Using PostgreSQL in Production

Licensing and Professional Support

Koichi Suzuki

Nov. 13, 2020

Agenda page

- New formation
- Open source products and business use
- Professional service example
    - Support
    - Consultation
    - DBA/Monitoring

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First of all ...

2ndQuadrant has been acquired by EnterpriseDB

- https://www.enterprisedb.com/blog/how-edb-became-leader-postgres-market
- Became the largest PostgreSQL Tech and Business company
- Will provide even more powerful and high quality product and support

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About myself

- NTT Lab, NTT DATA, NTT DATA Intellilink
    - Unix L10N
    - Oracle
    - UniSQL
    - PostgreSQL (NTT OSS Center)
    - Postgres-XC, Postgres-XL
- Joined 2ndQuadrant
- Now EDB member

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2ndQuadrant

Now a part of EnterpriseDB

- **Founded by an Enterprise Architect / Postgres Developer 15 years ago**
- **Contributed features to Postgres to make it Enterprise Ready**
  - Backup and Recovery
  - Point in Time Recovery
  - Streaming Replication
  - Logical Replication
  - Stored Procedures with Transactions
  - Performance improvements to partitioning
- **Funded by support of Postgres Servers**
- **Wrote the code, wrote the books**

PostgreSQL Programming
PostgreSQL Administration Cookbook
PostgreSQL High Availability Cookbook
Packt

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Using Open Source Products in the business

It’s free to use but …

- Issues while using in production
    - Need specialist help
        - Too expensive to hire and too painful to foster
    - Obtain from communities
        - Many good people to provide help in best-effort basis
        - No SLA
        - Cannot expose sensitive information to communities
        - Not suitable for too individual issues
            - Database design
            - Information security policies

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Top provider of Postgres Support

2nd Quadrant portion

We will provide even better professional support through merging into EnterpriseDB

- 100+ staff in over 20 countries worldwide
- Over 75% or revenue from PostgreSQL support
- Remaining Revenue comes from services
- Over 240 customers, including many fortune 100 companies
    - Major Credit Card Companies
    - Health Care Providers
    - Pharmaceuticals
    - Technology manufactures
- Over $300 Billion per year of Financial Transactions flowing through 2ndQuadrant Supported Services

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Support Plans

	Diamond	Platinum	Gold
Postgres BDR Support	yes	no	no
Response SLA	15 minutes	15 minutes	1 hour
Workaround SLA	4 hours	4 hours	Ongoing effort
Bug Fix SLA	24 hours	24 hours	Ongoing effort

- No other vendor offers guaranteed resolution times
- Staffed by Postgres Developers, Authors and DBAs
- Company is built around providing best possible support

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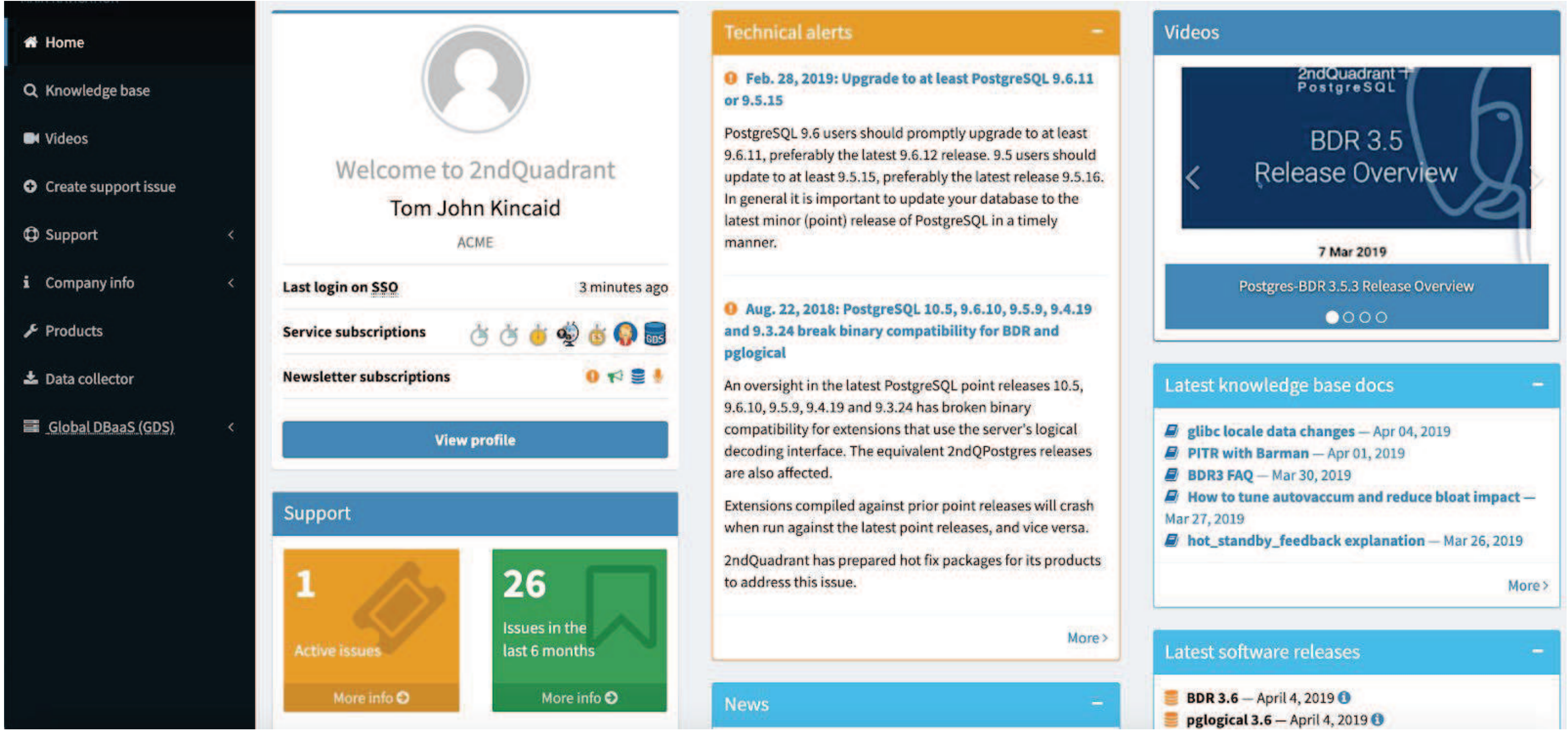
Support Portal



Welcome to 2ndQuadrant

Tom John Kincaid

ACME

Last login on SSO — 3 minutes ago

Service subscriptions

Newsletter subscriptions

Support

1 Active issues — More info

26 Issues in the last 6 months — More info

Technical alerts

Feb. 28, 2019: Upgrade to at least PostgreSQL 9.6.11 or 9.5.15

PostgreSQL 9.6 users should promptly upgrade to at least 9.6.11, preferably the latest 9.6.12 release. 9.5 users should update to at least 9.5.15, preferably the latest 9.5.16. In general it is important to update your database to the latest minor (point) release of PostgreSQL in a timely manner.

Aug. 22, 2018: PostgreSQL 10.5, 9.6.10, 9.5.9, 9.4.19 and 9.3.24 break binary compatibility for BDR and pglogical

An oversight in the latest PostgreSQL point releases 10.5, 9.6.10, 9.5.9, 9.4.19 and 9.3.24 has broken binary compatibility for extensions that use the server's logical decoding interface. The equivalent 2ndQPostgres releases are also affected.

Extensions compiled against prior point releases will crash when run against the latest point releases, and vice versa.

2ndQuadrant has prepared hot fix packages for its products to address this issue.

More ›

News

Videos

7 Mar 2019

Postgres-BDR 3.5.3 Release Overview

Latest knowledge base docs

- **glibc locale data changes** — Apr 04, 2019
- **PITR with Barman** — Apr 01, 2019
- **BDR3 FAQ** — Mar 30, 2019
- **How to tune autovaccum and reduce bloat impact** — Mar 27, 2019
- **hot_standby_feedback explanation** — Mar 26, 2019

More ›

Latest software releases

- **BDR 3.6** — April 4, 2019
- **pglogical 3.6** — April 4, 2019

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2ndQuadrant Support

- L1 Engineers Follow the Sun – 4 shifts / day
- Ever growing knowledge base
- Always perform work in timezone
- Major Incident Manager for Sev. 1 calls
- Dozens of Sev. 1 Data Loss Bugs fixed
- Everybody does support

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Some of our contributions to Postgres

- Online backup
- Point in Time Recovery
- Streaming Replication
- Logical Replication
- Many enhancements to Vacuum and MVCC
- Transaction controlled Stored Procedures
- Incremental Sort
- Many other features

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Supported Software List

- 7 Years of support for all major Postgres releases
- Support for important infrastructure projects including …

Project	Description
repmgr	Managing and creating replicas and providing automatic failover
barman	Backup and Recover (including 0 RPO)
pglogical	Advanced Logical Replication between Postgres
pgaudit	Audit logging for Compliance
pgbouncer	Lightweight connection pooler
OmniDB	Multi-database management tool

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Training

- Delivered on-line with Advanced Video techniques
- Lab Machines fully provided
- Advanced Video and teaching techniques

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2ndQuadrant Training

Title	Modules	Days	Description
Postgres Development	22	3	For developers new to Postgres
Advanced Development	11	3	In depth development topics and architecture
Administration	10	2	Basics of PG Administration
DR / HA	17	3	HA Disaster Recovery Administration
Immersion	27	5	Zero to hero (customized for team)
Linux for PostgreSQL DBAs	8	1	Gain Linux skills to Administer Postgres
BDR	2	1	Designing and deploying applications with BDR
Oracle Migration	5	1	How to migrate from Oracle to Postgres

