

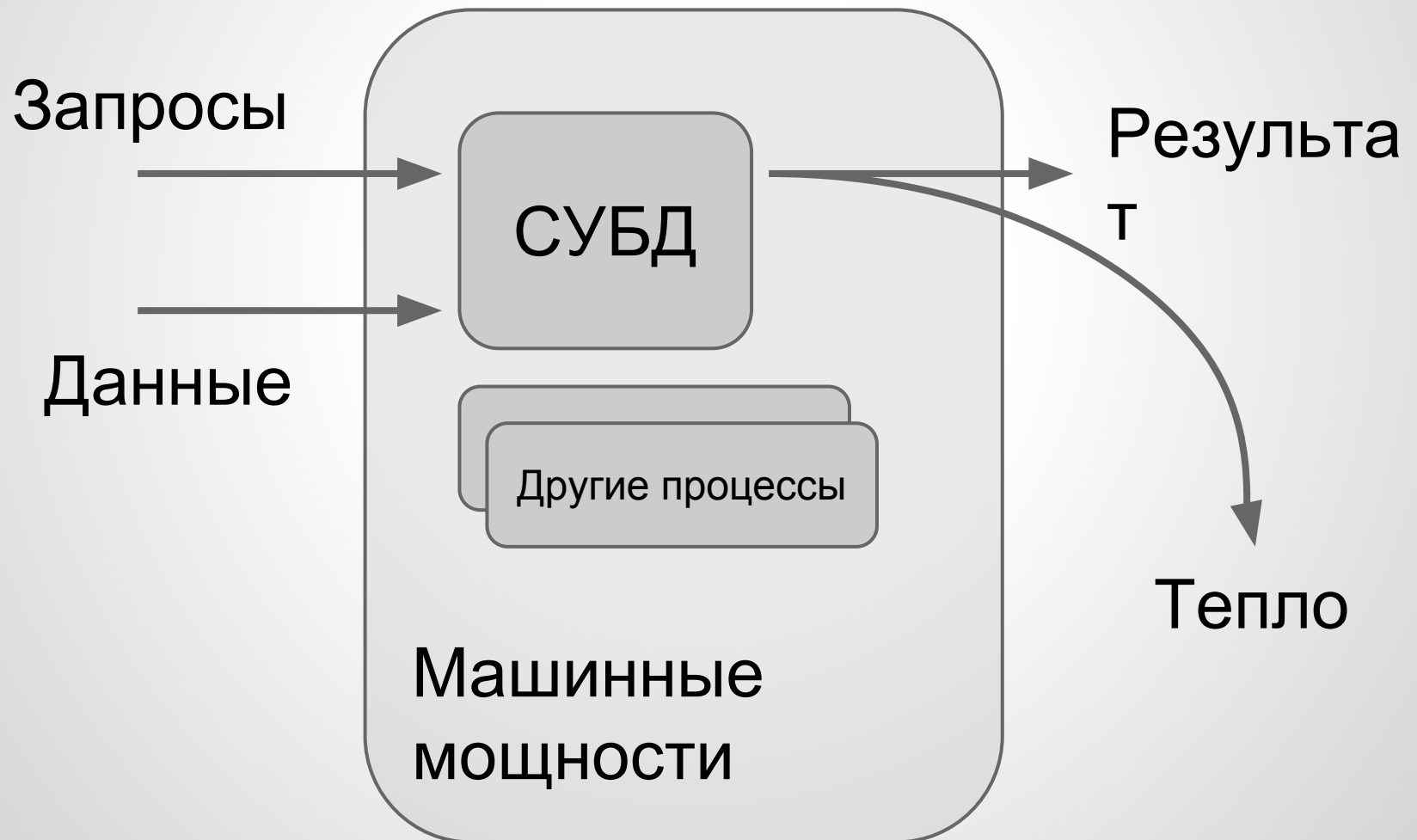
# Мониторинг

PG и мир вокруг

# О чём это

- OLTP vs OLAP
- пользовательские vs машинные запросы
- нормальная ситуация vs проблемы  
ака “как было vs как стало”

# БД



# Мониторинг

«наблюдение за состоянием объекта для определения момента перехода в предельное состояние»

1. обнаружить проблемы и оповестить
2. на сколько все плохо?
3. какие сервисы? в чем причина?
4. ... чиним ...
5. убедиться что всё снова ОК

# Мониторинг для БД

- Нет запросов — нет проблем
- Запросы \* данные
- Запросы vs доступные мощности

## Проблемы:

- блокировки и конкуренция запросов
- отсутствующие индексы
- неэффективные запросы
- проблемы управления памятью

# Мониторинг для БД

1. обнаружить проблемы
  - = тормозит ли?
  - = тормозят ли запросы?

**pg\_stat\_statements**



# Мониторинг для БД

1. обнаружить проблемы
  - = тормозит ли?
  - = тормозят ли запросы?

bgwriter

replication

**pg\_stat\***

database

user\_tables  
/indexes  
io\_user\_tables  
/indexes



activity

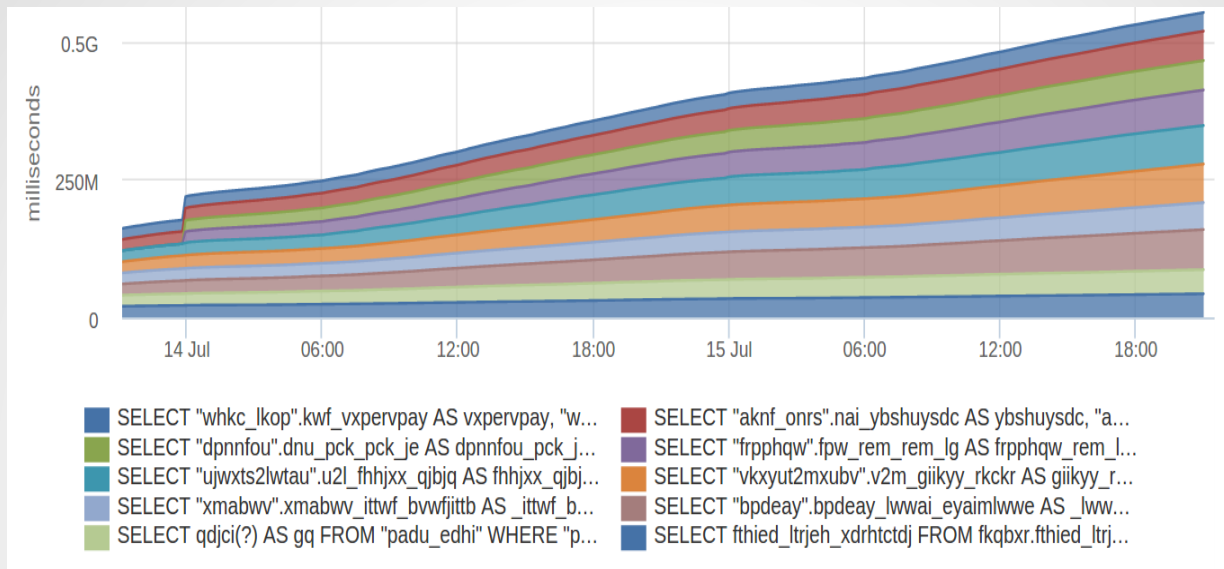
# pg\_stat\_statements

```
# SELECT query, calls, total_time, FROM pg_stat_statements ORDER  
BY total_time DESC LIMIT 1;  
-[ RECORD 1 ]-----  
query          | UPDATE pgbench_branches SET bbalance = bbalance + ?  
WHERE bid = ?;  
calls          | 3001  
total_time     | 9609.001000000002
```

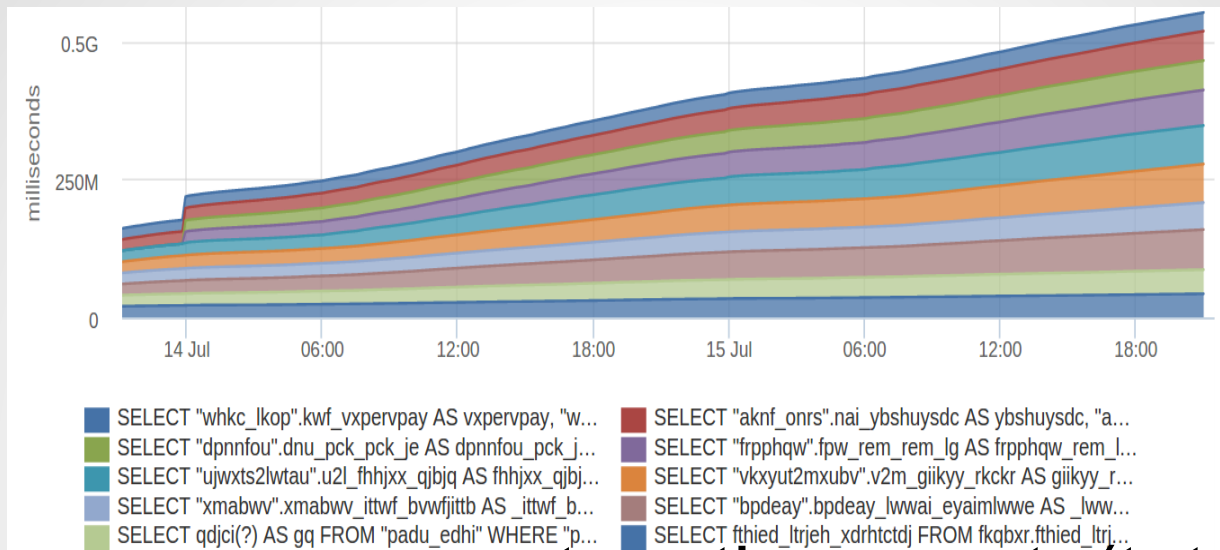
query	Text of a representative statement
calls	Number of times executed
total_time	<b>Total time</b> spent in the statement



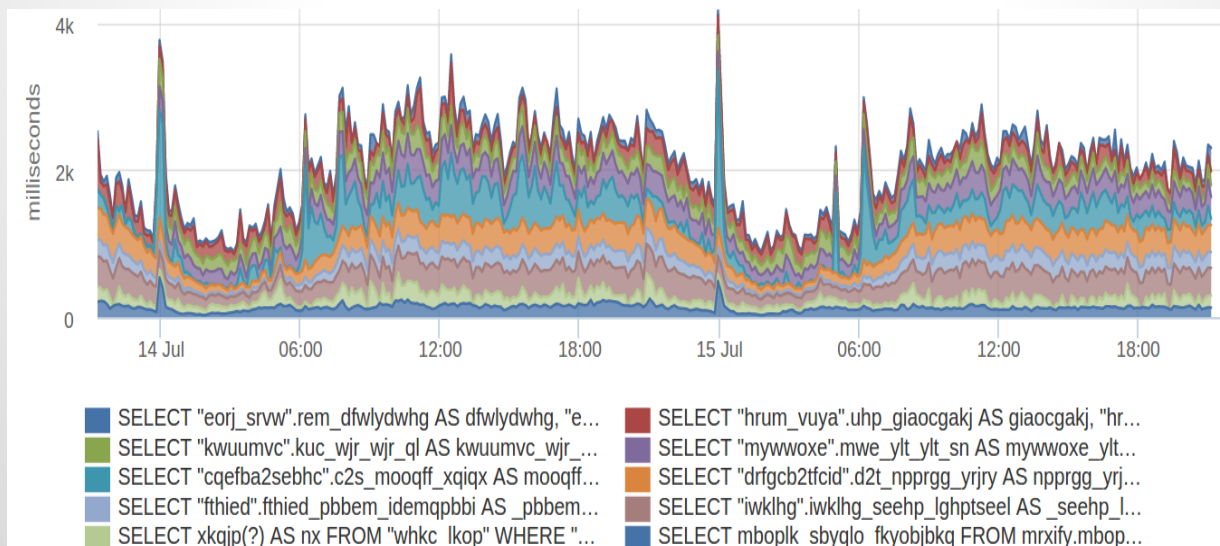
# pg\_stat\_statements total\_time



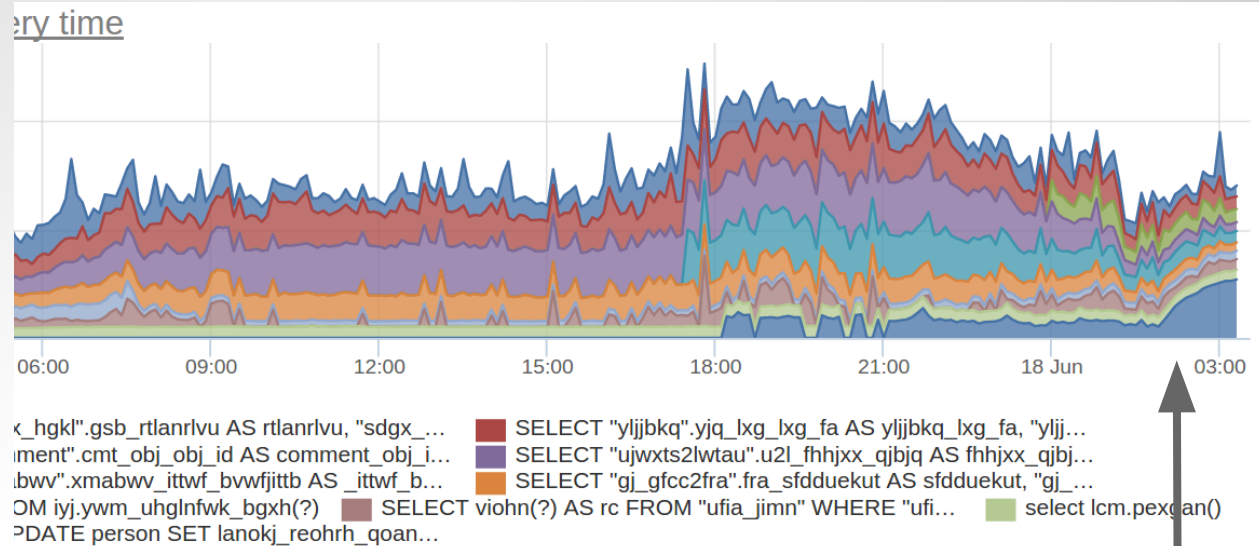
# pg\_stat\_statements total\_time



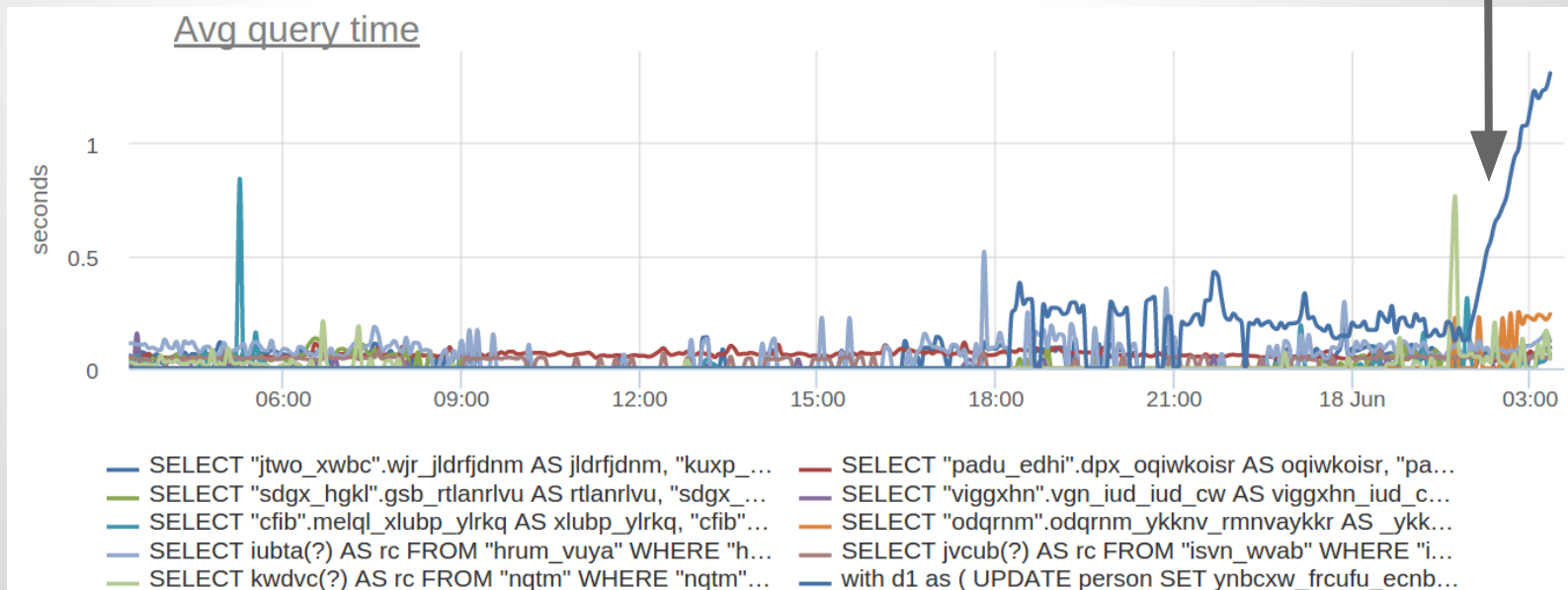
производная  $current\_q\_time = rate(total\_time)$



Например  
current\_q\_time



$\text{avg\_q\_time} = \text{rate}(\text{total\_time}) / \text{rate}(\text{calls})$



# Проблемы с pg\_stat\_statements

- гонка pg\_stat\_statements\_reset()

- нормализация

a as b

a as c

y IN (?, ?)

y IN (?, ?, ?)

select a, b

select b, a

...

