

ISV

Migrating to Oracle9i/10g

Methodology, Tips & Tricks
and Resources

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Server Technologies

Agenda

Typical Migration Projects

Migration Methodology

Comparison of Oracle and other RDBMS

What Oracle Migration Workbench does

Migration of the Application – Some Typical Cases

Resources

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Typical Migration Projects - Database

- Easy
 - 15 to 40 person days
- Medium Complexity
 - 40 to 180 person days
- Complex
 - 180 - 700 person days
- Very Complex
 - > 700 person days
- Most migrations from SQL Server take from 90 – 170 person days

Typical Migration Projects – PTS Support

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5 to 10 days:

- 3 days on site to kick off the project
 - 1 day install + basic skills transfer
 - 1 day database migration
 - 1 day to get application migration started
- Remote assistance
- 2-3 days to solve technical issues
- 1 day tuning
- 1 day automating Oracle Installations

Types of Migration Projects

- Prototypes vs Real Projects
- Migrations (20%) vs Portations (80%)
- Original database:
 - SQL Server
 - Sybase
 - Informix
 - DB2
 - ISAM/RMS/Btrieve

Project Origin

- Customer Request/Demand
- Scalability/performance
- Database consolidation/company direction
- Be part of the Oracle community
- eBusiness Suite Integration
- ISV Recruitment effort Account Manager
- Marketing Campaigns

Agenda

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Migration Methodology

- Follows the traditional “waterfall” System Life Cycle (SLC) approach rather than the “iterative” Rapid Application Development (RAD) approach.
- However, four to six week prototypes are often part of the migration.
- Requirements gathering, analysis and design are normally completed in two to ten weeks.
- Easiest part to migration is installation scripts, schema and data (normally two to eight weeks).

Migration Methodology - continued

- Application code is normally easy to migrate. However, SQL needs to be changed.
- Changes to the existing application (deltas) should be incorporated at the end of the migration.
- Exclude schema, architecture and application changes from the scope of the project. Stick to an “as is” port.
- **DO NOT** try to do other migrations (OS, language) at the same time.

Migration Methodology - continued

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- Migration Methodology Life Cycle
 - Questionnaire - Complete questionnaire with on-site client visit. Small project can be done all off-site.
 - Project Scope/Project Plan - Project scope and project plan can be completed on-site or off-site.
 - Schema, application and data migration design - Complete the analysis and design phase.
 - Implementation - Perform the migration effort.
 - Unit Testing - Is normally included with implementation
 - System Testing
 - Customer acceptance testing
 - Performance Acceptance
 - Delta integration

Migration Methodology - Location

- @Your Site
 - Migration resource physically located at your site. Use your hardware etc.
- @Your Site virtually
 - Your hardware etc. Resources doing the work VPN into your site.
- @Oracle
 - Oracle hosts the application and database at their facilities and partner and third party (if used) VPN in.
- @Third party off shore site “Batch mode”
 - Third party hosts the application and database at their facilities and security FTP sites are used to transfer completed work

Agenda

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Comparison of Oracle and other RDBMS

Similarities

- Similar Schema Objects (tables, views)
- Similar Datatypes
- Referential Integrity
- Check Constraints / Rules
- Transaction Support
- Triggers and Stored Subprograms
- SQL Access to System Catalogs

