

An Expert Guide to Migrating Legacy Databases to Postgres in the Cloud

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Product Development and Support
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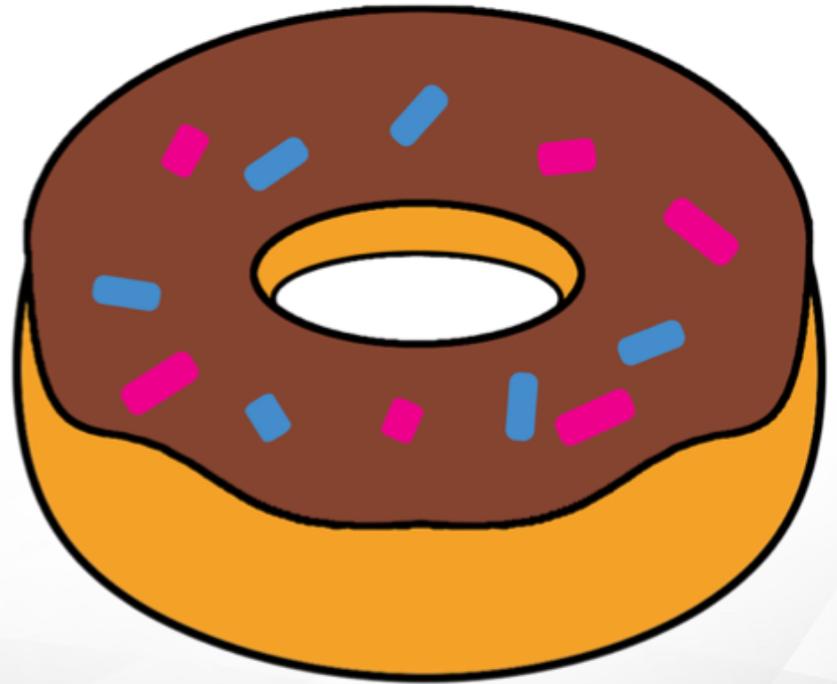
EDB
POSTGRES

TAKE AWAYS

- Migrating from Oracle to Postgres is not that hard
- 50%+ of migrations are easy – how do I identify those?
- Why are an Oracle-compatible version of Postgres and Oracle-compatible version of the drivers so important?
- If it's not just about the database ... what else do I need?
- Step by step – how do I go about it?

AGENDA

- Who is EDB
- Why migrate
- Components of migration
- Picking good candidates
- Demo



