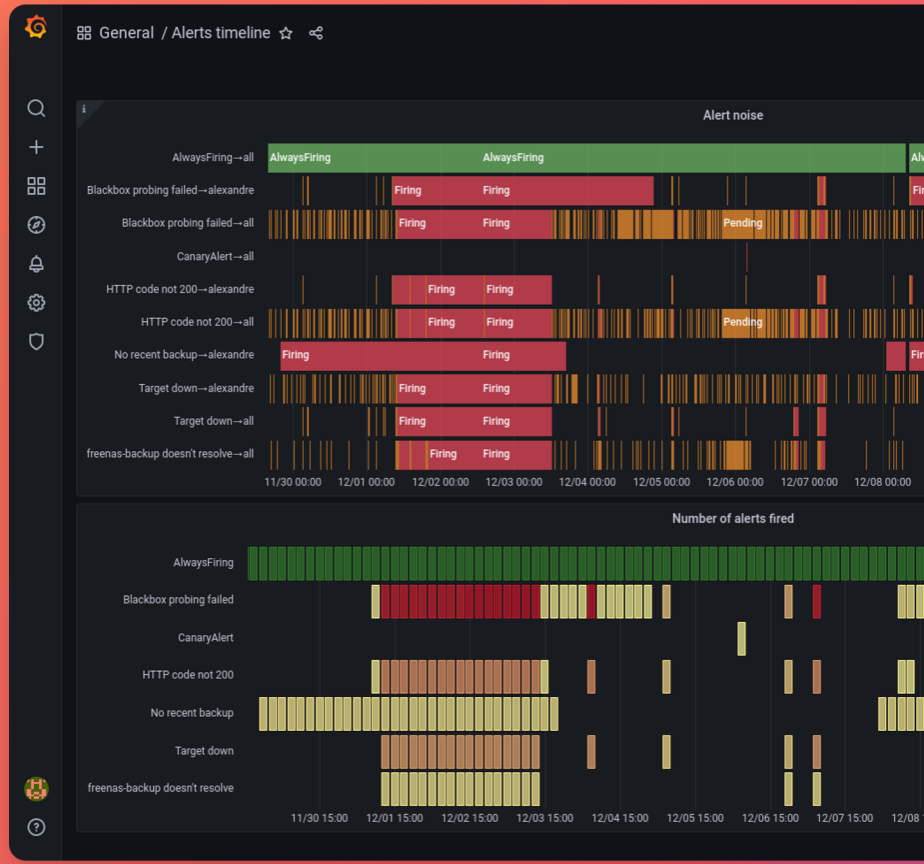
Grafana Labs | Webinar

Building advanced Grafana dashboards



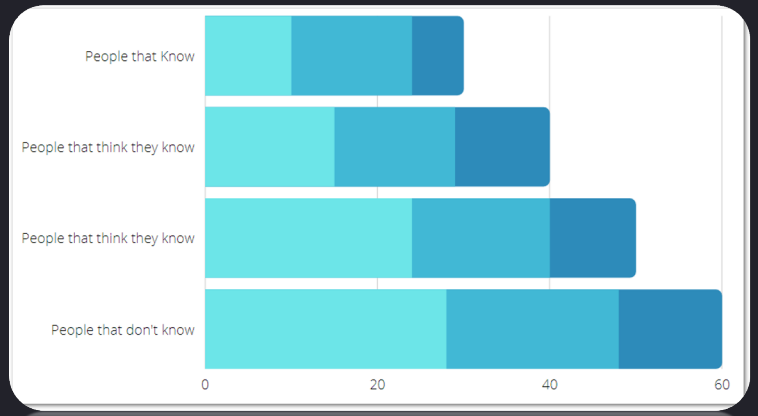
Every dashboard should have a goal or purpose.

Ward Bekker, Grafana Labs
Principal SE + Loki Project Contributor

Tell a story or solve a query with your dashboard

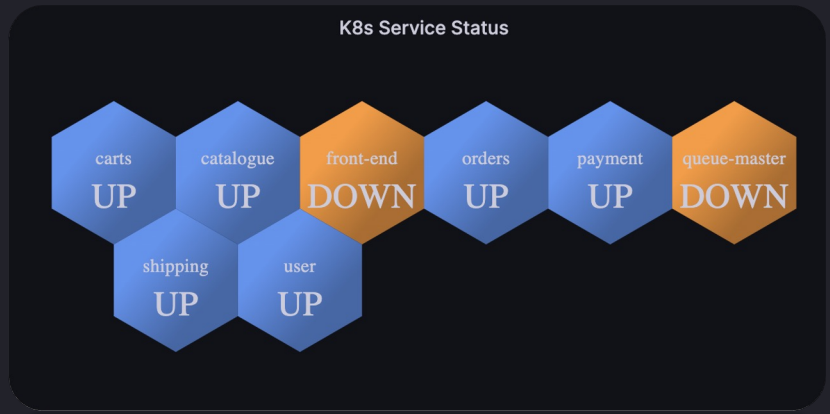
vs

Confusing



You encounter confusing information that lacks a clear goal.

Concise



Your dashboard currently displays a polystat panel, clearly indicating the status of each service container as UP or DOWN, providing you with straightforward and goal-oriented information.

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Understanding who will use your dashboard is key to delivering a design that not only presents data but solves real-world problems

Tailor your dashboards for different roles

The engineer	**Goal** Is anything broken?	**Pains** It takes me forever to find out where exactly my problem is.	**Gains** Finding the root of the issue asap, understanding our data flow.
The product manager	**Goal** What is the state of people using different devices to access my product?	**Pains** I can see the different device data but have trouble comparing it.	**Gains** The dashboard presents me the metrics I want, pre-calculated and neatly arranged.
The IoT device owner	**Goal** Did my behavior change optimize my device's battery life?	**Pains** My device isn't showing the right data to teach me the most efficient usage.	**Gains** I can see at a glance how much energy I'm saving and how much extra battery life I've gained.