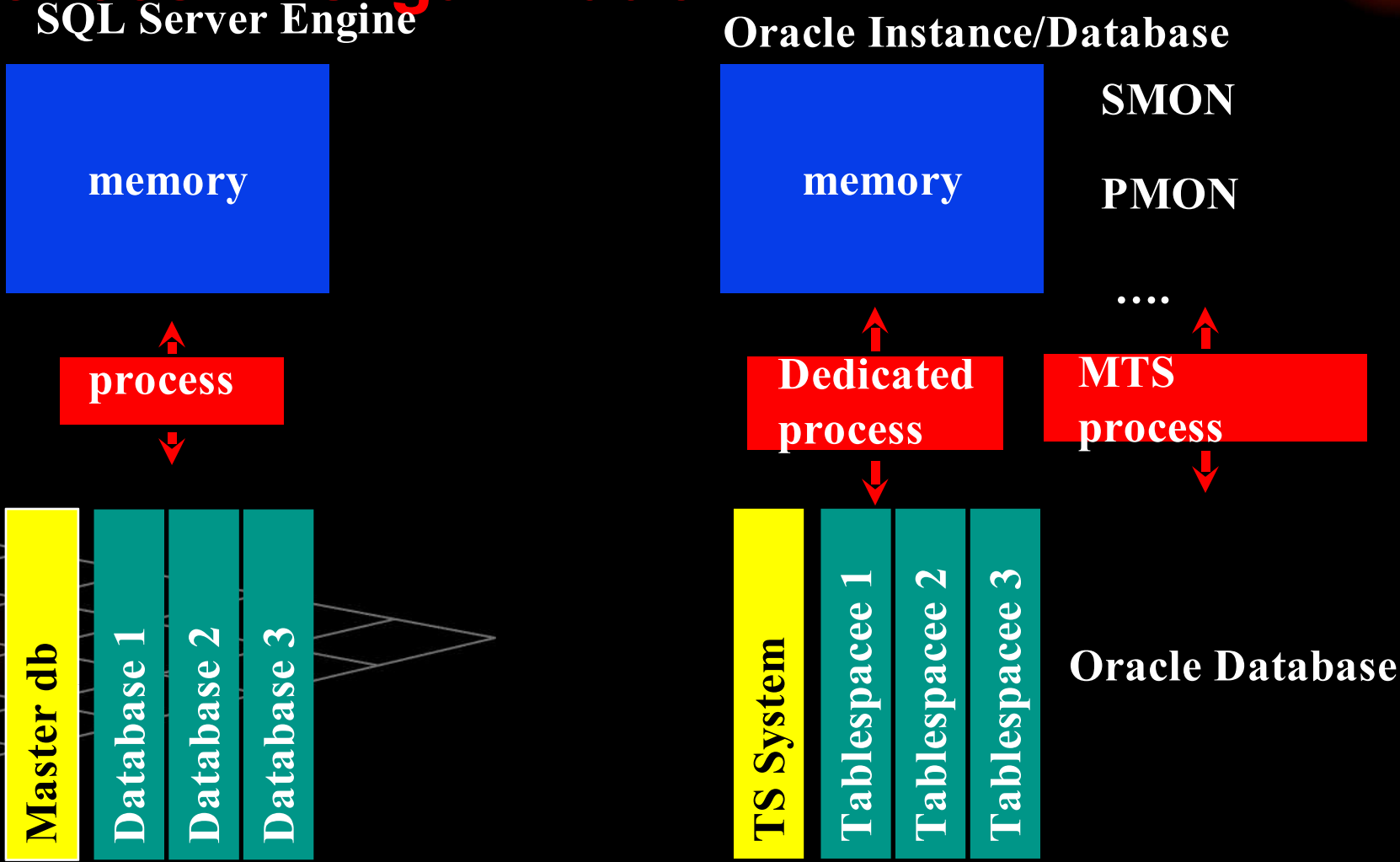
Comparison of Oracle and other RDBMS Differences

Main Differences:

- Organization
- Connection Models
- Transactional and Isolation Models
- Temporary Tables
- Application programming
- Stored Subprograms
- Utilities (Bulk Loading)
-

Comparison of Oracle and other RDBMS^{10g}

Differences in Organization



Comparison of Oracle and other RDBMS

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Differences in Organization - Terminology

- Oracle spfile(auto managed binary)/pfile(textfile initxxx.ora) = SQL Server sysconfig
- Oracle v\$, USER_TABLES = SQL Server sp_ stored procedures, sysxxx tables
- Oracle has schemas/tablespaces = SQL Server databases/devices
- Oracle has redo buffer cache, redo logs for archiving = SQL Server transaction log
- Oracle has UNDO space for read consistency = no equivalent in SQL Server
- Oracle SQL*PLUS (;) = SQL Server ISQL (go)

