DOAG

Regionaltreffen Nordrhein-Westfalen

Comparing PostgreSQL to Oracle

The best kept secrets to success

What's on the menu

- Introduction
- Comparing technologies
- Some words on pricing
- Getting started
- Conclusion

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Jan Karremans

- Working in IT since 1991
- Working with Oracle since version 6 and PostgreSQL since version 9.6
- From administration to development
- Leading Sales Engineering for EnterpriseDB
- Fierce supporter of #DBADev

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Who are you?

- DBA
- Manager
- Developer
- Architect
- Don’t know, just walked in…

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Your Major?

- Oracle
- Microsoft SQL Server
- My SQL
- PostgreSQL
- Coffee…

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Introduction

ORACLE DATABASE

- Anyone?

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- World leader in open-source based Postgres software
- Major contributor in open-source PostgreSQL

Disclaimer

Where I say **Oracle**
I mean Oracle **Enterprise Edition** + possible **options**

Where I say **PostgreSQL**
I mean **EnterpriseDB Postgres Advanced Server**

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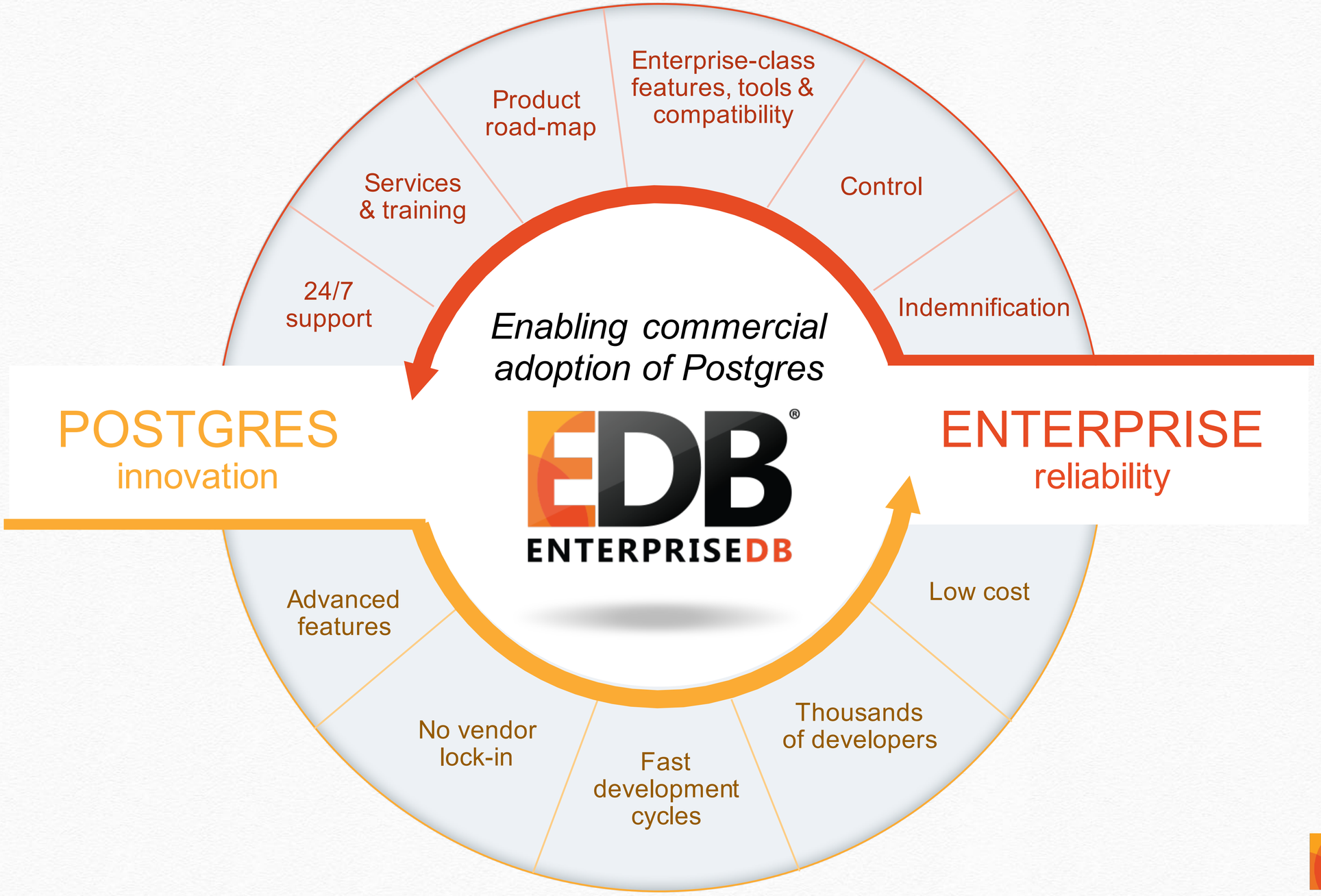

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Sometimes I will focus a little bit more on **PostgreSQL** than on **Oracle**…

