# Bee Balanced Software Design Document Version 1.0



# **Team Members:**

Meaghan Freund Patricia Madrid Javier Arribas Gonzales Gannon Rowlan

> Mentor: Scott LaRocca

# **Table of Contents**

I Introduction	3
2 Implementation Overview	4
2.1 Solution Vision for Bee Balanced	4
2.2 Architectural Approach and Technology	4
3 Architectural Overview	5
3.1 Architecture Diagram	6
3.2 Component Responsibilities	6
3.3 Communication & Control Flows	7
4 Module and Interface Descriptions	7
4.1 Frontend	7
4.2 Backend	8
4.3 Database	9
4.4 Notifications	9
4.5 API Integration	.10
5 Implementation Plan	.11
5 Conclusion	.12

#### **1** Introduction

Many adolescents today are currently facing challenges when it comes to staying healthy and balancing their lives. Today, with more kids not meeting their daily recommended physical activity, dealing with mental health issues, and struggling to make real social connections, it's important to find a solution. That's where Bee Balanced comes in. This project is a fun and easy-to-use web application that is aimed at helping young people improve their physical, mental, and social health. This project will blend many technologies with behavioral science and linguistic data provided by our client to create a personal lifestyle coach that meets the unique needs of each user.

The Bee Balanced app allows users to track their habits, get personalized advice, and set realistic health goals. Key features include health assessments, progress tracking, and feedback that helps users make real improvements over time. The app is designed to keep users engaged with a helpful user interface, email reminders, and game-like features to encourage regular use. Our main aim is to create a tool that is not only useful but also helps users build healthy habits for the long term.

To make sure the app works well for everyone, we focused on creating a platform that is easy to use, safe, and accessible. Teens will be able to create accounts, enter their health information, monitor their habits, and receive helpful tips. On top of this, several gamification features such as badges, mini-games, and a rewards system will be implemented. The system needs to perform well even with many users at once and should work smoothly on both computers and mobile devices. Protecting users' health data is going to be a top priority for us due to its sensitive nature.

This document provides the software design guidelines for Bee Balanced, converting its features and performance needs into a framework that can actually be implemented. We've considered certain environmental factors, such as using Technologies like React.js, MySQL, and Node.js, which has influenced our design decisions. This approach ensures the system can grow, be easily maintained, and remain relevant for the future. By outlining a clear plan for the development process, this document aims to make sure the final product effectively meets its goals.

The Bee Balanced project is important and exciting, offering a real solution to a significant problem. By helping teenagers take charge of their health in an easy and enjoyable way, this project could lead to lasting positive changes in their lives and communities.

# 2 Implementation Overview

#### 2.1 Solution Vision for Bee Balanced

Bee Balanced is envisioned as a user-friendly application that empowers users to adapt healthier, more balanced lifestyles through personalized tracking, insights, and supportive tools. The platform integrates various wellness aspects, such as nutrition, exercise, and mentality, into a cohesive community. By offering real-time data visualization, tailored recommendations, and community engagement features, Bee Balanced addresses the growing demand for a holistic wellness platform that adapts to individual needs.

#### 2.2 Architectural Approach and Technology

To bring Bee Balanced vision to life, a modular and scalable architecture will be implemented in which high performance and maintainability is prioritized. Below is an outline of the selected approach and technologies:

#### 2.2.1 Core Architectural Pattern

- Bee Balanced will utilize a modular system where key features, such as user data management, wellness insights, and notifications, operated as loosely coupled modules.
- A producer-consumer model will manage tasks the most effectively, such as:
  - Producers: Capturing user input and wellness data through intuitive user interfaces.
  - Consumers: Processing input data to provide insights, set reminders, or track progress.

#### 2.2.2 Frontend Framework

- Bee Balanced will utilize React.js as it provides a dynamic and responsive interface. It encourages the reuse of components, reducing development overhead.
- Contribution: Enables an intuitive and engaging user experience including interactive dashboards, personalized visualizations, and fluid navigation.

