MICHIGAN STATE UNIVERSITY

Beta Presentation

Global Waste Management System

The Capstone Experience

Team GM

Ben Blanchard
Hassan Maklai
Joseph Khalaf
Manh Tran
Nathan Shammami

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Michigan State University

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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
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  - Database Schema and Encryption
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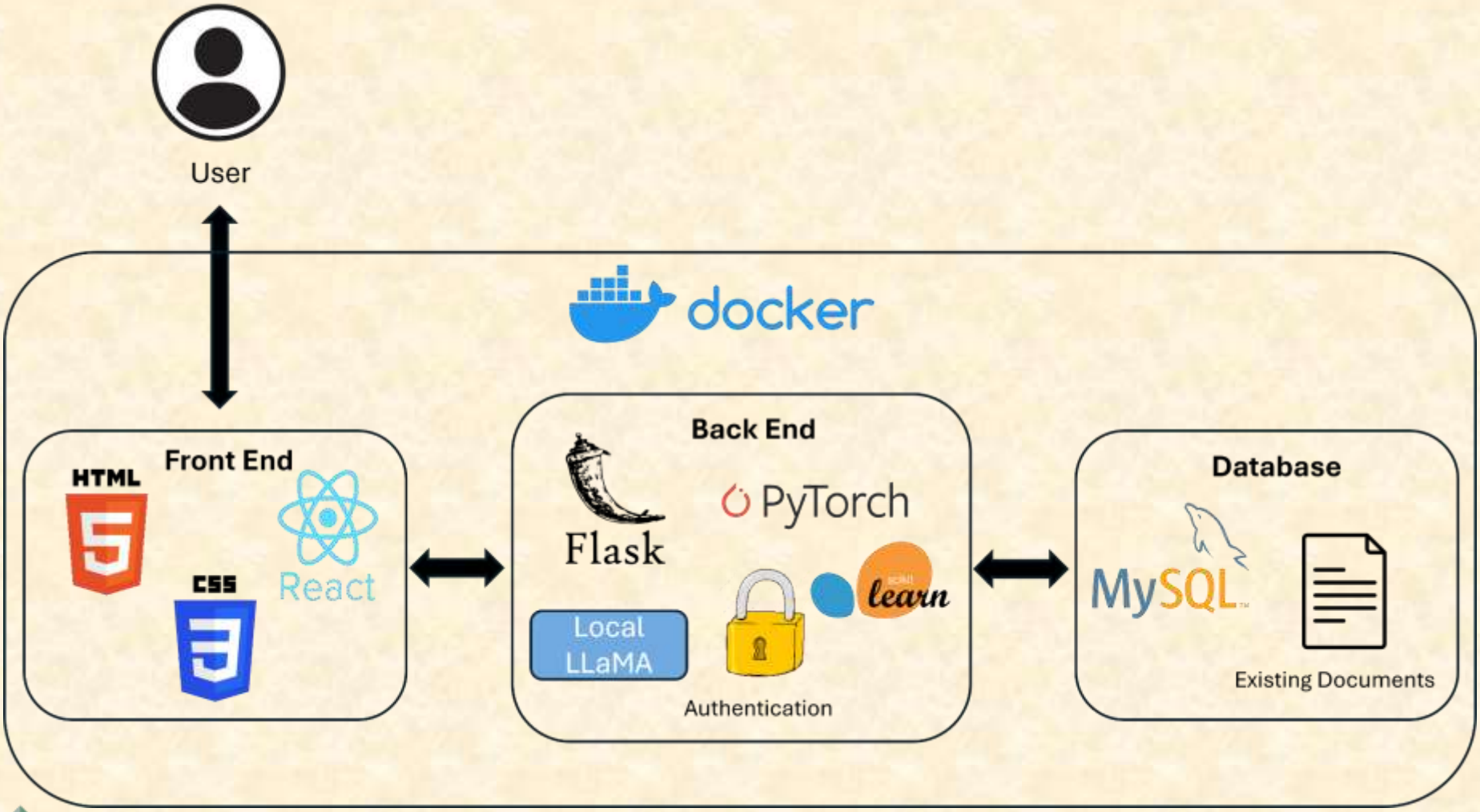
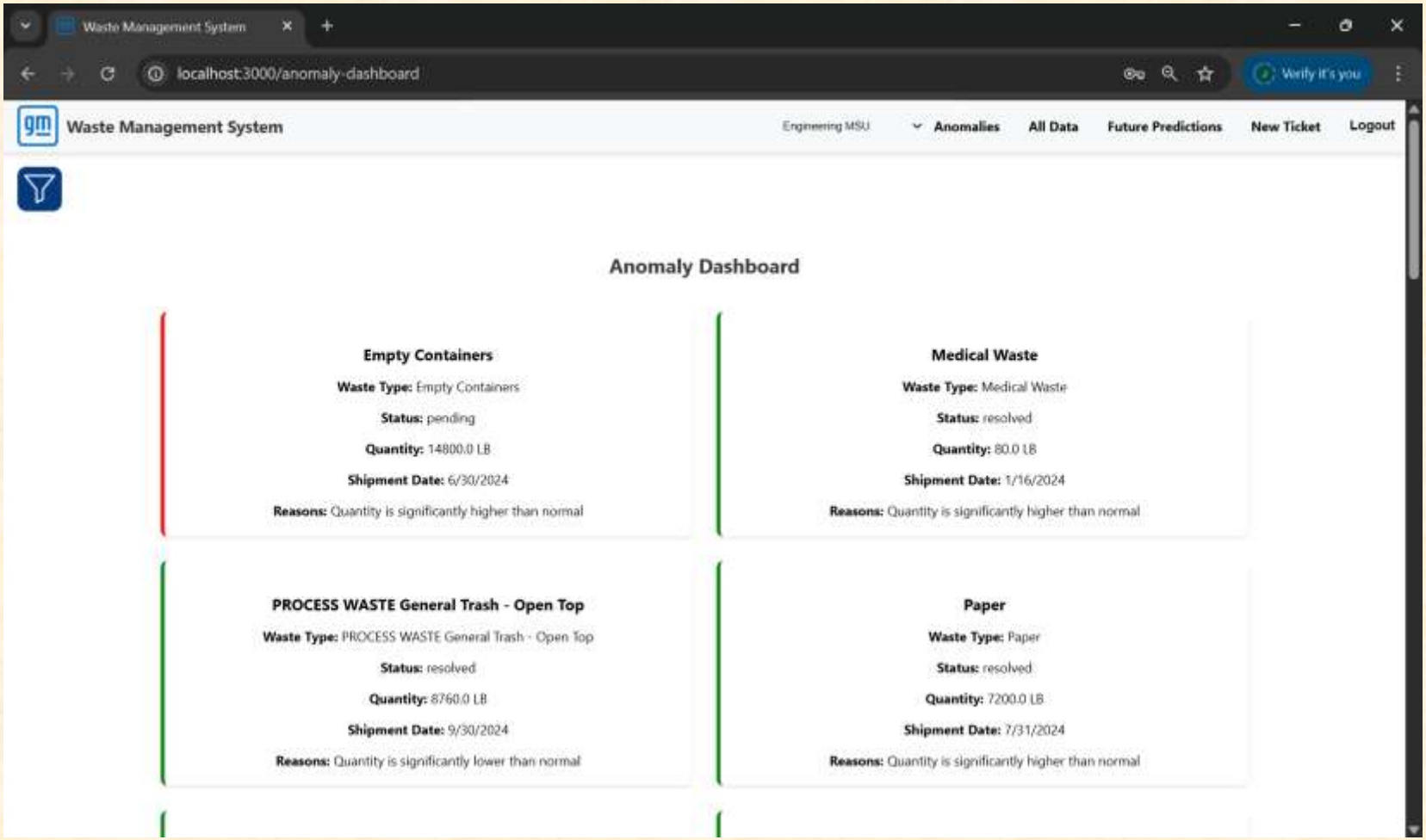
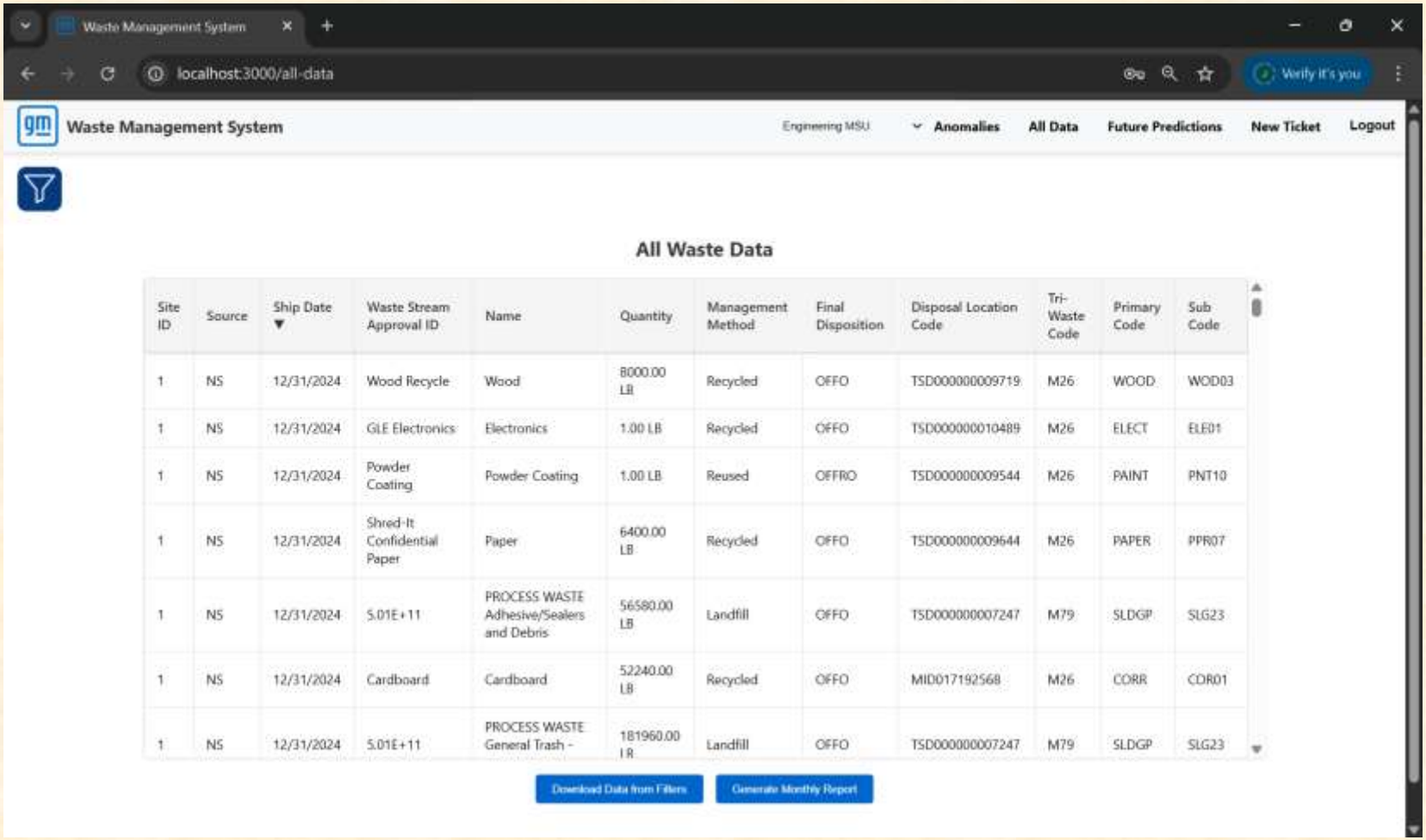
System Architecture



