Infra Monitoring

Team Rocket

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Problem Statement

BACKGROUND

In modern cloud environments, monitoring and observability are crucial for keeping applications running smoothly. In this hackathon, your challenge is to create a basic cloud monitoring tool. It will collect, process, and display logs and metrics from a Kubernetes cluster (control plane as well as pods).

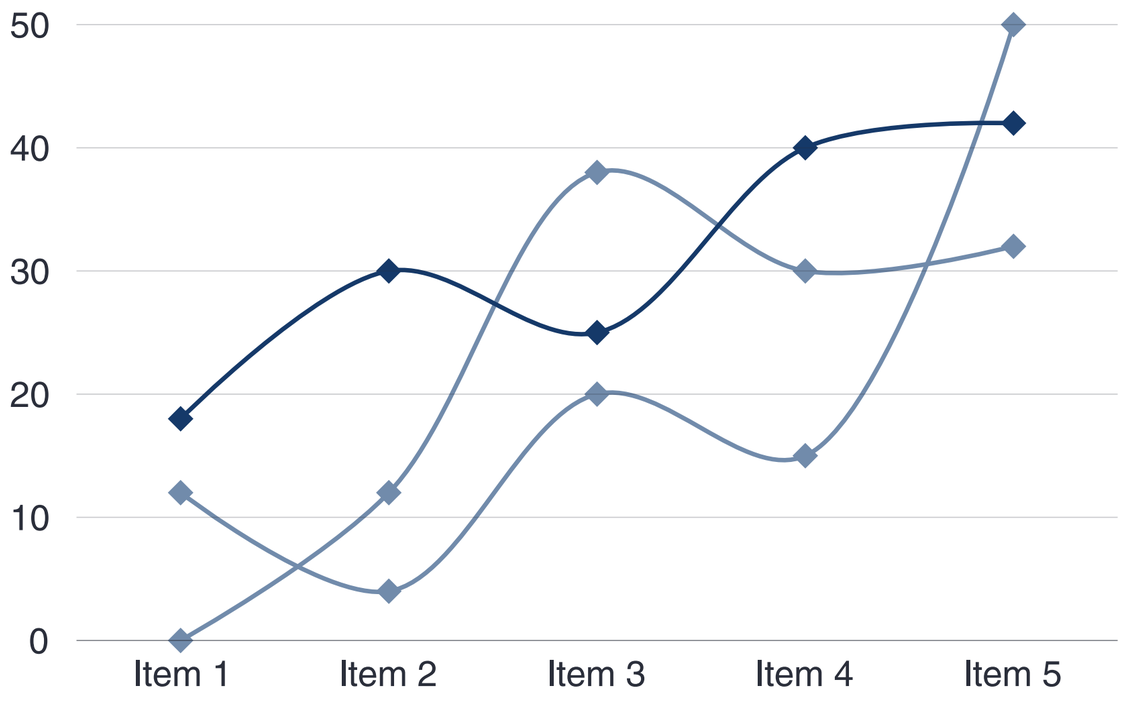
CHALLENGE

You will set up a Kubernetes cluster (using MiniKube) with two applications, a PostgreSQL and a MySQL database, running on your local machine. Your task is to build a monitoring solution that collects logs from the applications running in the Minikube cluster, authenticates them, stores them in a time series database, and visualizes them in a custom dashboard.

Logging Importance in Infrastructure

- Logging is essential for **maintaining the health and stability of any infrastructure**, especially in cloud-native or containerized environments where microservices are common.
- **Troubleshooting & Debugging**: When something goes wrong (e.g., an application crash), logs provide the necessary information to debug and trace issues back to the root cause.
- **Auditing & Compliance**: Logs are crucial for security and compliance, helping organizations track actions, detect anomalies, and maintain audit trails.

Observability vs. Monitoring:



MONITORING:

- It is the collection of predefined metrics (like CPU usage, memory consumption, and error rates) to track system health and ensure the infrastructure is working as expected.
- Monitoring tools can raise alerts when thresholds are crossed, indicating issues that need attention.

OBSERVABILITY:

- A broader concept that goes beyond monitoring. It focuses on the ability to infer the internal state of the system based on external outputs (logs, metrics, traces).
- While monitoring answers "what is happening?", observability answers "why is it happening?"

