

# Database Migration: DBA Stuff for the Non-DBA

Danny Bryant  
City of Atlanta



# About the Presenter

Danny Bryant



Information Technology Manager, Sr. – City of Atlanta

User Groups: ODTUG, OAUG, IOUG

Publications: ODTUG – *Why I Joined ODTUG*

RMOUG – SQL>UPDATE

*Regular Expressions:*

*A Love/Hate Relationship*

IOUG – SELECT Journal

*XML Gateway Setup*

Podcast – *SQL Dev 4.0 City of Atlanta*



@dbcapoeira



dbryant@atlantaga.gov



<http://implementoracle.blogspot.com>



Danny Bryant

# Agenda

- ☞ The City of Atlanta
- ☞ “You want to do WHAT?”
- ☞ SQL Developer to the Rescue
  - Setup
  - Migration
  - Populating Tables
  - Reporting
- ☞ Lessons Learned
- ☞ Q&A

# The City of Atlanta

## Overview

- Includes the Mayor/Executive Offices (13 Departments), Judicial and Board Officers, and City Council (16 Members)
- Metropolitan Statistical Area (MSA) is the 9<sup>th</sup> largest metropolitan area in the country
- Population of 443,775 citizens (2012 US Census estimate)
- Manages Hartsfield-Jackson International Airport, the world's busiest airport by serving over 95MM passengers in 2012
- Approximately 7,500 active employees and 5,000 retirees
- \$1.8B Operating Budget

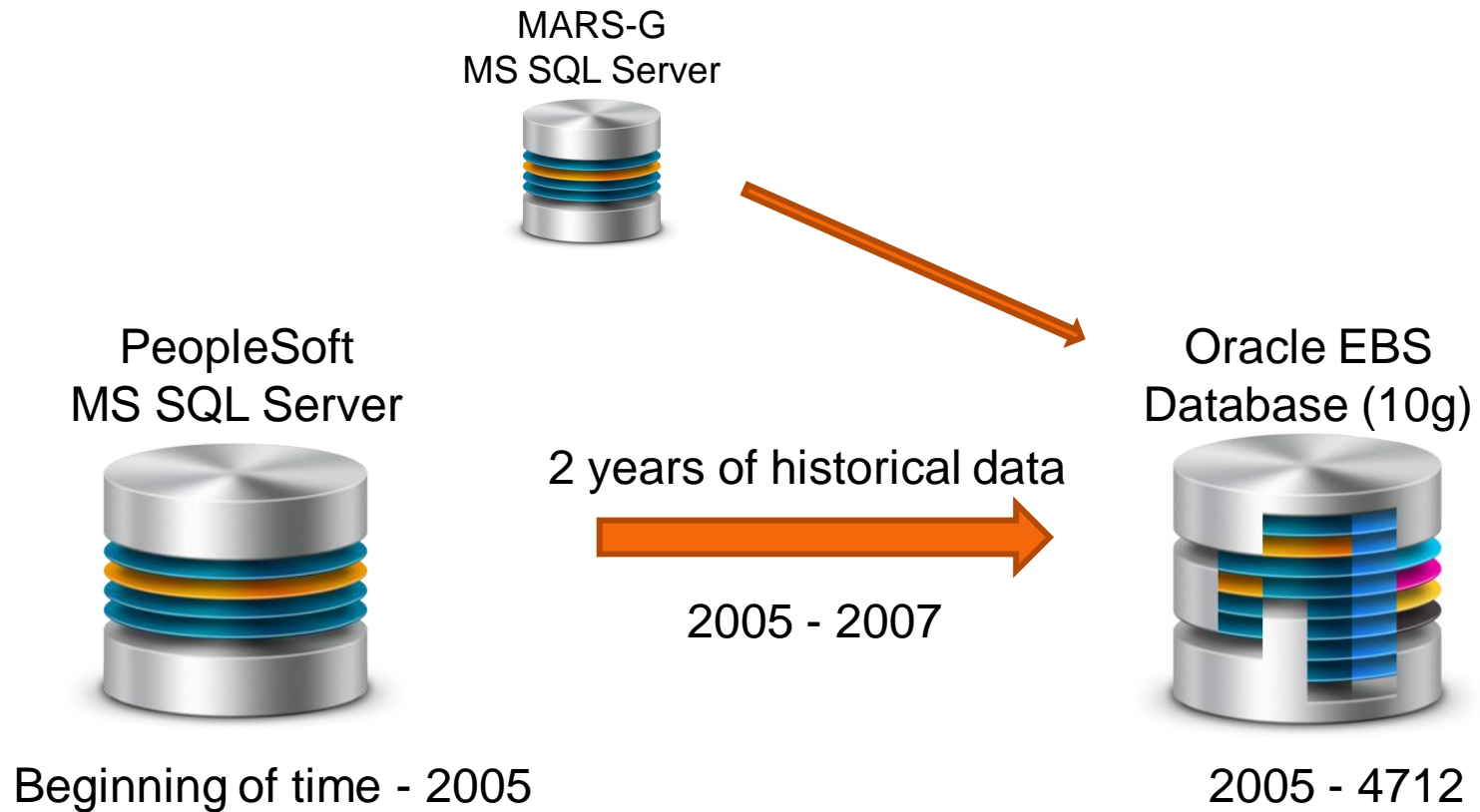
# The City of Atlanta

## Oracle Footprint

- Enterprise Resource Planning (ERP) Applications (eBS 11.5.10.2)
  - Financials
  - Human Resources Management System
  - Procurement
  - **Discoverer Reporting**
- Siebel Customer Relationship Management (CRM) Applications
- Enterprise Performance Management (EPM) Applications (v11.1.2)
  - Hyperion Public Sector Planning and Budgeting
  - Hyperion Financial Management
- Oracle Business Intelligence Enterprise Edition (OBIEE v11.1.1.2)
  - Human Resources Analytics
  - Financial Analytics

# History

In the beginning there was ....



