Many DBA’s are being required to support multiple DBMS’s on multiple platforms. Many IT shops today are running a combination of Oracle and DB2 which is resulting in either having to cross train DBA’s or hire new DBA’s with expertise on the specific DBMS. The new Oracle compatibility features available in DB2 9.7 LUW brings these 2 worlds much closer together. This presentation will compares the architectural differences between Oracle and DB2 LUW, and how DB2 9.7 will simplify the porting of Oracle applications over to DB2 for LUW.
Agenda

- Basic Components & Terminology
- Architectural Comparison
- Storage Management
- Administrative Differences
- New DB2 Oracle Compatibility Features

Objective 1: Understand the basics of Oracle objects and terminology compared to DB2 LUW
Objective 2: Overview of key architectural differences
Objective 3: Differences in the way space is managed across databases
Objective 4: Compare and contrast administration of Oracle vs. DB2 LUW
Objective 5: Understand how DB2 9.7 can simplify crossing from Oracle to DB2
Components of DBMS

Oracle
- Instance
- File
- Database
- Tablespace
- Schema
- Table
- Index
- View
- Trigger
- Rollback Segment
- Stored Procedures
- SQL Plus
- Packages

DB2 LUW
- Instance
- Container
- Database
- Tablespace
- Schema
- Table
- Index
- View
- Trigger
- NA
- Stored Procedures
- DB2 CLP
- Modules

Roles – Grouping of authorizations
# Product Options

<table>
<thead>
<tr>
<th><strong>Oracle</strong></th>
<th><strong>DB2</strong></th>
</tr>
</thead>
</table>
| **Express Edition** | • **Express-C**  
| • 1 CPU/1GB RAM  
| • 4 GB max DB size  
| • Windows/Linux only  | • 2 CPU/2GB RAM  
| • 4 CPU/4GB RAM max  | • Windows/Linux/Solaris/Mac  |
| **Standard Edition** | • **Express Edition**  
| • 4 sockets  
| • Unlimited scalability  | • 4 CPUs/16 GB RAM  |
| **Enterprise Edition** | • **Workgroup Edition**  
| • Unlimited scalability  
| • Table Partitioning  
| • RAC  | • Unlimited scalability  
| | • Data partitioning (DPF)  
| | • Purescale  |

**Oracle**
- Enterprise Edition typically used. Required for OEM add on packs.
- Requires you to purchase RAC in order to do Parallel server. “Real Application Clusters”

**DB2**
The data partion facility or DPF is the clustered version of DB2. This was formerly known as Enterprise Extended Edition (“triple E”)
<table>
<thead>
<tr>
<th><strong>Oracle</strong></th>
<th><strong>DB2</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Base tables</strong>&lt;br&gt;• SYS.xxxxx$</td>
<td><strong>Base Tables</strong>&lt;br&gt;• SYSIBM.xxxx</td>
</tr>
<tr>
<td><strong>System views</strong>&lt;br&gt;• SYS.GV.$ or GV$&lt;br&gt;• SYS.V.$ or V$&lt;br&gt;• ALL_&lt;br&gt;• DBA_&lt;br&gt;• USER_</td>
<td><strong>System Views</strong>&lt;br&gt;• SYSCAT&lt;br&gt;  • Read-only views defined for catalog base tables&lt;br&gt;• SYSSTAT&lt;br&gt;  • Updateable set of views&lt;br&gt;  • Primarily used for access path manipulation&lt;br&gt;• Administrative Views</td>
</tr>
</tbody>
</table>

**Oracle**
• V$ views used like snapshots in DB2
Accessing/Mgmt DB

**Oracle**
- OEM - GUI tool set
  - DBA Mgmt Pack (free)
  - Change Mgmt Pack ($) 
  - Diagnostics Pack ($) 
  - Tuning Pack ($) 
  - Recovery Manager ($) 
- Sqlplus

**DB2**
- Control Center GUI tool set
  - Command center 
  - Command line processor 
  - Command window 
  - Script center 
  - Visual Explain 
- Data Studio
  - Replacing Control Center 
- CLP