Design your dashboards for different environments

Dashboard accessibility

Explore how your design adapts to various viewing contexts, ensuring information is displayed in an understandable and actionable way wherever it's accessed.

To design good dashboards, we must primarily understand people, not computers.

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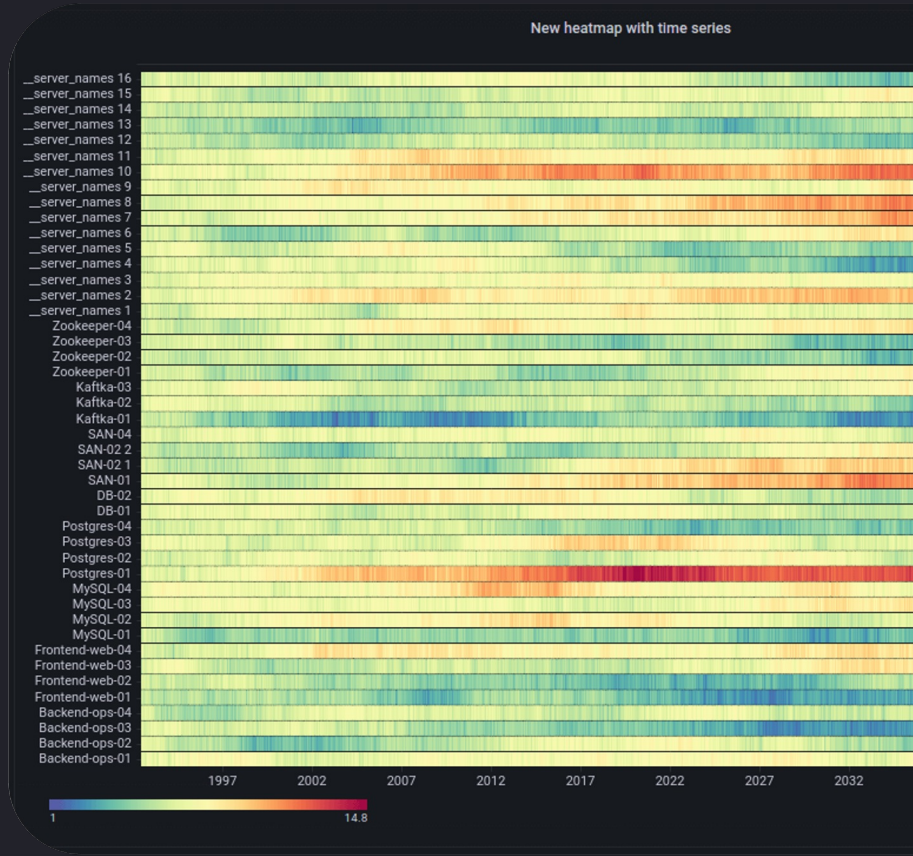
Panel Deep Dive

Typical panel configuration flow

1. Title and description
2. Legend configuration
3. Standard options setup
4. Panel specific options setup
5. Thresholds
6. Overrides
7. Value mappings

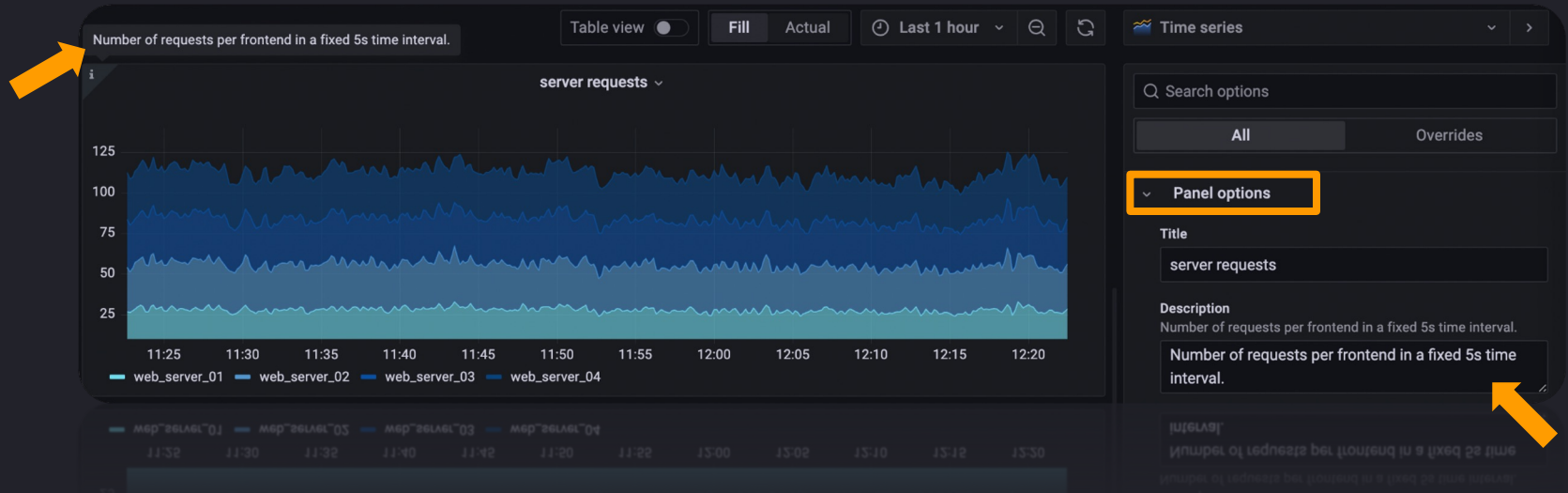


Guide your viewers with titles and descriptions

A title sets the stage, and a description offers the narrative.

Including these elements on your dashboard panels directs viewers to the heart of the data, enabling quick understanding and informed decision-making.

