

PantrySync

A Campus Food Pantry Management System

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Mentor & Faculty: Dr. Masoud Sadjadi | Florida International University | Spring 2026

SENIOR DESIGN PROJECT 2026

1 in 3

college students
face food insecurity

72%

rely on manual
spreadsheets

40%

of perishables wasted
due to poor tracking

■ Manual Tracking

Inventory managed via spreadsheets with no real-time visibility, leading to frequent errors and outdated records.

■ No Analytics

Administrators lack usage data and reporting tools to make evidence-based inventory decisions.

■ Expiration Blind Spots

No automated alerts for low-stock or near-expiry items, causing waste and student shortages.

■ Poor Coordination

Volunteers and staff rely on informal communication with no structured workflow or role-based access.

■ Walk-In Only

Students must physically visit the pantry with no option to browse inventory or schedule pickups online.

■ Single-Site Limitation

Current tools cannot scale across multiple campus locations or support multi-institution deployments.

Introducing PantrySync

02

A unified digital platform that digitizes campus food pantry operations — end to end.

■ Students

Browse items, place orders, schedule pickups, track status

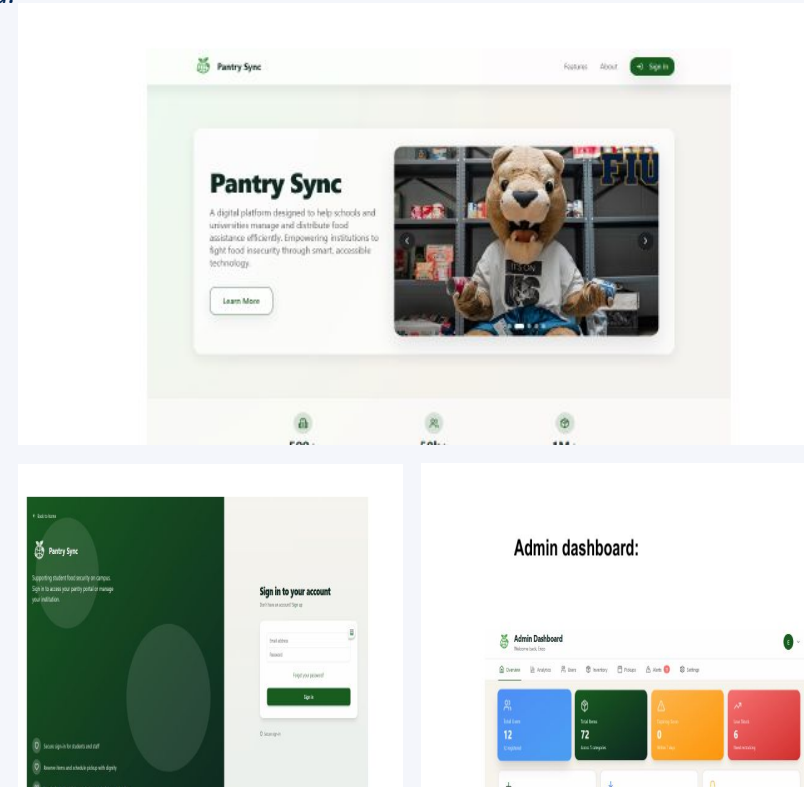
■ Volunteers

Manage order fulfillment, coordinate pickups

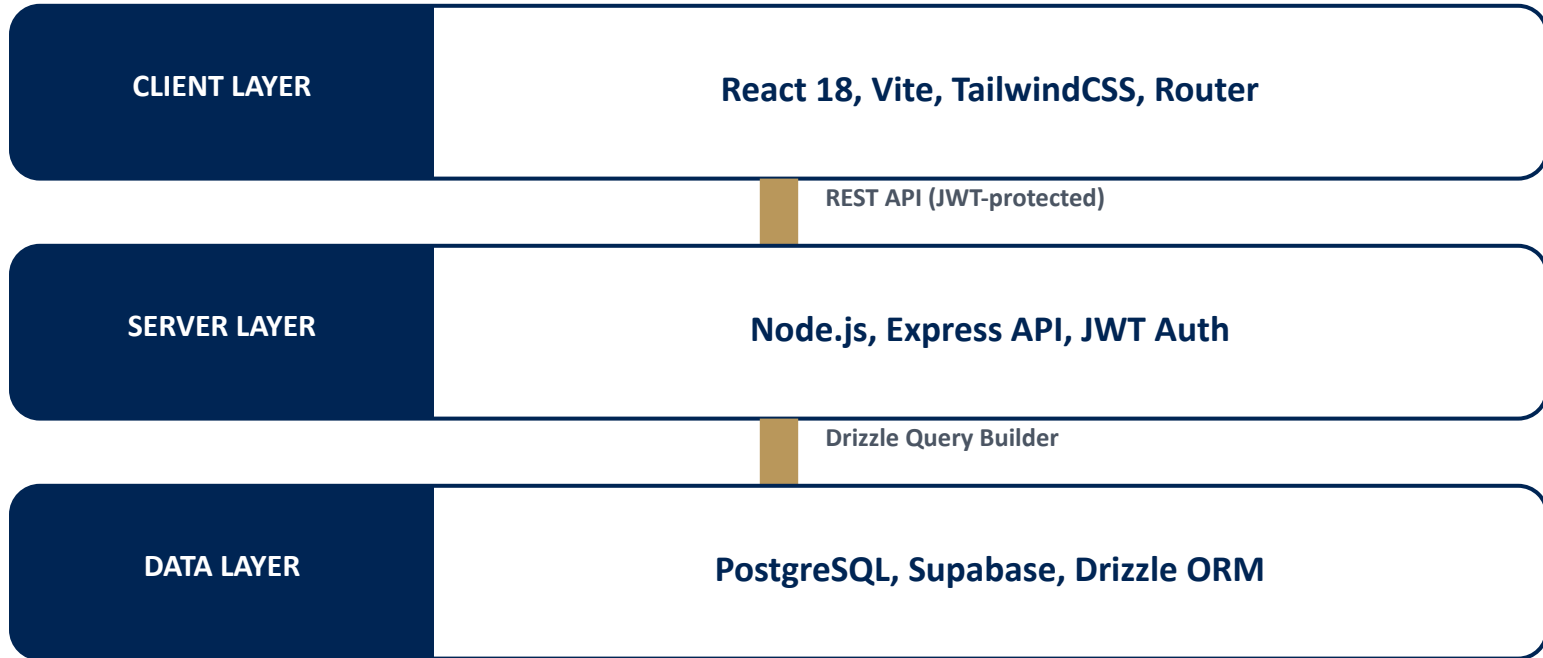
■ Administrators

Full inventory control, analytics & reporting

- ✓ Real-time inventory with automated low-stock & expiry alerts
- ✓ Role-based dashboards with secure JWT authentication
