

# LIFE CYCLE OF MIGRATION FROM ORACLE DB2 TO POSTGRESQL

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WHY ?

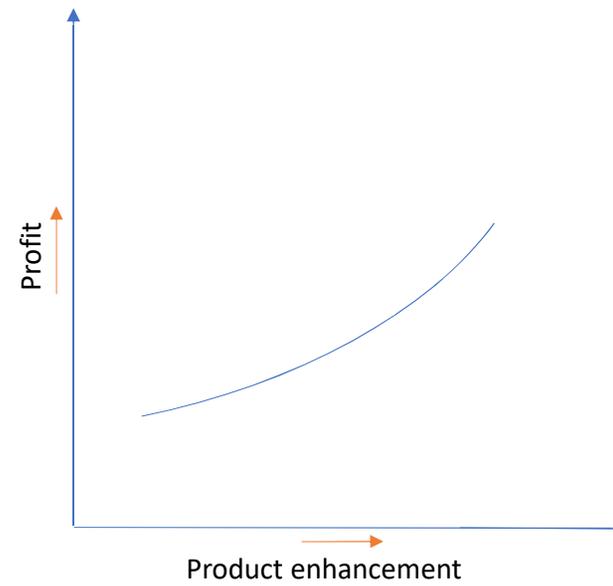
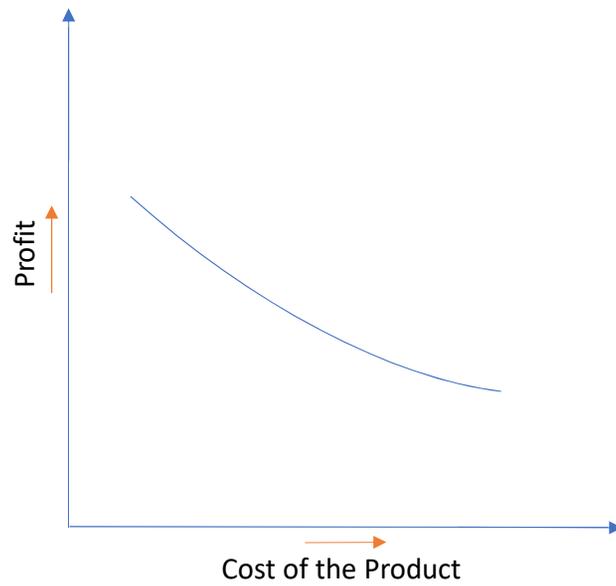
WHAT ?

HOW ?

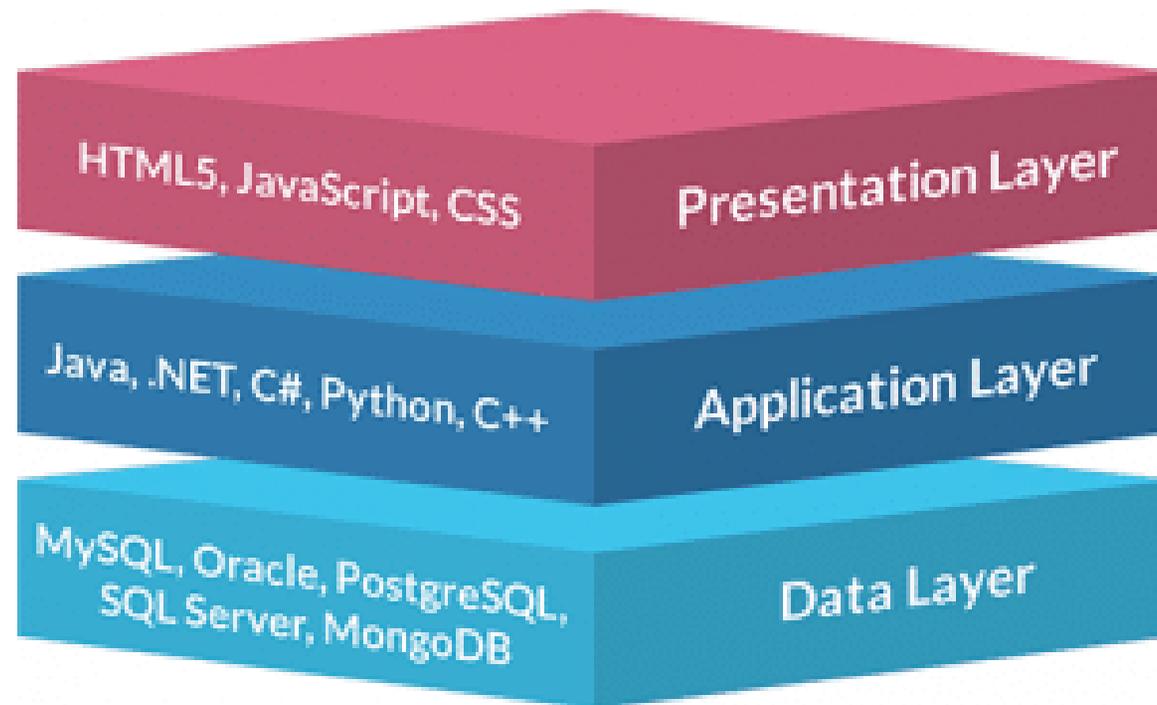
WHEN ?