**Oracle**
DBA Pack – Basic C,A,D Export/Import, SQL LOADER. Very similar to CC
Enterprise Edition only
- Change management
- Diag Pack
- Tuning Pack
- Recovery Manager
### Common Terms Different Meanings

<table>
<thead>
<tr>
<th>Oracle</th>
<th>DB2</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Stored Procedure</strong></td>
<td><strong>Stored Procedure</strong></td>
</tr>
<tr>
<td>• PL/SQL</td>
<td>• External - C, Java, Cobol</td>
</tr>
<tr>
<td><strong>Package</strong></td>
<td>• Internal, SQL/PL</td>
</tr>
<tr>
<td>• grouping of PL/SQL blocks</td>
<td>• Package</td>
</tr>
<tr>
<td>• Nothing to do with optimization</td>
<td>• Pre-compiled static SQL</td>
</tr>
<tr>
<td><strong>Segment</strong></td>
<td>• Segment</td>
</tr>
<tr>
<td>• Set of Oracle Extents</td>
<td>• Block of pages in TS</td>
</tr>
</tbody>
</table>

**Oracle**

PL/SQL requires a C compiler

**DB2**

Extent – An extent is a block of data pages which get allocated based on the EXTENTSIZE parameter of the tablespace definition. See the tablespace foil for more details.
### Different Terms Similar Meaning

#### Oracle
- Package
- Data Block
- Dictionary
- Alert Log
- Redo Log
- Archive log
- Segments
- Statement Cache
- System Global Area (SGA)

#### DB2
- Module (9.7)
- Data Page
- Catalog
- Diag log
- Log Files
- Archival Logging
- Space Consuming Objects
- Package Cache
- Instance shared memory/DB shared memory

---

Segments = Tables/IX’s

**DB2**

2 configuration files
- Database Manager configuration file – configuration parameters for entire instance
- Database configuration file – Created for each database
Instance & Database

Oracle
- **Instance**
  - A collection of Processes
  - One data dictionary
  - One active database
  - Init.ora parameter file

DB2
- **Instance**
  - Logical database server environment
  - Also referred to as a Node
  - 1 to many databases
  - Database Manager Configuration File

DB2
2 configuration files
- Database Manager configuration file – configuration parameters for entire instance
- Database configuration file – Created for each database
Oracle
• **SID – Oracle system ID**
  • Control files are like BSDS or Recovery History File

Every Oracle database has a control file. A control file contains entries that specify the physical structure of the database:
  • Database name
  • Names and locations of datafiles and redo log files
  • Time stamp of database creation

DB2
• On a single machine, one or more instances can exist
  • **DB2 Administration Server (DAS)**
    • Enables remote administration of DB2 servers
    • Provides scheduler used to schedule local and remote jobs
    • Provides a mechanism for DB2 discovery to return information to remote clients
  • Can connect to one or more databases at the same time on different instances and/or machines
  • Cannot have SQL statements joining tables from different databases.
  • **Database Manager Configuration file**
    • created when an instance is created
    • parameters affect system wide resources at the product or instance level
    • parameters can be changed from system default values improve performance or increase capacity.
  • **Database Configuration file**
    • one config file is created when the database is created
    • specifies amount of resources to be allocated to the database
### Bufferpools

**Oracle**
- Typically use single BP
- Defined in init.ora
- Dynamic create, alter, and delete
- Objects assigned via DDL

**DB2**
- IBMDEFALUTBP automatically created with database
  - Additional pools created with DDL
- Hidden Bufferpools
  - 4k, 8k, 16k, & 32K
  - Share only within individual databases

---

**Oracle**
9i allows 4, 18, 16, 32 pages

A single default buffer pool is generally adequate for most systems. However, users with detailed knowledge of an application’s buffer pool might benefit from configuring multiple buffer pools.
### Databases