#### 2.2.3 Backend Framework

- Bee Balanced will utilize Node.js as it efficiently handles asynchronous operations, making it ideal for real-time user interactions. It supports building scalable backend logic for managing wellness data processing and API communication.
- Contribution: Acts as the backbone for handling business logic, storing and retrieving data, and facilitating smooth communication between the frontend and the server.

#### 2.2.4 Data Storage and Management

- Bee Balanced will implement a tailored approach to managing user data, prioritizing efficiency, security, and scalability.
- Structured and unstructured data will be stored and processed using a flexible, in-house solution rather than relying on third-party databases.
- Contribution: Ensures complete control over data handling processes aligning with the platform's privacy and security principles.

#### 2.2.5 Infrastructure

• Bee Balanced will have a dedicated system that will handle user notifications, reminders, and background tasks efficiently.

This implementation plan elevates technologies and design principles to ensure Bee Balanced delivers an impactful, scalable, and user-centric experience. By maintaining control over all critical components and avoiding reliance on third-party, the application upholds its commitment to privacy and adaptability while creating a healthy community.

# **3** Architectural Overview

The Bee Balanced platform is designed in a way that makes it easy to use and flexible as it grows. It has three main parts: the front end (made with HTML and CSS), the back end (using Node.js with Express), and the database that stores all the information (using SQL and AWS). This setup keeps things organized, makes it easier to update, and helps the system handle more users without any problems.

#### 3.1 Architecture Diagram



#### 3.2 Component Responsibilities

#### 3.2.1 Frontend (HTML and CSS)

- Creates a simple and easy-to-use interface.
- Lets users log in, track habits, set goals, and see progress.
- Make sure the website looks good on all devices.
- Talks to the backend to get and send data.

#### 3.2.2 Backend (Node.js, Express.js)

- Manages user accounts (sign-up, login, passwords).
- Handles requests from the frontend and updates the database.
- Runs the main features like tracking health, setting goals, and giving feedback.

#### 3.2.3 Database (SQL, AWS)

- Stores structured data for users, goals, progress, and feedback.
- Manages relational data for user habits, achievements, and reminders.

#### 3.2.4 Notification Service (Knock API)

- Sends reminders to complete the survey every three days.
- Utilizes email to send notifications.
- Ensures scheduled and event-triggered notifications.

#### 3.2.5 External API Integration

- Interfaces with health-related APIs.
- Fetches relevant wellness content for educational purposes.
- Provides external sources for validating feedback and goals.

#### **3.3 Communication & Control Flows**

- User Requests: The frontend asks the backend for things like logging in, tracking health, and updating goals.
- **Data Processing:** The backend checks the request, does any needed calculations, and updates the database.
- **Response Handling:** The backend sends info back to the frontend, which updates what the user sees.
- Notification Workflow: The backend sends reminders and updates based on user activity and set schedules.
- **External API Interactions:** The backend pulls in extra health data from other services when needed.

## 4 Module and Interface Description

#### 4.1 Frontend

The Frontend Module is responsible for providing a dynamic, interactive, and user-friendly interface that allows users to log in, set health goals, track habits, and view progress through visual elements such as charts and progress bars. This module ensures accessibility across various devices by adopting a responsive design. Additionally, the frontend manages user input validation and communicates with the backend through API calls to fetch and update data.



It includes core components such as the User Interface, which displays forms and dashboards; FormHandler, which validates user input; and APIConnector, responsible for handling data communication with the backend. Public functions include Login(), which authenticates users, GetUserProgress(), which retrieves progress data, and SubmitSurvey(), which submits personalized survey responses.

#### 4.2 Backend

The Backend Module, built using Node.js and Express.js, processes requests from the frontend, handles business logic, and interacts with the database. This module manages critical operations such as user authentication, goal tracking, and progress updates. It uses asynchronous operations to efficiently handle concurrent user requests and integrates with external services for retrieving wellness data.

The core components include Routes, which define API endpoints, Controllers to execute business logic, Middleware for security and validation, and DatabaseHandler to manage data transactions. Key API endpoints include POST /login to authenticate users, GET /progress to retrieve progress data, and PUT /goals to update user goals.



