

Where are you in your open source journey?

... and where do you plan to be in the future?

Do you use PostgreSQL today?

... you may be using it and not know.



Understanding Postgres For Oracle DBA's

Tim Steward  @ dba_atwork
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I installed oracle from these methods



My Passport



Oracle DBA road trip began in 1991

- **Resorts:** 19c, 18c, 12c, 11g, 10g, 9i, 8i, 7.x, 6.x, 5.x, 3.x
- **Cruises:** EBS 10.6, 10.7nca, R11, R12.2, Hyperion, Peoplesoft
- **Timeshares:** Forms 3, 6, 9
- **Cabins:** Sql Server, MySQL, SAP Basis, Sybase ASE, Netsuite, Pentaho, Redshift
- **Ocean view resort:** PostgreSQL
- **Current Activity:** Helping customers migrate workloads from Oracle to PostgreSQL

Postgres + Postgres Sequel + PostgreSql =



A database of many names...

“Popular, Powerful, People”

It's a community

Agenda

- Introduction to Postgres
- Comparing Technologies
- Some words on pricing
- Getting Started
- Conclusion
- Questions

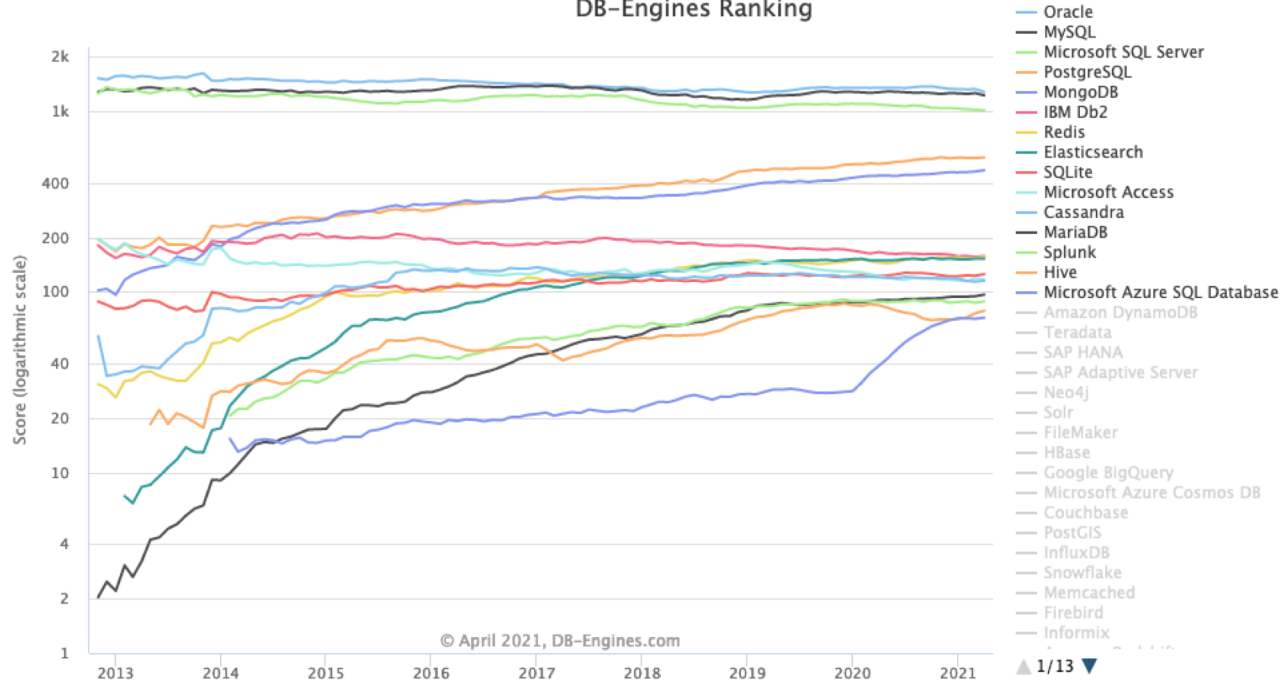
DB-Engines Ranking By Popularity

370 systems in ranking, April 2021

Rank			DBMS	Database Model	Score		
Apr 2021	Mar 2021	Apr 2020			Apr 2021	Mar 2021	Apr 2020
1.	1.	1.	Oracle +	Relational, Multi-model ⓘ	1274.92	-46.82	-70.51
2.	2.	2.	MySQL +	Relational, Multi-model ⓘ	1220.69	-34.14	-47.66
3.	3.	3.	Microsoft SQL Server +	Relational, Multi-model ⓘ	1007.97	-7.33	-75.46
4.	4.	4.	PostgreSQL +	Relational, Multi-model ⓘ	553.52	+4.23	+43.66
5.	5.	5.	MongoDB +	Document, Multi-model ⓘ	469.97	+7.58	+31.54
6.	6.	6.	IBM Db2 +	Relational, Multi-model ⓘ	157.78	+1.77	-7.85
7.	7.	↑ 8.	Redis +	Key-value, Multi-model ⓘ	155.89	+1.74	+11.08
8.	8.	↓ 7.	Elasticsearch +	Search engine, Multi-model ⓘ	152.18	-0.16	+3.27
