

# Sampath — Module Documentation

## 1. System Overview

RapidRide simulates a real ride-hailing ecosystem with distributed design.

Core objectives include:

- Stable real-time communication
- Predictable scaling behavior
- Modular subsystem separation

### <b>System Highlights</b>

- Distributed Services
- Scalable Data Flow
- Event-driven Coordination

## 2. Functional Architecture

Each module works semi-independently but maintains clear interaction boundaries.

Major functional flows:

- Ride request & validation
- Driver availability broadcast
- ETA calculation & ML inference

### <b>Core Flows</b>

- Request Intake
- Service Coordination
- Result Dispatch

## 3. Technical Stack Breakdown

A combination of modern technologies ensures responsiveness:

- Node.js for backend orchestration
- FastAPI for ML-heavy tasks
- Redis for in-memory caching
- ElasticSearch for analytics

### <b>Tech Purpose</b>

- Orchestration Layer
- ML Processing

- State Caching
- Log & Search Engine

## Role Responsibilities

This member is responsible for:

- WS routing
- Driver presence tracking
- Redis channel updates
- Event broadcasting

### <b>Sampath Overview</b>

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## 4. Integration Flow

Interaction order between major modules:

- Frontend → Backend (API request)
- Backend → FastAPI (ML/ETA)
- Backend → Redis (State lookup)
- Backend → ES (Trip logs)

### <b>Sequential Flow</b>

- Input ← User
- Processing → Backend
- Decision → Matching
- Output → Notifications

## 5. Future Scope

Possible long-term improvements:

- Heatmap-based driver analysis
- Predictive surge pricing
- Log-based behavioral ML models

### <b>Roadmap Ideas</b>

- Analytics Dashboards
- Distributed caching clusters
- Auto-scaling observability