PostgreSQL - High Availability

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Agenda

- A typical workflow in DR
- Why does everyone talk about it ?
- What is HA after all ?
- PostgreSQL HA
- PostgreSQL HA + Linux modus vivendi

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Who am I ??

- Working in PostgreSQL space @ **2ndQuadrant**
- Part of PostgreSQL family for over 10 years
- Work in almost all areas around PostgreSQL from development to professional services
- Past stints with PostgreSQL family include
  - **EnterpriseDB**
  - **OpenSCG**
- Headed Engineering & IT efforts **@ IBEX**
- Served as Principal Architect/Product Owner **@ TRG**

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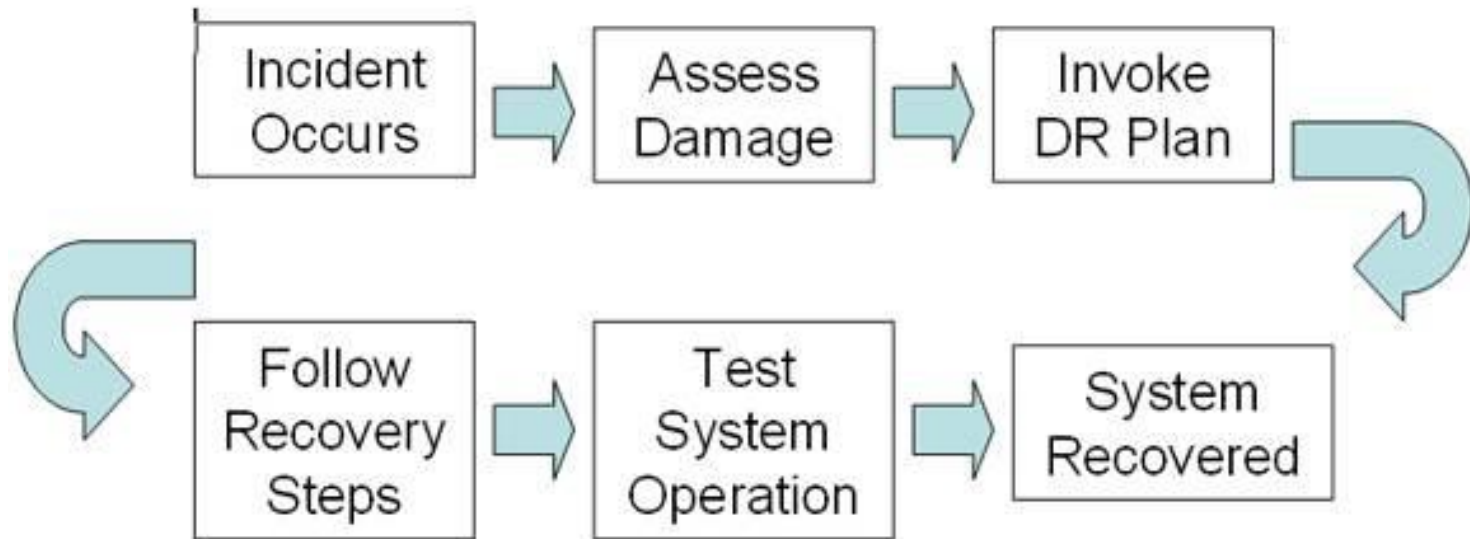# Where does it all begin ?

Downtime ???

Downtime

- Planned downtime
  - Software maintenance activity (upgrades etc)
  - Hardware maintenance activity (changes, upgrades etc)
- Unplanned downtime
  - Software crash
  - Hardware crash
  - Network failure
  - Human error

Typical DR workflow

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Admins/Sysadmins ...

HA - Availability Levels

Level of Availability	Percent of Uptime	Downtime per Year	Downtime per Day
1 Nine	90%	36.5 days	2.4 hrs.
2 Nines	99%	3.65 days	14 min.
3 Nines	99.9%	8.76 hrs.	86 sec.
4 Nines	99.99%	52.6 min.	8.6 sec.
5 Nines	99.999%	5.25 min.	.86 sec.
6 Nines	99.9999%	31.5 sec.	8.6 msec

What is HA after all ?

- RTO - Recovery Time Objective
  - The time interval it will take to restore ...
- RPO - Recovery Point Objective
  - The amount of data that you will lose ...

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Admins/Sysadmins ...

