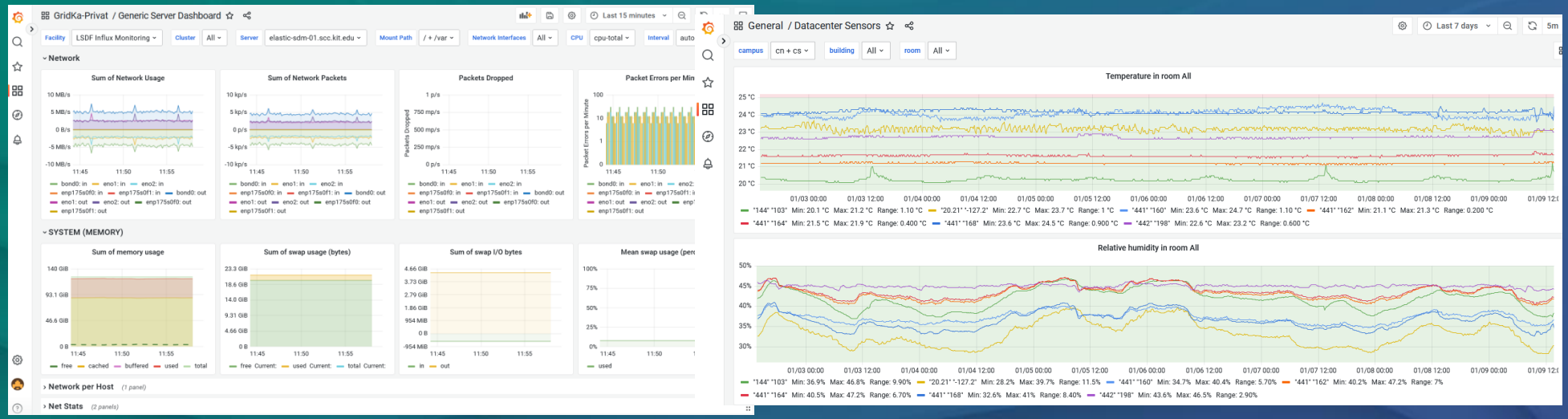
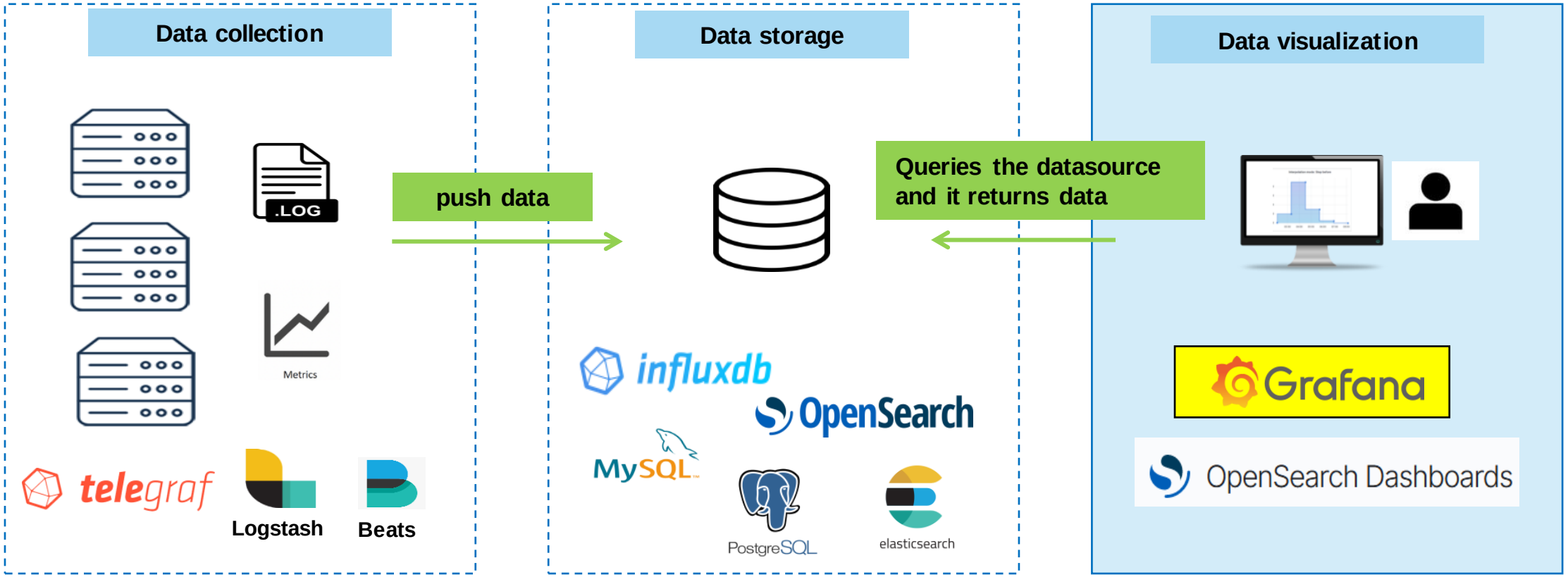
Karlsruhe Institute of Technology