# You want to do WHAT?



# Problem

- ⌘ We need historical data prior to 2005
  - Pension Reform
  - Open Records Requests
  - Retiree Information



# Solution

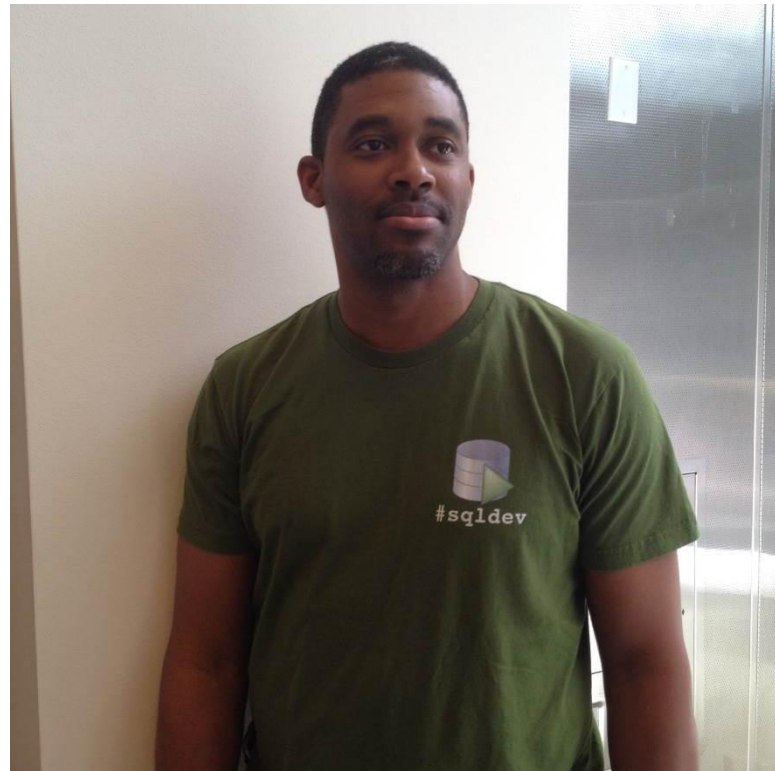
- ☞ Gather Requirements
- ☞ Query PeopleSoft for < 2005 data
  - Export to Excel
- ☞ Query EBS for > 2005 data
  - Export to Excel
- ☞ Stitch data together
- ☞ Email results to requestor
- ☞ Cross your fingers

# There's Got to be a Better Way

- ⌘ How can we speed up this process?
- ⌘ How can we empower the end users?
- ⌘ How do we take advantage of our existing reporting tools? -- Discoverer

# SQL Developer To the Rescue

---



# Database Migration Tool

## ☞ Why SQL Developer?

- Integrated UI
- Wizard Driven
- DDL Script Generation
- Online Data Mode
- Offline Data Move
- Repository Based (we will see this shortly)
- Log File

# Enough Already – Get to it!

## Pre-Requisites

1. Install 3<sup>rd</sup> party driver for source DB connectivity
2. Admin access to the MSSQL database
3. Build repository in a new schema for the meta-data, the user requires the following role and system privileges:
  - RESOURCE
  - CREATE SESSION
  - CREATE VIEW
  - UNLIMITED TABLESPACE (If using 12c)

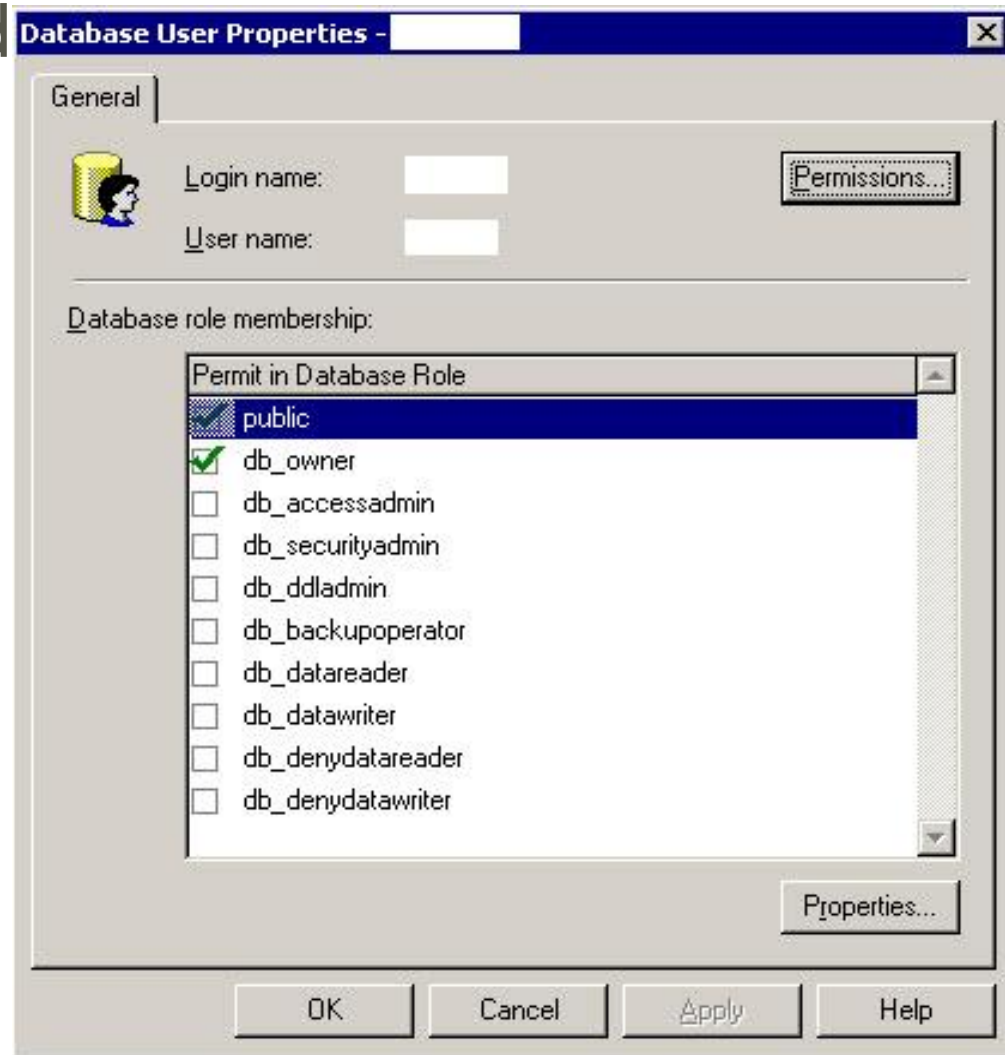
# What Did I Do?