because

Many of you already know a lot more about **Oracle** than **PostgreSQL**…

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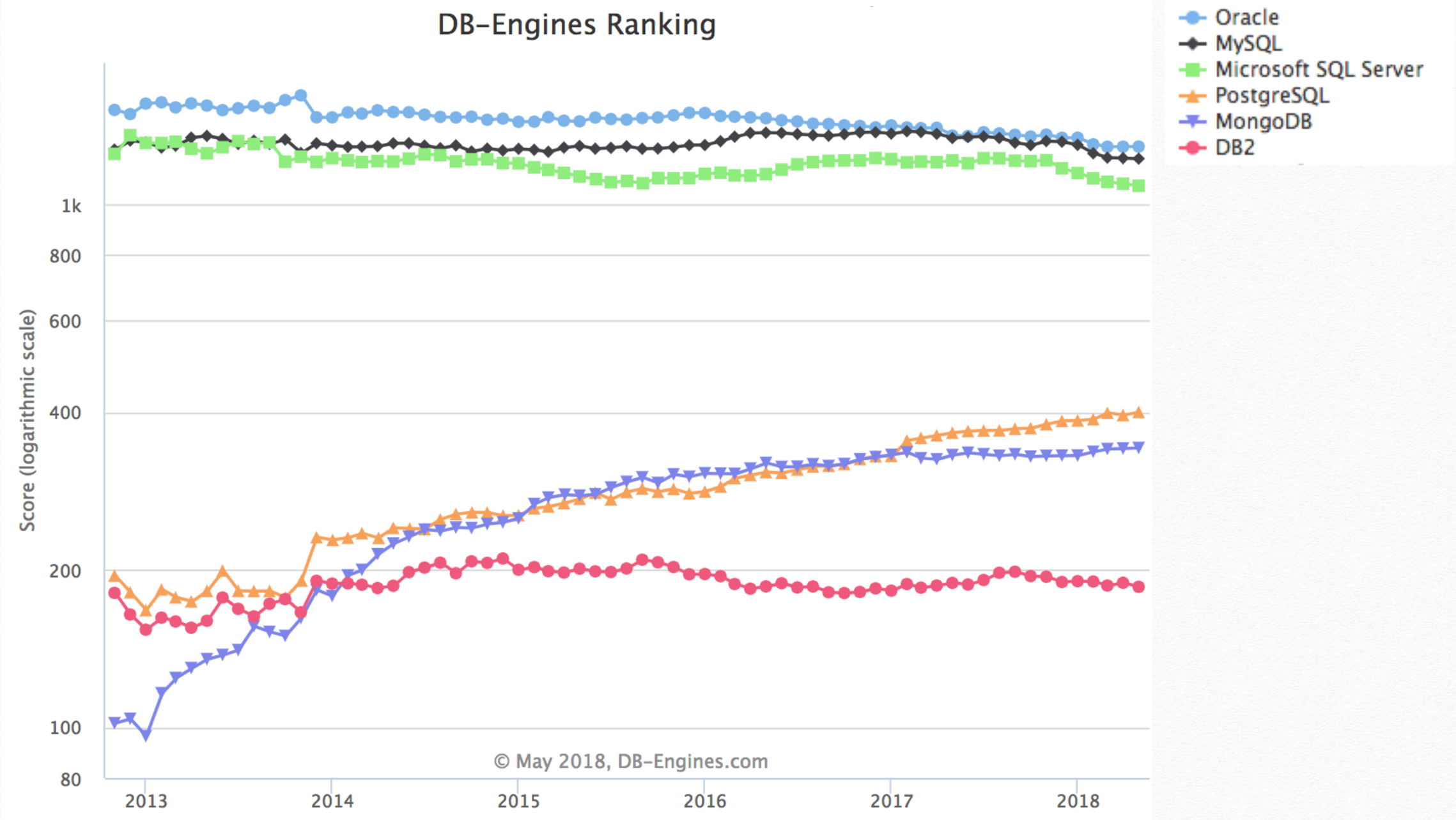
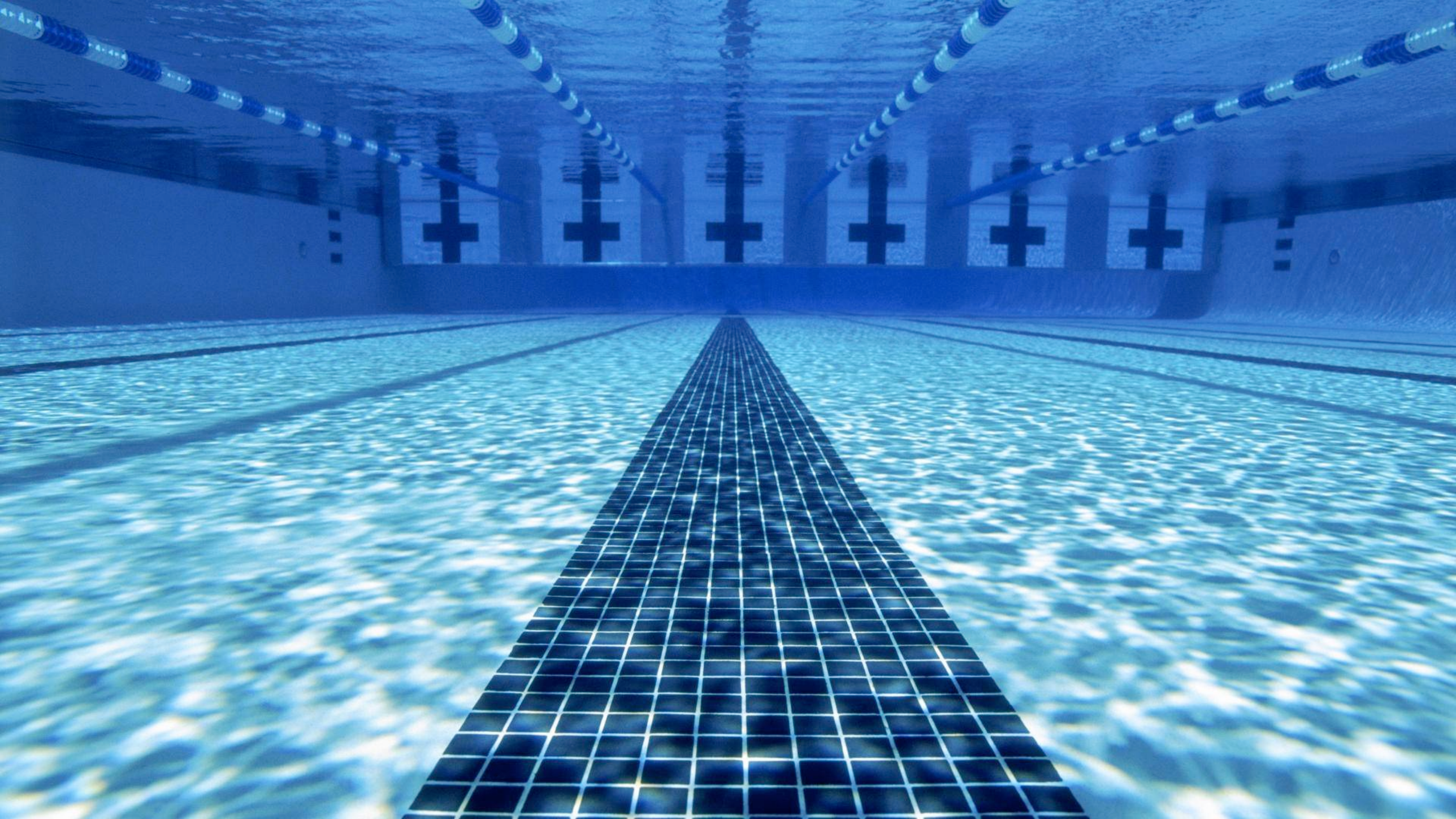

DB-Engines Ranking
Oracle
MySQL
Microsoft SQL Server
PostgreSQL
MongoDB
DB2
Score (logarithmic scale)
1k
800
600
400
200
100
80
© May 2018, DB-Engines.com
2013
2014
2015
2016
2017
2018



Comparing technologies

Besides differences

also lots of similarities

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Application Development

General / Capabilities

Capacities

Tables and Partitioning

Incompatibilities

Terminology

Deployment Options

Data Types

Indexes

SQL Capabilities

SQL Extensions

Management

Integration

High Availability

Security

Performance / Scalability

Big / Unstructured Data

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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 (REDO vs. WAL)
- Multi-Tenant architecture

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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)

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Capacities

- Unlimited dat
- Unlimited rov
- Unlimited nu le

Just because you can… doesn't mean you should.