THE ENTERPRISE POSTGRES COMPANY



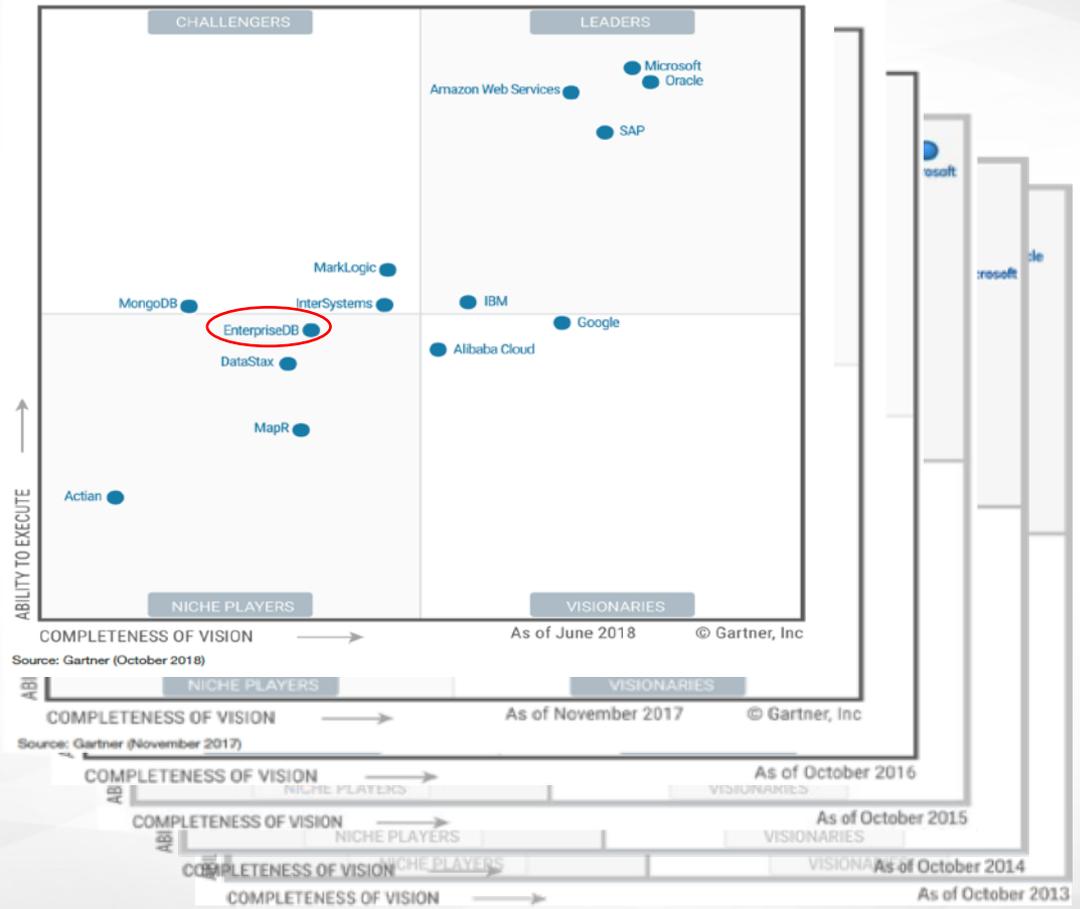
EnterpriseDB (EDB) delivers the premier open source-based, multi-model data platform for new applications, cloud re-platforming, application modernization, and legacy migration.



Figure 1. Magic Quadrant for Operational Database Management Systems

ONLY OPEN SOURCE RDBMS IN GARTNER MQ

EDB Recognized 6 Years In A Row on Gartner's Magic Quadrant



EDB OPEN SOURCE LEADERSHIP

Named EDB open source committers and contributors

CORE TEAM



Bruce Momjian



Dave Page

MAJOR CONTRIBUTORS



Andres Freund



Devrim Gündüz



Robert Haas



Amit Kapila

CONTRIBUTORS



Akshay Joshi



Amul Sul



Ashesh Vashi



Ashutosh Sharma



Dilip Kumar



Jeevan Ladhe



Mithun Cy



Rushabh Lathia

ECONOMIC REASONS

ROI Summary for EDB Postgres Database Solution



3 Year
ROI

168%



3 Year Cost of
Operations

42% Lower



Payback
Period

**4
MONTHS**



Database Costs and DBA Efficiencies



Cost Per
Database

65% Less



DBA Staff Time
Required for Deployment
and Configuration

8% Less



DBA Staff Time
for Administration
and Support

16% Less

Source: IDC: *The Economic and Business Advantages of EnterpriseDB Postgres Database Solutions, 2016*