## Four Phases

1. Verify Source DB Access
2. Create Migration Repository
3. Set up SQL Developer
4. Perform the Migration and Wait

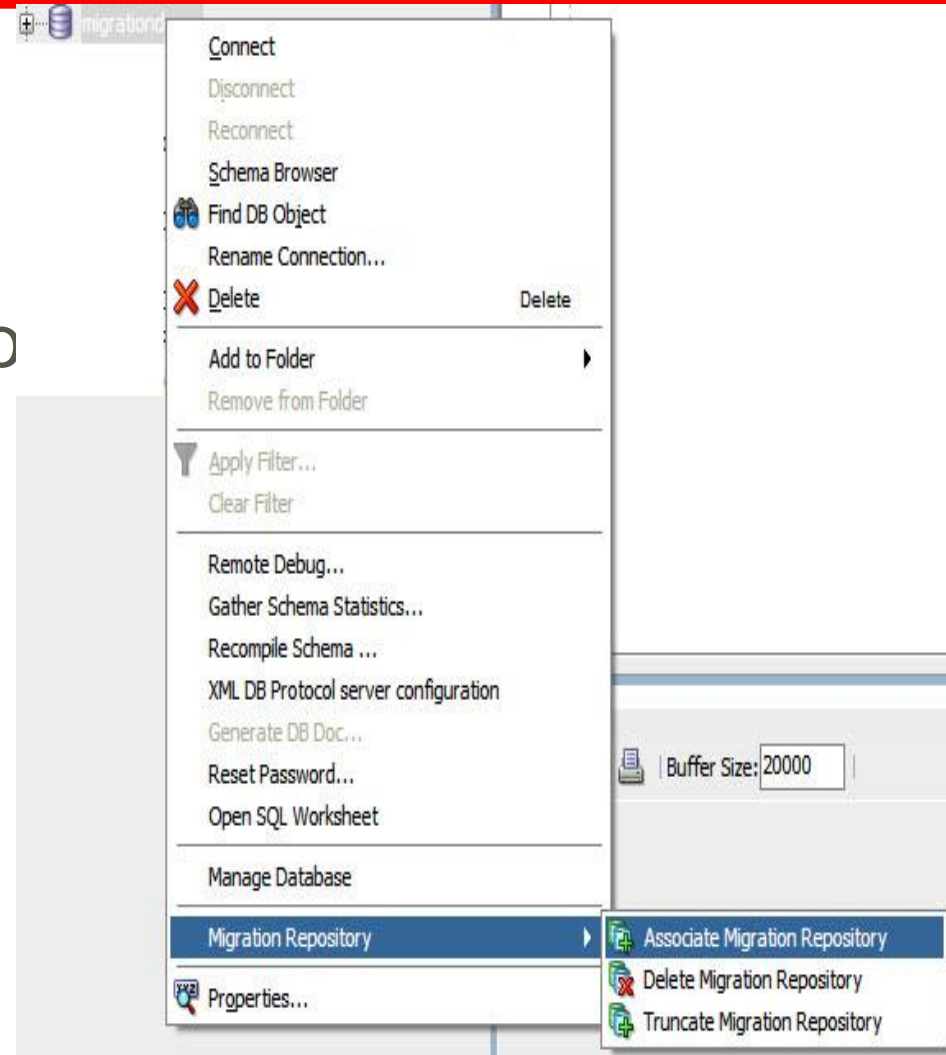
# Phase I – Verify Source DB Access

For MSSQL, I needed  
db\_owner  
permissions



# Phase II – Create the Repository

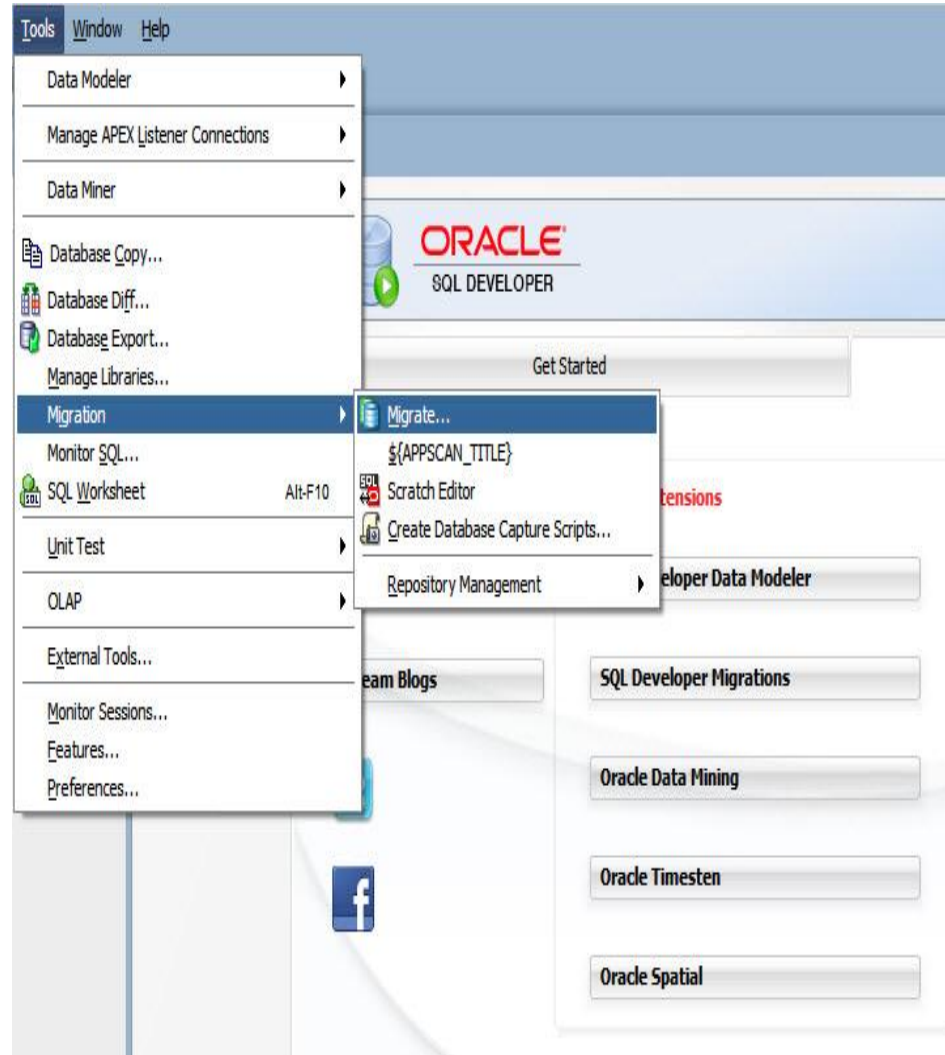
- ∞ Create your Migration Repository in your new schema. In this example: migrationdemo





# Phase III – Set up SQL Developer

Launch the Migration Wizard





# Phase III – Set up SQL Developer

**Migration Wizard - Step 2 of 10**

## Repository

Select a connection for the Migration Repository. Check Truncate to reset the repository to an empty state.

Connection:   

