



駕馭資料庫的未來 強化您的PostgreSQL策略

Ivan Wong

Enterprise Account Executive, Greater China, EDB

Edmond Wong

Sales Engineer, SEA & Greater China, EDB

Content

- EDB概述
- EDB平台：综合概述
- PostgreSQL高可用性与复制
- Oracle迁移
- Q&A





EDB Postgres AI:

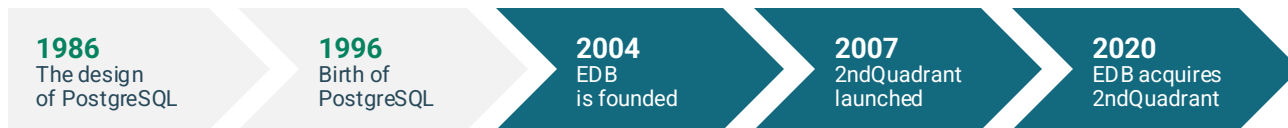
The industry's first intelligent platform for transactional, analytical, and new AI workloads

Ivan Wong
Enterprise Account Executive - Greater China



EDB
Postgres for the AI Generation

We're the PostgreSQL experts



***Now,
In the past,
and in the future***

Key PostgreSQL Contributions

EDB

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

2ndQuadrant

- Hot Standby
- Logical Replication
- Transaction Control
- 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



Robert Haas
PostgreSQL Major
Contributor and
Committer



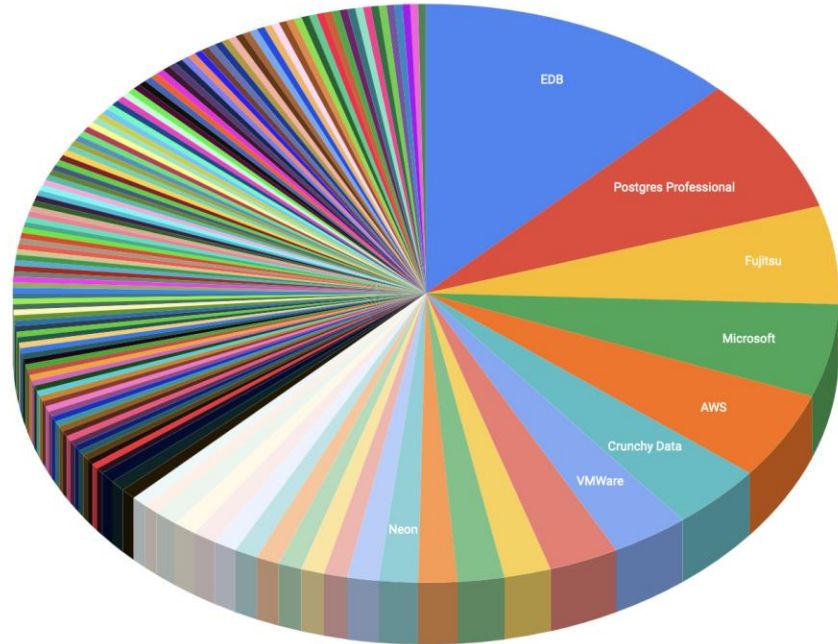
Peter Eisentraut
PostgreSQL Core Team
member



EDB
Postgres for the AI Generation

20+ years of Postgres innovation & adoption

- 3 Core Team members
- 7 Committers
- 9 Major Contributors
- 10 Contributors
- #1 site for desktop downloads





EDB
Postgres AI

Welcome to EDB Postgres AI.

The industry's first data and AI platform for transactional, analytical, and AI workloads — powered by Postgres. The open source answer to enterprise, fully compatible with existing Oracle systems, with built-in migration services.

With mission-critical performance and regulated industry compliance built in, and support for multi-cloud, on-premises, and far edge deployment.

Choose from self-managed software, fully managed cloud, or plug-and-play appliance.