Unplanned Downtime Impact

Number of Unplanned
Downtime Incidences
per Year

24% Less

Mean Time to Repair

**50% Fewer
Hours**

Productive Hours Lost per
EDB Postgres Database
Per Year

**62% Fewer
Hours**

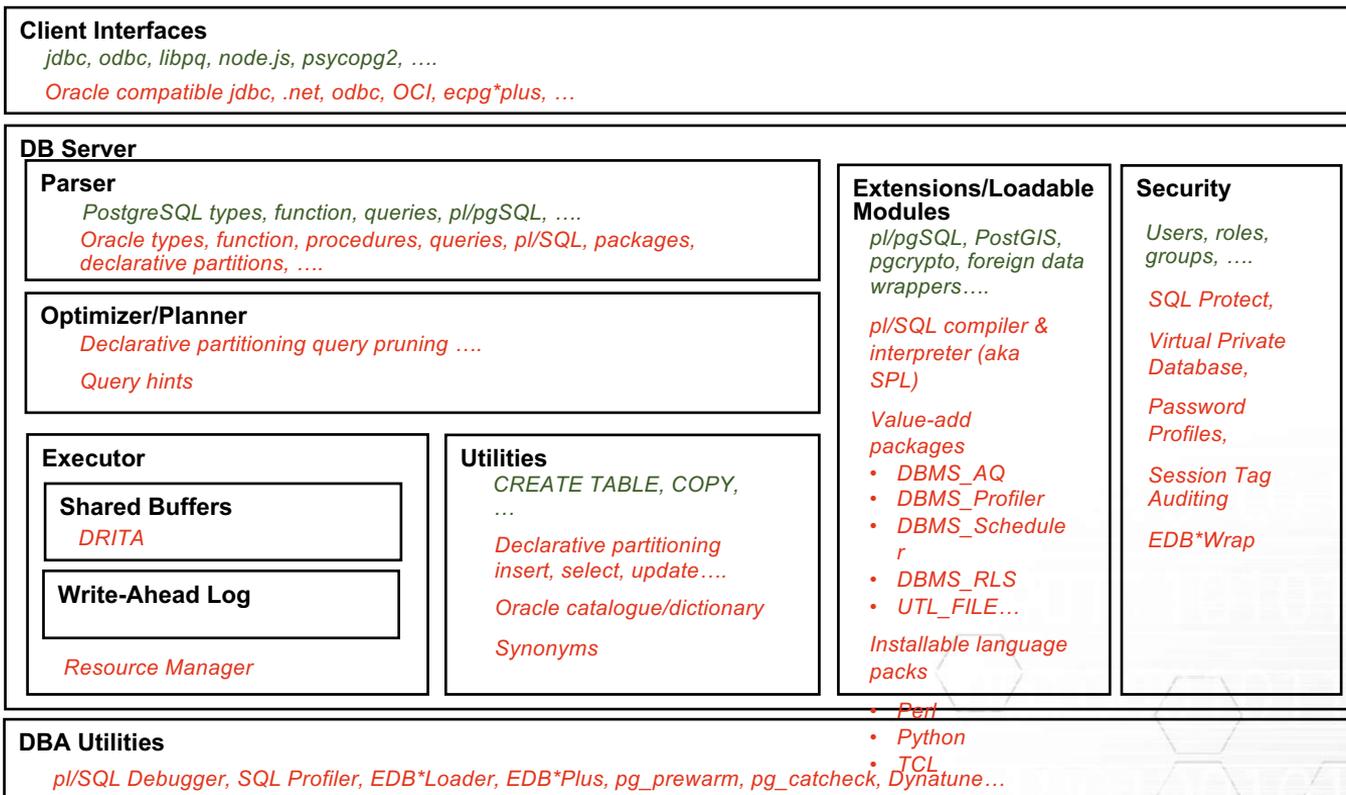
POSTGRES: THE INNOVATION LEADER

- Vibrant community
- ACID Compliant
- SQL + JSONB + KVP + GIS
- Many data types
- Foreign data wrappers
- Native streaming and logical replication
- ...