- разные планы одного запроса

pg\_stat\_plans?

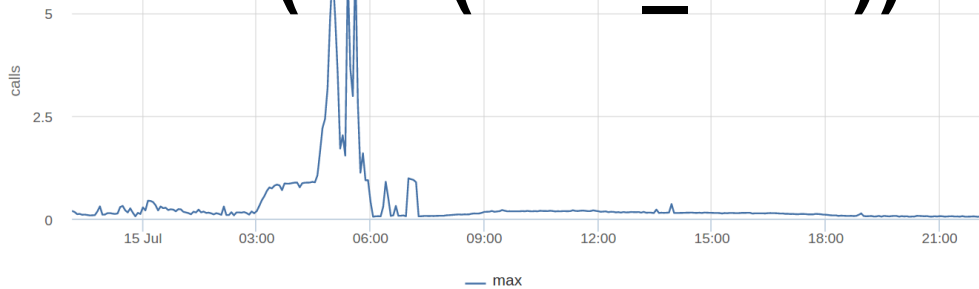
- только total\_time :(

- требует выполнения запроса в БД

# Реальная жизнь

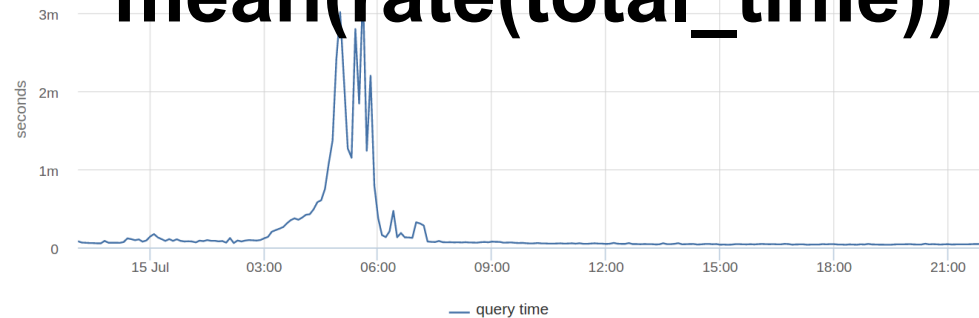
Max query times

## max(rate(total\_time))



Average query time

## mean(rate(total\_time))



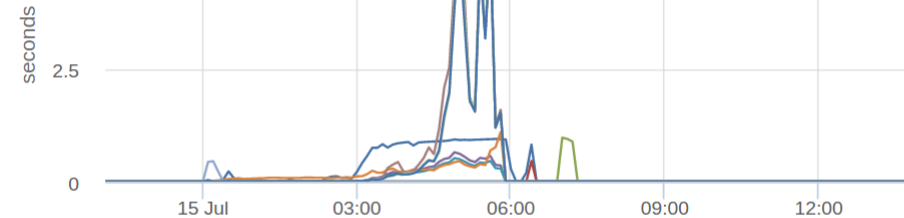
Min query times

## min(rate(total\_time))



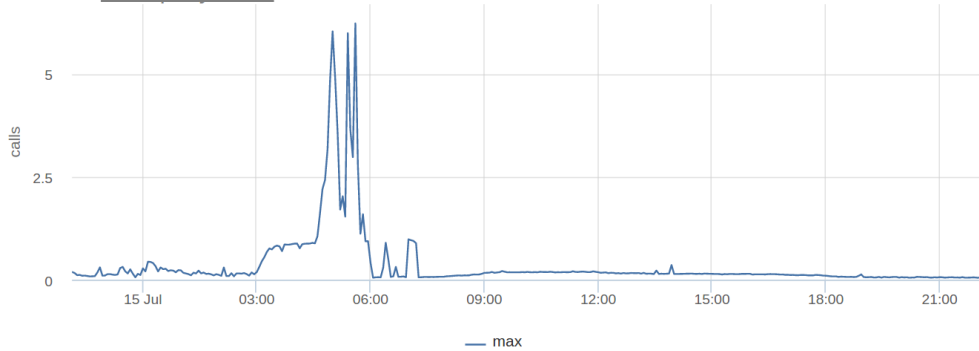
Query times

## top(10, rate(total\_time))



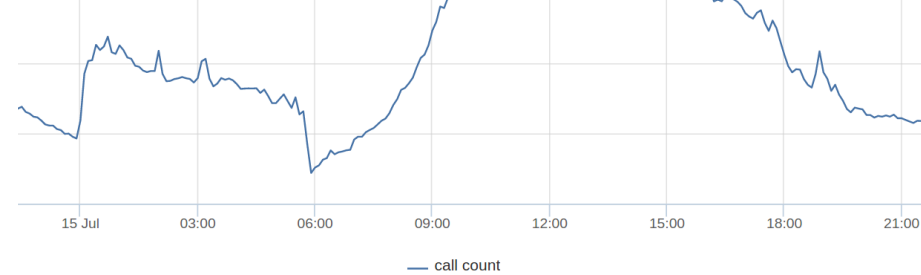
# Реальная жизнь

Max query times

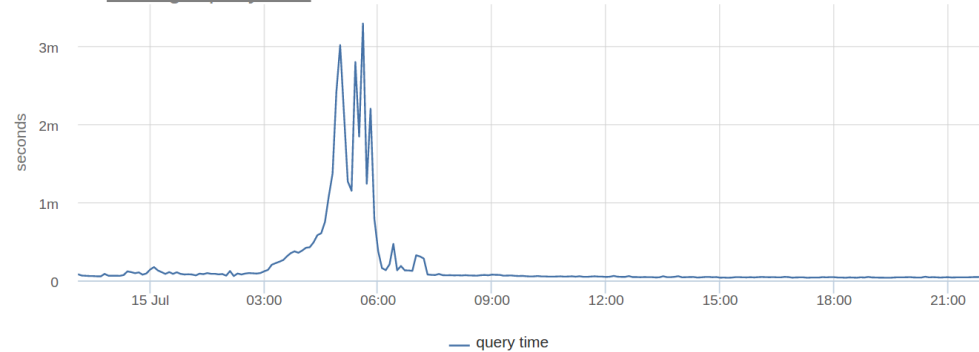


Queries

## pg\_stat\_statments.calls

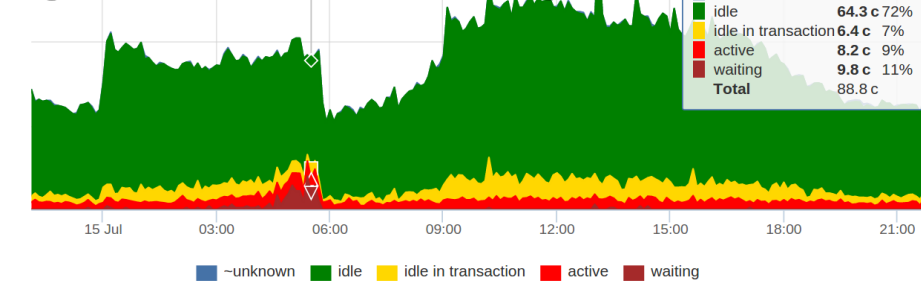


Average query time

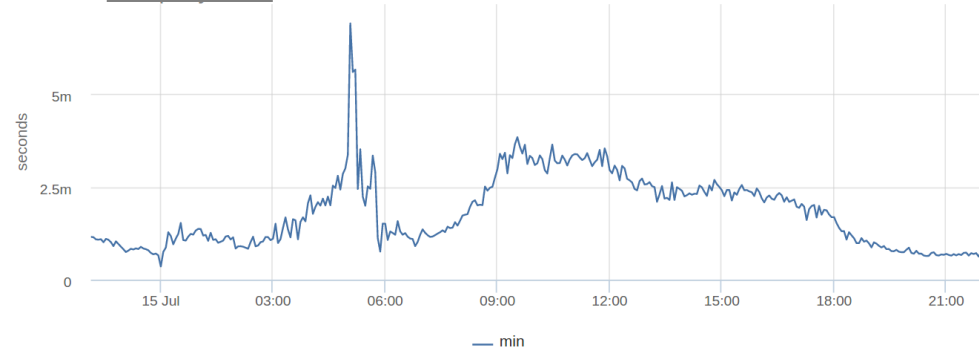


Connections

## pg\_stat\_activity

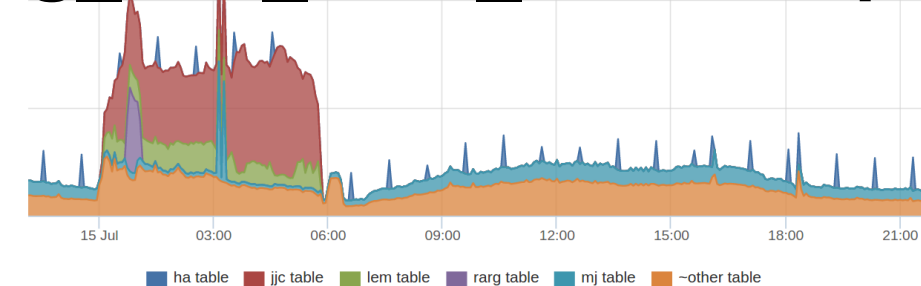


Min query times



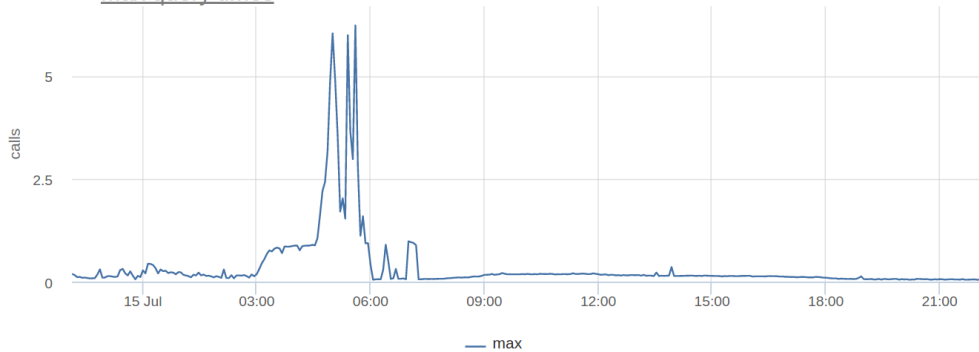
TOP-5 tables by UPDATE

## pg\_stat\_user\_tables.\*up

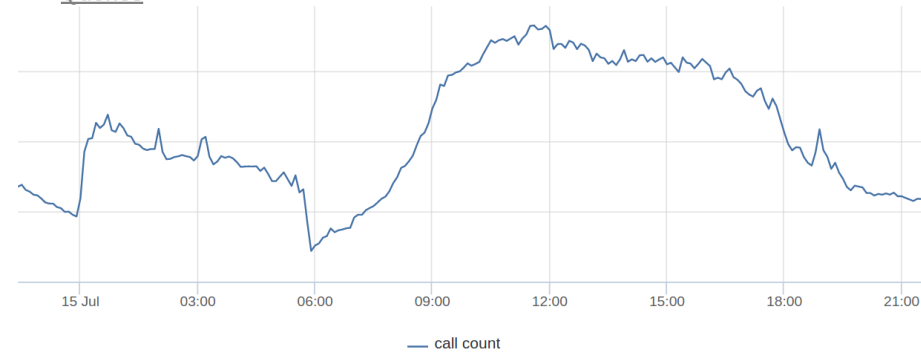


# Реальная жизнь

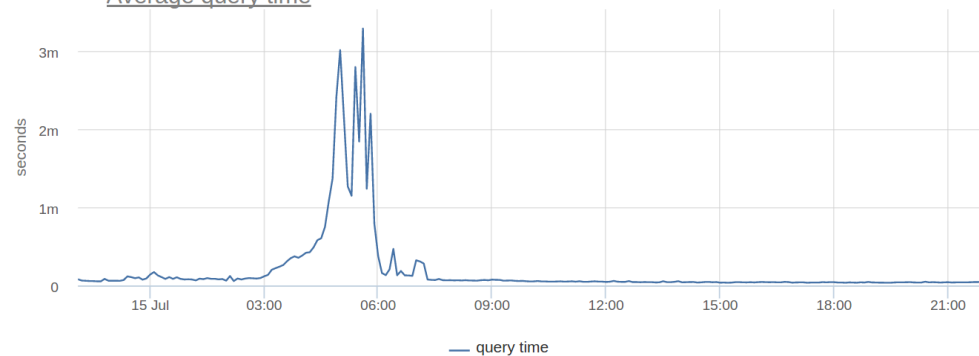
Max query times



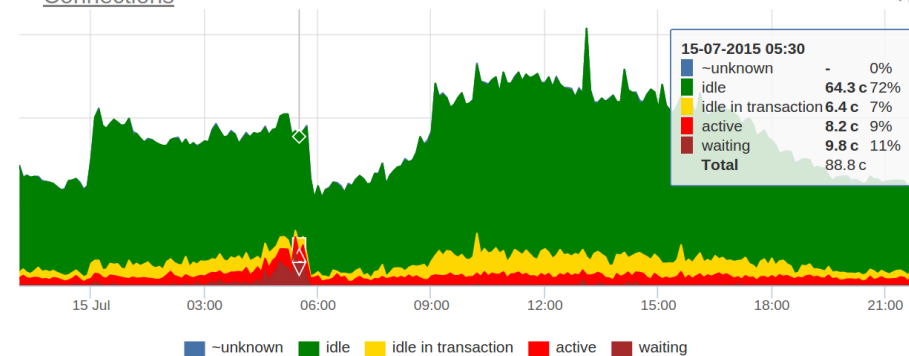
Queries



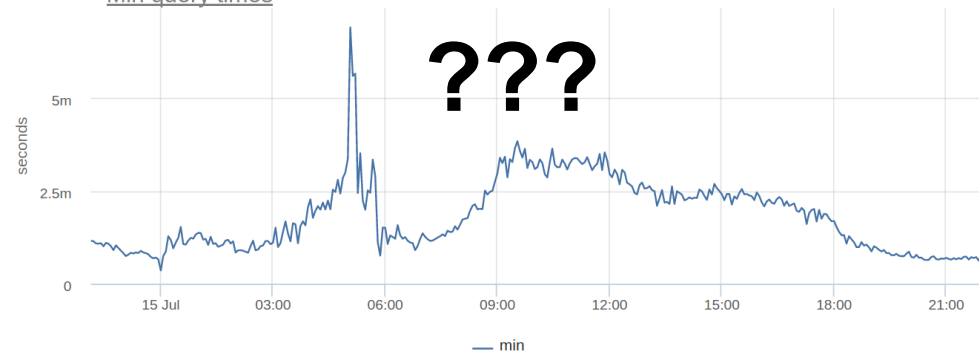
Average query time



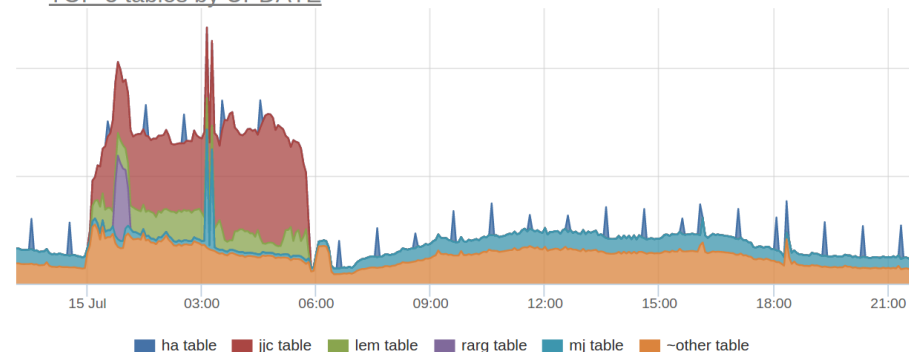
