High Level Design Document

Introduction

This High Level Design (HLD) document outlines the architecture and core components for **AdWise - AI Digital Marketing Campaign Builder**. AdWise is a platform leveraging generative AI to design, optimize, and analyze digital marketing campaigns across multiple channels, supporting collaborative editing, secure user management, and exportable reports.

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1. System Architecture Overview

Architecture Description:
AdWise follows a modular, service-oriented architecture with a React-based frontend, Node.js backend, AI service integration, and MongoDB for data storage. The system supports secure user management, campaign collaboration, and analytics.

Module	Role
Frontend (React)	User interface, campaign creation, collaboration, report export
Backend (Node.js)	API gateway, business logic, authentication, orchestration
AI Service Layer	Generative AI for ad copy, visuals, and campaign optimization
Database (MongoDB)	Persistent storage for users, campaigns, assets, analytics
Auth Service	Secure user authentication and authorization
Analytics Engine	Aggregates and analyzes campaign performance data
Export Service	Generates and exports campaign reports

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2. Component Interactions

Sequence Step	Interaction Description
1	User interacts with Frontend to create/edit campaigns
2	Frontend sends requests to Backend API
3	Backend authenticates user via Auth Service
4	Backend invokes AI Service Layer for content generation/optimization
5	Backend stores/retrieves campaign data in MongoDB
6	Analytics Engine processes campaign data and provides insights to Backend/Frontend
7	Export Service generates downloadable reports on request

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3. Data Flow Overview

Data Flow	Source	Destination	Purpose
User Actions	Frontend	Backend	Campaign creation, editing, collaboration
AI Content Requests	Backend	AI Service	Generate ad copy, visuals, optimizations
Campaign Data Storage	Backend	MongoDB	Persist campaigns, assets, analytics
Analytics Data	MongoDB	Analytics	Aggregate and analyze campaign performance
Report Generation	Backend	Export Service	Create/export campaign reports

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4. Technology Stack

Layer/Component	Technology/Framework
Frontend	React, Redux, Material UI
Backend	Node.js, Express
Database	MongoDB
AI Service Layer	OpenAI API / Custom Models
Authentication	JWT, OAuth2
Analytics	Node.js, Aggregation Pipelines
Deployment	Docker, Kubernetes (optional)
CI/CD	GitHub Actions, Docker Hub

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5. Scalability & Reliability

- **Scalability:**
  - Stateless backend enables horizontal scaling.
  - MongoDB supports sharding for large data volumes.
  - AI service calls can be queued and processed asynchronously.
- **Reliability & Security:**
  - JWT/OAuth2 for secure authentication and role-based access.
  - Data validation and input sanitization at API layer.
  - Regular backups and monitoring for database and services.
  - HTTPS enforced for all client-server communication.

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