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Capacities

Max	Oracle	PostgreSQL
Table size	4 GB x DB_BLOCK_SIZE *defaults to 32 TB*	32 TB
Row size	4 TB	1,6 TB
Field size	(4 GB - 1) x DB_BLOCK_SIZE	1 GB
Columns per table	1000	250 - 1600

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Tables and partitions

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

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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*

We have BOOLEAN

Sorry!

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Data types

Max	Oracle	PostgreSQL
Date / Time	Yes	
Row id	Yes	
XMLType	Yes	
JSON	is_json check constraint	*native JSON & JSONB with 58 operators, functions & relational converters*
Spatial	Yes	

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Indexes

Entities	Oracle	PostgreSQL
B-Tree, hash, expressions, partial, full text search, spatial	Same	
Reverse, bitmap, block range	Similar *Block range = Smart Scan*	
K-nearest-neighbor	With options	Native
GIST, GIN *Speed up full-text searches*	No	Yes

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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

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SQL Extensions

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

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Comparing technologies

We're about halfway through!!

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High availability

Entities	Oracle	PostgreSQL
PITR *Point In Time Recovery*	Similar	
Backup and recovery tools	RMAN	BART
Standby database	(Active) Data Guard	Streaming replication
Flashback *Query, Table, Database*	Yes	No

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Performance & Scalability

Entities	Oracle	PostgreSQL
Connection pooling CPU & IO Resource limits	Similar	
Columnar store	InMemory option	cstore FDW
In-memory database	well, yes…	No
Multi-master replication	Golden Gate Quest Shareplex Dbvisit Replicate	Yes

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Security

Entities	Oracle	PostgreSQL
Authentication support	LDAP, SSL, RADIUS, PAM, Kerberos, 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	No	Yes
Audit Vault	Yes	No

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Integration

Entities	Oracle	PostgreSQL
Database links, (a)synchronous transaction-log shipping, distributed transactions, distributed queries	Similar	
Session based synchronous replication	No	Yes
Integration with	SQL Server, Sybase, Hadoop, MongoDB & MySQL	Yes, FDW

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Application development

Entities	Oracle	PostgreSQL
PL/SQL	Yes	Compatible
Additional programming languages to PL/SQL	Java, C, C++	PL/pgSQL, PL/Java, C, C++, PL/Perl, Python, PL/Tcl, PL/R

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Application development

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, varrays, hierarchical queries, pragma restrict_reference & except_init, user defined exceptions, object types, sub types, synonyms, sequences, invoker rights, statement level rollback	Similar	

Autonomous Transactions

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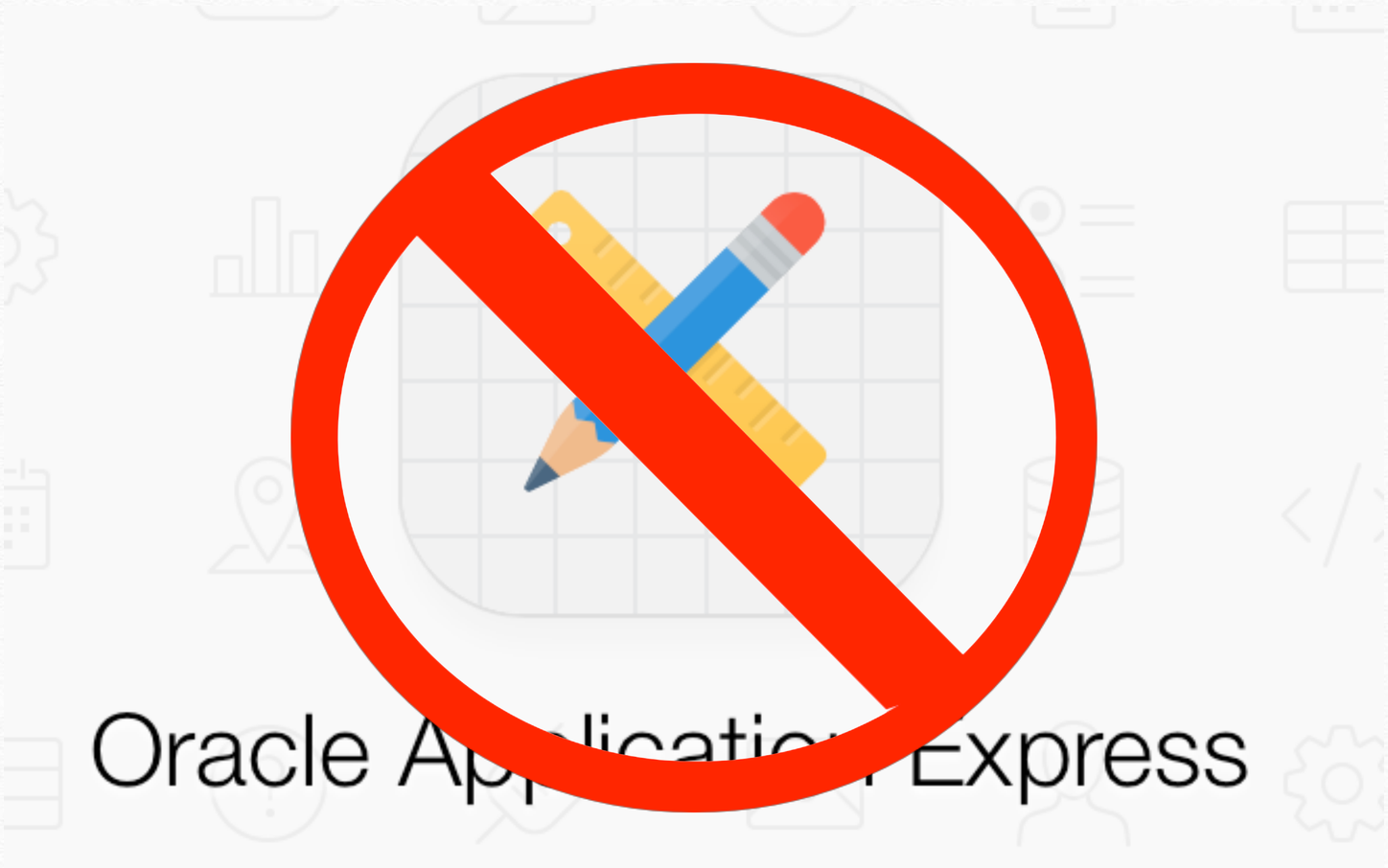

