Altimetrik

OBSERVABILITY AS A SERVICE (OaaS)

Author:
Chaman Lal Kumar
Manoranjan Behera
Sachin Pandurang Patil

Architect:
Ganapathy Santhanam

WHITEPAPER

Table of Contents

Executive Summary

In today's complex and dynamic IT environment, observability is crucial for detecting and resolving issues promptly, providing real-time application insights, and offering end-to-end performance analytics. Organizations encounter challenges such as inadequate observability, inefficient debugging processes, limited request tracing capabilities, and disjointed metrics and logs.

This whitepaper explores the critical necessity of enhancing system observability through the implementation of an Observability as a Service (OaaS) framework. By utilizing various open-source tools such as OpenTelemetry (OTEL), the Prometheus Stack for metrics, the Grafana Stack for log monitoring, and Jaeger for request tracing in public cloud environments, the proposed architecture aims to deliver comprehensive visibility into system performance. This approach enables proactive issue detection, efficient debugging, and enhances overall system reliability.

Introduction

Observability is crucial in modern systems, offering developers and operators vital insights into applications and infrastructure. It facilitates issue detection, troubleshooting, and performance optimization. Without adequate observability, organizations running applications risk inefficiencies and increased downtime, harming performance and reliability. Limited insights into application performance exacerbate troubleshooting challenges.

The implementation aims to streamline the setup and configuration of an Observability as a Service solution, facilitating seamless client onboarding to the platform. It includes automated instrumentation of application and infrastructure data, covering metrics, traces, and logs.

Key features include:

SRE Golden Signals Dashboard: Traffic, Latency, Error Rate, Saturation.

Industry Trends

The trend towards automation tools for observability is rapidly gaining momentum in the industry. As IT environments grow increasingly complex, the demand for comprehensive observability has become critical.

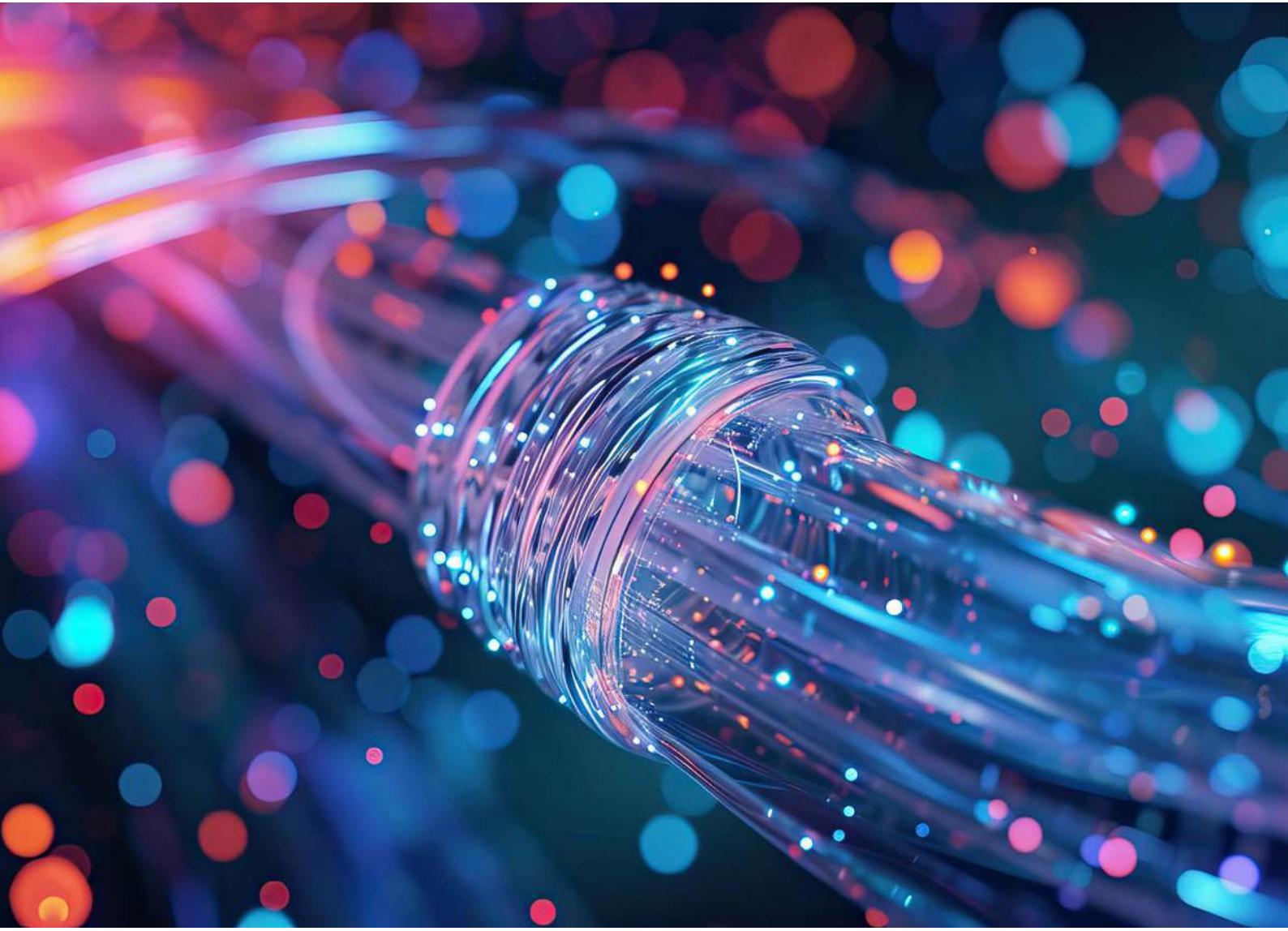
Without comprehensive observability, diagnosing and resolving performance issues becomes a complex and time-consuming task. Failure to detect and address issues in real-time can result in frequent and prolonged downtime. Existing monitoring solutions often fail to provide a holistic view of the system, hampering quick issue detection and resolution. Troubleshooting and debugging distributed systems are challenging due to the lack of end-to-end visibility into transactions and interactions between micro-services. Metrics and logs are typically managed separately, leading to a fragmented approach to observability and hindering correlation for effective analysis. The absence of request tracing makes it difficult to understand the flow of requests across micro-services, impacting the ability to identify performance bottlenecks and optimize system efficiency.

