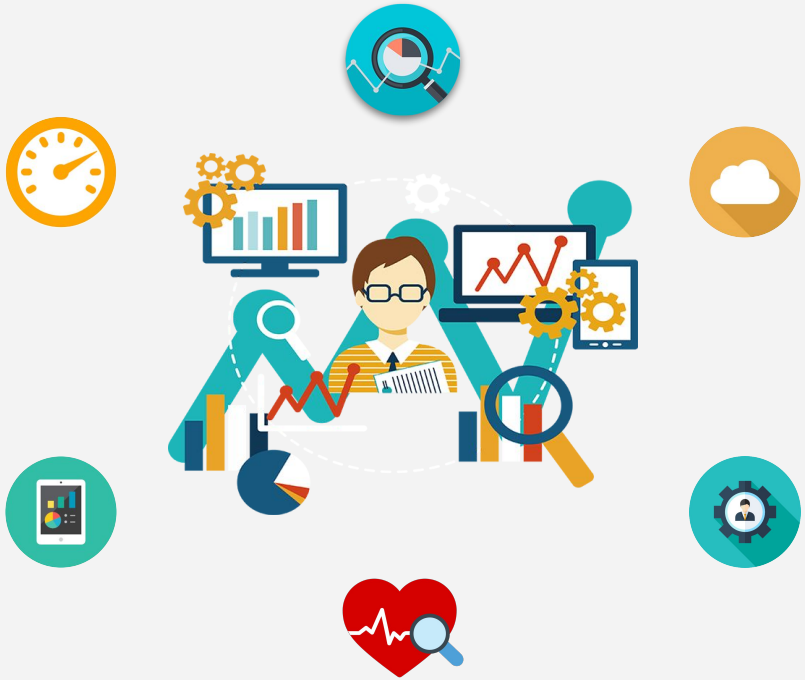
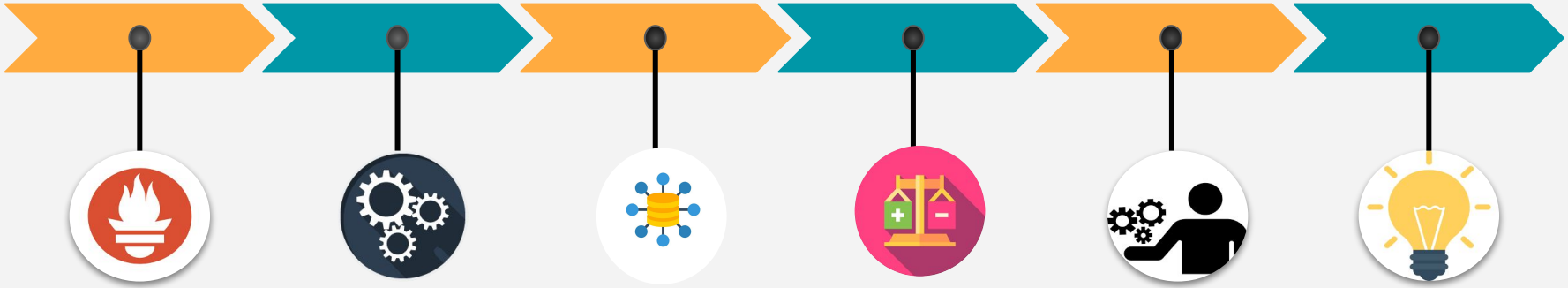
DATA AGGREGATION & MONITORING WITH PROMETHEUS



Pravin M J
Software developer

SESSION ROADMAP



Overview

About Prometheus
Time-series ?
Why it's needed?