EDB
Postgres for the AI Generation

MISSION

Enable builders, data champions, and business leaders to realize and operationalize the near-infinite potential of Postgres and AI

VISION

Postgres and AI deliver real-world outcomes to drive economic and social prosperity

760+ employees

32 countries

#1 contributor to Postgres

20+ years of innovation



EDB POSTGRES AI PLATFORM

UNIFIED WORKLOAD MANAGEMENT

TRANSACTIONAL

ANALYTICAL

ARTIFICIAL INTELLIGENCE

SINGLE PANE OF GLASS ADMINISTRATION

HYBRID DATA ESTATE

INTELLIGENT OBSERVABILITY

ENTERPRISE SECURITY

HYBRID AND MULTI-CLOUD DEPLOYMENT

PUBLIC CLOUD
(MANAGED)

PRIVATE CLOUD
(SOFTWARE)

ON PREMISES
(APPLIANCE)

EXTENSIBILITY

CSP INTEGRATIONS

DEVOPS TOOLING

KUBERNETES TOOLING

GENAI & LLM INTEGRATIONS

LAKEHOUSE INTEGRATIONS

PLATFORM TOOLS AND SERVICES

MIGRATION
PORTAL

CONTINUOUS HIGH
AVAILABILITY

BACKUP AND
RECOVERY

Delivered with world-class
strategic partners:

carahsoft



NUTANIX



BANKING FINANCIAL



TECHNOLOGY



TELCO



EDB平台：综合概述



EDB 為我們的客戶提供他們所需的 Postgres

您的使用案例

- 新應用
- 數據庫遷移
- 把平台遷移到雲

您的要求

- 可用性
- 可擴展性
- 靈活性
- 專門知識



你需要的數據庫

- Postgres
- EDB Postgres Advanced Server
- EDB Postgres Extended



你想要嘅地方

- On-premises | hybrid cloud | multi cloud
- Virtual machines
- Kubernetes
- Cloud managed service



The tools you need

- EDB 工具
- Open source 工具



您需要的幫助

- 專家24/7技術支持
- 遠程數據庫管理員|雲DBA
- 技術客戶經理
- 專業服務



功能和工具



管理/監控

Postgres Enterprise Manager
pgAdmin



高可用性

EDB Postgres Distributed
Failover Manager
Repmgr
Patroni



備份和恢復

Barman
pgBackRest



遷移

Migration Portal
Migration Toolkit
Replication Server



集成

Connectors
Foreign Data Wrappers
Connection Poolers



Kubernetes

EDB Postgres for Kubernetes
CloudNativePG



安全

安全增強功能和功能



密碼策略管理

DBA managed password profiles,
compatible with Oracle profiles



審計合規性

Track and analyze database
activities and user connections



代碼保護

Protects sensitive IP,
algorithms or financial policies by
obfuscating DB source code



EDB/SQL 保護

SQL firewall installed directly in DB
server, screens queries for
common attack profiles



數據編輯

Hide/remove data to protect sensitive
information for GDPR,
PCI and HIPAA compliance



虛擬專用資料庫

Fine grained access control
limits user views of data
records in one table



EDB PostgreSQL 与 Self-Supported PostgreSQL 的比較

Advantages	EDB Postgres Advanced Server
提高安全性	增強 Audit Logging, SQL Injection Protection, Security Certifications, Data Redaction, Row-Level Security, Password Policy Management, Code Protection
企業就緒工具	Monitoring and Management, Backup and Recovery, High Availability, Extreme High Availability, Advanced Replication, Cross Database Data Comparison, Auditing, Geospatial Data, Migration
性能特點	Interval Partitioning, Query Optimizer Hints, SQL Session/System Wait Diagnostics, Advanced Performance Analytics
開發人員工作效率	Function Packages, Hierarchical Query, Bulk Collect and Binds, Specialized Data Types, User-Defined Object Types
DBA 工作效率	Resource Management, Enhanced Catalog Views, Dynamic Runtime Instrumentation Tools Architectures, Bulk Data Loading
增強的集成	Heterogeneous Database Replication, Oracle® Database Links, Data Adapters

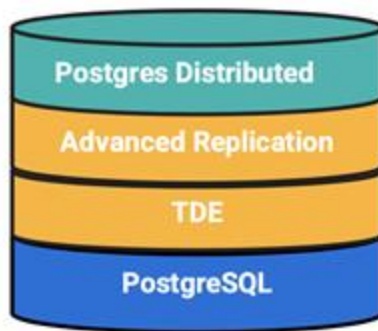
<https://www.enterprisedb.com/comparison-edb-products-services-vs-self-supported-postgresql>