Our proposed solution distinguishes itself from industry standards by seamlessly integrating with client product architectures. Offering plug-and-play functionality, our solution enables real-time generation of logs, traces, and metrics with minimal effort. This allows companies to gain valuable insights into their products' performance without requiring extensive modifications or disruptions to existing systems.

Objectives

The primary goal of this white paper is to tackle challenges via the following initiatives:

- Establishing a Centralized Observability Platform: This involves creating a centralized platform that aggregates metrics, traces, logs, and request traces, offering a unified view of system performance.
- Real-time Metrics Monitoring with Prometheus: Implementing the Prometheus Stack for real-time metrics monitoring enables the prompt identification of performance anomalies.
- Distributed Tracing with OpenTelemetry: Integrating OpenTelemetry to capture end-to-end traces across microservices enhances debugging efficiency and issue resolution.
- Centralized Log Management with Grafana Loki Stack: Utilizing the Grafana Stack for centralized log management enables cohesive log analysis and exploration for organizations.
- Request Tracing with Jaeger: Implementing Jaeger to trace requests across microservices facilitates understanding of request flow and optimization of system performance.



Advantages of Observability as a Service

- **Proactive Issue Detection:** The integrated solution enables proactive issue detection by continuously monitoring metrics, alerts, distributed traces, and request traces in real-time.
- **Efficient Debugging with Traces:** OpenTelemetry's distributed tracing capabilities provide comprehensive visibility into transactions, significantly reducing the time and effort required for debugging and issue resolution.
- **Unified Observability:** The solution delivers a unified observability experience by consolidating metrics, traces, logs, and request traces within a centralized platform. This integration facilitates effective correlation and provides comprehensive insights into system behavior.
- **Streamlined Operations:** Centralized log management, real-time metrics monitoring, and request tracing streamline operations, simplifying the identification, troubleshooting, and resolution of issues for teams.
- **Improved System Reliability:** Enhanced observability, including robust request tracing capabilities, enables proactive issue resolution, thereby enhancing system reliability and overall user experience.

Implementation of Observability as a Service

The goal is to provide a platform which integrates seamlessly with client product architecture and empower users with minimum effort to monitor, visualize and analyze the performance and behavior of their applications.