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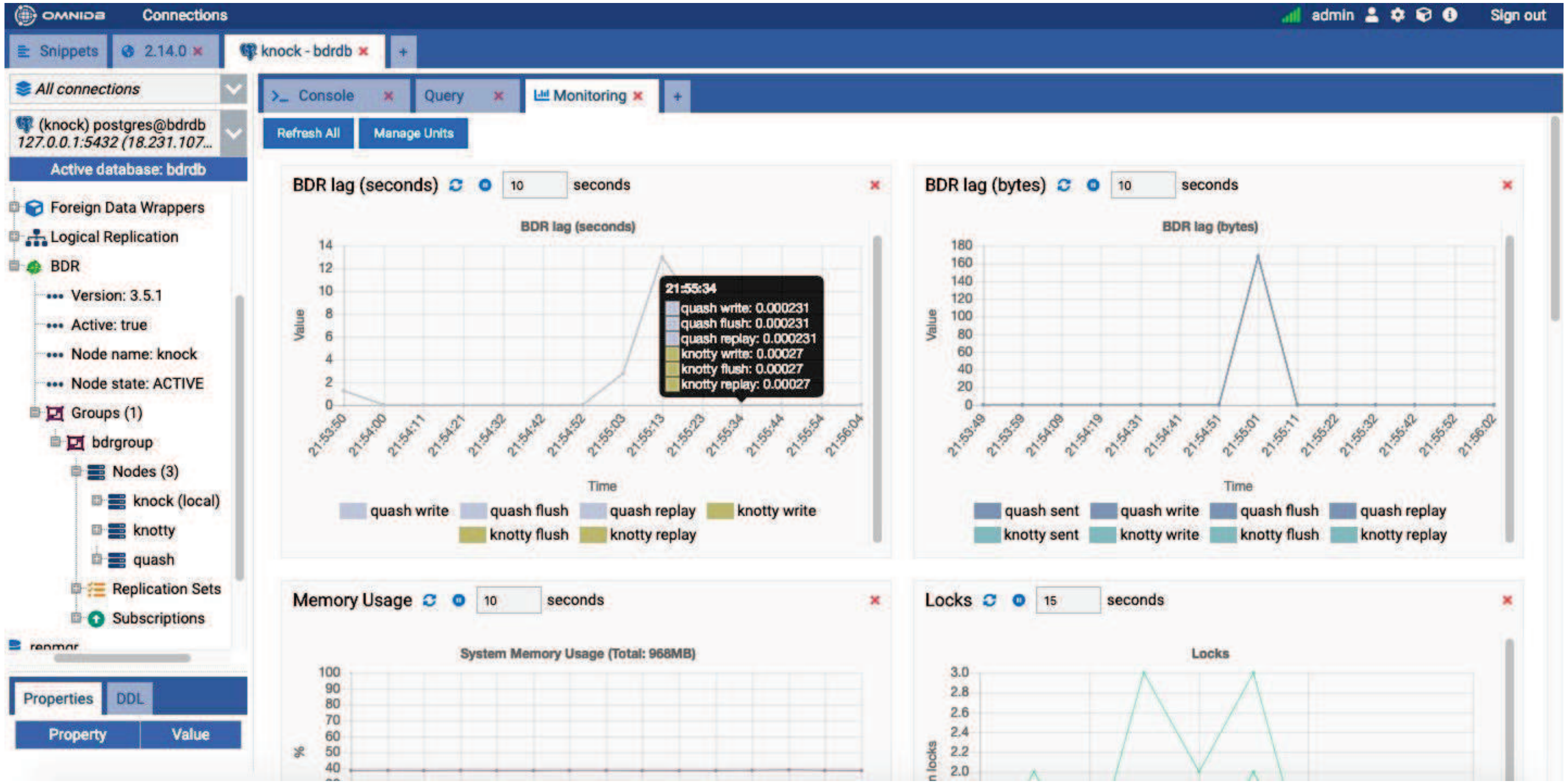
Postgres-BDR Plugin for OmniDB

Visual Administration



(knock) postgres@bdrdb
127.0.0.1:5432 (18.231.107...

Active database: bdrdb

Version: 3.5.1

Active: true

Node name: knock

Node state: ACTIVE

21:55:34
quash write: 0.000231
quash flush: 0.000231
quash replay: 0.000231
knotty write: 0.00027
knotty flush: 0.00027
knotty replay: 0.00027

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Monitoring

- **2ndQuadrant can setup and train on Zabbix Monitoring**
  - A completely open source solution
  - Support available from Zabbix

- **2ndQuadrant has extensive experience around monitoring production servers.**
  - Will be announcing a new monitoring solution for our customers shortly

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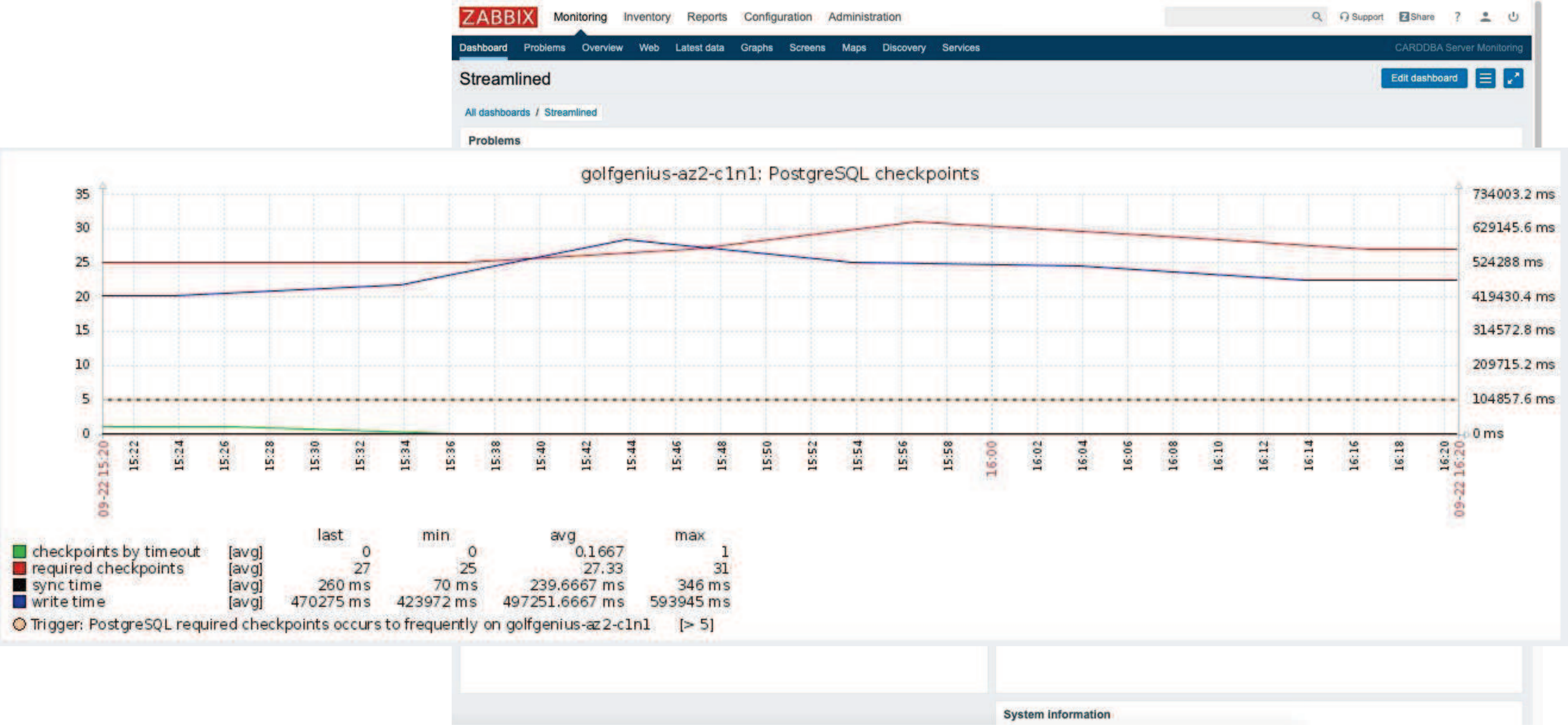
Monitoring Zabbix



golfgenius-az2-c1n1: PostgreSQL checkpoints

		last	min	avg	max
🟩 checkpoints by timeout	[avg]	0	0	0.1667	1
🟥 required checkpoints	[avg]	27	25	27.33	31
■ sync time	[avg]	260 ms	70 ms	239.6667 ms	346 ms
🟦 write time	[avg]	470275 ms	423972 ms	497251.6667 ms	593945 ms

○ Trigger: PostgreSQL required checkpoints occurs to frequently on golfgenius-az2-c1n1 [> 5]

