Break Free from Oracle:

Proven strategies for migrating databases to Postgres

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EDB

Agenda

Break Free from Oracle:
Proven strategies for migrating databases to Postgres

1. Why leave Oracle database
2. Why PostgreSQL
3. Why EDB
4. How we do it
5. How we support operations
6. Next steps

EDB

Poll questions (A) & (B)

Why leave the Oracle database

Price

Oracle's high cost

Restrictive and complicated contracts

Agility

70% of new apps use open source

Adopt modern software architectures

Deployment options

Organizations move to any Cloud

Transition to Containers / Cloud Native

Innovation

Oracle software is in maintenance mode

Postgres innovates in many directions

Consolidation

Focus IT spend on fewer platforms

PostgreSQL fits many workloads

Future-proof

PostgreSQL inherently innovates as the market evolves

What obstacles exist?

Some of the challenges when migrating Oracle databases

Migrations are hard

- Much assessment and effort required
- Across schema, data, and application

Oracle skills

- Businesses have invested Oracle training
- Concern of losing those skills/expertise

Troublesome contracts

- Oracle licenses are complicated
- And audits are disruptive

Apps designed for Oracle

- Oracle-specifics ingrained in the app
- Difficult to migrate one without the other

Why adopt Postgres

Why move to Postgres?

It does everything...

- Migration
- New App Development
- Replatforming to Cloud and Containers
- System of Record
- System of Analysis
- System of Engagement

It works everywhere...

- Public Cloud - IaaS
- Public Cloud - DBaaS
- Private Cloud
- Virtual Machines
- Bare Metal
- Kubernetes

You're not alone

Here are the top 5 reasons enterprises leave Oracle for PostgreSQL

Innovation action is in open source

Avoid vendor lock-in

Easier to replatform to cloud/hybrid

Smoother path to Digital Transformation

Significant cost savings

Why EDB for breaking free from Oracle

We're the PostgreSQL experts

1986
The design of PostgreSQL

1996
Birth of PostgreSQL

2004
EDB is founded

2007
2ndQuadrant launched

2020
EDB acquires 2ndQuadrant

PostgreSQL for Business

Key PostgreSQL Contributions

EDB

- Heap Only Tuples (HOT)
- Materialized Views
- Parallel Query
- JIT Compilation
- Serializable Parallel Query

2ndQuadrant

- Hot Standby
- Logical Replication
- Transaction Control in Procedures
- Generated Columns

We have the most PostgreSQL experts

EDB TEAM INCLUDES:

- 300+ PostgreSQL technologists
- 26 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

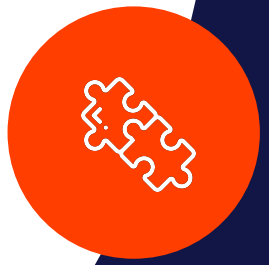
PostgreSQL Major Contributor and Committer

Simon Riggs

PostgreSQL Major Contributor, Founder of 2ndQuadrant

More than 15 years of experience

Knowledge and expertise to help reduce costs and mitigate risks



Deep compatibility with Oracle database

Comprehensive migration tools and services

24x7 support for any PostgreSQL deployment at any scale

EDB delivers the Postgres you need

Open, flexible, and enterprise-grade

Databases

PostgreSQL and extensions for enterprise workloads

Tools

Monitoring, management, scalability, high availability

Deployments

On-prem to the cloud, virtual machines to Kubernetes

Expertise

24/7 technical support, remote DBAs, professional services

How we do it

What factors should be considered when migrating?

Schemas

- Objects and code
- Mapping data types
- Handling syntax differences
- Raising incompatibilities