<table>
<thead>
<tr>
<th><strong>Oracle</strong></th>
<th><strong>DB2</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Physical Structure</strong></td>
<td><strong>Logical grouping of DB2 objects</strong></td>
</tr>
<tr>
<td>- Data files</td>
<td>- 1 to many databases/instance</td>
</tr>
<tr>
<td>- Redo Log files</td>
<td>- System tablespaces</td>
</tr>
<tr>
<td>- Control files</td>
<td>- SYSCATSPACE</td>
</tr>
<tr>
<td>- Only one DB mounted/opened</td>
<td>- TEMPSPACE</td>
</tr>
<tr>
<td>- SYSTEM Tablespace</td>
<td>- USERSPACE</td>
</tr>
<tr>
<td>- Data dictionary</td>
<td></td>
</tr>
</tbody>
</table>

The biggest difference at the database level is how the system catalog is defined.

- In Oracle there is one common system catalog for the databases
- On the Unix/NT platform a new system catalog gets generated for every database defined within an instance.

  - The catalog tables and memory structures are actually defined within the database itself.

- 3 SMS tablespaces are created by default
  
  - SYSCATSPACE – Contains system catalog tables = SYSTEM tablespace in Oracle
  - TEMPSPACE1 – Holds temp tables used by UDB
  - USERSPACE1 – Contains user tables unless tablespace specified (DSNDB04)
Cooked – Formatted by O/S
Raw – Native device
Resize – Dynamically changes size
Auto extend – similar to SMS
### Tablespaces

<table>
<thead>
<tr>
<th>Oracle</th>
<th>DB2</th>
</tr>
</thead>
<tbody>
<tr>
<td>System</td>
<td>Regular</td>
</tr>
<tr>
<td>• Automatically created</td>
<td>• USERSPACE1</td>
</tr>
<tr>
<td>• SYSAUX</td>
<td>• Temporary</td>
</tr>
<tr>
<td>• Auxillary system TS</td>
<td>• Large</td>
</tr>
<tr>
<td>• UNDO</td>
<td></td>
</tr>
<tr>
<td>• Non-System</td>
<td></td>
</tr>
<tr>
<td>• Permanent</td>
<td></td>
</tr>
<tr>
<td>• Temporary</td>
<td></td>
</tr>
<tr>
<td>• BIGFILE/SMALLFILE</td>
<td></td>
</tr>
</tbody>
</table>

Permanent used for all objects much like USERSPACE in LUW
Temporary used for sorts, temp workspace, etc.

Bigfile tablespaces can significantly increase the storage capacity of an Oracle database. Smallfile tablespaces can contain up to 1024 files, but bigfile tablespaces contain only one file that can be 1024 times larger than a smallfile tablespace. The total tablespace capacity is the same for smallfile tablespaces and bigfile tablespaces. However, because there is limit of 64K datafiles for each database, a database can contain 1024 times more bigfile tablespaces than smallfile tablespaces, so bigfile tablespaces increase the total database capacity by 3 orders of magnitude. In other words, 8 exabytes is the maximum size of the Oracle database when bigfile tablespaces are used with the maximum block size (32 k).
Oracle System vs. Non-System

• System Tablespace
  • Data dictionary
  • Rollback segment
  • PL/SQL Rollback Units

• Non-SYSTEM
  • Rollback segments
  • Temporary segments
  • Application data
  • Application indexes
## Tablespaces

<table>
<thead>
<tr>
<th>Oracle</th>
<th>DB2</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Dictionary Managed</strong></td>
<td><strong>System Managed</strong></td>
</tr>
<tr>
<td>- No space calculations</td>
<td>- O/S’s file manager allocates space as needed</td>
</tr>
<tr>
<td><strong>Locally Managed</strong></td>
<td>- Good for small tables</td>
</tr>
<tr>
<td><strong>Automatic Storage Management (ASM)</strong></td>
<td><strong>Database Managed</strong></td>
</tr>
<tr>
<td>- 10g</td>
<td>- Space is pre-allocated</td>
</tr>
<tr>
<td></td>
<td>- Better suited for large tables</td>
</tr>
<tr>
<td></td>
<td>- Faster I/O</td>
</tr>
<tr>
<td><strong>Automatic</strong></td>
<td><strong>Automatic</strong></td>
</tr>
<tr>
<td></td>
<td>- Combines features of both SMS and DMS</td>
</tr>
</tbody>
</table>

The type of tablespace chosen depends on the characteristics of the data stored within the tablespace. While DMS tablespaces clearly provide more flexibility for storage capacity, SMS tablespaces are generally recommended for temporary tablespaces and catalog tablespaces.