RPO

- Backups
  - Logical Backups
    - Database dumps
      - SQL script + data
  - Physical backups
    - Online
      - Basebackups (provides base for PITR)
    - Offline
      - Stop PostgreSQL, take backup
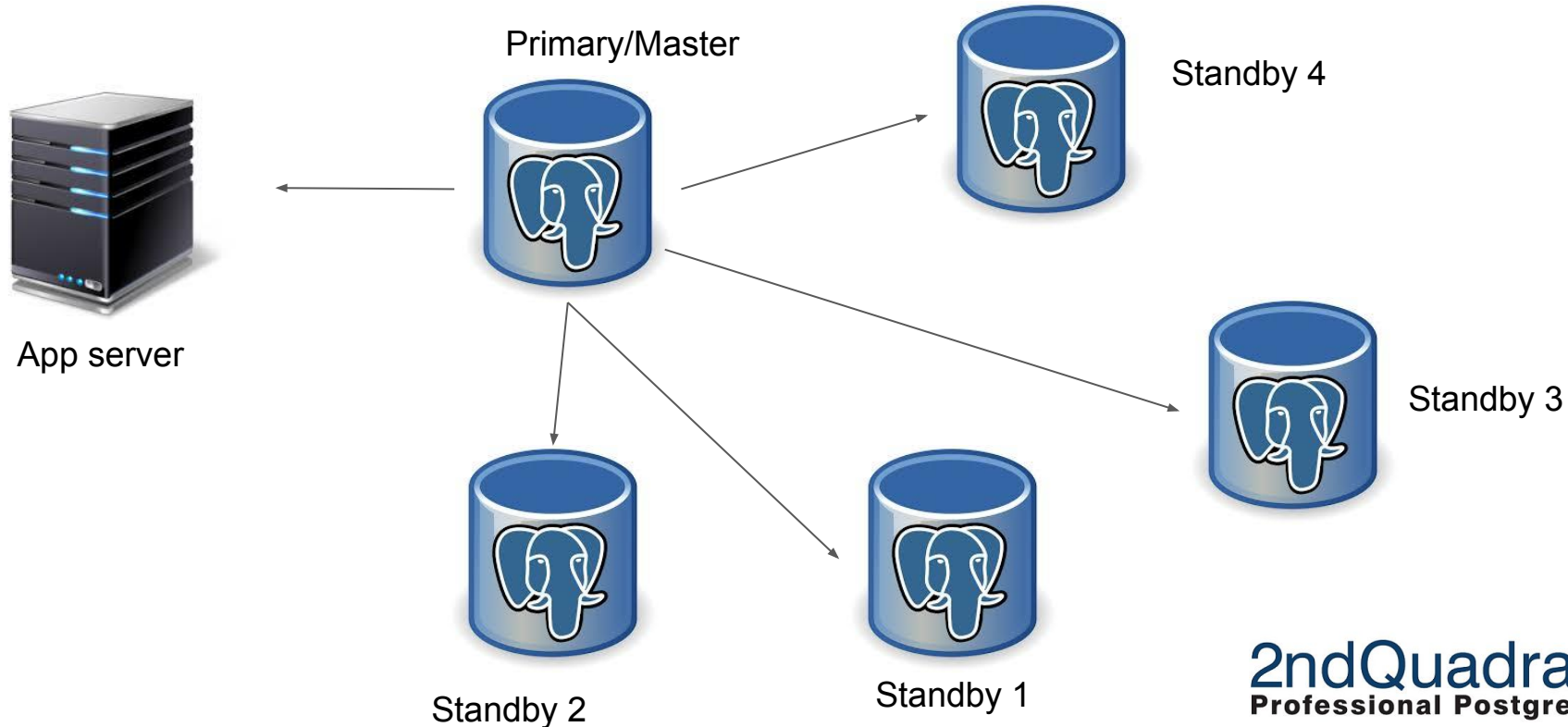   - Filesystem snapshots
  - WAL archiving

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Backup retention ???