Data

- Methodology: Bulk, ongoing, fallback
- Tools: ETL, validation

Infrastructure

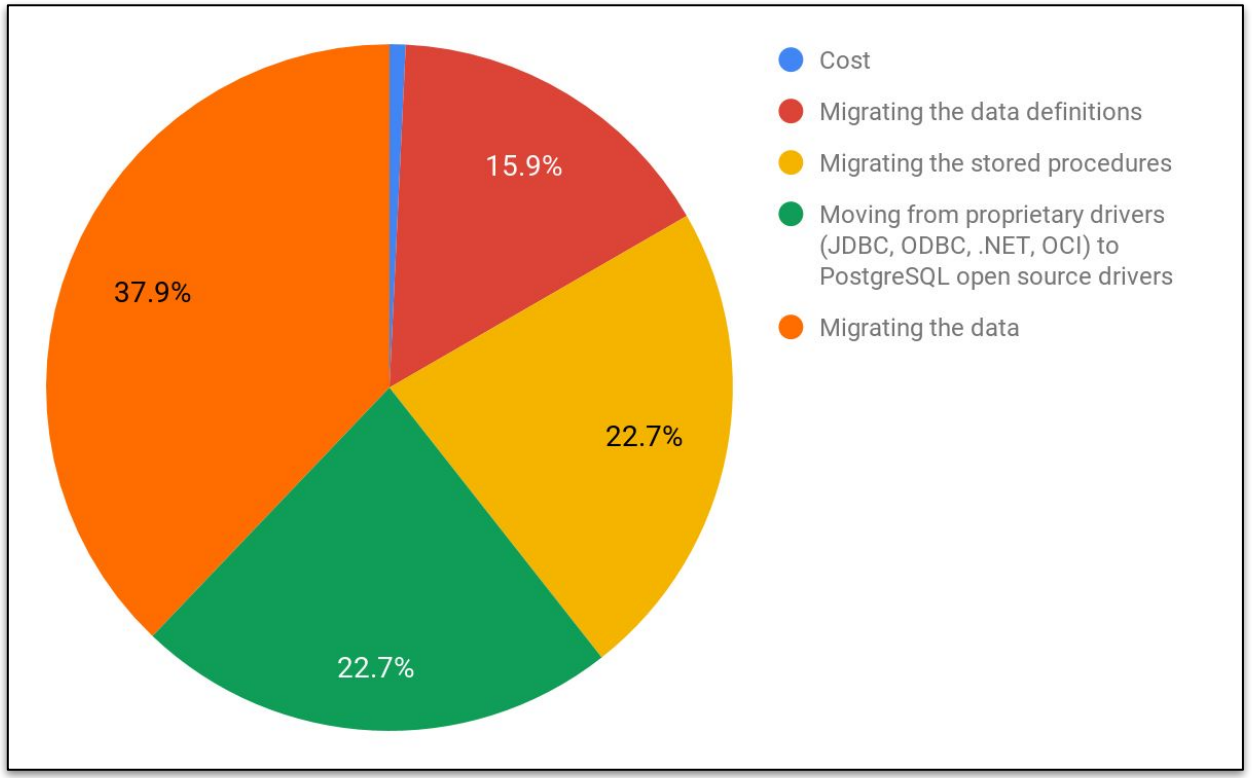
- Hosting (cloud, on-prem, DBaaSO
- Deployment (VM, k8s)
- DMBS Optimization
- HA Requirements
- Security and Encryption

Application

- Code
- Languages
- Connectors
- Syntax
- Performance
- Optimization
- Indexing

Survey: What is your biggest obstacle when migrating Oracle databases to Postgres?

EDB's cost, migration capabilities, and Oracle compatibility address all of these obstacles



Source: EDB Downloader Survey July 2020 (1,500 respondents)

Legacy Application Database Migration Journey

What are the steps in moving to a new database?

Decide to migrate
- Business case
- Organizational alignment

Analyze feasibility and alternatives
- Review of app portfolio
- Align migration with IT strategy
- Cloud vs. on-prem
- Open source vs. proprietary

Plan migration
- Prioritize applications
- Lift & shift, replatforming or restructuring?
- Define non-functional requirements
- High-level solution design
- Estimate efforts

Migrate DB schema, code, and data
- Move schema
- Migrate DB functionality
- Migrate data as snapshot and/ or CDC

Migrate interfaces and application
- Migrate APIs (JDBC, ODBC, OCI, .NET,...)
- Convert embedded application SQL
- Migrate applications

Migrate reports and management tools
- Migrate reports
- DBA utilities and scripts

Test migration
- Data validation
- Functional validation
- Performance validation

Optimize and configure post migration system
- Database tuning
- Query tuning
- Application tuning
- Address HA, DR, security, authentication/ authorization reqs

Complete cutover
- Completion of CDC
- Rollback setup
- Go/No-Go
- Production cutover