9.	9.	9.	SQLite +	Relational	125.06	+2.42	+2.87
10.	10.	10.	Microsoft Access	Relational	116.72	-1.41	-5.19
11.	11.	11.	Cassandra +	Wide column	114.85	+1.22	-5.22
12.	12.	12.	MariaDB +	Relational, Multi-model ⓘ	96.37	+1.92	+6.47

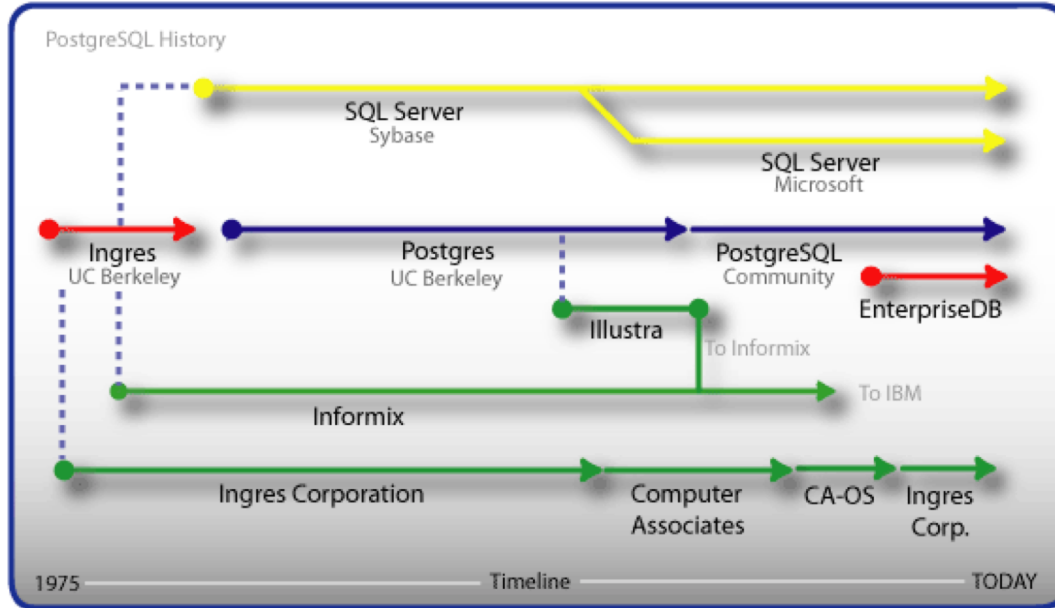
DB-Engines Trend Chart

DB-Engines Ranking



A look back at history

The evolution of the System-R research



Edgar Frank Codd



Donald D. Chamberlin

Michael Stonebraker + Eugene Wong work on Ingres and develop Post Ingres which evolved to become Postgres in 1989

Ingres commercialized in 1983
Oracle commercialized in 1979



“Oracle the first relational database”

Comparing Technologies

Besides some differences
there are
a lot of similarities

Application Development

Deployment Options

Tables and Partitioning

Indexes

SQL Extensions

Integration

Security

Management



Performance / Scalability

General / Capabilities

Incompatibilities

Capacities

Terminology

Data Types

SQL Capabilities

Big / Unstructured Data

High Availability

General / Capabilities

- ❖ Both based on IBM research for System R.
https://en.wikipedia.org/wiki/IBM_System_R
- ❖ Both are (+) relational databases
- ❖ ACID compliant and MVCC or transactional consistency
- ❖ Full transaction logging
- ❖ Multi-Tenant architecture

Terminology

WHAT	ORACLE	POSTGRESQL
Table or Index	Table or Index	Relation
Row	Row	Tuple
Column	Column	Attribute
Data block	Data block	Page (on Disk)
Page	Page	Buffer (in Memory)

Postgres Possible

But NOT Advised

- Unlimited database size
- Unlimited rows per table
- Unlimited number of indexes per table

Capacity

Maximum	Oracle	PostgreSQL
Table Size	4GB x db_block_size (default 32tb)	32TB
Row Size	4TB	1.6TB
Field Size	4GB -1 x db_block_size	1GB
Columns per table	1000	256-1600