**Truncate**

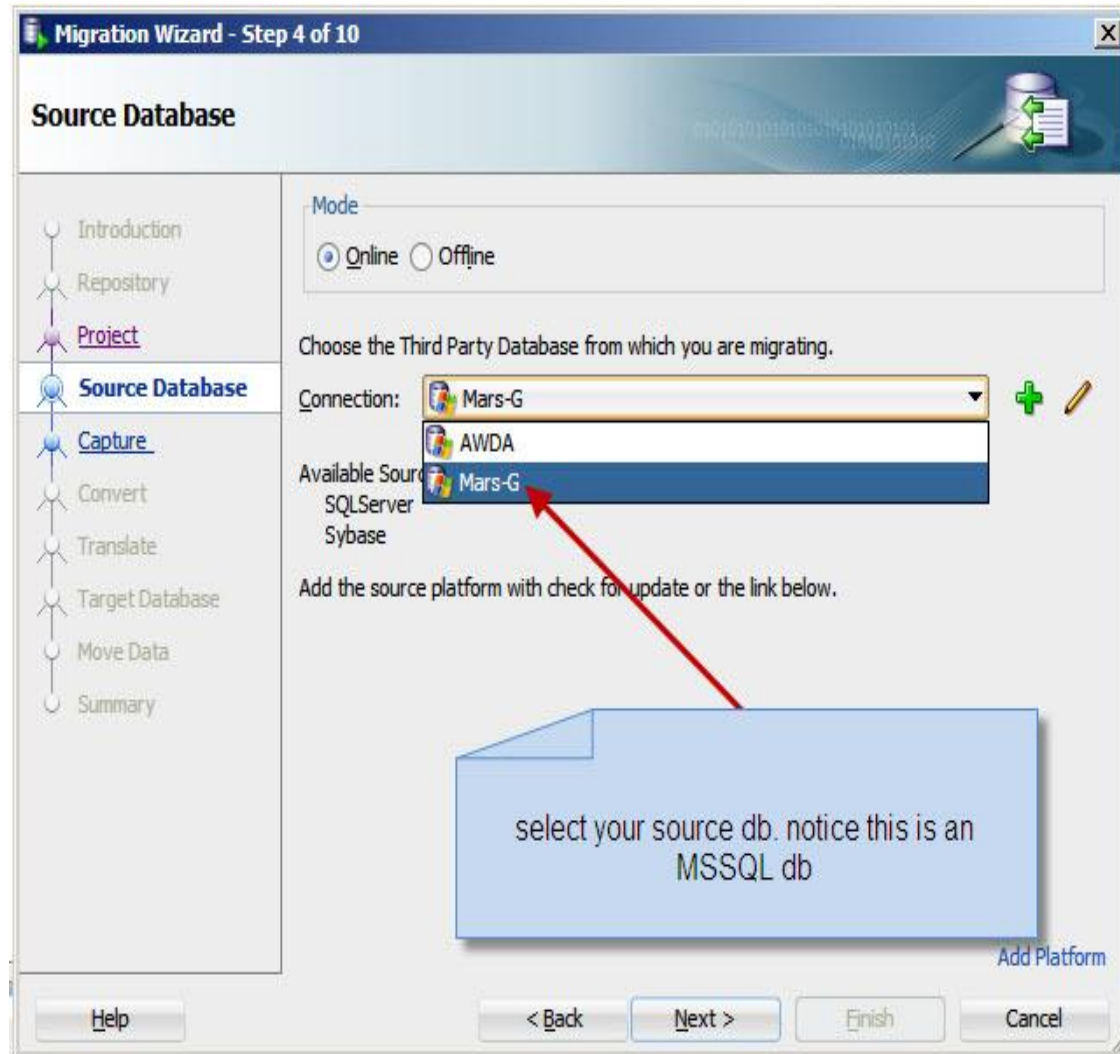
Proceed to Summary Page

**Help** **< Back** **Next >** **Finish** **Cancel**

If you have to start over, check this box.

# Phase III – Set up SQL Developer

∞ This will coincide with the 3<sup>rd</sup> party driver. In this case my source was SQLServer.



# Phase III – Set up SQL Developer

**Migration Wizard - Step 5 of 10**

## Capture

Select the database for definition capture.

**Available Databases**

**Selected Databases**

MARSG

Databases available to the connect account

Introduction  
Repository  
Project  
Source Database  
**Capture**  
Convert  
Translate  
Target Database  
Move Data  
Summary

Help < Back Next > Finish Cancel