Prometheus

How it Works?
Features &
Data Model

Architecture

Base Architecture
& its
Components

Benefits

Benefits
Shortcomings
Alternatives

Problem Statement

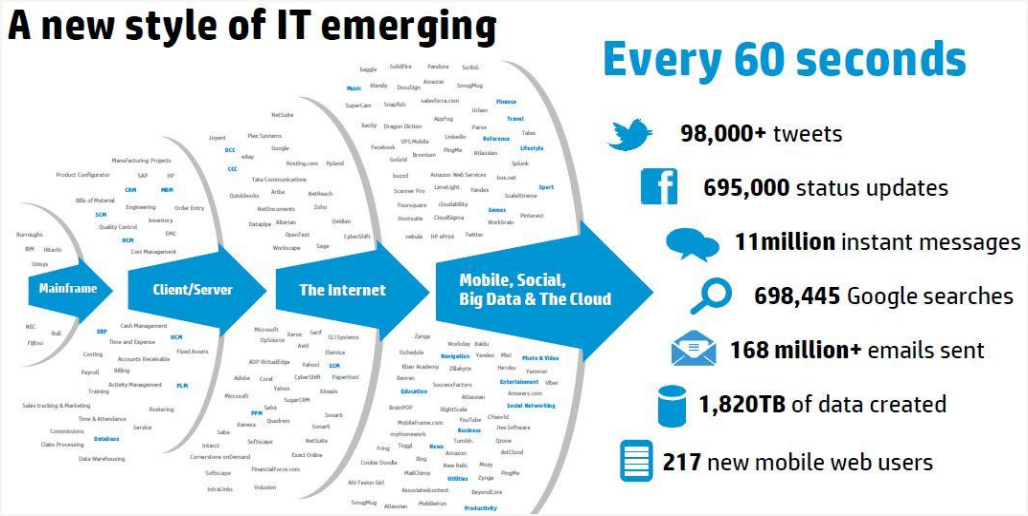
Current Problem
Statements
within services

Solutions

With Prometheus
&
Future Road Map

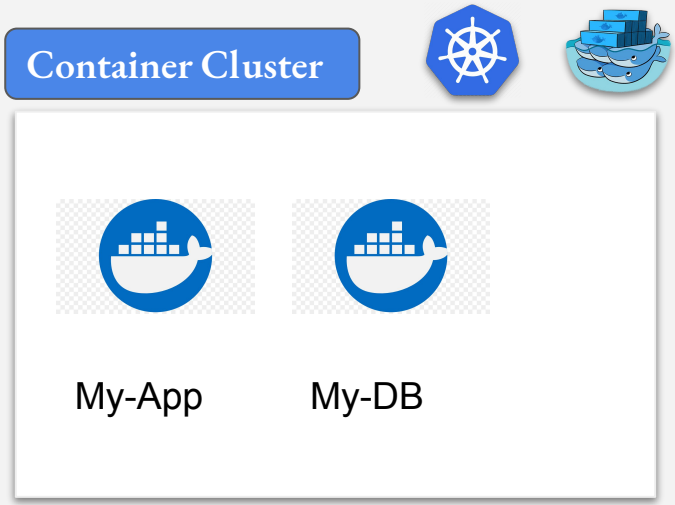
Why The Buzz??

- Cloud & Distributed System
- Containers/Serverless
- Mobile/Networking Security
- IoT - Data Generation Rate

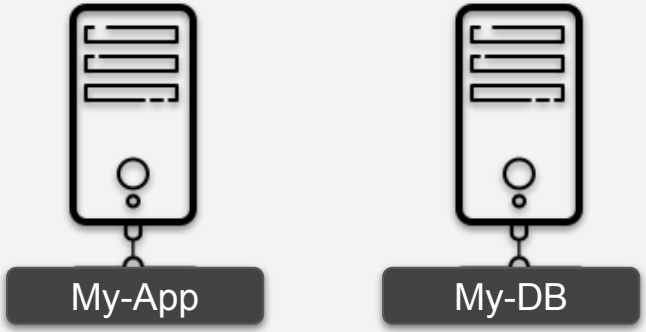


What is Prometheus?

- Open source monitoring and alerting tool (SoundCloud/CNCF)
- Highly dynamic container environments
- Stores data in Time-series model



