# The End of the Reign of Oracle RAC: Postgres-BDR Always On

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### Agenda

- EDB Postgres for the enterprise
- From High Availability to Always On
- Who cares about 'Always On'?
- Postgres-BDR RAC-like high availability for Postgres
- Are RDS, Aurora, or other DBaaS solutions valid options?
- Dollars and sense why make the switch



# EDB - Postgres for the enterprise



### **Postgres wins in containers: Datadog October 2021**



### Postgres wins in cloud native architectures: CNCF's Technology Radar for Database Storage (Nov 2020)

The CNCF End User Community was asked to describe what their companies recommend for different solutions: Adopt, Trial, Assess or Hold. This table shows how the End User companies rated each technology.



# Postgres is the most transformative open source tech since Linux

### EDB: Database fanatics who care deeply about Postgres

#### **Market leadership**



#### **PostgreSQL leadership & vision**



### The most PostgreSQL experts

#### **EDB team includes:**

350+ PostgreSQL technologists

29 PostgreSQL community contributors and committers

Including founders and leaders like



Michael Stonebraker "Father of Postgres" and EDB Advisor



Bruce Momjian Co-founder, PostgreSQL Development Corp and PostgreSQL Core Team



Peter Eisentraut PostgreSQL Core Team member



**Robert Haas** PostgreSQL Major Contributor and Committer



Simon Riggs PostgreSQL Major Contributor, Founder of 2ndQuadrant

### **EDB Postgres - technology for the enterprise**

#### Technology

#### Platforms



# **PostgreSQL wins!**



Most Commonly Used Database



#### **Postgres Popularity**



Most loved database Redis PostgreSQL Elasticsearch MongoDB Firebase MariaDB Microsoft SQL Ser.. DynamoDB SQLite MySQL Cassandra Couchbase Oracle IBM DB2 0% 20% 40% 60% 80%



Source: Stack Overflow Developer Survey, 2020 (65,000 developers)

Source: DB-Engines.com, 2020

# **High Availability**

or

# Always On?



### 'High Availability' or 'Always On'

#### Always On - the next step for high availability

- Historic perspective
  - Protects against hardware, network, and software failures
  - $\circ$  Assumes maintenance windows
  - Postgres tools: EDB Failover Manager, Repmgr, Patroni
- Always On the new business imperative
  - Near-zero downtime, or "Always On" a must-have for successful digital transformation in a global economy.
  - No more maintenance windows but patches and upgrades have to be applied
  - 99.999% is the target level (ITIC 2020 Global Server Hardware, OS Reliability Survey)

### Why is this so hard?

#### No downtime for maintenance!

HA Rating	Downtime/month (days:hours:min:secs)	Downtime/year (days:hours:min:secs)
99%	00:07:18:00	03:15:36:00
99.5%	00:03:39:00	01:19:48:00
99.9%	00:00:43:48	00:08:45:36
99.99%	00:00:04:23	00:00:52:34
99.999%	00:00:26	00:00:05:15

Patches, updates, and security fixes: at least four maintenance operations per year!

# Who cares about 'Always On'?



### How important is Always On?

- 99.99% is the standard today
- Downtime costs money and customers
  - Credit cards
  - Websites
  - Payment gateways
  - Single-sign on sites
  - 0 ....

#### Eighty-eight Percent of Firms Say Hourly Downtime Costs Exceed \$300K in 2020



\$1M to >5M

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Postgres-BDR: RAC-like availability for Postgres



### **Postgres-BDR** — the next step in Postgres replication

- Londiste, Bucardo, Slony
- Streaming replication evolution of log shipping
- Hot standbys and synchronous replication
- Logical replication
- DDL replication, ....