Grafana

Introduction and overview



Components of monitoring architecture



Agenda

- What is Grafana?
- Data sources
- Dashboards
- Panels and Visualizations
- Plugins
- Grafana vs OpenSearch Dashboards
- Live Demo: a sample Dashboard

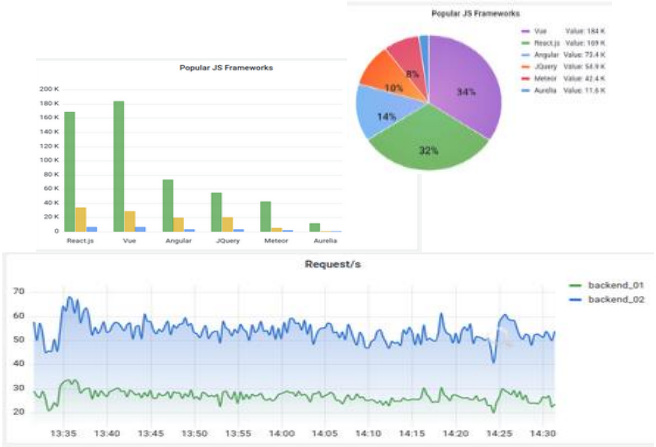
What is Grafana?

- Grafana is an open-source tool that allows you to **query, visualize, analyze metrics and logs**.

- Grafana is interoperable with more than 100 **data sources**, such as InfluxDB, ElasticSearch, OpenSearch and traditional relational database engines like MySQL.

- Dynamic and interactive **dashboards** are created by using these sources to select relevant fields from data.

- Dashboards can incorporate a varied range of **visualization components** such as gauge, graphs, heat maps, and histograms.



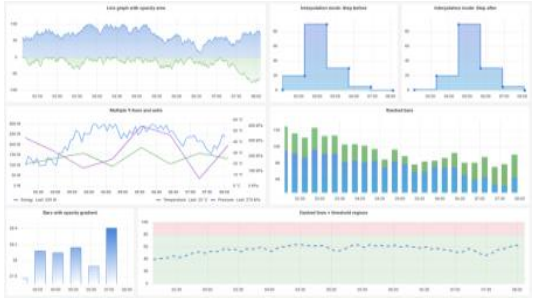
What is Grafana?

Community-driven development

Roles and permissions

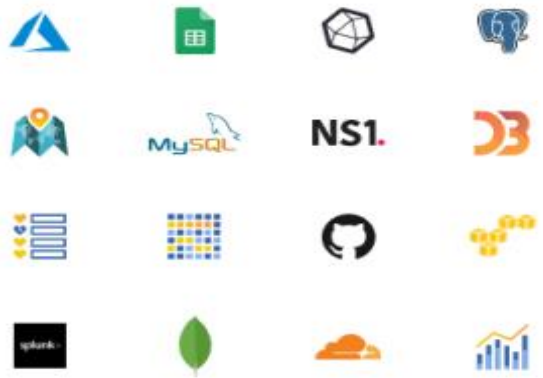
Grafana

Alerts



Many types of visualizations

Custom plugins



Grafana Demo

Play around with Grafana on our TEST instance:

- https://grafana-sdm-test.scc.kit.edu/
- Use it for testing!
- Monitoring Training Session Folder:
  - https://grafana-sdm-test.scc.kit.edu/dashboards/f/mpY9npcVk/monitoring-training-session
  - You find examples of logs and metrics Dashboards