Tables and Partitions

Entities	Oracle	PostgreSQL
Temporary tables, (materialized) views, constraints	Same	
Partitioning: range, hash, list, sub-partitioning	Similar (pg_partman)	
Interval partitioning & Partitioned indexes	Yes	No

Data Types

Max	Oracle	PostgreSQL
Integer	NUMBER	+ DEC, NUMERIC, SMALLINT, INT, BINARY_INTEGER, PLS_INTEGER, INTEGER & BIGINT
Floating point	BINARY_FLOAT, BINARY_DOUBLE	+ FLOAT, REAL & DOUBLE_PRECISION
Decimal	NUMBER	+ DEC, DECIMAL, NUMERIC
String	CHAR, VARCHAR2, CLOB, NCLOB, NVARCHAR2, NCHAR, LONG	+ CHARACTER, TEXT, CHAR VARYING, CHARACTER VARYING, VARCHAR
Binary	BLOB, RAW, LONG RAW , BFILE	+ BYTEA -/- BFILE

Data Types

Max	Oracle	PostgreSQL
Date / Time	Yes not same format yyyy-mm-dd	
Row id	Yes	
XMLType	Yes	
JSON	Yes	<i>JSON & JSONB more advanced</i>
Spatial	Yes	

Indexes

Entities	Oracle	PostgreSQL
B-Tree, hash, expressions, partial, full text search, spatial	Same	
Reverse, bitmap, block range	Similar <i>Block range = Smart Scan</i>	
K-nearest-neighbor	Yes	Yes more advanced
GIST, GIN <i>Speed up full-text searches</i>	No	Yes

SQL Capabilities

Entities	Oracle	PostgreSQL
Union, Intersect, Except, Inner joins, Outer joins, Merge joins, Common Table expressions, Windowing functions, Parallel query, Query hints, Alter session & Dynamic SQL	Same	
Transactional DDL	No	Yes

