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

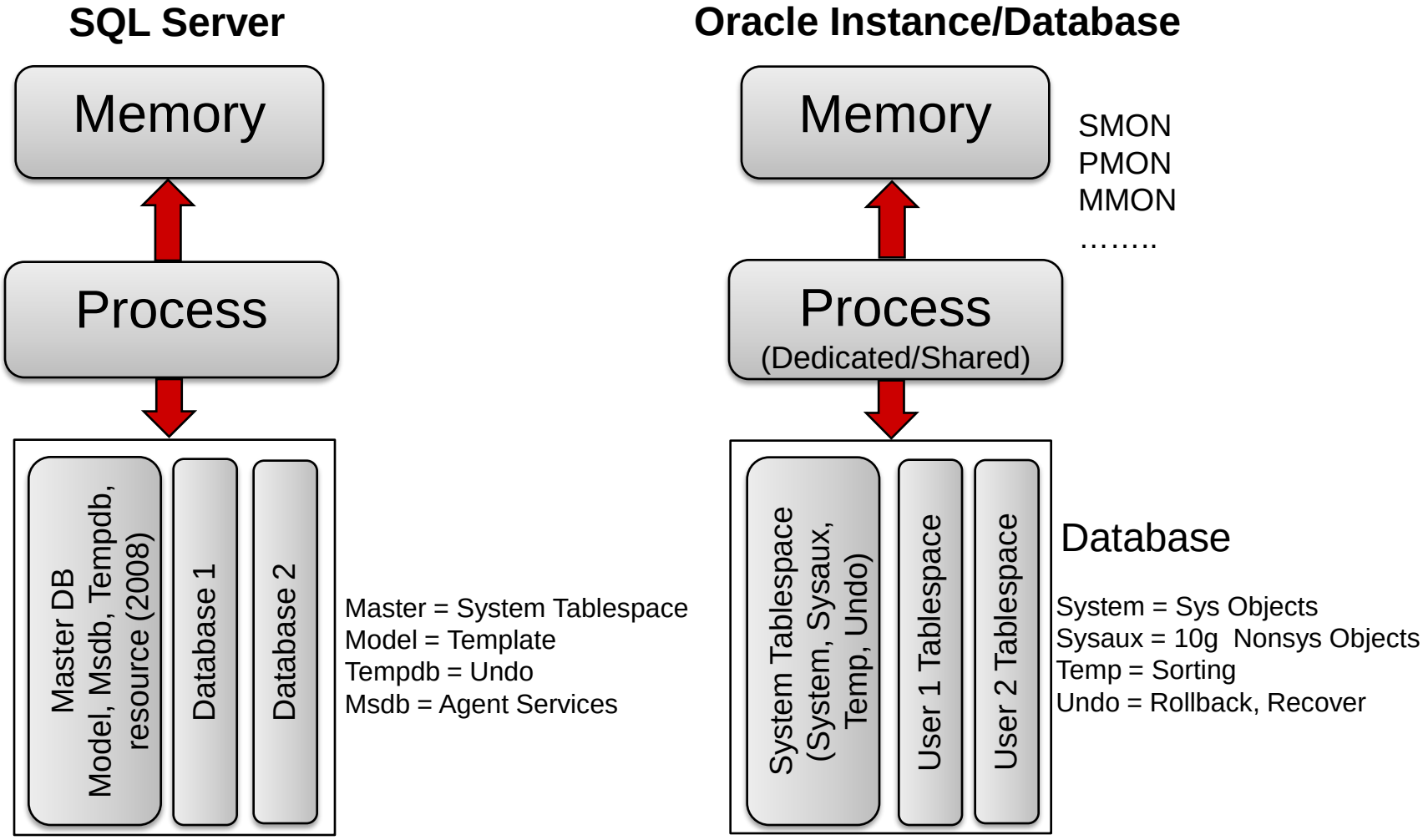
1. Physical and Logical Structure
   - 1.1 Characteristics
   - 1.2 Data Types/Storage
   - 1.3 Recommendations
2. Stored Procedures
3. SQL Migration
4. Database Design
5. Schema Design
6. Data Migration
7. Security

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.

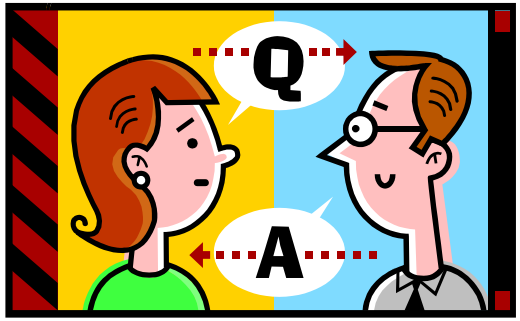
7. Security

- 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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