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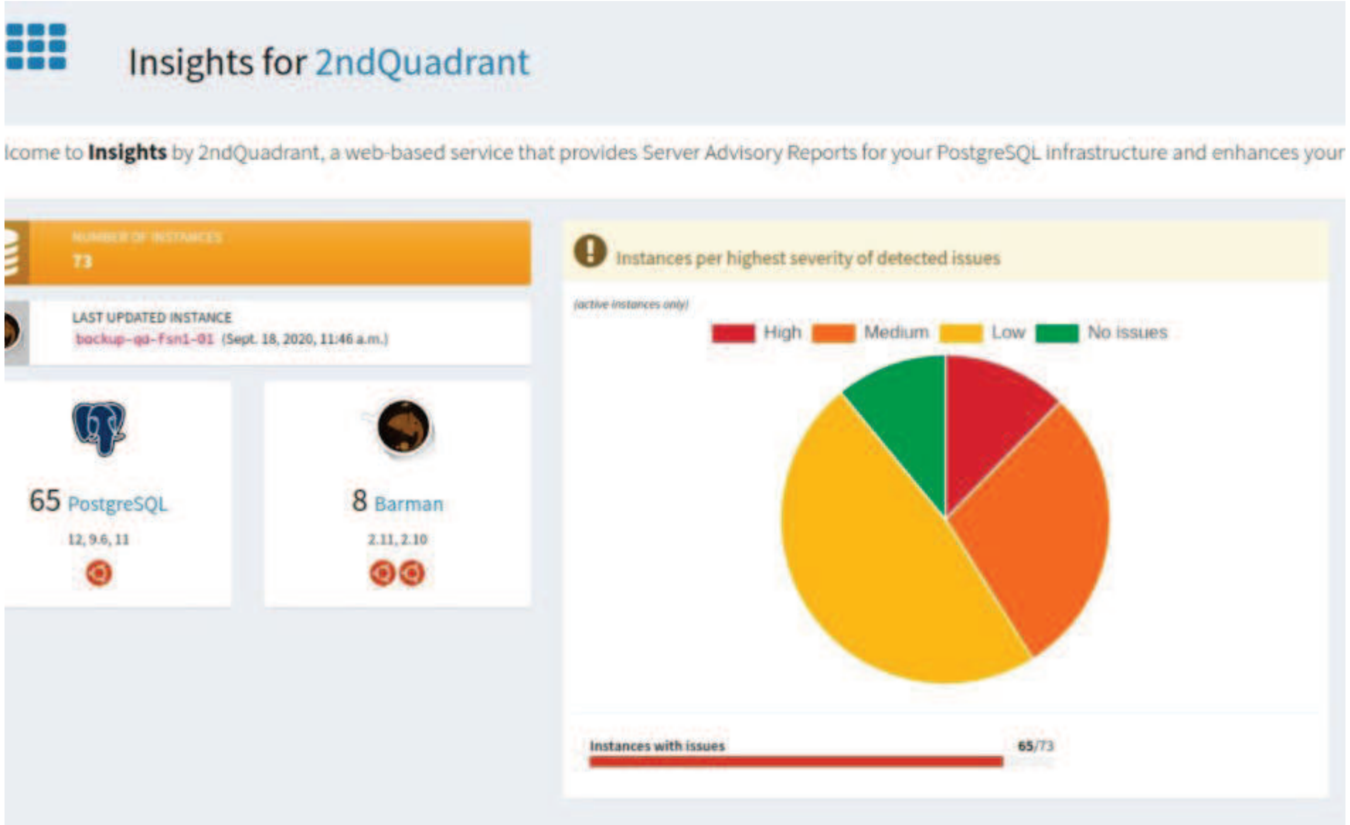
2ndQuadrant Insights



Insights for 2ndQuadrant

lcome to **Insights** by 2ndQuadrant, a web-based service that provides Server Advisory Reports for your PostgreSQL infrastructure and enhances your

NUMBER OF INSTANCES
73

LAST UPDATED INSTANCE
`bockup-qd-fsn1-01` (Sept. 18, 2020, 11:46 a.m.)

65 PostgreSQL
12, 9.6, 11

8 Barman
2.11, 2.10

Instances per highest severity of detected issues

(active instances only)

Instances with issues 65/73

18

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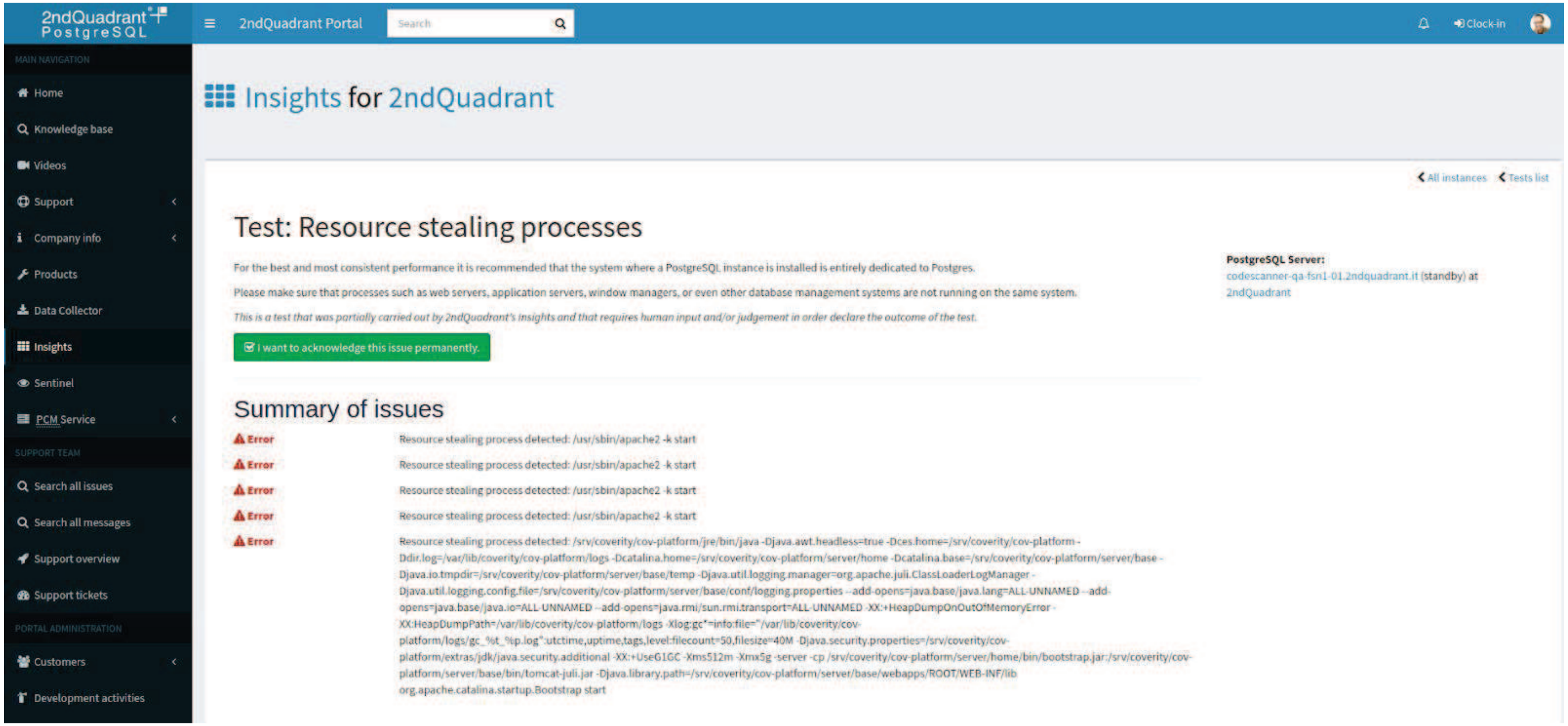
2ndQuadrant Insights



Insights for 2ndQuadrant

Test: Resource stealing processes

For the best and most consistent performance it is recommended that the system where a PostgreSQL instance is installed is entirely dedicated to Postgres.

Please make sure that processes such as web servers, application servers, window managers, or even other database management systems are not running on the same system.

This is a test that was partially carried out by 2ndQuadrant's insights and that requires human input and/or judgement in order declare the outcome of the test.

☑ I want to acknowledge this issue permanently.

PostgreSQL Server:
codescanner-qa-fsn1-01.2ndquadrant.it (standby) at 2ndQuadrant

Summary of issues

⚠ Error	Resource stealing process detected: /usr/sbin/apache2 -k start
⚠ Error	Resource stealing process detected: /usr/sbin/apache2 -k start
⚠ Error	Resource stealing process detected: /usr/sbin/apache2 -k start
⚠ Error	Resource stealing process detected: /usr/sbin/apache2 -k start
⚠ Error	Resource stealing process detected: /srv/coverity/cov-platform/jre/bin/java -Djava.awt.headless=true -Dces.home=/srv/coverity/cov-platform -Ddir.log=/var/lib/coverity/cov-platform/logs -Dcatalina.home=/srv/coverity/cov-platform/server/home -Dcatalina.base=/srv/coverity/cov-platform/server/base -Djava.io.tmpdir=/srv/coverity/cov-platform/server/base/temp -Djava.util.logging.manager=org.apache.juli.ClassLoaderLogManager -Djava.util.logging.config.file=/srv/coverity/cov-platform/server/base/conf/logging.properties --add-opens=java.base/java.lang=ALL-UNNAMED --add-opens=java.base/java.io=ALL-UNNAMED --add-opens=java.rmi/sun.rmi.transport=ALL-UNNAMED -XX:+HeapDumpOnOutOfMemoryError -XX:HeapDumpPath=/var/lib/coverity/cov-platform/logs -Xlog:gc*=info:file="/var/lib/coverity/cov-platform/logs/gc_%t_%p.log":utctime,uptime,tags,level:filecount=50,filesize=40M -Djava.security.properties=/srv/coverity/cov-platform/extras/jdk/java.security.additional -XX:+UseG1GC -Xms512m -Xmx5g -server -cp /srv/coverity/cov-platform/server/home/bin/bootstrap.jar:/srv/coverity/cov-platform/server/base/bin/tomcat-juli.jar -Djava.library.path=/srv/coverity/cov-platform/server/base/webapps/ROOT/WEB-INF/lib org.apache.catalina.startup.Bootstrap start