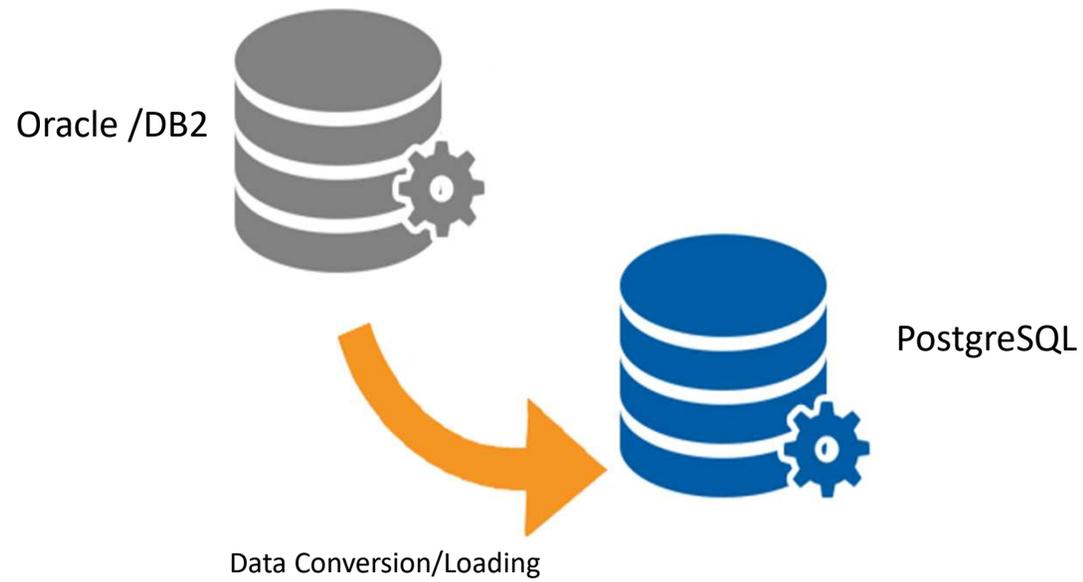
# Why to Migrate?