EDB Postgres 組合



Community 360



Standard



Enterprise



PostgreSQL高可用性与复制



為何 Failover Manager



確保業務連續性

Monitor health databases and identify failures quickly

監控運行狀況資料庫並快速
識別故障



保持高可用性

Meet your SLAs by switching over to the most recent standby

通過切換到最新的備用資料庫
來滿足您的 SLA 要求



以最短的停機時間進行 升級

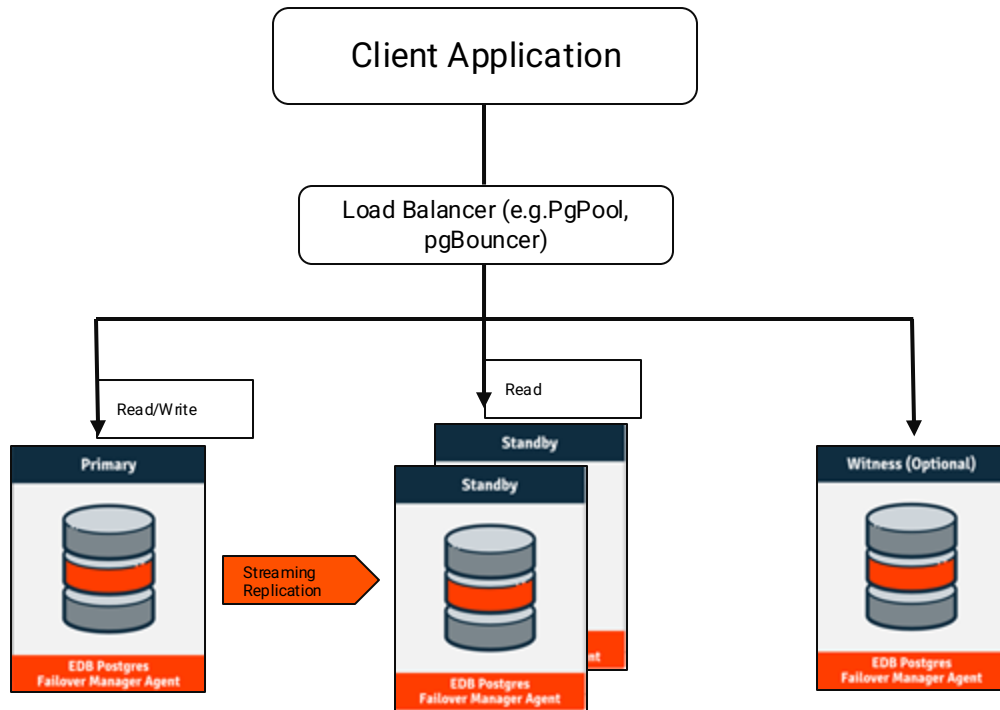
Switchover on demand to move the primary to standby for maintenance

按需切換，將主伺服器移至備
用伺服器以進行維護



EFM 概覽

- 監視資料庫運行狀況 - 檢測故障並採取措施
- 自動故障切換到最新的備用資料庫, 重新配置其他備用資料庫
- 在故障轉移時重新配置負載均衡器 - 與 pgPool 和其他 pgPool 集成
- 避免「腦裂」情況 - 防止兩個節點認為每個節點都是主節點
- 通過受控切換實現近乎零停機時間的維護



EDB Postgres Distributed (PGD)