EDB Postgres Advanced Server

Enterprise capabilities add to the strengths of community PostgreSQL



DATABASE COMPATIBILITY FOR ORACLE

- **SQL extension support**
 - Decode, NVL, Substr, NVL2, Date/time functions
 - DDL syntax support
- **PL/SQL support – native language**
 - REF Cursors, Implicit and explicit cursors
 - Looping, variable declarations, conditional statements
 - Collections: Associative Arrays, Varrays, Nested tables
 - Pragmas
 - Named parameters
 - User Defined Exceptions
 - Explicit Transaction Control(within sp)
- **Tools**
 - EDB*Plus – SQL*Plus look-a-like
 - EDB*Loader – SQL*Loader equivalent
- **Oracle-like Data Dictionary**
 - ALL_, DBA_, USER_ views
- **Wait Events**
 - System and session waits
 - Statspack-like reporting
- **Features**
 - Packages
 - Stored procedures
 - Functions
 - Triggers
 - Hints
 - Hierarchical Queries
 - Synonyms – Public and Private
 - Sequences
 - Rownum
 - Users/Roles
 - Dynamic SQL
 - Materialized Views
 - Partitioning
- **PL/SQL supplied packages**
 - 16 DBMS
 - 8 UTL
- **Data types**
 - Blobs, Clobs, XMLTYPE, VARCHAR2, NUMBER, CHAR, Integer
- **Drivers**
 - JDBC, ODBC, .NET with Oracle extensions
 - OCI & ProC compatible drivers

EDB Advanced Server 11 (Q4 2018): Pragma Autonomous Transaction
and DBMS_REDACT

EDB COMPATIBILITY WITH ORACLE



PART OF THE WAY
SCHEMA AND DATA ONLY

MOST OF THE WAY
SCHEMA, DATA, AND CODE

Almost there
SCHEMA, DATA, CODE, AND INTERFACE

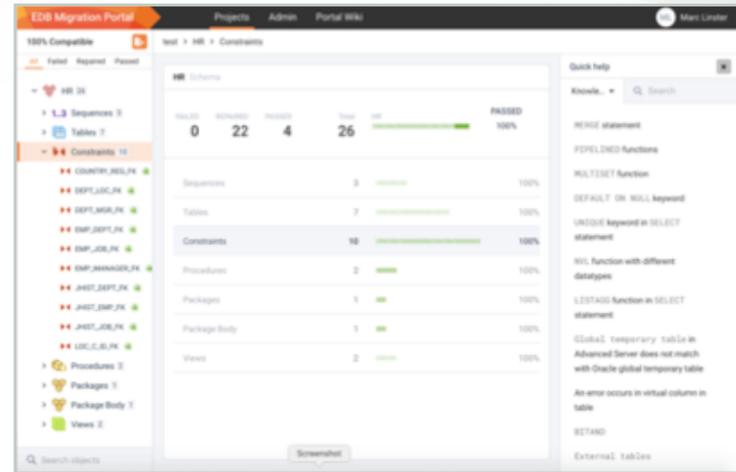
All the way
SCHEMA, DATA, CODE, INTERFACE, and OPERATIONAL TOOLS

DATABASE DRIVERS

Oracle Compatibility Feature	JDBC	ODBC	.NET	OCI
PL/SQL Support	✓	✓	✓	✓
REF_CURSOR - OracleTypes.CURSOR	✓	✓	✓	✓
User-defined Exceptions - vendor code	✓	✓		✓
Named Parameters - parameter names	✓	✓	✓	✓
Data Types- VARCHAR2 , STRUCT, ARRAYS	✓	✓	✓	✓
STRUCT - Enhanced Manipulation	✓		✓	✓
Upper Column Names - (OPTIONAL)	✓			
Multiple INOUT/OUT parameters	✓	✓	✓	✓

EDB POSTGRES MAKES IT EASY

- **EDB Advanced Server: Oracle compatible Postgres**
- **EDB Cloud Database Service:**
 - Try Oracle compatible Postgres in the the cloud
- **Migration tools:**
 - EDB Migration Portal: Cloud-based migration for schemas and stored procedures
 - EDB Migration Toolkit: One-time data migration
 - EDB Replication Server: Change data capture for large migrations with minimal downtime
- **Oracle-compatible Application drivers: OCL, JDBC, ODBC, .NET, ECPG*Plus**
- **Management Tools**
 - EDB Postgres Enterprise Manager
 - EDB Failover Manager



WHAT MAKES A GOOD CANDIDATE?