Comparison of Oracle and other RDBMS

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Differences in Organization - Terminology

- Oracle has scott/tiger schema = SQL Server PUBS database
- Oracle has System/manager = SQL Server SA/
- Oracle Oracle Call Interface = SQL Server DB-Library
- Oracle SQL*Loader = SQL Server BCP
- Oracle Warehouse Builder = SQL Server Data Transformation Services (DTS)
- Oracle Advanced Queuing (AQ) = MSMQ

Comparison of Oracle and other RDBMS

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Differences in Connection Models

- **Oracle:** connect to <schema>
- **other RDBMS:** connect to <database>
- The two models can be mapped:

```
CREATE USER <schema_name>  
... DEFAULT TABLESPACE <ts_name>
```

```
ALTER SESSION SET CURRENT_SCHEMA =
```

Comparison of Oracle and other RDBMS Differences in Connection Models

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- Oracle is “**connection-based**”
 - Multiple active resultsets per connection possible
 - **Needs only one connection**
 - Multiple Sessions per Connection possible
 - Multiple Transactions per Session possible
 - Can access distributed-databases via dblinks
- some RDBMS are “**stream-based**”
 - One active resultset per connection
 - Several connections typically used

Comparison of Oracle and other RDBMS Differences in Transactional Models ^{10^g}

- Oracle
 - Uses multi-version concurrency control to deliver consistent reads without Read Locks so **Readers and Writers never block each other**
 - Uses true Row Level locks
 - **Less INSERT, UPDATE conflict with other writers compared to other RDBMS**
 - Locks never escalate

Comparison of Oracle and other RDBMS Differences in Transactional Models ^{10^g}

- Most other RDBMS
 - Allow the application developer to choose from several isolation levels
 - “Read Committed” and “Serializable” use **Read Locks** to provide read consistency. This causes writers to be blocked.
 - Read uncommitted allows **Dirty Reads** to alleviate this problem.
 - Locks escalate as number increases
 - Locking in memory
 - Some RDBMS still use Page Locks

Comparison of Oracle and other RDBMS Differences in Transactional Models ^{10^g}

- SQL Server (auto commit is the default)
 - Must specify “Begin Transaction”
 - Can have “nested” transaction...@@trancount
- Oracle (implicit transactions is the default)
 - Any DML does an implicit “Begin Transaction”
 - Must issue “commit” or “rollback”

Comparison of Oracle and other RDBMS

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Differences in Temporary Tables

- Oracle does not need in most cases Temporary Tables
 - The Oracle optimizer is able to deal with really complex queries, so simply re-write to avoid the Temporary Table
 - Oracle9i supports ANSI global Temporary Tables
- other RDBMS use Temporary Tables for
 - Query simplification
 - Result accumulation
 - Legacy reasons...lack of cursors...4 limit table join

Comparison of Oracle and other RDBMS

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Differences in Application programming

- SQL Syntax Differences
 - Oracle9i/10g supports ANSI SQL (outer joins, case,...)
 - There are still differences
 - System tables access, system stored procedure access (sp_), @@ variable usage
 - Workbench handles some changes on the Server
 - Client side will need re-coding if an issue

Comparison of Oracle and other RDBMS

Differences in Stored Subprograms

- Various RDBMS use different languages
- Some RDBMS use SPs heavily

Allows code to be precompiled,
increasing performance

- Oracle has PL/SQL and Java, execute external C programs and Web Services from PL/SQL
 - Migration Workbench converts Transact SQL
 - Consider moving simple SPs in-line
 - Resultsets are converted using reference cursor variables

Comparison of Oracle and other RDBMS

Differences in Stored Subprograms – Error Handling

- Oracle is modeled after PL/1 and Java
- SQL Server
 - Checking @@error is up to the developer...errors can go undetected.
- Oracle
 - Errors are “thrown” and you need to “catch” them (EXCEPTION WHEN) ... can choose to ignore and continue processing.