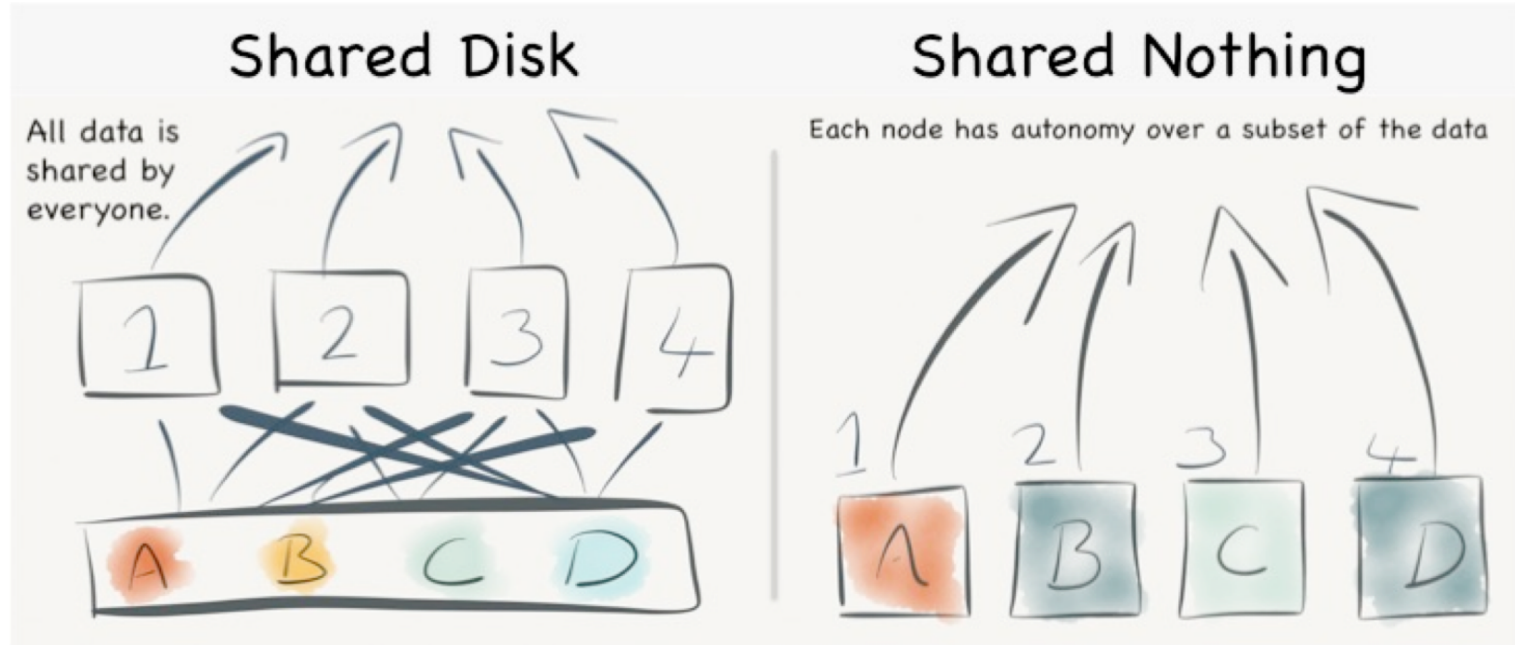
SQL Extensions

Entities	Oracle	PostgreSQL
Dual, DECODE, Rownum, Sysdate, Systimestamp, NVL & NVL2	Same	

Closed vs Open

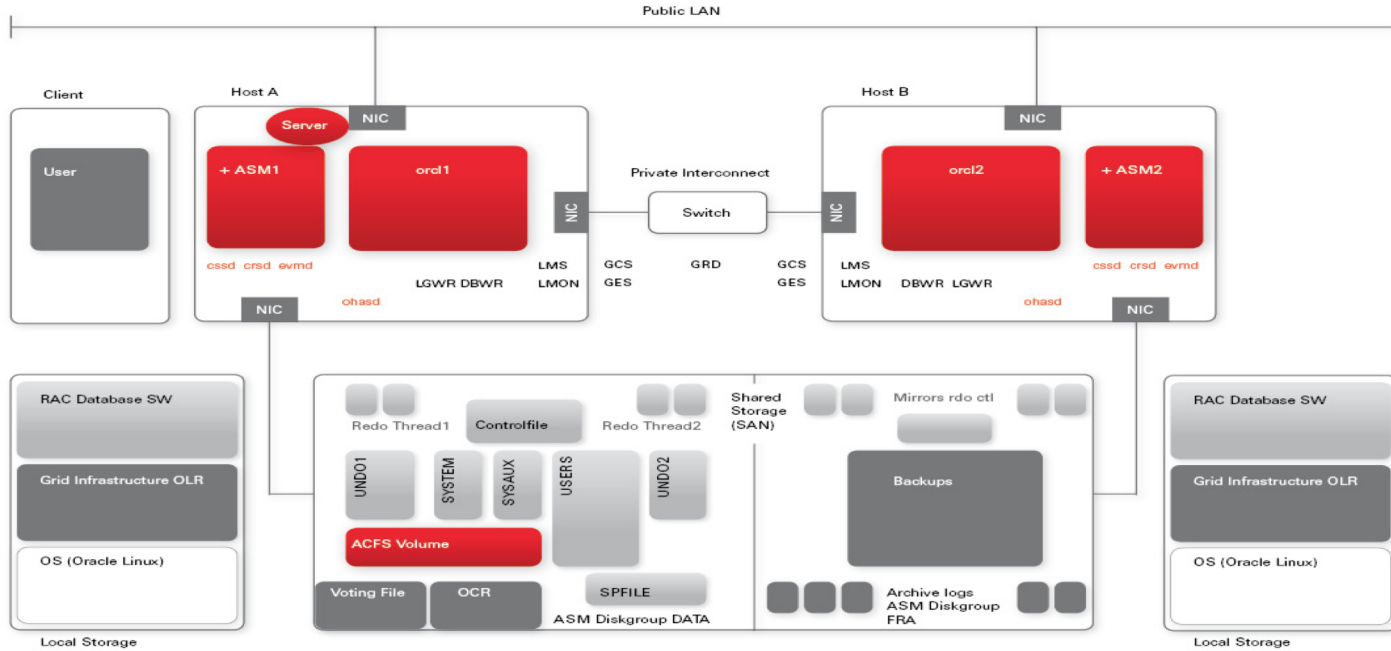
- Oracle has an isolated operating environment
- Operating system like qualities
- PostgreSQL integrates in it's surroundings
- Eliminating the need to “re-invent the wheel”