## What to Migrate ?



# How to Migrate?

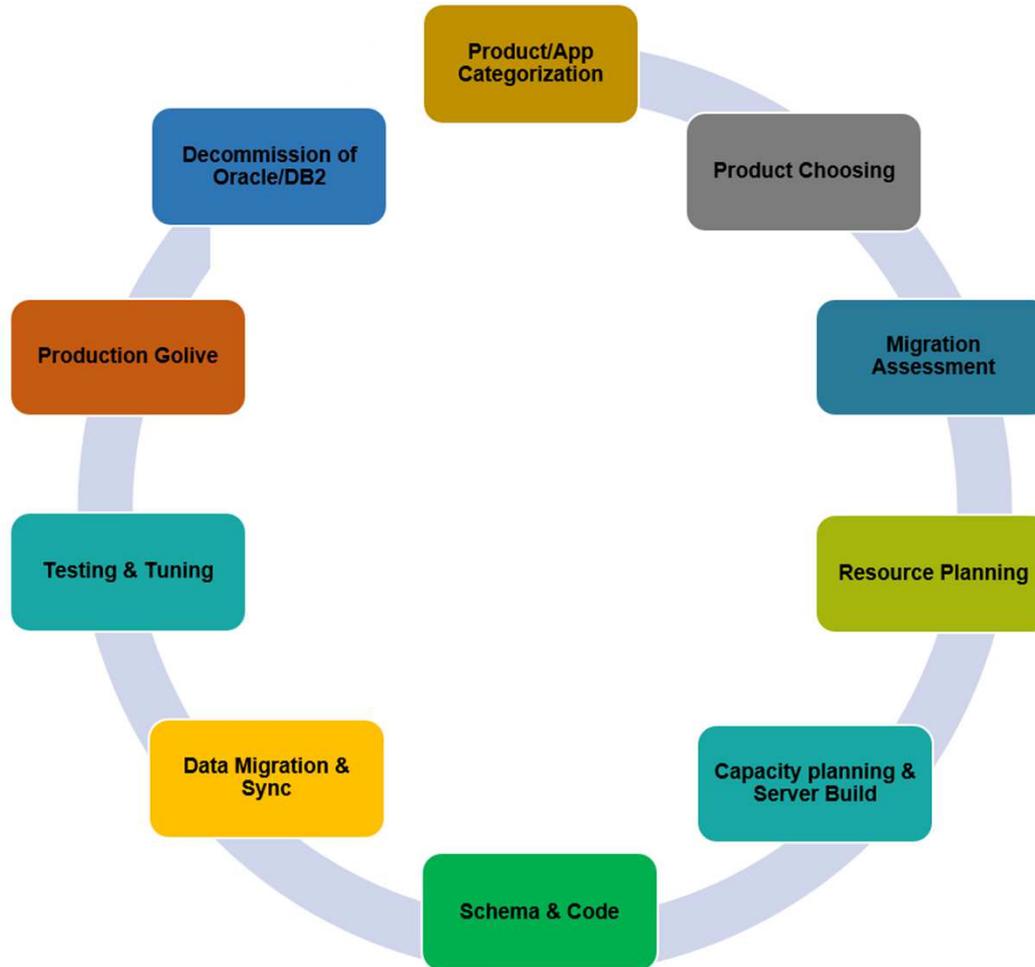


## When to Migrate ?

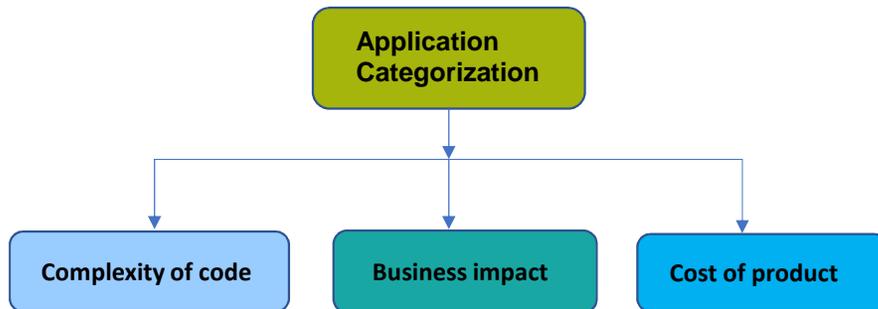


- Enough time to migrate and validate
- Less business impact due to downtime.
- After data purge retention.