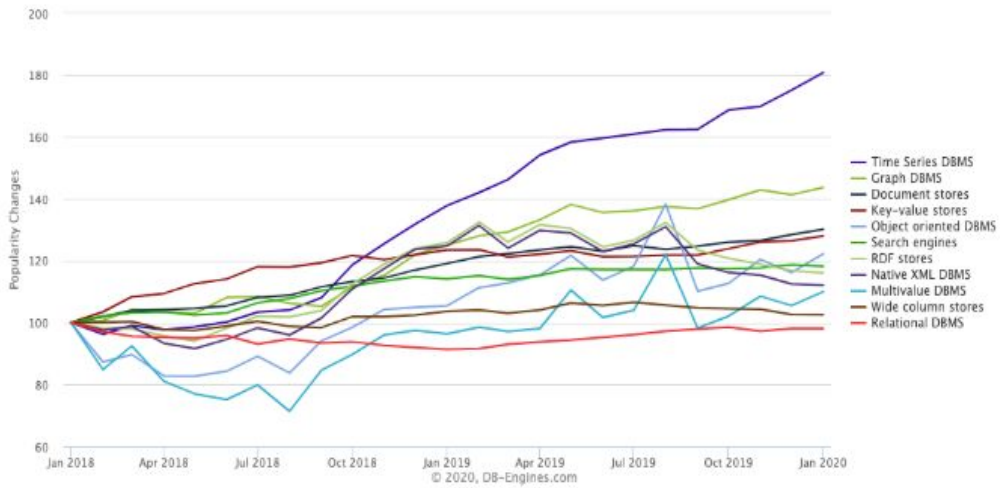
- Bare Metal Servers



What is Time Series Database?

A Database optimized to store timestamped data

Events that are tracked, monitored, downsampled and aggregated over time



Server metrics, Application performance monitoring, network monitoring, sensor data, events, clicks, trades in market...

influxdb

graphite

druid

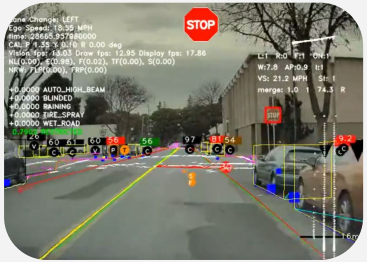
TIMESCALE

What is Time Series Database?

A Database optimized to store timestamped data

Events that are tracked, monitored, downsampled and aggregated over time

Self Driving cars



Retail Industry

Trading Algorithm

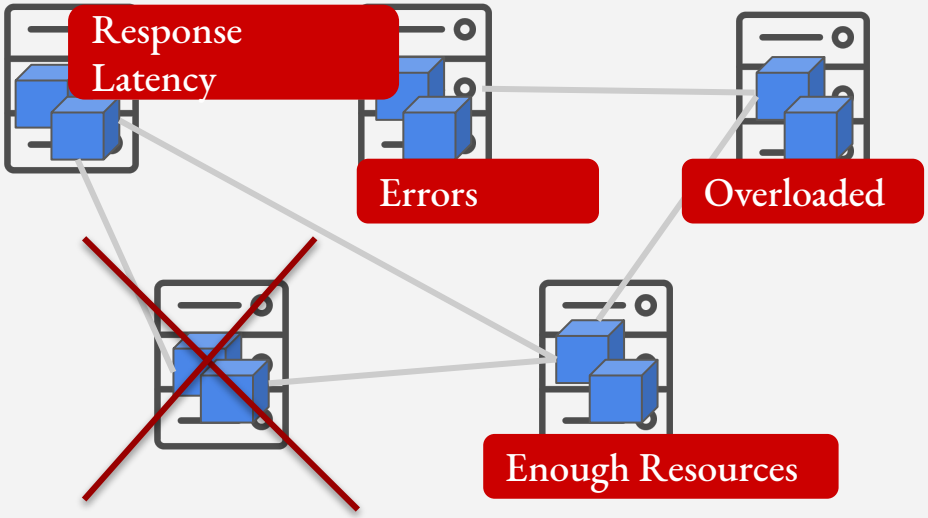
DevOps

NYPD/Transport

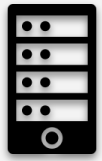
Smart Homes

Why it's Needed?

- Monitoring has become complex.