#### 4.3 Database

The Database Module is designed to store structured data, including user accounts, health goals, daily habits, and achievements. This module ensures data integrity, security, and scalability, using SQL and AWS infrastructure to handle large datasets.



The database schema includes tables such as Users, which stores account details; Habits, which tracks user activities; Goals, which manages progress objectives; and Achievements, which logs rewards earned through gamification features. The module's public operations include InsertUser(), which adds new users, GetUserProgress(), which fetches user progress data, and UpdateGoal(), which modifies user goals.

#### 4.4 Notifications

The Notification Service Module, integrated through the Knock API, handles automated reminders and notifications to keep users engaged. Notifications can be scheduled regularly (e.g., weekly progress updates) or triggered by specific events, such as goal completion.



The module comprises components like Scheduler, which manages notification timing, EmailSender, which handles message delivery, and ReminderManager, which tracks notification events. The public interface provides endpoints such as POST /notify, to schedule notifications, and GET /notify/status, to check their delivery status.

#### 4.5 API Integration

External API Integration Module connects the Bee Balanced system to third-party services to enrich the user experience with validated wellness content and resources.



This module handles data retrieval and validation through components like ExternalAPIConnector, which interfaces with external services, and DataParser, which processes and formats the retrieved information. Public functions include GET /external-data, which fetches wellness information, POST /validate-feedback, which submits user feedback for validation, and GET /health-articles, which retrieves relevant health content for users.

These modules work cohesively to provide a scalable, secure, and user-centric application, ensuring that Bee Balanced effectively meets its goal of promoting healthier lifestyles through technology and behavioral science.

# **5** Implementation Plan



The above figure is the Gantt chart for the course of the Bee Balanced project, with the dotted line representing the current day. The beginning stages of setting up the website basics have been implemented, with setting up the user account sign-up features and a database for storing the user data. The next phases have been started but not yet completed, starting with allowing users to fill their account information.

First, the team will work on the "Set User Information" phase, incorporating the ability for users to specify their name, age, gender, and their health focus for a personalized web application. Next, we will work to complete the "Survey System" step, which will update the survey system with the official survey questions implemented, given by Dr. Okim Kang. Parallel to the survey system, the team will conduct some research to go towards the "Healthy Habits Research" stage, consisting of gathering information for users to provide advice to improve upon their health. This will contribute to the "Progress/Feedback System" phase, which will give the system for user feedback on how to build on healthy habits and enhance their way of living. The feedback system will offer research and articles that cater to the user's specific attributes, such as their age and gender. Also in parallel with the progress system, the "Gamification" step will be addressed, in which game features will be in development as positive progress will trigger rewards points and badges. The team will spend extra time on these features as we would like to implement a virtual pet and will need to conduct the proper practice to do so. The notifications for the "User

Notifications" step are not expected to take up as much time as the other features, as this characteristic of the project has been tested on a small scale. Throughout the entirety of development, the design for the "User-Friendly Design" phase of the website will be worked on and adjusted accordingly to ensure the website works on any device. For the final stages of the project, the website will go through the "Testing" period for accuracy and performance to be approved for release.

## **6** Conclusion

Bee Balanced is a carefully designed and innovative platform that empowers adolescents to take control of their physical, mental, and social well-being. By integrating personalized health tracking, gamification features, and real-time insights, the application provides a user-friendly engaging experience that encourages long-term habit formation.

The architecture of the framework ensures scalability and security with a modular design that supports seamless data management, interactive frontend elements, and robust backend processing. By leveraging technologies such as React.js, Node.js, and AWS, Bee Balanced is built to deliver a high-performance and accessible solution for all users.

With a structured implementation plan, the project is on track to meet its objectives by gradually developing core features, refining user interactions, and enhancing engagement through research-driven feedback mechanisms. By prioritizing user privacy and accessibility, Bee Balanced is positioned to make a meaningful impact on youth health to foster positive lifestyle changes that extend beyond the digital space into real-life wellness improvements.

By successfully executing this vision, Bee Balanced has the potential to serve as a transformative tool for young individuals seeking balance in their lives, ultimately contributing to healthier communities and a brighter future.