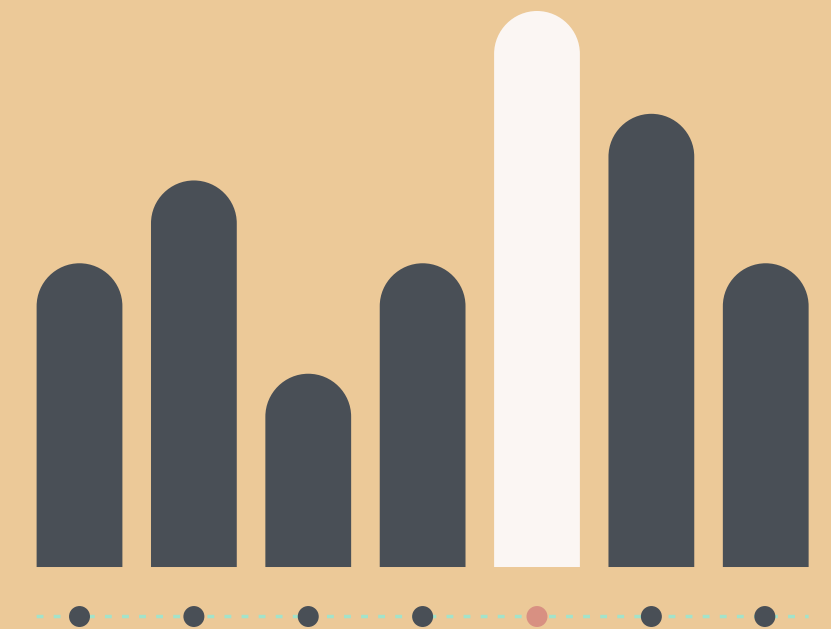
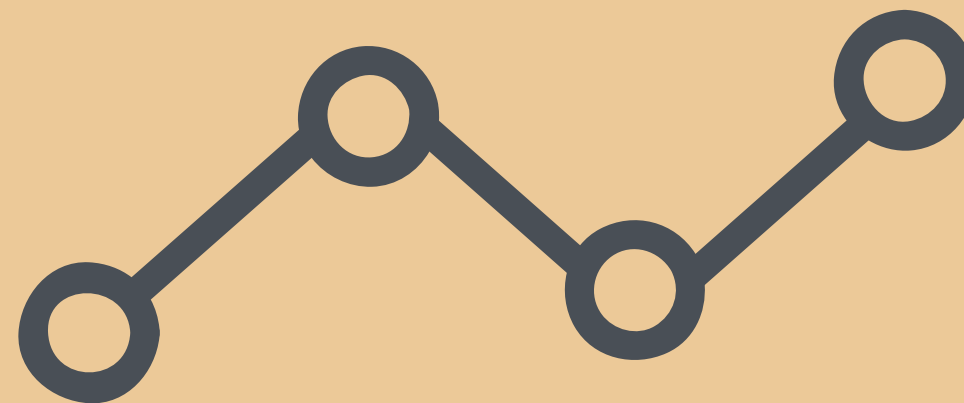
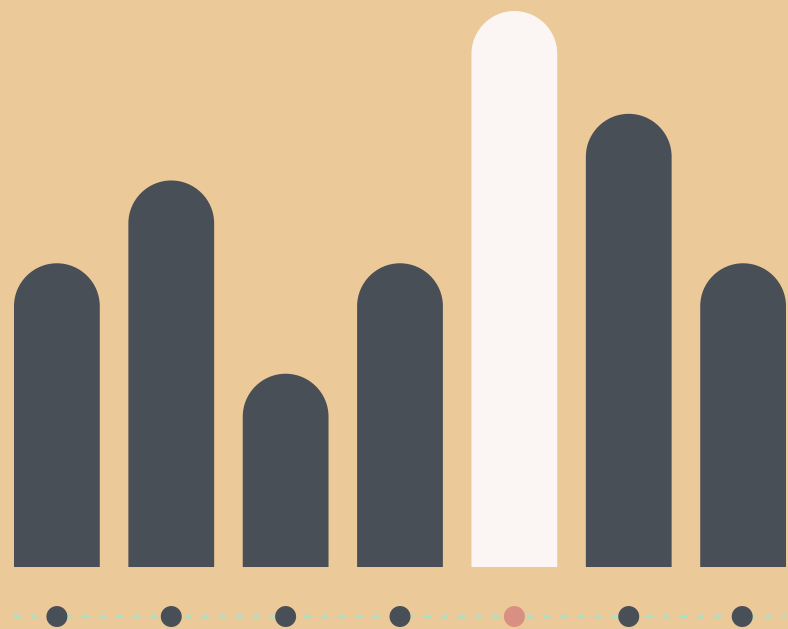