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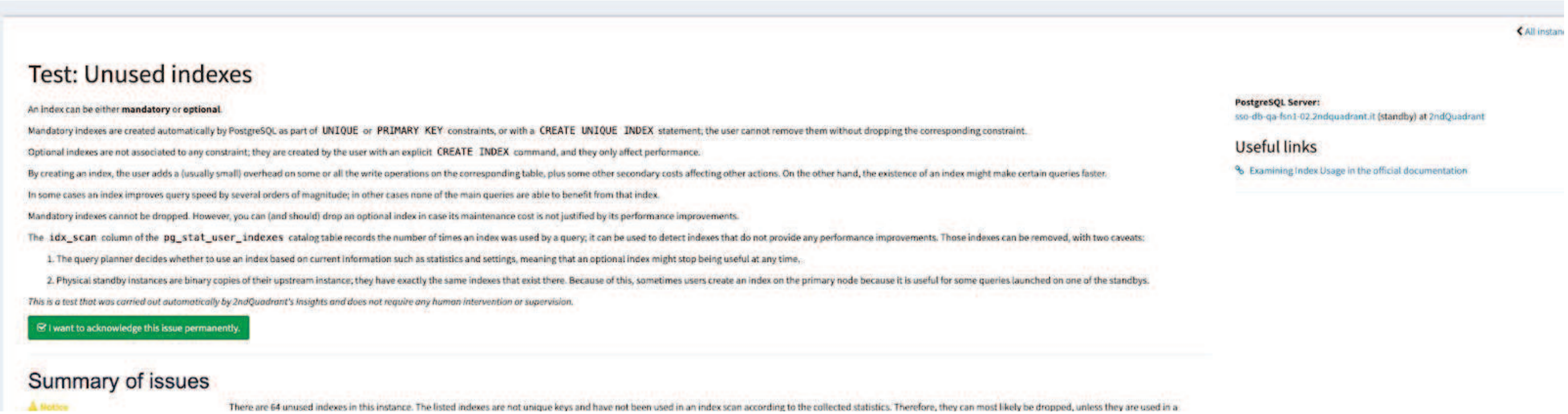
EDB

2ndQuadrant Insights



Test: Unused indexes

An index can be either **mandatory** or **optional**.

Mandatory indexes are created automatically by PostgreSQL as part of `UNIQUE` or `PRIMARY KEY` constraints, or with a `CREATE UNIQUE INDEX` statement; the user cannot remove them without dropping the corresponding constraint.

Optional indexes are not associated to any constraint; they are created by the user with an explicit `CREATE INDEX` command, and they only affect performance.

By creating an index, the user adds a (usually small) overhead on some or all the write operations on the corresponding table, plus some other secondary costs affecting other actions. On the other hand, the existence of an index might make certain queries faster.

In some cases an index improves query speed by several orders of magnitude; in other cases none of the main queries are able to benefit from that index.

Mandatory indexes cannot be dropped. However, you can (and should) drop an optional index in case its maintenance cost is not justified by its performance improvements.

The `idx_scan` column of the `pg_stat_user_indexes` catalog table records the number of times an index was used by a query; it can be used to detect indexes that do not provide any performance improvements. Those indexes can be removed, with two caveats:

1. The query planner decides whether to use an index based on current information such as statistics and settings, meaning that an optional index might stop being useful at any time.
2. Physical standby instances are binary copies of their upstream instance; they have exactly the same indexes that exist there. Because of this, sometimes users create an index on the primary node because it is useful for some queries launched on one of the standbys.

This is a test that was carried out automatically by 2ndQuadrant's Insights and does not require any human intervention or supervision.

PostgreSQL Server:
sso-db-qa-fsn1-02.2ndquadrant.it (standby) at 2ndQuadrant

Useful links

Examining Index Usage in the official documentation

Summary of issues

⚠ Notice

There are 64 unused indexes in this instance. The listed indexes are not unique keys and have not been used in an index scan according to the collected statistics. Therefore, they can most likely be dropped, unless they are used in a

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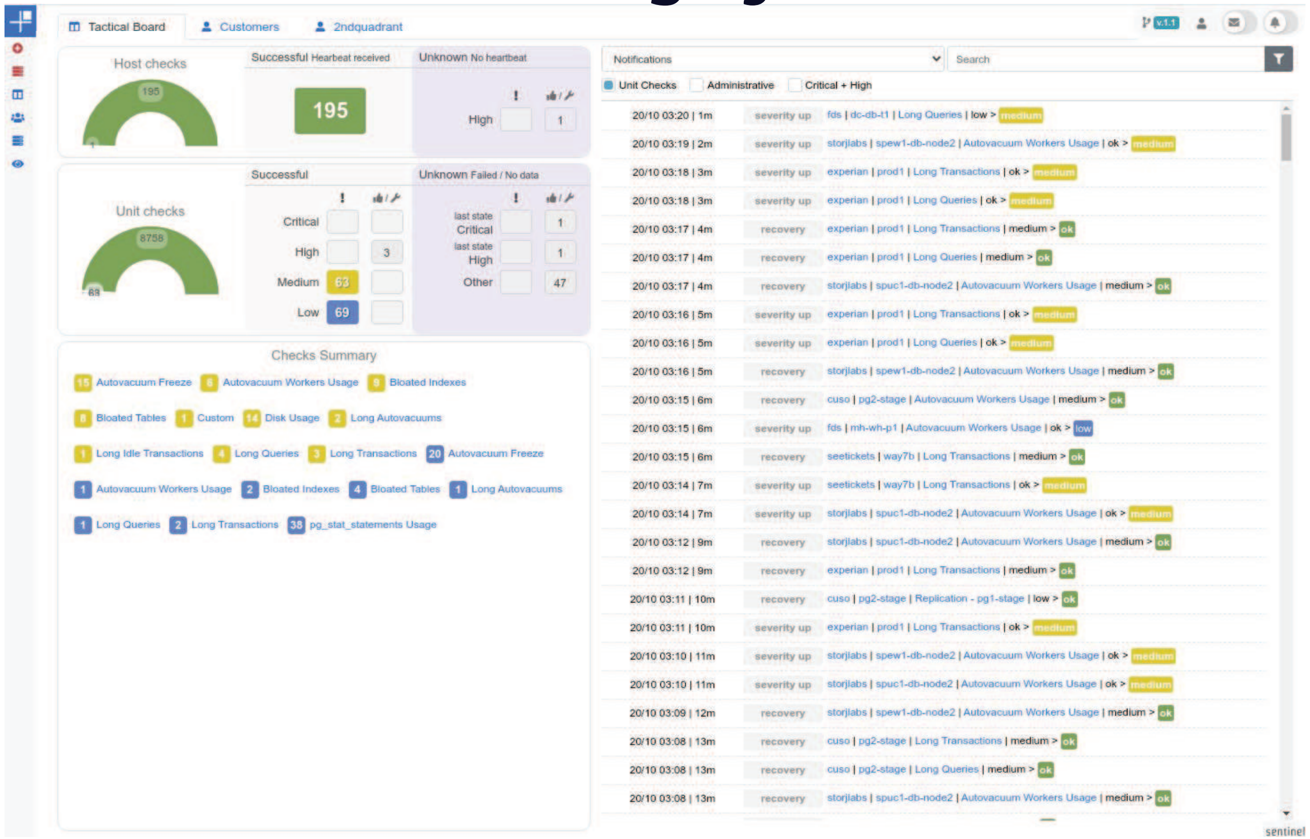
Remote DBA monitoring by Sentinel



Successful Hearbeat received: 195

Unknown No heartbeat

	!	👍 / 🔧
High		1

Successful

	!	👍 / 🔧
Critical		
High		3
Medium	63	
Low	69	

Unknown Failed / No data

	!	👍 / 🔧
last state Critical		1
last state High		1
Other		47

Checks Summary

15 Autovacuum Freeze · 6 Autovacuum Workers Usage · 9 Bloated Indexes · 8 Bloated Tables · 1 Custom · 14 Disk Usage · 2 Long Autovacuums · 1 Long Idle Transactions · 4 Long Queries · 3 Long Transactions · 20 Autovacuum Freeze · 1 Autovacuum Workers Usage · 2 Bloated Indexes · 4 Bloated Tables · 1 Long Autovacuums · 1 Long Queries · 2 Long Transactions · 38 pg_stat_statements Usage

Notifications · Search

● Unit Checks □ Administrative □ Critical + High

```
20/10 03:20 | 1m    severity up   fds | dc-db-t1 | Long Queries | low > medium
20/10 03:19 | 2m    severity up   storjlabs | spew1-db-node2 | Autovacuum Workers Usage | ok > medium
20/10 03:18 | 3m    severity up   experian | prod1 | Long Transactions | ok > medium
20/10 03:18 | 3m    severity up   experian | prod1 | Long Queries | ok > medium
20/10 03:17 | 4m    recovery      experian | prod1 | Long Transactions | medium > ok
20/10 03:17 | 4m    recovery      experian | prod1 | Long Queries | medium > ok
20/10 03:17 | 4m    recovery      storjlabs | spuc1-db-node2 | Autovacuum Workers Usage | medium > ok
20/10 03:16 | 5m    severity up   experian | prod1 | Long Transactions | ok > medium
20/10 03:16 | 5m    severity up   experian | prod1 | Long Queries | ok > medium
20/10 03:16 | 5m    recovery      storjlabs | spew1-db-node2 | Autovacuum Workers Usage | medium > ok
20/10 03:15 | 6m    recovery      cuso | pg2-stage | Autovacuum Workers Usage | medium > ok
20/10 03:15 | 6m    severity up   fds | mh-wh-p1 | Autovacuum Workers Usage | ok > low
20/10 03:15 | 6m    recovery      seetickets | way7b | Long Transactions | medium > ok
20/10 03:14 | 7m    severity up   seetickets | way7b | Long Transactions | ok > medium
20/10 03:14 | 7m    severity up   storjlabs | spuc1-db-node2 | Autovacuum Workers Usage | ok > medium
20/10 03:12 | 9m    recovery      storjlabs | spuc1-db-node2 | Autovacuum Workers Usage | medium > ok
20/10 03:12 | 9m    recovery      experian | prod1 | Long Transactions | medium > ok
20/10 03:11 | 10m   recovery      cuso | pg2-stage | Replication - pg1-stage | low > ok
20/10 03:11 | 10m   severity up   experian | prod1 | Long Transactions | ok > medium
20/10 03:10 | 11m   severity up   storjlabs | spew1-db-node2 | Autovacuum Workers Usage | ok > medium
20/10 03:10 | 11m   severity up   storjlabs | spuc1-db-node2 | Autovacuum Workers Usage | ok > medium
20/10 03:09 | 12m   recovery      storjlabs | spew1-db-node2 | Autovacuum Workers Usage | medium > ok
20/10 03:08 | 13m   recovery      cuso | pg2-stage | Long Transactions | medium > ok
20/10 03:08 | 13m   recovery      cuso | pg2-stage | Long Queries | medium > ok
20/10 03:08 | 13m   recovery      storjlabs | spuc1-db-node2 | Autovacuum Workers Usage | medium > ok
```