PostgreSQL & RTO

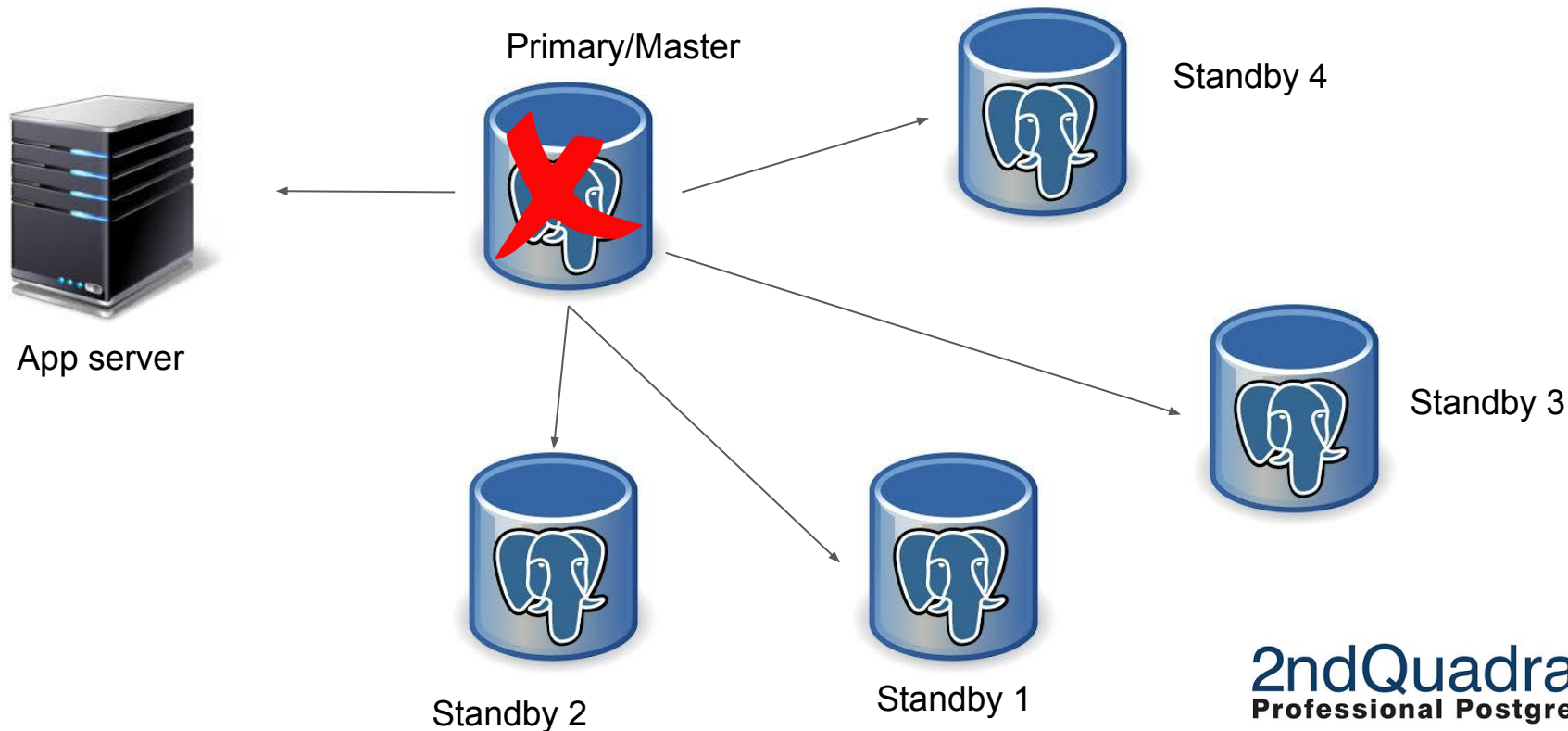2ndQuadrant®
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PostgreSQL HA - Replication