Oracle RAC vs PostgreSQL MMR



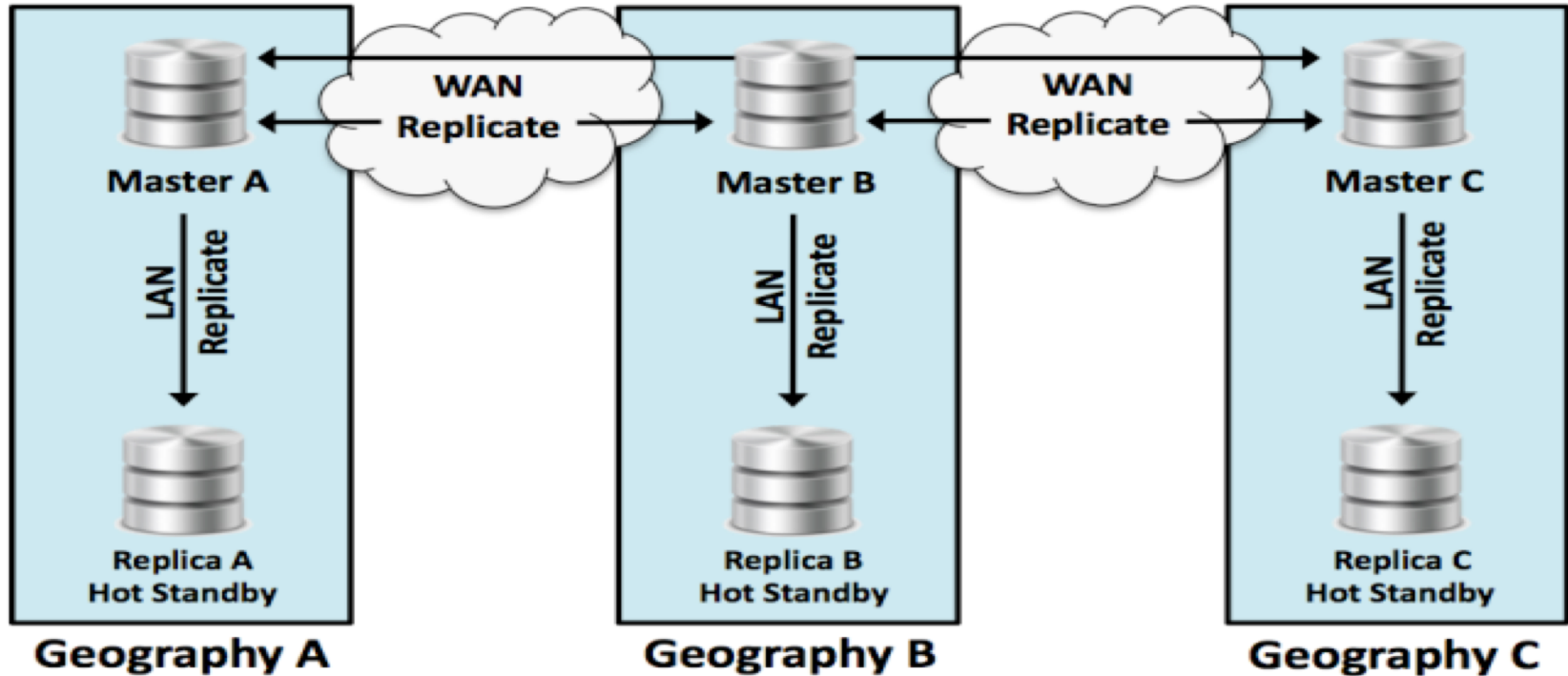
Courtesy: Ben Stopford

Real Application Cluster



Courtesy: Uwe Hesse

Multi Master Replication



Include pgpool II

Connection Confusion

- Oracle has a listener
- Postgres has a postmaster

- Oracle defaults 1521
- Postgres defaults 5432

- Oracle sqlnet.ora
- Postgres pg_hba.conf

Logging

- Oracle has online redo logs
- Postgres has wal logs (write ahead logging)

- Oracle has log switch tuning
- Postgres has file reuse tuning

Tuning / Configuration

- Oracle has init.ora
- Postgres has postgresql.conf

- Oracle db_cache_size
- Postgres shared_buffers

- Oracle log_buffer_size
- Postgres wal_buffers

Permissions / Privileges

- Oracle has users and roles
- Postgres has roles only

- Oracle schema consist from a single user objects (schema = user)
- Postgres schema is a grantable name-space object

Key Catalog Tables

Max	Oracle	PostgreSQL
Table Locks	dba_ddl_locks	<i>pg_locks</i>
User Roles	dba_roles	<i>pg_roles</i>
Tables	dba_tables	<i>pg_tables</i>
Sql	v\$sql	<i>pg_stat_statements</i>
Sql	v\$session	<i>pg_stat_activity</i>

Performance and Scalability

Entities	Oracle	PostgreSQL
Wait Events/Timed statistics	Similar	
Connection pooling CPU & I/O Resource limits	Similar – pgpool, pgbouncer	
Columnar store	InMemory option	Cstore FDW
In-memory database	Yes	No
Multi-master Replication	Golden Gate, Quest Shareplex, Dbvisit Replicate	Yes via extension

High Availability/Backups

Entities	Oracle	PostgreSQL
PITR <i>Point In Time Recovery</i>	Similar	
Backup and recovery tools	RMAN	pgdump/pgrestore, pgbasebackup
Standby database	(Active) Data Guard	Streaming replication w/extensions
Flashback <i>Query, Table, Database</i>	Yes	No