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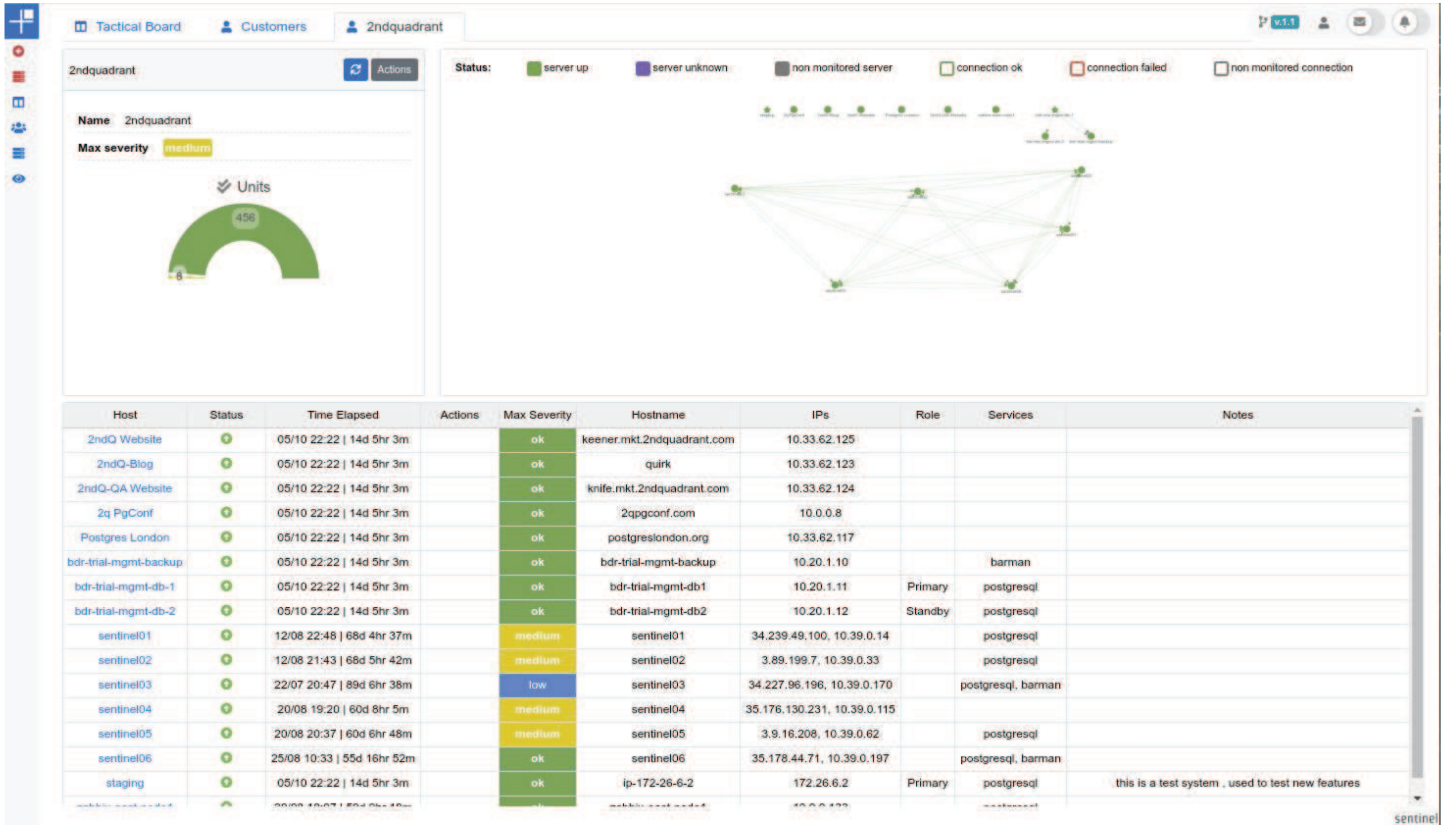
Remote DBA monitoring -- All servers per customer



Name 2ndquadrant

Max severity medium

Host	Status	Time Elapsed	Actions	Max Severity	Hostname	IPs	Role	Services	Notes
2ndQ Website	●	05/10 22:22 | 14d 5hr 3m		ok	keener.mkt.2ndquadrant.com	10.33.62.125			
2ndQ-Blog	●	05/10 22:22 | 14d 5hr 3m		ok	quirk	10.33.62.123			
2ndQ-QA Website	●	05/10 22:22 | 14d 5hr 3m		ok	knife.mkt.2ndquadrant.com	10.33.62.124			
2q PgConf	●	05/10 22:22 | 14d 5hr 3m		ok	2qpgconf.com	10.0.0.8			
Postgres London	●	05/10 22:22 | 14d 5hr 3m		ok	postgreslondon.org	10.33.62.117			
bdr-trial-mgmt-backup	●	05/10 22:22 | 14d 5hr 3m		ok	bdr-trial-mgmt-backup	10.20.1.10		barman	
bdr-trial-mgmt-db-1	●	05/10 22:22 | 14d 5hr 3m		ok	bdr-trial-mgmt-db1	10.20.1.11	Primary	postgresql	
bdr-trial-mgmt-db-2	●	05/10 22:22 | 14d 5hr 3m		ok	bdr-trial-mgmt-db2	10.20.1.12	Standby	postgresql	
sentinel01	●	12/08 22:48 | 68d 4hr 37m		medium	sentinel01	34.239.49.100, 10.39.0.14		postgresql	
sentinel02	●	12/08 21:43 | 68d 5hr 42m		medium	sentinel02	3.89.199.7, 10.39.0.33		postgresql	
sentinel03	●	22/07 20:47 | 89d 6hr 38m		low	sentinel03	34.227.96.196, 10.39.0.170		postgresql, barman	
sentinel04	●	20/08 19:20 | 60d 8hr 5m		medium	sentinel04	35.176.130.231, 10.39.0.115			
sentinel05	●	20/08 20:37 | 60d 6hr 48m		medium	sentinel05	3.9.16.208, 10.39.0.62		postgresql	
sentinel06	●	25/08 10:33 | 55d 16hr 52m		ok	sentinel06	35.178.44.71, 10.39.0.197		postgresql, barman	
staging	●	05/10 22:22 | 14d 5hr 3m		ok	ip-172-26-6-2	172.26.6.2	Primary	postgresql	this is a test system , used to test new features
[illegible]	●	[illegible]		ok	[illegible]	[illegible]		postgresql	

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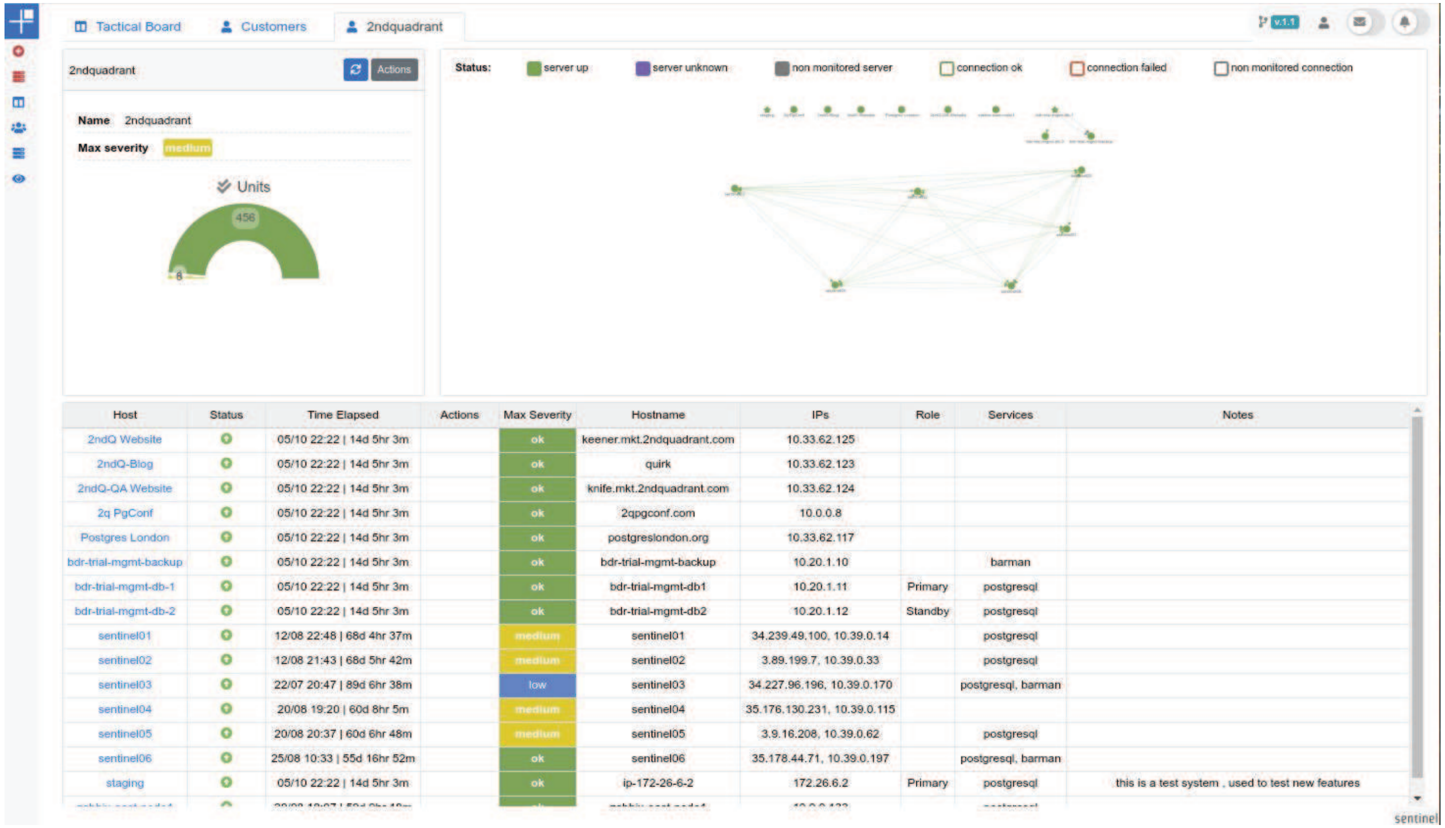
Remote DBA monitoring -- All servers per customer