- Streaming Replication
  - Synchronous
  - Asynchronous
  - Master, slave(s)
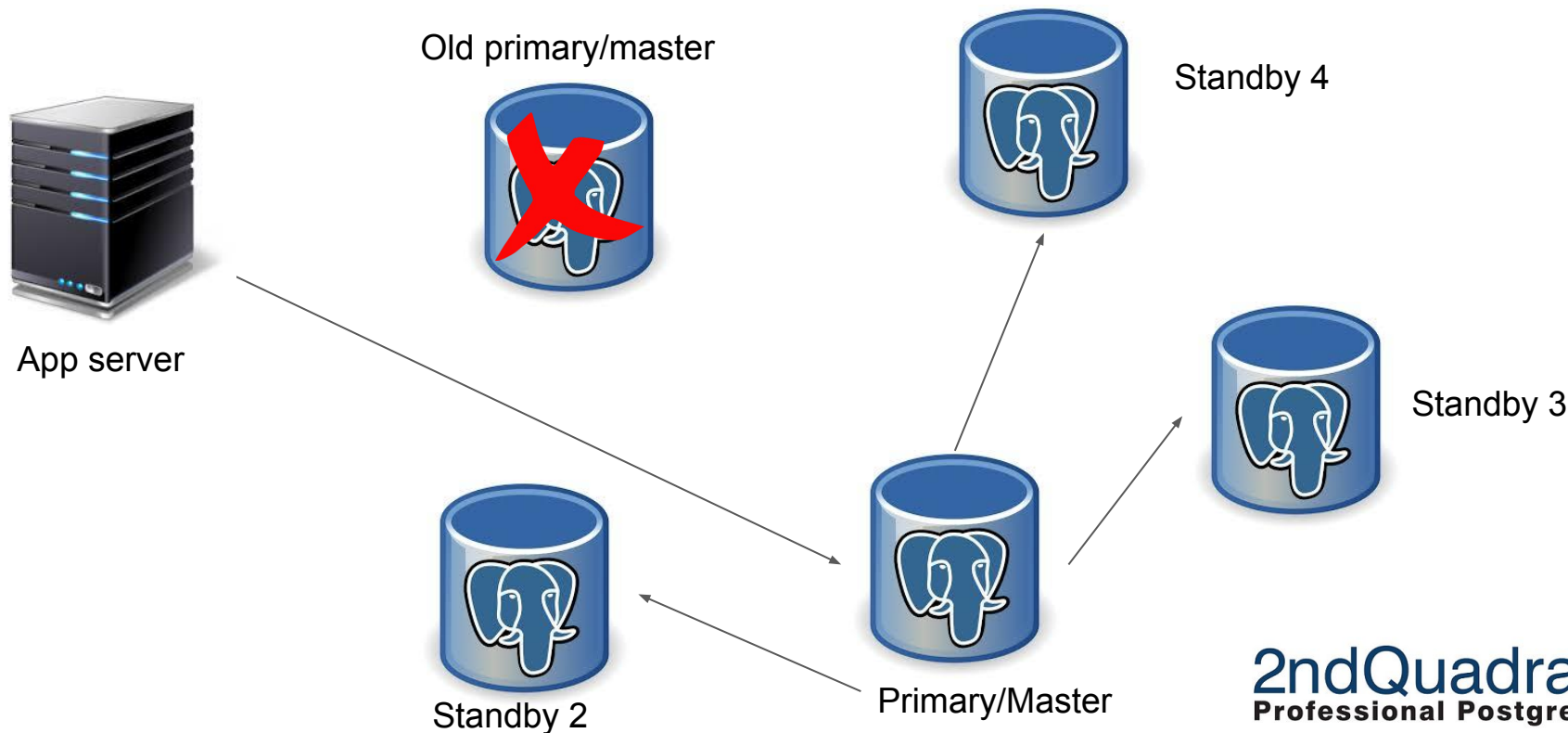 - Master, slave(s), cascaded slaves(s)
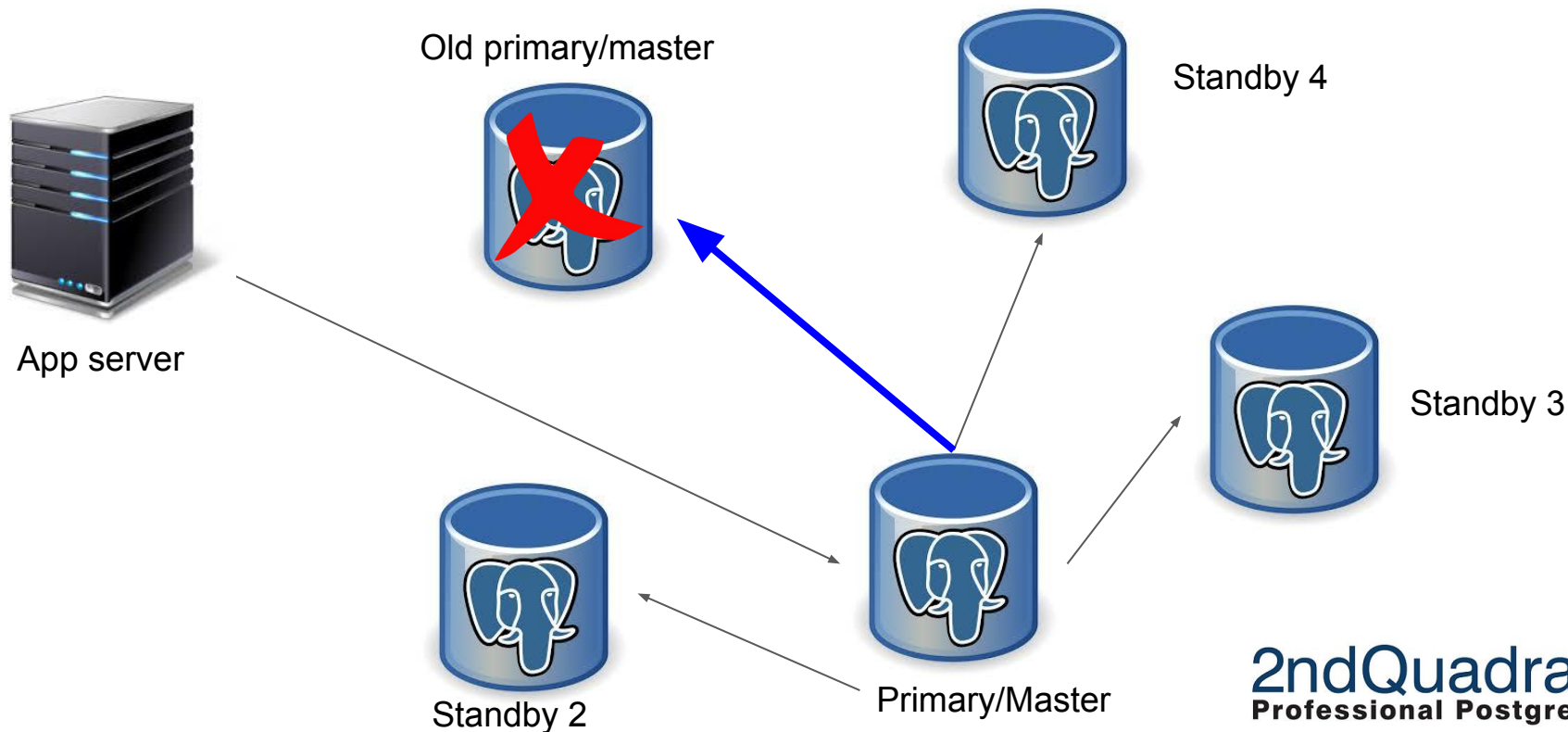- WAL shipping