# INTRODUCTION TO PROMETHEUS MONITORING



# TOPICS

- Introduction
- Prometheus Architecture
- Prometheus Uses
- Prometheus Exporters
- Alerting with Prometheus
- Visualizing Prometheus Data

# INTRODUCTION

- Prometheus is an open-source systems monitoring and alerting toolkit originally built at SoundCloud
- Prometheus collects and stores its metrics as time series data, i.e. metrics information is stored with the timestamp at which it was recorded, alongside optional key-value pairs called labels.

# Features

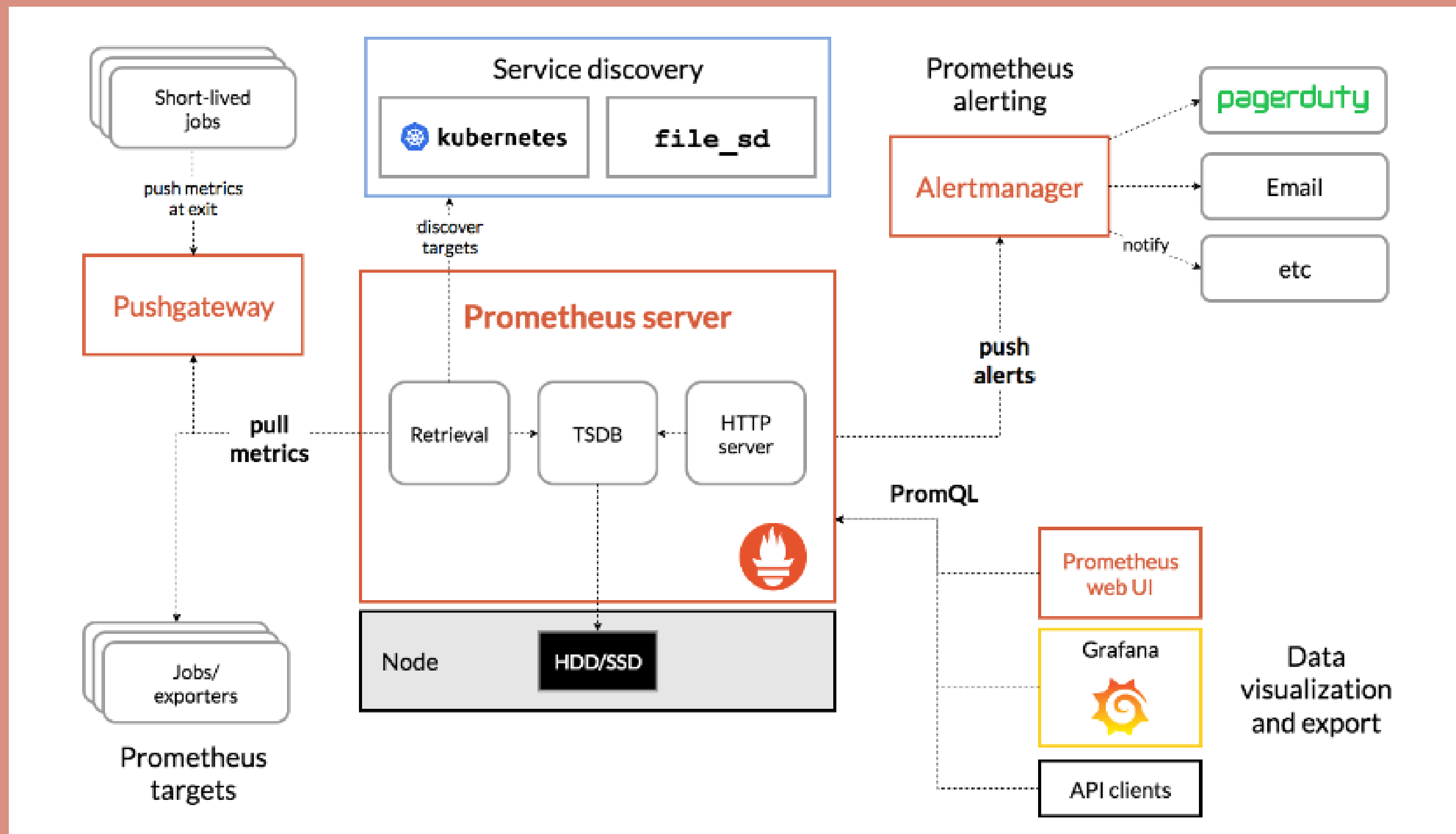
- Multi-dimensional data model with time series data and metrics in the form of key-value pairs.
- PromQL, a flexible query language for multidimensional data.
- Autonomous single server nodes.
- Accessing your metrics via HTTP endpoint and showing them in a browser.
- Exceptional support and libraries for metrics of different stacks.
- Multiple nodes for graphing and dashboarding support.
- A pull-based metric system that helps in scraping metrics remotely.
- Discovering targets via service discovery or static configuration.