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Big & Unstructured data

Entities	Oracle	PostgreSQL
Spatial	Good	Better
Key-value store & Full Text Search	Similar	
XML Storage, Compression	Yes	No !!
Hadoop, MongoDB, Cubes	Yes	

!! In the OS we trust…

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Management

Entities	Oracle	PostgreSQL
Bulk loader	SQL*Loader	EDB*Loader
Management	OEM	PEM
PITR, Diagnostic & Tuning pack, SQL Profiler, online reorganization	Similar	
Automatic memory & storage management	Yes	No !!

!! In the OS we trust…

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Some more perspective

Close versus Open

- Develop solutions to sell
  Primary goal is to do business
- Develop solutions to solve a problem
  Primary goal is to solve a problem

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Close versus Open

```
17 / 116331 \ 6843
     102
      143
      136
        73
        68
         51
         51
          0
```

- Open software shows the math, not just the answer
- No reverse engineering, just a good read
- Allows for tailoring of solutions

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Isolated versus integrated

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

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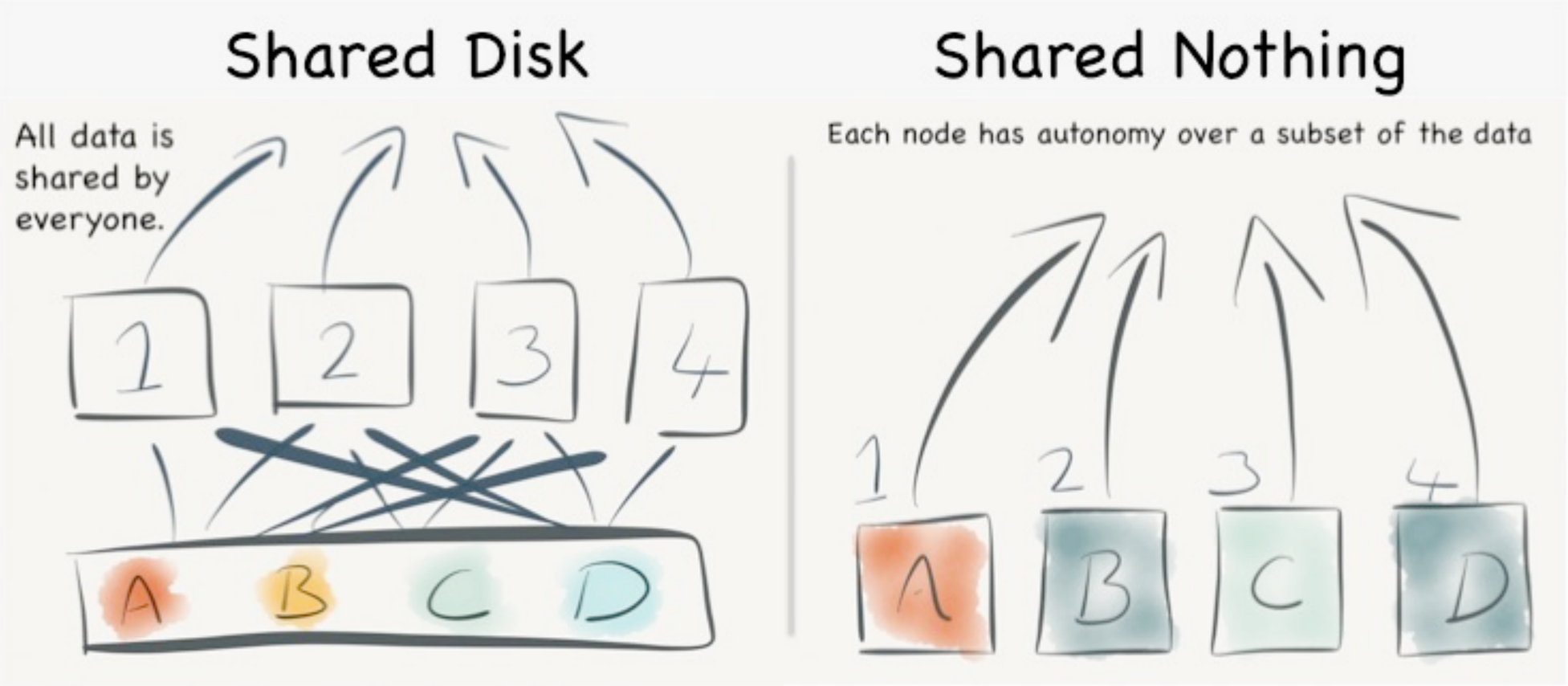
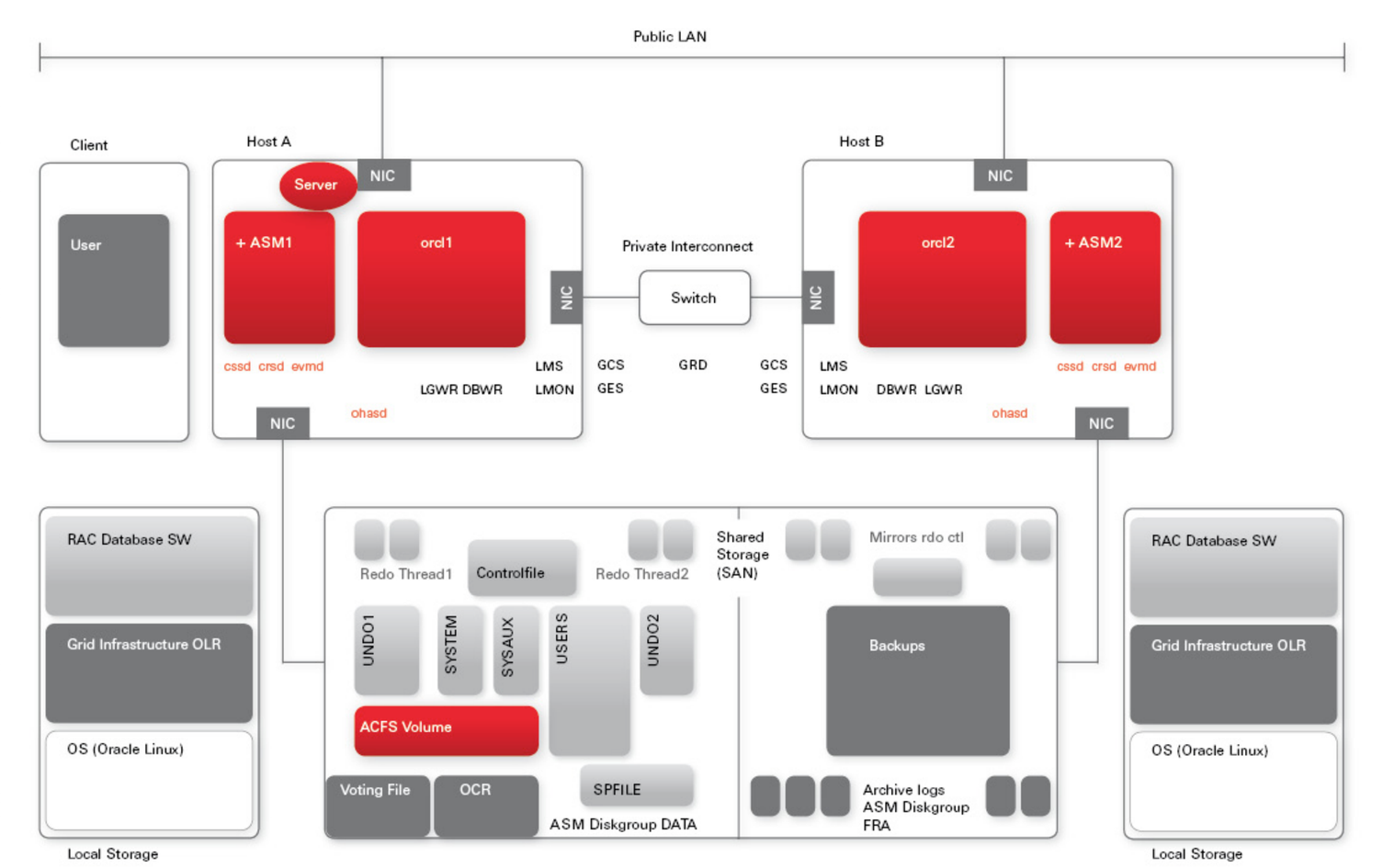
versus