- 100s of process
- Interconnected

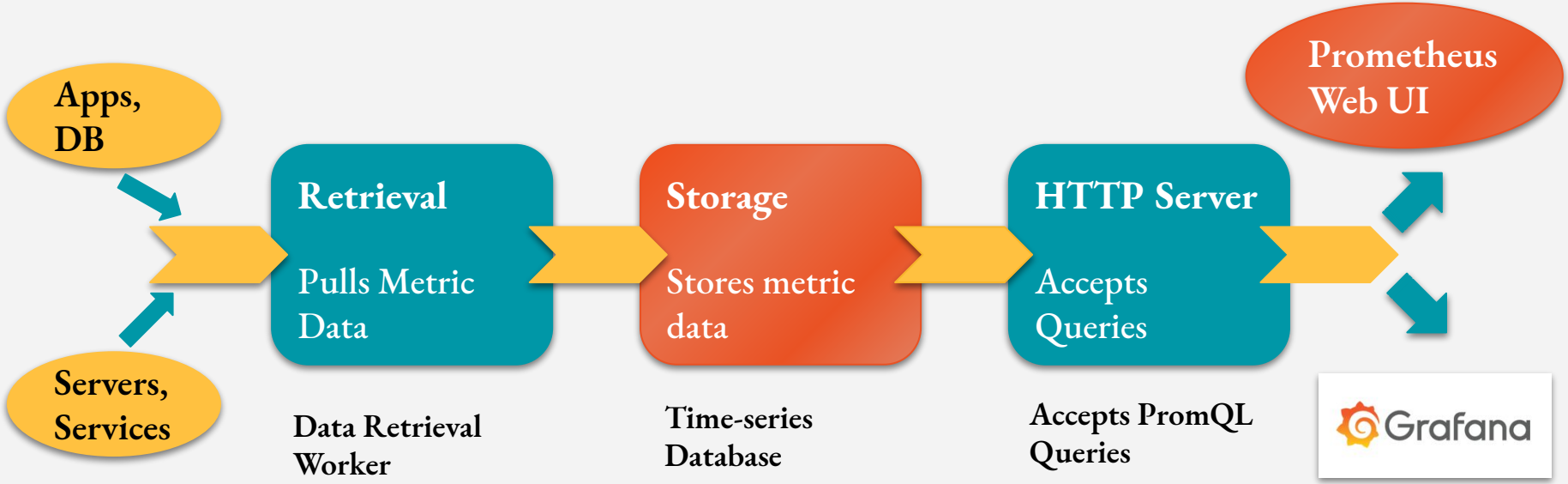


Hardware ?

Application ?

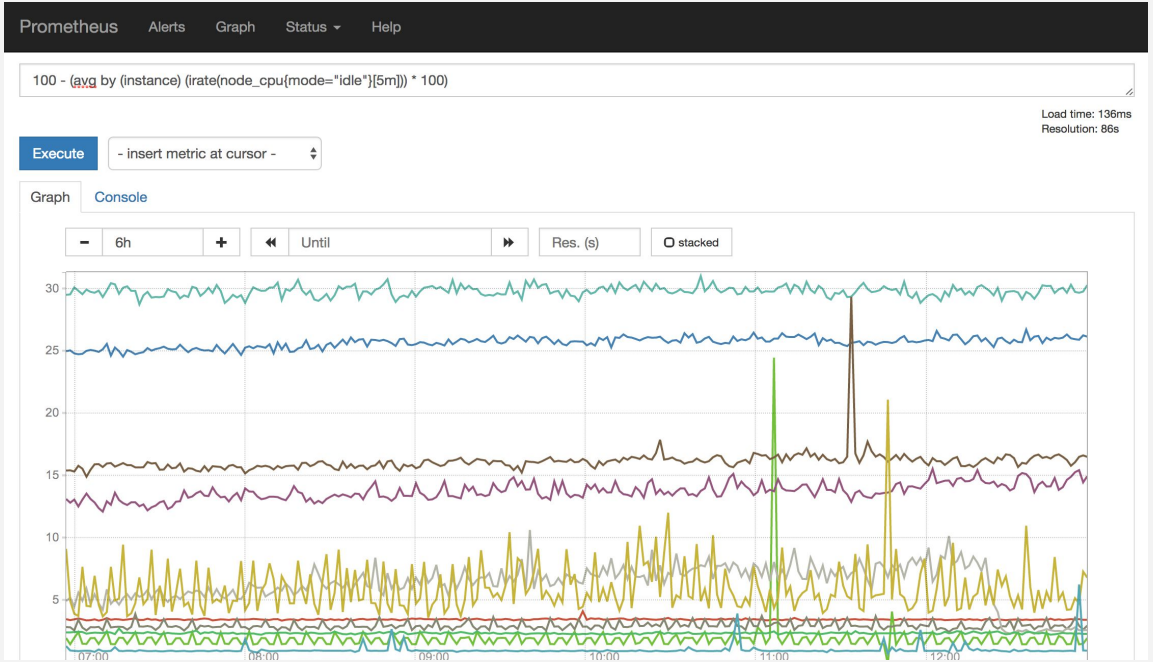
Database ?