Connections



Min query times

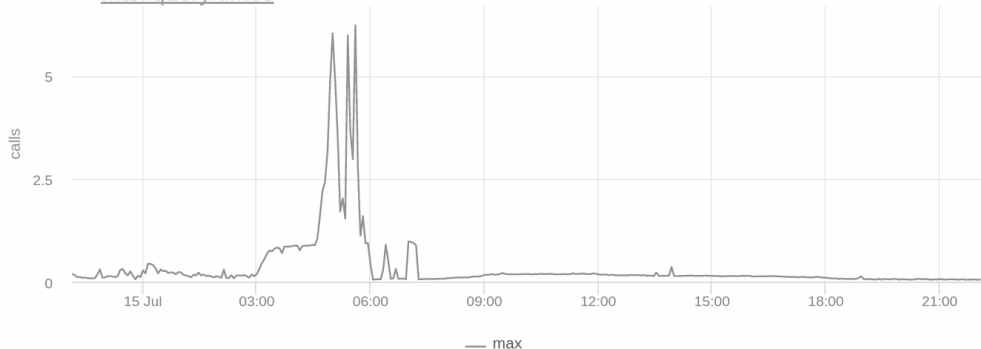


TOP-5 tables by UPDATE

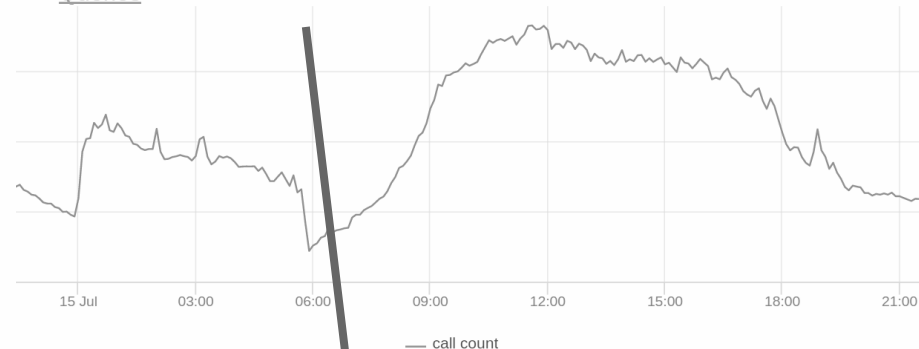


# Реальная жизнь

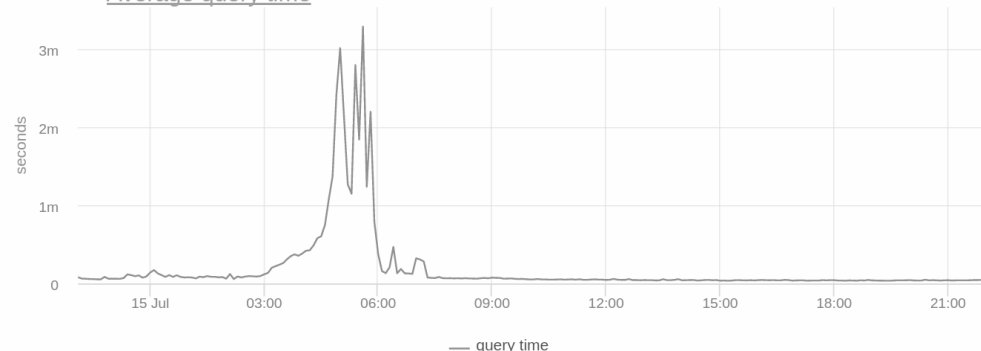
Max query times



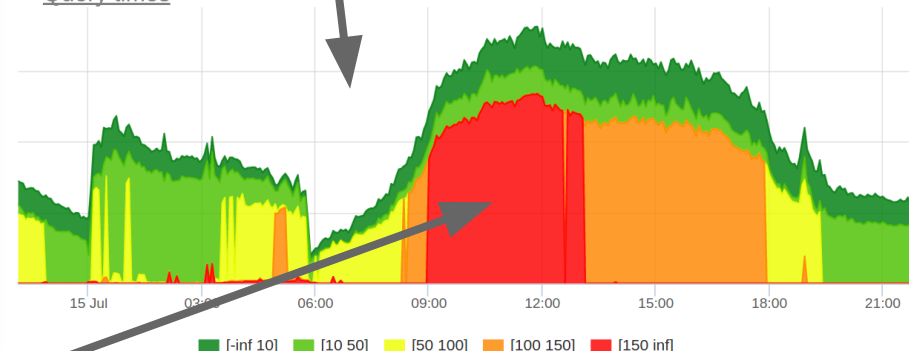
Queries



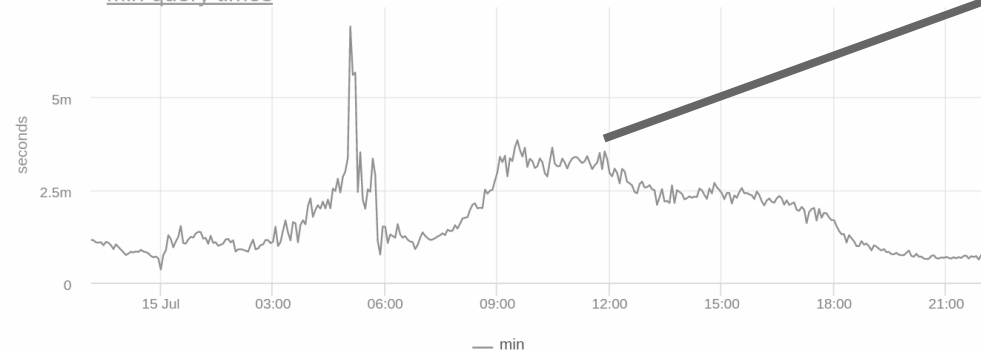
Average query time



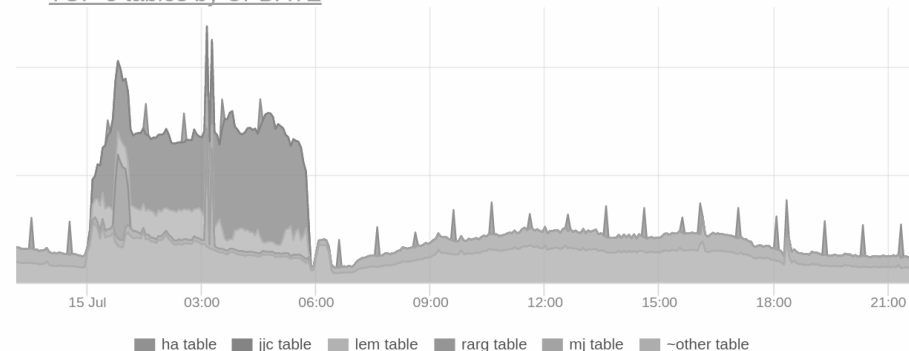
Query times



Min query times

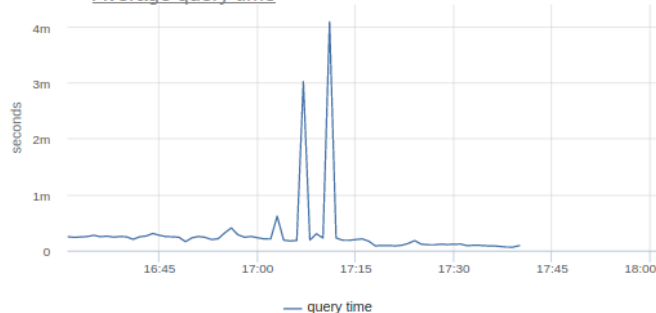


TOP-5 tables by UPDATE

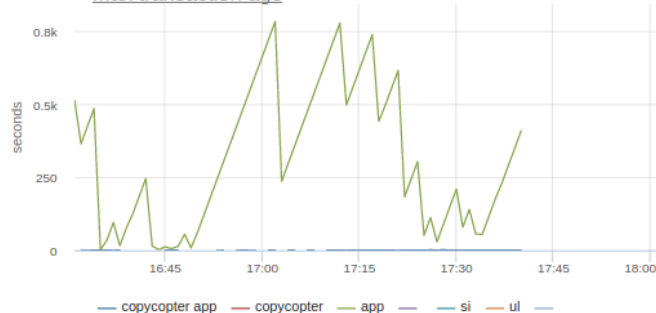




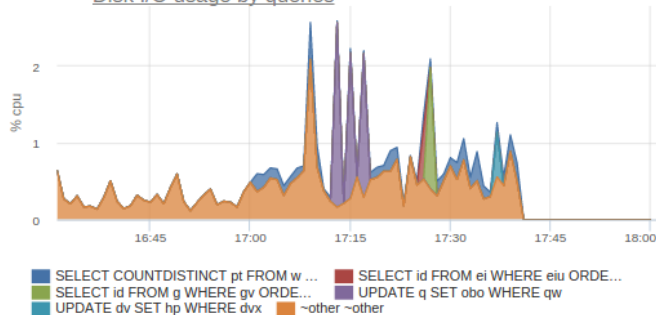
Average query time



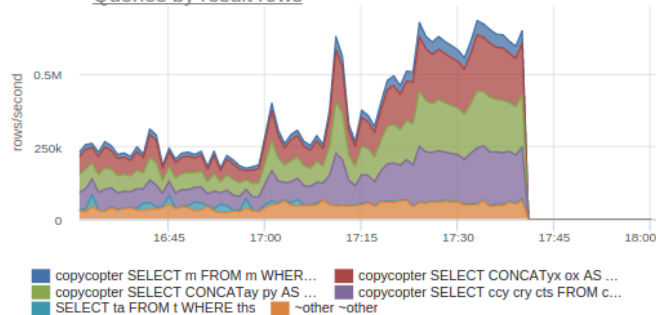
Max transaction age



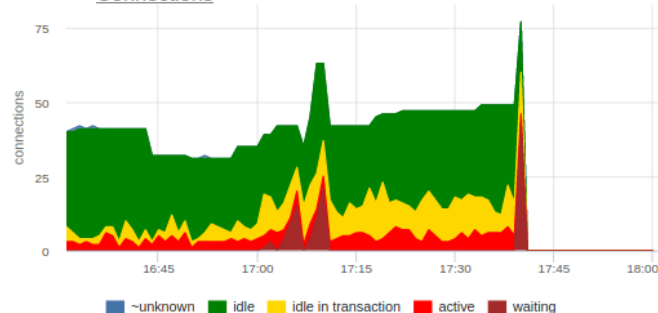
Disk I/O usage by queries



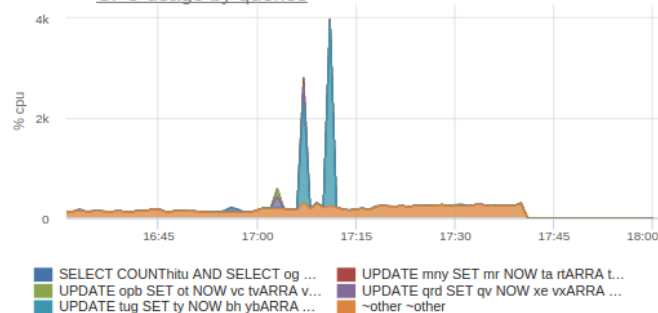
Queries by result rows



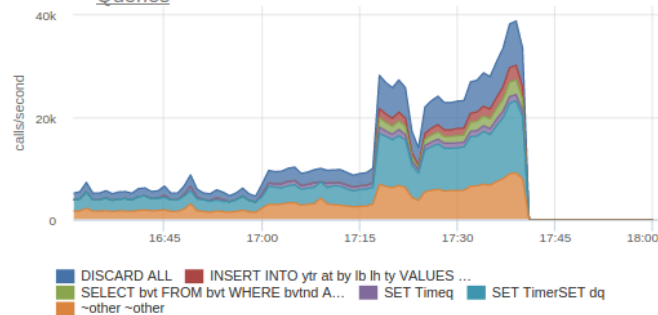
Connections



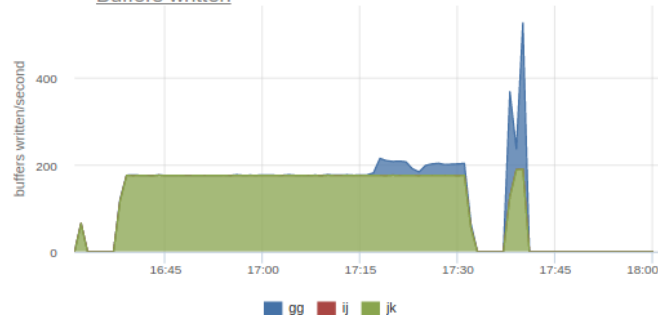
CPU usage by queries

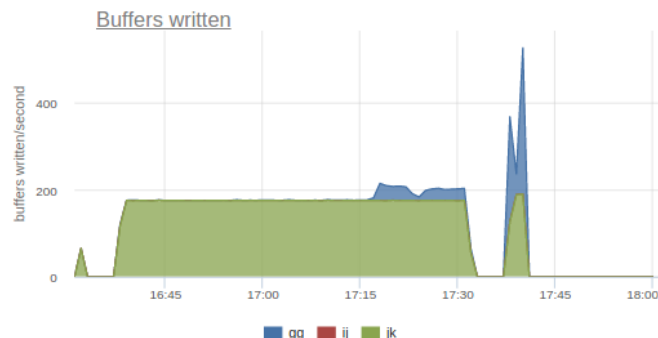
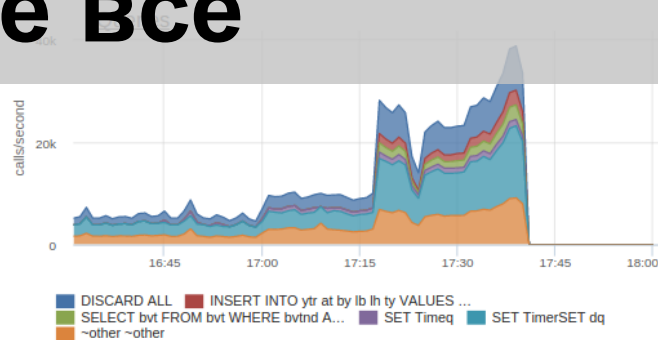
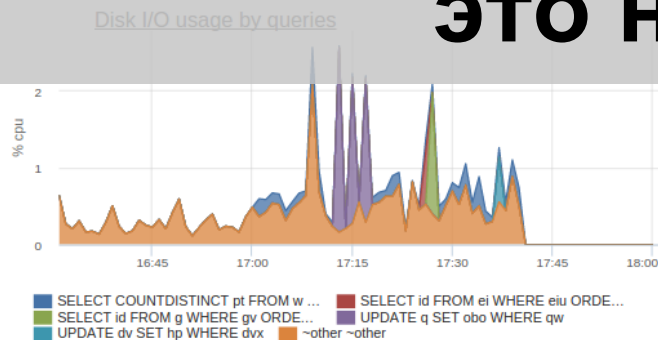
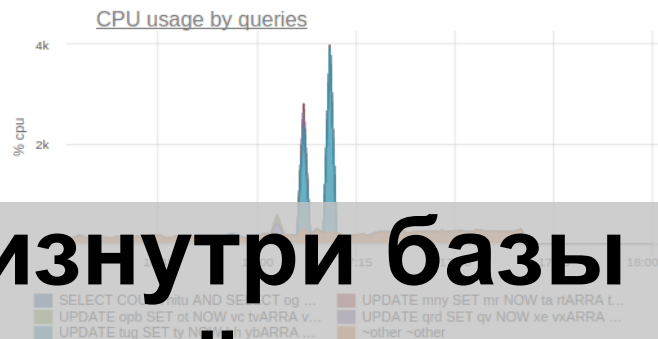
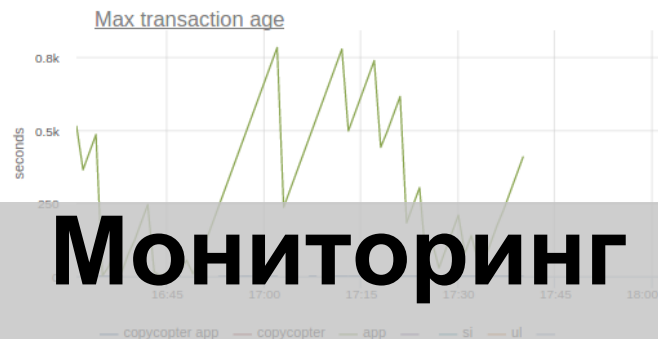
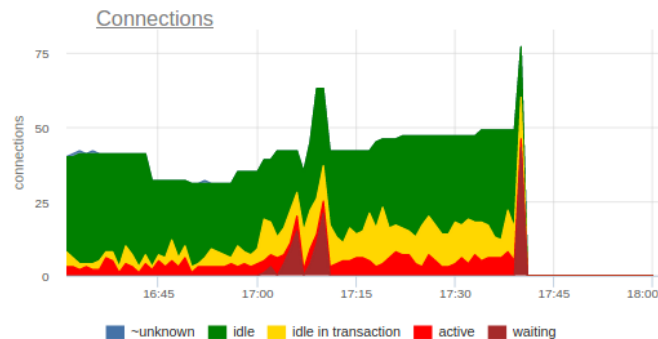
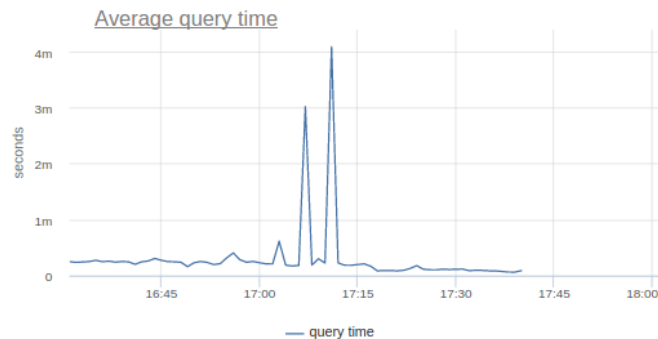