Below outline steps to setup OaaS

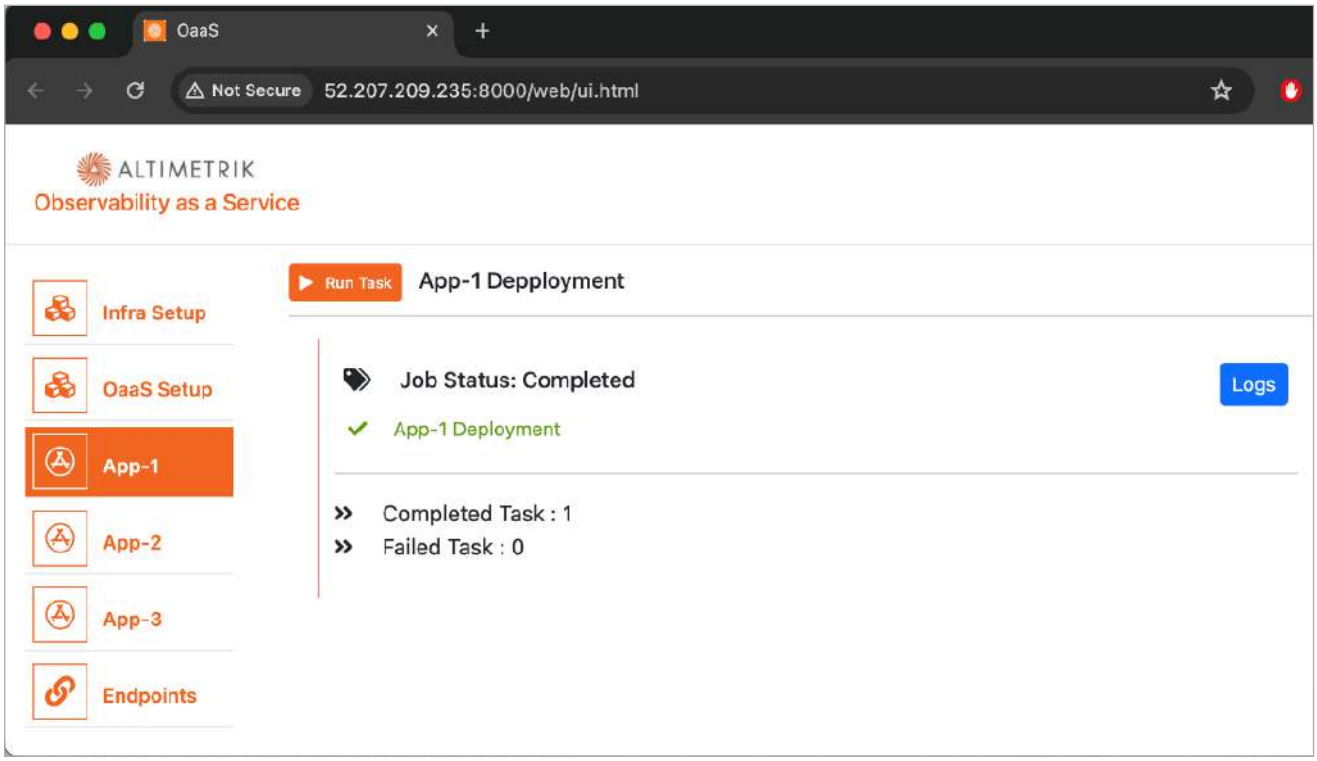
Implementing Observability as a Service with Open-source software (OSS) that includes OTEL, Prometheus Stack for Metrics, Grafana Loki for Log Monitoring, and Request Tracing with Jaeger.

Infrastructure Setup

- Set up the Kubernetes cluster in the cloud. This could be on AWS cloud or any cloud provider of choice.
- Use Terraform for infrastructure as code to automate the setup and management of your cloud resources.

CI/CD Pipeline (OnClick)