- ORM (Hibernate, Spring, etc.)
- Procedures, Functions, Packages written in PL/SQL



- Ability to modify source code
- Availability of Application Developers



- No use of RAC for scalability
- No need for Flashback

TYPICALLY MORE DIFFICULT TARGETS



Moderate candidates

- OCI interface
- Spatial/XML
- Oracle extensions of .NET and ODBC



Typically difficult candidates:

- ProC interface
- Transaction management control inside PL/SQL (Commit/rollback/savepoint/exceptions)
- Stored procedures written in Java
- Must have RAC capabilities and Flashback



Other Oracle proprietary extensions

Data – What Oracle Constructs?

Object Type	%Pass	% of Total	Total
TABLE	98.52%	45.80%	1,402,742
INDEX	88.40%	27.49%	841,946
CONSTRAINT	93.86%	8.39%	256,837
VIEW	65.01%	4.48%	137,224
SEQUENCE	91.20%	3.01%	92,296
TRIGGER	88.16%	2.70%	82,683
SYNONYM	99.53%	2.33%	71,319
PROCEDURE	59.13%	2.08%	63,826
PACKAGE	84.46%	1.28%	39,170
PACKAGE BODY	47.35%	1.04%	31,762
FUNCTION	67.45%	0.61%	18,597
TYPE	88.04%	0.43%	13,226
MATERIALIZED VIEW	35.16%	0.23%	6,960
TYPE BODY	59.56%	0.10%	2,965
DATABASE LINK	93.98%	0.03%	1,013
Total			3,062,566

Transformational Rules (examples)

Repair Handler (Constraints)	Use Count
-- ERH-2009 deleted [ENABLE]	140,723
-- ERH-2004 deleted [ENABLE NOVALIDATE]	716
-- ERH-2067 deleted [RELY in FOREIGN KEY constraint]	24

Repair Handler (Tables)	Use Count
-- ERH-2009 deleted [ENABLE]	283,249
-- ERH-2014 replaced [NUMBER precision] with [38]	81,651
-- ERH-2005 deleted [USING INDEX <CREATE INDEX CLAUSE> ENABLE]	74,864
-- ERH-2008 deleted [CHAR/BYTE IN SIZE]	20,319
-- ERH-2047 deleted [schema name]	3,672
-- ERH-2063 deleted [SUPPLEMENTAL LOGGING GROUP Clause]	2,052
-- ERH-2037 replaced [TIMESTAMP WITH LOCAL TIME ZONE] with [TIMESTAMP WITH TIME ZONE]	1,821
-- ERH-1009 replaced [External Table syntax] with [Foreign Table syntax]	858

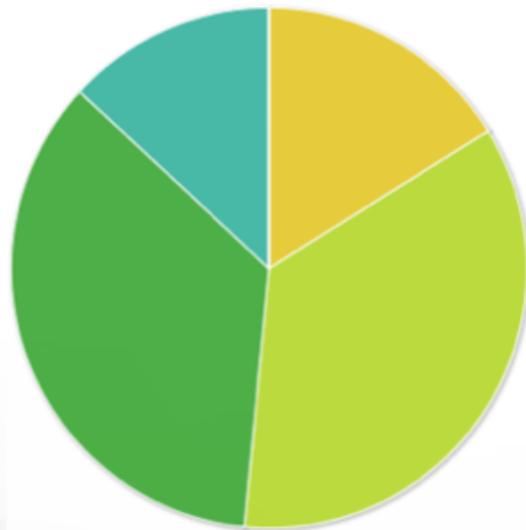
PICK YOUR BATTLES

50%+ of migrations are easy ...

30% involve more work ...