Queries



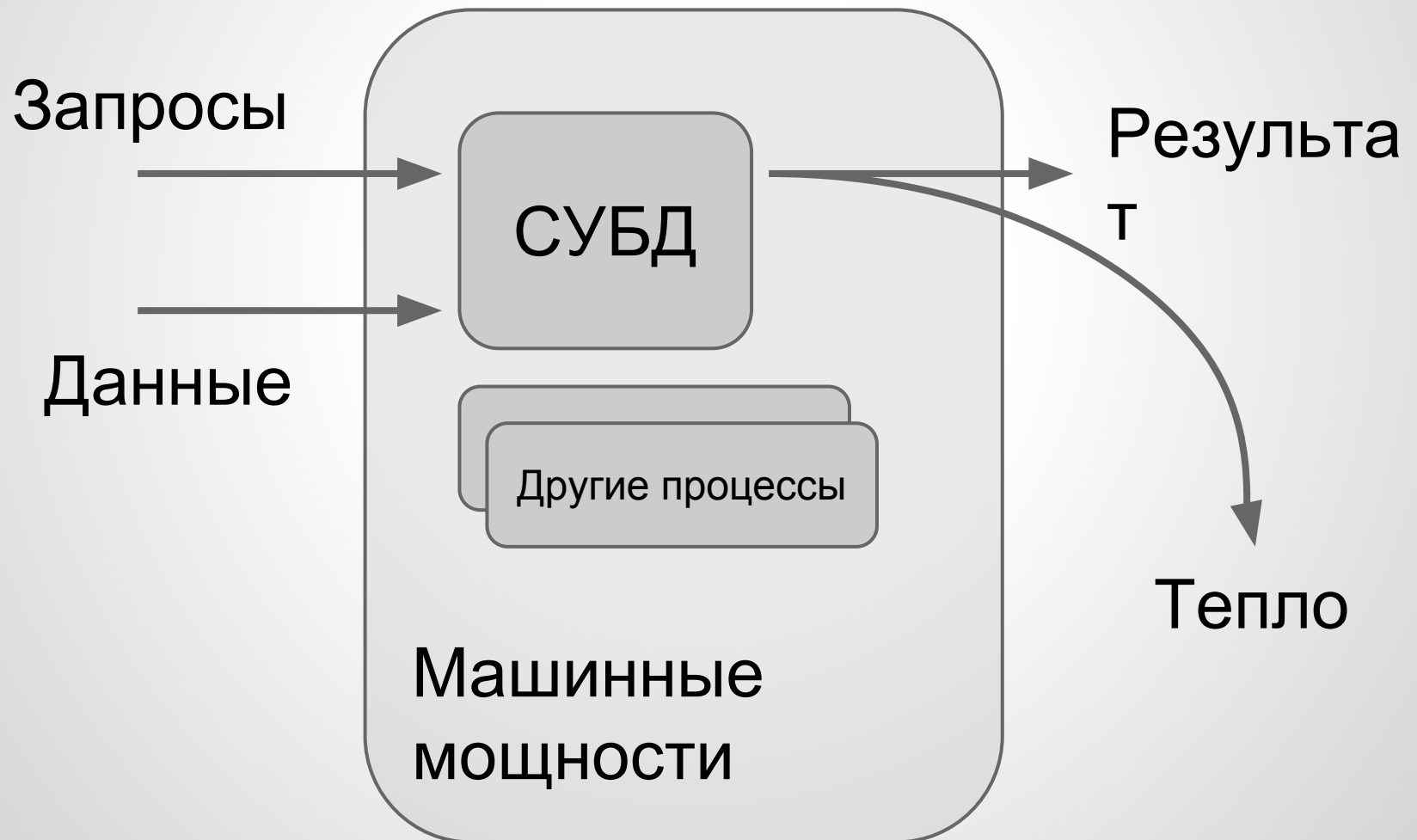
Buffers written



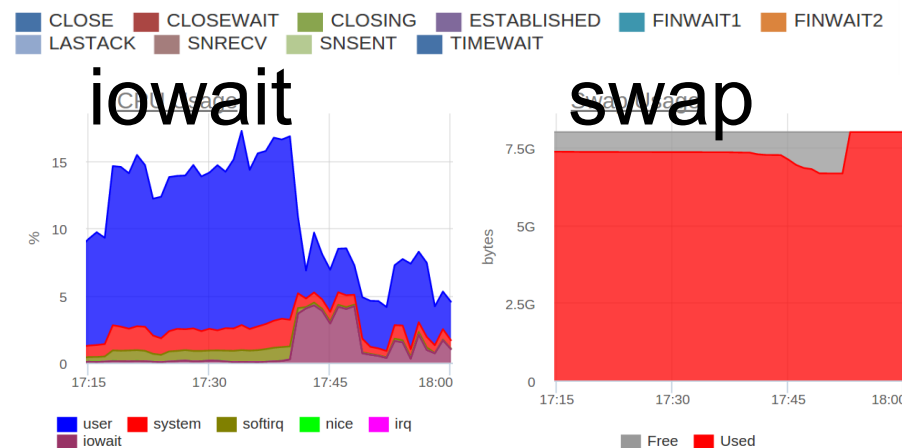
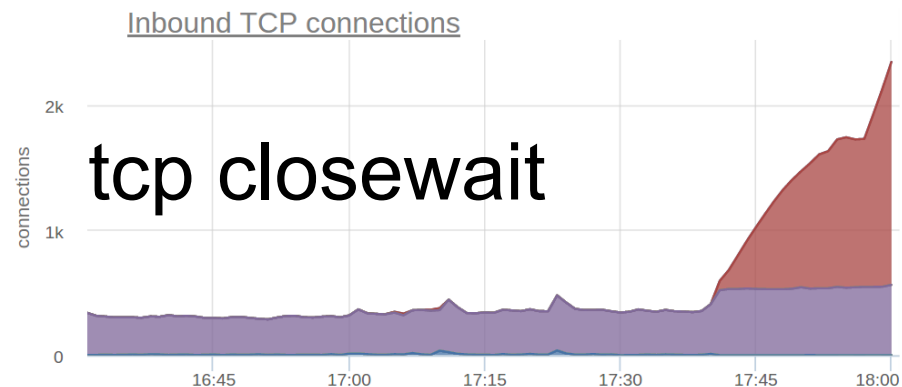
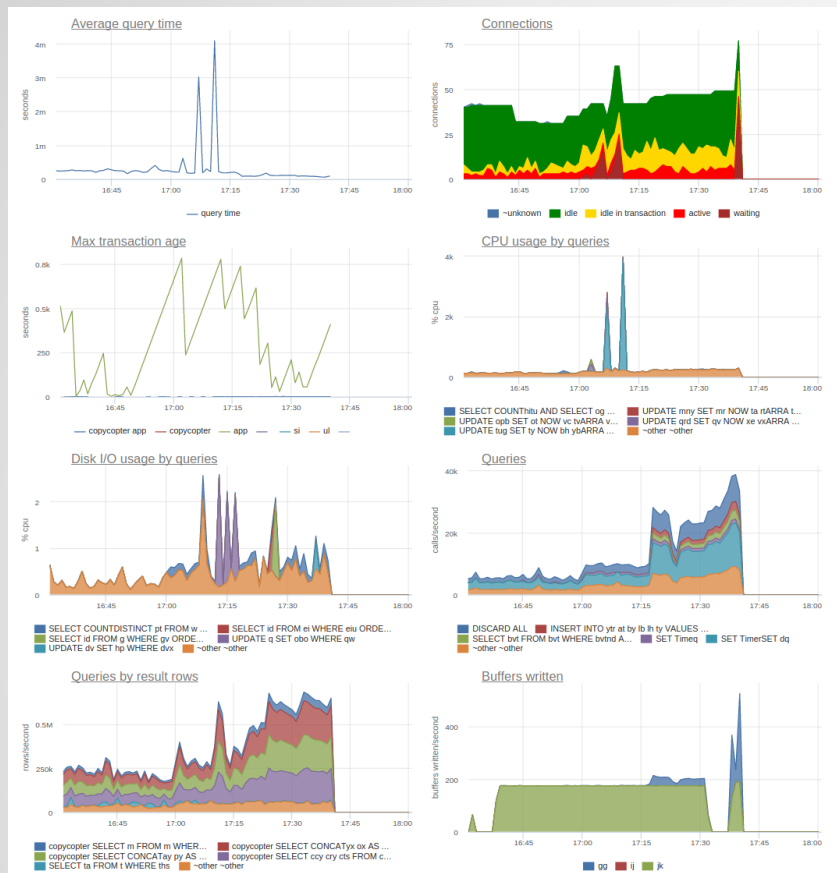


# Мониторинг изнутри базы это не всё

# БД

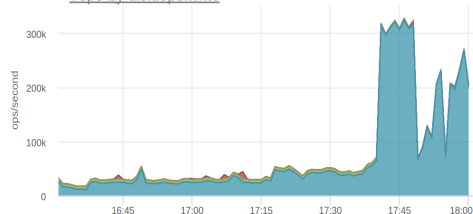


# «Снаружи» — ресурсы



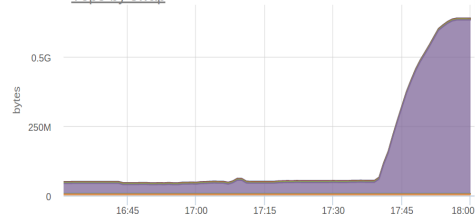
## disk.write

Top5 by disk.ops.write



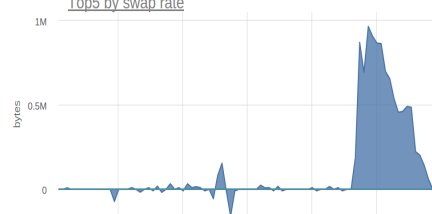
## swap

Top5 by swap



## swap rate

Top5 by swap rate



## process

Top5 by process count



# Снаружи

Память

Диски

Диски

Диски

Raid?

# Где это есть?

Zabbix! ? — pg\_monz, libzbxpgsql

Nagios / Munin / Cacti ...

**НЕТ** pg\_stat\_statements :(

## Что еще?

cli tools, другие pg extensions

см [wiki.postgresql.org/wiki/Monitoring](http://wiki.postgresql.org/wiki/Monitoring)

# Где это есть?

FOSS: OpenPgMonitoring (OPM), PoWA

SaaS:

New relic + EnterpriseDB	No pg_stat_statements
--------------------------	-----------------------

Datadog	No pg_stat_statements
---------	-----------------------

VividCortex	!
-------------	---

pganalyze	!
-----------	---

OKmeter (это мы :)	!
--------------------	---


# VividCortex


Filter hosts						Showing all 55 hosts	
Rank: Queries By: Total time Show: 15 Query Text: Filter queries by content Apply							
#		Total time		CPU Time	Age		
1		replace into `env_?`.`observation` (host... 57.06 m		1.15 m	4 months		
2	1	replace into `env_?`.`observation_minut... 26.32 m		0.27 m	7 months		
3	4	select host, metric, sum(sum_value), su... 16.45 m		0.06 m	10 months		
4		insert ignore into `env_?`.`query_sampl... 9.06 m		0.18 m	3 months		
5		select host, metric, points, points_set, mi... 5.86 m		0.08 m	a year		
6	2	select shard_hostname from customers.e... 5.01 m		0.1 m	a year		
7		select shard_hostname from customers.e... 4.42 m		0.09 m	a year		
8		commit 3.98 m		0.08 m	a year		
9		replace into `env_?`.`host_variable` (hos... 3.46 m		0.06 m	7 months		
10		select id, env, expires, status from custo... 3.26 m		0.06 m	a year		
11		update `env_?`.`host_agent` set lastsee... 3.2 m		0.06 m	5 months		
12		replace `env_?`.`agent_status` (agenth... 3.06 m		0.06 m	3 months		
13		select metric, ewma, ewma_sos from `en... 3.01 m		0.06 m	3 months		
14		update `vividcortex`.`heartbeat` set ts ... 2.86 m		0.06 m	4 months		