Comparison of Oracle and other RDBMS

Differences in Stored Subprograms – Packages and Functions

- Oracle is modeled after PL/1 and Pascal
- Packages are like Java Packages
 - Have Java Interface definitions where only the stored procedure signature is defined
 - Allows stored procedure that perform similar functionality to be packaged together
- Functions can return a value stored procedures can not...stored procedure are for return results sets...functions can be executed as part of a SQL statement

Comparison of Oracle and other RDBMS

Differences in Stored Subprograms – Triggers

- SQL Server
 - Only “after statement level” triggers
 - Deleted and Inserted “Tables”
 - Can issue commit and rollback statements
 - DDL execution is possible
- Oracle
 - Have row and statement, before and after triggers

Agenda

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What Oracle Migration Workbench does

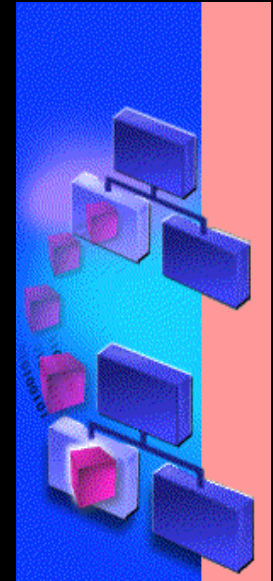
Migration of the Application – Some Typical Cases

Resources

Oracle Migration Workbench Overview

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- Basis of all Oracle migration technology
- Wizard-driven tool; developed **100% in Java**
- Easy to use, GUI Interface
- Supports various RDBMS
- **Production** since October 1998



Oracle Migration Workbench Overview (2)

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- Database (Schema + Data)
- Triggers & Stored Procedures
- Proven solution
- Reduced Effort, Risk and Cost

Oracle Migration Workbench

Concepts

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- Repository Based
- Extensible
 - 3rd party integration
- Leverage existing Oracle Technology
 - Oracle Enterprise Manager
 - Gateways
- Leverage new Oracle Technology
 - Direct Load API