### **Postgres Native Logical Replication**

#### Not a great HA solution

- No DDL replication
- No failover
- No integration with backup and recovery
- No built-in procedures for maintenance, updates and upgrades
- Unidirectional no easy way to 'fall back'

### **Postgres-BDR**

#### Multi-master logical replication in a mesh network

- Automatic DDL and DML replication in an active-active mesh network
- Failover and switchover infrastructure to re-route traffic in case of failures or during maintenance operation
- Advanced conflict detection and conflict management
- Management of distributed sequences
- Differentiated replication sets to control which data gets replicated and to which downstream databases
- Cluster expansion/consolidation
- Rolling database software upgrades
- Rolling schema change/migration using cross-schema replication

### **Postgres-BDR - Always On Platinum**



### **Postgres BDR and Oracle RAC**

#### Two different approaches to high availability



#### **Always On Architectures**

#### Always On Bronze (single active location)



#### Always On Silver (single active location, backup in DR location)



#### Always On Gold (two active location)



### **Case Study - ClickUp**

#### **SaaS Project Management and Collaboration**

- Massive growth
- Global customers
- Long term Postgres user
- Geo distributed and highly available

EDB's support has helped us to upgrade our PostgreSQL and BDR version with zero downtime and resolve any issues that have come up with using the extension, as well as analyze our PostgreSQL server configurations to ensure we are getting the best performance out of our database cluster.





# RDS, Aurora, and other CSP DBaaS solutions — are they an option?

"If the DB cluster has one or more Aurora Replicas, then an Aurora Replica is promoted to the primary instance during a failure event. A failure event results in a brief interruption, during which read and write operations fail with an exception. However, service is typically restored in less than 120 seconds, and often less than 60 seconds." https://docs.aws.amazon.com/AmazonRDS/la test/AuroraUserGuide/Concepts.AuroraHighAv ailability.html

AWS SLA is limited to 99.99%

https://aws.amazon.com/rds/aurora/sla/).

# Dollars and sense why make the switch?

### Why switch?

#### Cost is a major driver - but not the only reason

- Cost
  - Oracle RAC: Oracle licenses + annual maintenance + proprietary hardware + enterprise grade SAN + limited cloud platforms
  - Postgres-BDR: Annual subscription + commodity hardware + every public cloud
    - ⇒ Significant ROI!
- Flexibility and innovation
  - Run in every public cloud
  - Deploy the same license anywhere
  - Take advantage of Postgres (PostGIS, JSONB, KVP, ...)
  - Combine with EDB Postgres Advanced Server for Oracle PL/SQL compatibility

### Conclusion

- Postgres-BDR uses logical replication and mesh-based multi-master architecture
- Enables multiple deployment architectures
- Achieves 99.999% availability on prem and in the cloud
- Provides a high availability alternative to Oracle RAC
- Significant ROI and flexibility advantage



### Learn more about Postgres-BDR

#### Whitepapers, webinars and conference presentations



EDB Webinar:

• Upgrade easily with BDR; Simon Riggs; August 18 2021

**Conference presentations:** 

- Building a business that never sleeps; Simon Riggs; Postgres Vision 2021
- A Case Study in "What If" PostgreSQL-BDR High-Availability/Disaster Recovery Analysis; Dominic Mortimer, Principal Software Engineer, ACI; 2Q Postgres Conference 2019

**Blogs and Customer Success Stories** 

- <u>How to Achieve Five Nines with Database Extreme High Availability</u>: An Integral Part of Any Oracle Replacement Strategy, <u>Jan Karremans</u> - Sep 10, 2021
- <u>4 Reasons Why You Probably Don't Need RAC</u>, <u>Jan Karremans</u> · Aug 24, 2021
- Project Management SaaS company uses Postgres-BDR to achieve consistent performance globally EDB Team · Aug 19, 2021
- <u>Application High Availability and Resiliency</u>: Steps to Improve Transaction Retry, <u>Tom Kincaid</u> Jul 30, 2021
- <u>ACI Worldwide Modernizes Software Architecture</u> While Reducing Risk and Lowering Costs with PostgreSQL; EDB Team · Mar 2, 2021