# PgAnalyze

DATABASE

 pgbench ▾

 Dashboard

 Database

Queries


Tables

Views

Indices

Functions

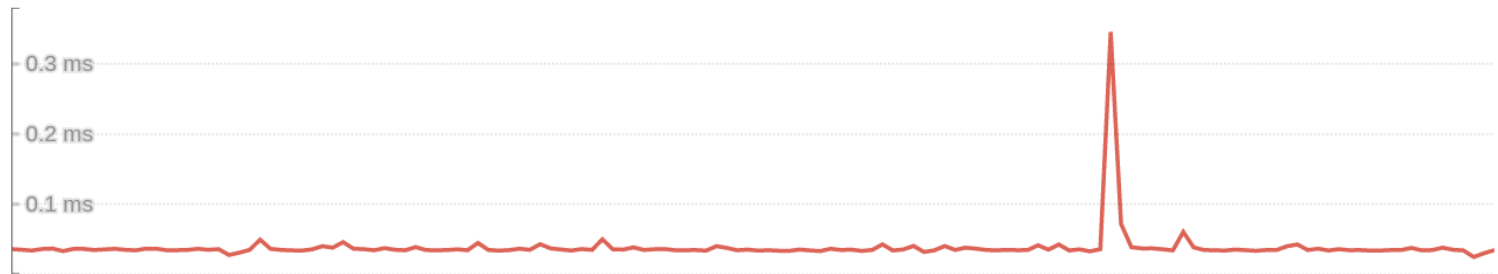
Config

 Server

☒ Check-Up

## Query Overview

### Frequent Queries

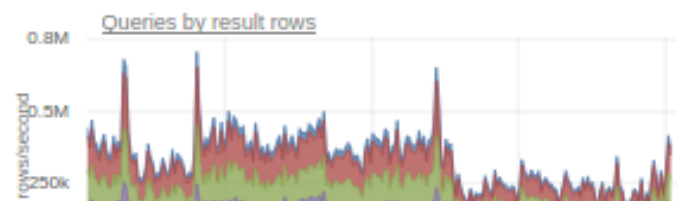
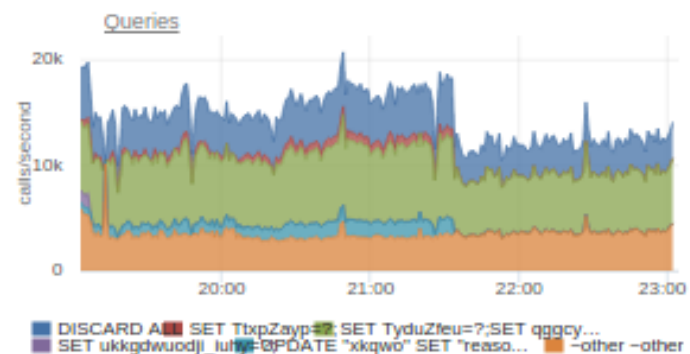
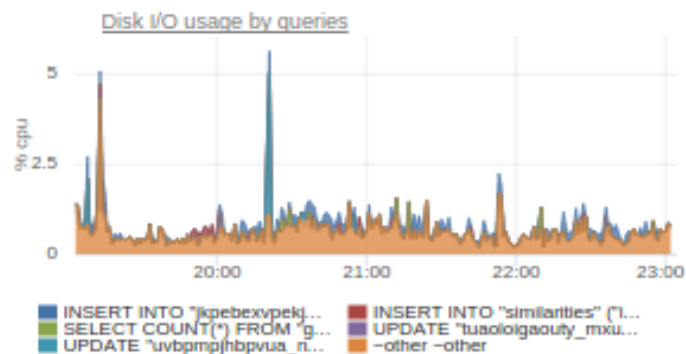
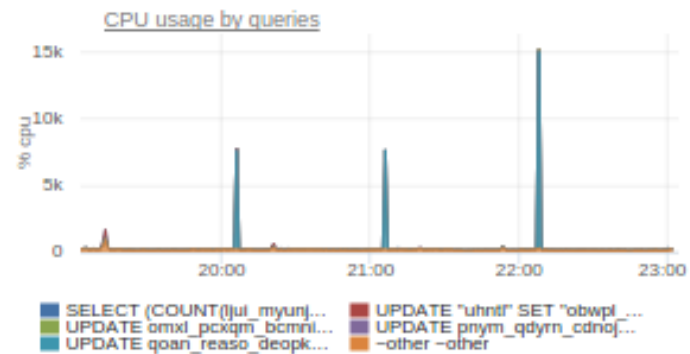
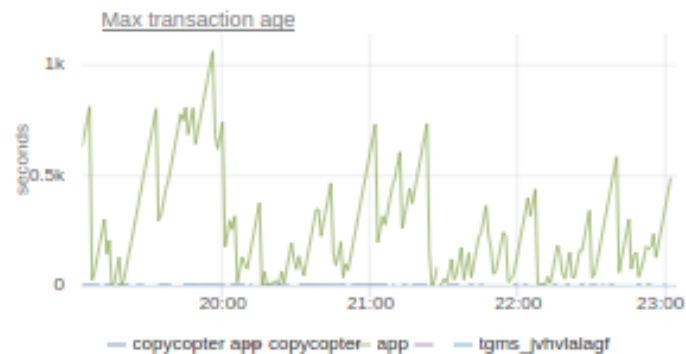
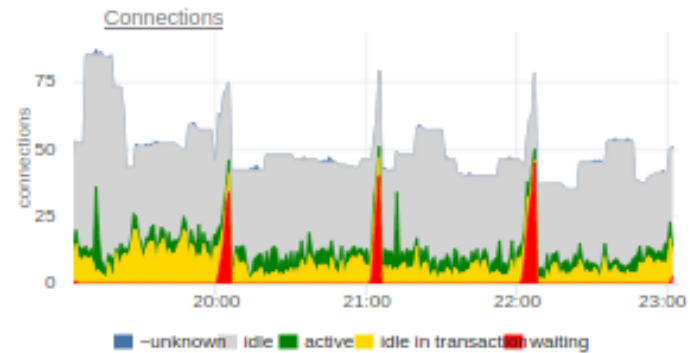
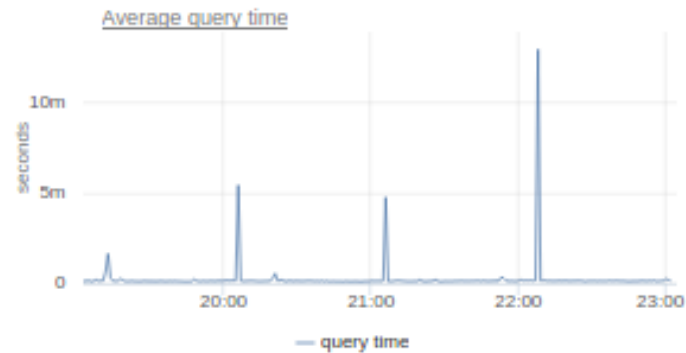


☒ SELECT ☐ INSERT, UPDATE, DELETE ☐ DDL & other

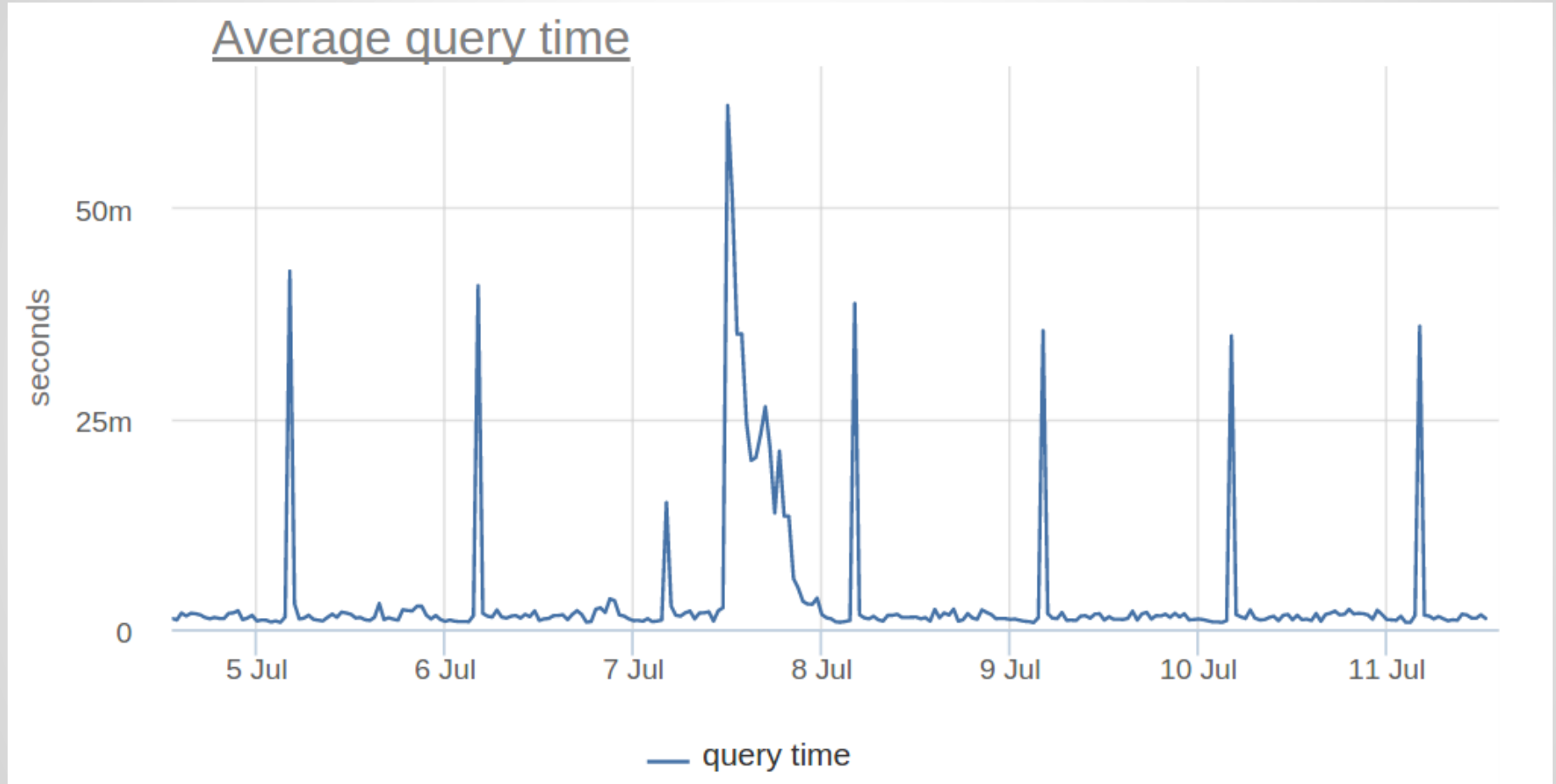
Search...

Type	Query	Avg Time (ms)	Calls	Total (ms)
Frequent	<code>select count(*) from pgbench_branches</code>	0.02	480	8.18
Frequent	<code>SELECT abalance FROM pgbench_accounts WHERE aid = ?</code>	0.01	48000	311.31

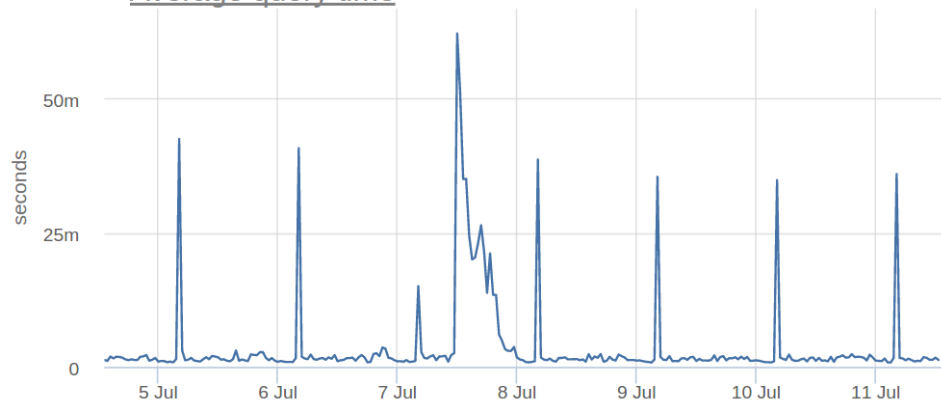
# OKmeter



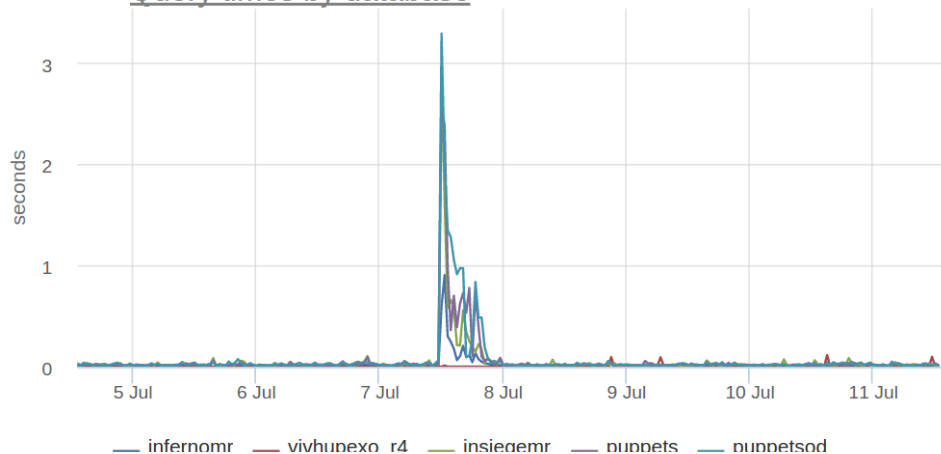
# pg\_stat\_statements



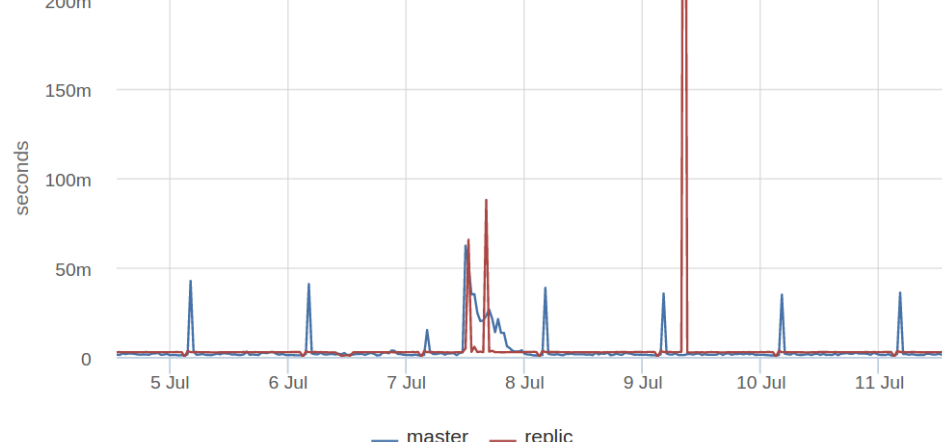
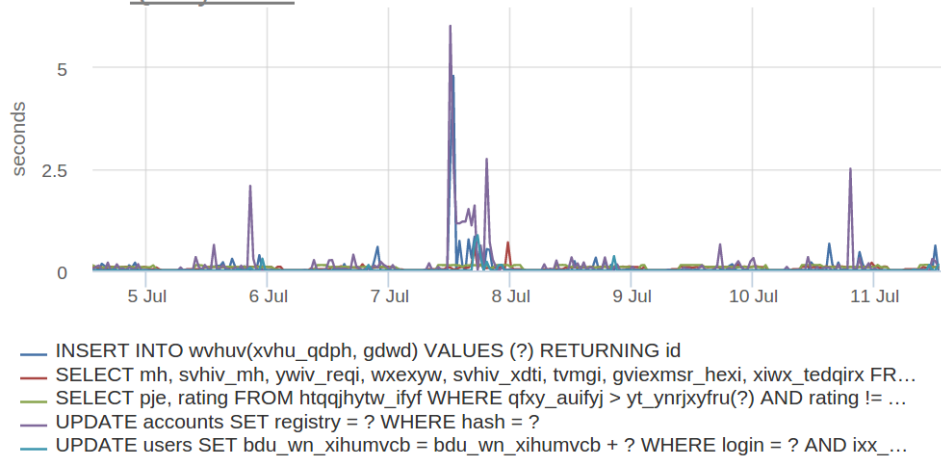
Average query time