In addition to understanding the types of tablespaces, it is important to understand how data is managed within the tablespace. All data within DB2 is stored in pages. A *page size* is defined at tablespace creation and can be specified in 4k, 8k, 16k, and 32k sizes. Row size, random vs. sequential access, and several other factors must be evaluated to determine the optimal page size for the tablespace.

*Pages* are grouped into allocation units called extents. Each time the tablespace needs to allocate additional storage, the extent size is used to determine the size. During insert activity, DB2 UDB will write to a container until the extent size has reached capacity, at that point, DB2 UDB will allocate an extent on the next container and continue the write activity.
# Tablespace components

<table>
<thead>
<tr>
<th><strong>Oracle</strong></th>
<th><strong>DB2</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Segments</td>
<td>Storage Object</td>
</tr>
<tr>
<td>Extents</td>
<td>Extents</td>
</tr>
<tr>
<td>Data Blocks</td>
<td>Page</td>
</tr>
<tr>
<td>Data Files</td>
<td>Containers</td>
</tr>
</tbody>
</table>
Data Storage

Oracle

- Datafile
  - Datafiles associated to an individual tablespace
  - ‘/DISK6/app04.dbf’

DB2

- Containers
  - A container is assigned to an individual tablespace
  - Directory name
    - SMS Only
    - D:\MYTS
  - Raw Device
    - DMS Only
    - E:
  - File name
    - DMS Only
    - D:\SODADB\SODA.UTILITY.DMS

Datafile

A tablespace in an Oracle database consists of one or more physical datafiles. A datafile can be associated with only one tablespace and only one database.
### Partitioning

#### Oracle
- **Table Definition**
  - 1-64k partitions
  - Partitioning on range, hash, both or list
  - Partitions assigned to TS
- **Enhances Parallel Query**
- **Easier Data Management**

#### DB2
- **Table partitioning**
  - Partitioning part of table DDL
  - Partitions can be in one or multiple tablespaces
  - Partitions can be rolled in/out
  - Partitions can be administered independently
- **Database Partitioning**
  - Database Partitioning Feature (DPF)
    - ESE Edition only
    - Database is partitioned across multiple servers
    - Multiple tables

---

**Oracle**

Partitioning very much like DB2 z/OS in concept. Designed primarily for manageability

Local indexes- Can create an index on an individual partition.
### Tables

<table>
<thead>
<tr>
<th>Oracle</th>
<th>DB2</th>
</tr>
</thead>
<tbody>
<tr>
<td>• One to many tables defined in a tablespace</td>
<td>• One to many tables defined in a tablespace</td>
</tr>
<tr>
<td>• Tables and Indexes are independent of each other</td>
<td>• Indexes directly tied to table definition</td>
</tr>
<tr>
<td>• Index Organized Tables</td>
<td></td>
</tr>
</tbody>
</table>
### Indexes

<table>
<thead>
<tr>
<th>Oracle</th>
<th>DB2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unique</td>
<td>Unique</td>
</tr>
<tr>
<td>Non-unique</td>
<td>Non-unique</td>
</tr>
<tr>
<td>Partitioning</td>
<td>Clustering</td>
</tr>
<tr>
<td>Function based</td>
<td>Partitioned</td>
</tr>
<tr>
<td>Bit Map</td>
<td></td>
</tr>
</tbody>
</table>

Function based- Index which performs a function such as doing CAP’s on a name.

