
SQL Server to Oracle A Database Migration Roadmap

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Agenda

- **Introduction**
- **Institutional Background**
- **Migration Criteria**
- **Database Migration Methodology**
- **SQL/Oracle Tool for Data Migration**
- **Questions**

Institutional Background

- The Superior Court of California (SacCourt), County of Sacramento is part of the statewide justice system of 58 trial courts, Appellate Courts and the California Supreme Court.
- Each county operates a Superior Court that adjudicates criminal, civil, small claims, landlord-tenant, traffic, family law, and juvenile dependency and delinquency matters.
- SacCourt has 60 judicial officers and 760 staff who processed over 400,000 new cases filed in FY 2008-09.



“Our Mission is to assure justice, equality and fairness for all under the law.”

Database Environment

▪ SQL Server

- SQL Server 6.5, 2000, 2005 32-bit on Window
- SQL Server 2008 64-bit on VMWare/Physical Hardware

▪ Oracle

- Oracle 10G R2, 10G R2 RAC on Sun SPARC Solaris 10
- Oracle Enterprise Manager, Grid Control on Window
- Oracle Application Express
- Oracle Migration Workbench

Migration Objectives

- Validate the purpose of migration.
- Achieve Return of Investment.
- Compatibility of Hardware and Software.
- Accomplish Physical and Logical Model.
- Meet Source and Target Application/Database Criteria.
- Minimize Outage Time.

“No single best method for all cases!”

Migration Process

- Analyze
 - Database Architecture
 - Cost-Effectiveness
 - Risk Mitigation
- Plan
 - Routines
 - Downtime
- Perform
 - Data Migration
- Verify
 - Migration Success

Migration Methodology

- Recommend approaches
 - Traditional Waterfall System Life Cycle over Rapid Application Development
 - “As-Is” approach
- Upgrade after migration.
- Automate using Oracle Migration WorkBench.
- Create custom installation scripts.

SQL to Oracle Migration

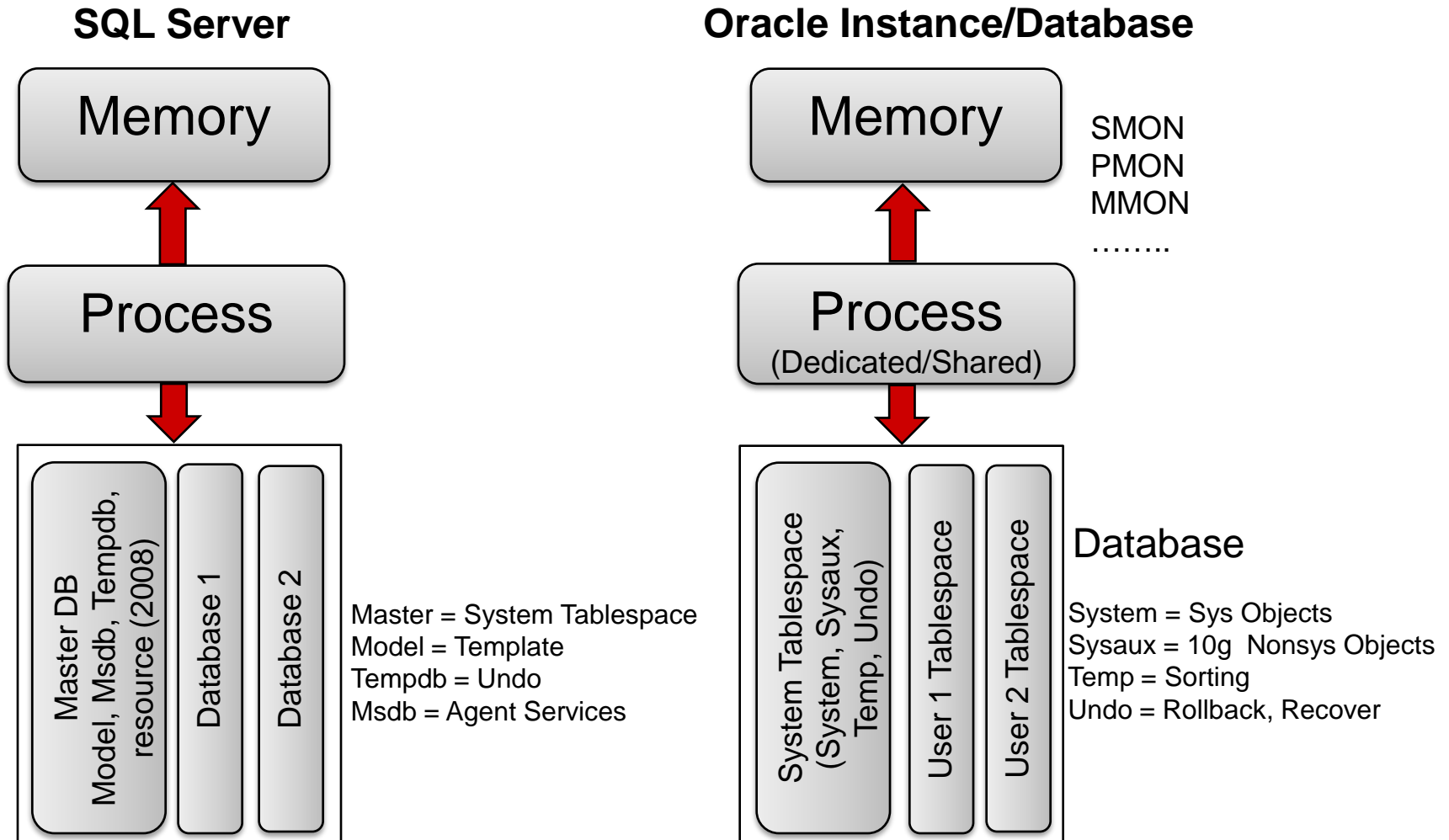
1. Physical and Logical Structure
 - 1.1 Characteristics
 - 1.2 Data Types/Storage
 - 1.3 Recommendations
2. Stored Procedures
3. SQL Migration
4. Database Design
5. Schema Design
6. Data Migration
7. Security