Postgres Five 9s for all your Extreme HA use cases



啟用滾動升級

沒有其他 Postgres 解決方案可以消除主要版本升級和日常維護所需的停機時間



保持極高的可用性

高度彈性的架構可保護您的任務關鍵型應用程式免受計劃外的基礎設施問題和資料庫中斷的影響



按地理位置分配工作負載

通過使數據在地理上可用，滿足國際網路安全要求，減少延遲並滿足數據當地語系化合規性法律

。



Always On 單一位置

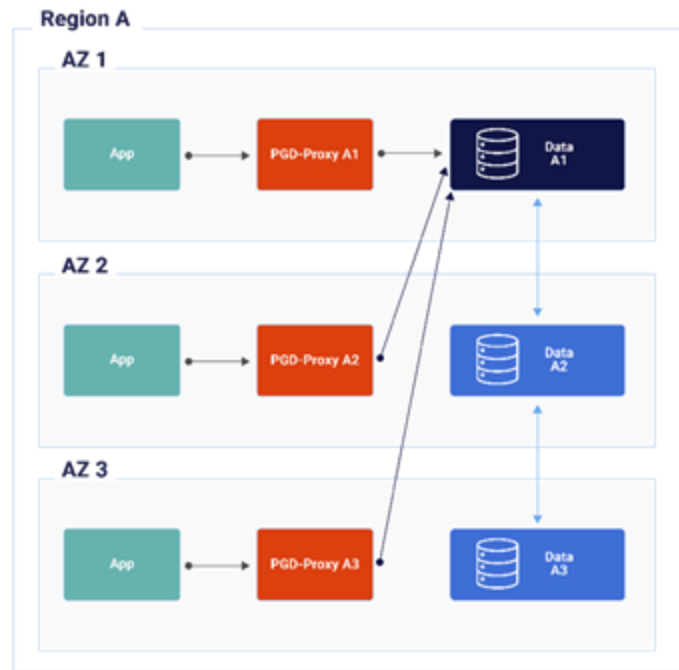
冗餘硬體，可快速從本地故障中恢復

3 個 PGD 節點

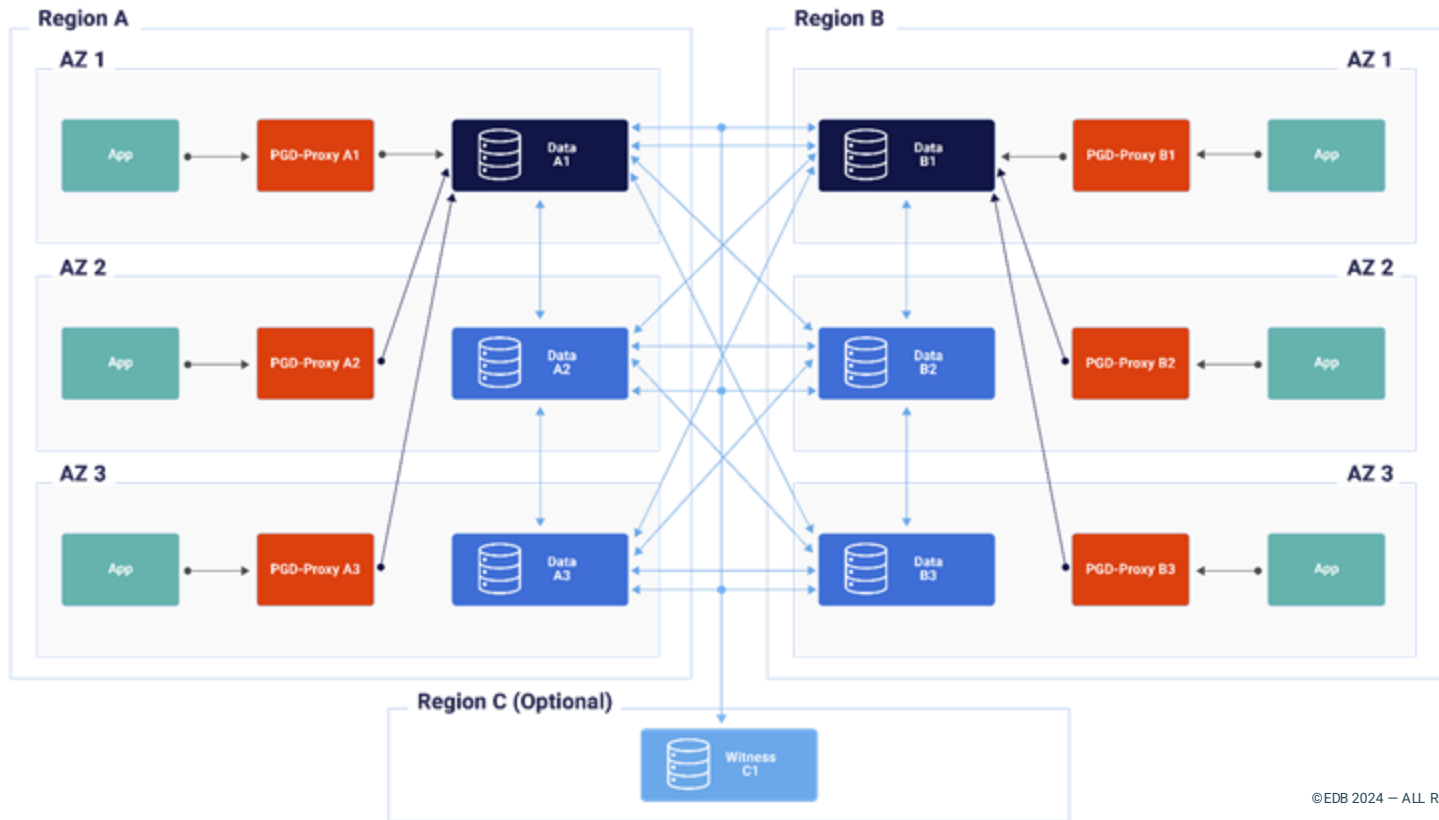
- 可以是 3 個數據節點（推薦），
- 也可以是 2 個數據節點和 1 個不保存數據的見證節點（如圖所示）

