Disposal Location Code, Tri-Waste Code, Primary Code, and Sub-Code. The table lists 7 rows of waste data. At the bottom of the table, there are two buttons: "Download Data from Filters" and "Generate Monthly Report".

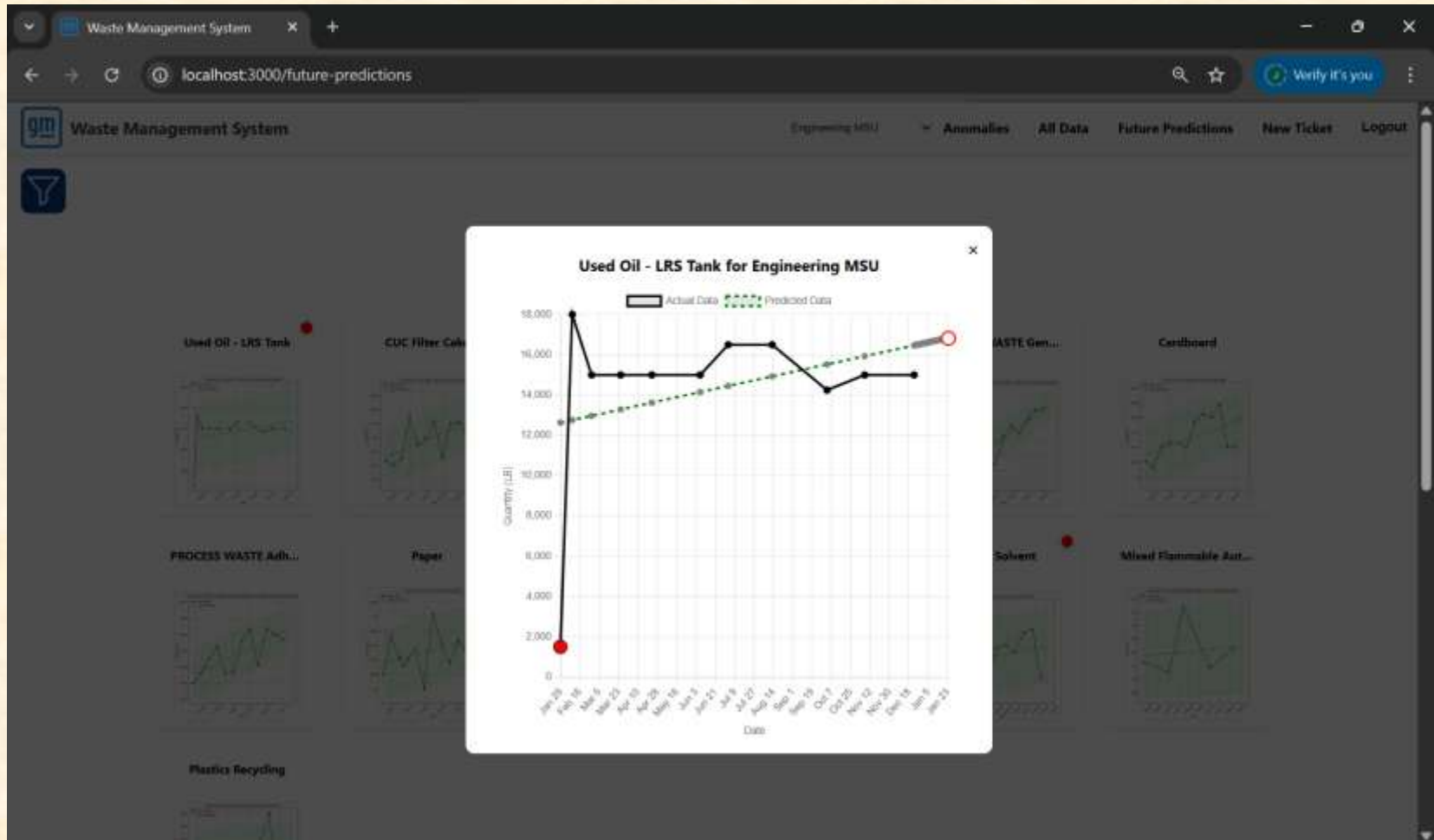
Site ID	Source	Ship Date	Waste Stream Approval ID	Name	Quantity	Management Method	Final Disposition	Disposal Location Code	Tri-Waste Code	Primary Code	Sub-Code
1	NS	12/31/2024	Wood Recycle	Wood	8000.00 LB	Recycled	OFFO	TSD000000009719	M26	WOOD	WOD03
1	NS	12/31/2024	GLE Electronics	Electronics	1.00 LB	Recycled	OFFO	TSD000000010489	M26	ELECT	ELE01
1	NS	12/31/2024	Powder Coating	Powder Coating	1.00 LB	Reused	OFFRO	TSD000000009544	M26	PAINT	PNT10
1	NS	12/31/2024	Shred-It Confidential Paper	Paper	6400.00 LB	Recycled	OFFO	TSD000000009644	M26	PAPER	PPR07
1	NS	12/31/2024	5.01E+11	PROCESS WASTE Adhesive/Sealers and Debris	56580.00 LB	Landfill	OFFO	TSD000000007247	M79	SLDGP	SLG23
1	NS	12/31/2024	Cardboard	Cardboard	52240.00 LB	Recycled	OFFO	MID017192568	M26	CORR	COR01
1	NS	12/31/2024	5.01E+11	PROCESS WASTE General Trash -	181960.00 LB	Landfill	OFFO	TSD000000007247	M79	SLDGP	SLG23