EDB compatibility with Oracle database

SCHEMA

DATA

CODE

API

TOOLS

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

Robust Compatibility with Oracle

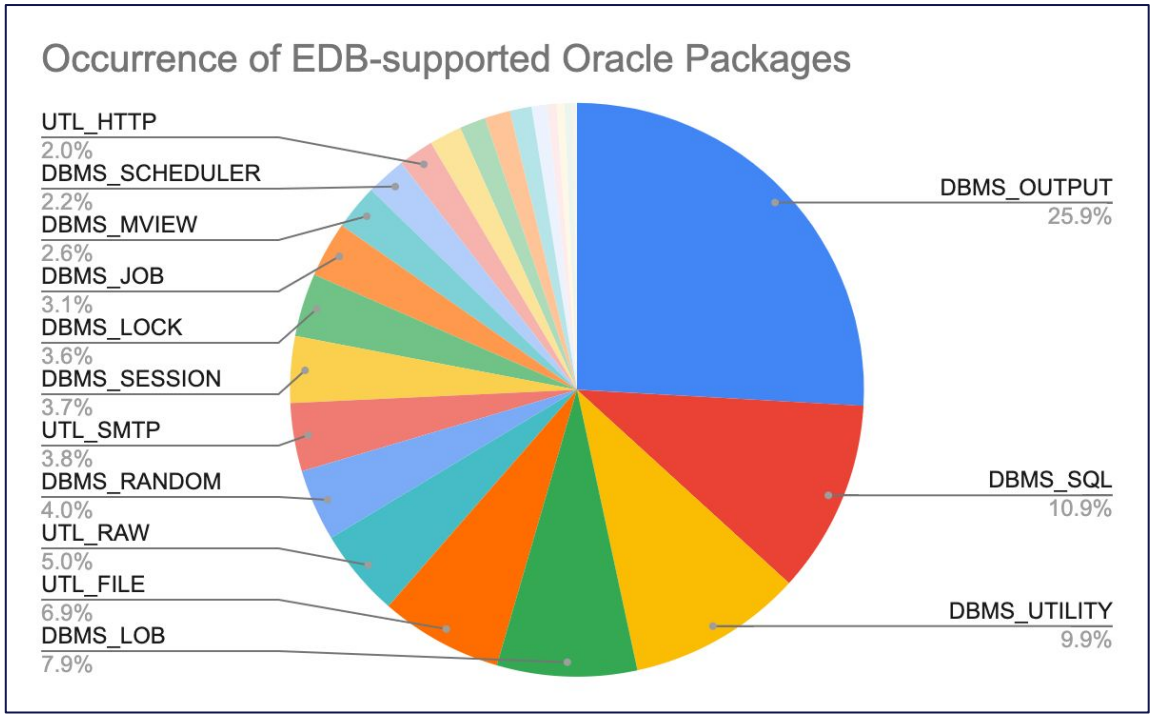
EDB Postgres Advanced Server's compatibility is wide and deep

- What are the areas of compatibility?
  - Oracle specific and syntax compatible database object types
  - Oracle specific data types
  - Oracle PL/SQL support as a built-in native procedural language
  - Oracle-like data dictionary views (i.e., ALL_, DBA_, USER_ views)
  - Oracle-like built in PL/SQL packages
  - Oracle-like database drivers
  - Oracle work-alike tools for DBAs
- What are the benefits of compatibility?
  - Significantly reduces the amount of time and effort required for a migration from Oracle
    - More schema, SQL, and code can run in Postgres without modification
    - Less schema, SQL, and code needs to be converted or rewritten
  - Eases the transition from Oracle to Postgres for Oracle DBAs and developers
    - Familiar database and application constructs and tools available to DBAs and developers

Migration Portal - 2021 Observations

Practical findings

- Based on over 18 million DDL constructs analyzed since January, 2019
- 14% of all schemas had at least one reference to PRAGMA AUTONOMOUS_TRANSACTION
- 14% of all schemas had at least one HINT
- 32% of all schemas referred to at least one of the EDB supported Oracle packages



EDB's Oracle compatibility addresses practical challenges in Oracle migration

EDB Postgres Advanced Server

Benefits of compatibility

Your apps

Leverage existing infrastructure with native PL/SQL support and OCI interoperability

Your people

Leverage the existing skills of your Oracle DBAs and developers

Your business

Lower costs and reduce risks

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Poll question (C)

EDB Postgres Advanced Server deployment options

Migrate your database to where your business needs it

On-Premises

Physical Servers
VMs
Containers
Private Cloud

Kubernetes / Containers

Public Cloud - IaaS

Public Cloud - DBaaS

BIGANIMAL
Powered by EDB

How can EDB help in the cloud?