Bit Map – Useful for low cardinality values such as color.
Indexes

DB2

- Indexes are dependent on tables. Index space must be specified when table created.
  - All indexes for table use 1 tablespace
  - Index space is predefined before IX’s are created
  - Indexes can be defined in same tablespace as table
    - Required for SMS

When creating a table in UDB you must have a tablespace pre-defined for both the table and any indexes you might add to the table. The indexspace specification is part of the table definition. Therefore all indexes for the table use the same indexspace.
Administration
Optimizer

Oracle
- Cost based
- Rules Based
  - Backward compatibility

DB2
- Cost based more sophisticated than Oracle
  - Seven levels of optimization
  - Adjusted based on query complexity
- No Rules
Optimizer Class

- **DB2 Optimizer Class**
  - Values are between 0 and 9, default is 5
    - Determines the intensity used by the DB2 SQL Compiler when rewriting SQL
    - Dynamic SQL can’t spend time optimizing, use lower class
    - Static SQL optimizes once, use a higher class
    - “dft_queryopt” database setting
  - **SET CURRENT QUERY OPTIMIZATION n**

<table>
<thead>
<tr>
<th>Level</th>
<th>Recommendation</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Minimal amount of optimization. Only recommended for very simple SQL accessing well indexed tables. Only nested loop joins and IX scans enabled.</td>
</tr>
<tr>
<td>1</td>
<td>Similar to 0 except Merge Scan and TS scan enabled.</td>
</tr>
<tr>
<td>2</td>
<td>Recommended for very complex queries which are infrequently executed in a decision support or OLAP environment.</td>
</tr>
<tr>
<td>3</td>
<td>Closest to z/OS optimizer. Recommended for queries with 4 or more joins.</td>
</tr>
<tr>
<td>5</td>
<td>DEFAULT – Most cost effective method for mix of simple and complex queries. Optimization will be automatically reduced for complex dynamic SQL if optimizer determines that the resources are not necessary.</td>
</tr>
<tr>
<td>7</td>
<td>Same as 5 except optimization not reduced for complex dynamic SQL</td>
</tr>
<tr>
<td>9</td>
<td>Used to determine whether more comprehensive optimization can generate better access plan for very complex long running queries using large tables</td>
</tr>
</tbody>
</table>

---

**Optimizer Class**

**Static SQL**

Controlled on PREP and BIND statements

Stored in QUERYOPT in SYSCAT.PACKAGES

**Dynamic SQL**

CURRENT QUERY OPTIMIZATION register using

SET command

If not set, DFT_QUERYOPT database parameter
Oracle

Very similar to z/OS

DB2

LUW

EXPLAIN_ARGUMENT: Represents the unique characteristics for each individual operator.

EXPLAIN_INSTANCE: Main control table for all explain information. Each row of data in the explain tables is explicitly linked to one row in this table. Basic information about the source of the SQL statements being explained and environment information is kept in this table.

EXPLAIN_OBJECT: Contains data objects required by the access plan to satisfy the SQL statement.

EXPLAIN_OPERATOR: Contains all the operators needed to satisfy the SQL statement.

EXPLAIN_PREDICATE: Identifies which predicates are applied by a specific operator.

EXPLAIN_STATEMENT: Contains the text of the SQL statement in two forms. The original version entered by the user, and a rewritten version generated by the compilation process.

EXPLAIN_STREAM: This table represents the input and output data streams between individual operators and data objects.
Clustering/Scalability: Oracle RAC

Oracle Real Application clusters allows multiple instances to access a single database, the instances will be running on multiple nodes. In an standard Oracle configuration a database can only be mounted by one instance but in a RAC environment many instances can access a single database.
DB2 pureScale is a cluster-based, shared-disk architecture similar to the SYSPLEX architecture of DB2 z/OS.

