Process Manager - High Level Design Document

1. Overview

Purpose & Objectives

- **zona_process_manager** orchestrates and manages the lifecycle of microservices and integrations in the Securaa platform.
- Automates deployment, scaling, and health management of services using Docker and MongoDB.
- Dynamically configures integrations for multi-tenant environments.

Architecture Pattern

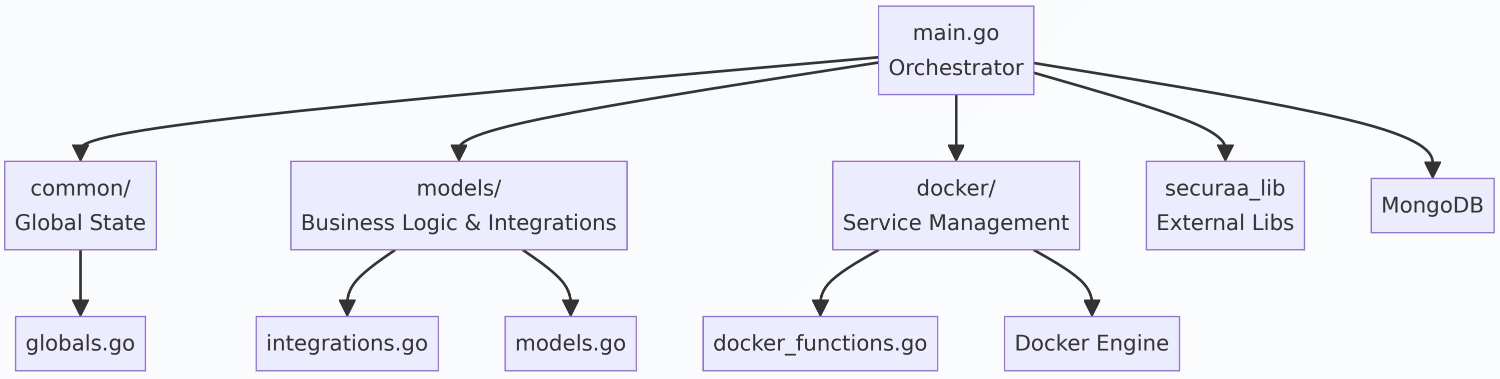
- **Layered Modular Architecture**
- Separation of concerns: main orchestration, configuration/state, service management, integration logic.
- Microservices managed as Docker containers.

Technology Stack

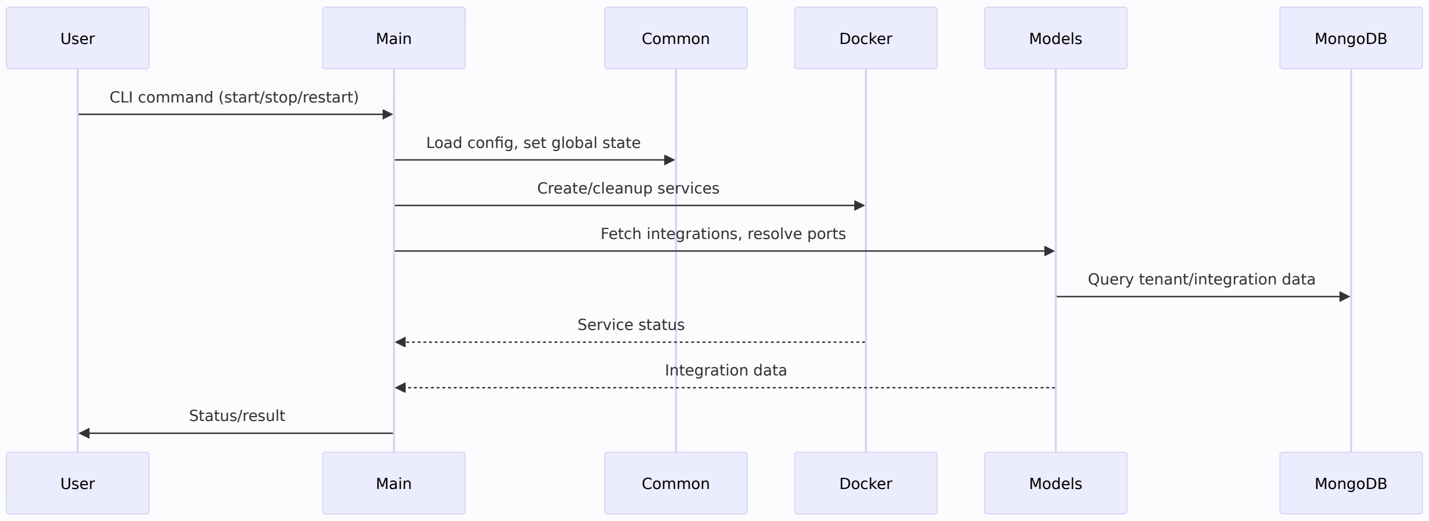
- **Language:** Go
- **Containerization:** Docker
- **Database:** MongoDB
- **Logging/Config:** securaa_lib (shared library)
- **Other:** Makefile for build/run automation

