



SQL Datasources in Grafana

Carl Bergquist & Marcus Efraimsson



Grafana raintank



Usage stats

Mysql: 22000

Postgres: 7800

MSSQL: 3000



MySQL
System software

PostgreSQL
System software

Microsoft SQL Ser...
System software

+ Add comparison

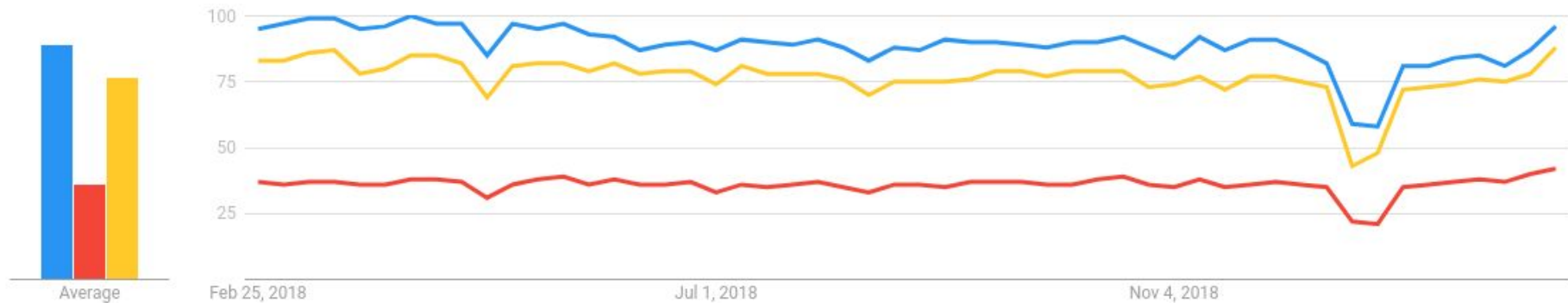
Worldwide

Past 12 months

All categories

Web Search

Interest over time





Basic usage

Values

Time ▾	source	datacenter	hostname	value
2019-02-22 09:22:17	frontend	America	server1	1.01 K
2019-02-22 09:22:17	frontend	America	server1	996.48
2019-02-22 09:22:17	frontend	America	server1	998.11
2019-02-22 09:22:17	site	America	server1	148.12

1
2
3
4
5
6
7
8
9

Queries to

 gdev-mysql ▾

Add Query

Query Inspector



▾ A



```
SELECT createdAt as Time, source, datacenter, hostname, value
FROM grafana_metric WHERE hostname in($host)
```

Format as

Table ▾

Show Help ▶

Generated SQL ▶





Queries to

gdev-mysql

Add Query

Query Inspector



A



```
SELECT
  $__timeGroup(createdAt, '$summarize') as time_sec,
  avg(value) as value,
  'started' as metric
FROM
  grafana_metric
WHERE
  $__timeFilter(createdAt) AND
  measurement = 'payment.started'
GROUP BY 1, 3
ORDER BY 1
```

Format as

Time series

Query Builder

Show Help

Queries to



-- Mixed --



▼ A (gdev-prometheus)

```
go_goroutines * 6
```

Legend

legend format



Min step



Resolution

1/1



▼ B (gdev-mysql)

```
SELECT
  createdAt AS "time",
  measurement AS metric,
  value
FROM grafana_metric
WHERE
  $__timeFilter(createdAt)
ORDER BY createdAt
```