# Stages of Life Cycle



# Product/ Application Categorization

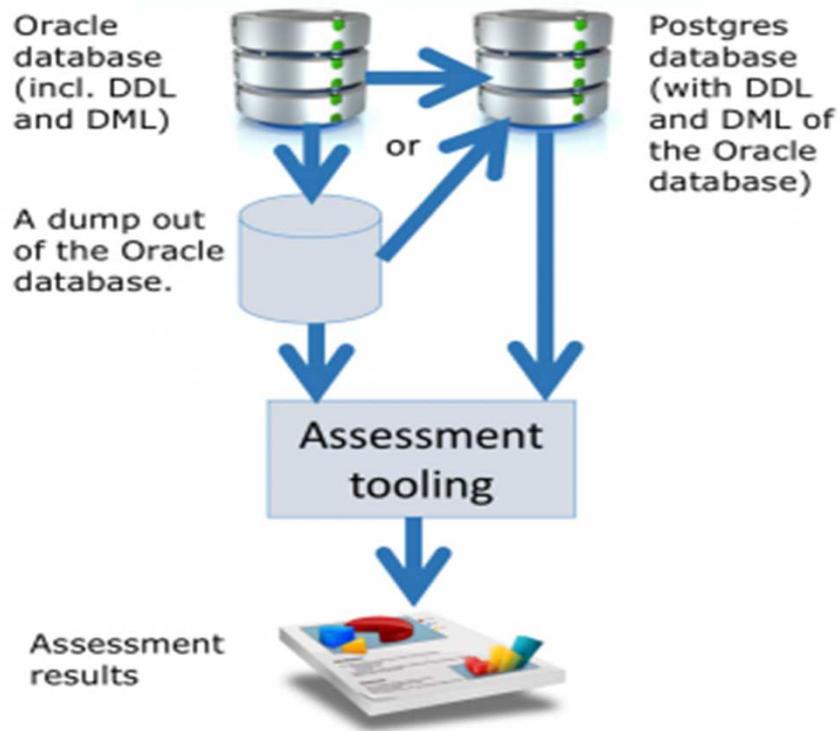


## Choose Product/ Application

	Low	Medium	High
Complexity (C)	▲	●	■
Business Impact (B)	▲	●	■
Product cost (P)	▲	●	■

**C**   **B**   **P**  
 ▲   ●   ■   Reduce cost in less effort and time with high profitability.  
 ■   ■   ■   More time and high risk with High profitability

# Migration Assessment



# Datatypes Compatibility



Data Types	Oracle	DB2	PostgreSQL
Integer	NUMBER	INTEGER	INTEGER
Decimal	NUMBER	Decimal	Numeric, Decimal
String	CHAR, VARCHAR2, CLOB	CHAR, VARCHAR	CHAR, VARCHAR
Binary	BLOB	BLOB	BYTEA
DATA/TIME	DATE, TIMESTAMP(with/without TIMEZONE)	DATE, TIMESTAMP(without TIMEZONE)	DATE, TIMESTAMP(with/without TIMEZONE)
Boolean	no	no	Yes
XMLTYPE	XMLTYPE	XML	XML
JSON	VARCHAR2, CLOB	BSON	JSONB

# Data Volume Compatibility



Capabilities	Oracle	DB2	PostgreSQL
Max. Database Size	Unlimited	Unlimited	Unlimited
Max. Table Size	4GB * Block Size	~2.8TB	32TB
Max. Row Size	4TB	N/A	1.6TB
Max. Field Size	For BLOB: (4GB -1) * DB_BLOCK_SIZE Initialization Parameter	N/A	1GB
Max. Rows per Table	Unlimited	~4.2Billion	Unlimited
Max. Columns per Table	1000	~750	250 – 1600 Depending on Column types
Max. Indexes per Table	Unlimited	N/A	Unlimited

# Programming Compatibility



Program	Oracle	DB2	PostgreSQL
Triggers	yes	yes	yes
Compound Triggers	yes	no	no
Cursors	yes	yes	yes
Ref Cursors	yes	yes	no
Anonymous Blocks	yes	yes	Yes
Bind	Yes	yes	Yes
Bulk Collect	Yes	yes	No
Parallel query	Yes	yes	Yes
Cast	Yes	Yes	Yes
Pl/Sql supplied packages	Yes	Yes	No
Pragma Autonomous transactions	Yes	Yes	Yes
User defined functions	Yes	Yes	Yes
Stored Procedures	Yes	Yes	Yes (From 11+ version)



# Ora2Pg Tool – Assessment Report

Ora2Pg - Database Migration Report					
<b>Version</b> Oracle Database 18c Express Edition Release 18.0.0.0.0 <b>Schema</b> HR <b>Size</b> 1.56 MB					
Object	Number	Invalid	Estimated cost	Comments	Details
DATABASE LINK	0	0	0	Database links will be exported as SQL/MED PostgreSQL's Foreign Data Wrapper (FDW) extensions using oracle_fdw.	
GLOBAL TEMPORARY TABLE	0	0	0	Global temporary table are not supported by PostgreSQL and will not be exported. You will have to rewrite some application code to match the PostgreSQL temporary table behavior.	
INDEX	19	0	3	11 index(es) are concerned by the export, others are automatically generated and will do so on PostgreSQL. Bitmap will be exported as btree_gin index(es) and hash index(es) will be exported as b-tree index(es) if any. Domain index are exported as b-tree but commented to be edited to mainly use FTS. Cluster, bitmap join and IOT indexes will not be exported at all. Reverse indexes are not exported too, you may use a trigram-based index (see pg_trgm) or a reverse() function based index and search. Use 'varchar_pattern_ops', 'text_pattern_ops' or 'bpchar_pattern_ops' operators in your indexes to improve search with the LIKE operator respectively into varchar, text or char columns.	11 b-tree index(es)
JOB	0	0	0	Job are not exported. You may set external cron job with them.	
PROCEDURE	2	0	8	Total size of procedure code: 772 bytes.	secure_dml: 3 add_job_history: 3
SEQUENCE	3	0	1	Sequences are fully supported, but all call to sequence_name.NEXTVAL or sequence_name.CURRVAL will be transformed into NEXTVAL('sequence_name') or CURRVAL('sequence_name').	
SYNONYM	0	0	0	SYNONYMS will be exported as views. SYNONYMS do not exists with PostgreSQL but a common workaround is to use Views or set the PostgreSQL search_path in your session to access object outside the current schema.	
TABLE	7	0	1.2	2 check constraint(s).	Total number of rows: 245 Top 10 of tables sorted by number of rows: employees has 107 rows departments has 27 rows countries has 25 rows locations has 23 rows jobs has 19 rows job_history has 10 rows regions has 4 rows Top 10 of largest tables: update_job_history: 3
TRIGGER	2	0	5	Total size of trigger code: 123 bytes.	
VIEW	1	0	1	Views are fully supported but can use specific functions.	update_job_history: 3
<b>Total</b>	<b>34</b>	<b>0</b>	<b>19.20</b>	19.20 cost migration units means approximatively 1 man-day(s). The migration unit was set to 10 minute(s)	