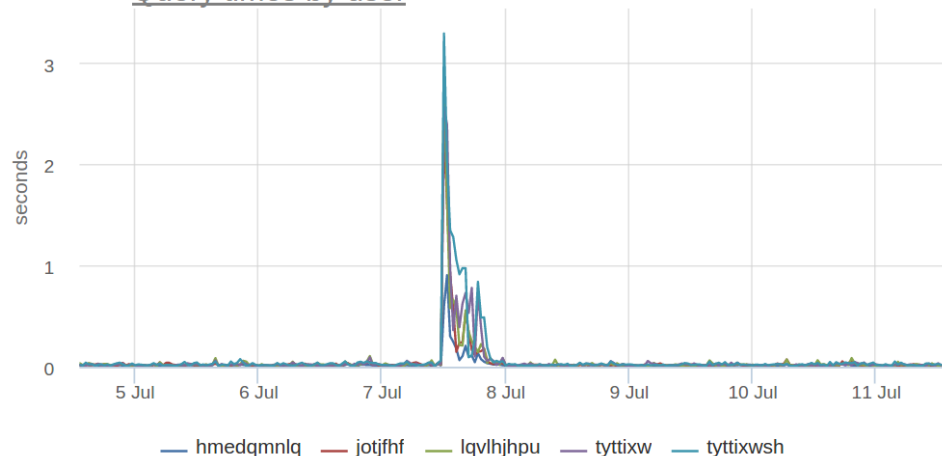
Query times by database



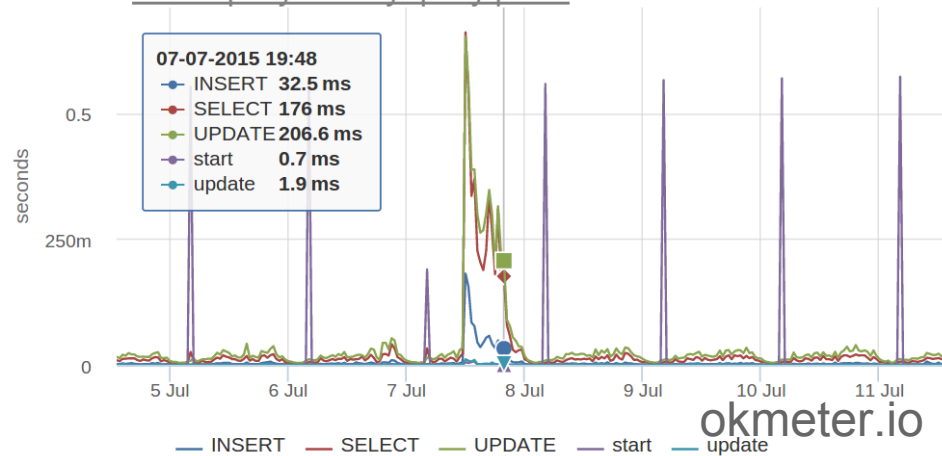
Query times



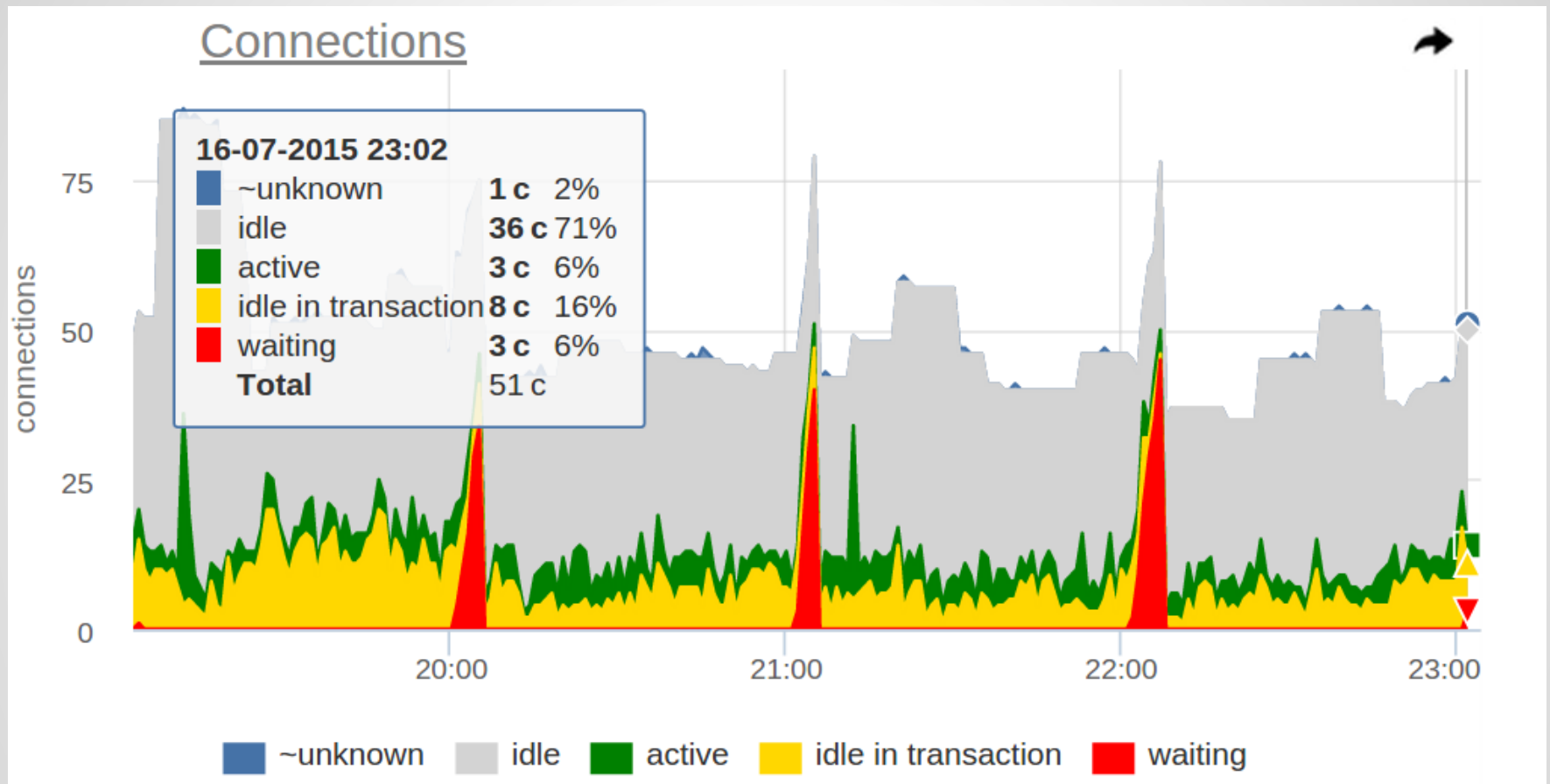
Query times by user

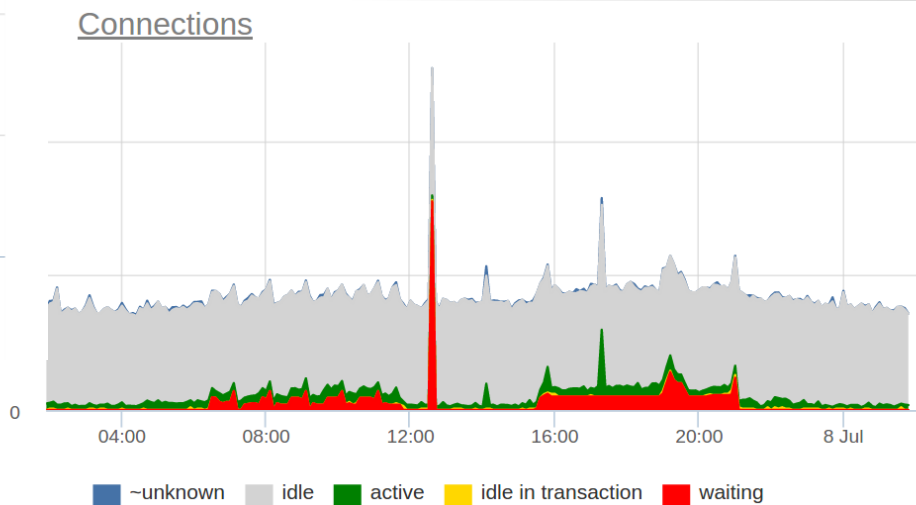
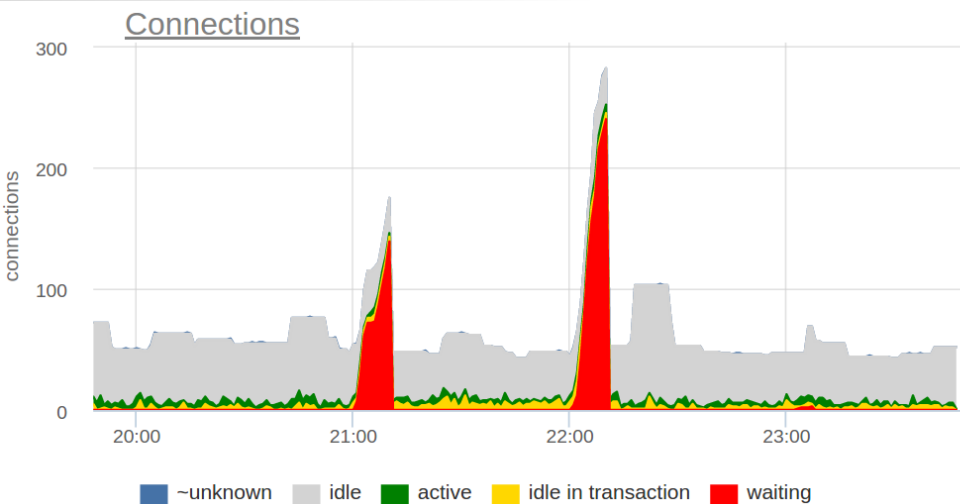
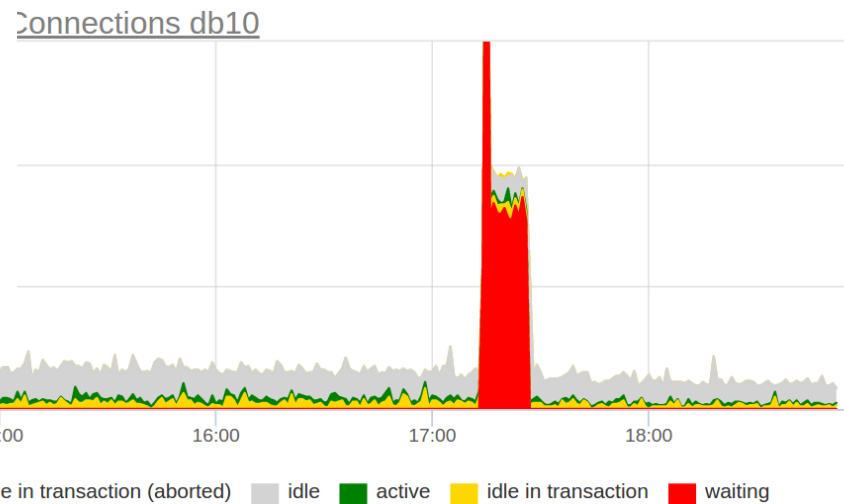
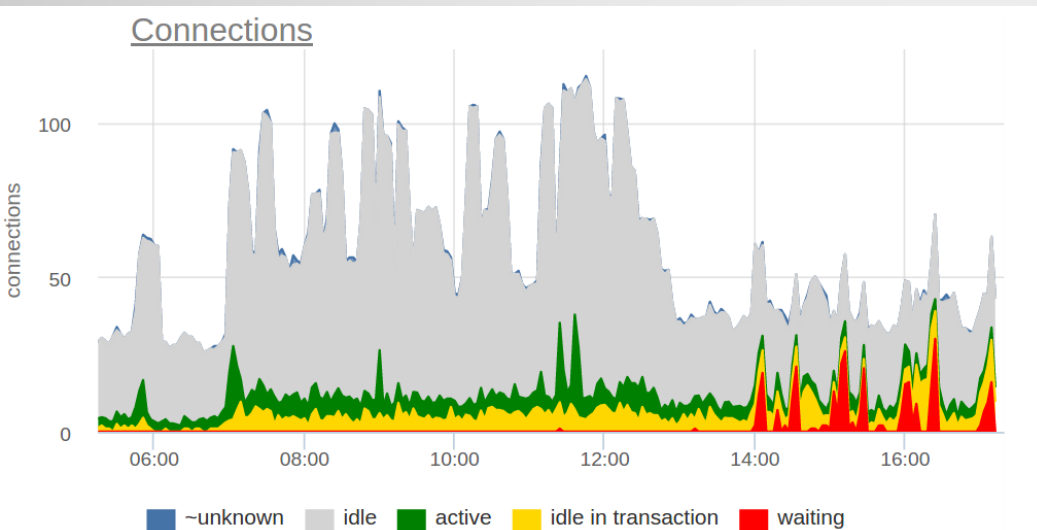


Mean query time by query prefix

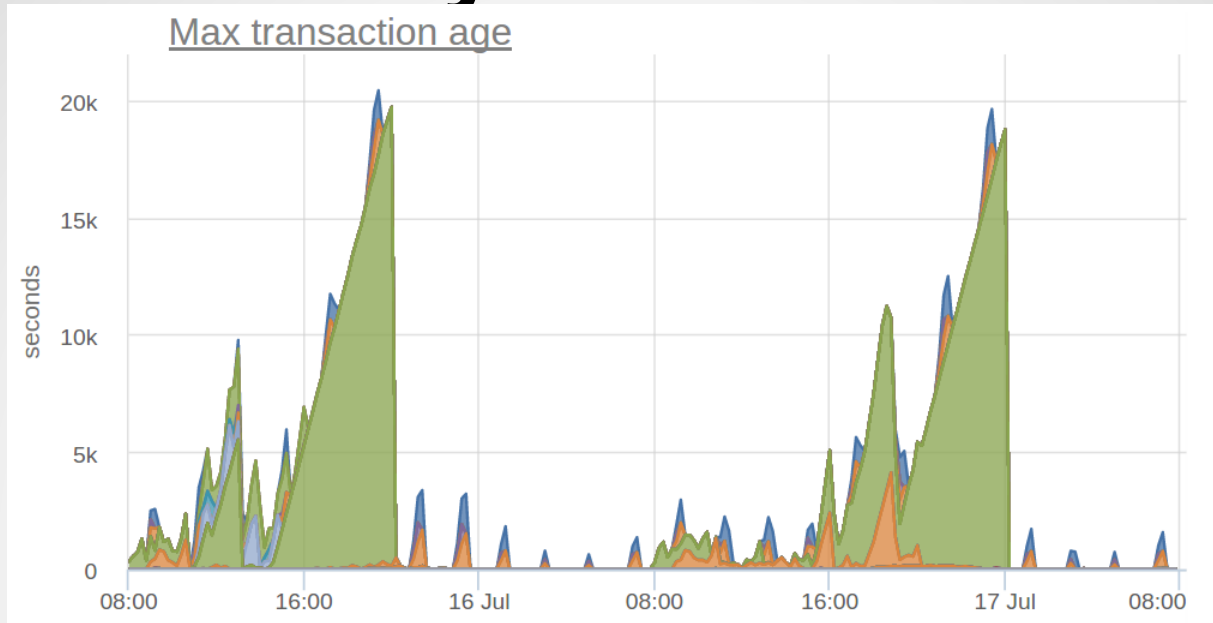


# pg\_stat\_activity

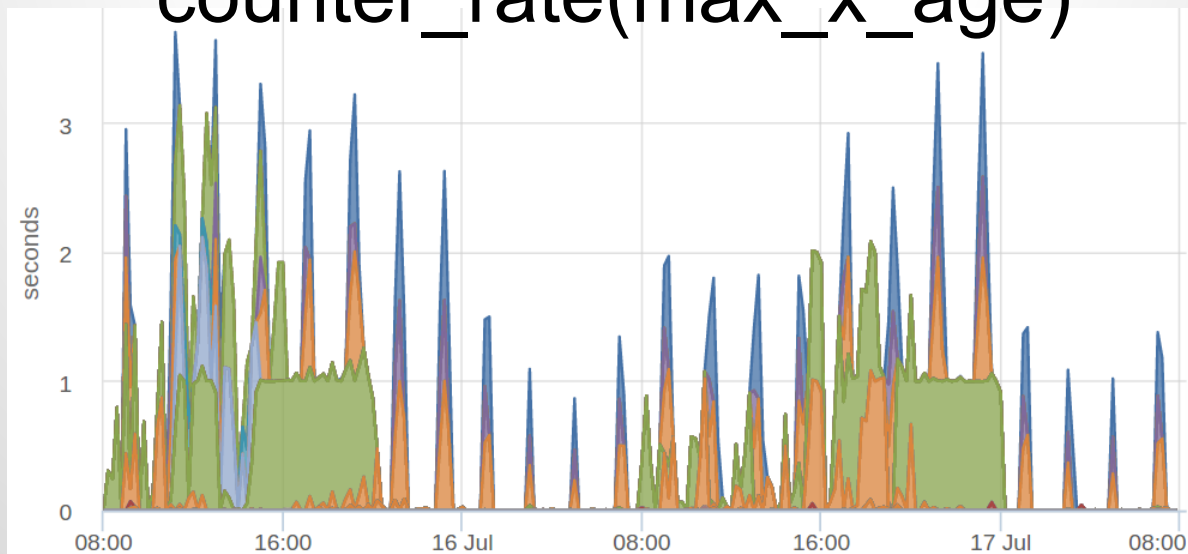




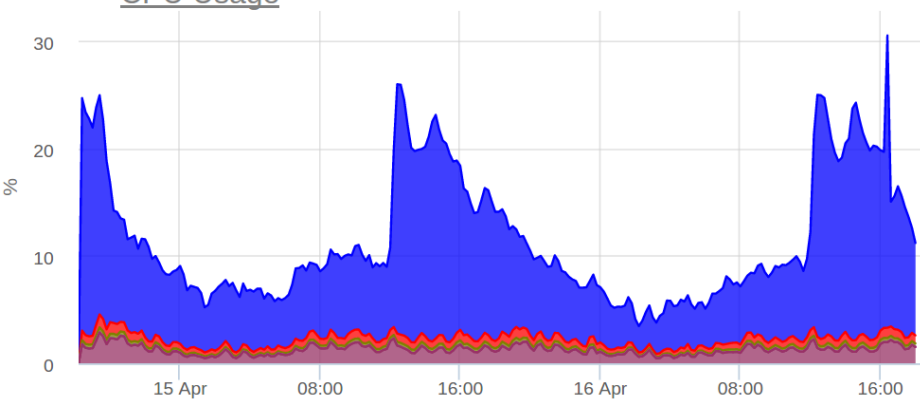
# pg\_stat activity



counter\_rate(max\_x\_age)