Shared everything versus shared nothing



Courtesy: Ben Stopford

Real Application Cluster



Courtesy: Uwe Hesse

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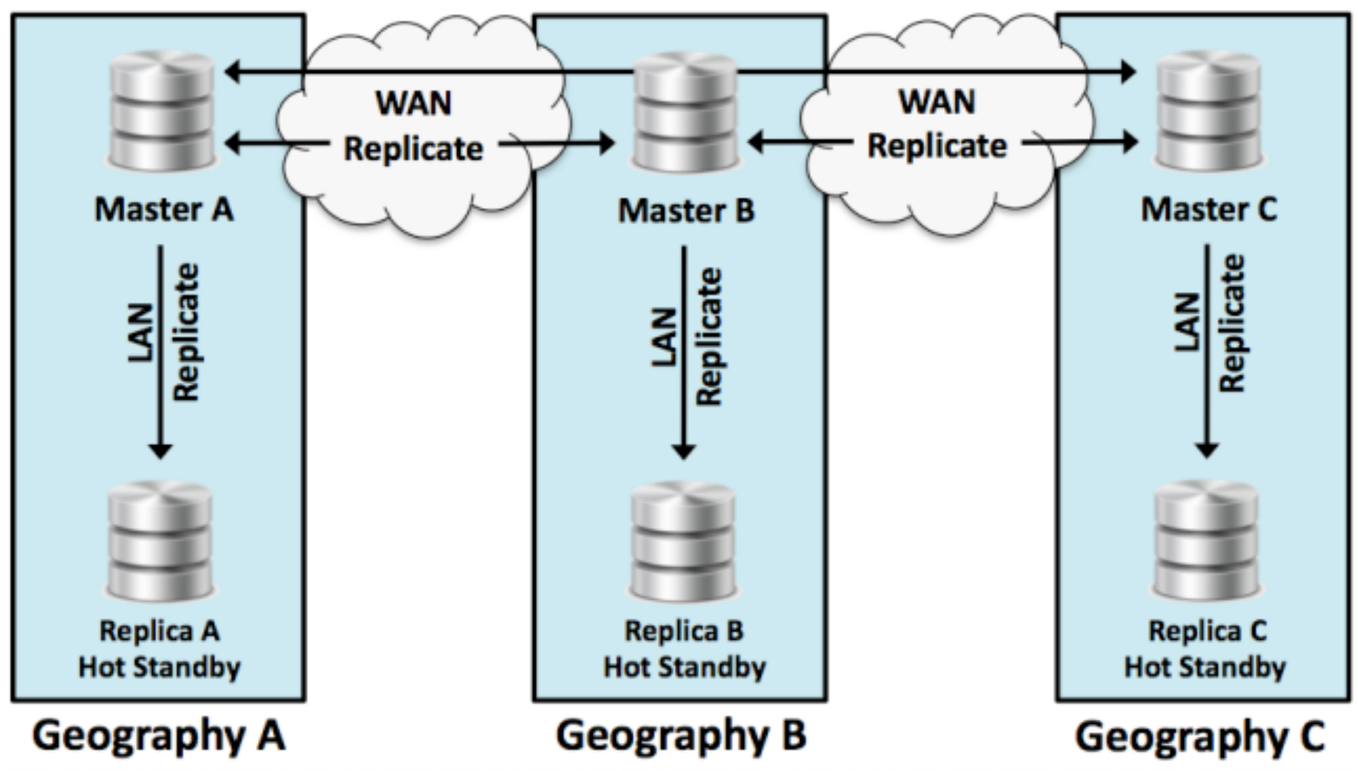
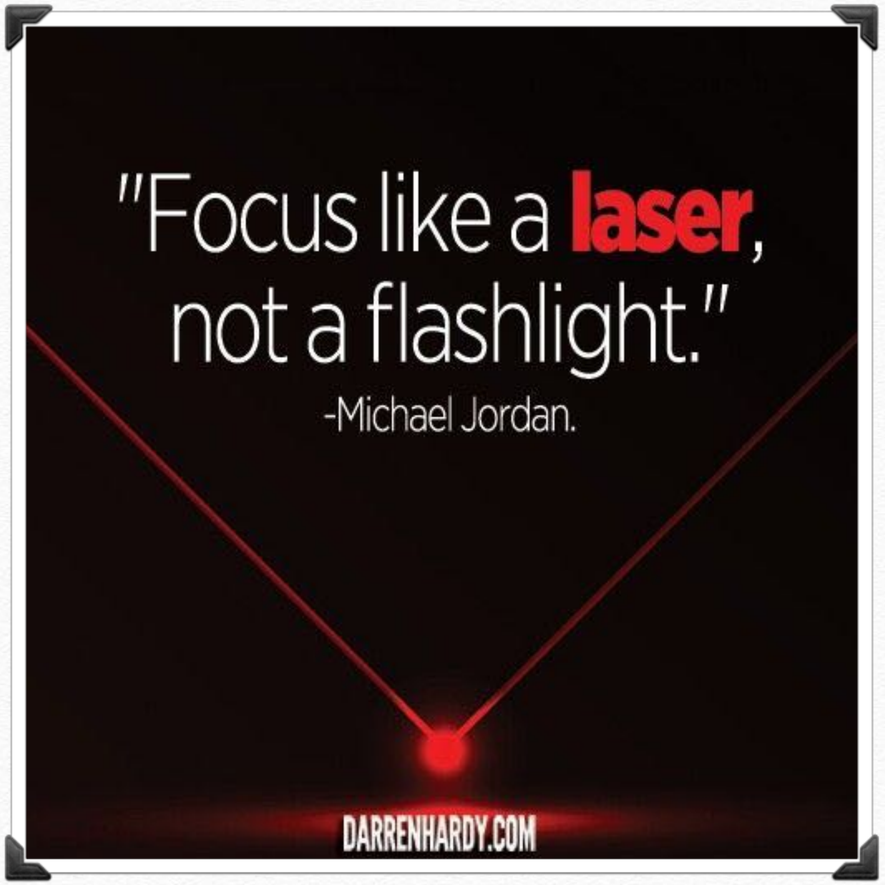
Multi Master Replication