Name 2ndquadrant

Max severity medium

Status: 🟩 server up 🟪 server unknown ⬛ non monitored server □ connection ok □ connection failed □ non monitored connection

Host	Status	Time Elapsed	Actions	Max Severity	Hostname	IPs	Role	Services	Notes
2ndQ Website	●	05/10 22:22 | 14d 5hr 3m		ok	keener.mkt.2ndquadrant.com	10.33.62.125			
2ndQ-Blog	●	05/10 22:22 | 14d 5hr 3m		ok	quirk	10.33.62.123			
2ndQ-QA Website	●	05/10 22:22 | 14d 5hr 3m		ok	knife.mkt.2ndquadrant.com	10.33.62.124			
2q PgConf	●	05/10 22:22 | 14d 5hr 3m		ok	2qpgconf.com	10.0.0.8			
Postgres London	●	05/10 22:22 | 14d 5hr 3m		ok	postgreslondon.org	10.33.62.117			
bdr-trial-mgmt-backup	●	05/10 22:22 | 14d 5hr 3m		ok	bdr-trial-mgmt-backup	10.20.1.10		barman	
bdr-trial-mgmt-db-1	●	05/10 22:22 | 14d 5hr 3m		ok	bdr-trial-mgmt-db1	10.20.1.11	Primary	postgresql	
bdr-trial-mgmt-db-2	●	05/10 22:22 | 14d 5hr 3m		ok	bdr-trial-mgmt-db2	10.20.1.12	Standby	postgresql	
sentinel01	●	12/08 22:48 | 68d 4hr 37m		medium	sentinel01	34.239.49.100, 10.39.0.14		postgresql	
sentinel02	●	12/08 21:43 | 68d 5hr 42m		medium	sentinel02	3.89.199.7, 10.39.0.33		postgresql	
sentinel03	●	22/07 20:47 | 89d 6hr 38m		low	sentinel03	34.227.96.196, 10.39.0.170		postgresql, barman	
sentinel04	●	20/08 19:20 | 60d 8hr 5m		medium	sentinel04	35.176.130.231, 10.39.0.115			
sentinel05	●	20/08 20:37 | 60d 6hr 48m		medium	sentinel05	3.9.16.208, 10.39.0.62		postgresql	
sentinel06	●	25/08 10:33 | 55d 16hr 52m		ok	sentinel06	35.178.44.71, 10.39.0.197		postgresql, barman	
staging	●	05/10 22:22 | 14d 5hr 3m		ok	ip-172-26-6-2	172.26.6.2	Primary	postgresql	this is a test system , used to test new features

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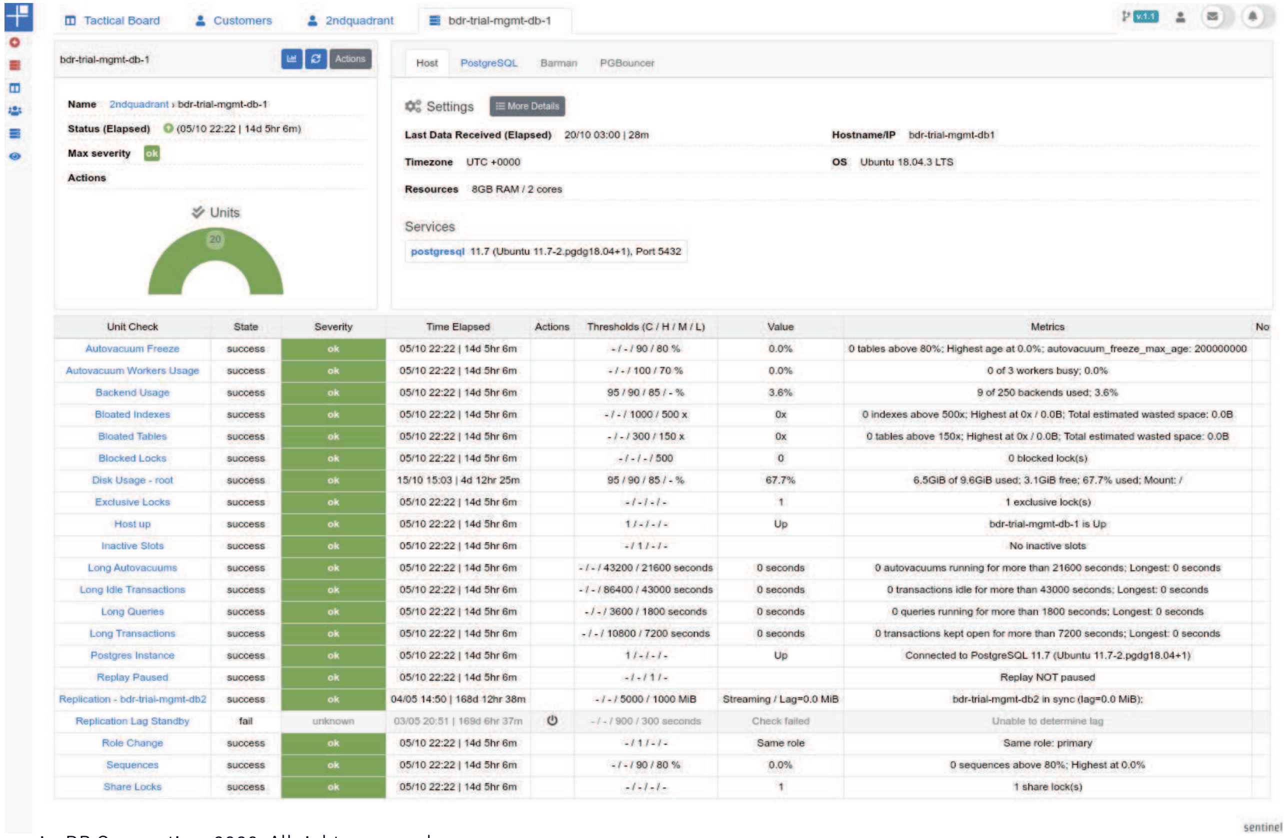
Remote DBA monitoring -- monitoring each server



Name 2ndquadrant › bdr-trial-mgmt-db-1

Status (Elapsed) (05/10 22:22 | 14d 5hr 6m)