[Download Data from Filters](#) [Generate Monthly Report](#)

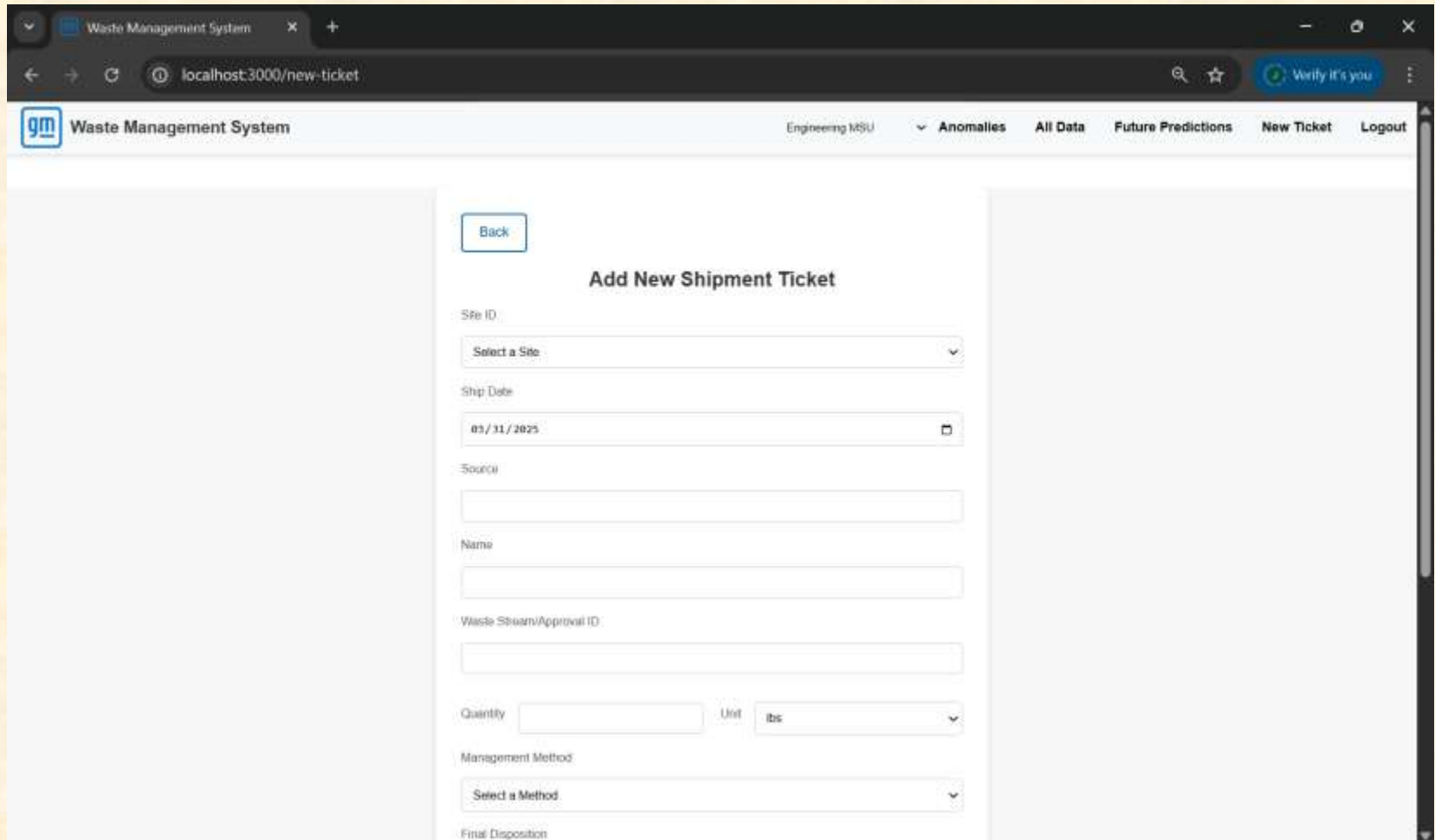




# Future Predictions



# New Ticket



The screenshot shows a web browser window with the title 'Waste Management System' and the URL 'localhost:3000/new-ticket'. The browser's address bar shows 'localhost:3000/new-ticket'. The page header includes the 'gm' logo, the text 'Waste Management System', and a navigation menu with links: 'Engineering MSU', 'Anomalies', 'All Data', 'Future Predictions', 'New Ticket', and 'Logout'. The main content area is titled 'Add New Shipment Ticket' and contains a 'Back' button. The form fields are as follows:

- Site ID: A dropdown menu with the placeholder text 'Select a Site'.
- Ship Date: A date input field showing '03/31/2025'.
- Source: A text input field.
- Name: A text input field.
- Waste Stream/Approval ID: A text input field.
- Quantity: A text input field.
- Unit: A dropdown menu with the placeholder text 'lbs'.
- Management Method: A dropdown menu with the placeholder text 'Select a Method'.
- Final Disposition: A text input field.





# What's left to do?

---

- Features
- Stretch Goals
  - Check for Anomalous Input Before Adding to Database
- Other Tasks
  - General Optimization
  - Bug Fixes



# Questions?

---

?

?

?

?

?

?

?

?

?



# Anomaly Algorithm Example