In both cases, **you can use template variables** but *not global variables*



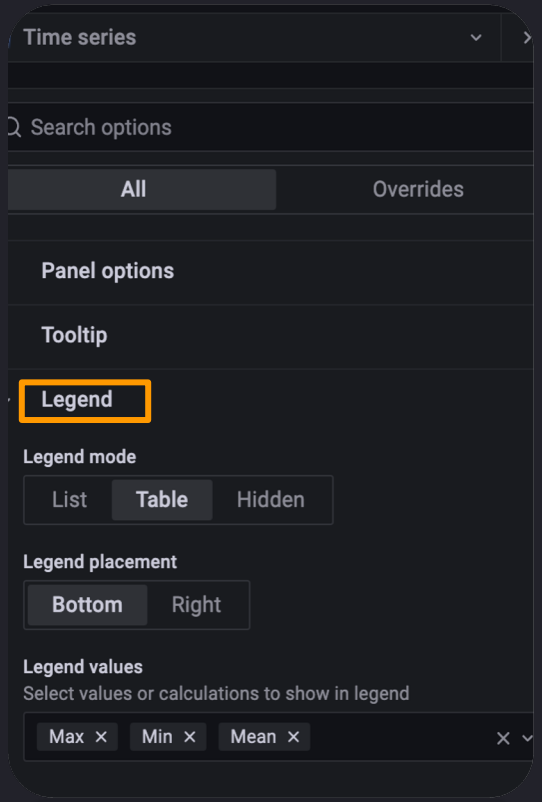
Legend configuration

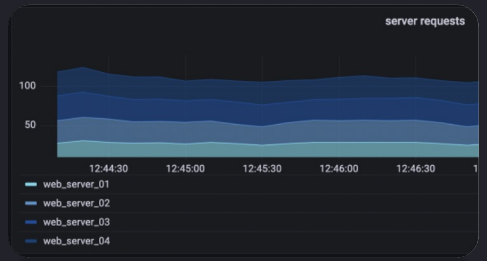
Legends are navigational tools that add depth to your data story.

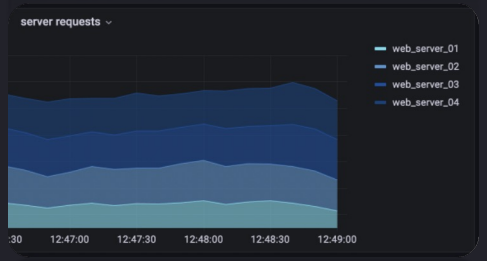
Thoughtful configuration of the legend mode and its placement—whether as a list, table, or hidden—improves your viewer's understanding.

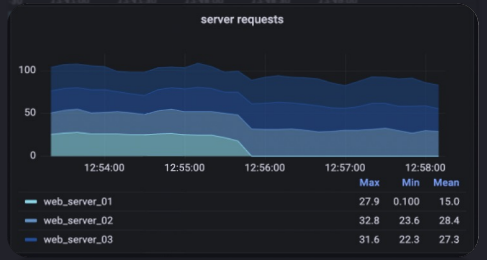
Opting for a table mode with calculated values like Max or Mean offers immediate insights, fostering a clearer interpretation of complex datasets.

Choose settings that turn your data into a compelling narrative, making every number count









Legend configuration

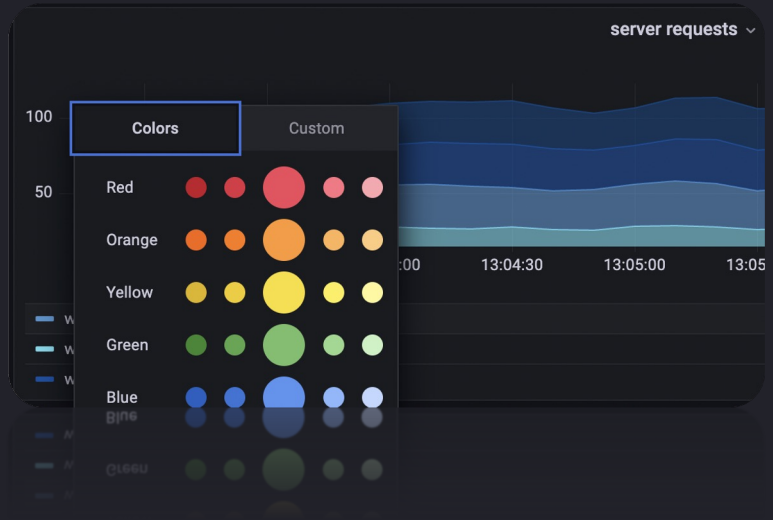
Legends provide control over the data presented.

When dealing with a multitude of data series, legends can be used to simplify the view:

- Clicking on a legend item isolates the series, allowing for a focused analysis of specific data points.
- Ctrl (Win/Linux) or Command (Mac), while clicking, enables comparing multiple data series, providing a multifaceted view of the information.
- Double-clicking any legend returns the display to the comprehensive default view, giving a quick reset option.

Color customization is another layer of control.

By clicking the color icon next to a legend item, you personalize the dashboard's palette, enhancing visual distinction and adherence to branding or accessibility standards.

