This document outlines the detailed understanding of the project requirements, the underlying assumptions considered during planning, a high-level overview of the proposed solution, and a justification for the resources selected and utilized. The purpose of this documentation is to ensure alignment among all stakeholders, provide transparency into the design and execution strategy, and support informed decision-making throughout the project lifecycle.

**Requirement Understanding:**

The project requires building a modular backend using Node.js microservices to ensure scalability and independent service management. The solution must be deployed on GCP using Kubernetes for orchestration, scaling, and high availability. Key expectations include RESTful APIs, cloud-native design.

**Assumptions**

It is assumed that the DB creation and record insertions need to be done manually.

Security measures like authentication, authorization, and encryption are currently out of scope for this phase and will be addressed later.

Integration with third-party services is assumed to be stable and accessible during runtime.

**Solution Overview**

The proposed solution follows a Node.js microservices architecture deployed on Google Cloud Platform (GCP) using Kubernetes (GKE) for container orchestration. There is one microservice is packaged as a Docker container(pushed to docker hub) and exposed via RESTful APIs, enabling modular, scalable, and independently deployable components. Kubernetes handles auto-scaling, and load balancing.

**Justification for the Resources Utilized**

Node.js was chosen for its non-blocking, event-driven architecture, which is well-suited for building lightweight, high-performance microservices with fast I/O operations.

Docker enables consistent packaging and environment parity across development, testing, and production, simplifying deployment and rollback strategies.

Google Kubernetes Engine (GKE) provides robust orchestration, auto-scaling, and self-healing capabilities, reducing operational overhead while ensuring high availability and resiliency.

GCP was selected for its managed services, scalability, integrated security, and ease of CI/CD integration, accelerating development and ensuring operational efficiency.