Format as

Time series



Query Builder

Show Help ▶

Generated SQL ▶

Variables

+ New

Variable Definition

`$user` `SELECT username as __text, user_id as __value FROM users`

Duplicate



☐ User Dashboard ▾

User

bergquist

marefr

Selected user value: 2



What's new for SQL datasources

Up until Grafana 5.0

- MySQL in 4.3
- Postgres in 4.6

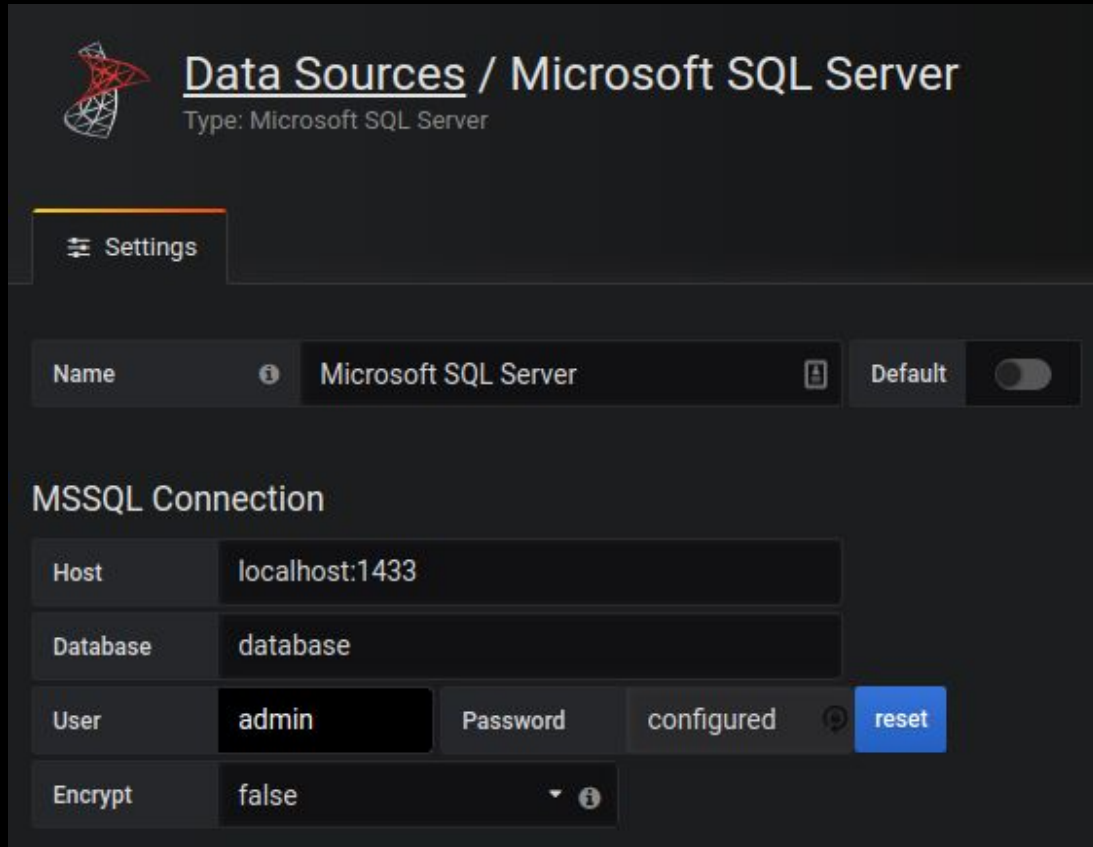
(Oracle Database available as a premium plugin)




Grafana 5.1





Microsoft SQL Server support



The screenshot shows a configuration page for a Microsoft SQL Server data source. At the top left is a red and white logo. The main heading is "Data Sources / Microsoft SQL Server" with a subtitle "Type: Microsoft SQL Server". Below this is a "Settings" tab. The main configuration area includes a "Name" field set to "Microsoft SQL Server" with an information icon and a "Default" toggle switch. The "MSSQL Connection" section contains fields for "Host" (localhost:1433), "Database" (database), "User" (admin), "Password" (configured), and "Encrypt" (false). A blue "reset" button is located next to the password field.