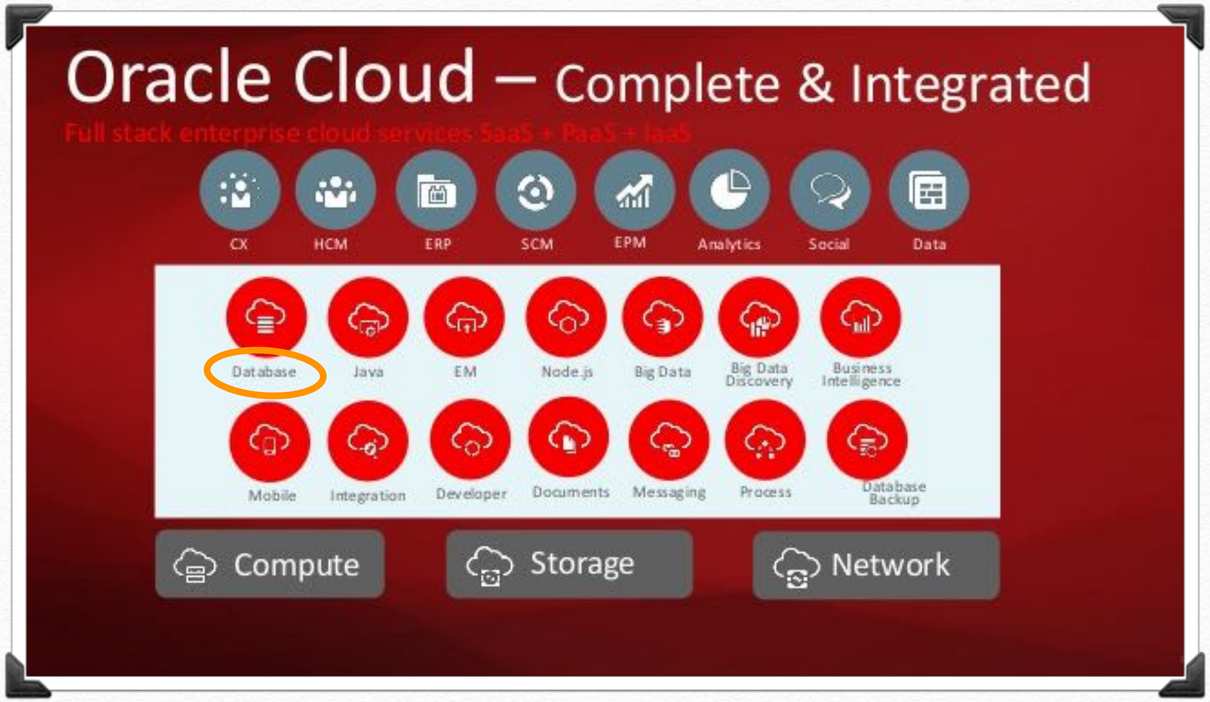


Include pgpool II

Courtesy: ULX Hungary

Focus





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Some words on pricing

How does EnterpriseDB do it

- Subscriptions just for databases
- Independent of virtualisation
- Always inclusive of everything *
- No police

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What does EnterpriseDB bring?

- Per year per core
- EnterpriseDB Postgres Standard Server
- EnterpriseDB Postgres Advanced Server
- Developer subscription

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What does it cost

- Enterprise Edition
- Active Data Guard
- Partitioning
- Diagnostic & Tuning
- Cloud Management