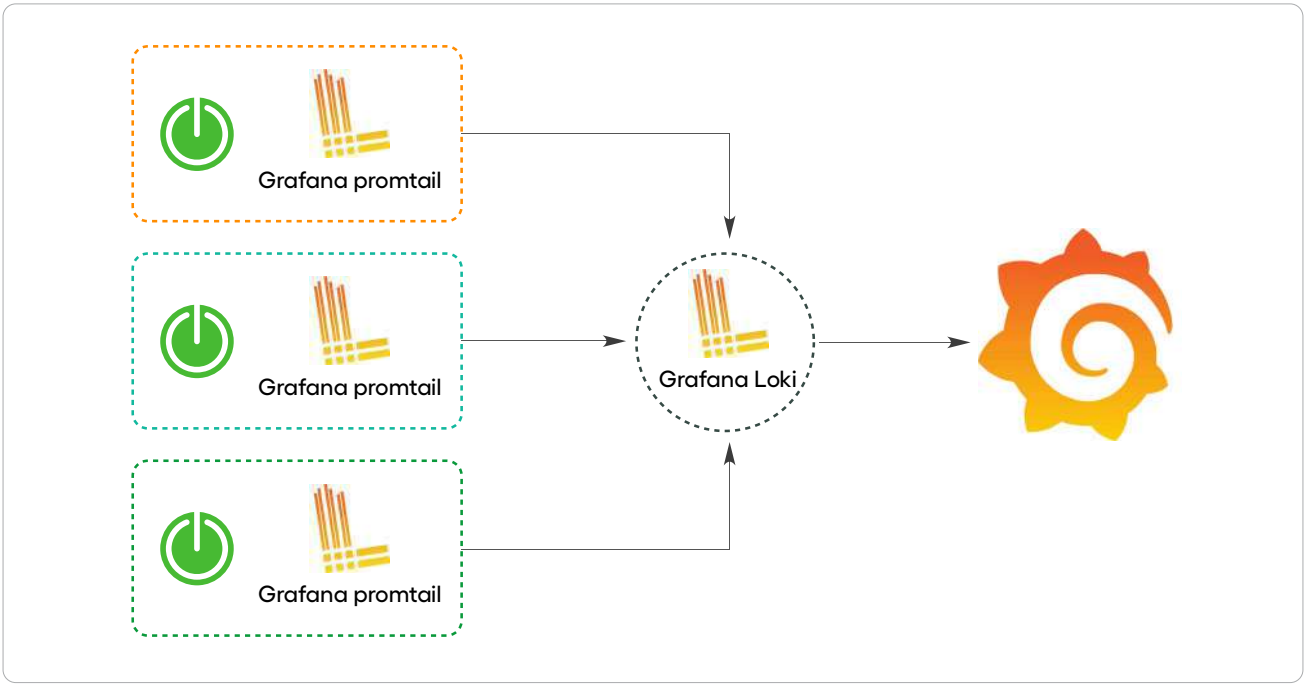
- Implement a CI/CD pipeline for deploying your applications onto the Kubernetes cluster.



Prometheus Stack

- Install and configure Prometheus in your K8s cluster for metrics collection.