Max severity ok

Actions

Last Data Received (Elapsed) 20/10 03:00 | 28m

Hostname/IP bdr-trial-mgmt-db1

Timezone UTC +0000

OS Ubuntu 18.04.3 LTS

Resources 8GB RAM / 2 cores

Services

postgresql 11.7 (Ubuntu 11.7-2.pgdg18.04+1), Port 5432

Unit Check	State	Severity	Time Elapsed	Actions	Thresholds (C / H / M / L)	Value	Metrics	No
Autovacuum Freeze	success	ok	05/10 22:22 | 14d 5hr 6m		- / - / 90 / 80 %	0.0%	0 tables above 80%; Highest age at 0.0%; autovacuum_freeze_max_age: 200000000	
Autovacuum Workers Usage	success	ok	05/10 22:22 | 14d 5hr 6m		- / - / 100 / 70 %	0.0%	0 of 3 workers busy; 0.0%	
Backend Usage	success	ok	05/10 22:22 | 14d 5hr 6m		95 / 90 / 85 / - %	3.6%	9 of 250 backends used; 3.6%	
Bloated Indexes	success	ok	05/10 22:22 | 14d 5hr 6m		- / - / 1000 / 500 x	0x	0 indexes above 500x; Highest at 0x / 0.0B; Total estimated wasted space: 0.0B	
Bloated Tables	success	ok	05/10 22:22 | 14d 5hr 6m		- / - / 300 / 150 x	0x	0 tables above 150x; Highest at 0x / 0.0B; Total estimated wasted space: 0.0B	
Blocked Locks	success	ok	05/10 22:22 | 14d 5hr 6m		- / - / - / 500	0	0 blocked lock(s)	
Disk Usage - root	success	ok	15/10 15:03 | 4d 12hr 25m		95 / 90 / 85 / - %	67.7%	6.5GiB of 9.6GiB used; 3.1GiB free; 67.7% used; Mount: /	
Exclusive Locks	success	ok	05/10 22:22 | 14d 5hr 6m		- / - / - / -	1	1 exclusive lock(s)	
Host up	success	ok	05/10 22:22 | 14d 5hr 6m		1 / - / - / -	Up	bdr-trial-mgmt-db-1 is Up	
Inactive Slots	success	ok	05/10 22:22 | 14d 5hr 6m		- / 1 / - / -		No inactive slots	
Long Autovacuums	success	ok	05/10 22:22 | 14d 5hr 6m		- / - / 43200 / 21600 seconds	0 seconds	0 autovacuums running for more than 21600 seconds; Longest: 0 seconds	
Long Idle Transactions	success	ok	05/10 22:22 | 14d 5hr 6m		- / - / 86400 / 43000 seconds	0 seconds	0 transactions idle for more than 43000 seconds; Longest: 0 seconds	
Long Queries	success	ok	05/10 22:22 | 14d 5hr 6m		- / - / 3600 / 1800 seconds	0 seconds	0 queries running for more than 1800 seconds; Longest: 0 seconds	
Long Transactions	success	ok	05/10 22:22 | 14d 5hr 6m		- / - / 10800 / 7200 seconds	0 seconds	0 transactions kept open for more than 7200 seconds; Longest: 0 seconds	
Postgres Instance	success	ok	05/10 22:22 | 14d 5hr 6m		1 / - / - / -	Up	Connected to PostgreSQL 11.7 (Ubuntu 11.7-2.pgdg18.04+1)	
Replay Paused	success	ok	05/10 22:22 | 14d 5hr 6m		- / - / 1 / -		Replay NOT paused	
Replication - bdr-trial-mgmt-db2	success	ok	04/05 14:50 | 168d 12hr 38m		- / - / 5000 / 1000 MiB	Streaming / Lag=0.0 MiB	bdr-trial-mgmt-db2 in sync (lag=0.0 MiB);	
Replication Lag Standby	fail	unknown	03/05 20:51 | 169d 6hr 37m	⏻	- / - / 900 / 300 seconds	Check failed	Unable to determine lag	
Role Change	success	ok	05/10 22:22 | 14d 5hr 6m		- / 1 / - / -	Same role	Same role: primary	
Sequences	success	ok	05/10 22:22 | 14d 5hr 6m		- / - / 90 / 80 %	0.0%	0 sequences above 80%; Highest at 0.0%	
Share Locks	success	ok	05/10 22:22 | 14d 5hr 6m		- / - / - / -	1	1 share lock(s)	

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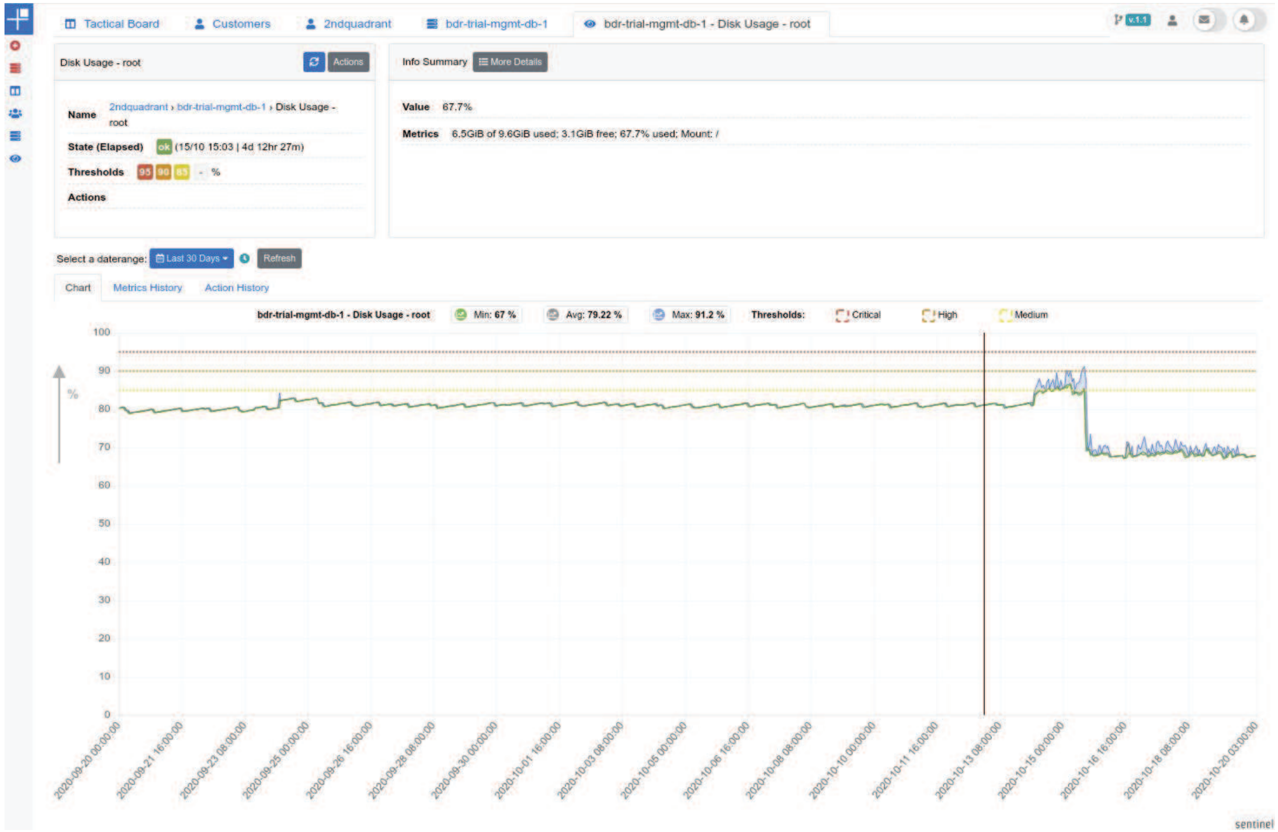
Remote DBA monitoring -- specific measure



Name 2ndquadrant › bdr-trial-mgmt-db-1 › Disk Usage - root

State (Elapsed) ok (15/10 15:03 | 4d 12hr 27m)

Thresholds 95 90 85 - %

Actions

Value 67.7%

Metrics 6.5GiB of 9.6GiB used; 3.1GiB free; 67.7% used; Mount: /

bdr-trial-mgmt-db-1 - Disk Usage - root Min: **67 %** Avg: **79.22 %** Max: **91.2 %** **Thresholds:** Critical High Medium

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Trusted Postgres Architecture

- Ansible based technology for quickly deploying repeatable Postgres architectures
- 2ndQuadrant is a top contributor to Ansible outside Redhat
- Create clusters based on 2ndQuadrant best practices
- Entirely repeatable

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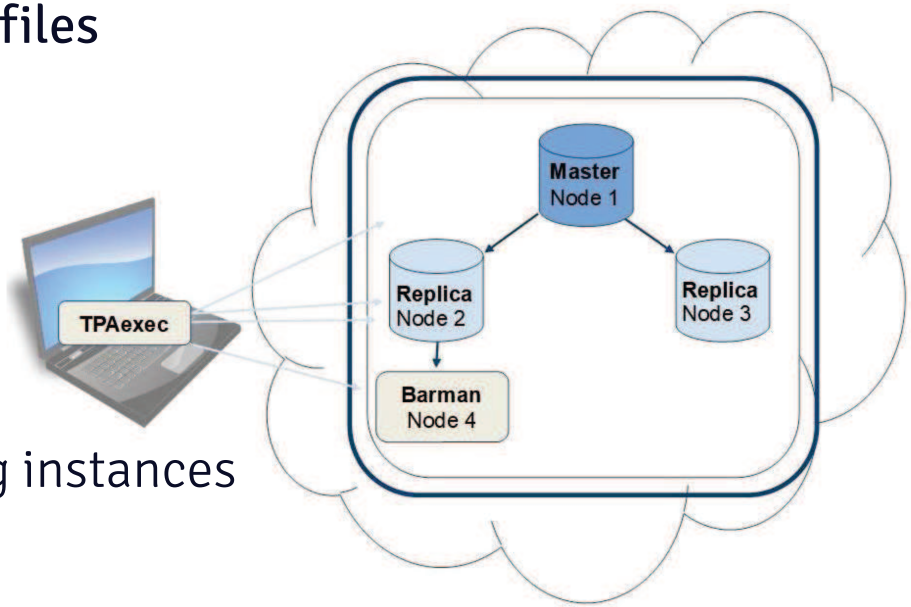
TPAExec

- Uses Ansible - config done via .yml files
- Platform independent - currently:
  - AWS
  - GCP
  - docker
  - vagrant on VirtualBox
  - bare metal - used for existing instances
- Platforms in the pipeline:
- Kubernetes/docker