Oracle Migration Workbench

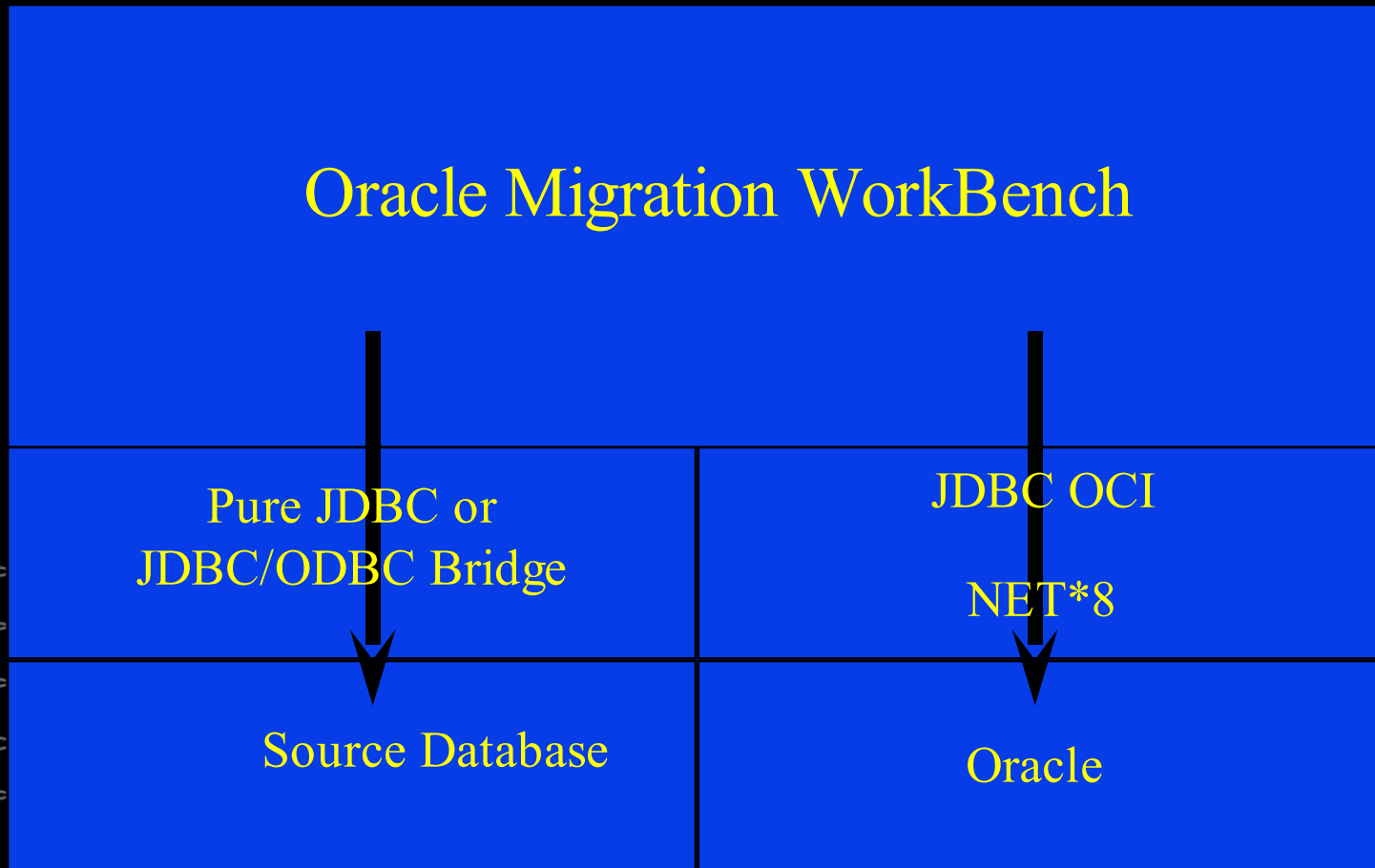
Migratable Objects in the database

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- Tables and Data
- Primary Keys
- Check Constraints
- Foreign Keys
- Indexes
- Views
- Groups / Users
- Databases
- Stored Procedures
- Triggers
- Grants
- Rules
- Defaults
- User Defined Types

Oracle Migration Workbench Connectivity

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Objects being migrated from LocalServer

- Databases (1)
 - demo
 - Check Constraints (4)
 - Foreign Keys (3)
 - Groups/Users (1)
 - Indexes (1)
 - Primary Keys/Unique Constraints (6)
 - Stored Procedures (3)
 - enter_position
 - read_avg**
 - read_position
 - Rules (0)
 - Tables (4)
 - Triggers (1)

SQL Server 6.5 Source Model Oracle Model

General

Name:

Owner:

Query Text


```
CREATE PROCEDURE read_avg
AS
    Create table #tmp (
        order_id int not Null,
        value money not Null
    )

    Insert #tmp Select order_id, sum (price * quantity)
        from positions
        group by order_id
```

Time	Message	Type	Action
20-OCT-1998 11:32:57	SQL Server 6.5 Indexes Mapped	Info	Mapping
20-OCT-1998 11:33:02	Mapping SQL Server 6.5 Views	Info	Mapping
20-OCT-1998 11:33:07	Parsing view text	Info	Mapping
20-OCT-1998 11:34:09	Mapped View: current_credit	Info	Mapping
20-OCT-1998 11:34:10	SQL Server 6.5 Views Mapped	Info	Mapping
20-OCT-1998 11:34:12	Mapping SQL Server 6.5 Triggers	Info	Mapping
20-OCT-1998 11:34:17	Parsing trigger text	Info	Mapping
20-OCT-1998 11:34:55	Mapped Trigger: check_cred_limit	Info	Mapping
20-OCT-1998 11:34:57	SQL Server 6.5 Triggers Mapped	Info	Mapping
20-OCT-1998 11:34:58	Parsing SQL Server 6.5 Procedures	Info	Mapping