How it Works?


Apps, DB
Servers, Services
Retrieval
Pulls Metric Data
Storage
Stores metric data
HTTP Server
Accepts Queries
Prometheus Web UI
Grafana
Data Retrieval Worker
Time-series Database
Accepts PromQL Queries

Features & Data Model

- Multidimensional data model, identified by metric and key,value pair
- Data Extraction with pull mode over HTTP
- Service Discovery/Static configs
- Inbuilt Dashboard



PromQL

```
100 - (avg by (instance)
(irate(node_cpu_seconds_total{job=”node”,mode=”idle”}
[5m]))*100)
```

Architecture & Exporters

Prometheus Server

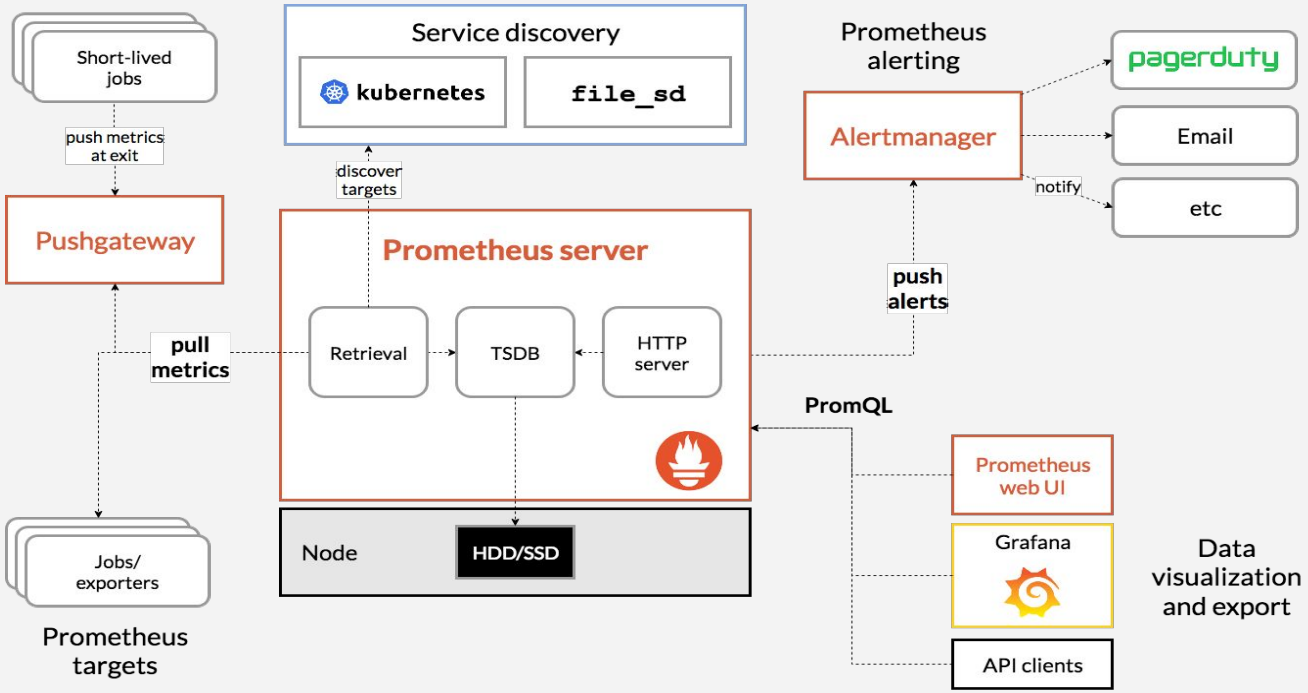
Scrapes and Stores time series data

Push Gateway

For Short Lived Jobs (Emails, Cron, push notifications)