- ✓ Order management with pickup scheduling
- ✓ Analytics dashboard with usage insights & reporting
- ✓ Multi-institution support & secure access controls



Three-Tier Client–Server Architecture with JWT-Secured API Gateway



Technology Stack & Database Schema

05

TECHNOLOGY STACK

Frontend

React 18

TypeScript

Vite

TailwindCSS

Backend

Node.js

Express

JWT Auth

React Router

Data

PostgreSQL

Supabase

Drizzle ORM

DATABASE SCHEMA (ERD)

users

id (PK)

email

full_name

role

institution_id

pantry_items

id (PK)

name

qty

category_id

expires_at

orders

id (PK)

student_id(FK)

status

pickup_time

order_items

id (PK)

order_id(FK)

item_id(FK)

qty

categories

id (PK)

name

stock_analysis

id (PK)

item_id(FK)

date

level



Role-Based Auth

Supabase JWT authentication enforces student, volunteer, and admin roles across all API routes via middleware.



Inventory Engine

CRUD operations with Drizzle ORM. Automatic low-stock (<10 units) and expiration (<7 days) alert generation.



Order System

Students place multi-item orders with pickup scheduling. Admins approve, fulfill, or reject with real-time status updates.



Analytics Dashboard

Aggregated stats including top-requested items, monthly distribution trends, and category breakdowns via REST API.



Multi-Institution

Each pantry is scoped to an institution. Role checks and data access are isolated per campus.

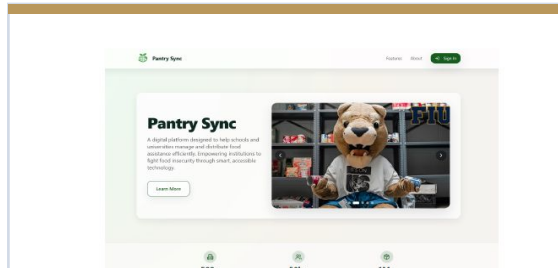


Open Food Facts API

Integrated barcode-based food lookup to accelerate inventory entry with automatic metadata population.