High Availability/Backups Tools Extensions

Feature	Tools	
Active Passive HA	Repmgr	EFM
Backup and recovery tools	PG_Backrest	Barman
Logical Replication	PG_Logical	XDB (oracle,sql server, mysql)
5x9's	BDR (active-active geo disbursed)	

Security

Entities	Oracle	PostgreSQL
Authentication support	LDAP, SSL, RADIUS,PAM, KERBOS,GSSAPI,SSPI	
Connection encryption, password profiles, code wrapping, ansi sql grants, column level security, row level security(virtual private database), fine grained auditing, data encryption toolkit, database firewall	Similar	
Database-connection encryption & white lists	Yes	Yes
Audit Vault	Yes	No

Security

Entities	Oracle	PostgreSQL
Password Verification	Yes	Not Easy
Roles/Profile limits	Yes	Similar
Password Complexity	Yes	Not Easy

Ease of Application Development

Entities	Oracle	PostgreSQL
PLSQL	Yes	User defined functions (PL/pgSQL)
Additional programming language support	similar	

Ease of Application Development cont...

Entities	Oracle	PostgreSQL
Java, JDBC, ODBC, .NET, user defined functions & objects, nested transactions, external routines	Same	
STORED PROCEDURES, triggers, cursors, bulk collect, anonymous blocks, associate arrays, nested tables etc..	Similar yet the developer favorite autonomous transactions requires some thought of a new transaction	

Big Data – Unstructured data

Entities	Oracle	
Spatial	Good	Better
Key value store & full text search	Similar	
XML Storage, Compression	Yes	No!!!! (xmlparse, xmltable)
Hadoop, MongoDB, Cubes	Yes	

!!!In the OS we trust...

Integration

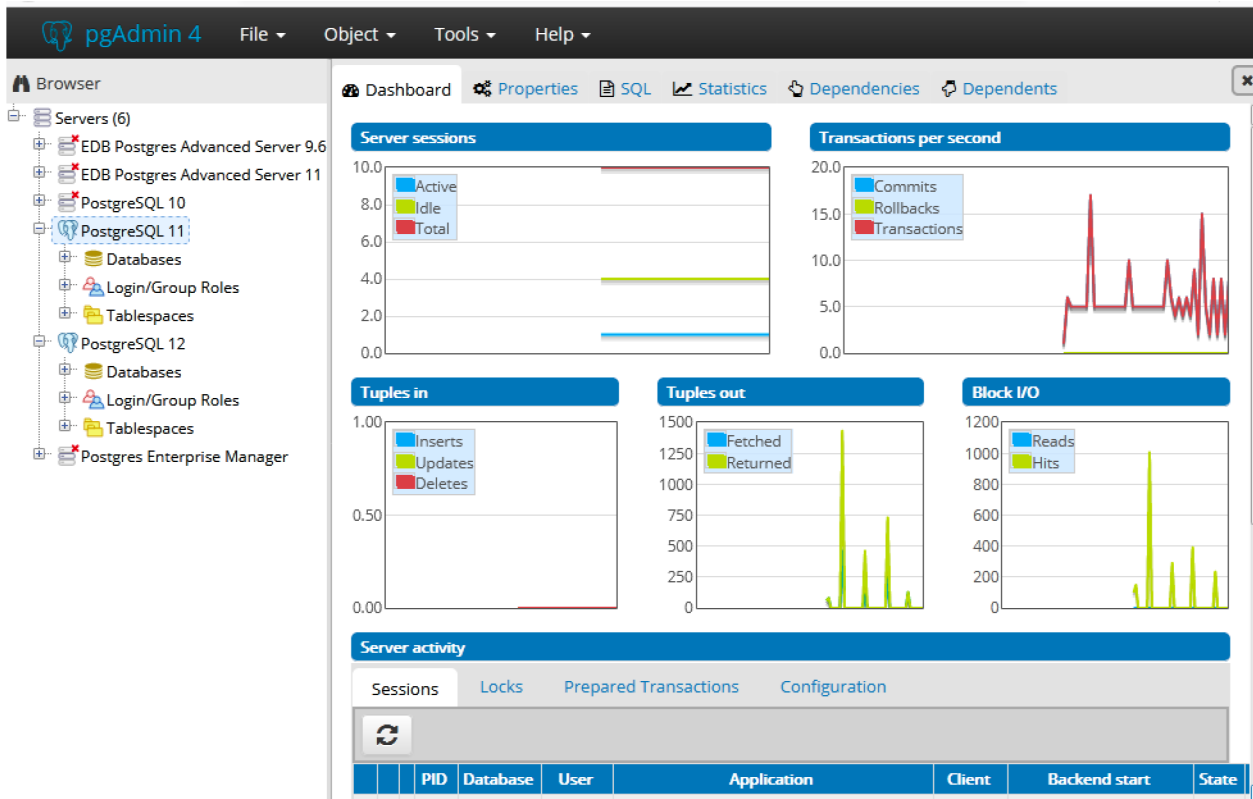
Entities	Oracle	PostgreSQL
DATABASE LINKS, (a)synchronous transaction-log shipping, distributed transactions, distributed queries	Similar	
Integration with SQL Server, Sybase, Hadoop, MongoDB, MySql	Yes	Yes - fdw