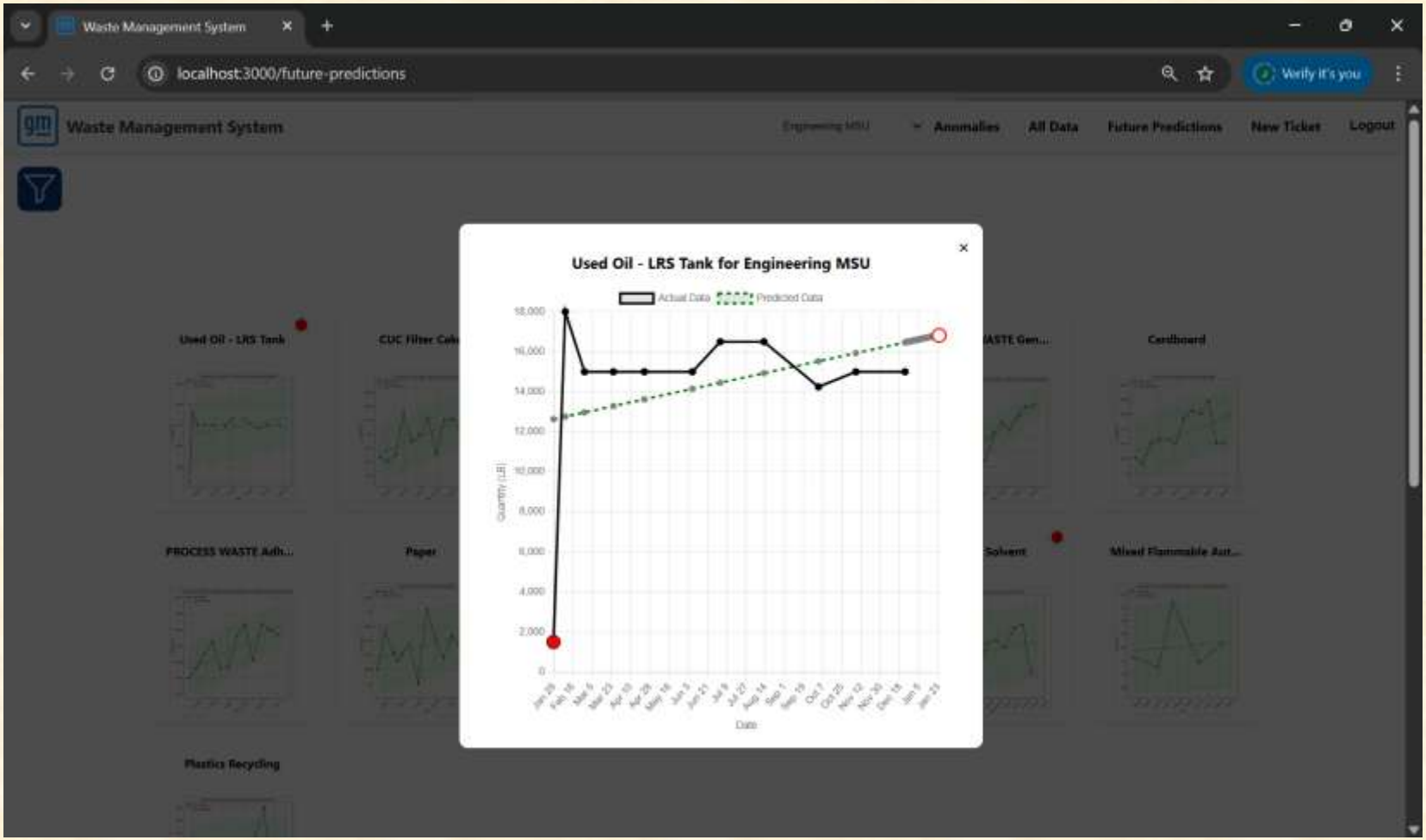
Anomaly Dashboard



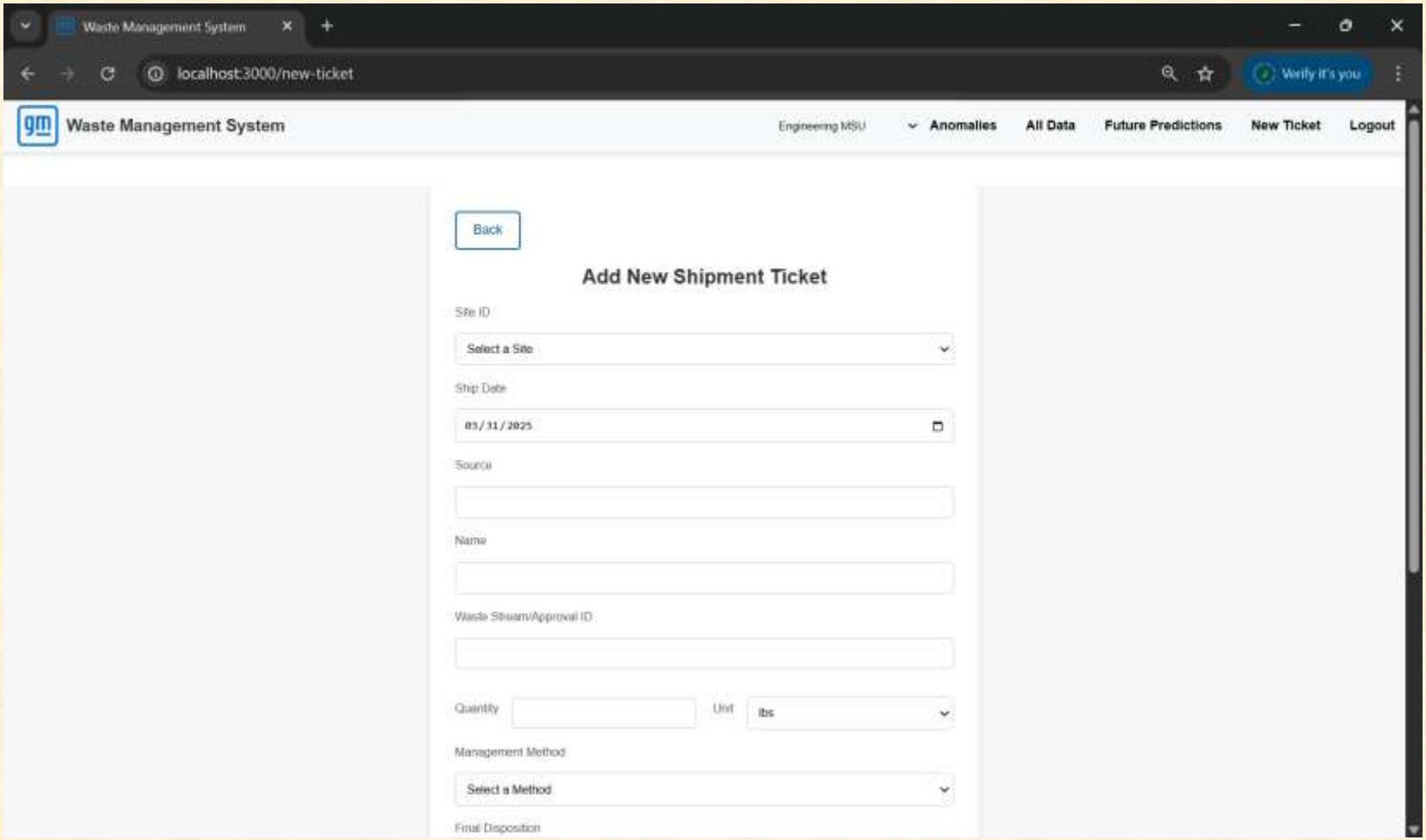
All Data


Waste Management System
localhost:3000/all-data
Verify it's you
Waste Management System
Engineering MSU
Anomalies
All Data
Future Predictions
New Ticket
Logout
All Waste Data
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 CDR01
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