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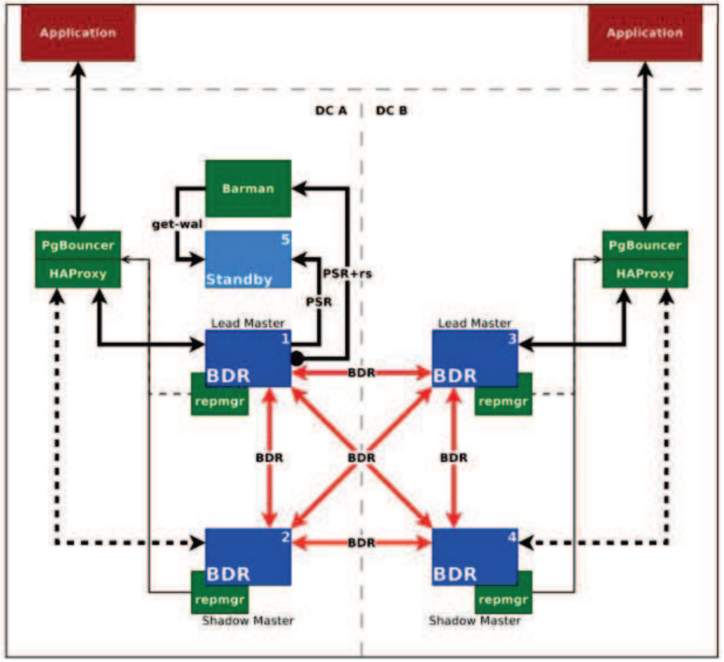
TPAExec - Use proven configurations

```
tpaexec configure ~/tpa/test_cluster \
    --architecture BDR-Always-ON ……
```



2ndQuadrant
Trusted PostgreSQL Architecture:
Postgres-BDR AlwaysOn

Version 4.3
13 March 2019

2ndQuadrant

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Kubernetes

- 2ndQuadrant is a Silver Member of the CNCF
- 2Q specific Kubernetes operators for BDR and PostgreSQL
- Moving to fully in-house Kubernetes infra using above
- OpenTracing built into BDR3.7 for end-end observability
- Prometheus storage plugin for BDR AutoScale 3.7
- Fluentd integration via syslog input

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EDB

Postgres-BDR

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Postgres-BDR3

Future of multi-master database for PostgreSQL

- Postgres-BDR Standard Edition
  - Runs as an Extension on Community PostgreSQL 10+

- Postgres-BDR Enterprise Edition
  - Runs as an Extension, using additional features in 2ndQuadrant PostgreSQL 11+

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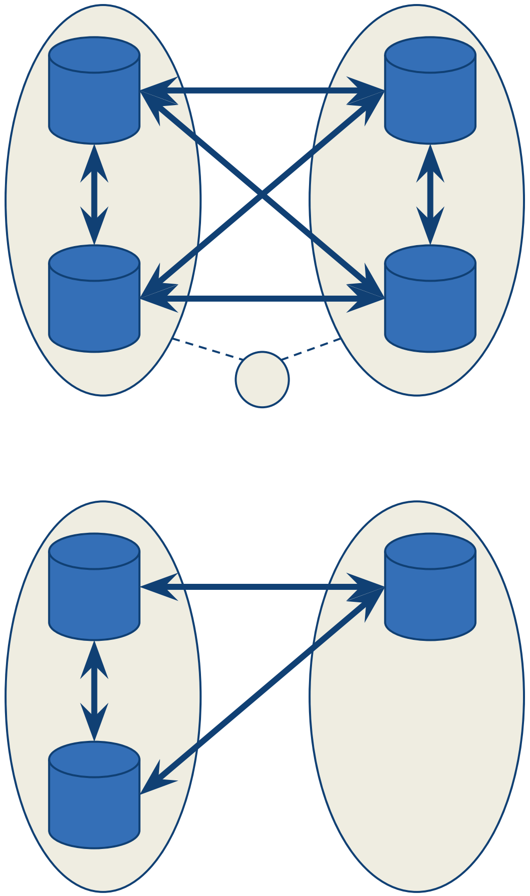
BDR AlwaysOn

- One main node in heavy use
    - All nodes Active
- Fast switch to alternate nodes
- Run maintenance on “off” node
- 66 ms failover with no transaction loss



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Using Postgres-BDR

Transparent multi-master database for PostgreSQL

- Connect to any node
- Read and Write SQL like standard PostgreSQL
- Create/Manage tables like standard PostgreSQL
- Options to control which tables are replicated
- Some minor restrictions on DDL
- Design considerations for distributed database

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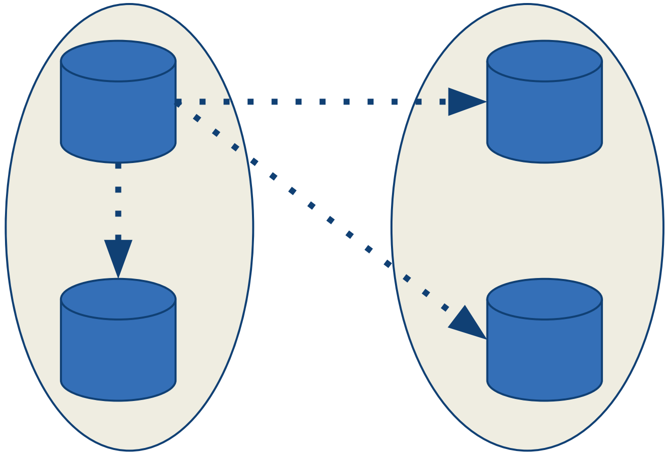
EDB

Writing to Postgres-BDR



- Distributed database options
- **Post**-Commit Synchronization

  Resolve issues *after* COMMIT
  - Conflict-Free Custom Datatypes (CRDTs)
  - Row-level Conflict Handling by default
  - Column-level Conflict Handling option
  - Logging and resolution of issues
  - Conflict Triggers
- Low latency, suitable for widely distributed nodes

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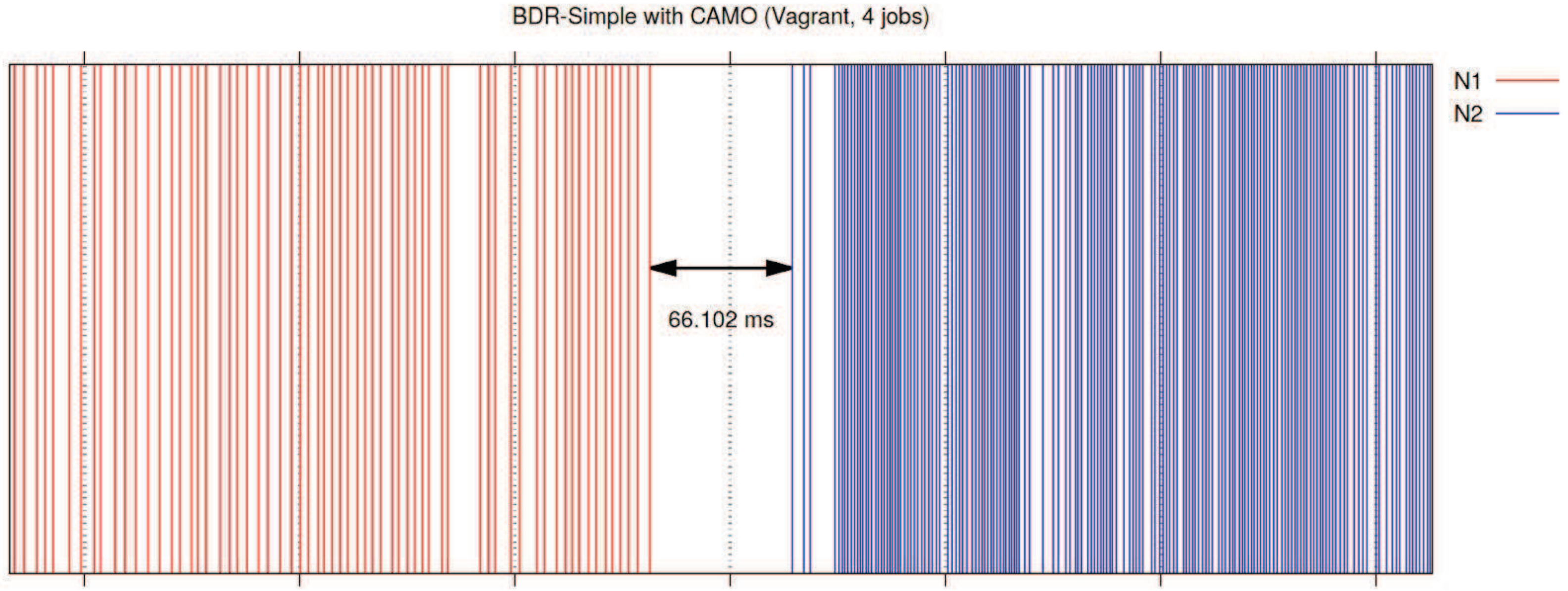
BDR Fast Switchover



- Execute on node1 until failure, fast failover node2
- Compare 30-90s for single master failover against <100ms for AlwaysOn failover

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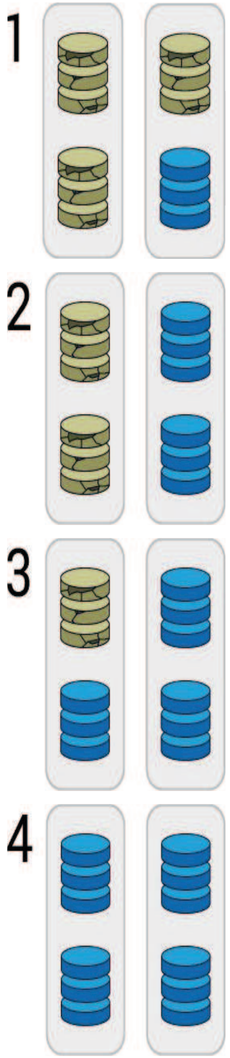
EDB

Rolling System Upgrades

- Rolling upgrades start with least used node and roll across all nodes slowly

- System Upgrades can upgrade BDR and/or main PostgreSQL releases
  - e.g. PG10 to PG11
    E.g. BDR3.5.5 to BDR3.6.2
  - Nodes re-negotiate their protocols to ensure compatibility



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Conclusion

- Professional service boosts your database
  - Stability
  - Availability
  - Scalability
  - Productivity
  - Robustness
  - Problem solving
  - Day-by-day operation

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Thank you very much

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