20% are difficult

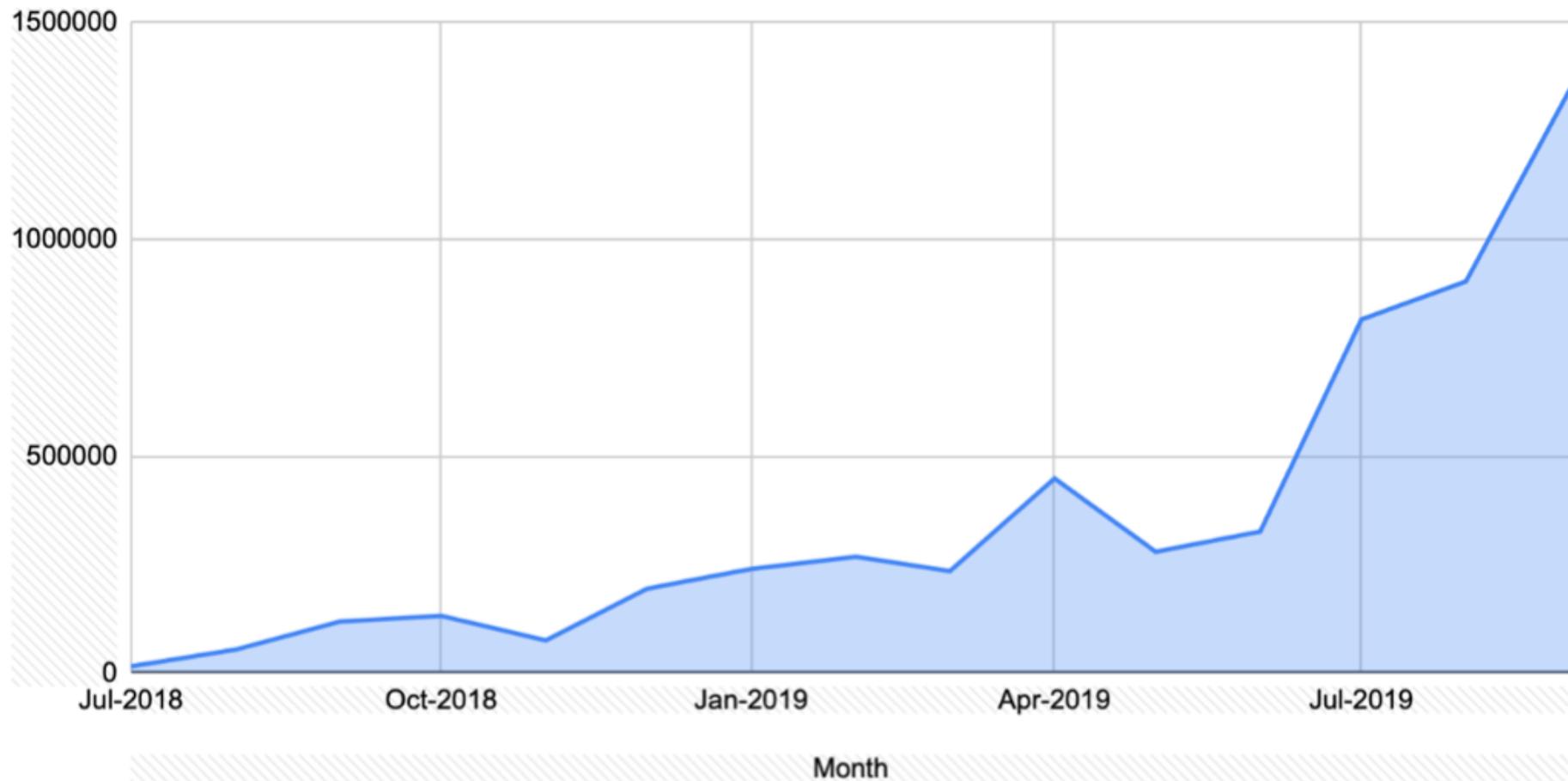
Research by  TechValidate



- Not at all: 16%
- Slightly 1-19%: 35%
- Moderately 20-49%: 35%
- Substantially 50-89%: 13%
- Extensively 90-99%: 0%
- Completely 100%: 0%