Migration Workbench Logging

- Log Information is Persistent
- Conversion Problems can be revisited



The screenshot shows the Oracle Migration Workbench - Log Window interface. At the top, the session is identified as '20-OCT-1998 11:13:50'. Below this is a table with four columns: Time, Message, Type, and Action. The table contains 13 rows of log entries, primarily showing row counts inserted into various system tables. At the bottom of the window, there are four buttons: 'Delete Session', 'Delete All', 'Save', and 'Close'.

Time	Message	Type	Action
20-OCT-1998 11:26:49	7 rows inserted into table SYSDEVICES	Summary	Loading
20-OCT-1998 11:26:52	17 rows inserted into table SYSUSAGES	Summary	Loading
20-OCT-1998 11:26:58	8 rows inserted into table SYSDATABASES	Summary	Loading
20-OCT-1998 11:27:22	486 rows inserted into table SYSSPTVALUES	Summary	Loading
20-OCT-1998 11:27:24	Loaded tables from MASTER database	Info	Loading
20-OCT-1998 11:27:26	Loading Source Model for demo	Info	Loading
20-OCT-1998 11:27:29	0 rows inserted into table SYSALTERNATES	Summary	Loading
20-OCT-1998 11:27:33	0 rows inserted into table SYSARTICLES	Summary	Loading
20-OCT-1998 11:27:54	225 rows inserted into table SYSCOLUMNS	Summary	Loading
20-OCT-1998 11:27:59	18 rows inserted into table SYS COMMENTS	Summary	Loading
20-OCT-1998 11:28:03	15 rows inserted into table SYSCONSTRAINTS	Summary	Loading
20-OCT-1998 11:28:07	10 rows inserted into table SYSDEPENDS	Summary	Loading

Oracle Migration Workbench Architecture

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- Framework of **services**
- **MWSDK** Public API
- MWSDK **Plugins**