Observability Frameworks

Fluent Bit

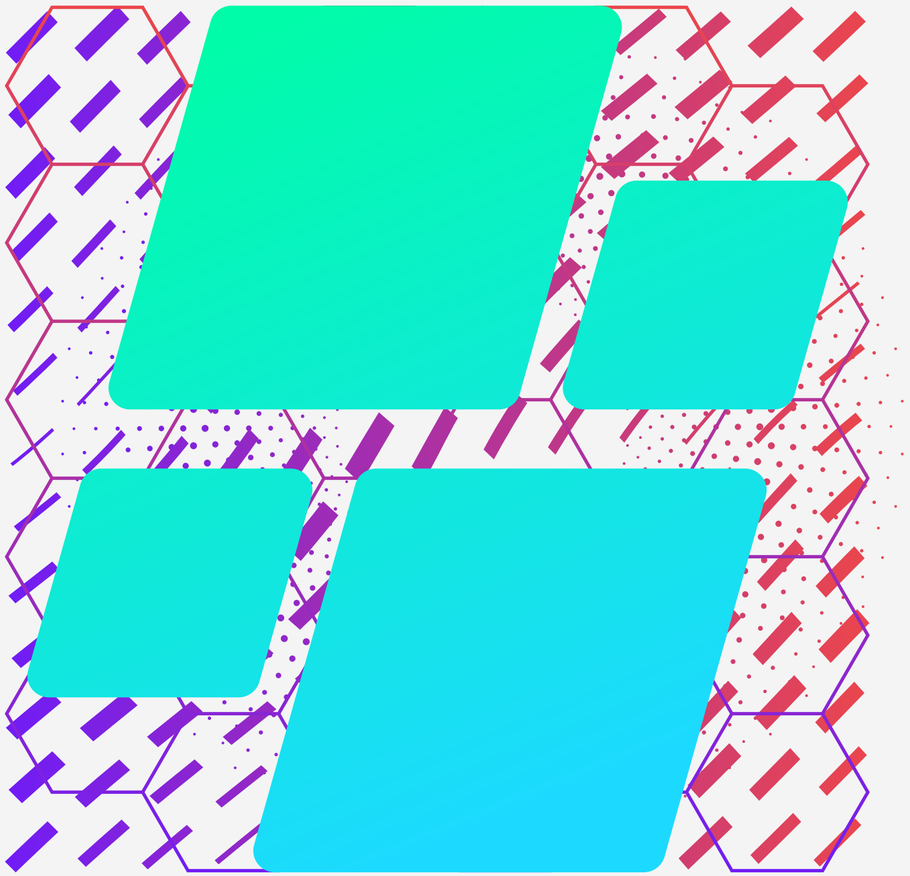
Loki

Prometheus

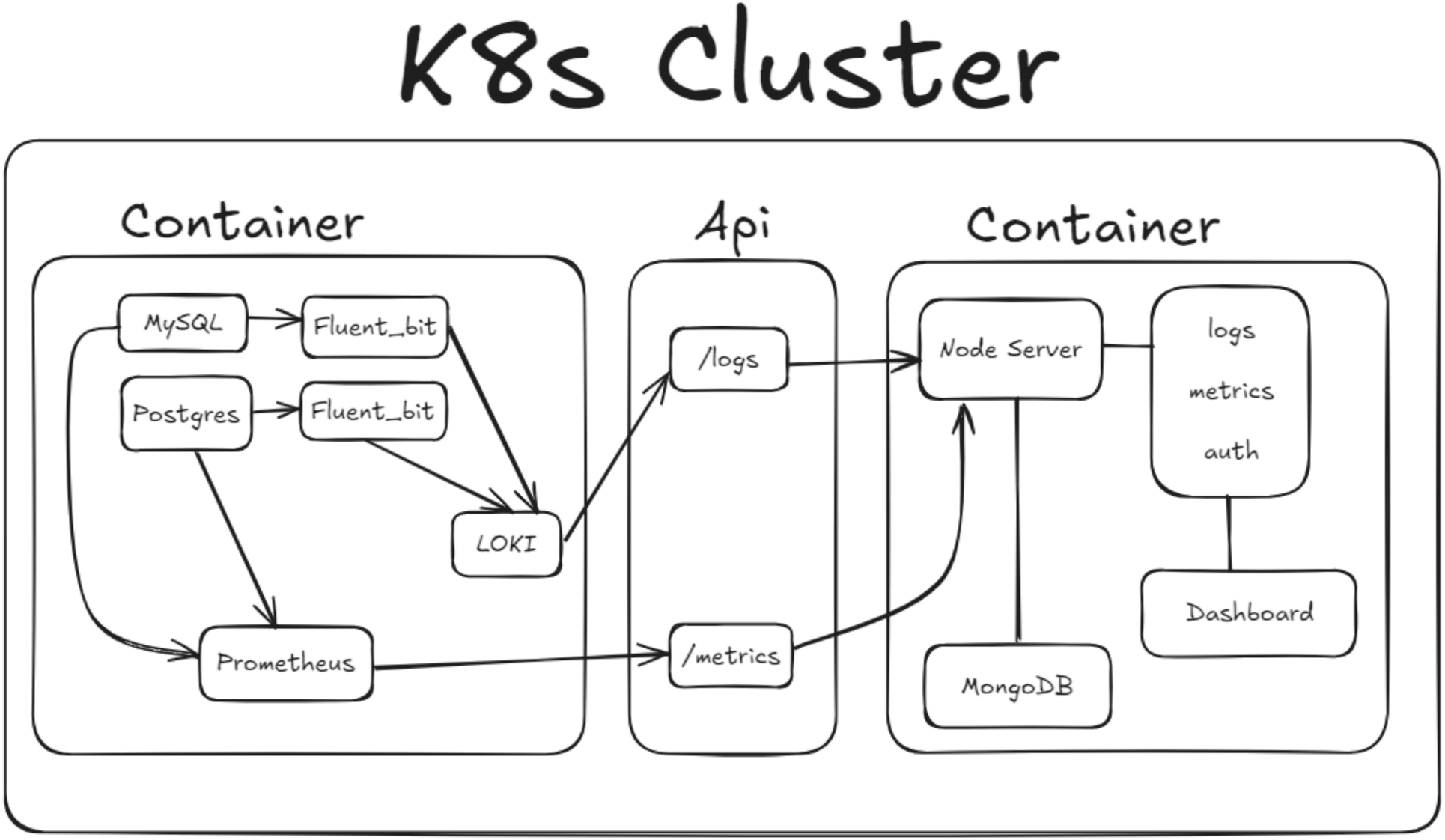
DataDog

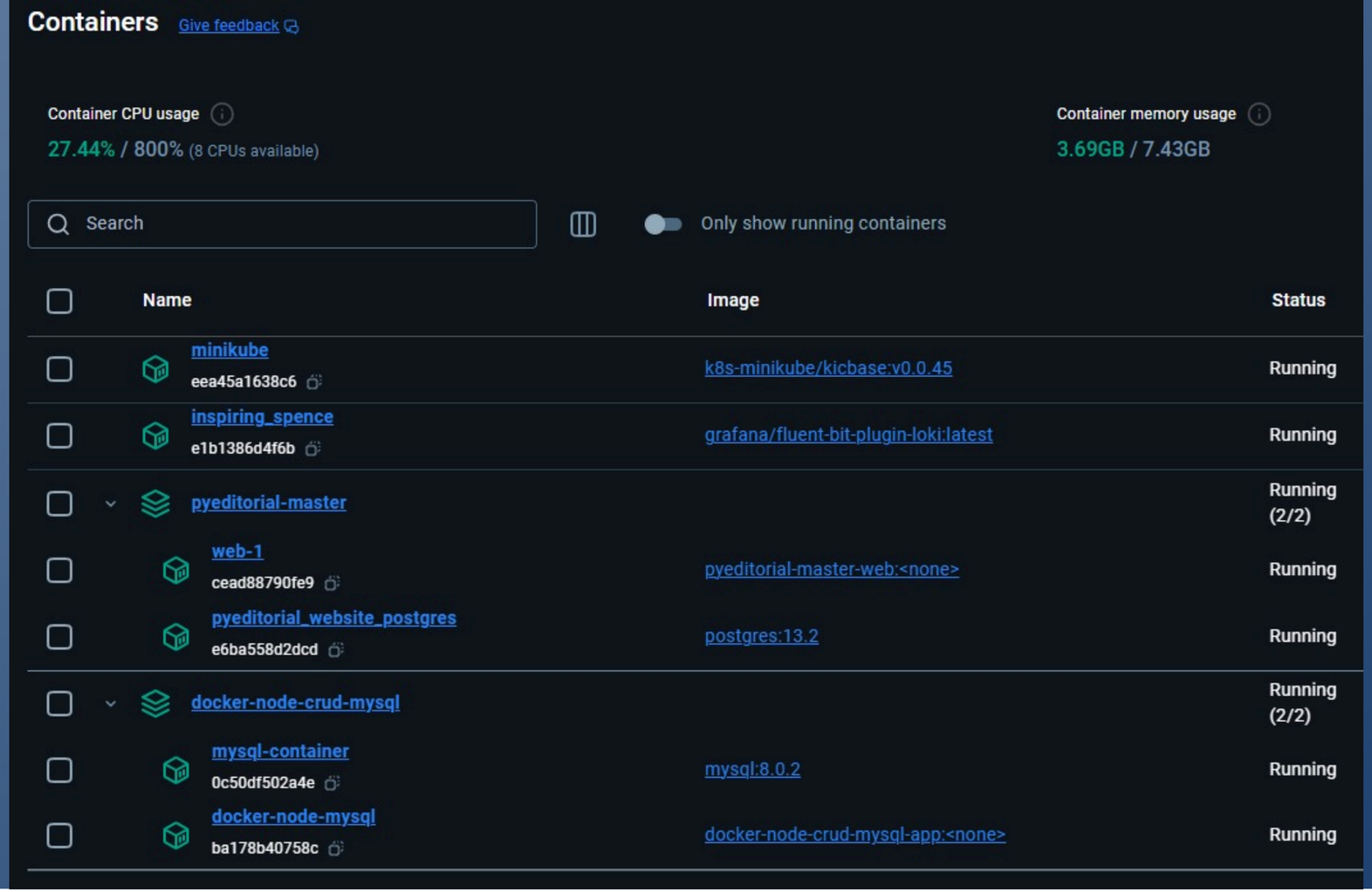
Implementation

- Used Fluent Bit for Logging
- Used Prometheus for Metric Collection
- Used Loki for Time Series data storage
- Integrated with MySQL and PostgreSQL servers running on Kubernetes Clusters
- Backend Service in Node.js and Custom Dashboard in React.js