 **Data Sources / Microsoft SQL Server**
Type: Microsoft SQL Server


Settings


Name  Microsoft SQL Server  Default

MSSQL Connection

Host localhost:1433

Database database

User admin Password configured  **reset**

Encrypt false 

Grafana 5.3



Postgres graphical query builder

The screenshot displays a graphical query builder interface for PostgreSQL. The interface is organized into several sections:

- FROM:** The table is set to `docker_container_net`. It includes fields for `Time column` (set to `"time"`) and `Metric column` (set to `none`).
- SELECT:** The column is `rx_bytes`, with an aggregate function of `avg` and a window function of `rate`. The alias is also `rx_bytes`.
- WHERE:** A macro `$_timeFilter` is applied. The expression is `container_name = 'docker_grafana_1'`.
- GROUP BY:** The grouping is based on `time ($__interval, none)`.
- Format as:** The output format is set to `Time series`.
- Actions:** There are buttons for `Edit SQL`, `Show Help`, and `Generated SQL`.
- Bottom Section:** A section labeled `B` contains an `Add Query` button.

Additional UI elements include a hamburger menu, an eye icon for visibility, and a trash icon for deletion.

Postgres TimescaleDB extension support

PostgreSQL details

Version



9.3



TimescaleDB



[Help](#) ▶

Min time interval

1m



Grafana 5.4



MySQL graphical query builder

▼ B (gdev-mysql)

FROM	grafana_metric	Time column	createdAt	Metric column ⓘ	measurement
SELECT	Column: value	+			
WHERE	Macro: \$__timeFilter	+			
GROUP BY	+				
Format as	Time series ▼	Edit SQL	Show Help ▶	Generated SQL ▶	

Grafana 6.0



MySQL SSL support

Settings

Name



MySQL



Default



MySQL Connection

Host

localhost:3306

Database

grafana

User

grafana

Password

.....



TLS Client Auth



With CA Cert



Skip TLS Verify



TLS Auth Details



CA Cert

configured

reset

Client Cert

configured

reset

Client Key

configured

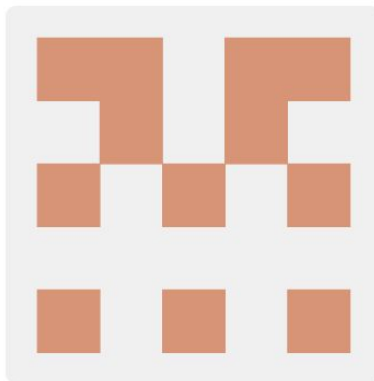
reset



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svenklemm

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 Dresden, Germany

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Forked from timescale/timescaledb

An open-source time-series database optimized for fast ingest and complex queries. Engineered up from PostgreSQL, packaged as an extension.

● C

[grafana](#)

Forked from grafana/grafana

Grafana with PostgreSQL datasource

● TypeScript 🍴 1

[docs.timescale.com-content](#)

Forked from timescale/docs.timescale.com-content



Tips and tricks!

HI, THIS IS
YOUR SON'S SCHOOL.
WE'RE HAVING SOME
COMPUTER TROUBLE.



OH, DEAR - DID HE
BREAK SOMETHING?
IN A WAY-



DID YOU REALLY
NAME YOUR SON
Robert'); DROP
TABLE Students;-- ?



OH, YES. LITTLE
BOBBY TABLES,
WE CALL HIM.

WELL, WE'VE LOST THIS
YEAR'S STUDENT RECORDS.
I HOPE YOU'RE HAPPY.



AND I HOPE
YOU'VE LEARNED
TO SANITIZE YOUR
DATABASE INPUTS.

Permissions

- Grafana cannot sanitize the database input
- Only grant select permissions on database and tables for database user

User Permission

The database user should only be granted SELECT permissions on the specified database & tables you want to query. Grafana does not validate that queries are safe so queries can contain any SQL statement. For example, statements like `DELETE FROM user;` and `DROP TABLE user;` would be executed. To protect against this we **Highly** recommend you create a specific PostgreSQL user with restricted permissions.