Informix 7.3

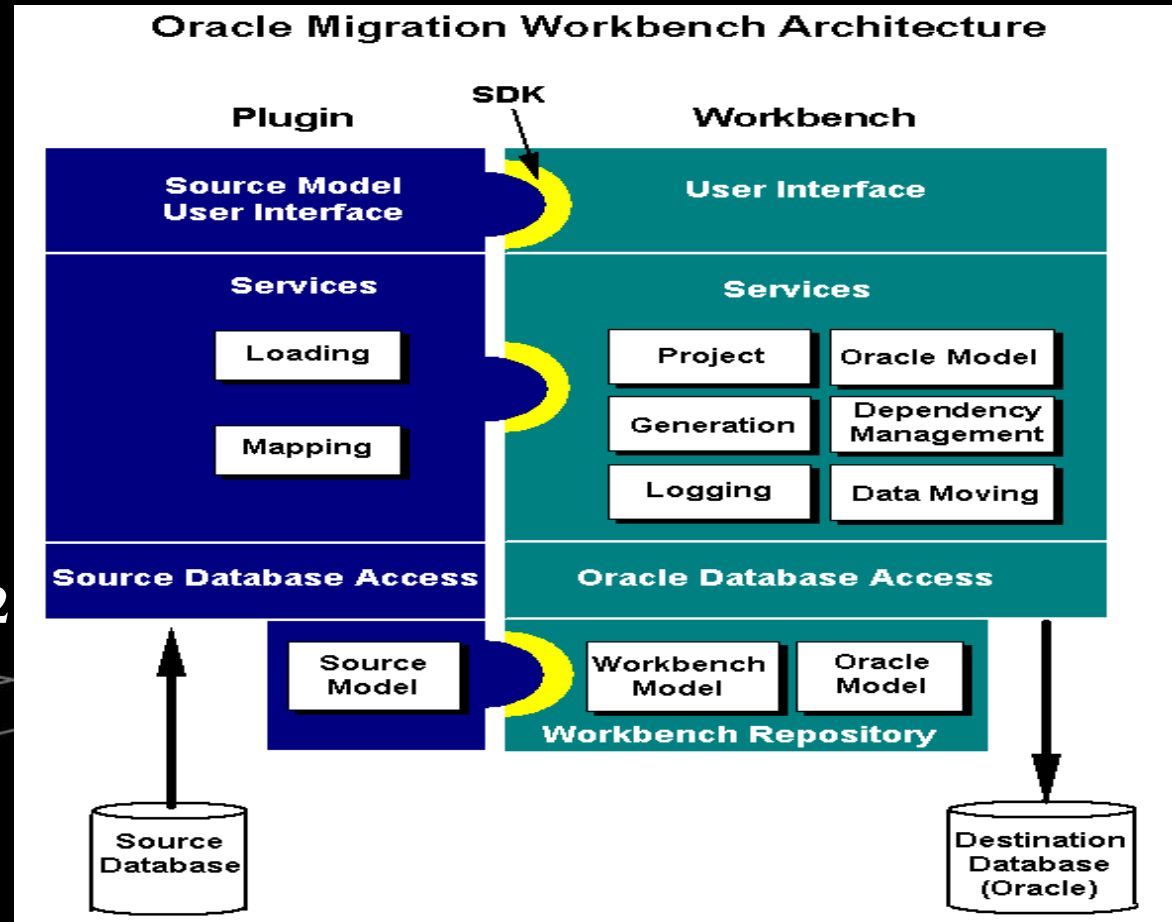
SQL Server 6.5/7.0/2000

Sybase Adaptive Svr 11&12

MS Access 2.0, 95, 97, 2000

MySQL 3.22 / 3.23

DB2/400 V4R3 for iSeries
(AS/400)



Oracle Migration Workbench Workflow

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Capture
Wizard

- Step 1 Select Server
- Step 2 Select Source Databases
- Step 3 Load and Map Source Model
-
- Step 4 Customize Mapping Options

Migration
Wizard

- Step 5 Select Target Database
- Step 6 Select schema object types to migrate
- Step 7 Create Users, Tables, Load Table Data, and Create Schema Objects

Oracle Migration Workbench

Capabilities

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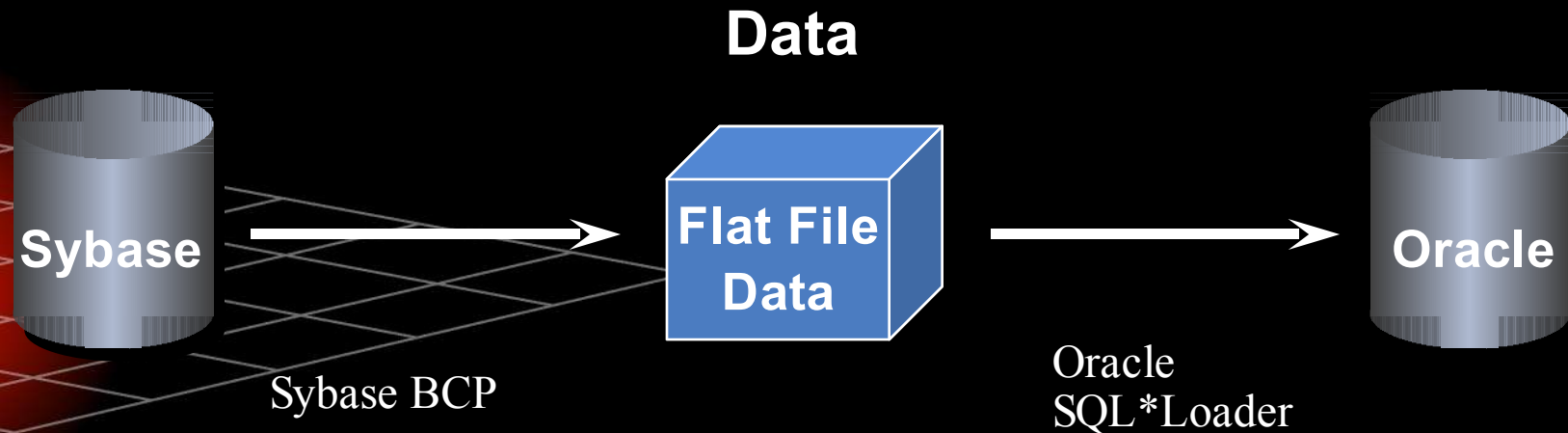
- Multiple Databases are consolidated into one Oracle Database
- One Tablespace per Database is created
- Multiple Users are retained
- Name Space conflicts are automatically resolved by the Workbench