Physical and Logical Structure

- Map Similar Database Objects
 - Schema objects, data types
 - Referential integrity, constraints, rules
 - Triggers, stored procedure, system catalogs

- Map Different Database Objects
 - Connection types or models
 - Temporary tables
 - Application programming
 - Data migration

Physical and Logical Structure



Physical and Logical Structure

1.1 Characteristics

| SQL | Oracle |
|-----------------------------------|---------------------------------------|
| Instances/Database | SGA/SID |
| Case Insensitive | N/A |
| Database | Database |
| Database and Database Owner (DBO) | Schema |
| Database | Tablespace |
| T-SQL Stored Procedure | PL/SQL Procedure, Function or Package |
| Triggers | After Triggers |
| Complex Rules | Before Triggers, Trigger for Each Row |
| Identity Property for a Column | Sequences |
| View | View, M-View |

Physical and Logical Structure

1.1 Characteristics (Cont.)

| SQL | Oracle |
|-------------------------------|--------------------------------------|
| Transaction Logs Per Database | Transaction Logs for Entire Database |
| Auto Commit | Manual Commit or Rollback |
| Manual Exception | Default Exception |
| SA Account | System/manager Account |
| sysconfig | spfile |

Physical and Logical Structure

1.2 Data Types/Storage

| SQL | Oracle |
|---|------------------------------|
| Integer, Small Int, Tiny Int, Bit, Money, Small Money | Number (10, 6, 3, 1, 19, 10) |
| Real, Float | Float |
| Text | CLOB |
| Image | BLOB |
| Binary, VarBinary | RAW |
| DateTime, Small DateTime | Date |
| Varchar2 (max) | LONG, CLOB |
| Varbinary (max) | LONG RAW, BLOB, BFILE |

Physical and Logical Structure

1.2 Data Types/Storage (Cont.)

| SQL | Oracle |
|------------------|----------------------------------|
| Database Devices | Datafile |
| Page | Data Block |
| Extent | Extent and Segments |
| Segments | Tablespace (Extent and Segments) |
| Log Devices | Redo Log Files |
| Data, Dump | N/A |