Management

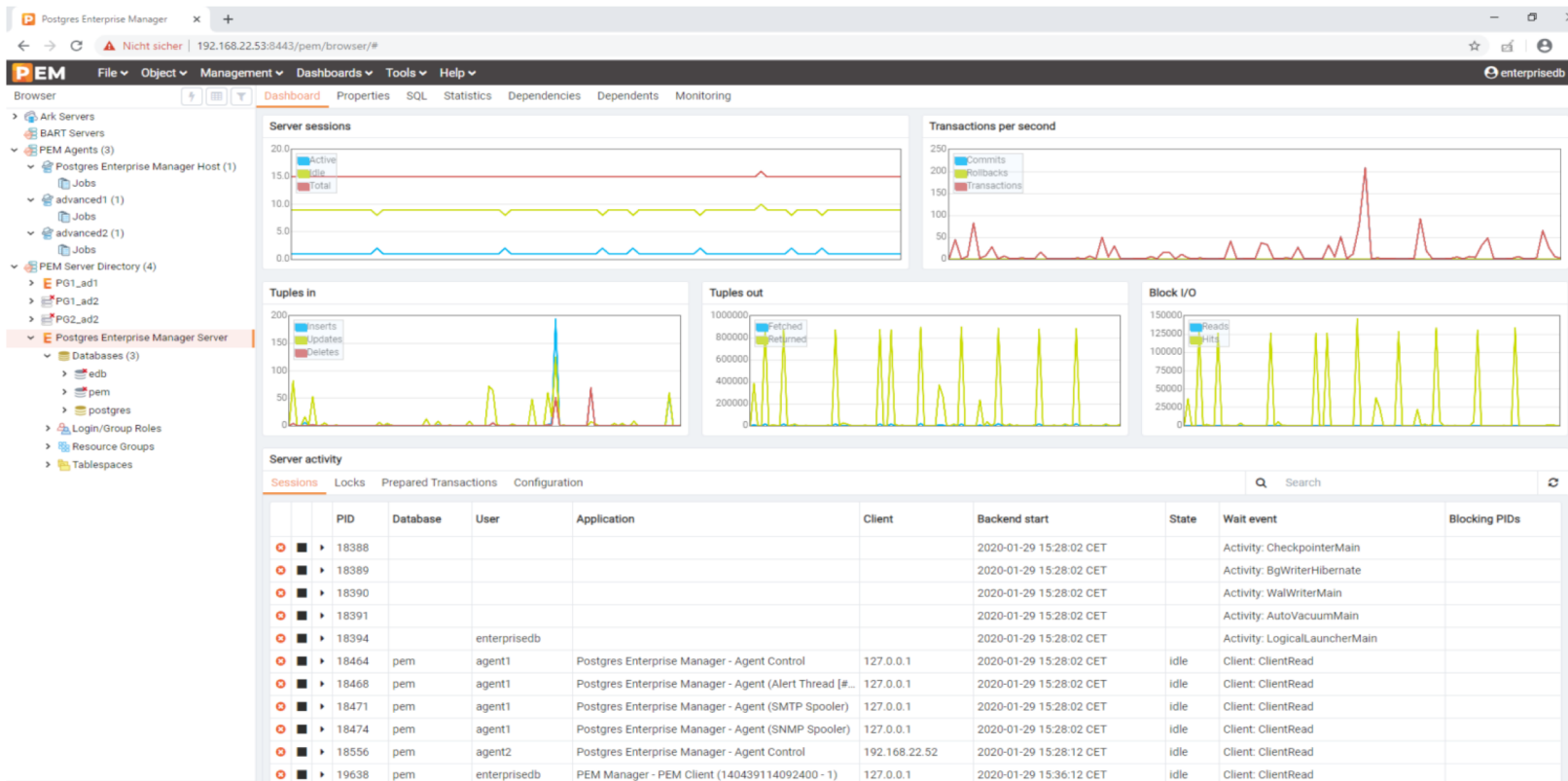
Entities	Oracle	PostgreSQL
Bulk loader	SQL*Loader	Copy
Management	OEM	pgAdmin
Automatic memory & storage management	Yes	No!!!!