Performance

- Easy to write really expensive queries (SELECT * FROM)
- Can slow database server down
- Can hang browser where Grafana is used
- Use a separate database from production/data warehouse



Time zones

- Run Grafana and database server on UTC time zone
- Use time zone-aware data types for storing dates
- Use epochs (seconds since 1970)



Time series queries

- Most panels expects time series data
- Must include a column named time

▼ A

```
SELECT 10 as value, 'Metric' as metric
```

Format as

Time series ▼

Query Builder

Show Help ▶

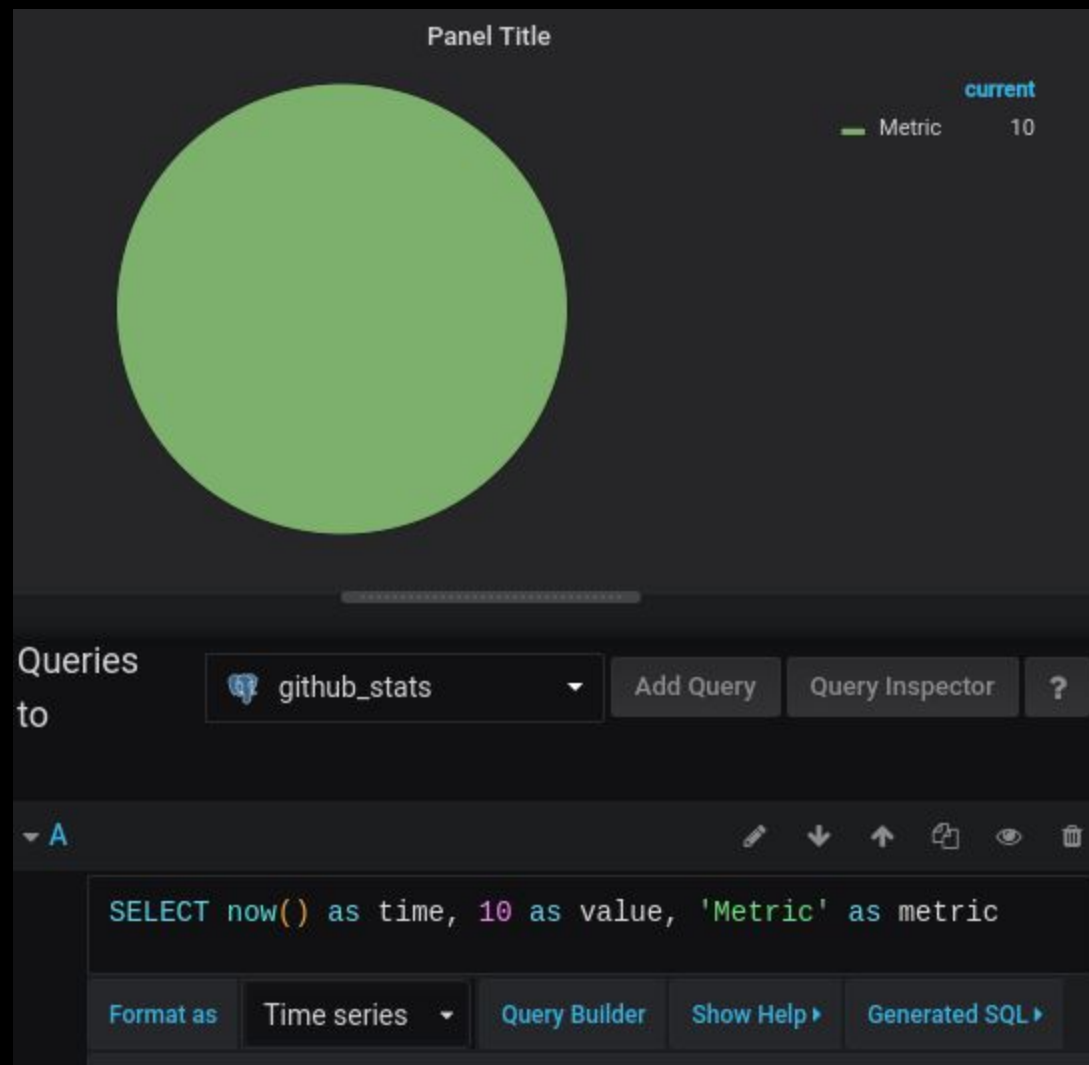
Generated SQL ▶

Found no column named time

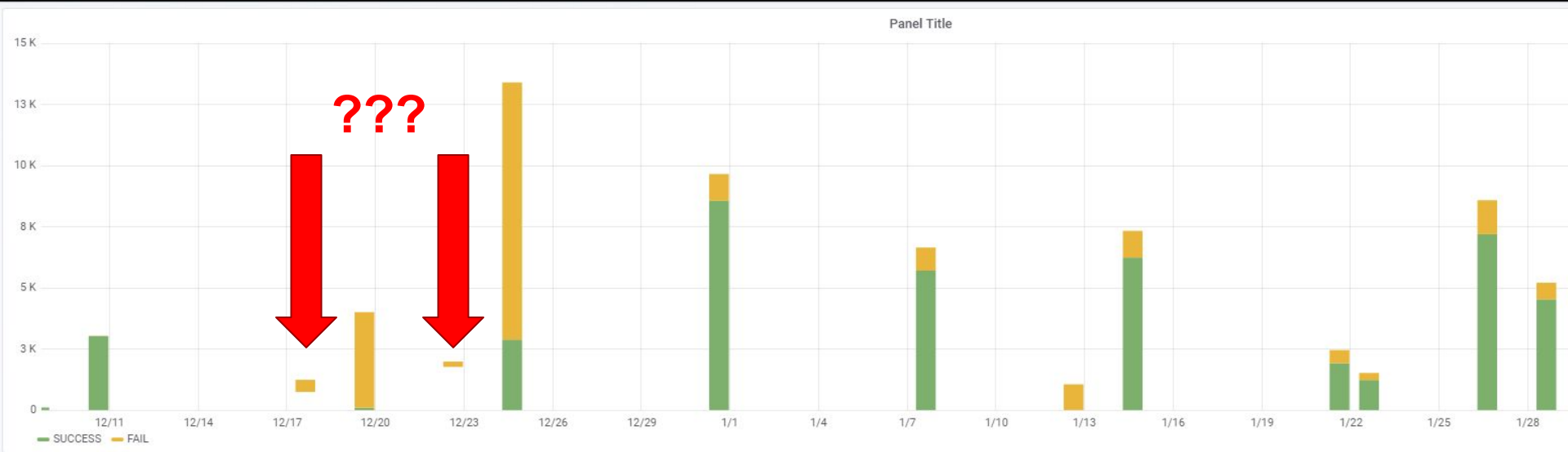


Pie Chart panel

- Without having a time column?
- You create one



Graph panel - stacked bar chart



Graph General Metrics Axes Legend **Display** Alert Time range

Draw options

Series overrides (0)

Thresholds (0)

Draw Modes

- Bars
- Lines
- Points

Mode Options

- Fill 1
- Line Width 1
- Staircase
- Point Radius 5

Hover tooltip

- Mode All series
- Sort order None
- Stacked value individual

Stacking & Null value

- Stack
- Percent
- Null value null as zero

Graph panel - stacked bar chart

- Need to supply a value for every interval
- Use \$__timeGroup/\$__unixEpochGroup macro with fill parameter

```
$__timeGroup(dateColumn,'5m', 0)
```

```
$__unixEpochGroup(dateColumn,'5m', 0)
```