# Ora2Pg Tool – Assessment Report (cont..)



### Ora2Pg - Database Migration Report

**Version** Oracle Database 18c Express Edition Release 18.0.0.0.0  
**Schema** FO3X  
**Size** 139.25 MB

Object	Number	Invalid	Estimated cost	Comments
DATABASE LINK	0	0	0	Database links will be exported as SQL/MED PostgreSQL's Foreign Data Wrapper (FDW) extensions using oracle_fdw.
FUNCTION	4	0	27.8	Total size of function code: 1928 bytes. platz_counter: 5 f_pda_dirstring: 3
GLOBAL TEMPORARY TABLE	11	0	110	
INDEX	112	0	11.3	

v\_wichtige\_ergebnisse\_ger: 1.2

<b>Total</b>	731	0	1879.00	1879.00 cost migration units means approximately 23 man-day(s). Th
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**Migration level: C-5**

- Migration levels:
  - A - Migration that might be run automatically
  - B - Migration with code rewrite and a human-days cost up to 5 days
  - C - Migration with code rewrite and a human-days cost above 5 days
- Technical levels:
  - 1 = trivial: no stored functions and no triggers
  - 2 = easy: no stored functions but with triggers, no manual rewriting
  - 3 = simple: stored functions and/or triggers, no manual rewriting
  - 4 = manual: no stored functions but with triggers or views with code rewriting
  - 5 = difficult: stored functions and/or triggers with code rewriting

# Resource Planning



**Hardware**



**OS**



**Dependent packages**



**Required Tools**

Any Migration Tool  
(Ora2Pg)  
Data Loaders  
PgAdmin  
Foreign data  
wrappers(FDW)



**Resource Identification**

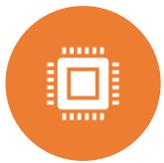


**Knowledge Transfer**



**Test Strategy**

# Capacity planning & Server build



CPU



RAM



Storage



Network



Backup strategy

## Schema & Code conversion



PostgreSQL ANSI standard SQL syntax and datatypes make converting your database schema from other relational databases a fairly straight forward process.



Sometimes migrated code requires manual resolution.



If the code is embedded in application that interfaces with the database has to be modified.

# Data migration & Sync



There are different approaches to data migration depending on the size of the data to be migrated.



## Example tools :

1. Ora2Pg
2. PG\_loaders
3. Slony
4. db\_links
5. Foreign data wrappers

# Testing & Tuning



- Application connectivity
  - pg\_hba.conf entries
  - User permissions/Grants

Examples:

PgAdmin - for data validations

- Resource utilization by OS & Database
  - Memory
  - CPU
  - I/O
- Database
  - Logs
  - Locks
  - Query performance



## Testing & Tuning (cont..)



Backups and recoveries with in SLA



HA configuration & DR



Configuring alerting



Reorganization (Maintenance)

Vacuum  
Reindex

# Production Go-Live



- Pointing DNS entries
- First Steps connections (Read-only)
  - Reporting
  - Application dashboards
- Transactional part



# Decommission of Oracle/DB2 servers



Export code from Oracle/DB2 in to dump files.



Backup DB/OS configuration.



Decommission the Database.