!!!In the O/S we trust...

pgAdmin Monitoring/debugging



Postgres Enterprise Monitoring



Some words on pricing

... is open source free

Some words on pricing

- No audit police
- Independent of virtualization
- No vendor lock-in
- Lower cost (total cost of ownership)
- Do I really need support? YES!!!

Where do I start?

... are you ready

It is too easy

My first thoughts:

- ❖ It's too easy maybe that's why it's Popular
- ❖ It's too easy to be Powerful
- ❖ It's really the database for the People

If other People can try it why not you?

postgresql.org/docs

Documentation

[View the manual](#)

Manuals

You can view the manual for an older version or download a PDF of a manual from the below table.

Online Version	PDF Version
13	A4 PDF (12.7 MB) • US PDF (12.6 MB)
12	A4 PDF (12.4 MB) • US PDF (12.3 MB)
11	A4 PDF (12.1 MB) • US PDF (12.0 MB)
10	A4 PDF (11.8 MB) • US PDF (11.7 MB)
9.6	A4 PDF (6.5 MB) • US PDF (6.5 MB)
Development snapshot	PDF version not available

Looking for documentation for an older, unsupported, version? Check the [archive](#) of older manuals.

Translated Manuals

- [Chinese](#)
- [French](#)
- [Japanese](#)
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postgresql.org/download

Downloads

PostgreSQL Downloads

PostgreSQL is available for download as ready-to-use packages or installers for various platforms, as well as a source code archive if you want to build it yourself.

Packages and Installers

Select your operating system family:



Select your Linux distribution:



Database setup

```
update /etc/yum.repos.d/CentOS-Base.repo
add exclude=postgresql* to base and update sections
[root@riga-demo data]# yum install
https://download.postgresql.org/pub/repos/yum/9.6/redhat/rhel7-x86_64/pgdg-centos96-9.6-
3.noarch.rpm
[root@riga-demo data]# yum install postgresql96-server
alter /etc/profile
export PATH=/usr/pgsql-9.6/bin/:$PATH
export PGDATA=/var/lib/pgsql/9.6/data
export PGDATABASE=postgres
export PGUSER=postgres
export PGPORT=5432
[root@riga-demo data]# /usr/pgsql-9.6/bin/psql96-setup initdb
```

30
SECONDS

5
SECONDS

15
SECONDS

1
MINUTE

30
SECONDS

Database setup

```
[root@riga-demo data]# systemctl enable postgresql-9.6.service
[root@riga-demo data]# systemctl start postgresql-9.6.service
[root@riga-demo data]# su - postgres
-bash-4.2$ psql
```

```
postgres-# \l
```

```
                                List of databases
  Name      | Owner   | Encoding | Collate  | Ctype    | Access privileges
-----+-----+-----+-----+-----+-----
 postgres  | postgres | UTF8     | en_US.UTF-8 | en_US.UTF-8 |
 template0 | postgres | UTF8     | en_US.UTF-8 | en_US.UTF-8 | =c/postgres      +
           |          |          |          |          | postgres=CtC/postgres
 template1 | postgres | UTF8     | en_US.UTF-8 | en_US.UTF-8 | =c/postgres      +
           |          |          |          |          | postgres=CtC/postgres
(3 rows)
```

It is too easy

Installed and running in minutes!!

Deployment of your choice

✓ Bare metal (Windows, RHEL, CentOS, Ubuntu, Debian, PowerLinux)

✓ Virtualized deployments



✓ Container deployments



✓ Public cloud deployments



Conclusion

... the open source alternative

Conclusion

- Oracle has a solid place in the database ecosystem
- PostgreSQL has a solid place in the database ecosystem
- You need to love extensions and add-ons
- What's your use case?
- The comparison shows it can be a true alternative for specific workloads

Interesting Blogs

How to Choose Which Database to Use

<https://www.enterprisedb.com/blog/how-choose-which-database-use>

Comparing Oracle with EDB Postgres

<https://www.enterprisedb.com/blog/comparing-oracle-edb-postgres>

How to import data from Oracle into PostgreSQL

<https://www.enterprisedb.com/postgres-tutorials/how-import-data-oracle-postgresql>

4 Reasons PostgreSQL was Named Database Management System of the Year 2020

<https://www.enterprisedb.com/blog/4-reasons-postgresql-was-named-database-management-system-year-2020>

Are you ready to use PostgreSQL today?

... now that you see how easy it can be

Thank You