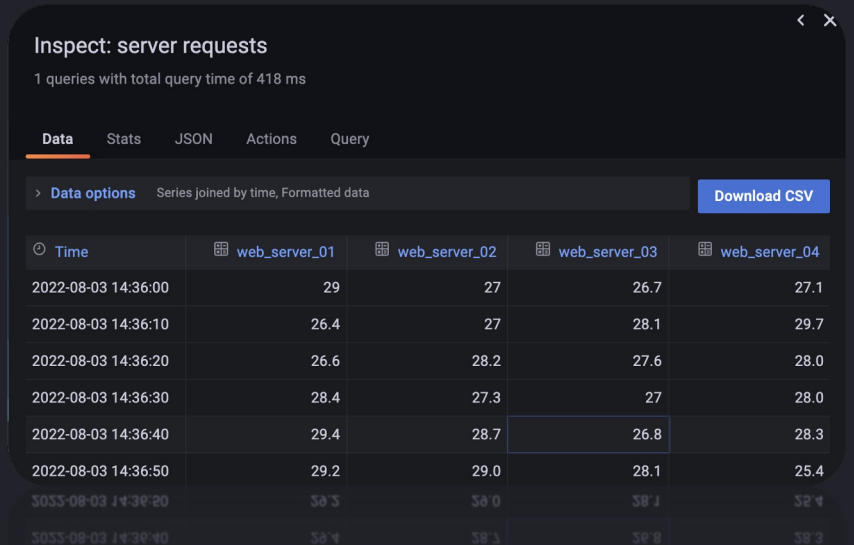


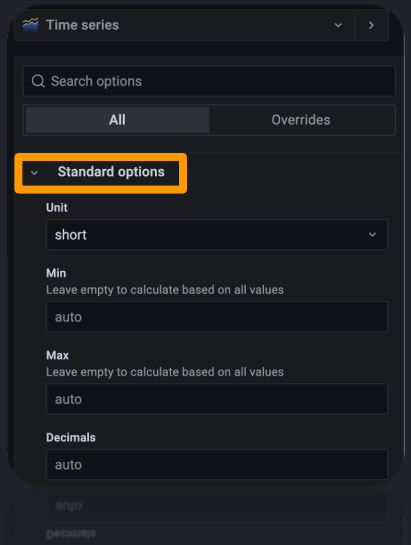
Standard options setup

Data Frames are essential structures for organizing and displaying data within the tool.

These options allow you to:

1. Modify how data is presented within the Data Frame, enhancing readability and context for the viewer. You can choose how to display the data in raw or formatted forms, ensuring it is immediately understandable.
2. Apply changes across all fields or columns within the Data Frame simultaneously, ensuring consistency and saving time when adjusting multiple metrics simultaneously.





Standard options setup

Fine-tune your data's appearance and functionality in the dashboard using these Standard options.

- **Unit**: Define the data measurement unit. Start typing to see available units or create a custom one by selecting 'Custom'.
- **Min/Max**: Set minimum and maximum thresholds for your data. Leave blank for automatic calculations based on the full data range.
- **Decimals**: Decide how many decimal places to show for precision. Leave blank to default to the data source's settings.
- **No value**: Choose a placeholder for empty or null data points, with a hyphen as the default.
- **Display Name**: Customize field names using a blend of constants and variables for easier identification.
- **Color Scheme**: Assign colors to data values for visual impact. Use single colors for consistency or to match branding guidelines.

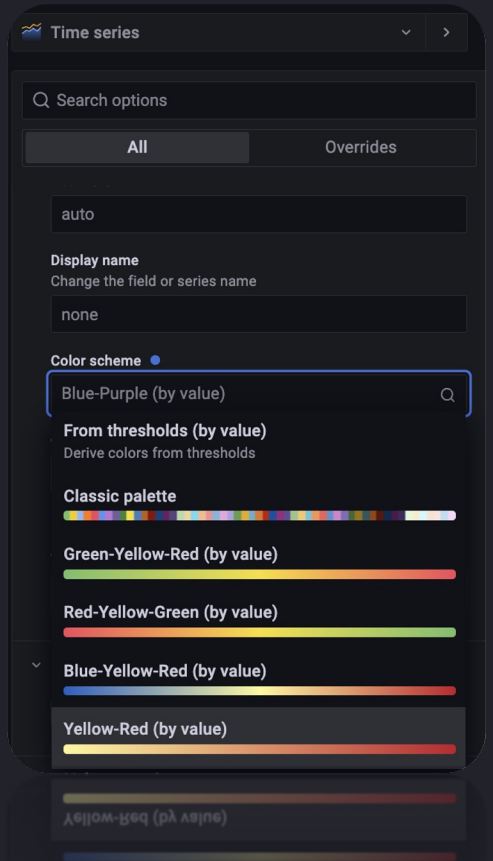
Each setting is a step towards a dashboard that not only displays data but tells its story effectively. Apply these to ensure your dashboard communicates clearly and meets your analytical needs.

Use the power of color to convey information quickly and intuitively

Select a scheme that aligns with your data storytelling goals. Color makes your dashboard more aesthetically pleasing and makes it an efficient communicator of insights.

1. **Continuous/Gradient Schemes**: Apply a gradient color scheme based on data values to provide visual weight to numerical information, making trends and patterns instantly recognizable.
2. **Threshold-Based Schemes**: Use color changes at specific data thresholds to highlight significant value ranges or to indicate status changes like safe, warning, and critical levels.
3. **Custom Palettes**: Personalize the color palette to match your organization's branding or to improve accessibility for all users.

Strategically selecting your color schemes improves your dashboard from a data container to a compelling visual narrative that engages and informs with clarity.



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Let's explore how to convey information with maximum impact and efficiency using Transformations

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Transformations allow you to manipulate and refine your data directly in the browser, tailoring it before it reaches the visualization stage

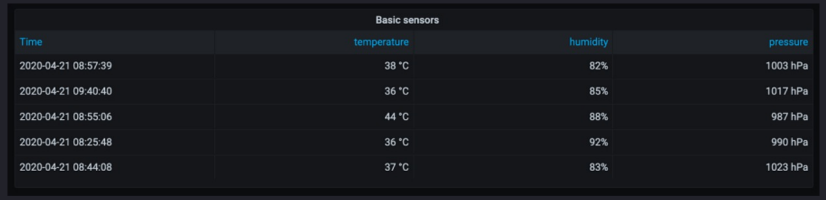
They facilitate operations like filtering, organizing, and even performing calculations on time-series data, ensuring the displayed information aligns with your specific needs