RAC vs. PureScale

When you use Oracle RAC lot of application changes have to be made when we add new nodes. But with PureScale the application is completely transparent to the changes in nodes. Also PureScale has centralized resource management system that manages the lock and other resources.
Monitoring

Oracle
- Performance Snapshots - V$
  - Instance/DATABASE
  - Memory
  - Disk
  - User/Session
  - Contention
- AWR (Statspack)
  - Collects Stats over time
  - Similar to DB2 Snapshot
- TKPROF
  - Formats SQL trace data from applications

DB2
- Snapshot Monitor
  - Show status of database counters at instant in time
  - Buff, Lock, Sort, Stmt, Tbl, UOW
- Event Monitor
  - Status after the event
    - Databases
    - Tablespaces
    - Connections
    - Tables
    - Statements
    - Transactions
    - Deadlocks
- Administrative Views and Table Procedures

Oracle
UTLBSTAT/UTLESTAT – Stats pac – Automatically capture stats over time
AWR – Automatic Workload Repository
The AWR is used to collect performance statistics including:
Wait events used to identify performance problems.
Time model statistics indicating the amount of DB time associated with a process from the V$SESS_TIME_MODEL and V$SYS_TIME_MODEL views.
Active Session History (ASH) statistics from the V$ACTIVE_SESSION_HISTORY view.
Some system and session statistics from the V$SYSSTAT and V$SESSSTAT views.
Object usage statistics.
Resource intensive SQL statements.

TKPROF – Similar to z/OS SQL traces

STATSPACK is a performance diagnosis tool, available since Oracle8i. STATSPACK can be considered BSTAT/ESTAT's successor, incorporating many new features. STATSPACK is a diagnosis tool for instance-wide performance problems; it also supports application tuning activities by providing data which identifies high-load SQL statements. STATSPACK can be used both proactively to monitor the changing load on a system, and also reactively to investigate a performance problem.
Utilities

<table>
<thead>
<tr>
<th>Utilities</th>
<th>Oracle</th>
<th>DB2</th>
</tr>
</thead>
<tbody>
<tr>
<td>RMAN</td>
<td></td>
<td>BACKUP</td>
</tr>
<tr>
<td>IMPORT</td>
<td></td>
<td>IMPORT</td>
</tr>
<tr>
<td>EXPORT</td>
<td></td>
<td>EXPORT</td>
</tr>
<tr>
<td>SQL*LOADER</td>
<td></td>
<td>LOAD</td>
</tr>
<tr>
<td>ANALYZE</td>
<td></td>
<td>RUNSTATS</td>
</tr>
<tr>
<td>DB_VERIFY</td>
<td></td>
<td>RESTORE</td>
</tr>
<tr>
<td></td>
<td></td>
<td>REORG</td>
</tr>
<tr>
<td></td>
<td></td>
<td>REORGCHK</td>
</tr>
</tbody>
</table>

Analyze = Runstats
DB_Verify =
RMAN = Backup/Restore
Export/Import=Reorg
Backup/Recovery
Backups

Oracle
- Database
  - Cold
  - Hot
- Tablespace
- Components
  - Database Backup
  - REDO Log
  - ARCHIVED REDO logs
  - UNDO Records
  - Control File

DB2
- Database
  - Online
  - Offline
- Tablespace
- Components
  - Backup Image
  - Incremental Copy
  - Backup History File
  - Active Logs
  - Archive Logs
- HADR
  - High Availability Disaster Recovery
    - Primary/Standby Databases

Oracle Backups
Cold- Can use any type of copy method
Hot – Run alter commands and then copy datafiles
Export database- Can use the export command to backup database. Very slow.
Standby database = Fail over database

REDO Log
The redo log is a set of files that protect altered database data in memory that has not been written to the datafiles. The redo log can consist of two parts: the online redo log and the archived redo log.

UNDO records
Undo records can be stored in either undo tablespaces or rollback segments. Oracle uses the undo data for a variety of purposes, including accessing before-images of blocks changed in uncommitted transactions. During database recovery, Oracle applies all changes recorded in the redo log and then uses undo information to roll back any uncommitted transactions

Control Files
The control files of a database keep, among other things, information about the file structure of the database and the current log sequence number being written by LGWR. During normal recovery procedures, the information in a control file is used to guide the automated progression of the recovery operation. Oracle can multiplex the control file, that is, simultaneously maintain a number of identical control files
### Oracle

Control file is a small binary file that describes the structure of the database.

