# Detailed Architecture Description and Roles of Each Component

## Introduction

Your architecture consists of several interconnected components that enable monitoring of metrics (system and container performance) and logs (system and application logs). Here is a detailed description of the architecture and the roles of each tool in this environment.

## 1. Global Architecture

Your system includes the following elements:  
- Prometheus: Collects and stores metrics.  
- Loki: Collects and stores logs.  
- Grafana: Provides a graphical interface for visualizing metrics and logs.  
- Node Exporter: Provides system metrics (CPU, RAM, storage, etc.).  
- cAdvisor: Provides metrics specific to Docker containers (CPU, memory, etc.).  
- Promtail: Collects system and container logs and sends them to Loki.

## 2. Roles of Each Component

### 2.1 Prometheus (Metric Collector)

Role: Prometheus is used to collect, store, and query metrics from servers and containers. It scrapes data from tools like Node Exporter and cAdvisor at regular intervals.  
Type of Data Collected:  
- CPU, RAM, disk usage.  
- Network statistics.  
- Container metrics (resources used by each container).  
Access: Interface Prometheus: http://10.0.2.4:9090

### 2.2 Loki (Log Collector)

Role: Loki is designed to collect and store logs from servers and containers. Unlike Prometheus which handles metrics, Loki focuses on logs.  
Type of Data Collected:  
- System logs (e.g., syslog, auth.log).  
- Application and Docker container logs.  
Access: Interface Loki: http://10.0.2.4:3100

### 2.3 Grafana (Visualization Platform)

Role: Grafana serves as the graphical interface for visualizing the metrics and logs collected by Prometheus and Loki. It allows the creation of custom dashboards for performance monitoring.  
Sources of Data:  
- Prometheus (for metrics).  
- Loki (for logs).  
Access: Interface Grafana: http://10.0.2.4:3000  
Suggested Dashboards:  
- Node Exporter (ID: 1860): To monitor system metrics.  
- cAdvisor (ID: 193): To monitor container metrics.

### 2.4 Node Exporter (System Metric Collection)

Role: Provides system metrics to Prometheus for each host machine (Jenkins VM and Web VM).  
Metrics Collected:  
- CPU and memory usage.  
- Disk usage.  
- Network activity.  
Access: Metrics exposed: http://<ip\_vm>:9100

### 2.5 cAdvisor (Container Metric Collection)

Role: Provides container-specific metrics to Prometheus.  
Metrics Collected:  
- CPU and memory usage of each container.  
- Network statistics of containers.  
- Disk usage linked to containers.  
Access: Metrics exposed: http://<ip\_vm>:8080

### 2.6 Promtail (Log Collector)

Role: Collects system and container logs and sends them to Loki.  
Types of Logs Collected:  
- System logs (e.g., /var/log/syslog, /var/log/auth.log).  
- Container logs via docker.sock.  
Configuration: Promtail is configured to read local log files and query Docker container logs.

## 3. Data Flow

### 3.1 Metrics

Collection: Node Exporter and cAdvisor collect the metrics.  
Storage: The metrics are sent to Prometheus.  
Visualization: Grafana queries Prometheus to visualize the metrics.

### 3.2 Logs

Collection: Promtail collects logs from system files and containers.  
Storage: The logs are sent to Loki.  
Visualization: Grafana queries Loki to visualize the logs.

## 4. Access to Tools

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| Tool | Address | Description |
| Prometheus | http://10.0.2.4:9090 | Metric collection and query interface. |
| Grafana | http://10.0.2.4:3000 | Visualization interface for metrics and logs. |
| Loki | http://10.0.2.4:3100 | Log collection and storage. |
| Node Exporter | http://<ip\_vm>:9100 | System metric exposure. |
| cAdvisor | http://<ip\_vm>:8080 | Container metric exposure. |

## 5. Summary of Roles

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| --- | --- | --- |
| Component | Type of Data | Primary Role |
| Prometheus | Metrics | Collects and stores metrics. |
| Loki | Logs | Collects and stores logs. |
| Grafana | Visualization | Displays metrics and logs through dashboards. |
| Node Exporter | System Metrics | Provides system metrics to Prometheus. |
| cAdvisor | Container Metrics | Provides container metrics to Prometheus. |
| Promtail | Logs | Collects and sends logs to Loki. |