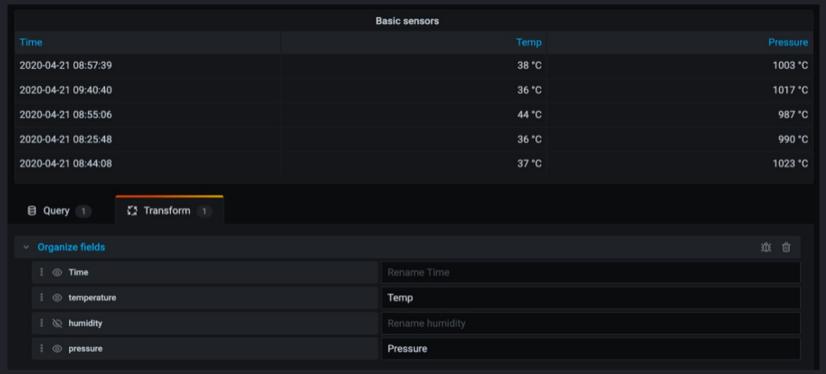
Refine your data with transformations for clearer insights

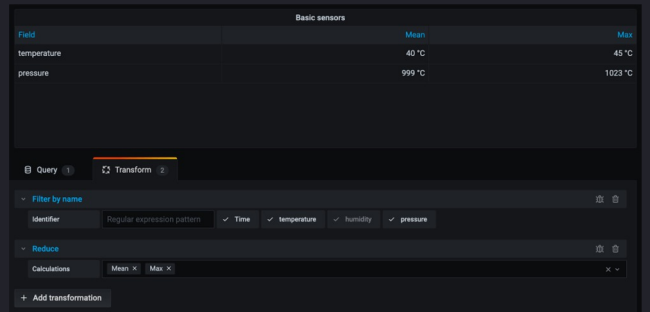
Transformations are powerful in simplifying and clarifying your data within visualizations.

The 'Organize Fields' transformation lets you customize how data is presented by allowing you to rename, reorder, or hide specific fields. For example, 'Temperature' becomes 'Temp', and 'Pressure' remains precise, while less relevant details like 'Humidity' can be discreetly filtered out.

This approach to layering transformations ensures a clean, focused dataset where subsequent operations like 'Reduce' can be applied to calculate key statistics, such as the average or peak values, all within a seamless workflow







Transformation use cases to improve your visualizations

Transformations are your toolkit for enhancing data visualization, offering a range of capabilities to fine-tune your analytics.

With them, you can:

- Compress complex results into a single value,
- Selectively filter data and systematically organize fields for better clarity
- Merge results from multiple queries
- Craft new fields through calculated expressions.

These are just a few possibilities—transformations unlock a world of data manipulation to suit your analysis needs.

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If you've spent time in Grafana, you've likely interacted with variables and templates - and you may not have known it!

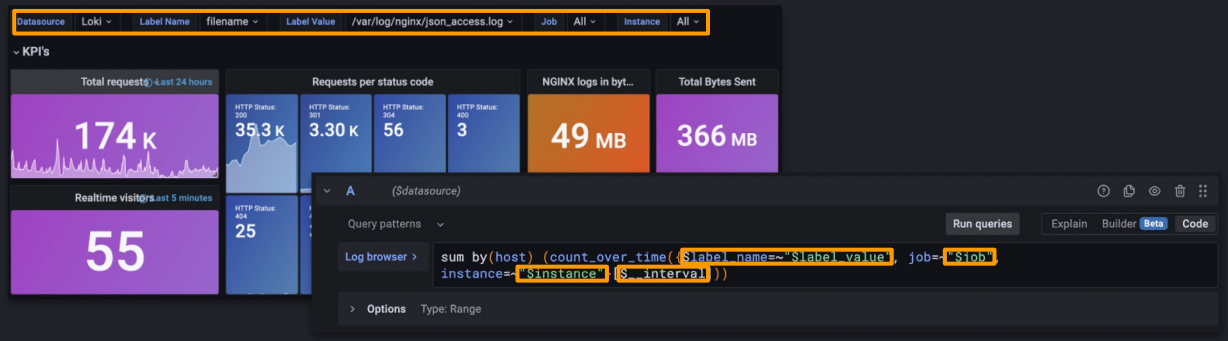
Configure your Grafana setup with dashboard and environment variables for dynamic monitoring

Dashboard variables are pivotal for tailoring analytical dashboards within Grafana, allowing a single dashboard to adapt to multiple data sources or contexts through user selection.

Environment variables configure system processes on which Grafana operates, such as Docker containers or EC2 instances, influencing Grafana's behavior without direct user interaction.

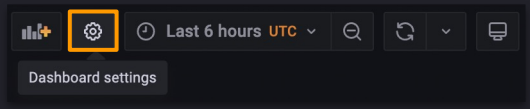
While we focus less on environment variables today, remember they are key-value pairs crucial for system configuration.

A template, then, harnesses these variables in queries, as seen in the example, enabling a single dashboard to monitor multiple servers efficiently by prefixing a dollar sign ($) to reference variables in query and panel code.

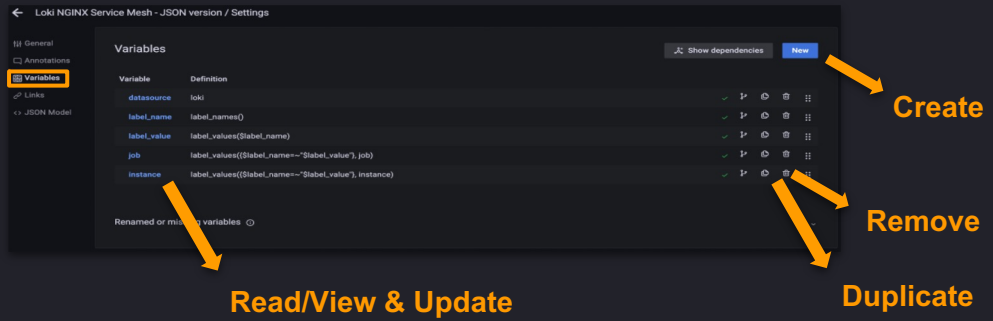


Manage your dashboard with custom variables for better control and visibility

Dashboard variables are designed for individual dashboards, allowing users with editing rights to tailor the dashboard's interactivity and data representation.



