

Pantry Sync: A Campus Food Pantry Management System

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tailwindcss

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

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SYSTEM DESIGN

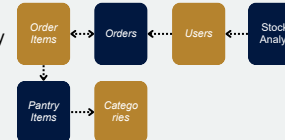


Pantry Sync follows a client-server architecture where the **React** frontend communicates with a **Node.js** Express REST API responsible for application logic.

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

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<https://jwt.io/introduction>