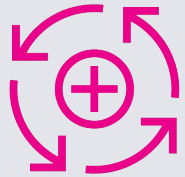
BigAnimal, EDB's fully managed cloud offering on Microsoft Azure

Postgres Expertise

EDB's expertise goes above the infrastructure; we help steer the database roadmap and patch its bugs

Oracle Compatibility

Leave Oracle and further your cloud journey with a fully managed Postgres service



Continuous Availability

High availability of your PostgreSQL clusters so you're always on, always available

BIGANIMAL

Migration tools and services

Migration Portal

Free, web-based tool

Assess Oracle schema compatibility

Converts Oracle objects to EDB Postgres Advanced Server

Migration Toolkit

Command line tool

Granular control schema and data migration

From Oracle to EDB Postgres Advanced Server

Replication Server

Change data capture for large migrations with minimal downtime

Provides ability to perform replication between Oracle and Postgres

CLI and GUI options for configuring replication

Migration Services

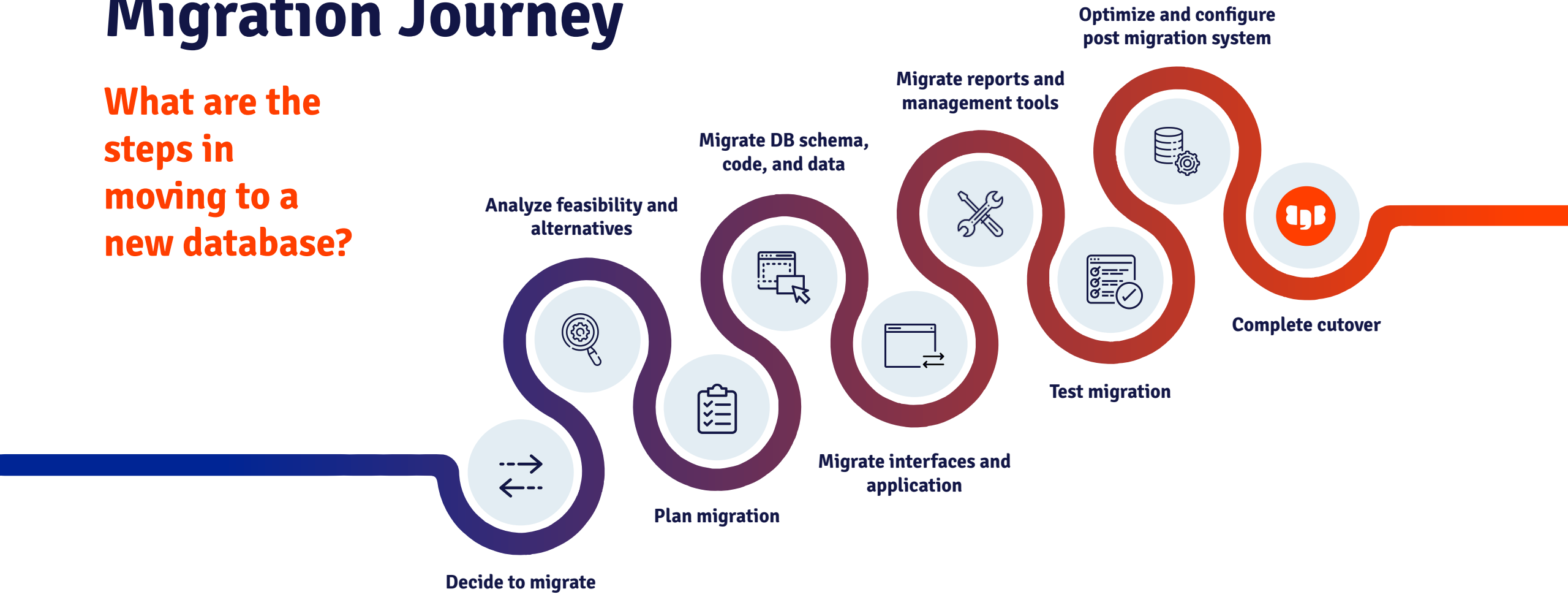
For complex migrations

For organizations that are short-staffed

Helps ensure a smooth transition

Legacy Application Database Migration Journey

What are the steps in moving to a new database?