Accessible through the Variables menu in Dashboard settings, these variables, once created, appear as dropdown lists at the dashboard's top—unless configured to be hidden. You can enable multi-selection or 'Select All' options, providing a customized and user-friendly experience for dashboard interaction.



Customize your dashboards with versatile variable types

Grafana provides a suite of variable types to customize your dashboards precisely.

- Use 'Query' variables to pull dynamic lists from your data, set 'Custom' variables with a comma-separated list for specific selections, and input direct text with 'Text box' variables.
- 'Constant' variables hold fixed values behind the scenes, while 'Data source' variables let you switch data sources across the dashboard. 'Interval' variables define the time ranges for your queries.
- 'Ad hoc filters' apply key/value filters to metric queries for certain data sources like InfluxDB, Prometheus, and Elasticsearch.
- Employ 'Global' variables within query expressions and create dependent selections with 'Chained' variables.

Use global variables for real-time process insights

Global variables function as read-only indicators, reflecting the status of your Grafana instance.

They are essential for creating expressions within the query editor, serving as live process indicators.

Variables like $__dashboard, $__from and $__to, not only inform you about the dashboard's name and the time range but can also be formatted and shared via URLs for coordinated analysis efforts.

Syntax	Example result	Description
`${__from}`	1594671549254	Unix millisecond epoch
`${__from:date}`	2020-07-13T20:19:09.254Z	No args, defaults to ISO 8601/RFC 3339
`${__from:date:iso}`	2020-07-13T20:19:09.254Z	ISO 8601/RFC 3339
`${__from:date:seconds}`	1594671549	Unix seconds epoch
`${__from:date:YYYY-MM}`	2020-07	Any custom date format that does not include the `:` character

Streamline queries and personalize dashboards using global variables

Optimize your Grafana dashboards using the $__interval global variable to group time series data efficiently, which is ideal for handling dense datasets. This variable automatically calculates the optimal grouping interval to speed up your queries, especially over longer periods.

For millisecond precision, use $__interval_ms.

Identify your organizational context with $__org, which provides the organization ID and can display its name with ${__org.name}.

Tailor the user experience with $__user variables, accessing the current user's ID, login, and email through ${__user.id}, ${__user.login}, and ${__user.email}, respectively, to personalize dashboard interactions and controls.

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Create cutting-edge dashboard interfaces with advanced querying and dynamic rendering

Dynamic App Creation

Scenes

Build your own highly interactive, custom experiences within Grafana's app plugins, using the new Scenes library

Easily manage complex dashboards with deep nesting and composition

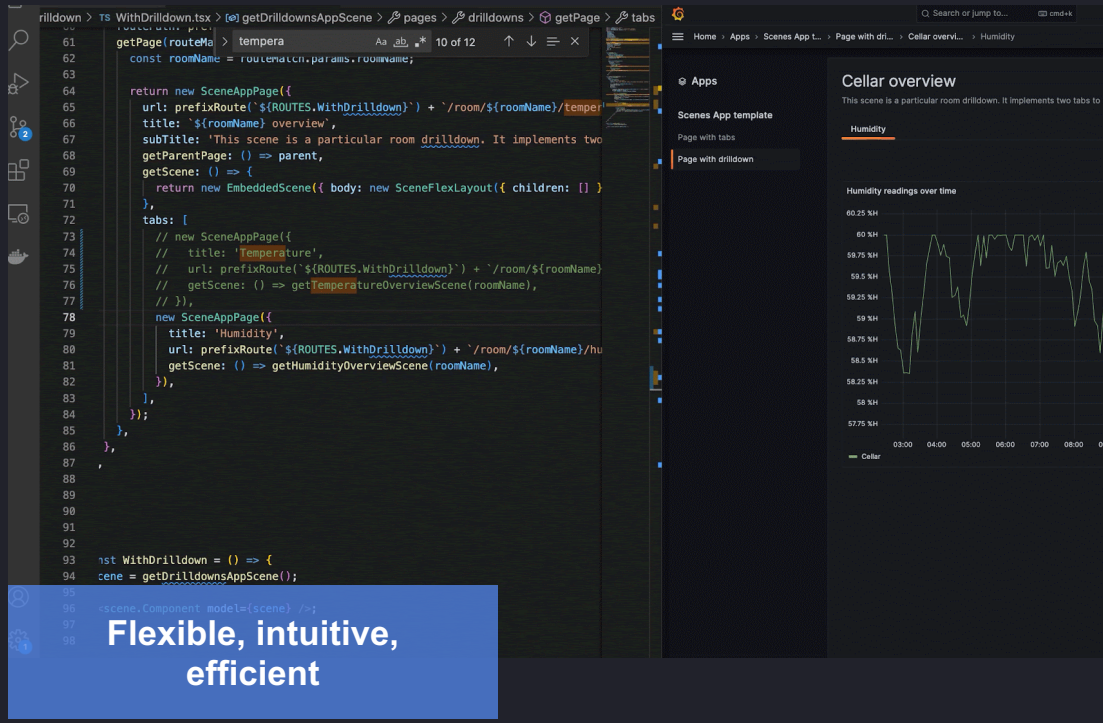
Organize, visualize, and manage large amounts of data intuitively with nested and composed dashboards

Flexible layouts for dynamic visualization

Adapt to any screen size with layout systems, including a new flex layout that makes visualizing data a breeze

Efficient performance with serialized and cached state

Experience improved performance and faster re-rendering with runtime state, including query results, that can be serialized and cached in the frontend



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More visualization tips

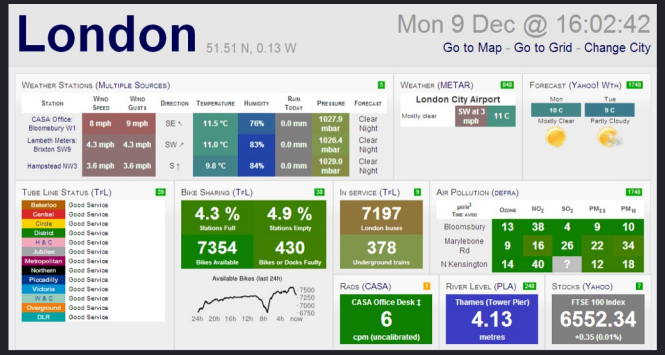
Craft clear and cohesive dashboards

Effective dashboards should offer clarity, not complexity.