Exporters

Export Metrics from 3rd party systems



Alert Manager

Handle and tracks alerts

Service Discovery

Automatically scrap metrics

Visualization

WebUI/Grafana

Architecture & Exporters

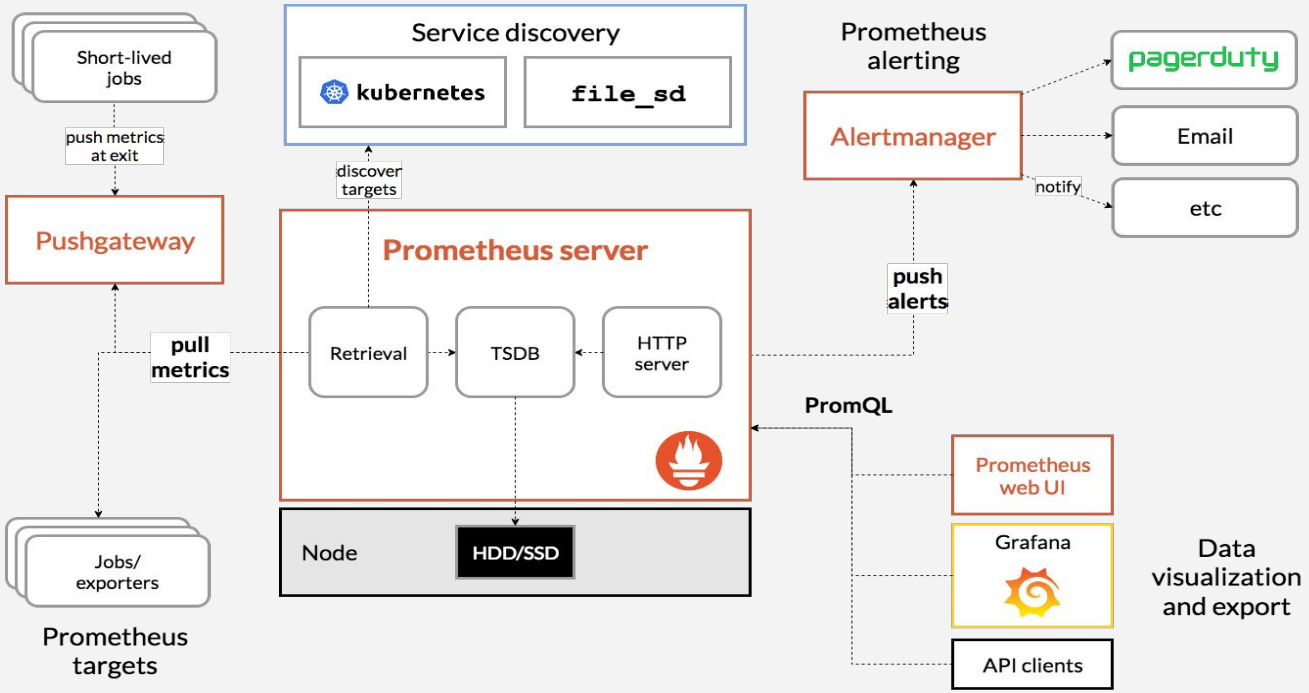
Database Exporters
MySQL,MongoDB,Redis, Postgres

Hardware Related
Netgear Router, NVIDIA GPU

Issue Tracker/CI
JIRA, Jenkins

Messaging Systems
RabbitMQ, Kafka

Storage
Ceph, Gluster, hadoop



HTTP
Apache, Nginx VTS

API
AWS. DO. Azure Health, GitHub, Gmail

Others..
Alibaba, Bitcoin, CAdvisor. JSON, Nagios. OpenStack..,

250 + Exporters

Targets

Linux/ Windows Server

Web Servers Apache, Nginx

Single Apps

Database Services

Metrics

CPU Status

Memory/ Disk Space Usage

Request Counts

Exception Counts

Request Duration

Benefits

- Time-series Optimized
- Pull based metrics
- One Service to rule all
- Centralized Control
- Inbuilt Alerting
- Service Discovery

Shortcomings

- Limited Scalability
- DSL
- Service Maintenance
- Needed Secure Network Configuration
- Does not Store raw text, but only numerics

>>> Logs <<<

Others

New Relic

ZABBIX

DATADOG

Nagios®

- Faster Recovery (MTTR)
- Better Quality
- Reduced Maintenance
- Improved Productivity

The Problem Statement

To be Continued with next session

- Monitor Infrastructure and Nodes?
  - App servers, Web servers, Databases, Caches, Message Queues, Networks calls, API calls..
- How an error is identified?
- How node failure or resource outage is identified?
- Analysis/History of Logs?
- Expected Downtime/MTTR?

Redis Wannamine

Resource Overload

Smart meter failure

Parse Logs

Wait Until it occurs Again.....