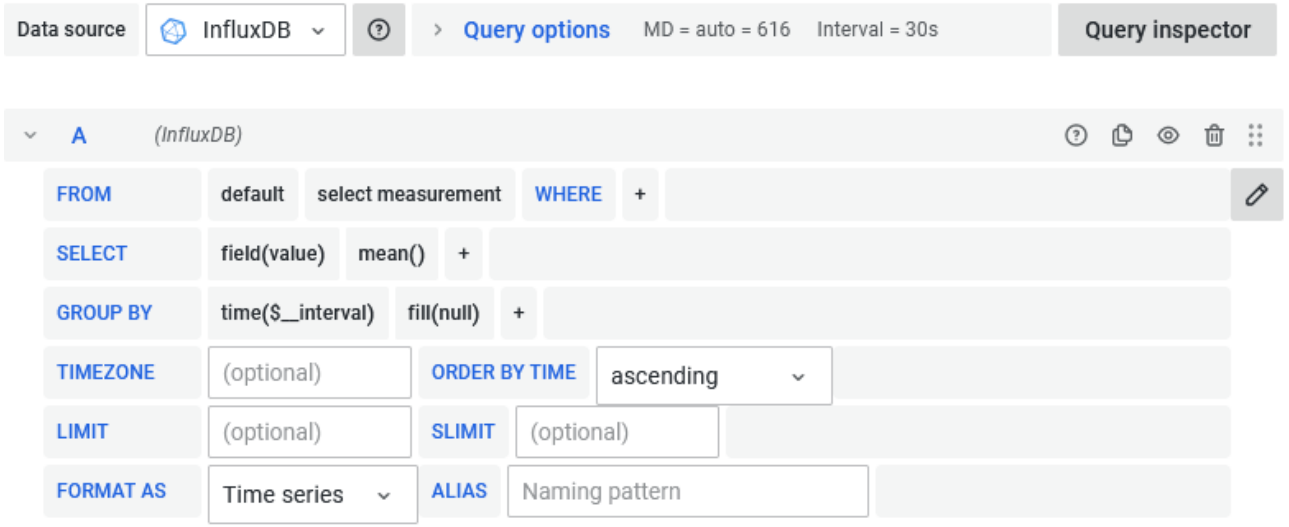
Data sources

- Grafana can query and integrate with many different types of databases. This is done by adding a **data source** (only the administrators can manage the data sources) of the type you want to query or integrate with.
- When a data source has been created and configured you are ready to start exploring and visualizing data.

Data sources query editor

- Each data source's **query editor** provides a customized user interface that helps you write queries.
- You use a data source's query editor when you create queries in dashboard panels or Explore.