Avoid the visual chaos of a 'bad dashboard' like the example on the left, where excessive colors and elements confuse. Instead, aim for a personalized and coherent design that guides the viewer's eye and conveys a clear narrative, as demonstrated by the dashboard on the right.

By using consistent color schemes aligned with your brand and organizing information hierarchically, you create a dashboard that’s visually appealing and tells your data’s story at a glance.

Generic dashboard



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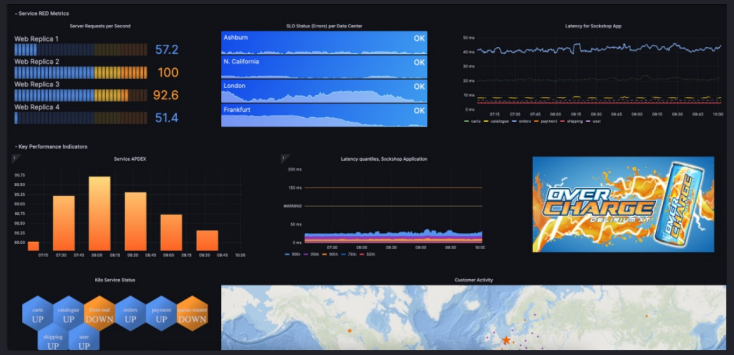
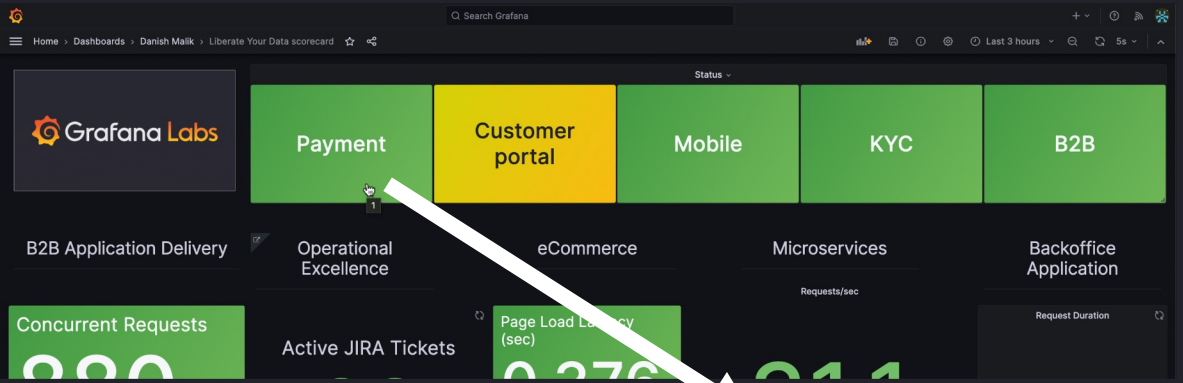
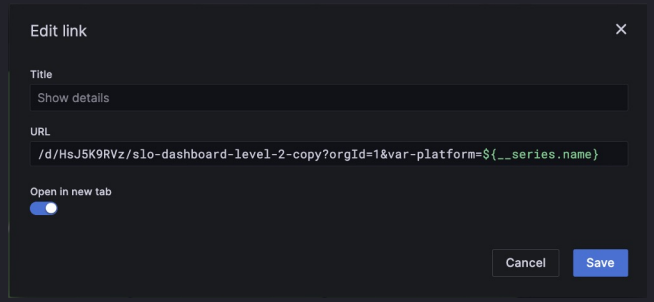
Personalized dashboard



Improve navigation with drill-down links





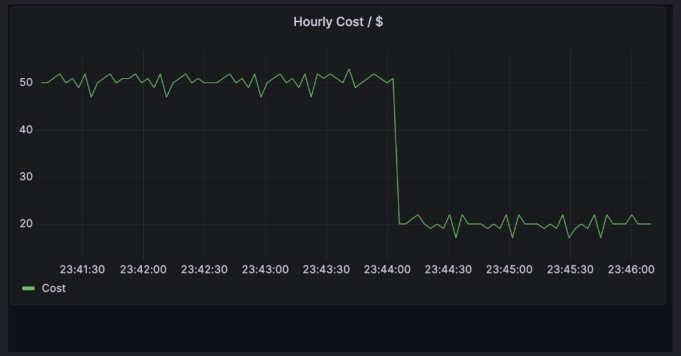
Panel and Data Links simplify user interactions, providing detailed views for each metric and creating an interactive journey through your data.

Clarify your dashboard with strategic annotations

Annotations turn a static graph into a narrative, highlighting key events like deployments that may impact your metrics, as shown in the hourly cost graph.

By marking these pivotal moments, annotations offer immediate context, aiding in rapid interpretation and insightful analysis of your data trends.