每個數據節點的PGD代理，與應用程式具有相關性

- 可以與數據節點位於同一位置
- Redundant hardware to quickly restore from local failures
 - 3 PGD nodes
 - could be 3 data nodes (recommended), or 2 data nodes and 1 witness which does not hold data (depicted)
 - A PGD-Proxy for each data node with affinity to the applications
 - can be co-located with data node



Always On 多點: Active/Active



Monitoring and Tuning



EDB Postgres Enterprise Manager

Deep Insights into your PostgreSQL Deployment



Manage from one interface

One place to visualize and manage everything PostgreSQL



Monitor system health

Built-in dashboards and customizable alert thresholds



Optimize database performance

In-depth diagnostics for database reports and tuning



Reduce admin burden

Accomplish bulk changes and routine tasks



EDB Postgres Enterprise Manager

Manage, Monitor, and Tune PostgreSQL at Scale

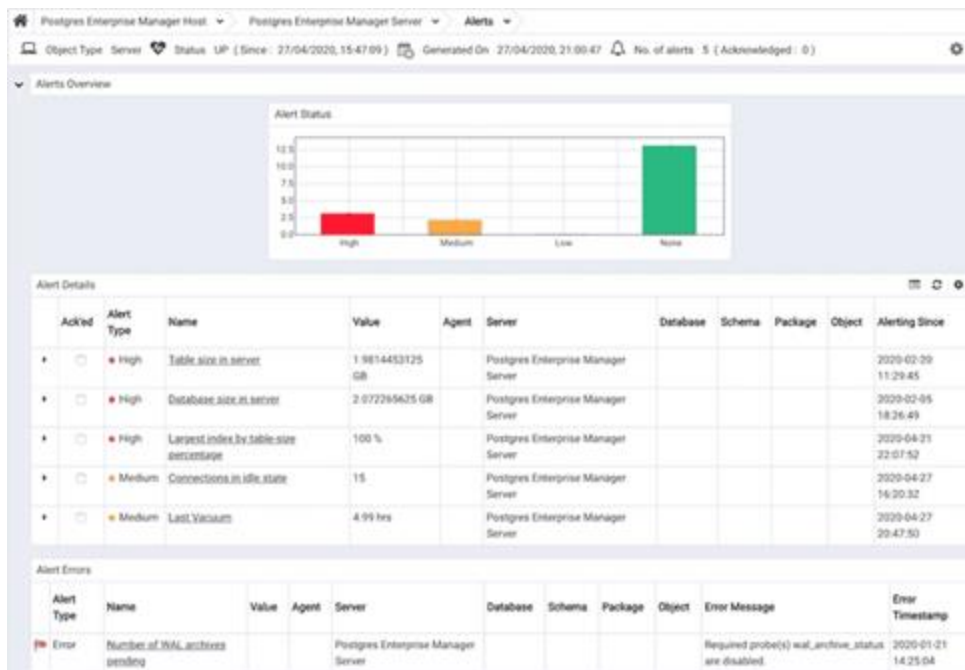
- Aggregates performance and status data - Collects from DBs, OS, and jobs
- Monitors overall system health - Alerts thru charts and dashboards, email, or SNMP
- Runs performance diagnostics - Execute SQL, tune queries, run backups, and deploy updates
- Provides 200+ built-in alerts - Monitor bloat, memory utilization, server status, and more



