Observability Project Report

Introduction

The Observability Project demonstrates the integration of monitoring, logging, and tracing tools within a containerized environment. By combining Prometheus, Grafana, Jaeger, Loki, and Promtail, the system enables real-time visibility of metrics, logs, and traces for a Node.js application deployed with Docker Compose.

Abstract

This project focuses on building a complete observability stack. The main objective was to monitor application health, visualize metrics, analyze logs, and trace distributed requests. The system collects data from a Node.js demo app, exports traces using OpenTelemetry, and integrates with Grafana for centralized dashboards.

Tools Used

- **Docker & Docker Compose**: Containerization and orchestration of services. - **Prometheus**: Metrics collection and monitoring. - **Grafana**: Visualization and dashboard creation. - **Jaeger**: Distributed tracing. - **Loki & Promtail**: Centralized logging solution. - **Node.js (Express)**: Demo application with OpenTelemetry integration.

Steps Involved in Building the Project

1. **Set up Node.js Application** with Express and OpenTelemetry for tracing and metrics. 2. **Created Dockerfiles and Docker Compose** to containerize the app and observability tools. 3. **Configured Prometheus** to scrape application metrics. 4. **Connected Grafana** to Prometheus, Loki, and Jaeger as data sources. 5. **Imported Dashboards** into Grafana for metrics visualization. 6. **Set up Loki and Promtail** to collect and visualize container logs. 7. **Verified Jaeger Traces** by generating requests and analyzing request flows. 8. **Tested the complete stack** ensuring observability across metrics, logs, and traces.

Conclusion

The Observability Project successfully integrates monitoring, logging, and tracing into a unified environment. This enables developers and operators to gain insights into system performance, detect issues quickly, and analyze root causes effectively. The project demonstrates the practical implementation of DevOps and SRE practices in real-world systems.