The Solution

To be Continued with next session

Centralized Monitoring

CPU, Memory Usage,
Disk Usage..With Prometheus &
Node Exporter

Store Smart-meter logs in Loki.
Ship, Analyse and Filter logs
easily

Log Aggregation and Analysis

Visualize in Real Time

Created dynamic and highly
customizable dashboards
with available data set

Notify in microsoft teams

Alert and Notify on issue

Future RoadMap

1. Network Related monitoring (Web servers)
2. Database exporters
3. Long term log storage
4. On demand Admin Dashboards
5. More IoT..

Node Exporter Sample Dashboard

Last 5 minutes | 1d

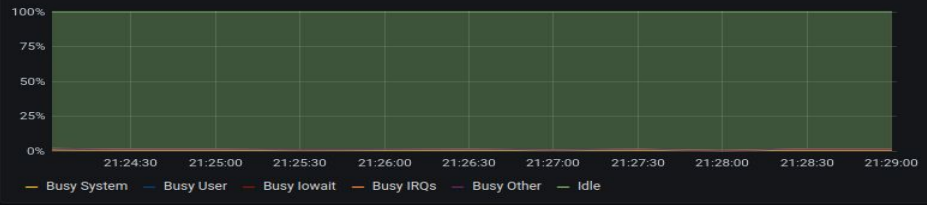
Quick CPU / Mem / Disk

CPU Busy	Sys Load (5m avg)	Sys Load (15m avg)	RAM Used	SWAP Used	Root FS Used	CPU Cores...	Uptime
1.8%	3%	1%	55%	N/A	16%	1	4.9 week

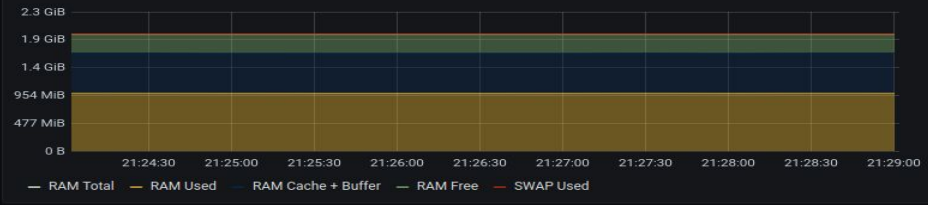
RootFS Tot...	RAM Total	SWAP Total...
48 GiB	2 GiB	0 B

Basic CPU / Mem / Net / Disk

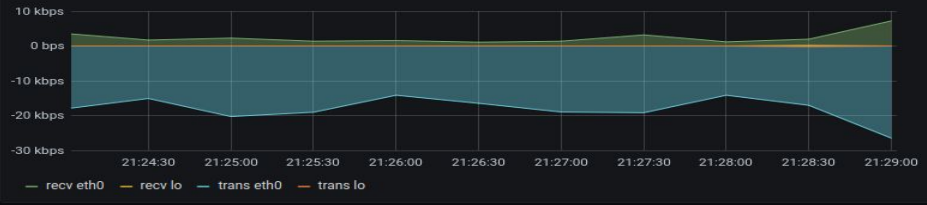
CPU Basic



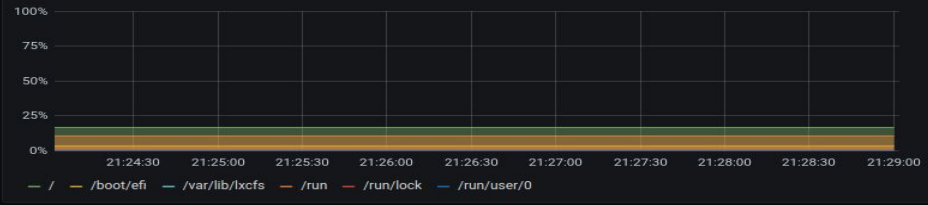
Memory Basic



Network Traffic Basic



Disk Space Used Basic



CPU / Memory / Net / Disk *(7 panels)*

Memory Meminfo *(15 panels)*

Memory Vmstat *(4 panels)*

System Timesync *(4 panels)*

System Processes *(8 panels)*

Storage Disk *(8 panels)*

Storage Filesystem *(5 panels)*

Network Traffic *(5 panels)*

Network Sockstat *(4 panels)*

Network Netstat *(13 panels)*

A Peek Into...

Prometheus UI

Any Questions