# PROMETHEUS ARCHITECTURE

## Components

- Prometheus server which scrapes and stores time series data
- Instrumenting client libraries for application code
- Push gateway for supporting short-lived jobs
- Prometheus Exporters
- Alertmanager to handle alerts
- Service discovery, Prometheus automatically detects and monitors services and endpoints within your infrastructure.
  - targets can be dynamically added/removed without having to reconfigure Prometheus.

# PROMETHEUS ARCHITECTURE



# METRICS

Metrics are numerical measurements (Standard of measurements), to use common terminology.

## Prometheus Metrics Type

- **Counter** One of the most basic metric types is the counter. It is helpful for keeping track of and evaluating values that are only going to rise.

## PROMETHEUS METRICS TYPE CONT....

- **Gauge** Values that rise and fall are measured by gauge metrics. This includes the quantity of concurrent requests or the memory usage at the moment. Usually, the metric is represented by a single numerical value.
- **Summary** displays the total number of observations and the sum of observed values. Additionally, it determines variable quantiles over a sliding time window.
- **Histogram** It typically provides the total of all observed values and counts in buckets.



# PROMETHEUS USES

Prometheus serves a wide range of use cases, such as:

- a. **Infrastructure Monitoring:** Keeping an eye on servers, networks, and hardware.
- b. **Application Performance Monitoring (APM):** Tracking the health and performance of applications.
- c. **Alerting and Notification:** Detecting and responding to anomalies and issues.
- d. **Capacity Planning:** Understanding resource usage trends.
- e. **Anomaly Detection:** Identifying unexpected patterns in your data.

# PROMETHEUS USES CONT...

Real-world examples for each use case can include scenarios like monitoring server CPU usage, tracking response times of a web application, and setting up alerts for low disk space.

# PROMETHEUS EXPORTERS

- Prometheus exporters are specialized software components that collect and expose specific metrics or monitoring data from various systems, services, or applications in a format that Prometheus can scrape and store.
- These exporters act as intermediaries between Prometheus and the systems or services being monitored, making it possible for Prometheus to monitor a wide range of targets beyond its native capabilities.

# PROMETHEUS EXPORTERS CONT...

- Example Exporters: There are various exporters available for common systems, including:
  - **node\_exporter**: Exposes hardware and OS metrics (CPU, memory, disk, network) from Linux and other Unix-like systems.
  - **blackbox\_exporter**: Monitors network services and probes endpoints, checking for availability and response times.
  - **postgresql\_exporter**: Collects metrics from PostgreSQL databases.
  - **redis\_exporter**: Exposes metrics from Redis databases.
  - **cAdvisor\_exporter**: provides container users an understanding of the resource usage and performance characteristics of their running containers.

# PROMETHEUS EXPORTERS CONT...

**Custom Exporters:** You can also develop custom exporters tailored to your specific needs. These are useful when monitoring proprietary or less common systems.

# ALERT MANAGER

- Alertmanager is responsible for managing the alerts sent by the clients.
- It checks for duplication, groups the signals, and routes them to the correct application like email, Pagerduty, Opsgenie, etc. It also checks for when it should keep alerts off and when not.
- You can do various things with Alerts received from a client (Prometheus Server) to the Alertmanager. You can group similar types of notifications that prevent you from seeing similar notifications repetitively. You can mute notifications as well.

# VISUALIZING PROMETHEUS DATA

- **Grafana Integration:** Grafana is a popular visualization tool often used with Prometheus. It allows you to create visually appealing dashboards.
- **Benefits of visualization:** Visualization helps you understand trends, anomalies, and performance, making it easier to make data-driven decisions.

# Demo

Time