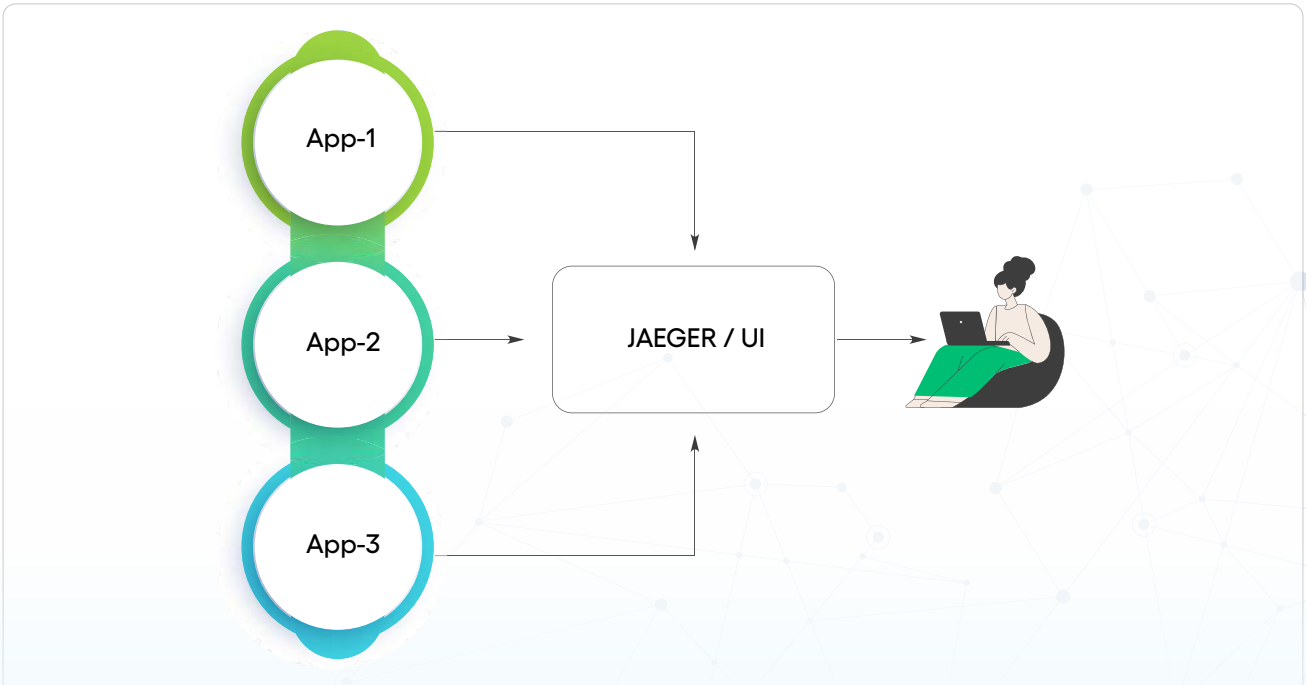
Grafana, Loki and Promtail



- Set up Promtail and Loki for centralized logging.
- Configure your applications to send logs via promtail.
- Set up Grafana for visualizing the metrics collected by Prometheus.
- Set up Grafana for expose Logs from the application.

Jaeger

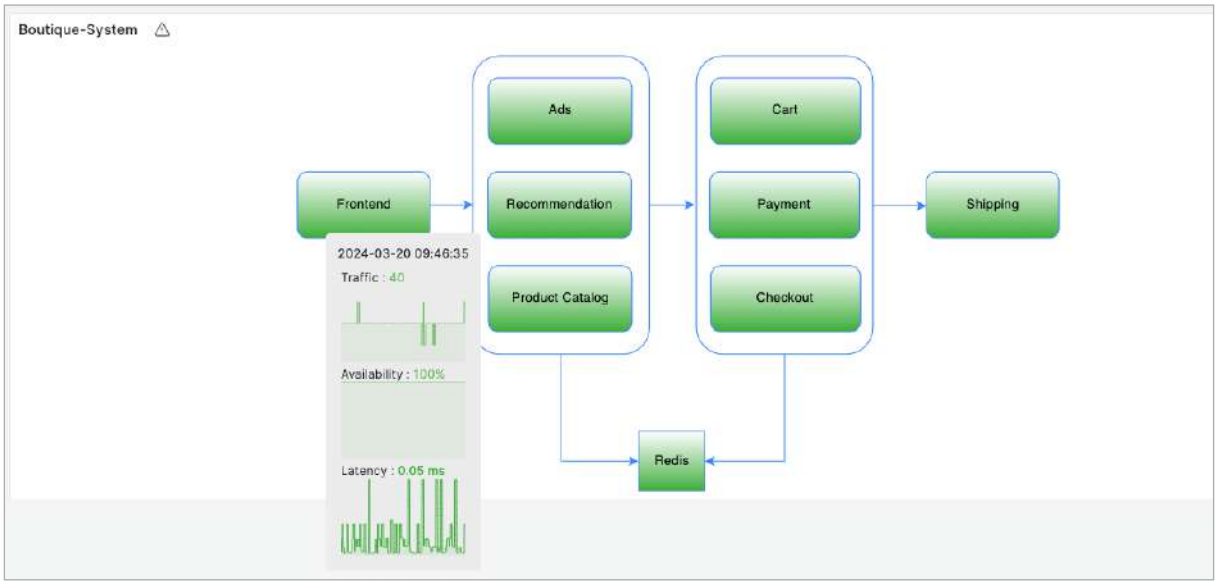
- Install and configure Jaeger for distributed tracing. This will help you trace requests as they travel across various microservices in your application.



Alerting

- Set up alerting based on the metrics collected. Prometheus Alertmanager can be used for managing alerts.

Application Monitoring Dashboard



Benefits of Observability as a Service

- This streamlined integration not only saves significant time, reducing implementation periods by up to 50%, but also delivers cost savings of approximately 30% compared to traditional integration methods.
- Enhanced system reliability through proactive issue detection.
- Improved troubleshooting and debugging with end-to-end tracing nd request tracing.
- Centralized monitoring, logging, and request tracing contribute to streamlined operations.

Conclusion

This proposal outlines a comprehensive Observability as a Service setup using OTEL, Prometheus, Grafana Stack, and Jaeger. Implementing this architecture will offer real-time visibility into system metrics, distributed traces, request traces, and centralized log management, thereby enhancing the system's reliability and performance.

About Altimetrik

Altimetrik is a pure-play digital business services company. We focus on delivering business outcomes with an agile, product-oriented approach. Our digital business methodology provides a blueprint to manage data as well as develop, scale, and launch new products to market faster. Our team of 6,000+ practitioners with software, data, cloud engineering skills help create a culture of innovation and agility that optimizes team performance, modernizes technology, and builds new business models. As a strategic partner and catalyst, Altimetrik quickly delivers results without disruption to the business.