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| Marwadi University | **Marwadi University**<br>**Faculty of Technology**<br>**Department of Information and Communication Technology** | |
| **Subject:Capstone Project** | **System Design and Architecture - Intermediate Review** | |
| | **Date: 21.09.25** | **Enrolment No:92200133041 & 92200133043** |

**Project Title:** Welth- AI-Powered Finance Management Platform

## System Design and Architecture

## Introduction

The "Wealth" platform is a modular, AI-powered personal finance management system designed to automate expense tracking, budget planning, and provide AI-generated financial insights for students, young professionals, and small business owners in India. The system leverages modern web technologies, AI/ML algorithms, and OCR-based receipt scanning to enhance usability, efficiency, and security. The system design focuses on modularity, scalability, and maintainability, ensuring smooth operation even as the user base or data grows.

## Modular Design

The system is divided into the following modules:

### 1. Front-End Module

- Built using **ReactJS** for responsive UI components and smooth animations.
- Responsible for user interactions, dashboards, charts, budget visualisations, and forms.

### 2. Back-End Module

- Built with **Node.js** and **Express.js**.
- Handles authentication, API requests, business logic, recurring transactions, notifications, and integration with AI services.

### 3. Database Module

- **MongoDB** is used as a NoSQL database for flexible storage of accounts, transactions, budgets, and user profiles.
- Supports high-volume data storage, indexing, and query optimisation for fast retrieval.

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| Layer | Technology | Justification |
|---|---|---|
| Front-End | React.js, HTML, CSS | Builds dynamic UI, responsive, modern web experience |
| Back-End | Node.js, Express.js | Handles APIs, server logic, and communication between UI & database |
| Database | MongoDB (NoSQL) | Scalable, flexible schema for storing financial records & user data |
| AI/ML Module | Python, OCR (Tesseract) | Automates data extraction and financial insights |
| Notification Module | Email (SMTP / Nodemailer) | Sends alerts, reminders, and system notifications |
| Hosting | Vercel (Front-End), MongoDB Atlas (DB) | Free-tier deployment, easy scaling, reliable hosting |

## 4. AI & ML Module

- **Python-based machine learning algorithms** categorise transactions and generate personalised insights.
- **OCR (Tesseract)** reads receipts and auto-fills transaction data, reducing manual entry.

## Justification of Modularity:

- Each module is independent, allowing easy updates or replacements without affecting other modules.
- Improves maintainability: UI changes won't affect AI/ML logic.
- Extensible for future features like mobile apps, third-party integrations, or new analytics modules.

## Technology Stack

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## Rationale:

- All technologies are open-source or free for student deployment.
- Chosen for compatibility, ease of integration, and scalability potential.
- Industry-relevant stack ensures applicability for future career and maintenance.

## Scalability Plan

**Objective:** Ensure the system can handle increased users, data, and transactions efficiently.

## 1. Horizontal Scaling:

- Front-end hosted on CDN-backed platforms like Vercel/Netlify for global distribution.
- Node.js back-end can be deployed across multiple instances with load balancing.

## 2. Database Scalability:

- MongoDB supports sharding for distributed storage across servers.
- Indexing ensures fast queries even with large datasets.

## 3. AI/ML Scaling:

- ML computations run asynchronously or in batch processing for multiple users.
- Future cloud-based GPU/TPU support can accelerate ML inference.

## 4. Caching & Performance:

- Frequently accessed data (like dashboards or recurring transactions) can be cached using Redis or in-memory storage.
- Reduces load on the database and improves response time.

## 5. Bottleneck Management:

**Database:** Sharding and indexing.
**Back-End API:** Load balancers and rate-limiting.
**AI Processing:** Asynchronous task queues (e.g., Celery, RabbitMQ).

## Cost & Reliability:

- Free-tier cloud services keep costs minimal.
- Modular deployment ensures one component's failure doesn't crash the system.
- Easy to extend for premium hosting or GPU acceleration in the future.

## Conclusion

The "Wealth" system's architecture is designed to be modular, scalable, and robust. Each component is clearly defined and integrates seamlessly to provide an efficient AI-powered finance platform. The chosen technology stack ensures fast development, high performance, and easy future expansion. The modular approach enhances maintainability, security, and reliability, positioning the platform for long-term adoption and success in the Indian market.