# Phase III – Set up SQL Developer

**Migration Wizard - Step 7 of 10**

## Translate

Select SQL Objects to translate.

Available SQL Objects

- ALL\_VIEWS
- ALL\_TRIGGERS
- ALL\_PROCEDURES
- ALL\_FUNCTIONS

Selected SQL Objects

- ALL\_CONSTRAINTS

I only needed the constraints, but pick what you need. They are all selected by default

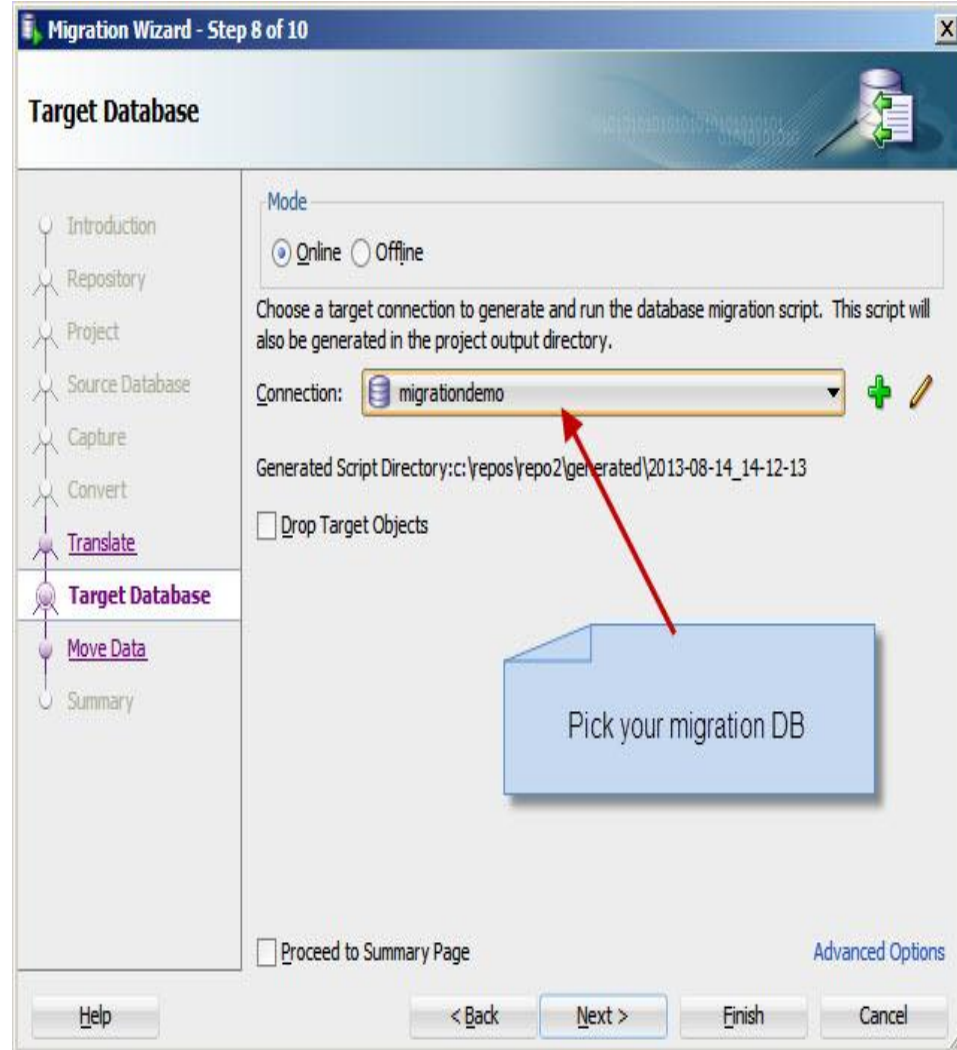
Proceed to Summary Page

Help < Back Next > Finish Cancel



# Phase III – Set up SQL Developer

☞ This is your Migration Repository schema



# Phase III – Set up SQL Developer

**Migration Wizard - Step 9 of 10**

## Move Data

Mode

Online  Offline

Specify the connections to be used for online data move.