2. System Architecture

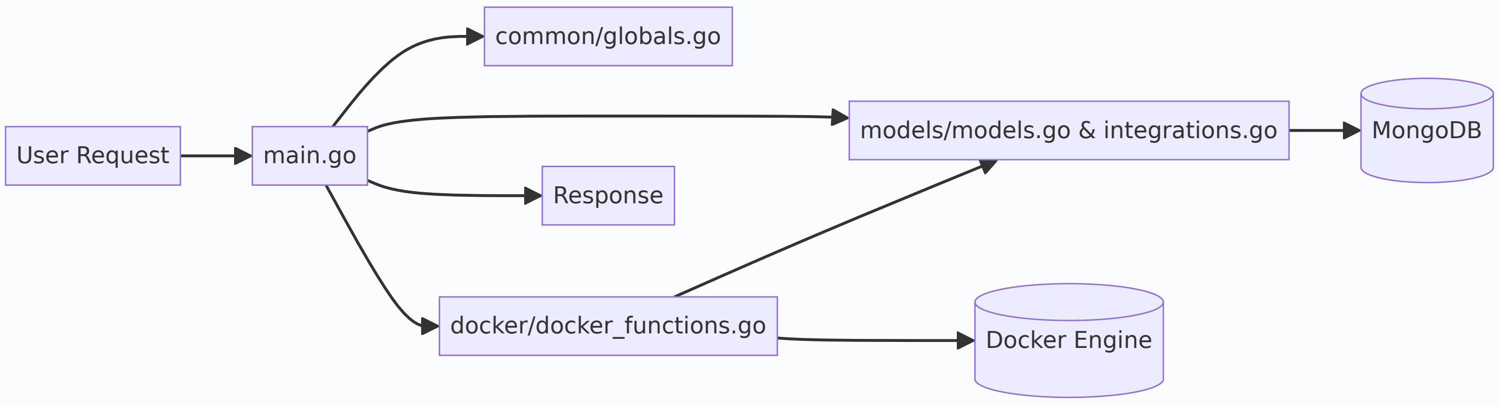
2.1 High-Level Architecture



2.2 Component Interaction Diagram


User
Main
Common
Docker
Models
MongoDB
CLI command (start/stop/restart)
Load config, set global state
Create/cleanup services
Fetch integrations, resolve ports
Query tenant/integration data
Service status
Integration data
Status/result

2.3 Data Flow Diagram



3. Component Analysis

Major Modules/Components

main.go (Orchestrator)

- **Purpose:** Entry point, parses commands, coordinates deployment, restart, and cleanup.
- **Responsibilities:**
  - Loads configuration
  - Initializes global state
  - Orchestrates Docker and integration logic
  - Handles patch-based restarts

common/ (Global State & Utilities)

- **Purpose:** Shared state, configuration, and utility functions.
- **Responsibilities:**
  - Holds service maps (system, core, batch, app)
  - Manages DB sessions and integration lists
  - Provides server role detection and feature toggles

docker/ (Service Management)

- **Purpose:** Docker orchestration and lifecycle management.
- **Responsibilities:**
  - Initializes service contexts
  - Verifies/creates Docker volumes
  - Creates/updates Docker services and replicas
  - Manages Zookeeper/Kafka for event streaming

models/ (Business Logic & Integrations)

- **Purpose:** Data models and integration logic.
- **Responsibilities:**
  - Defines tenant, integration, and session structures
  - Fetches active integrations per tenant
  - Resolves ports and parameters for services

Inter-Component Relationships

- `main.go` coordinates all modules
- `common/` provides shared state to all
- `docker/` and `models/` interact via service contexts and integration data
- All modules use shared config and session objects

4. External Integrations

Third-Party Services & APIs

- **Docker Engine:** Container orchestration
- **MongoDB:** Tenant/integration data storage
- **securaa_lib:** Logging, config, Docker, MongoDB, utilities

Database Systems

- **MongoDB:** Used for storing tenant, integration, and system data

External Dependencies

- **Go Modules:** Dependency management
- **Makefile:** Build/run automation

5. High-Level Data Flow

User Request Processing Flow

1. User issues a CLI command (`start`, `stop`, `restart`).
2. `main.go` parses the command and loads configuration.
3. Global state is initialized in `common/`.
4. Docker services are created/cleaned up via `docker/`.
5. Integrations are fetched and configured via `models/`.
6. MongoDB is queried for tenant/integration data.
7. Services are deployed as Docker containers.
8. Status/result is returned to the user.

Business Logic Execution Flow

- Integrations are dynamically resolved per tenant.
- Service contexts are updated based on integration and config data.
- Docker services are orchestrated for each required component.

Response Generation Flow

- Service status and integration results are aggregated in `main.go`.
- Final status/result is output to the user (CLI or API).

Summary

This HLD provides a comprehensive overview of the zona_process_manager system, its architecture, major components, external integrations, and high-level data flows. The modular, layered design enables extensibility and robust orchestration of microservices and integrations in a multi-tenant environment.