EDB Postgres Enterprise Manager

Alerts

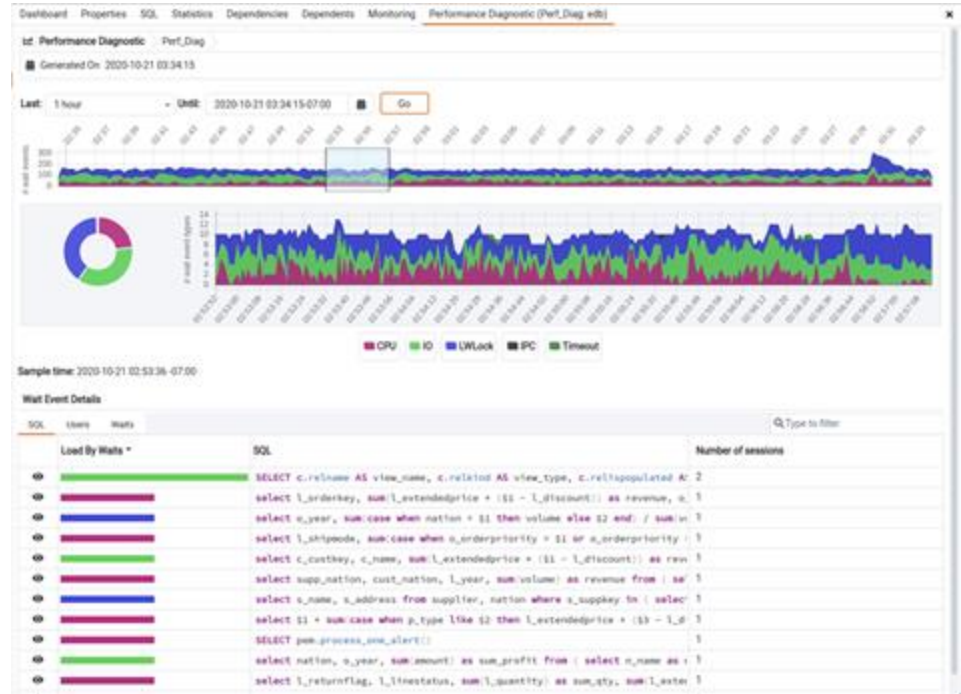
- PEM Continually monitors registered servers
- Compares performance metrics against predefined and user-specified thresholds that specify good/acceptable performance for each statistics
- Any deviation from an acceptable threshold value triggers an alert
- An alert is a system/user-defined set of conditions that PEM compares to the system statistics.



EDB Postgres Enterprise Manager

Performance Diagnostic

- Analyzes database performance for Postgres instances by monitoring the wait events
- Required Extension: edb_wait_states
- SQL Tab: displays the list of SQL queries having wait events for the selected sample time
- Users Tab: Displays the details of the wait events grouped by users for the selected sample time
- Waits Tab: Displays the number of wait events belonging to each wait event type for the selected sample time



EDB Postgres Enterprise Manager

Index Advisor

The screenshot shows the EDB Postgres Enterprise Manager interface. The main window displays a table of query matches for the Index Advisor. The table has columns for Start Time, Duration (ms), Query, Rows Affected, User, Database, PID, and File System Read. Below the table, the SQL query is shown: `select * from adv_test where a = 100;`. The execution plan is displayed as a tree diagram, and the statistics table shows the following data:

#	Node	Exclusive	Inclusive	Rows	Actual	Plan
1	Seq Scan on adv_test	12,600 ms	12,600 ms	11	11	1

The screenshot shows the EDB Postgres Enterprise Manager interface. The main window displays a table of suggested indexes. The table has columns for Schema, Table, Columns, Benefits, Index Size, Gain, and Index Creation Query. Below the table, the execution plan is displayed as a tree diagram, and the statistics table shows the following data:

Schema	Table	Columns	Benefits	Index Size	Gain	Index Creation Query
adv_test	adv_test	a	140.0%	3014	0.4435837445706	CREATE INDEX ON adv_test (a)



EDB Postgres Enterprise Manager

Audit Manager - Simplify Audit Log Configuration for EDB Postgres Advanced Server

Audit Manager - Audit log configuration (step 4 of 5)

The Audit manager contains the following steps:

- Welcome ✓
- Select Servers ✓
- Configuration ✓
- Log Parameters**
- Schedule or Run?