PostgreSQL HA - Failover Scenario

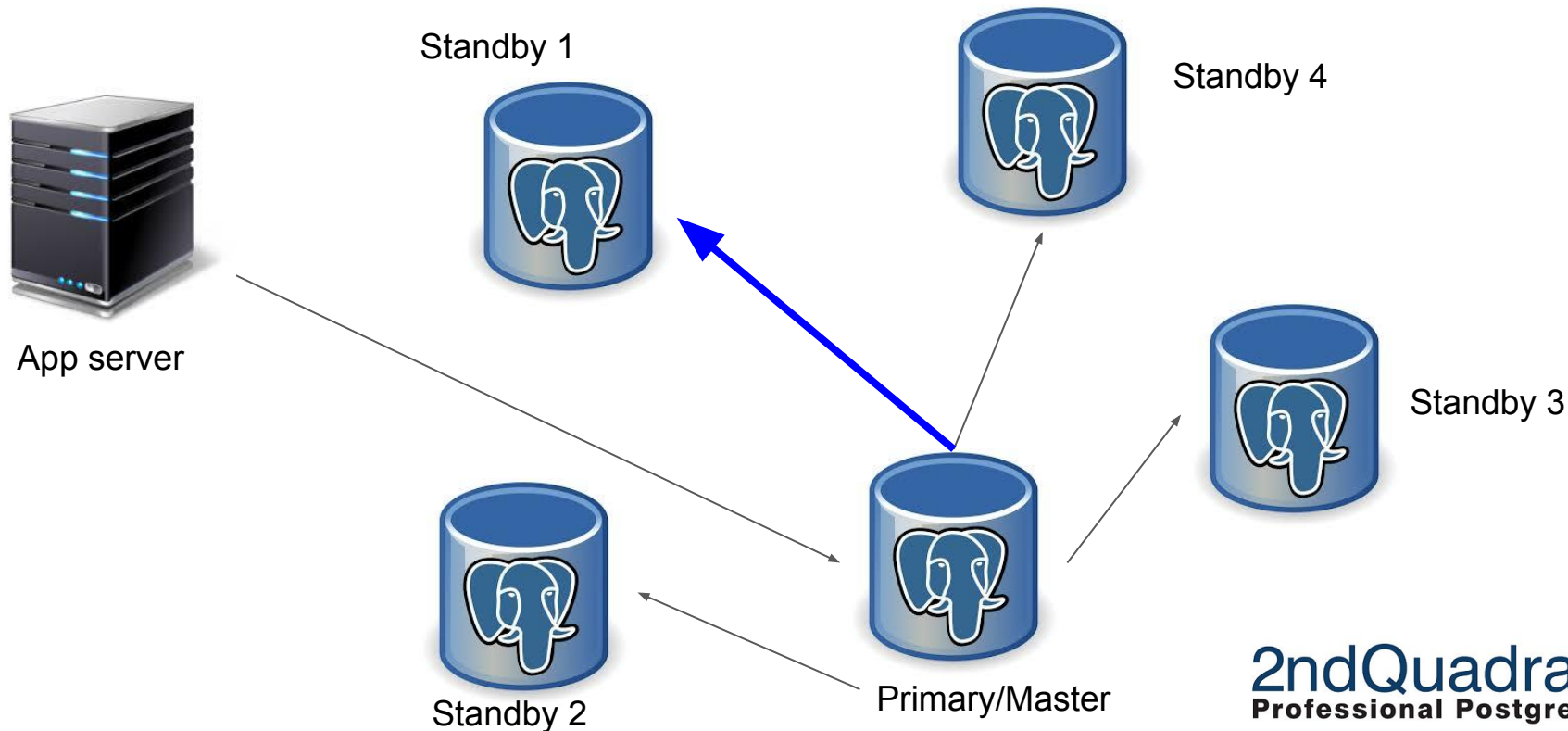# PostgreSQL HA - Failover Scenario (cont.)

