Monitoring with Prometheus and Grafana

Monitoring is a fundamental aspect of modern DevOps and SRE practices. Prometheus and Grafana are among the most widely used tools for collecting, analyzing, and visualizing system and application metrics. Together, they form a powerful, open-source monitoring stack.

📊 What is Grafana?

Grafana is a multi-platform, open-source analytics and interactive visualization web application. It allows users to query, visualize, alert on, and explore metrics from various data sources, including Prometheus.

📌 Key Features:

- Interactive dashboards
- Rich plugin ecosystem
- Alerting and notifications
- Role-based access control
- Data source agnostic (supports Prometheus, Loki, InfluxDB, MySQL, etc.)

🚀 Setting Up Prometheus and Grafana

1. Export Metrics

Target applications need to expose metrics at an HTTP endpoint (`/metrics`). For example, in Python using `prometheus_client` :

```
from prometheus_client import start_http_server, Summary

REQUEST_TIME = Summary('request_processing_seconds', 'Time spent proce

@REQUEST_TIME.time()
def process_request():
    # Simulated workload
    pass

if __name__ == '__main__':
    start_http_server(8000)
    while True:
        process_request()
```

3. Grafana Setup

- Install Grafana
- Access at `http://localhost:3000` (default creds: admin/admin)
- Add Prometheus as a data source
- Import a dashboard or create a custom one
- Set alerts based on PromQL queries

⚠️ Alerting with Prometheus

Configure alert rules in `prometheus.yml`:

```
groups:
  - name: instance-down
    rules:
      - alert: InstanceDown
        expr: up == 0
        for: 1m
        labels:
          severity: critical
```

```
        annotations:
          summary: "Instance {{ $labels.instance }} down"
```

Use **Alertmanager** to route alerts via:

- Email
- Slack
- PagerDuty
- Webhooks

📚 Use Cases

- Kubernetes monitoring (`kube-prometheus-stack`)
- Microservices performance visualization
- SLA/SLO compliance tracking
- Anomaly detection via Grafana + machine learning plugins

🔚 Conclusion

Prometheus and Grafana provide a robust, flexible, and scalable monitoring stack that’s widely adopted in cloud-native environments. Prometheus handles metric collection and alerting, while Grafana turns those metrics into rich dashboards and insights.