Connection attempts: None All Failed

Disconnection attempts: None All

Log statements:

Audit tag:

Log rotation:

Enable?

Day:

Size(MB):

Time(seconds):

```
{local}:5444; enterprisedb@edb # create table audit_t1 (id int, name varchar(20)) tablespace tbs1;
CREATE TABLE
Time: 188.316 ms
```

EDB Postgres Enterprise Manager - Audit Log

Object Type: Server | Status: UP (Since: 3/22/2022, 5:24:38 PM) | Generated On: 3/22/2022, 5:37:00 PM | No. of alerts: None

ID	Timestamp	User Name	Database Name	Process ID	Session ID	Transaction ID	Connection Freqs	Command	Message
3430	3/22/2022, 5:27:35 PM	enterprisedb	edb	26938	62298473.693a	0	social	idle	statement: create table audit_t1 (id int, name varchar(20)) tablespace tbs1;



Oracle 迁移



EDB 遷移過程中的工具和服務



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*
- *EDB Migration Factory Services*



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

遷移時應考慮哪些因素？



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, DBaaS)
- Deployment (VM, k8s)
- DBMS Optimization
- HA Requirements
- Security and Encryption



Application

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



EDB Postgres Advanced Server Database

Database	Oracle	EDB Postgres Advanced Server
Binary	Blob, Long, Raw	Blob, Long, Raw
String	CHAR, VARCHAR2, CLOB, NCLOB, NVARCHAR2, NCHAR, LONG (deprecated)	CHAR ✓, VARCHAR2 ✓, CLOB ✓, NCLOB ✓, NVARCHAR2 ✓, NCHAR also CHARACTER, TEXT, CHAR VARYING, CHARACTER VARYING, VARCHAR
Date/Time	DATE, TIMESTAMP (with/without TIMEZONE), INTERVAL	DATE ✓, TIMESTAMP ✓ (with/without TIMEZONE), INTERVAL ✓ also TIME (with/without TIMEZONE)
Rowid	Rowid	Rowid
Spatial/GeoSpatial	Yes	Yes



Database compatibility support

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

PL/SQL supplied packages

18 DBMS
7 UTL

Data types

Blobs, Clobs, XMLTYPE, VARCHAR2, NUMBER, CHAR, Integer

Drivers

JDBC, ODBC, .NET with Oracle extensions
OCI & ProC compatible drivers

Features

Packages
Stored procedures
Functions
Triggers
Hints
Hierarchical Queries
Synonyms – Public and Private
Sequences
Rownum
Users/Roles
Dynamic SQL
Materialized Views
Partitioning

EDB Postgres Advanced Server 11:

- EPAS 13: Improvement in List Partitioning, EDB Loader
- EPAS 14: Improvement in Subpartition, USERENV(), connect_by
- EPAS 15: Transparent Data Encryption (TDE)