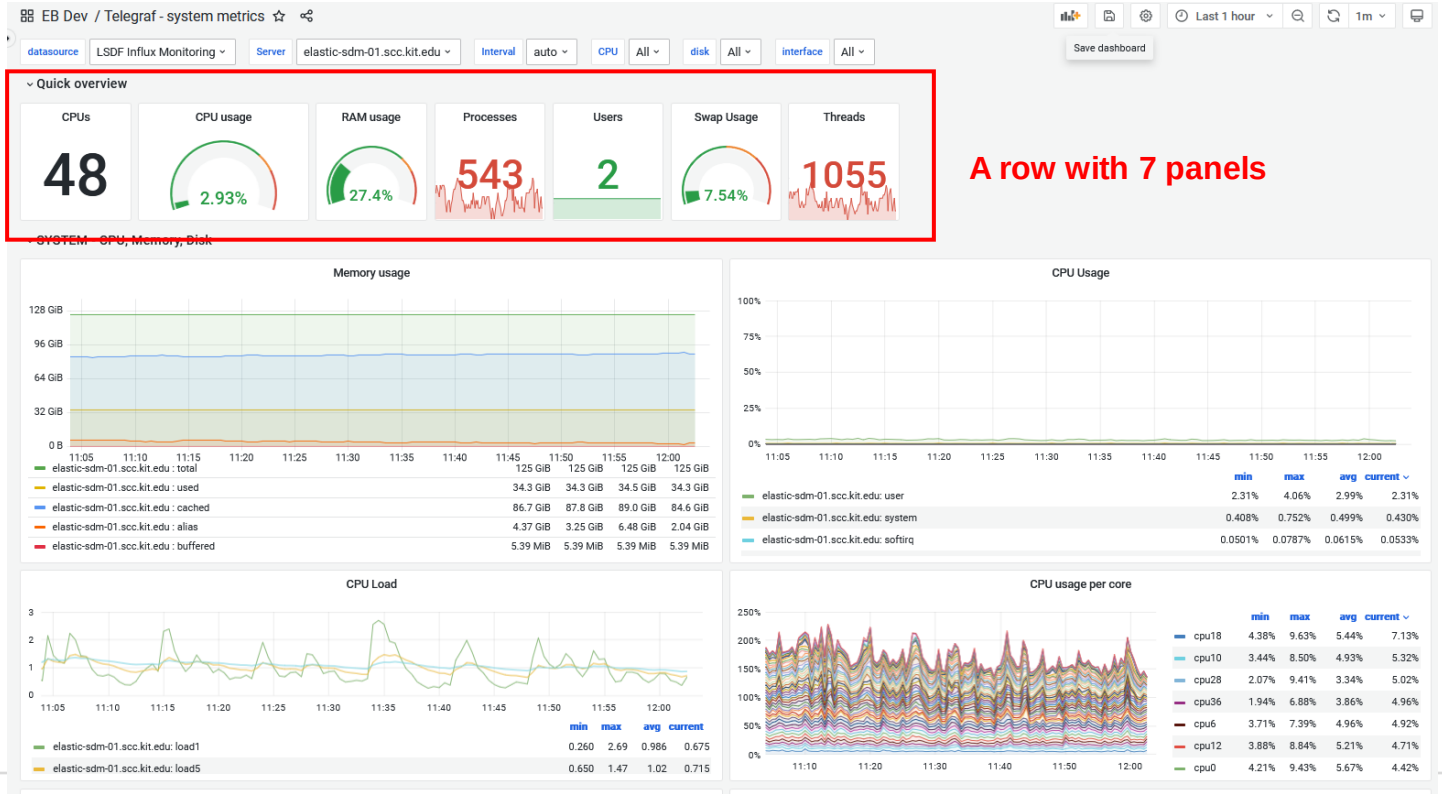
Example: the InfluxDB query editor



Dashboards

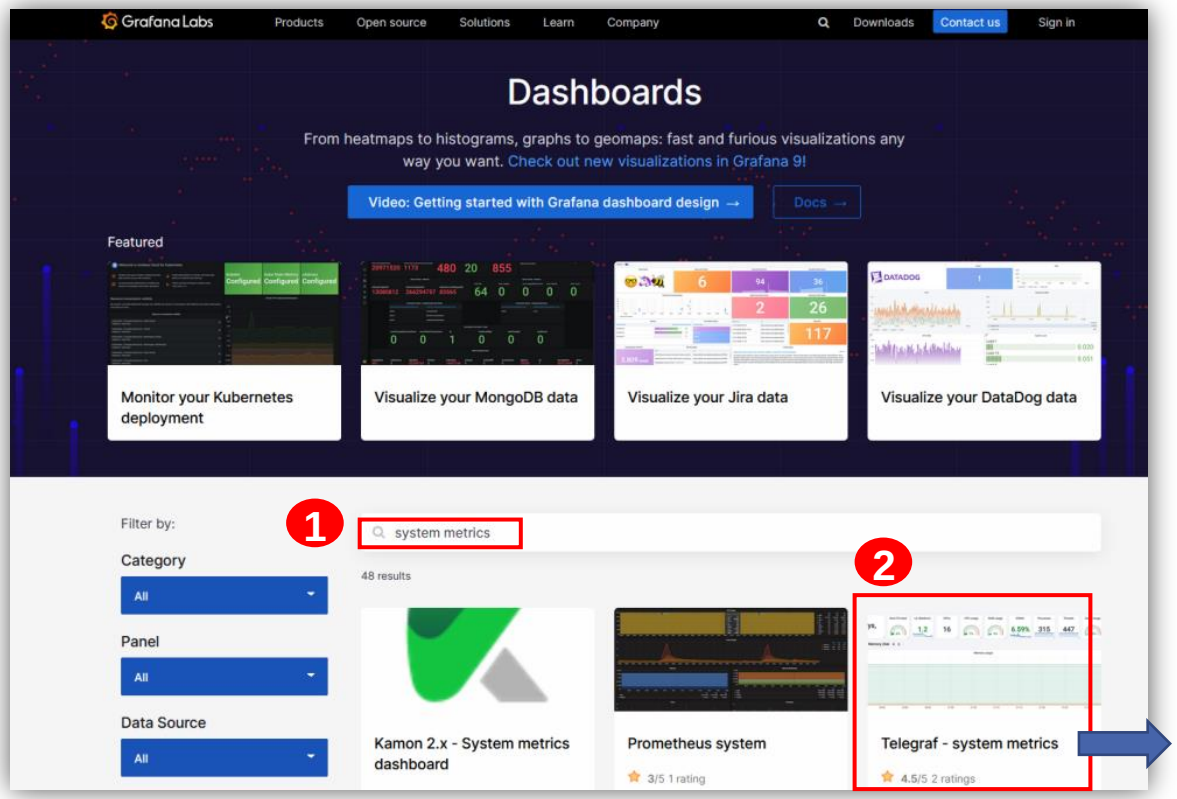
- A dashboard is a set of one or more **panels** organized and arranged into one or more **rows**.
- Each panel can interact with data from any configured Grafana data source.
- Dashboards may have variables that can act as filters on your visualizations.
- Dashboards may be imported/exported as JSON.

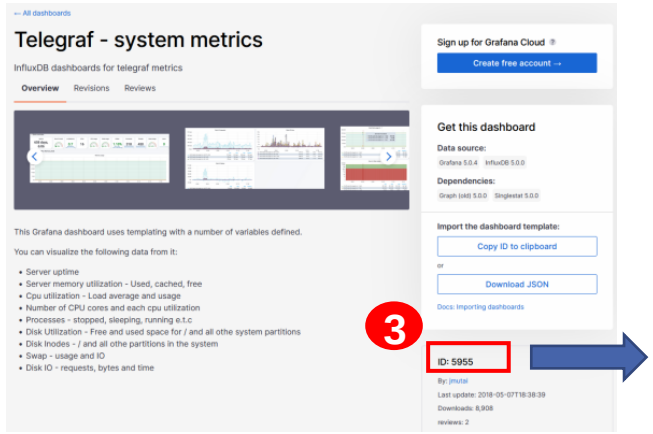
Example of Dashboard:
Telegraf- System metrics