Oracle Migration Workbench

Large volume of data

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Dump data from tables to flat files



Application Migration - Server side^{10^g}

Agenda

- **Transact SQL** Stored Sub Programs (Sybase / SQL Server) must be converted to PL/SQL or Java
- Oracle Migration Workbench converts Sybase / SQL Server / Informix Stored Procedures to PL/SQL

Agenda

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Application Migration - Client side 10^g

ODBC Issues & parameters

- ODBC driver must support Oracle reference cursors if using stored Sub Programs with resultsets.
 - Oracle and Data Direct ODBC driver do not require extra parameters for REF Cursors.
 - ODBC PassThrough Mode will potentially require re-coding of SQL statements
- ODBC AutoCommit Parameter needs consideration
- ODBC array processing considerations
 - Oracle ODBC Driver Rows Pre-Fetch parameter.

Application Migration - Client side ^{10^g}

Web Applications

- MS applications tend to use Active Server Pages on the client.
- ASPs tend to use ADO to communicate to the Database backend
 - Can be easily migrated to use the Oracle OLE/DB provider behind ADO
 - ODBC also possible via OLE/DB provider for ODBC
- Could leave as is or migrate to JSP (Java Server Pages).

Application Migration - Client side ^{10^g} **Client/Server Applications**

- ODBC Based Applications
 - When standard API is used (e.g. ODBC), only limited changes may be necessary
 - Some applications use proprietary API (e.g. DB/LIB) => DB layer needs re-writing
- DB/Library migrated to Oracle OCI
 - White papers
 - Sample code

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Resources

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- **Where Do I Start**
 - Install and setup up the hardware. Make sure the system is on the network.
 - 10g Database download
 - A. Enterprise database: <http://otn.oracle.com/software/products/database/oracle10g/index.html>
 - B. Client (for those machines that you want to access the Oracle database server instance) - Same location as about.
 - Migration Workbench - <http://otn.oracle.com/tech/migration/workbench/index.html>
 - Oracle Technology Network
<http://otn.oracle.com/tech/migration/content.html>

Resources

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- **How long will it take**
 - iMigrate or Questionnaire/Estimating Templates
 - <http://immigrate.oracle.com/iMigrate/>
- **How can I get questions answered**
 - PTS Technical Contact
 - Discussion forum on OTN:
 - <http://www.oracle.com/forums/homepage.jsp?null&|>
 - Oracle Support/MetaLink:
<http://www.oracle.com/support/metalink/index.html>

Resources - Continued

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- **Who Can Help**
 - PTS – Tom Laszewski 603.929.9201 or **tom.laszewski@oracle.com**...Scoping, Architecture, 9i
 - Tools Partners
 - <http://otn.oracle.com/tech/migration/mti/content.html>
 - SI Partners
 - Oracle Consulting – Based in India
 - Sierra Atlantic - <http://www.sierraatl.com/>

Questions?