PostgreSQL HA - Failover Scenario (cont.)

Old primary/master

Standby 4

App server

Standby 3

Standby 2

Primary/Master

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PostgreSQL HA - Failover Scenario (cont.)

Old primary/master

Standby 4

App server

Standby 3

Standby 2

Primary/Master

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PostgreSQL HA - Failover Scenario (cont.)

Standby 1

Standby 4

App server

Standby 3

Standby 2

Primary/Master

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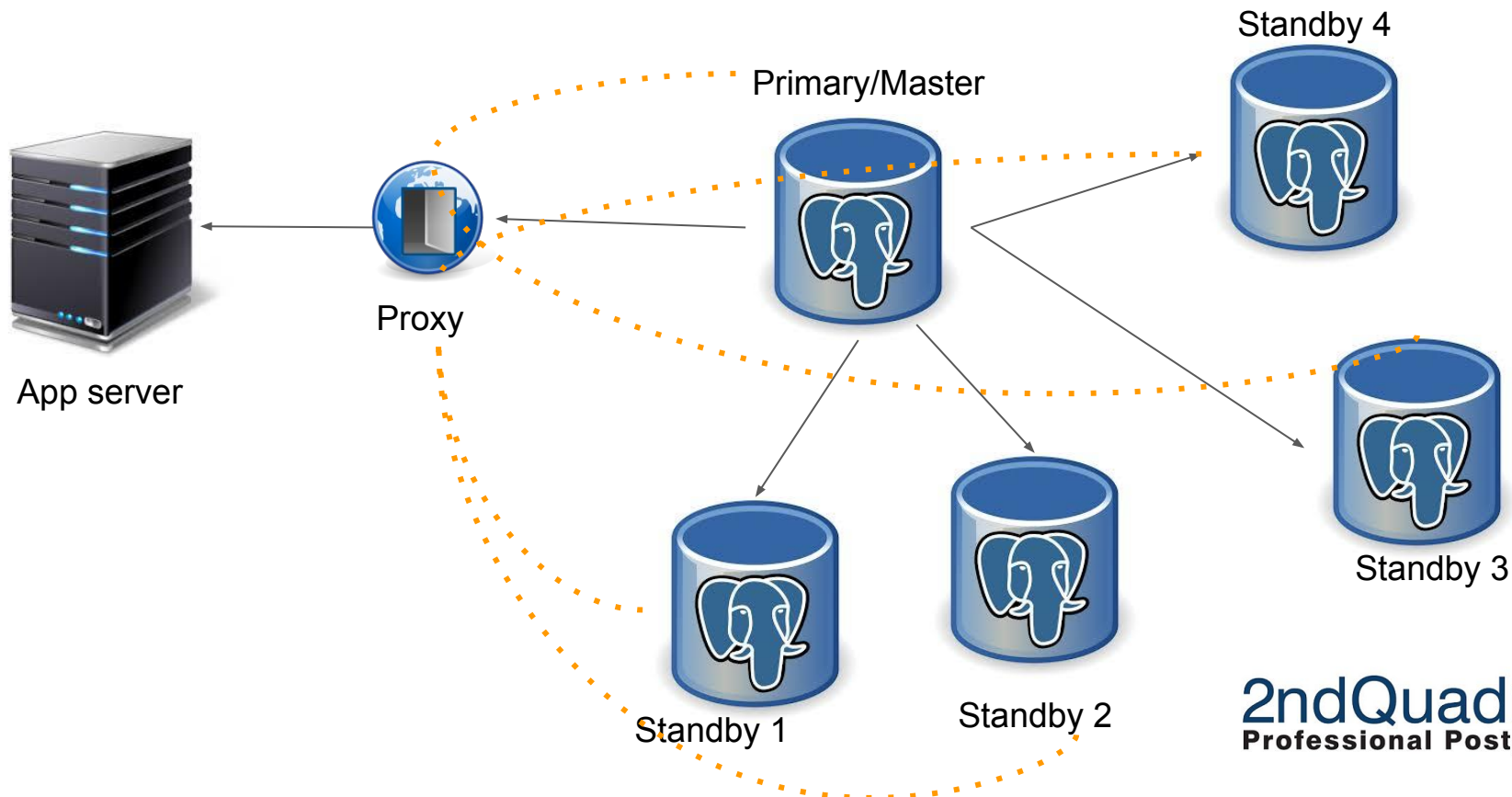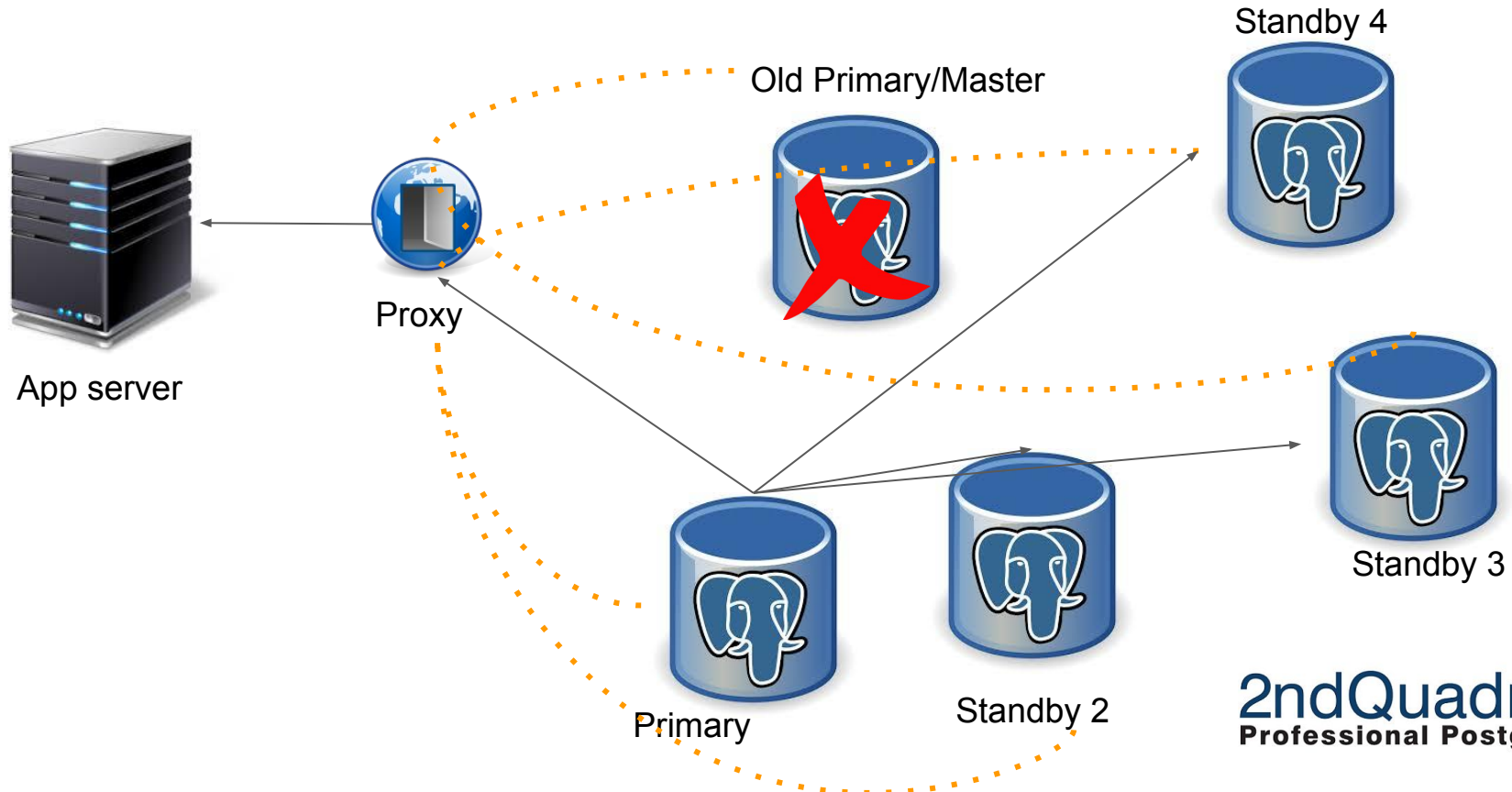
Free & Open source complete HA