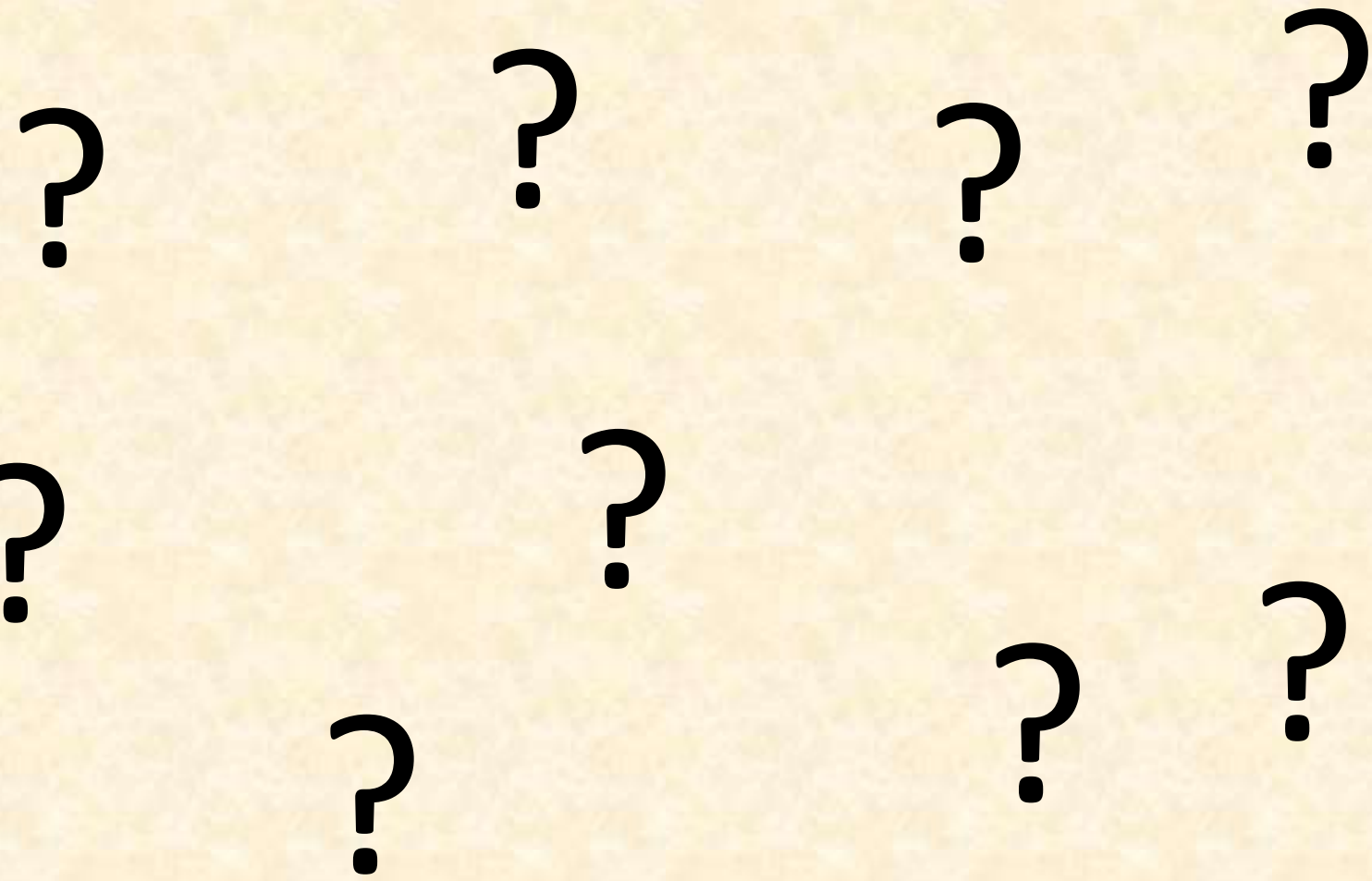
New Ticket


Waste Management System
localhost:3000/new-ticket
Verify it's you
Waste Management System
Engineering MSU
Anomalies
All Data
Future Predictions
New Ticket
Logout
Back
Add New Shipment Ticket
Site ID
Select a Site
Ship Date
03/31/2025
Source
Name
Waste Stream/Approval ID
Quantity
Unit
lbs
Management Method
Select a Method
Final Disposition

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