**Properties**

- All necessary database files and log files are identified in the control file.

**RMAN** – Keeps track of backups

### DB2

**Recovery History File**

**Updated:**

- Backup of DB/TS
- Restore/Roll Forward of DB/TS
- Drop/Load/Reorg/Stats of a table
- Quiesce/Alter TS

**Contains**

- Part of DB which was copied
- When DB was copied
- Location of the copy
- Time of last restore
- DDL of tables
Oracle

The redo log is a set of files that protect altered database data in memory that has not been written to the datafiles. The redo log can consist of two parts: the online redo log and the archived redo log.

Redo log files record all changes made to the database, and are used for data recovery. If the redo log files are multilexed, the same redo log information is written to multiple online redo log files.

• Redo files are written to in a circular fashion
• Must be at least 2 redo log groups

Rollback Segments exist only until data is committed.
Circular Logging

- Non-recoverable databases
- Log files are reused
- Uses active logs only
  - Secondary used for overflow
- Roll-forward recovery not possible
- Default method for new DB’s

Supports both crash and version type recoveries
Primary log files are allocated when the database is created.
Secondary log files are allocated as needed.
- Automatically de-allocated when no longer needed
- Good for periodic large units of work
Archival Logging

- Log files not reused
- Roll Forward Recovery

**Active (15,16)** – Contains information related to units of work that have not yet been committed or rolled back. They also contain information for transactions that have committed, but whose changes have not been written to disk.

**Online archive (14)** – Contains information related to completed transactions that no longer require crash recovery protection. These are called online because they reside in the same subdirectory as the active logs.

**Offline archive (12,13)** – log files which have been removed from the active log subdirectory. The files must be moved manually. There is no auto-archiving in UDB.
Types of Recovery

Oracle

- Instance Recovery
  - RAC only
  - Uses Redo logs to recover from System/Instance failures
- Crash
  - Uses online REDO logs
  - Recovers data files
- Disaster
- Media Recovery

DB2

- Crash
  - Uses logs to recover from power interrupts or application ABENDS
- Roll-Forward
  - Image copy plus log apply
  - LOCAL TIME
- Version
  - Image copy
- HADR

Archive Mode
Automatic – To current
## Reorganizing Data

### Oracle
- OEM Reorg Wizard
  - Tables
  - Tablespace
  - Indexes
  - Repair migrated rows
- Online Redefinition Package
  - Enterprise Edition only
  - Online reorg

### DB2
- REORG
  - Table
  - Index
- REORGCHK
  - Determines when Reorg is required
- Online

---

**Oracle**

The Reorg Wizard can eliminate space problems by reorganizing database space usage. It also allows you to change objects storage settings and location. The Reorg Wizard gives you three reorganization options:

- Reorganize specific schema objects, such as tables or indexes
- Reorganize an entire tablespace
- Repair migrated rows

The Reorg Wizard performs reorganizations completely within the Oracle database using SQL. Reorganizations can be performed within the target tablespace or by temporarily using space in another tablespace. The Reorg Wizard allows you to indicate whether the generated script should favor availability or speed. If availability is chosen, the generated script will take full advantage of online capabilities supported by the server. On the other hand, if speed is chosen, the generated script will always use an off-line reorganization approach. The Reorg Wizard evaluates the reorganization operations and generates an Impact Report and reorganization script as shown below.