Source Mars-G Target Local\_DB-XE\_Mars\_G

Truncate Data

Verify you source and destination DBs

Advanced Options

Help < Back Next > Finish Cancel

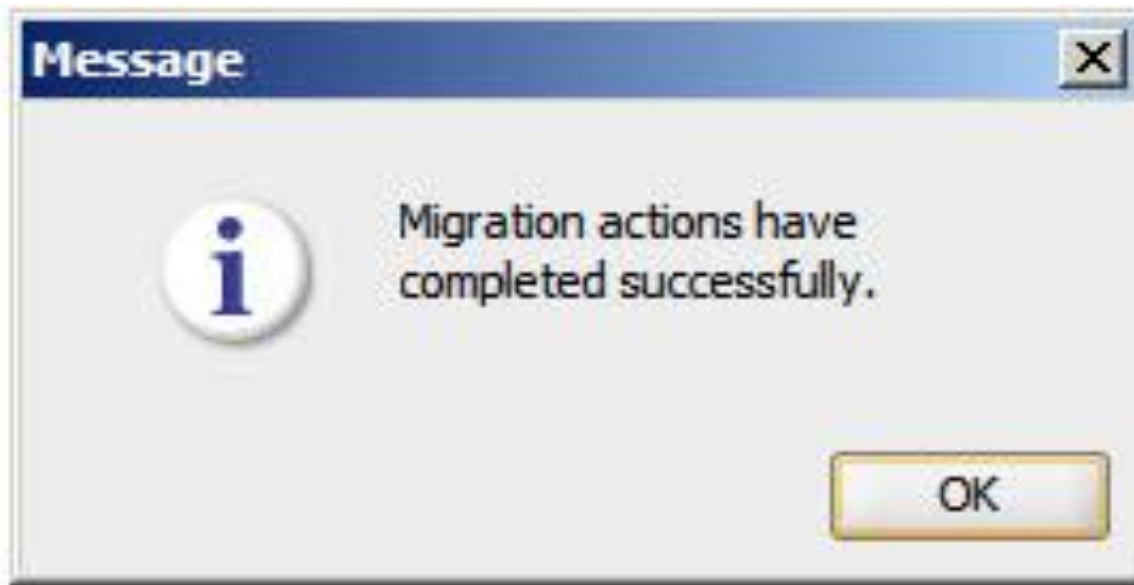
# Phase IV – Perform Migration

---





# Phase IV – Perform Migration



# What's Happening

```
SET DEFINE OFF;
PROMPT Creating User Emulation ...
CREATE USER Emulation IDENTIFIED BY Emulation DEFAULT TABLESPACE USERS TEMPORARY TABLESPACE TEMP;
GRANT CREATE SESSION, RESOURCE, CREATE VIEW, CREATE MATERIALIZED VIEW, CREATE SYNONYM,CREATE PUBLIC SYNONYM TO Emulation;
SET SCAN OFF;
PROMPT Creating User dbo_PSARCH ...
CREATE USER dbo_PSARCH IDENTIFIED BY dbo_PSARCH DEFAULT TABLESPACE USERS TEMPORARY TABLESPACE TEMP;
GRANT CREATE SESSION, RESOURCE, CREATE VIEW, CREATE MATERIALIZED VIEW, CREATE SYNONYM TO dbo_PSARCH;
SET SCAN OFF;
PROMPT Creating User FMUKESHI_PSARCH ...
CREATE USER FMUKESHI_PSARCH IDENTIFIED BY FMUKESHI_PSARCH DEFAULT TABLESPACE USERS TEMPORARY TABLESPACE TEMP;
GRANT CREATE SESSION, RESOURCE, CREATE VIEW, CREATE MATERIALIZED VIEW, CREATE SYNONYM TO FMUKESHI_PSARCH;
connect Emulation/Emulation;
```