Unannotated panel



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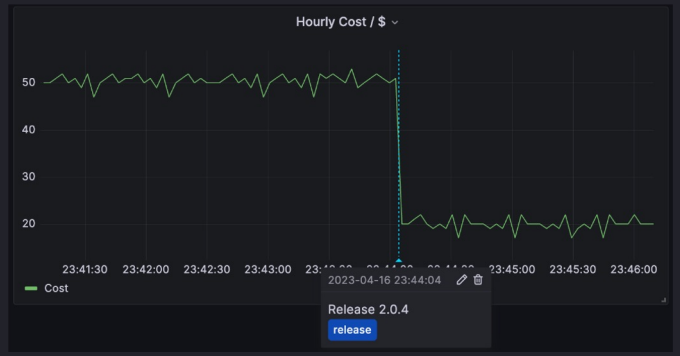
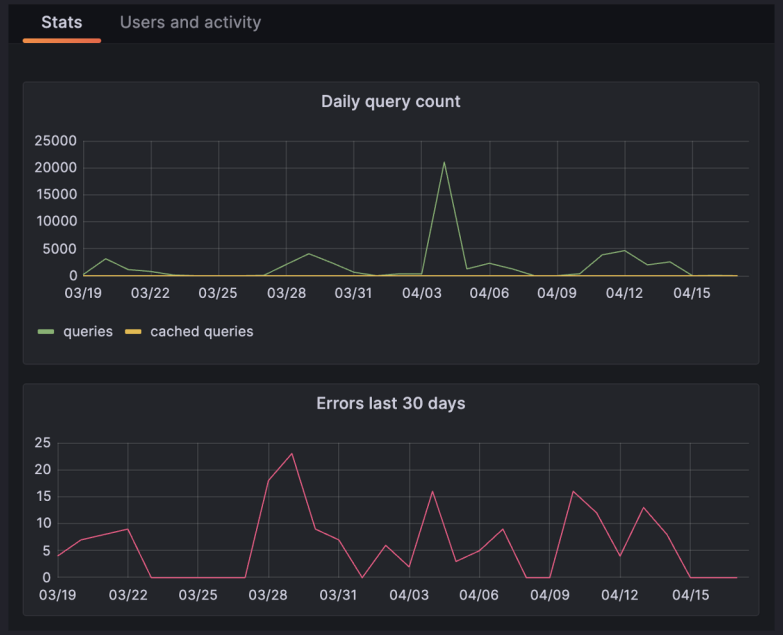
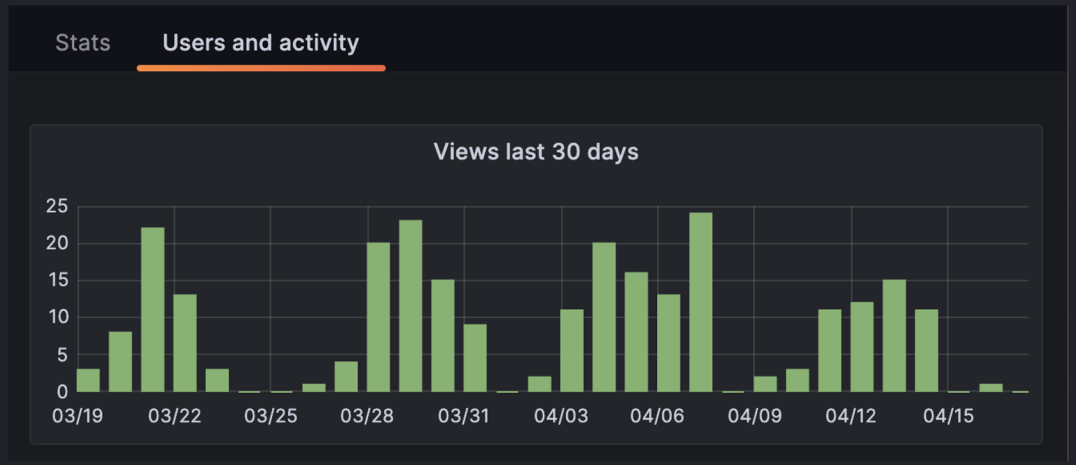
Annotated panel



Track dashboard engagement to optimize performance



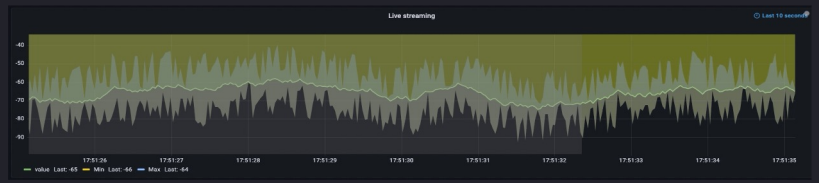


Keep tabs on dashboard interactions to understand usage patterns and user engagement. This data helps you fine-tune your dashboards, ensuring they remain relevant and valuable to your users.

Optimize performance with data source usage analytics

Monitoring your data source usage provides insights into frequency and impact, guiding you toward data optimization and efficient resource allocation for better dashboard performance.

Be innovative! Discover more with play.grafana.org



Dive into play.grafana.org for a wealth of dashboard examples to spark creativity and expand your Grafana skill set. It's a resourceful platform to observe, learn, and be inspired by various data visualization techniques.

Embrace continuous dashboard evolution

Transform your dashboards into dynamic tools that grow and adapt to your organization's pulse.

Feedback Loop - Actively seek and apply user feedback to enhance dashboard utility.

Adapt to Change - Regularly update metrics to reflect current performance benchmarks.

Iterative Process - Continually refine visualizations for clarity and relevance.

User-Centric Design - Tailor dashboards to varied user interpretations and needs.

Your dashboard is a living tool. Keep it growing with your goals!

Grafana Cloud is the easiest place to get started!

Free Forever Plan

3 users, 10k metrics, 50GB logs, 50GB traces, and 500 virtual user hours for performance testing

Enterprise Plugins

Splunk, Datadog, MongoDB, ServiceNow and more!

One-click integrations

Including preconfigured dashboards enabling you to go from blank slate to beautiful Grafana dashboards and alerts in just a few clicks

Get started now!