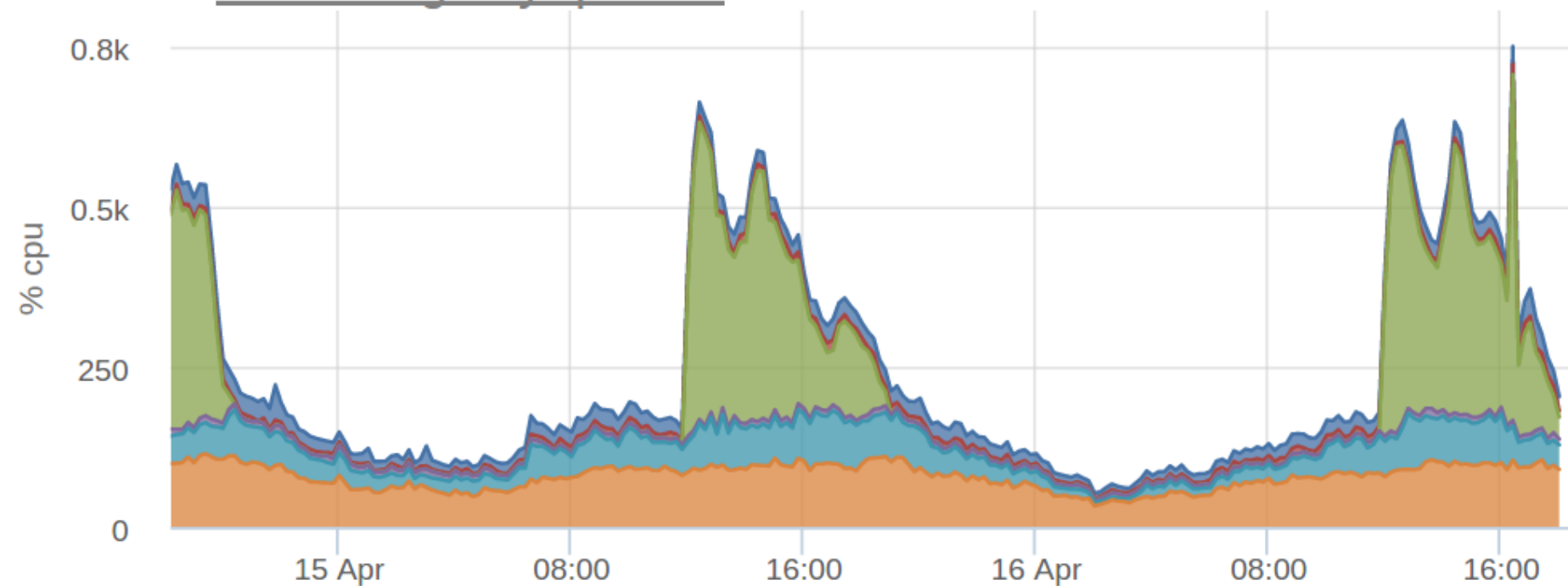
CPU Usage



Average query time



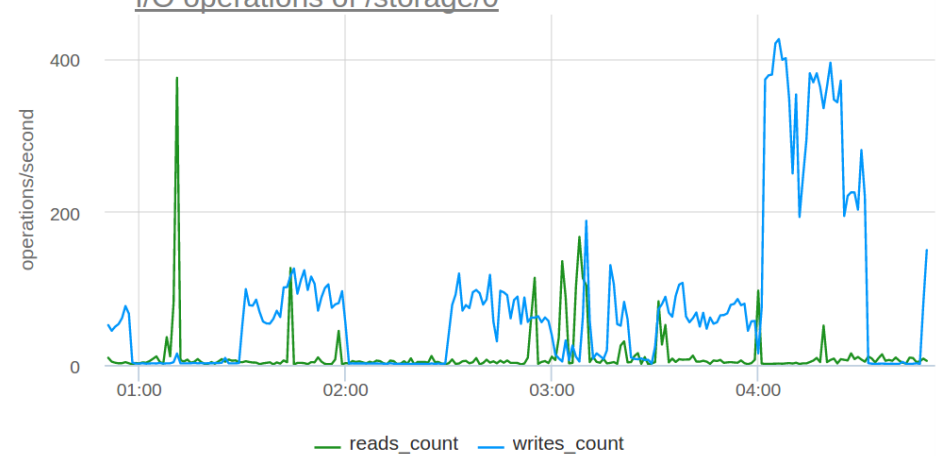
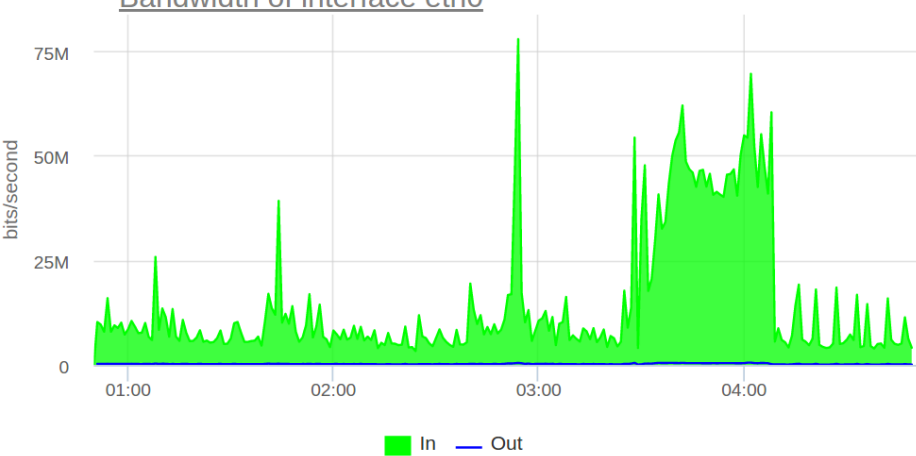
CPU usage by queries



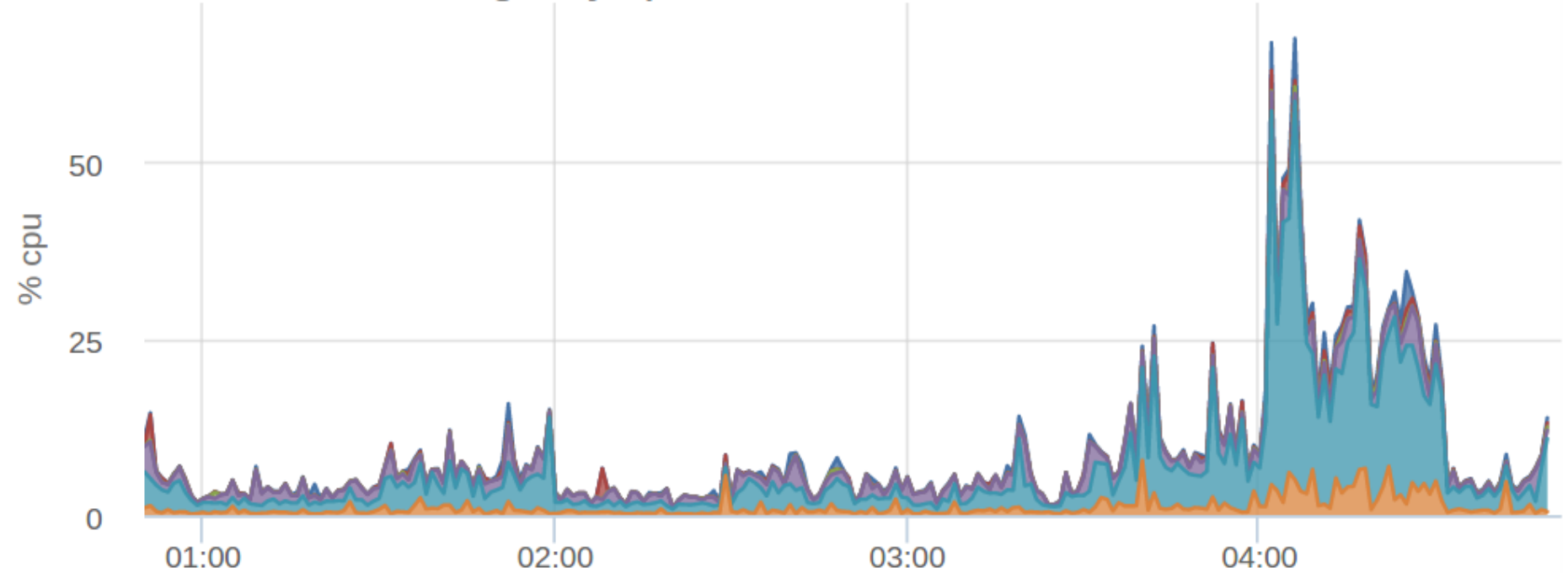
x SELECT "gqtl\_utxy".tgo\_fhynbfyji AS f...  
x SELECT "cqefba".cqefba\_mxxbj\_fabjn...  
x SELECT s\_sfn\_mh AS "mh" FROM gs...

x SELECT "lvyq\_ayde".ylt\_kmesgkeon ...  
x SELECT frxqw(?) AS rc FROM "eorj\_s...  
~other ~other





## Disk I/O usage by queries



x SELECT "mwar\_baef".amu\_Infthlfpo A...

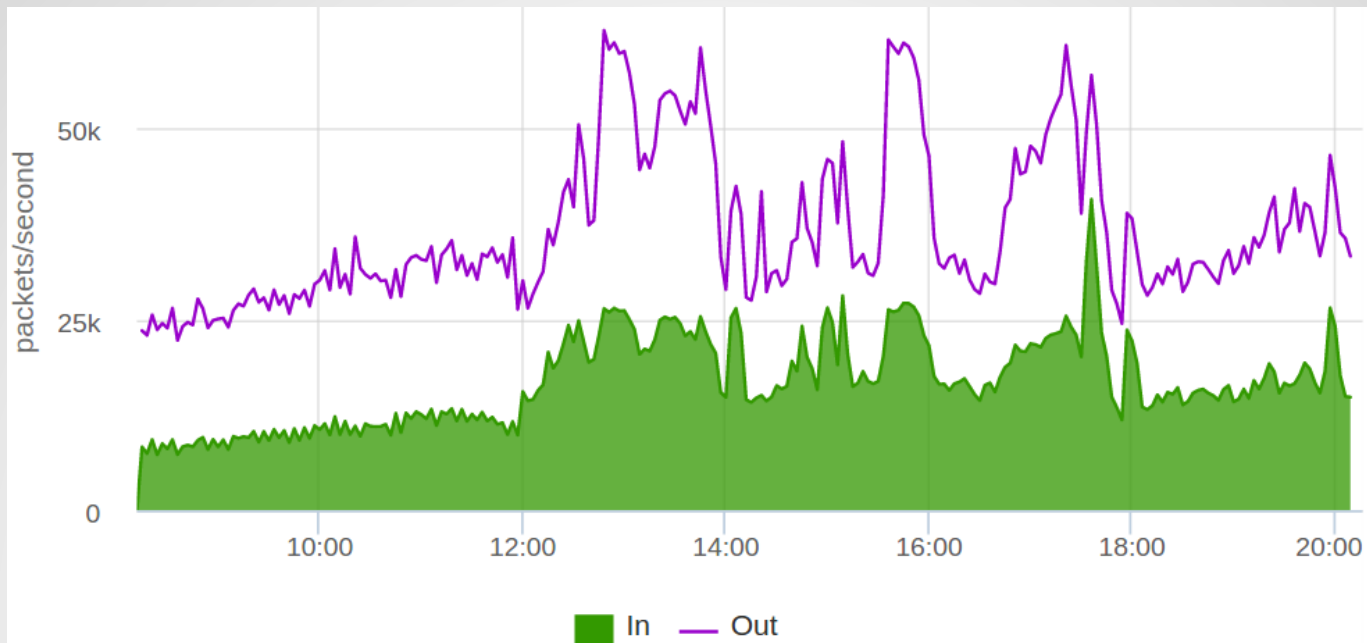
x SELECT "wjhhyio".who\_jve\_jve\_dx AS...

x SELECT bntms(?) AS rc FROM "bnlld...

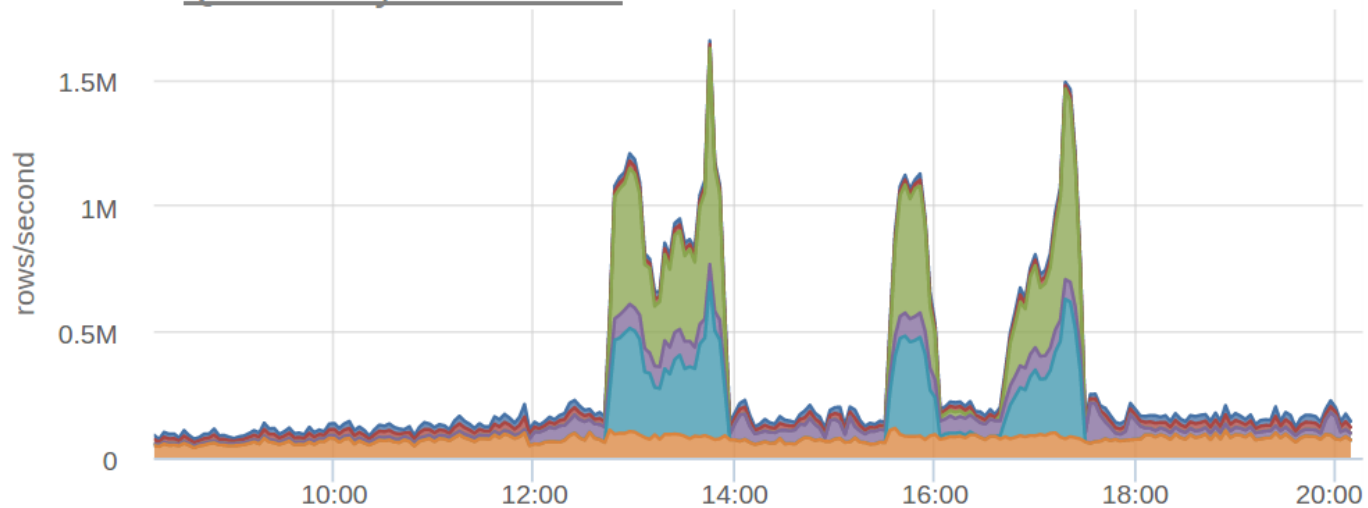
x SELECT "sdgx\_hgkl".gsb\_rtlanrlvu AS...

x SELECT amslr(?) AS rc FROM "yjme\_...