EDB Postgres Advanced Server Database

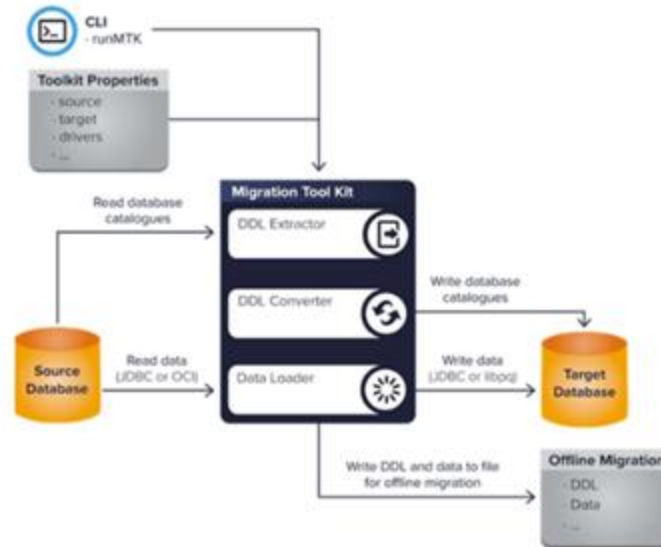
Supports Oracle Compatible packages

DBMS_ALERT	DBMS_AQ	DBMS_AQADM	DBMS_CRYPTO
DBMS_JOB	DBMS_LOB	DBMS_LOCK	DBMS_MVIEW
DBMS_PROFILER	DBMS_RANDOM	DBMS_RLS	DBMS_OUTPUT
UTL_MAIL	UTL_SMTP	UTL_URL	UTL_RAW
UTL_ENCODE	DBMS_UTILITY	UTL_HTTP	UTL_FILE
DBMS_SCHEDULER	DBMS_SQL	DBMS_SESSION	DBMS_PIPE



Database Migration Toolkit

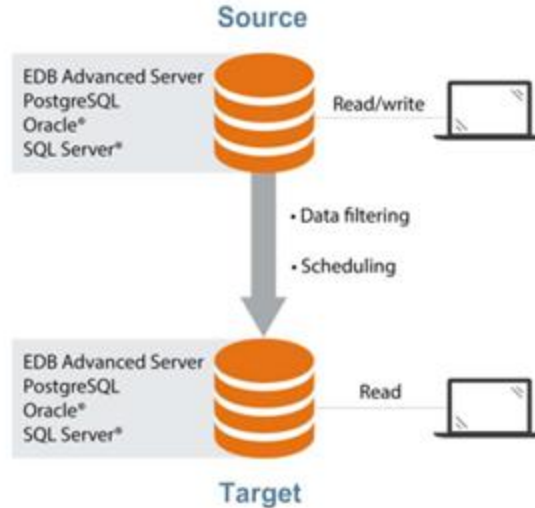
- MTK is a powerful command line tool
- It simplifies the process of migrating from other databases to EDB Postgres Advanced Server
- The EDB Postgres Migration Toolkit can be used to migrate the entire schema including triggers and stored procedures



Database Migration using Replication Server

Single Master Replication (SMR) between Oracle and EDB Postgres for Migration

- Replicate Oracle or SQL Server data to EDB Postgres Advanced Server
- Distributed multi-Publication/Subscription Architecture
- Synchronize data across geographies
- Replicate selected tables and sequences



Oracle and EDB 綜合的比較

Required Operational Capability	Oracle	Postgres On-Premises and IaaS	EDB Postgres® AI Cloud Service
Monitoring and Management	Oracle Enterprise Manager	EDB Postgres Enterprise Manager pgAdmin	EDB Postgres Enterprise Manager 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	EDB Postgres Distributed	EDB Postgres Distributed [H2 2022]
Advanced Replication: Bi-Directional Replication	Golden Gate	EDB Postgres Distributed Replication Server	EDB Postgres Distributed [H2 2022] Replication Server (as pub/sub DB)
Advanced Replication: Geo-distributed Replication	Golden Gate	EDB Postgres Distributed Replication Server	EDB Postgres Distributed [Early 2023] 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]



Migration Demo



What's Next?



EDB POSTGRES 人工智慧平台

統一的工作負載管理

交易型

分析

人工智慧

單一玻璃管理

混合數據產業

智慧可觀察性

企業安全

混合和多雲部署

PUBLIC CLOUD
(MANAGED)

PRIVATE CLOUD
(SOFTWARE)

ON PREMISE
(APPLIANCE)

可擴展性

CSP INTEGRATIONS

DEVOPS TOOLING

KUBERNETES TOOLING

GENAI & LLM INTEGRATIONS

LAKEHOUSE INTEGRATIONS

平台工具和服務

MIGRATION
PORTAL

CONTINUOUS HIGH
AVAILABILITY

BACKUP AND
RECOVERY

與世界一流的策略夥伴
一起交付

carahsoft.  Red Hat





Next Steps

- EDB [plans](#) offering EDB Postgres
- EDB Postgres [training portal](#)
- EDB Postgres [documentation](#)
- EDB Postgres [website](#)





THANK YOU