Grafana GitHub stats

Carl Bergquist & Marcus Efraimsson

Background

Pull requests 94 ZenHub Projects 3 Wiki Insights

February 17, 2019 – February 24, 2019

Period: 1 week

Overview

64 Active Pull Requests

108 Active Issues

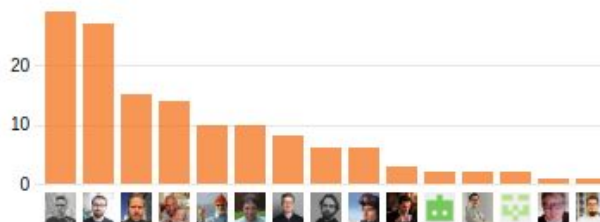
42 Merged Pull Requests

22 Proposed Pull Requests

62 Closed Issues

46 New Issues

Excluding merges, **17 authors** have pushed **79 commits** to master and **138 commits** to all branches. On master, **234 files** have changed and there have been **4,707 additions** and **1,651 deletions**.



GitHub Insights



Google Docs



Background cont.

- Pull request activity kept growing
- WHY?
 - Probably because Grafana Labs are growing?
 - We maybe have a lot of new contributors?
 - Non-Grafana Labs contributors are probably as active as before?
- Clearly needed a solution to remove the uncertainty!



Problem description

We want to measure and visualize GitHub activity of Grafana Labs vs contributors over time to make sure we have a healthy community and keep growing the contributor base



Solution

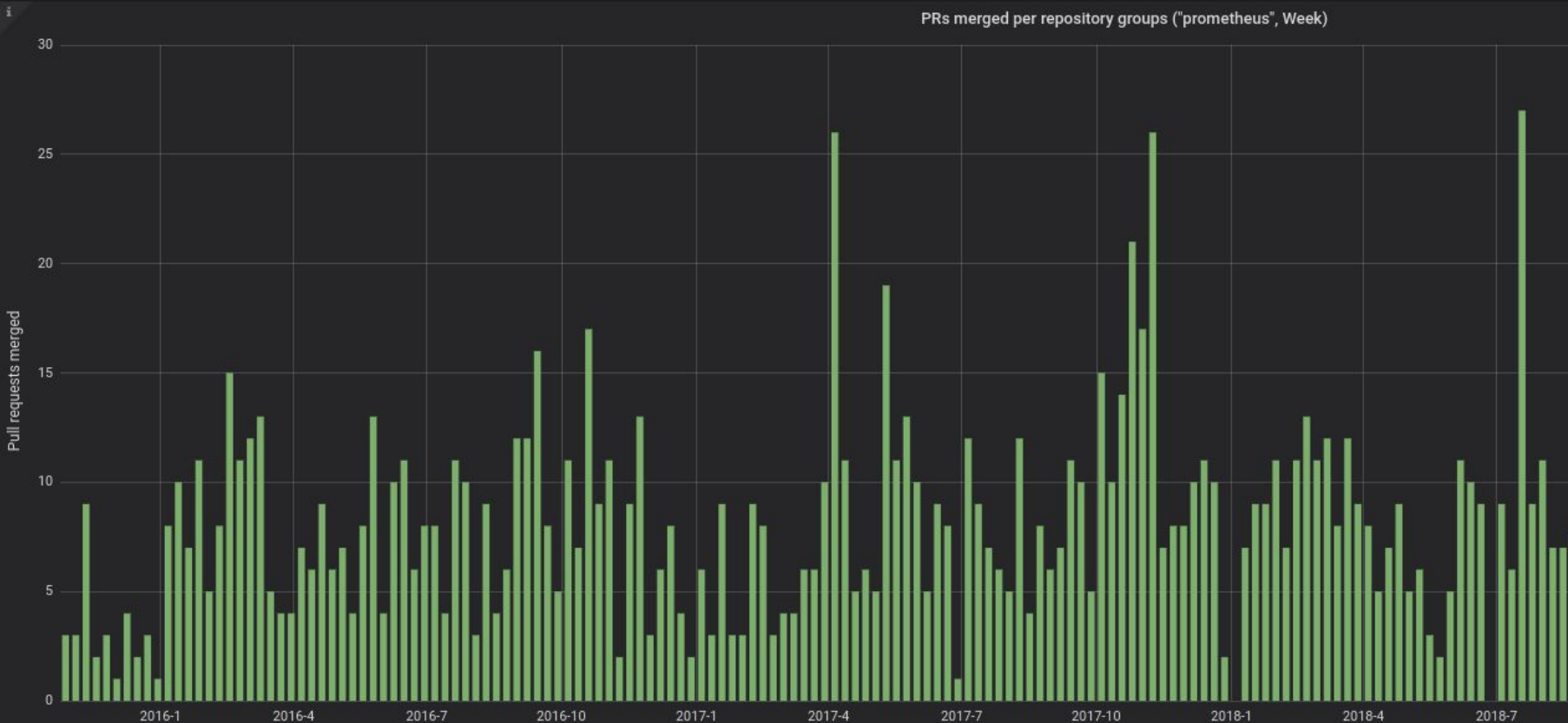
- Process GitHub events
- Build pre-aggregated views
- Store in a relational database
- Visualize in Grafana
- Highly inspired by CNCF devstats