EDB Tools and Services for the Migration Journey

Assess Feasibility

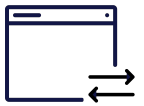
- **Migration Portal**
- *Migration Assessment Service*

Plan Migration

- *Migration Assessment Service*
- *Enterprise Architecture Service*
- *Solution Design Service*

Migrate DB Schema, Code, and Data

- EPAS (Oracle Compatible Postgres)
- **Migration Portal**
- **Migration Toolkit**
- **Replication Server**
- Database Links and FDW
- *Quick Deploy Service*
- *Embedded Postgres SME Service*



Migrate Application & Interfaces

- EPAS (Oracle Compatible Postgres)
- **Oracle Compatible Database Connectors**
  - JDBC, ODBC, OCI, .NET
- *Embedded Postgres SME Service*

Migrate Reports & Management Tools

- **EDB*Plus**
- **EDB*Loader**
- *Embedded Postgres SME Service*

Test Migration

- **LiveCompare**
- **Postgres Enterprise Manager (PEM)**
- *Embedded Postgres SME Service*

Optimize & Configure Post Migration System

- **Postgres Enterprise Manager (PEM)**
- **Barman**
- **EDB Failover Manager**
- **Postgres-BDR**
- *Performance Tuning Service*
- *Monitoring Best Practices Service*
- *Backup Best Practices Service*
- *Embedded Postgres SME Service*

Complete Cutover

- **Replication Server**
- **LiveCompare**
- *Embedded Postgres SME Service*

Bold = Tool | *Italic = Service* | Underlined = Compatibility

Oracle to Postgres Migration Demo

- What's covered in the demo?
  - Reviewing some DDL and SQL constructs in Oracle that can be "tricky" to migrate without compatibility
  - Using the Migration Portal to assess Oracle schema DDL, to resolve compatibility issues, and to load the converted schema into an EDB Postgres Advanced Server (EPAS) database
  - Using the Migration Toolkit to migrate data from Oracle to the EPAS database
  - Using LiveCompare to validate that the data was fully migrated and consistent in both the source and target databases
  - Using PEM to review the contents of some of the migrated objects and functionality of migrated views

EDB Professional Services for Database Migrations to Postgres

Why use EDB Professional services for your migration journey

- Some migrations are more complex than others
- EDB has over 15 years of experience in helping customers with their migrations
- You may not have sufficient resources to perform a migration on your own
- You may not have sufficient PostgreSQL expertise
- You need help in assessing, prioritizing, and planning migrations for a large number of databases in your organization

Oracle and EDB operational tools matrix

Required Operational Capability	Oracle	Postgres On-Premises and IaaS	Postgres BigAnimal
Monitoring and Management	Oracle Enterprise Manager	PEM | pgAdmin	PEM | pgAdmin Azure Monitor
Backup and Recovery	RMAN	Barman | pgBackRest	provided by EDB Cloud managed service
High Availability (4-9s)	Active Data Guard	EDB Failover Manager (EFM) repmgr	provided by EDB Cloud managed service
High Availability (5-9s)	Real Application Clusters	Postgres-BDR	Postgres-BDR [H1 2022]
Advanced Replication: Bi-Directional Replication	Golden Gate	Postgres-BDR Replication Server	Postgres-BDR [H2 2022] Replication Server (as pub/sub DB)
Advanced Replication: Geo-distributed Replication	Golden Gate	Postgres-BDR Replication Server	Postgres-BDR [H2 2022] Replication Server (as pub/sub DB)
Advanced Replication: Heterogeneous Replication	Golden Gate	Replication Server	Replication Server (as pub/sub DB)
Cross Database Data Comparison	Golden Gate VeriData	Live Compare	Live Compare
Auditing	Oracle Auditing	EDB Audit [EPAS] pgAudit [PostgreSQL]	EDB Audit [EPAS] pgAudit [PostgreSQL]
Geospatial Data	Oracle Spatial	PostGIS	PostGIS [TBD]

Recommended next steps

Lunch and Learn

- Contact EDB to schedule a deep dive on your project needs and EDB compatibility with Oracle

Migration Assessment

- Try the migration portal!
- Migration Discovery exercise with EDB

Migration Whitepaper

- All the details
- All the process
- All the tools