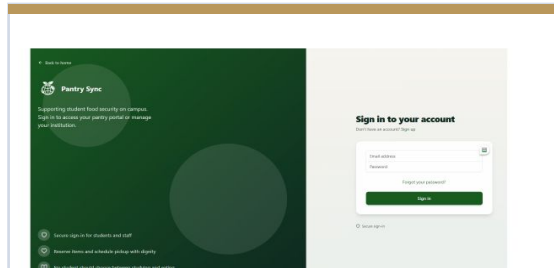
Demonstration Overview

07



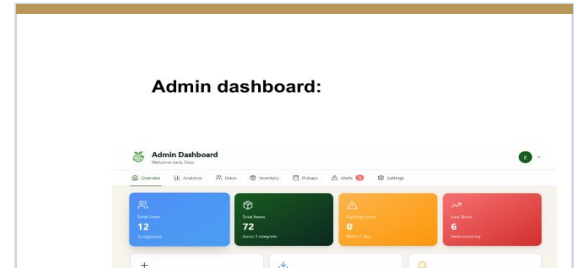
Landing Page

Public-facing homepage



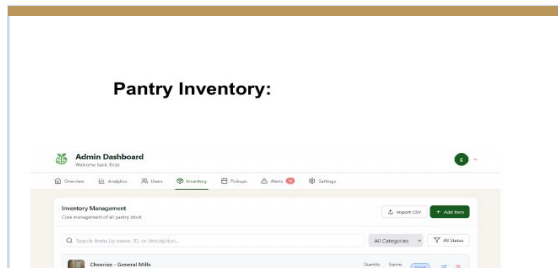
Login / Auth

Supabase JWT authentication



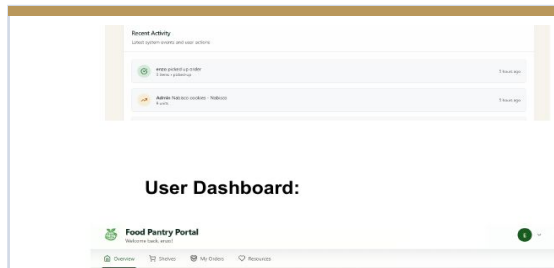
Admin Dashboard

Full control center



Inventory Manager

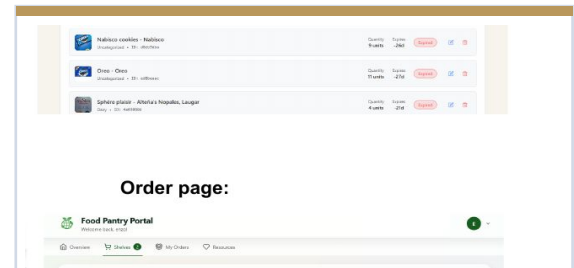
Real-time stock tracking



User Dashboard:

User Dashboard

Browse & order items



Order page:

Order management

Status & pickup tracking

[▶ Watch Full Demo Video](#)

The system was tested through manual end-to-end workflows:



*No automated testing framework
is currently implemented.*

TESTED END-TO-END WORKFLOWS		
1	User authentication	✓ PASS
2	Inventory management operations	✓ PASS
3	Order creation and tracking	✓ PASS
4	Pickup scheduling	✓ PASS
5	Role-based access validation	✓ PASS
6	Alerts and analytics features	✓ PASS

Auth Complexity

Integrating Supabase JWT tokens with our own Express middleware required careful token validation and CORS handling.

State Synchronisation

Keeping real-time inventory and order status in sync across user roles without websockets required careful polling.

Schema Evolution

Iterating on the database schema mid-development using Drizzle ORM meant coordinating migrations smoothly.

Team Coordination

Managing parallel feature branches across 5 developers required disciplined Git workflows and frequent testing.

Design Auth First

Establishing role-based access control architecture before building features saved significant refactoring time.

Test Early & Often

Catching schema mismatches and API contract issues early via manual end-to-end testing prevented late regressions.

Component Architecture

Building reusable React components with TypeScript interfaces from day one dramatically accelerated development.

Communication is Key

Daily standups and shared Notion boards kept all five team members aligned and unblocked throughout the sprint.





Engineering
& Computing

Knight Foundation School of Computer & Information Sciences

Spring 2026 Senior Design Project

Pantry Sync: A Campus Food Pantry Management System

Students: Enzo Gomes, Michael Lopez, Gabriela Hernandez, Aiden Beaton, Alexander Soto.

Mentor: Dr. Masoud Sadjadi

Instructor/Faculty: Dr. Masoud Sadjadi Florida International University



PROBLEM

Campus food pantries play an important role in supporting students experiencing food insecurity. However, many university pantries still rely on manual processes such as spreadsheets, paper records, and informal coordination to manage food inventory and distribution.