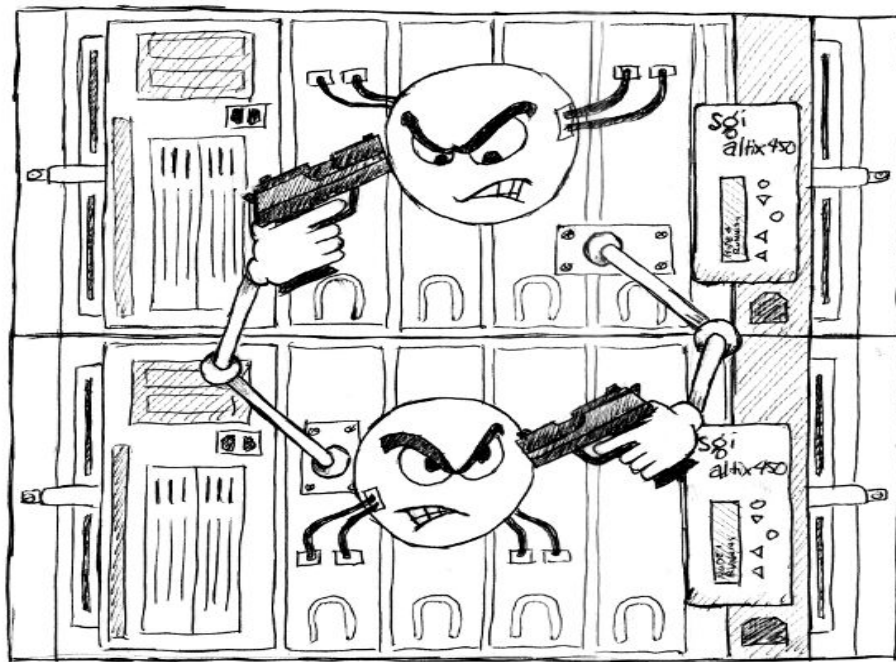## PostgreSQL HA + Open source PG community tools + Linux

PostgreSQL HA - Streaming Replication

PostgreSQL HA - Streaming Replication

Old primary - STONITH

DON'T ANYBODY MOVE . . .

Shoot
The
Other
Node
In
The
Head

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image courtesy ourobengr.com

Further reading

- Barman: http://www.pgbarman.org
- Repmgr: http://www.repmgr.org
- Repmgrd: http://www.repmgr.org
- Pgbouncer: https://pgbouncer.github.io
- pgPool: http://www.pgpool.net/mediawiki/index.php/Main_Page
- pgBackRest: https://github.com/pgbackrest/pgbackrest
- CoroSync: http://corosync.github.io/corosync/
- Various other tools available to work with postgres

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Special Thanks!!

Questions

Thank you for your time

Questions ?

- Need **customized** PostgreSQL suited to your needs?
- Looking for **PostgreSQL training** ?
- Need help **migrating to PostgreSQL** ?
- Need PostgreSQL **production support** ?
- Got **specific PostgreSQL** needs ?
- Looking for **cloud** and/or **hybrid** high availability clusters ?

Let us help you!

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- PostgreSQL News
  - PostgreSQL 9.6 Beta4 Released - August 11, 2016
  - MariaDB license change
  - PGConf.ASIA - Tokyo (2-3 December 2016)
- 2ndQuadrant News
  - repmgr 3.1.5
  - Postgres-XL 9.5 R1.3
  - BDR9.4 1.0
  - 2UDA 9.6 Beta4

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