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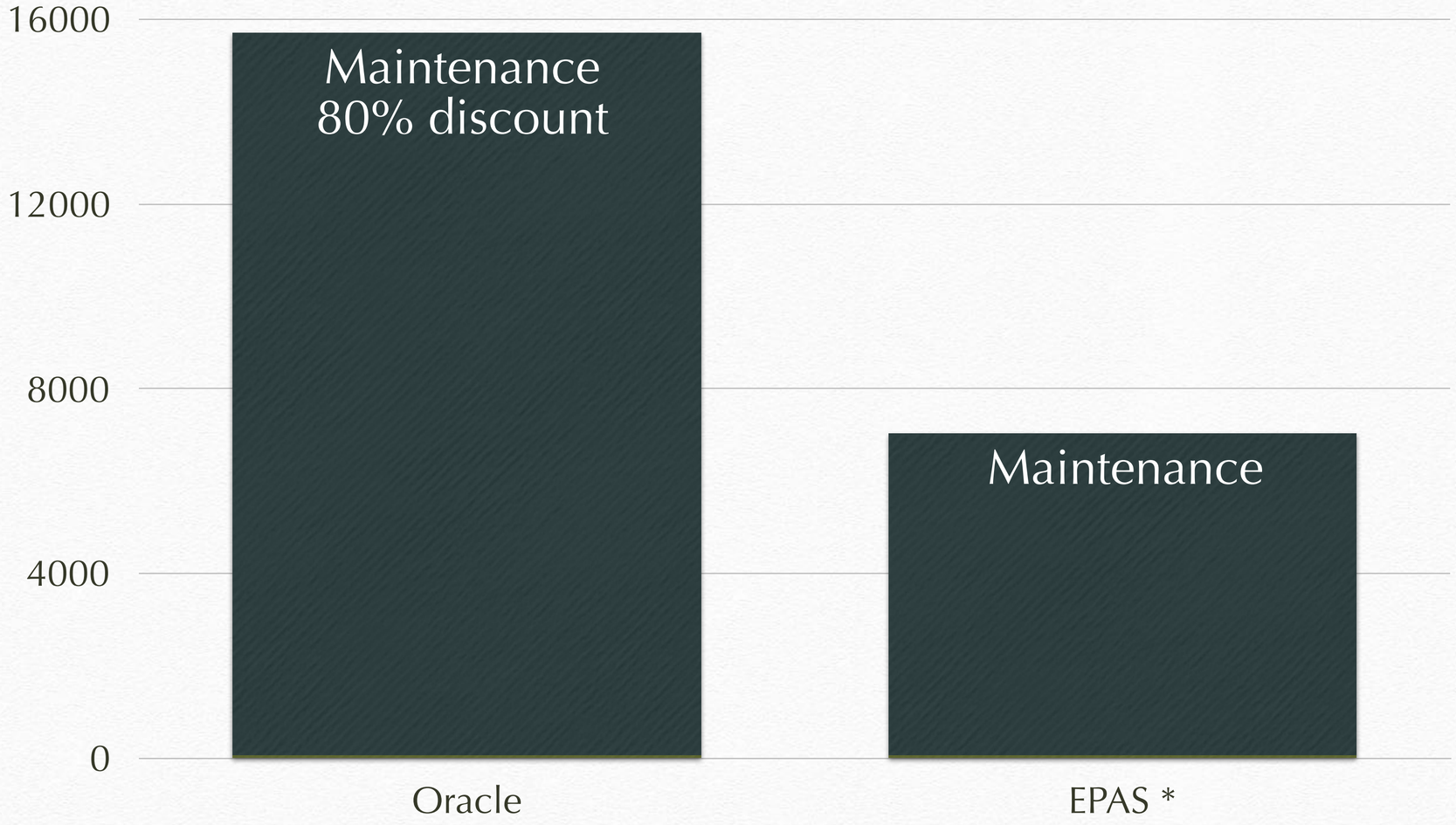
What does it cost