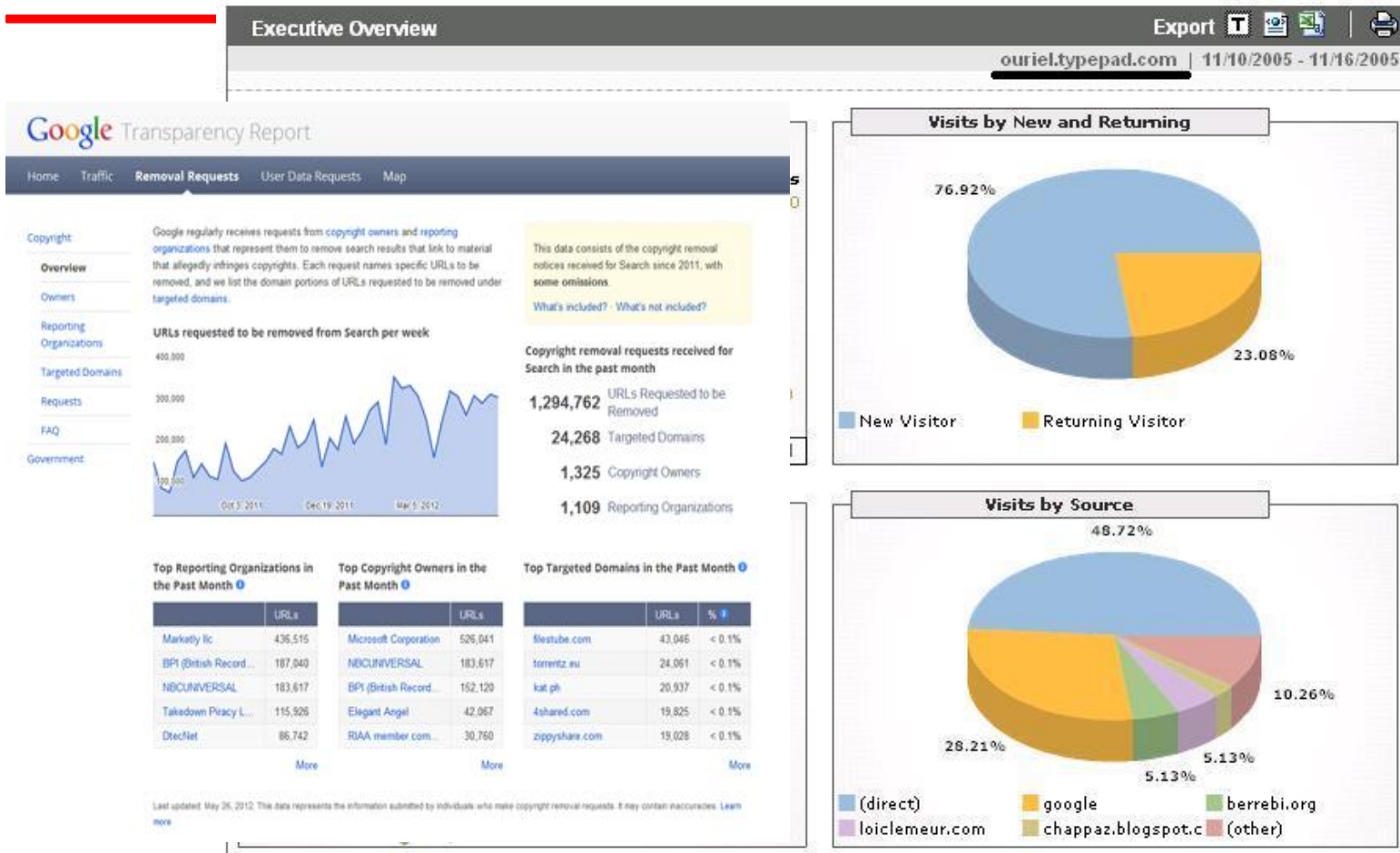
# What's Happening

```
90238 PROMPT Creating Table PS_COST_UNIT_TBL ...
90239 CREATE TABLE PS_COST_UNIT_TBL (
90240     COST_UNIT_CD CHAR(10 CHAR) NOT NULL,
90241     DESCR CHAR(30 CHAR) NOT NULL,
90242     DESCRSHORT CHAR(10 CHAR) NOT NULL,
90243     COST_UNIT_TYPE CHAR(1 CHAR) NOT NULL,
90244     RELATED_TIME_UNIT CHAR(10 CHAR) NOT NULL
90245 );
90246
90247
90248
90249 PROMPT Creating Unique Index PS_COST_UNIT_TBL on PS_COST_UNIT_TBL...
90250 CREATE UNIQUE INDEX PS_COST_UNIT_TBL ON PS_COST_UNIT_TBL
90251 (
90252     COST_UNIT_CD
90253 )
90254 ;
90255 PROMPT Creating Index PS#COST_UNIT_TBL_14 on PS_COST_UNIT_TBL ...
90256 CREATE INDEX PS#COST_UNIT_TBL_14 ON PS_COST_UNIT_TBL
90257 (
90258     COST_UNIT_CD,
90259     DESCR,
90260     DESCRSHORT
90261 )
90262 ;
```

# What's Happening

```
90238 PROMPT Creating Table PS_COST_UNIT_TBL ...
90239 CREATE TABLE PS_COST_UNIT_TBL (
90240     COST_UNIT_CD CHAR(10 CHAR) NOT NULL,
90241     DESCR CHAR(30 CHAR) NOT NULL,
90242     DESCRSHORT CHAR(10 CHAR) NOT NULL,
90243     COST_UNIT_TYPE CHAR(1 CHAR) NOT NULL,
90244     RELATED_TIME_UNIT CHAR(10 CHAR) NOT NULL
90245 );
90246
90247
90248
90249 PROMPT Creating Unique Index PS_COST_UNIT_TBL on PS_COST_UNIT_TBL...
90250 CREATE UNIQUE INDEX PS_COST_UNIT_TBL ON PS_COST_UNIT_TBL
90251 (
90252     COST_UNIT_CD
90253 )
90254 ;
90255 PROMPT Creating Index PS#COST_UNIT_TBL_14 on PS_COST_UNIT_TBL ...
90256 CREATE INDEX PS#COST_UNIT_TBL_14 ON PS_COST_UNIT_TBL
90257 (
90258     COST_UNIT_CD,
90259     DESCR,
90260     DESCRSHORT
90261 )
90262 ;
```