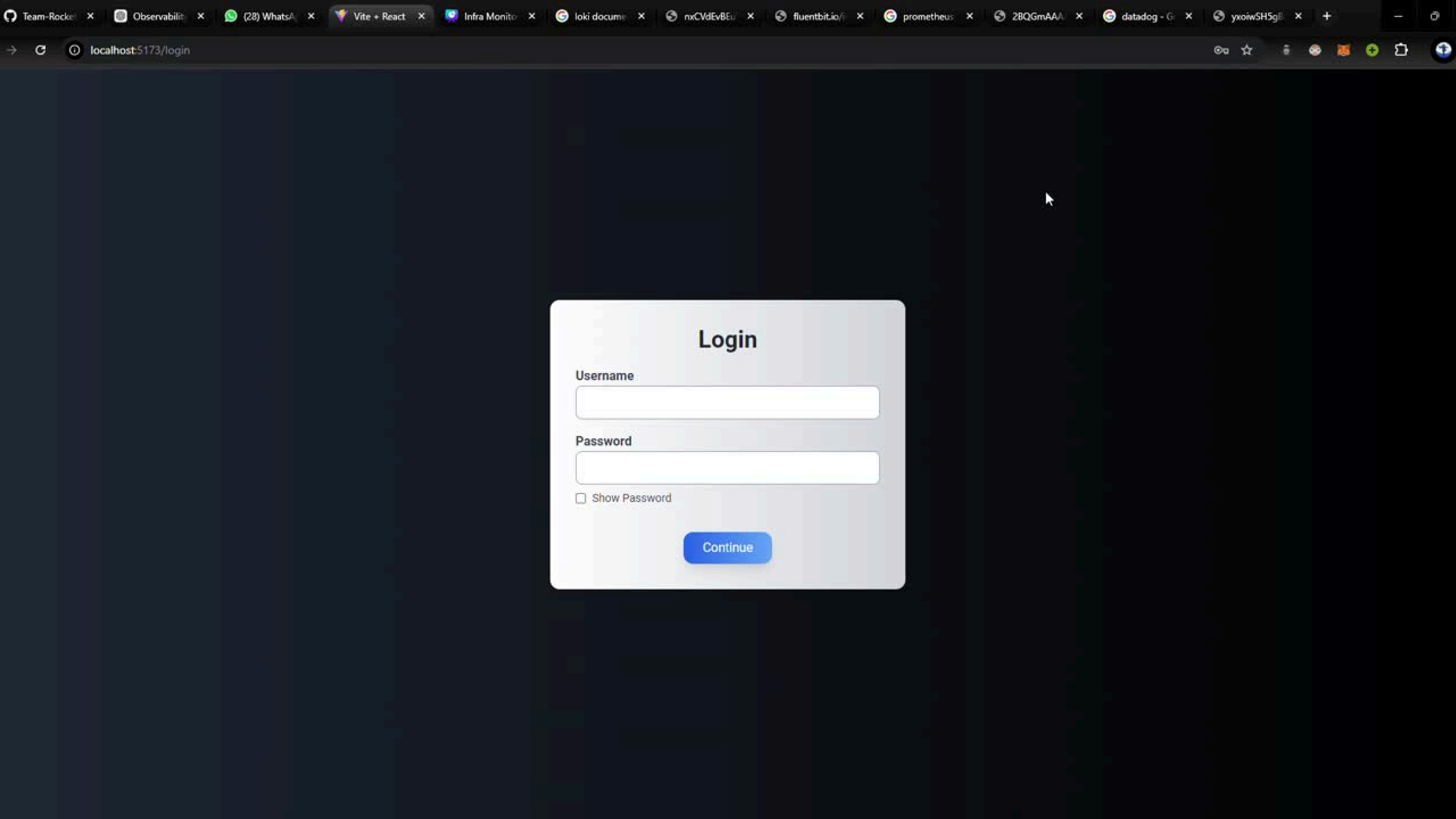


System Architecture





RUNNING ALL THE CLUSTERS ON MINIKUBE

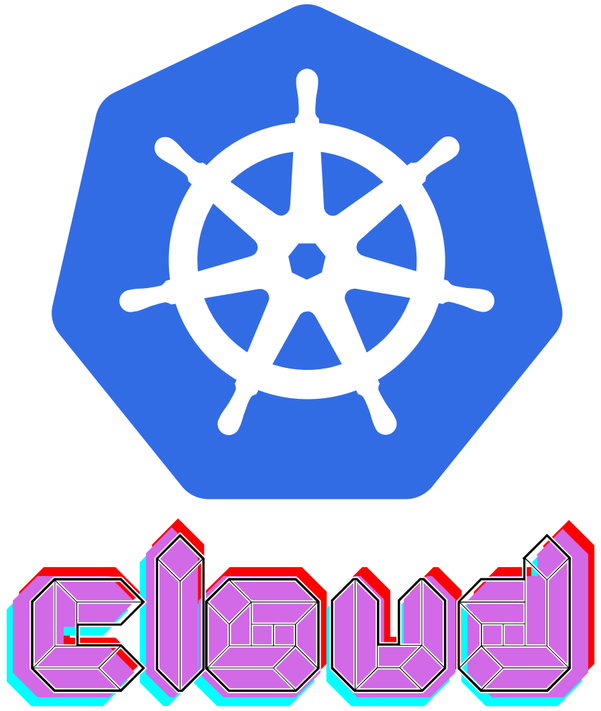

Team-Rocke
Observabilit
(28) WhatsA
Vite + React
Infra Monito
loki docum
nxCVdEvBEu
fluentbit.io/
prometheus
2BQGmAAA
datadog - G
yxoiwSH5gB
localhost:5173/login
Login
Username
Password
Show Password
Continue

Learnings

- Explored industry standard deployment tools like **Docker**, **K8s**.
- Learnings about the importance of observability and monitoring in SDLC.
- Integrating all the different technologies and understanding how they all work in tandem.
- How to configure **Fluent Bit**, **Loki**, and **Grafana** in a Kubernetes environment.
- Handling and manipulation of Time Series data.

Challenges Faced

- Configuring Kubernetes, Docker and all the different frameworks was a novel experience.
- Debugging through all of that in a short amount of time.
- Couldn’t properly configure InfluxDB so had to switch to Loki.
- Handling CrashLoopBackOff Errors: Understanding and debugging Kubernetes pod failures was essential to stabilizing the deployments.



FUTURE SCOPE

- **Scaling**: Moving the solution from Minikube to a production-grade Kubernetes cluster (like EKS or GKE) with more nodes and higher traffic.
- **Alerting**: Integrating an alerting system based on log patterns or metrics thresholds (e.g., using Prometheus).
- **Distributed Tracing**: Introducing tracing capabilities to track request flows across multiple services, adding another layer of observability.