Physical and Logical Structure

1.3 Recommendations

| SQL | Oracle |
|--|--|
| MS Applications tend to use ASP on Clients. ASP uses ADO to communicate to DB. | Use Oracle OLE/DB or migrate to JSP. |
| DB Library | Use Oracle OCI calls. |
| IIS/ASP | IAS/Fusion on JAVA 2 Platform, J2EE |
| Embedded SQL from C/C++ | Manual conversion |
| Stored Procedure return Multiple Sets | Find driver support Reference Cursors (i.e. DataDirect). |
| Delphi, MS Access (Embedded SQL/C or MS Library) | Use ODBC Driver. |
| DBO.Database | Transform to Single or Multiple Schema. |
| DTS/SSIS | Warehouse Builder |

2. Stored Procedures

- Use Package for nested procedures.
- Use Functions for User-Defined Functions.
- Use Hints or CBO.
- Remove Create/Drop temporary tables.

3. SQL Migration

- TOP function
- Dynamic SQL → No conversion
- Case statements → Decode
- Unique identifier (GUID) → ROWID or UROWID

Example:

```
select newid()
```

vs.

```
select sys_guid() from dual
```

4. Database Design

- Evaluate Constraints
 - Entity Integrity
 - Referential Integrity
 - Unique Key
 - Check

- Use Table Partitions.
- Apply Reverse Key for sequence generated columns.
- Apply Flashback for restoration.
- Use Oracle RAC, Active DataGuard for HA/DR.
- Use Transparent Data Encryptions and remove data encryptions.

4. Database Design (Cont.)

- Outer Joins
- Oracle Exceptions (i.e. no_data_found)
- Autonomous Transactions
- Records and Types
- Reverse Key for RAC environment

5. Schema Design

- Table (Data Types, Constraints)
 - Numeric (10, 2) → Number (10, 2)
 - Datetime (Oracle 4712 BC, SQL 01/01/0001 – 12/31/9999)
- Views (Materialized views)
- Trigger (Functionality difference)
- Synonyms (Public or Private)
- Spatial
 - Create table abc (id number (10) not null, geo dsys.sdo_geometry)
 - vs.
 - Create table abc (id number (10) not null, geo geography)

5. Schema Design (Cont.)

- Data Types

- Datetime

1/300th of a second vs. 1/100th million of a second

- Image and Text

- Image of data is stored as pointer vs. Image stored in BLOB and Text in CLOB

- User-Defined

- Equivalent to PL/SQL data type

- Table Design

SQL

```
Create table sample
(datetime_col datetime      not null,
 integer_col  int           null,
 text_col     text         null,
 varchar_col  varchar2 (10) null)
```

Oracle

```
Create table sample
(datetime_col  date        not null,
 integer_col   number      null,
 text_col      long        null,
 varchar_col   varchar2 (10) null)
```

6. Data Migration

- SQL Loader
- Data Pump
- Stream
- Database Link or Transparent Gateway
 - Create table as select.
 - Insert as select.

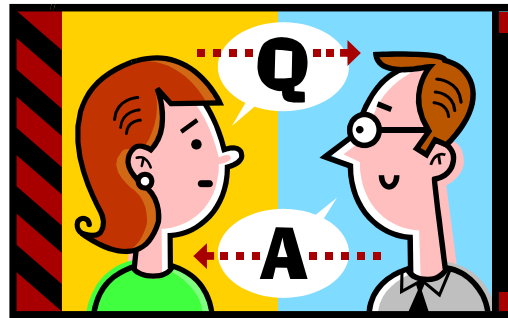
7. Security

- Create user accounts in Oracle.
- Leverage default Role and Privs.
- Map user accounts to Role.

SQL/Oracle Tool for Migration

- Oracle Migration Workbench
- OEM/Grid Control
- Upgrade SQL to ver. 2005 with Transparent Gateway
- Oracle APEX
- Scripting

Questions



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