PRs merged repository groups ▾

Period **Week** ▾ Repository group **"prometheus"** ▾ Releases



Relational database schemas

```
github_stats_streams=# select * from pr_activity limit 30;
```

time	period	repo	proposed_by	opened	merged	closed_with_unmerged_commits
1420070400	m	grafana/grafana	Contributor	10	6	2
1420243200	d	grafana/grafana	Contributor	2	2	0
1419811200	w	grafana/grafana	Contributor	2	2	0
1420070400	q	grafana/grafana	Contributor	48	23	21
1420070400	y	grafana/grafana	Contributor	399	266	137
1420761600	d7	grafana/grafana	Contributor	0.428571	0.285714	0.285714
1422748800	m	grafana/grafana	Contributor	9	4	2
1422748800	m	grafana/grafana	Grafana Labs	3	3	0
1420416000	d	grafana/grafana	Contributor	1	0	0
1420416000	w	grafana/grafana	Contributor	2	0	2
1420070400	q	grafana/grafana	Grafana Labs	12	10	0
1420070400	y	grafana/grafana	Grafana Labs	59	48	12
1420848000	d7	grafana/grafana	Contributor	0.142857	0	0.285714
1420934400	d7	grafana/grafana	Contributor	0.285714	0	0.285714
1425168000	m	grafana/grafana	Contributor	29	13	17
1420502400	d	grafana/grafana	Contributor	0	0	1
1421020800	w	grafana/grafana	Contributor	3	3	0
1427846400	q	grafana/grafana	Contributor	85	60	33
1451606400	y	grafana/clock-panel	Contributor	2	1	1
1421020800	d7	grafana/grafana	Contributor	0.285714	0.428571	0.285714
1421107200	d7	grafana/grafana	Contributor	0.285714	0.428571	0.142857
1425168000	m	grafana/grafana	Grafana Labs	9	7	0
1420675200	d	grafana/grafana	Contributor	0	0	1
1421625600	w	grafana/grafana	Contributor	3	1	0
1427846400	q	grafana/grafana	Grafana Labs	13	9	6
1451606400	y	grafana/clock-panel	Grafana Labs	2	2	0
1451606400	y	grafana/grafana-plugin-repository	Contributor	53	47	7

Relational database schemas optimized for

- Ease of use in Grafana
- Separation of “business logic” and visualization logic
- Performance






Demo

Next steps?

- Make dashboards publicly available on play.grafana.org
- Make it easier to use for other projects/companies
- Process GitHub events older than 2015-01-01
- Track bugs, feature requests and feature areas?
- Other kinds of visualizations?

We  contributions



Resources

- Soon available on <https://play.grafana.org>
- Source code: <https://github.com/grafana/devtools>
- Public GitHub events archive: <https://www.gharchive.org/>
- <https://all.devstats.cncf.io>
- <https://github.com/cncf/devstats>

