📊 Project Report: Application Monitoring Dashboards

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1 - Project Overview

This project implements a **Log Analytics Platform** that collects, processes, and visualizes log data in real-time. It is built using a **microservices architecture** and includes the following core components:

- 🌐 **REST API Server** (Node.js)
- 🔄 **Apache Kafka** for message brokering
- 🗄️ **PostgreSQL** for data storage
- 📈 **Grafana** for visualization and monitoring

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2 - System Architecture

The system follows a **distributed architecture**, composed of the following layers:

- 🧩 **API Layer** – Handles all HTTP requests and responses
- 📬 **Message Queue** – Uses Kafka for log ingestion and asynchronous processing
- 🗃️ **Database** – PostgreSQL is used for persistent and structured storage
- 👁️ **Visualization** – Grafana dashboards provide real-time insights

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3 - API Endpoints Implementation

System Overview Our monitoring system provides 5 core endpoints focused on application performance testing and health monitoring:

1. Basic Testing

Test Endpoint GET /api/test

- **Purpose: Basic API health verification**
- **Response: { "message": "Test endpoint successful" }**
- **Status: 200 OK**

2. Error Simulation

Error Endpoint

GET /api/error

- **Purpose: Simulates error scenarios**
- **Response: { "error": "Simulated error" }**
- **Status: 500 Internal Server Error**

3. Performance Testing

Delay Endpoint

GET /api/delay

- **Purpose: Tests latency handling**
- **Response: { "message": "Delayed response (X ms)" }**
- **Delay Range: 100-1100ms**
- **Status: 200 OK**

4. Reliability Testing   Unreliable Endpoint

GET /api/unreliable

- **Purpose: Tests service reliability**
- **Success (70%): { "message": "Service is working" }**
- **Failure (30%):**

{ "error": "Service temporarily unavailable" }

- **Error Status: 503 Service Unavailable**

5. Health Monitoring

Health Check

GET /health

- **Purpose: System health verification**
- **Response: { "status": "healthy" }**
- **Status: 200 OK**

6. Error Handling

All undefined routes return:

{ "error": "Not found" }

Status: 404 Not Found

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4 – Procedure

- **API requests come in through different endpoints (/api/test, /api/error, etc.)**
- **Each request is processed and logged via Kafka producer**

- **Logs are sent to specific Kafka topics based on endpoint**
- **Kafka consumer processes messages and stores them in PostgreSQL tables**
- **Grafana dashboards query PostgreSQL to display metrics**
- **Run python load_test.py from the scripts directory**
- **Generates simulated traffic to various endpoints**
- **Creates a mix of successful and error responses**
- **Uses multiple concurrent workers to simulate real-world load**

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4 - Technical Features

📡 Monitoring Capabilities

- Real-time log collection
- Performance metric tracking
- Error detection and visualization

🧪 Load Testing Support

- Pre-built load testing scripts in Python
- Simulates **concurrent requests**
- Captures benchmarking results

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5 - Deployment and Operations

The system is **Docker-based** and can be easily deployed using docker-compose.

- 🔌 Default Ports:
  - API: 8080
  - Grafana: 3000
  - Kafka: 9092
- 🔐 Default Credentials for Grafana:
  - Username: admin
  - Password: admin

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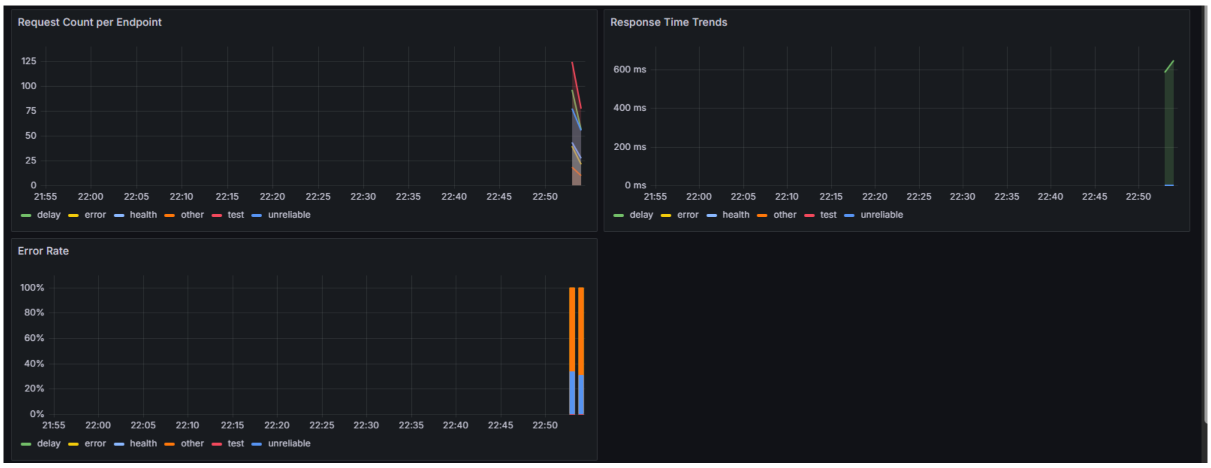
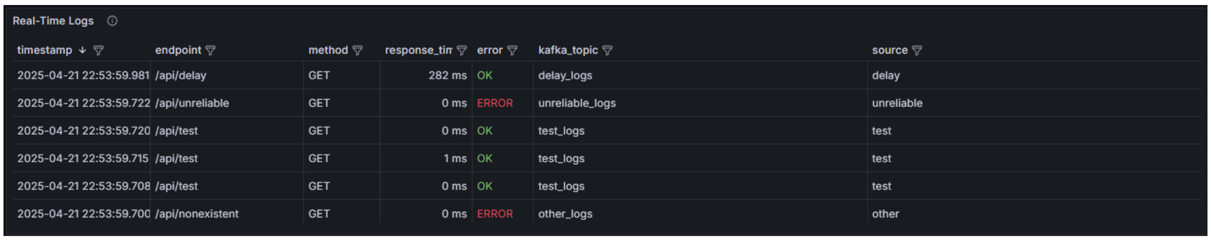
6 - Monitoring Dashboard Features

The **Grafana dashboards** offer powerful real-time visualizations including:

- 📈 Request count per endpoint
- ⏱️ Response time trends
- ❌ Error counts per endpoint



- 🪵 Live log stream and log-based alerts



Real-Time Logs

timestamp	endpoint	method	response_tir	error	kafka_topic	source
2025-04-21 22:53:59.981	/api/delay	GET	282 ms	OK	delay_logs	delay
2025-04-21 22:53:59.722	/api/unreliable	GET	0 ms	ERROR	unreliable_logs	unreliable
2025-04-21 22:53:59.720	/api/test	GET	0 ms	OK	test_logs	test
2025-04-21 22:53:59.715	/api/test	GET	1 ms	OK	test_logs	test
2025-04-21 22:53:59.708	/api/test	GET	0 ms	OK	test_logs	test
2025-04-21 22:53:59.700	/api/nonexistent	GET	0 ms	ERROR	other_logs	other

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7 - System Requirements

To deploy and run this system, the following tools and resources are required:

- ✅ Docker & Docker Compose
- ✅ Node.js
- ✅ Python (for test automation)
- ✅ Adequate system memory & CPU for container orchestration

✅ Conclusion

- This project delivers a scalable, fault-tolerant **log monitoring solution** for managing and visualizing the operations of a 3D printing platform. With structured **API endpoints**, a robust backend, and **Grafana-powered dashboards**, it enables comprehensive **real-time monitoring** of distributed systems.

CODE - https://github.com/Mdr-Pranav/ApplicationMonitoringDashboards

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