51% had slight to no modifications

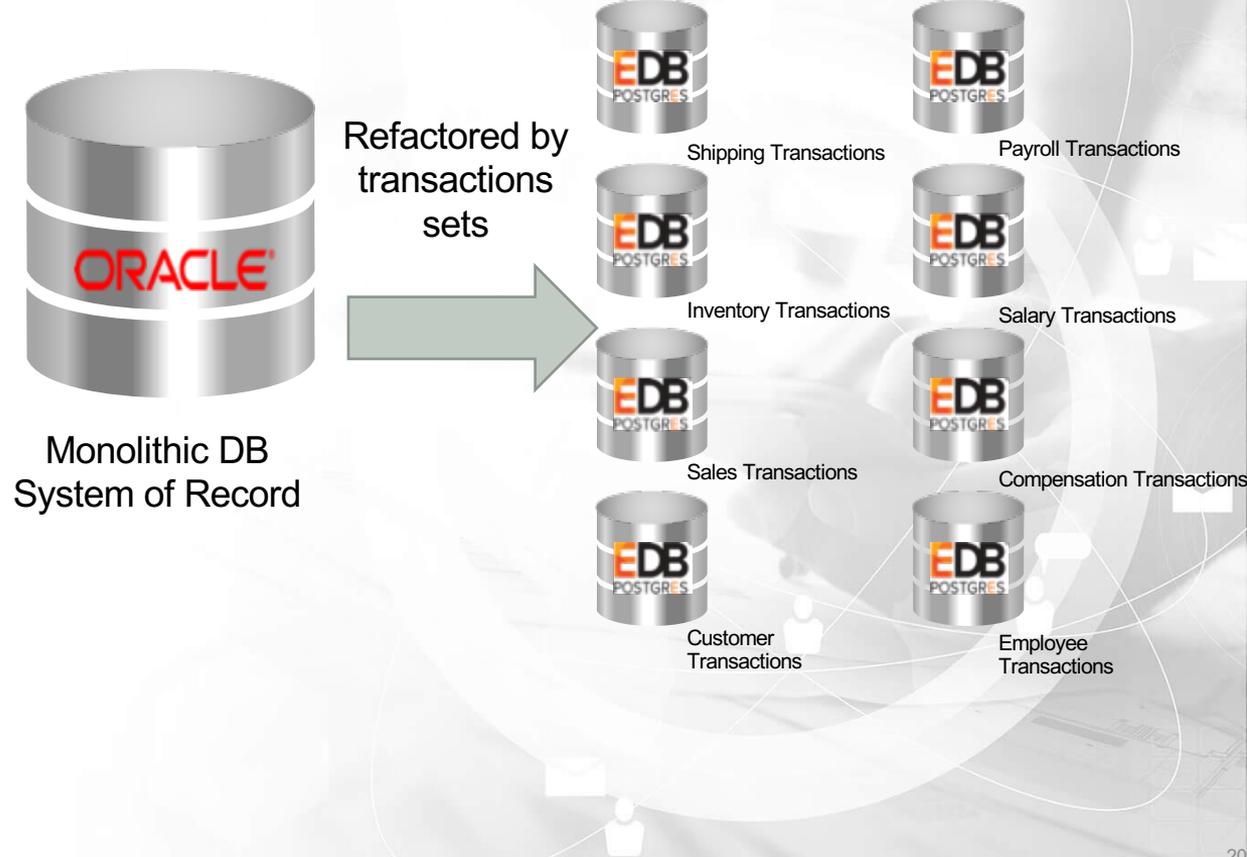
Total DLL Constructs Analyzed/Month



Focus on Innovation – Micro Services and Containers

Major trends

- Large monolithic databases refactored into transaction sets
- Applications get refactored into micro-services
- Deployment models move from VM/Bare Metal to DBaaS and Containers



**DEMO:
LIVE MIGRATION
FROM ORACLE TO
EDB POSTGRES**



SUMMARY AND LESSONS LEARNED

Migration is not hard

- Pick the right target
- Schema and data are only the first steps
- Code and drivers are important
- Tools are essential for operational integration



NEXT STEPS

- **Sign up for free training:**
<https://www.enterprisedb.com/free-postgres-training>
- **Try the EDB Migration Portal**
<https://migration.enterprisedb.com>
- **Sign up for EDB Cloud Database Services**
<https://cds.enterprisedb.com>
- **Get in touch** info@enterprisedb.com

QUESTIONS & DISCUSSION

THANK YOU

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