# Phase V – Set up Reporting



# Lessons Learned



# Lessons Learned - Migrate Directly to Target DB

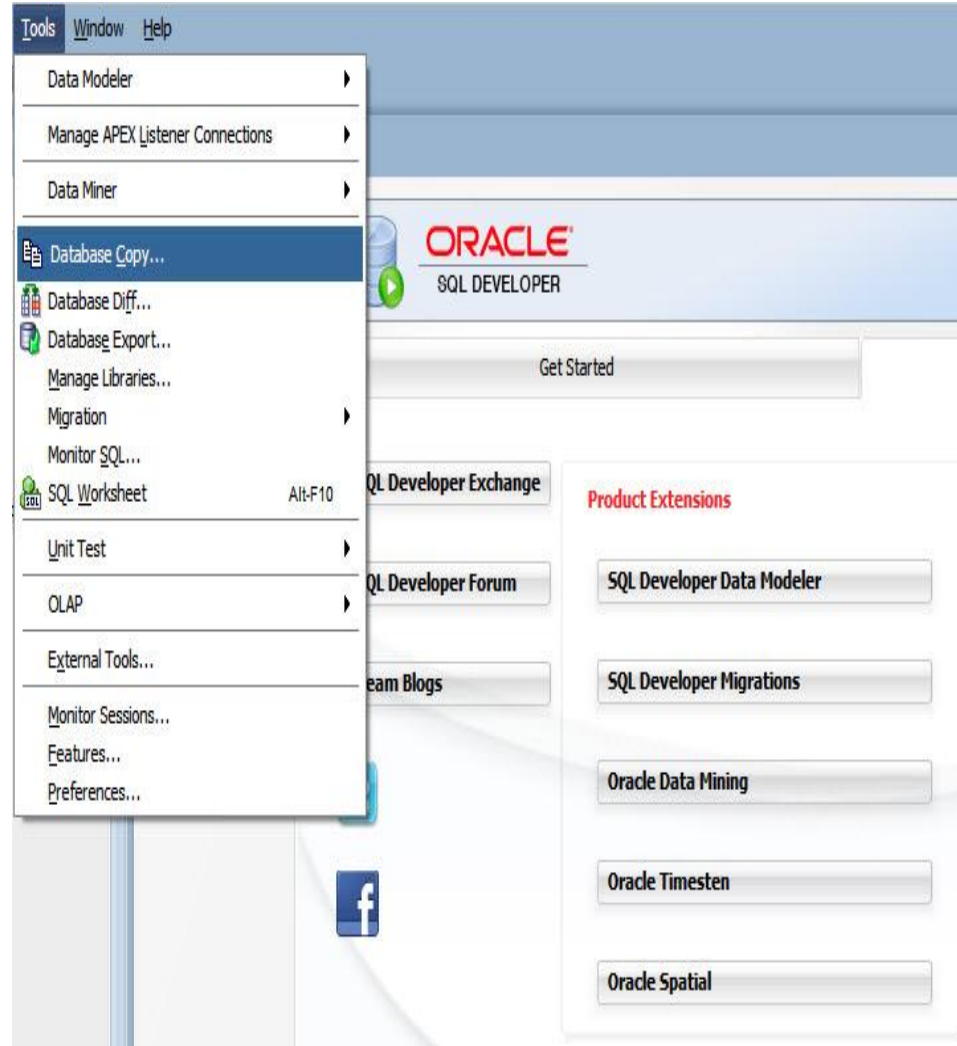
1. Compatibility issues with DDL when DB versions are different.

```
PCTFREE 10 PCTUSED 40 INITRANS 1 MAXTRANS 255 NOCOMPRESS  
LOGGING STORAGE(INITIAL 131072 NEXT 131072 MINEXTENTS 1  
MAXEXTENTS 2147483645 PCTINCREASE 0 FREELISTS 1 FREELIST  
GROUPS 1 BUFFER_POOL DEFAULT)
```

DB 10.2.0.4 doesn't like this.

# Lessons Learned – Migrate Directly to Target DB

2. Extra Step to Populate DB Tables
3. Use Database Copy





# Lessons Learned — Get Familiar with the Logs

```
Error starting at line 7 in command:
CREATE USER dbo_PSARCH IDENTIFIED BY dbo_PSARCH DEFAULT
TABLESPACE USERS TEMPORARY TABLESPACE TEMP
Error at Command Line:7 Column:38
Error report:
SQL Error: ORA-01031: insufficient privileges
01031. 00000 - "insufficient privileges"
*Cause:      An attempt was made to change the current username or
password
              without the appropriate privilege. This error also
occurs if    attempting to install a database without the necessary
operating   system privileges.
              When Trusted Oracle is configure in DBMS MAC, this
error may occur if the user was granted the necessary privilege at a
higher label than the current login.
*Action:     Ask the database administrator to perform the
operation or grant the required privileges.
              For Trusted Oracle users getting this error although
granted the  the appropriate privilege at a higher label, ask the
database     administrator to regrant the privilege at the
appropriate label.

Error starting at line 8 in command:
GRANT CREATE SESSION, RESOURCE, CREATE VIEW, CREATE MATERIALIZED
VIEW, CREATE SYNONYM TO dbo_PSARCH
```

# What's Next

Send	To...	My Favorite DBAs
	Cc...	
	Subject:	Please Migrate to Production

Dear DBAs,  
Please migrate the IDidThisByMyself SCHEMA to Production.

Danny Bryant



# What's Next?



# Useful Links

## ☞ 3<sup>rd</sup> Party Drivers

- **IBM DB2:** <http://www-306.ibm.com/software/data/db2/express/additional-downloads.html>
- **Microsoft SQL Server and Sybase:** jTDS driver available from <http://jtds.sourceforge.net/>. Use version 1.2
- **MySQL:** <http://dev.mysql.com/downloads/connector/j/5.0.html>
- **Teradata:** <http://www.teradata.com/downloadcenter/>

## ☞ Oracle documentation on Database Migration

- <http://www.oracle.com/technetwork/database/migration/omwb-getstarted-093461.html>

# Thank You



Danny Bryant

ODTUG Marketing Committee

Kscope14 Abstract Review Committee

Editor's Choice review team

Student Day Hackathon Judge



@dbcapoeira



dbryant@atlantaga.gov



<http://implementoracle.blogspot.com>



Danny Bryant