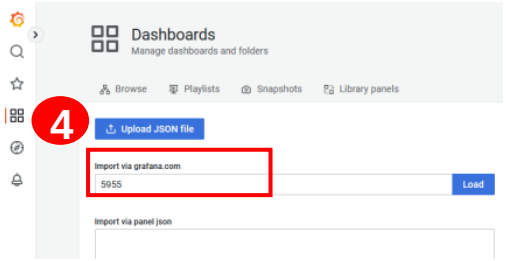


Dashboards library

- Browse a *library* of official and community-built *dashboards* at https://grafana.com/grafana/dashboards/



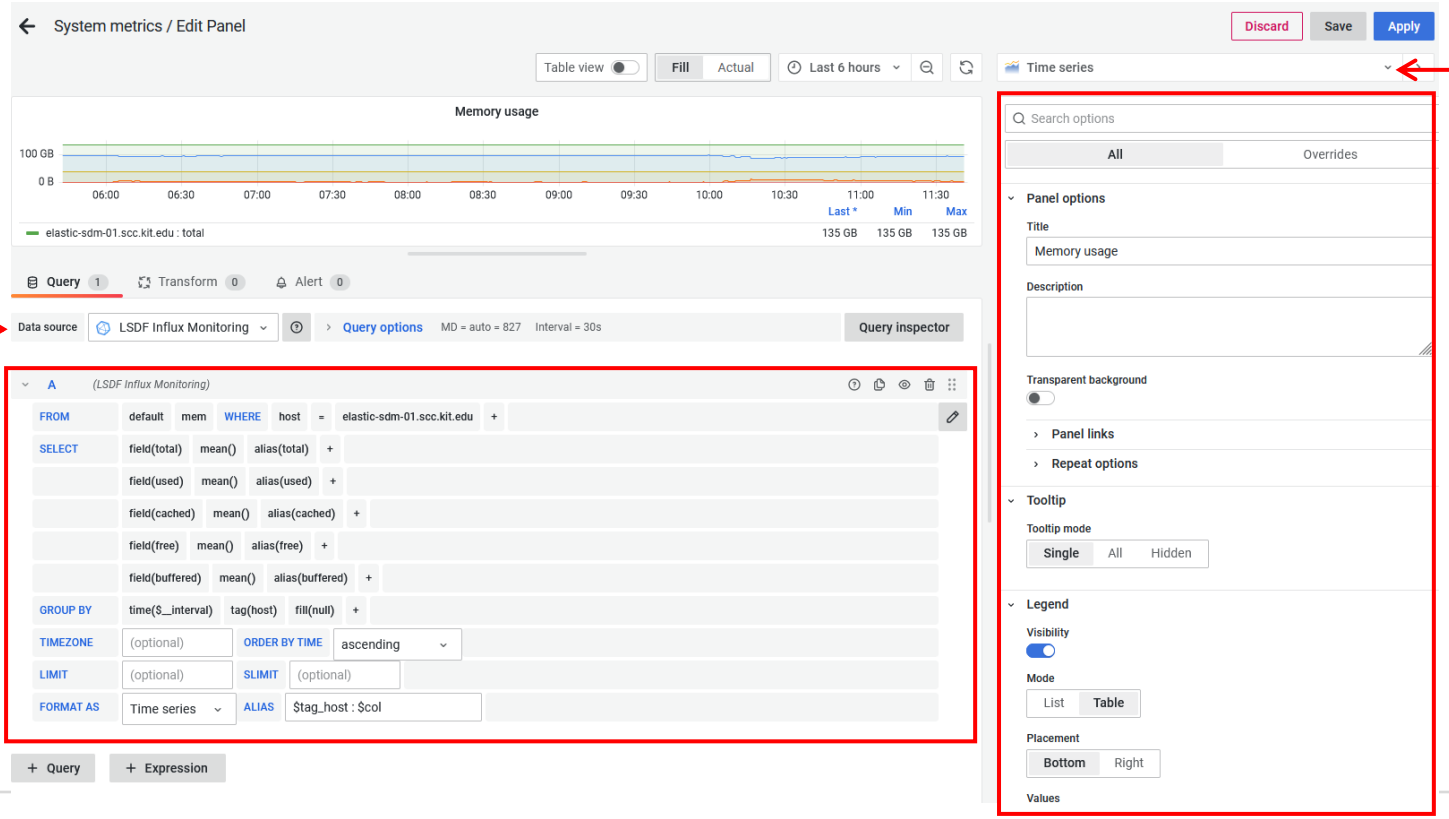




1. Search for a Dashboard
2. Open it
3. Copy the ID
4. Import it in your Grafana instance

Panels

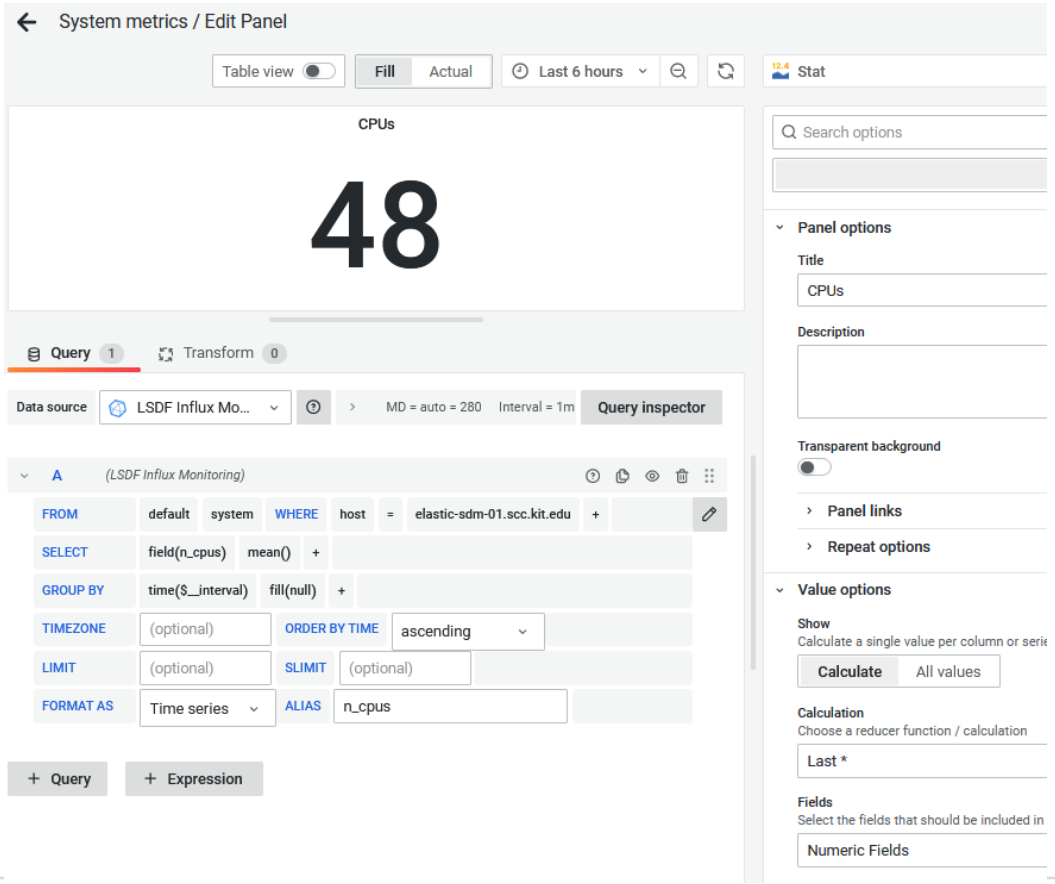
- The *panel* is the basic visualization building block in Grafana.
- Each panel has a query editor specific to the data source selected in the panel.
- There are a wide variety of styling and formatting options for each panel.
- Panels can be dragged and dropped and rearranged on the dashboard. They can also be resized.