- Online Redefinition Package – Designed to redefine a table from one type to another, but can be used like an online reorg.
Loading Data

Oracle

- SQL*Loader Utility
  - Insert/Append/Replace/Truncate
  - Direct=True|False
  - By-pass SGA build data block
  - No Triggers
  - No RI
  - Parallel=True|False
  - Multiple load files
  - Drop all indexes
  - Recoverable/Unrecoverable

DB2

- Load
  - Locks single table in TS
  - Insert/Replace
  - RUNSTATS
  - Good for large amounts of data
  - READ ACCESS for rows not being loaded
  - Load directly from a SQL query

- Import
  - Can dynamically create table
  - Insert process
    - Update
    - Replace
  - Good for small amounts of data
ORACLE COMPATIBILITY FEATURES
Enabling Oracle Compatibility Features

- DB2 Compatibility Vector
  - New registry value
    - Enables Oracle compatibility
  - Controls which compatibility features to turn on
  - `db2set DB2_COMPATIBILITY VECTOR=ORA`
    - Activates all features.

Compatibility Vector Options
- `ROWNUM`
- `DUAL`
- `Outer join Operator`
- `Hierarchical queries`
- `NUMBER data type`
- `VARCHAR2 data type`
- `DATE data type`
- `TRUNCATE TABLE`
- `Character literals`
- `Collection methods`
- `Data disctionary-compatible views`
- `PL/SQL compilation`
Compatibility Features

- Oracle data dictionary compatible views
  - ALL_*
  - DBA_*
  - USER_*
- CLPPlus
  - SQL*Plus compatible command line processor
MODULES

- New DB2 Object
  - Groups object definitions together for an application
    - Functions
    - Procedures
    - TYPE
    - VARIABLE
- Same as Oracle PL/SQL Packages
Application Enablement

- Native PL/SQL support
  - No SQL translation required
  - PL/SQL compiler
  - PL/SQL debugger
  - PL/SQL Object support
    - After each row triggers
    - Anonymous Blocks
    - Before each row triggers
    - PL/SQL packages
    - Procedures
Application Enablement

Common Packages Provided by DB2

<table>
<thead>
<tr>
<th>Package</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>DBMS_ALERT</td>
<td>Allows sessions to semaphore</td>
</tr>
<tr>
<td>DBMS_JOB</td>
<td>DB2 task scheduler API</td>
</tr>
<tr>
<td>DBMS_LOB</td>
<td>Oracle LOB API</td>
</tr>
<tr>
<td>DBMS_OUTPUT</td>
<td>Basic reporting</td>
</tr>
<tr>
<td>DBMS_PIPE</td>
<td>Allows sessions to send data back and forth</td>
</tr>
<tr>
<td>DBMS_SQL</td>
<td>Dynamic SQL API</td>
</tr>
<tr>
<td>DBMS UTILITY</td>
<td>Misc. application procedures</td>
</tr>
<tr>
<td>UTL_DIR</td>
<td>Maintains directory aliases used w/UTL_FILE</td>
</tr>
<tr>
<td>UTL_FILE</td>
<td>Allows working with files on DB2 server</td>
</tr>
<tr>
<td>UTL_MAIL</td>
<td>Send Email from SQL</td>
</tr>
</tbody>
</table>

Common Oracle packages are commonly used in Oracle applications. These packages are now provided by DB2.
### New DB2 Data Types

#### Oracle
- BFILE
- BLOB
- CHAR(n)
- CLOB
- DATE
- LONG
- LONG RAW
- NCHAR(n)
- NCLOB
- NUMBER(p,s)
- NVARCHAR2(n)
- RAW(n)
- ROWID
- VARCHAR2(n)

#### DB2
- BOOLEAN
- INDEX BY
- NUMBER
- Oracle DATE
- Ref Cursor type
- ROW TYPE
- TIMESTAMP(n)
- VARCHAR2
- VARRAY
Summary

To be a successful cross platform DBA:

• Have a sound foundation of relational principles
• Understand the nuances of the individual platforms
• The new Oracle compatibility features built into DB2 9.7 provide an easy mechanism to transition existing Oracle applications over to DB2 LUW.
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D08
DB2 LUW for the Oracle DBA
Slide Title
(can be up to two lines of text)

• First Topic
• Second Topic
  • Sub-Topic A
    • Secondary Sub-Topic 1
    • Secondary Sub-Topic 2
  • Sub-Topic B
  • Sub-Topic C
• Third Topic
• Fourth Topic