~other ~other

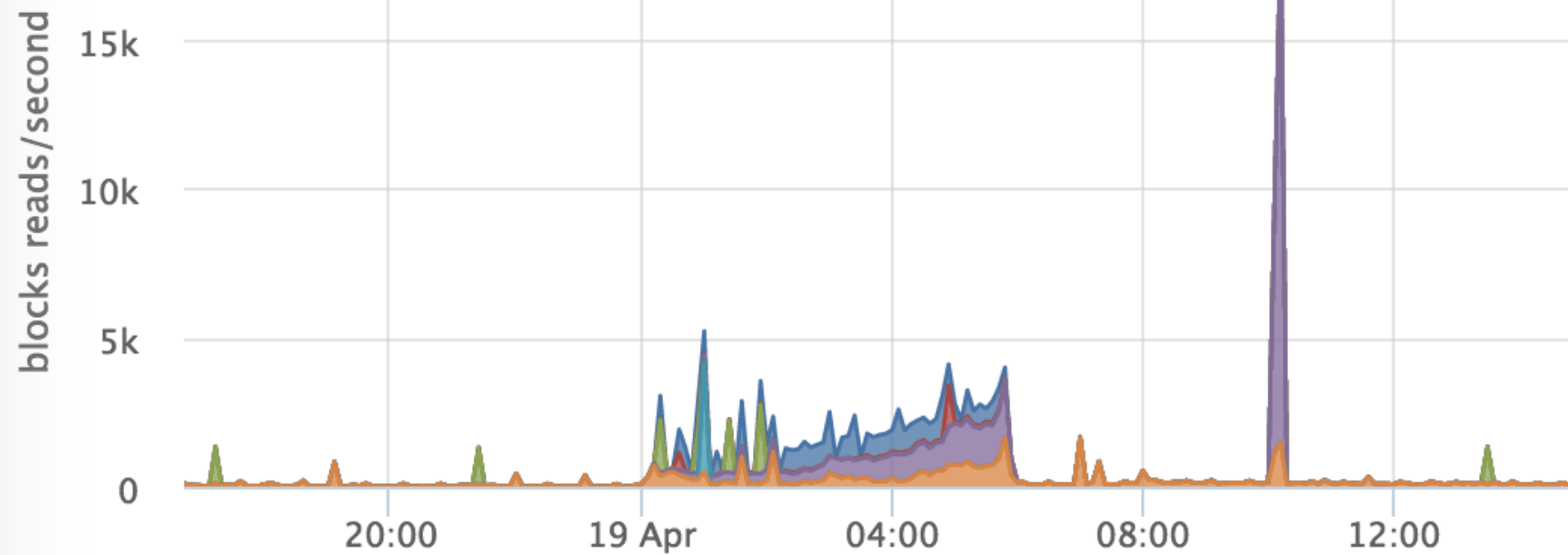


### Queries by result rows

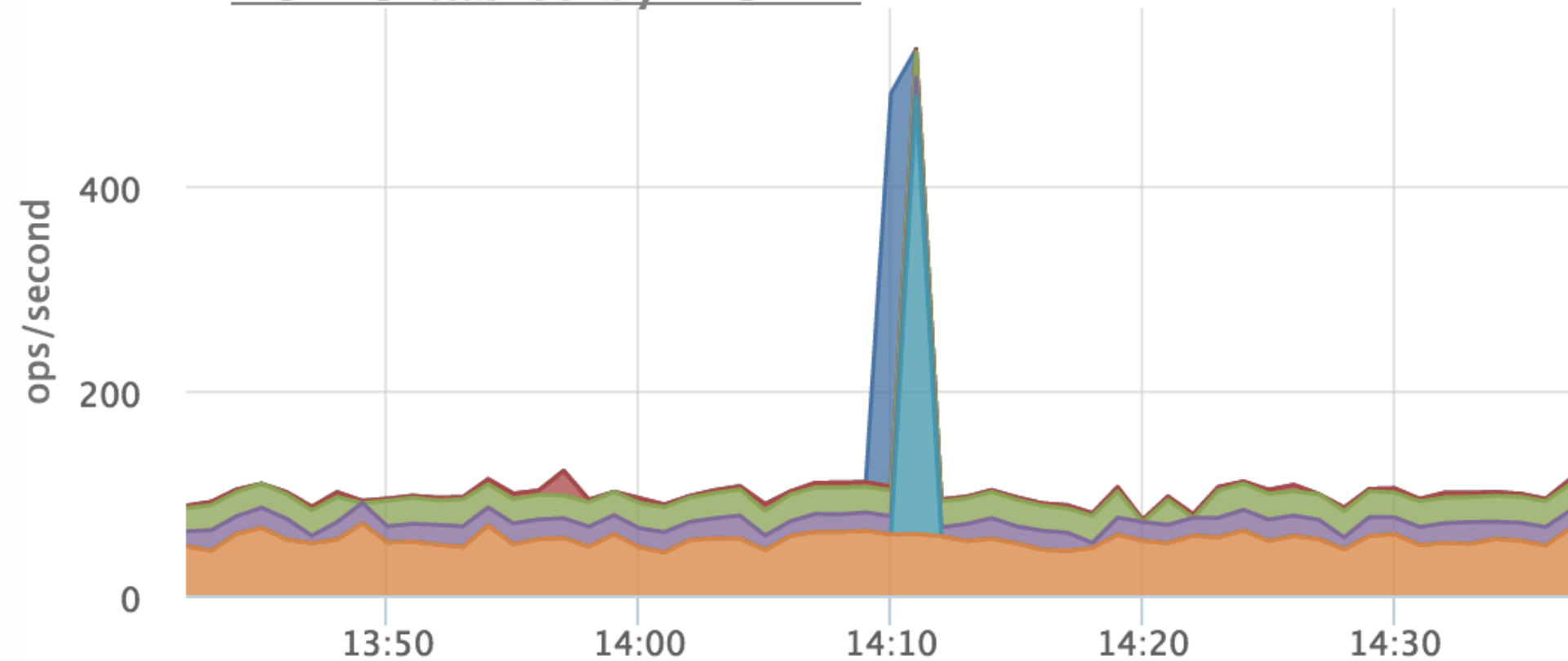


■ copycopter SELECT CONCAT(orfdohv....	■ copycopter SELECT CONCAT(ruigrky.q...
■ x SELECT "nwtwfb"."kpivvmt_dbma_ql"...	■ x SELECT j.jddwjvn, oxbvjd_diyn(j.jdddi...
■ x SELECT qawwaipd_to, COUNT(nslly...	■ ~other ~other

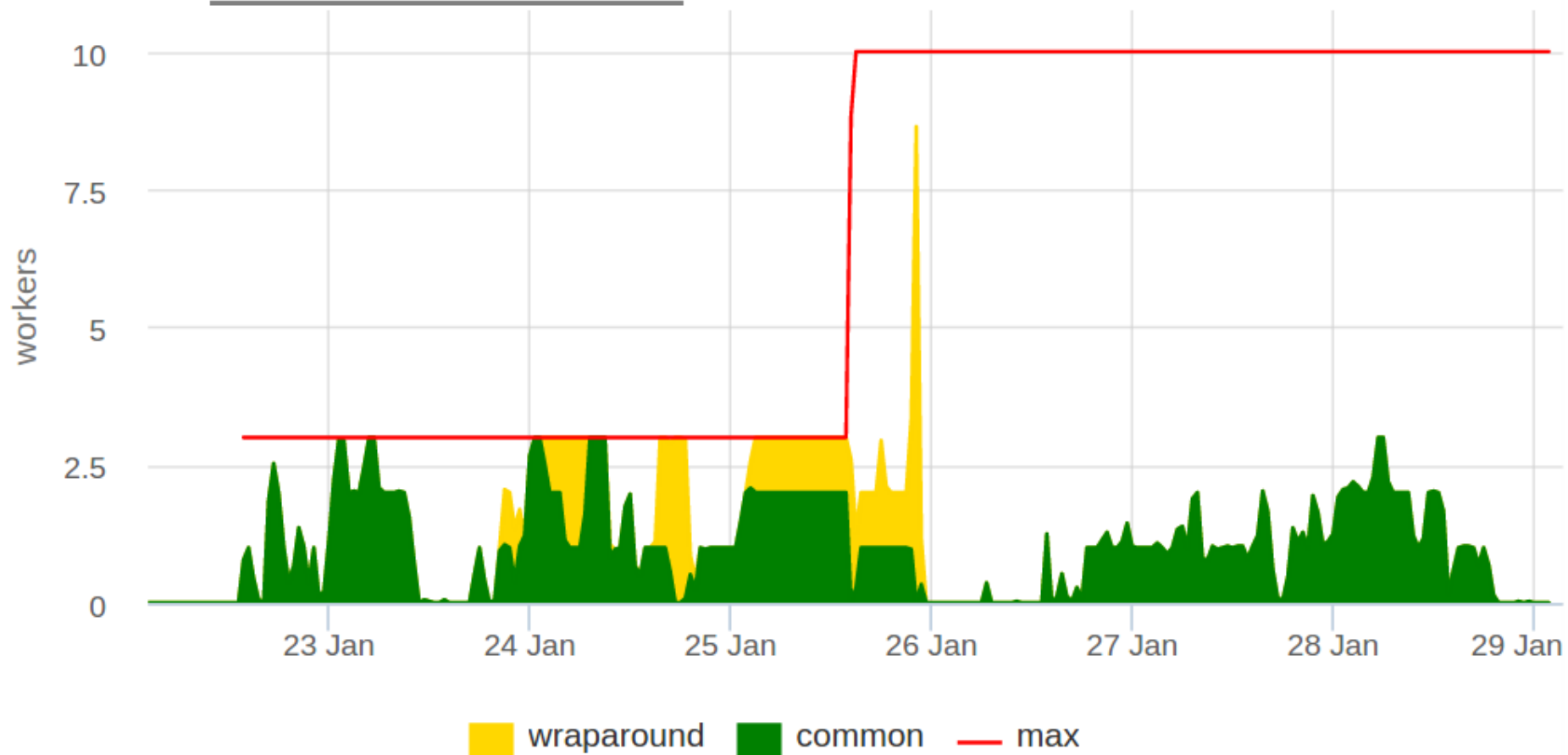
## TOP-5 tables by blocks read



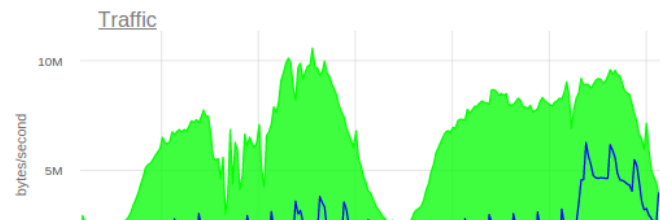
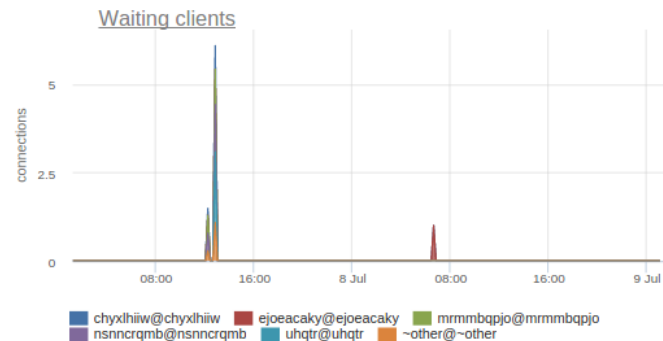
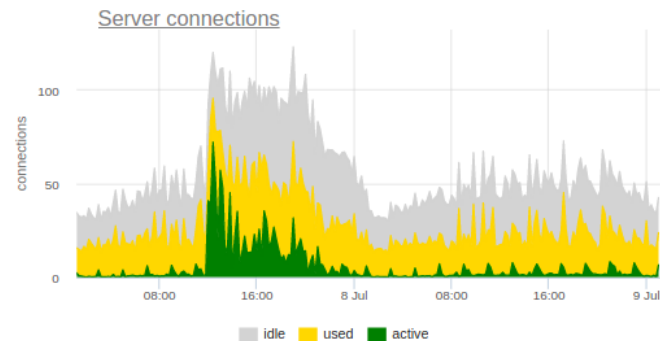
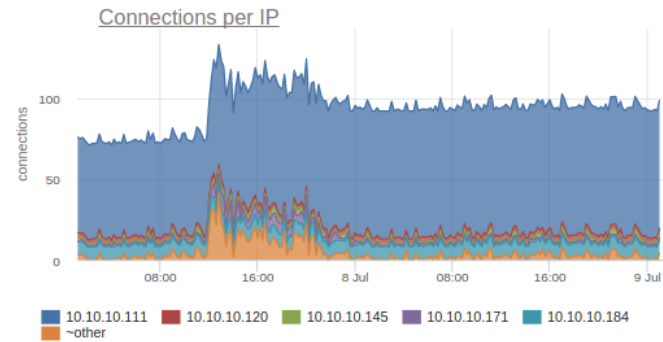
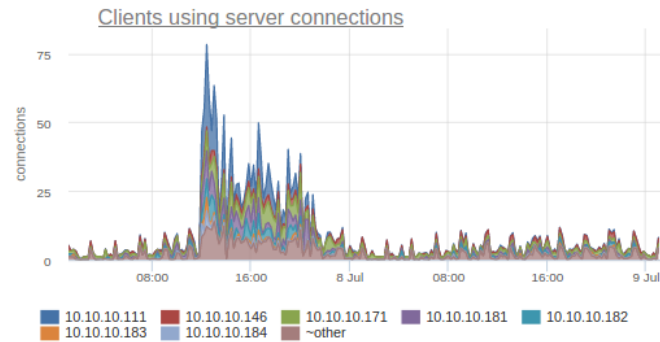
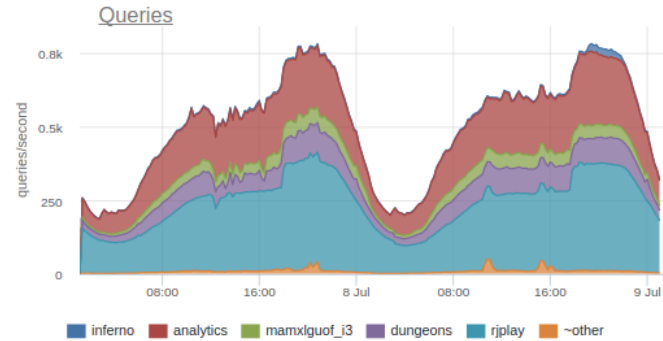
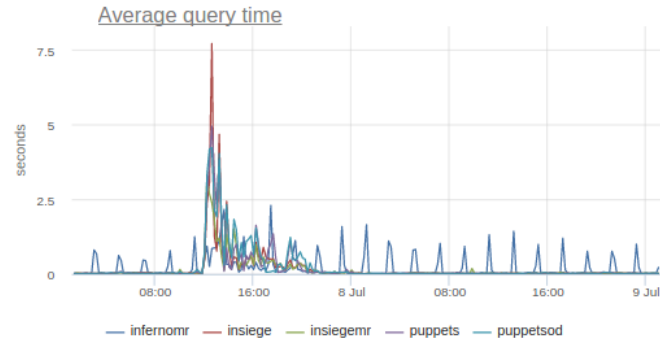
## TOP-5 tables by INSERT



## Autovacuum workers

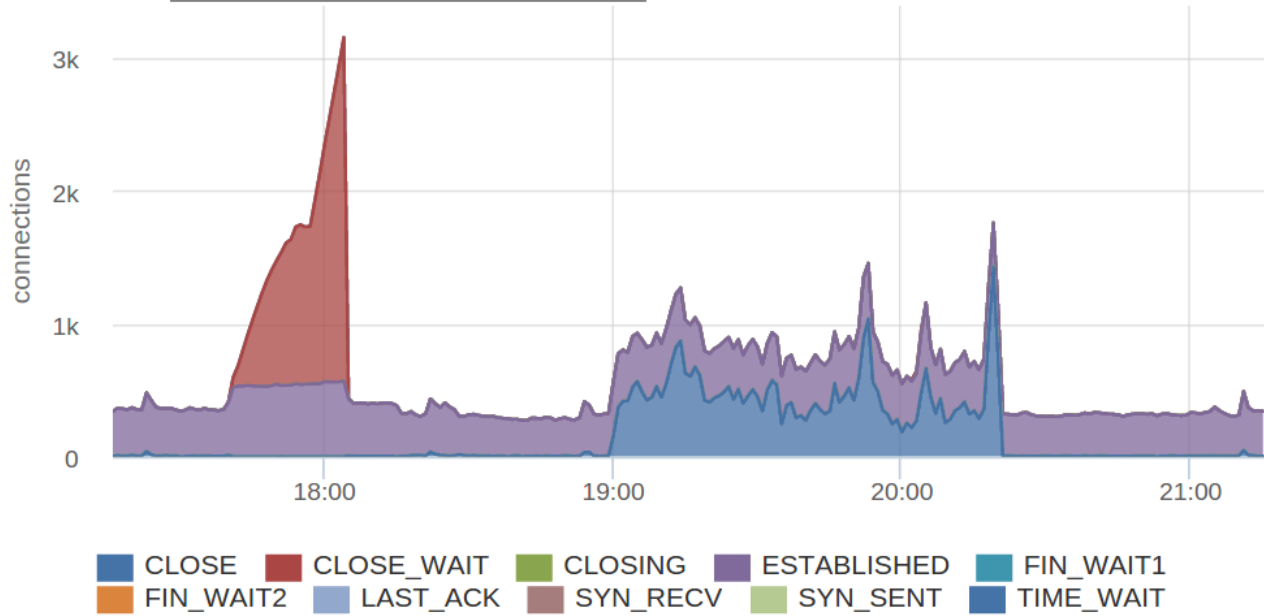


# PgBouncer

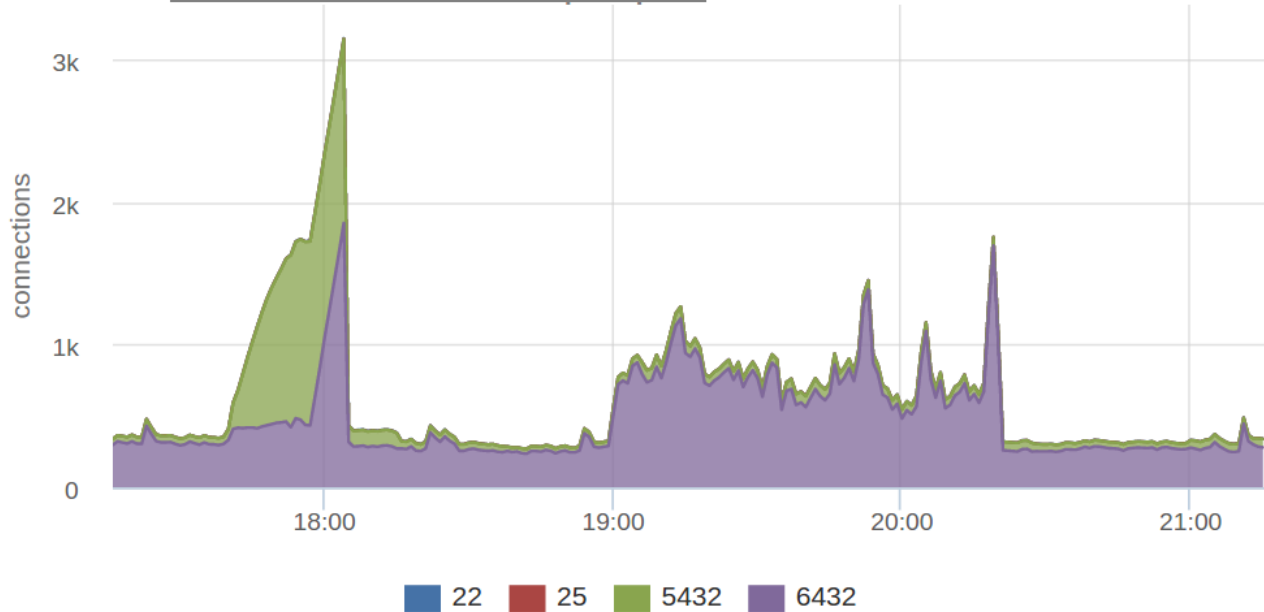


# tcp

## Inbound TCP connections



## Inbound connections per port



# Мониторинг

PG и мир вокруг