

# Capstone Project Proposal

Student Name: Brandon Mountan

Date: August 29, 2025

Project Title: RewardMountan: Multi-Tenant Business Rewards Platform

Duration: 3 Months

Advisor: Nabil Makarem

## Executive Summary

RewardMountan is a comprehensive Software-as-a-Service (SaaS) platform that enables businesses of all sizes to create and manage customer loyalty programs through user-friendly web and mobile applications. Similar to website builders like Squarespace and GoDaddy, RewardMountan provides businesses with customizable templates and intuitive tools to design their own branded rewards system without technical expertise. The platform features a dual-portal architecture serving both business administrators and end customers, with cross-platform compatibility through React web application and React Native mobile applications.

## Problem Statement

Small to medium-sized businesses struggle to implement effective customer loyalty programs due to high development costs, technical complexity, and lack of customization options in existing solutions. Businesses need an accessible, affordable solution that allows them to create branded, feature-rich loyalty programs that engage customers across both web and mobile platforms.

## Project Objectives

### Primary Objectives

1. Develop a multi-tenant SaaS platform for business rewards system creation and management
2. Create intuitive template-based system for non-technical business users
3. Build customer-facing web and mobile applications for rewards interaction
4. Implement comprehensive analytics and reporting dashboard for businesses
5. Design scalable architecture supporting multiple business types and reward structures

## Learning Objectives

1. Master multi-tenant application architecture and data isolation
2. Develop expertise in template engine implementation and dynamic UI generation
3. Gain experience with business analytics integration and data visualization
4. Understand SaaS business model implementation and customer onboarding flows
5. Learn DevOps practices for scalable application deployment

## Technical Architecture

### Technology Stack

- Frontend Web: React.js with JavaScript
- Mobile: React Native
- Backend: Node.js with Express.js
- Database: MongoDB with Mongoose ODM
- Authentication: JSON Web Tokens (JWT) with role-based access control
- Analytics: Python scikit learn
- Deployment: Docker containerization with potential cloud deployment

### System Architecture

The platform employs a multi-tenant architecture where each business operates as an isolated tenant with customized branding and functionality. The system consists of:

1. Business Administration Portal (React Web Application)
2. Customer-Facing Applications (React Web + React Native Mobile)
3. RESTful API Backend (Node.js/Express)
4. Multi-Tenant Database Layer (MongoDB)
5. Template Generation Engine
6. Analytics and Reporting Module

## Major Components and Functionality

### 1. Business Onboarding and Account Management

#### *Functionality:*

- Business registration and profile setup
- Subscription tier selection and billing integration
- Brand customization (colors, logos, themes)
- Business information and contact management
- Multi-user business account support with role permissions

#### *Technical Implementation:*

- Secure authentication system with password encryption
- Multi-tenant data isolation using tenant-specific collections
- File upload system for logos and brand assets
- Role-based access control for business team members

## 2. Template Selection and Customization System

#### *Functionality:*

- Gallery of pre-designed rewards program templates
- Visual template preview and selection interface
- Drag-and-drop customization tools
- Real-time preview of customer-facing applications
- Template deployment to customer applications

#### *Technical Implementation:*

- Dynamic template rendering engine
- Component-based template architecture
- Real-time preview using React portals
- Template versioning and rollback capabilities

## 3. Rewards Program Configuration Interface

#### *Functionality:*

- Flexible rewards structure definition (points-based, tier-based, referral programs)
- Custom reward creation and management
- Point value and redemption rule configuration
- Automated rewards triggers and conditions
- Campaign scheduling and expiration management

#### *Technical Implementation:*

- Rules engine for flexible reward logic
- Configurable point calculation algorithms
- Event-driven architecture for reward triggers
- Database schema supporting various reward types

## 4. Customer-Facing Web and Mobile Applications

#### *Functionality:*

- User registration and login
- List of “subscribed” businesses
- Point balance and transaction history

- Available rewards catalog and redemption
- QR code generation for in-store point collection
- Push notifications for rewards and promotions
- Social sharing features for referral programs

#### *Technical Implementation:*

- React Native for cross-platform mobile development
- Shared component library between web and mobile
- Real-time synchronization of user data
- QR code generation and scanning functionality
- Push notification integration

## 5. Analytics and Reporting Dashboard

#### *Functionality:*

- Customer engagement metrics and trends
- Rewards program performance analysis
- Customer acquisition and retention reports
- Revenue impact measurement
- Exportable reports and data visualization

#### *Technical Implementation:*

- Use what was learned in CS6017 Data Analytics and Visualization
- Python program with scikit learn

## 6. Administration and Support Tools

#### *Functionality:*

- Business support ticket system
- Usage monitoring and quota management
- Platform-wide analytics for business intelligence
- Automated backup and recovery systems

## Project Scope and Deliverables

### Minimum Viable Product (MVP) – 3 Month Timeline

1. Business Portal – Complete account management and rewards configuration
2. Customer Web Application – Fully functional rewards interaction interface
3. Customer Mobile Application – React Native app with core functionality
4. Basic Analytics Dashboard – Key metrics and reporting features
5. Template System – at least 3-5 customizable templates

## 6. Documentation – Technical documentation and user guides

### *Stretch Goals*

1. Advanced drag-and-drop template builder
2. Real-time chat support system
3. Advanced analytics with predictive modeling
4. Third-party integration (Shopify, etc.)
5. Live deployment with cloud hosting

## Conclusion

RewardMountan combines technical complexity with real-world business viability. It addresses a genuine market need while providing extensive learning opportunities in modern web development, mobile development, multi-tenant architecture, and SaaS business models. The ambitious scope reflects both the technical skills developed throughout the program and the entrepreneurial vision for creating a viable business solution.