4 core server

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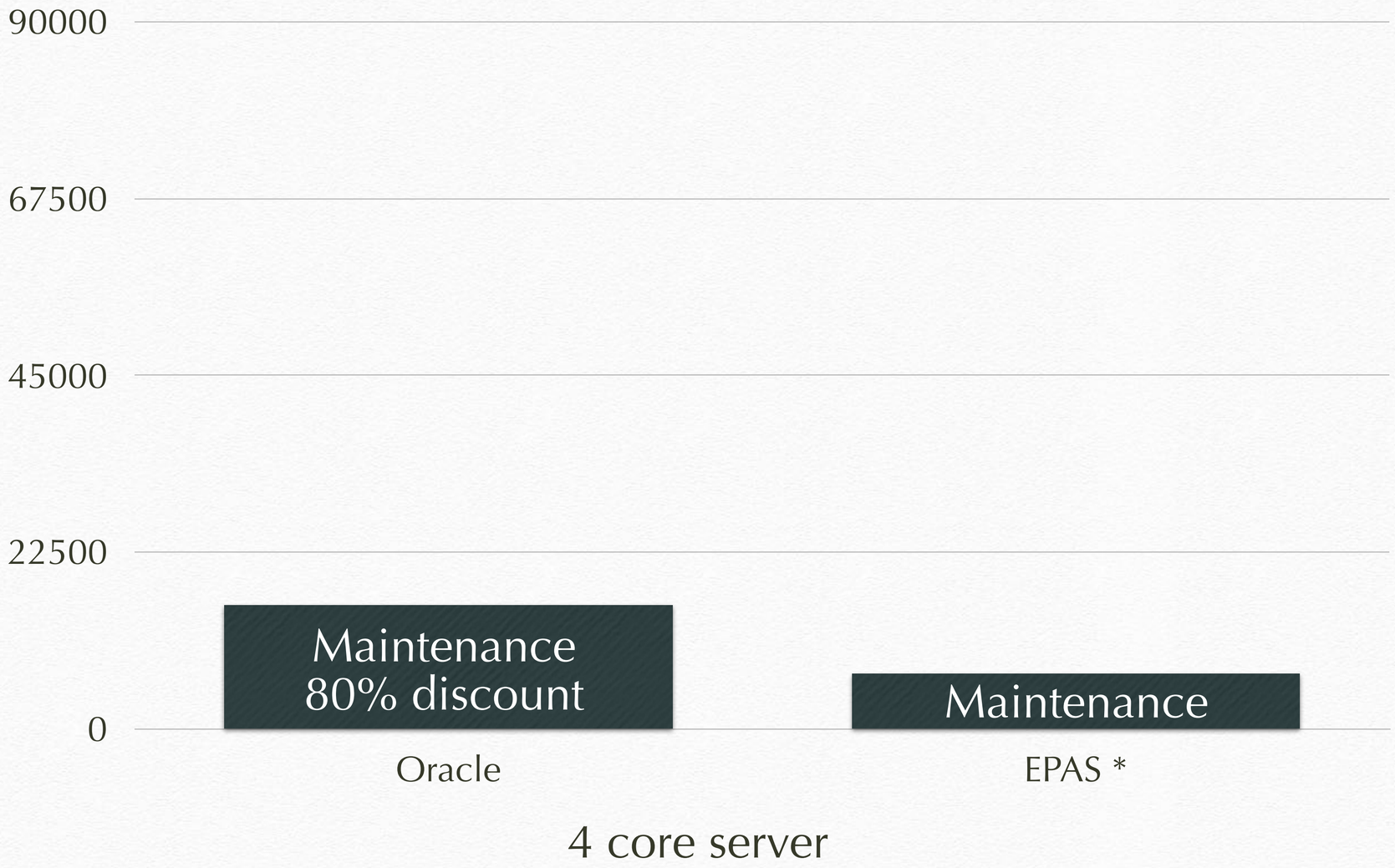
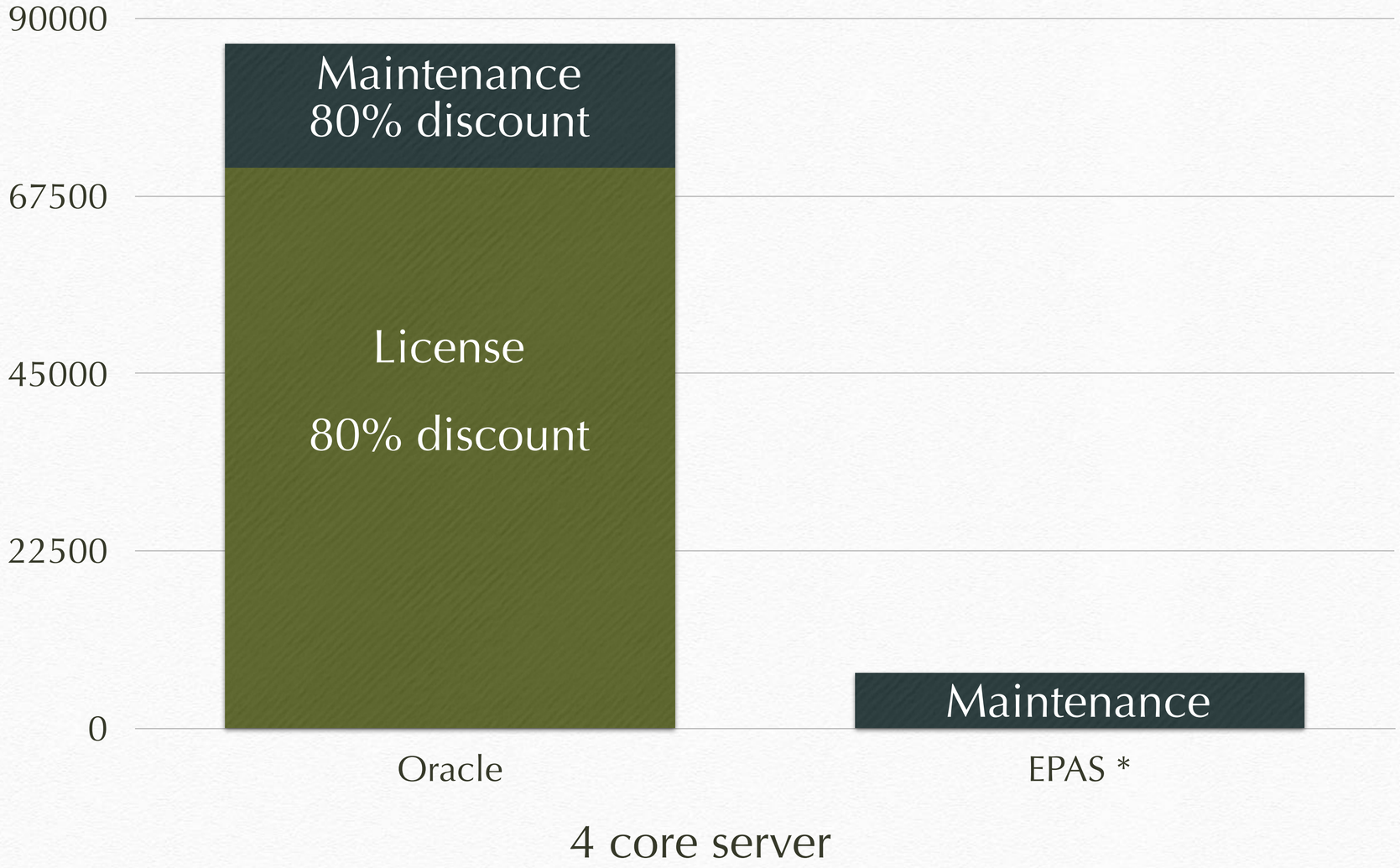
What does it cost



What does it cost



4 core server

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Getting started

It is too easy

- When I started I thought, can this really be?
- Then I also heard this from others
- Yes, it really can be this easy / transparent

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Database setup

- update /etc/yum.repos.d/CentOS-Base.repo
  add exclude=postgresql* to ***base*** and ***update*** secti 30 seconds
- [root@riga-demo data]# yum install
  https://download.postgresql.org/pub/repos/yum/ 5 seconds /rhel-7-x86_64/pgdg-
  centos96-9.6-3.noarch.rpm
- [root@riga-demo data]# 15 seconds postgresql96-server
- alter /etc/profile
  export PATH=/usr/pgsql-9.6/bin/:$PATH
  export PGDATA=/var/lib/pgsql/9.6/data
  export PGDATABASE=postgres 1 minute
  export PGUSER=postgres
  export PGPORT=5432
- [root@riga-demo data]# /usr/pgsql-9.6/bin/postgresql96-setup initdb 30 seconds

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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)
```

Download, install & play

- https://wiki.postgresql.org/wiki/Main_Page
- EDB Postgres server & tools from *https://www.enterprisedb.com/software-downloads-postgres*
- Documentation on *https://www.enterprisedb.com/resources/product-documentation*
- Setup scripts on *https://community.postgresrocks.net/t5/EDB-Guides/bg-p/edbguides*

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Conclusion

Well…

- Oracle has a solid place in the database eco-system
- PostgreSQL has a solid place in the database eco-system
- With some help, PostgreSQL can support more
- It constitutes a real alternative
- In 80% of the cases

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Wrap-up

- Would it be smart to look at PostgreSQL?
- From what I have learned…
- I would say, yes, please.

You don't have to do this all alone!

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meetup

- Frankfurt (next week Thursday)
  https://www.meetup.com/Postgres-User-Group-Frankfurt-am-Main/
- München
- Berlin
- Hamburg
- Throughout Europe & Worldwide

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Quest TOAD Edge for EDB Postgres

That's all Folks!

Let's stay in touch

- email: jan.karremans@enterprisedb.com
- email: j.karremans@jk-consult.nl
- Twitter: @johnnyq72
- Skype: jankarremansnl
- Web: www.jk-consult.nl

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