These methods create several operational challenges:

- Limited visibility into inventory levels
- Difficulty tracking expiration dates
- Inefficient coordination of food pickups
- Lack of operational analytics for planning and reporting
- Increased administrative workload for staff and volunteers

Without a structured digital system, pantry operations can become inefficient and prone to errors

CURRENT SYSTEM

Most campus food pantries operate using manual tracking systems or basic spreadsheets to manage food inventory and distribution.

Typical limitations include:

- Inventory quantities updated manually
- Limited visibility into low-stock or expiring items
- Walk-in based food requests with limited scheduling
- Minimal reporting on food distribution trends
- Difficult coordination between volunteers and administrators

These limitations make it difficult to efficiently distribute food resources and maintain operational transparency.

REQUIREMENTS

Pantry Sync was designed to support both students and pantry staff through a structured digital workflow.

Functional Requirements

- User authentication and role-based access
- Inventory tracking and item categorization
- Food ordering system for students
- Pickup scheduling and order status management
- Automated inventory alerts
- Analytics dashboard for pantry operations

Non-Functional Requirements

- Secure authentication and authorization
- Reliable data storage
- Scalable web-based architecture
- User-friendly interface for students and staff

Pantry Sync was designed to support both students and pantry staff through a structured digital workflow.

SYSTEM DESIGN



Pantry Sync follows a client-server architecture where the **React** frontend communicates with a **Node.js** Express REST API responsible for application logic.

The system then uses **Supabase** as the backend platform, providing a hosted **PostgreSQL** database for data storage and authentication services that issue secure **JWT** tokens used to access protected API routes.

OBJECT DESIGN

Pantry Sync uses a **relational database** model to organize pantry operations and maintain relationships between users, inventory, and food orders.

System Tables include:

- Users** - Stores user accounts including name, email, and system role
- Pantry Items** - Food inventory stored in the pantry
- Orders** - Represents food requests placed by user
- Order Items** - Links pantry items to orders allowing multiple item orders
- Categories** - Organizes pantry items into logical groups
- Stock Analysis** - Stores data related to inventory trends/Stock levels



IMPLEMENTATION

Pantry Sync uses a modern full-stack web development architecture design

Frontend

- React with TypeScript
- Vite build environment
- TailwindCSS for responsive UI design
- React Router for navigation

Backend

- Node.js with Express REST API
- Role-based access control
- API endpoints for inventory, orders, analytics, and users

Backend Platform (Supabase)

- Hosted PostgreSQL database
- Secure authentication services
- JWT-based access control

Provides dashboards and interfaces for students and pantry staff to interact with the system.

Handles logic, processes requests from the frontend and communication with the database.

Verifies authentication tokens before allowing access to protected resources.

VERIFICATION

The system was verified through end-to-end functional testing of critical application workflows.

Tested workflows include:

- User registration and login authentication.
- Role-based access control validation.
- Adding, updating, and removing pantry inventory items.
- Creating and managing food orders.
- Pickup scheduling and order status updates.
- Inventory alerts for low-stock or expiring items.
- Food bank API integrations for adding new items.
- User password reset.

SUMMARY

Pantry Sync provides a structured digital platform designed to improve the efficiency of campus food pantry operations.

It replaces manual tracking methods with a modern web application that supports:

- Real-time inventory management
- Structured food ordering and pickup coordination
- Role-based dashboards for students and staff
- Automated alerts for low-stock and expiring items
- Operational insights through analytics dashboards

By integrating inventory management, order processing, and reporting tools into a single platform, Pantry Sync enables campus food pantries to operate more efficiently while better supporting students experiencing food insecurity.

Future improvements may include expanded analytics capabilities, automated inventory forecasting, and support for multiple campus pantry locations.

REFERENCES

Supabase Documentation

<https://supabase.com/docs>

React Documentation

<https://react.dev/>

Node.js Express Framework

<https://expressjs.com/>

PostgreSQL Documentation

<https://www.postgresql.org/docs>

Open Food Facts API

<https://world.openfoodfacts.org/data>

JSON Web Token (JWT) Introduction

<https://jwt.io/introduction>



FLORIDA INTERNATIONAL UNIVERSITY

Thank You!

PantrySync — Empowering campus food pantries through smart, accessible technology.

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[Demo: youtube.com/watch?v=3ix-RIPvbm0](https://www.youtube.com/watch?v=3ix-RIPvbm0)