Example 1

- Visualize the number of CPU of one server from InfluxDB

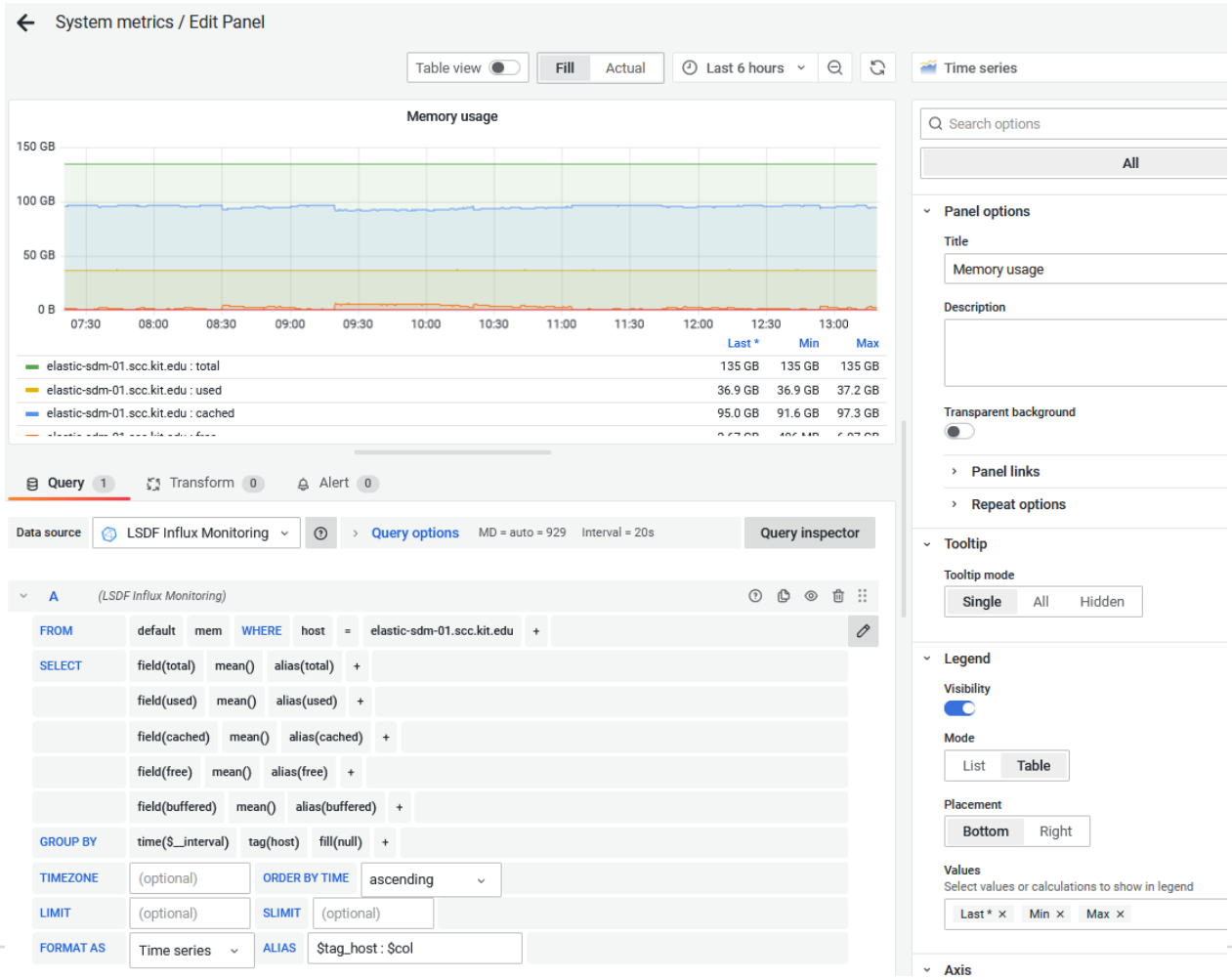
Grafana InfluxQL query editor	InfluxDB data element	Example
FROM	measurement	`system`
WHERE	tag_set (key and value)	`host = elastic-sdm-01.scc.kit.edu`
SELECT	field	`n_cpu`



Example 2

- Visualize the memory usage of one server from InfluxDB

Grafana InfluxQL query editor	InfluxDB data element	Example
FROM	measurement	`mem`
WHERE	tag_set (key and value)	`host = elastic-sdm-01.scc.kit.edu`
SELECT	field	`total,used,cached, etc…`
Add function (+)		aggregations(), alias() etc..
GROUP BY	tag	`host`
ALIAS		$measurement or $m $tag_<tag_name> $col (for fields)



Visualizations

- Grafana offers a variety of visualizations to support different use cases.

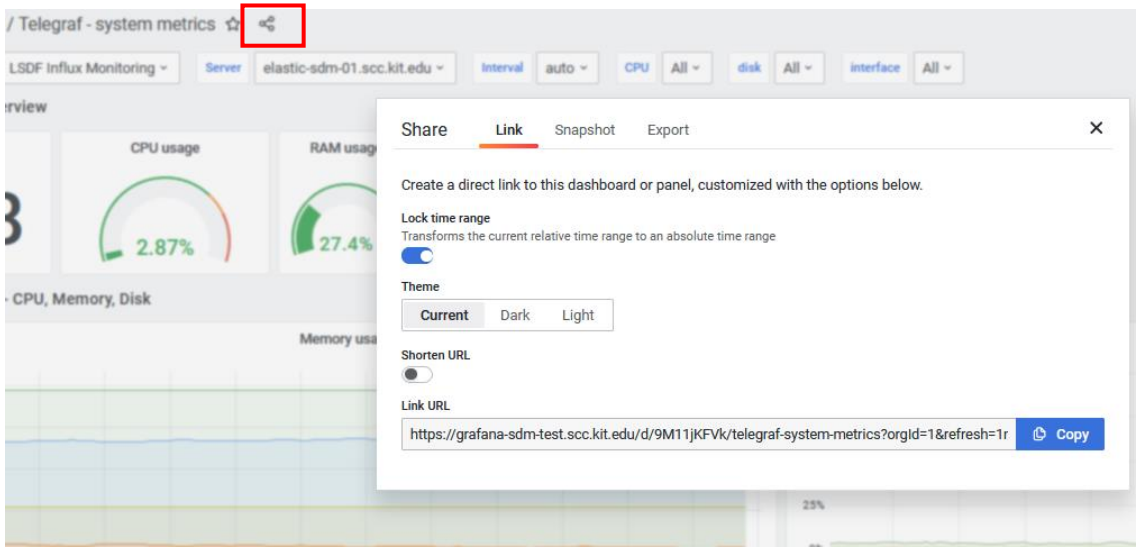
Highlights of the built-in panels:

- Graphs & charts
  - Time series is the default and main Graph visualization.
  - State timeline for state changes over time.
  - Status history for periodic state over time.
  - Bar chart shows any categorical data.
  - Histogram calculates and shows value distribution in a bar chart.
  - Heatmap visualizes data in two dimensions, used typically for the magnitude of a phenomenon.
  - Pie chart is typically used where proportionality is important.
  - Candlestick is typically for financial data where the focus is price/data movement.
- Stats & numbers
  - Stat for big stats and optional sparkline.
  - Bar gauge is a horizontal or vertical bar gauge.
- Misc
  - Table is the main and only table visualization.
  - Logs is the main visualization for logs.
  - Node Graph for directed graphs or networks.
  - Traces is the main visualization for traces.
  - Flame Graph is the main visualization for profiling.
- Widgets
  - Dashboard list can list dashboards.
  - Alert list can list alerts.
  - Text panel can show markdown and html.
  - News panel can show RSS feeds.

For a complete documentation check the visualization types at: https://grafana.com/docs/grafana/latest/panels-visualizations/visualizations

Sharing dashboard and panels

- Grafana allows you to share dashboards and panels with other users within an organization and in certain situations, publicly on the Web.
- You can share using:
  - Link (For panels -> You can also optionally click **Direct link rendered image** to share an image of the panel)
  - Snapshot (to share an interactive dashboard publicly)
  - Embedded link (for panels only)
  - Export Dashboard (in JSON format)

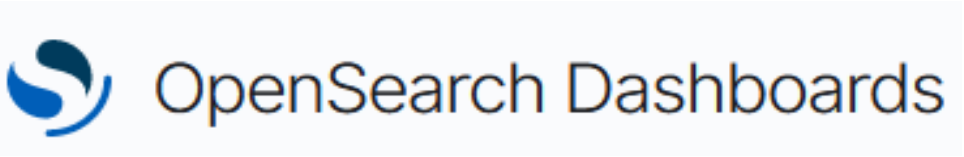


Plugins

- After the Grafana installation a wide range of visualizations and data sources are available. However we can extend them with the *plugins*.
- It is possible to install one of the plugins built by the Grafana community (or build one by yourself).
- Grafana supports three types of plugins:
  - panels (Worldmap Panel, Clock, etc)
  - data sources (support for new databases)
  - apps (for applications)

- Browse a *library* of official and community-built *plugins at* https://grafana.com/grafana/plugins/

VS



Grafana vs OpenSearch Dashboards

	Grafana	OpenSearch Dashboards
Product	It is an open-source standalone visualization tool.	It is part of the open-source OpenSearch project.
Datasources	Cross-platform: supports over 100 data sources such as InfluxDB, MySQL, Elasticsearch and OpenSearch.	Dashboards is currently designed to work only with OpenSearch and does not support any other type of data source -> Multi data sources is an experimental feature in the last release!
Metrics/Logs	Better suited for application that require continuous real-time monitoring metrics like CPU load, memory, etc..	Better suited for log file analysis and full-text search queries
Installation	Setting up Grafana is very easy as it is standalone.	Dashboards should be configured against the same version of the OpenSearch node.
Query	Grafana provides a platform to use multiple query editors based on the database and its query syntax.	Dashboards supports Dashboards Query Language (DQL) (but might not be intuitive to a first time)
Data Visualization Capabilities	Grafana has a wide variety of customization capabilities with collapsible rows and panel editors.	Also offers a large variety of visualization types

Useful links

SDM/SCC:

- Grafana instance: https://grafana-sdm.scc.kit.edu
- Grafana Test instance : https://grafana-sdm-test.scc.kit.edu
- Grafana DataCenter Metrics: https://datacenter-metrics.scc.kit.edu
- Contact mail: sdm-grafana-admins@lists.kit.edu

Official links:

- Grafana Documentation: https://grafana.com/docs/grafana/latest/?plcmt=footer
- Intro to timeseries: https://grafana.com/docs/grafana/latest/fundamentals/timeseries/
- Webinar and videos: https://grafana.com/videos/?plcmt=footer *
- Tutorials: https://grafana.com/tutorials/?pg=oss-graf&plcmt=resources *
- Getting started with Grafana(video): https://grafana.com/go/webinar/getting-started-with-grafana/
- Best practices for creating dashboards: https://grafana.com/docs/grafana/v9.3/dashboards/build-dashboards/best-practices/#best-practices-for-creating-dashboards

*Filter by Technology= Grafana

Live Demo: a sample Dashboard