ISV
Migrating to Oracle9*i*/10*g*

Methodology, Tips & Tricks
and Resources

Tom Laszewski
Technical Director
Partner Technical Services
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

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

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

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

Typical Migration Projects

Migration Methodology

Comparison of Oracle and other RDBMS

What Oracle Migration Workbench does

Migration of the Application – Some Typical Cases

Resources

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

- 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

Typical Migration Projects

Migration Methodology

Comparison of Oracle and other RDBMS

What Oracle Migration Workbench does

Migration of the Application – Some Typical Cases

Resources

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

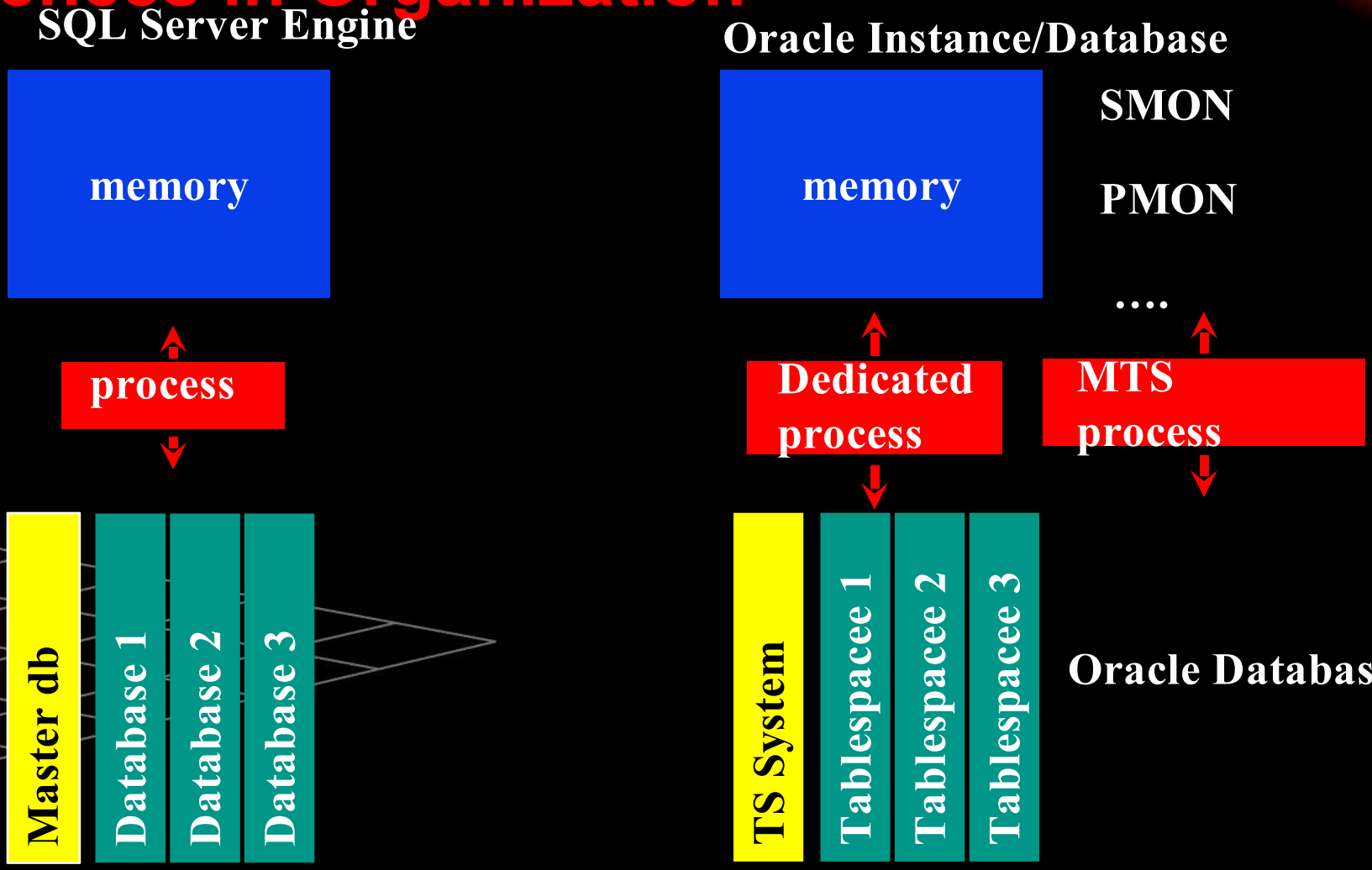
Comparison of Oracle and other RDBMS
Differences

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

10g

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

10g

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

10g

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

10g

- 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

10g

- 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

10g

- 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

10g

- 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

10g

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

Differences in Application programming

- SQL Syntax Differences
  - Oracle9*i*/*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

Typical Migration Projects
Migration Methodology

Comparison of Oracle and other RDBMS

What Oracle Migration Workbench does

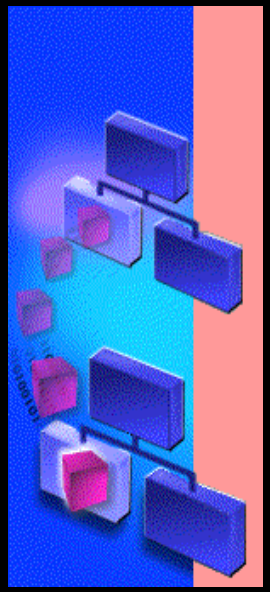
Migration of the Application – Some Typical Cases

Resources

Oracle Migration Workbench
Overview

10g

- 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)

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

Oracle Migration Workbench
Concepts

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

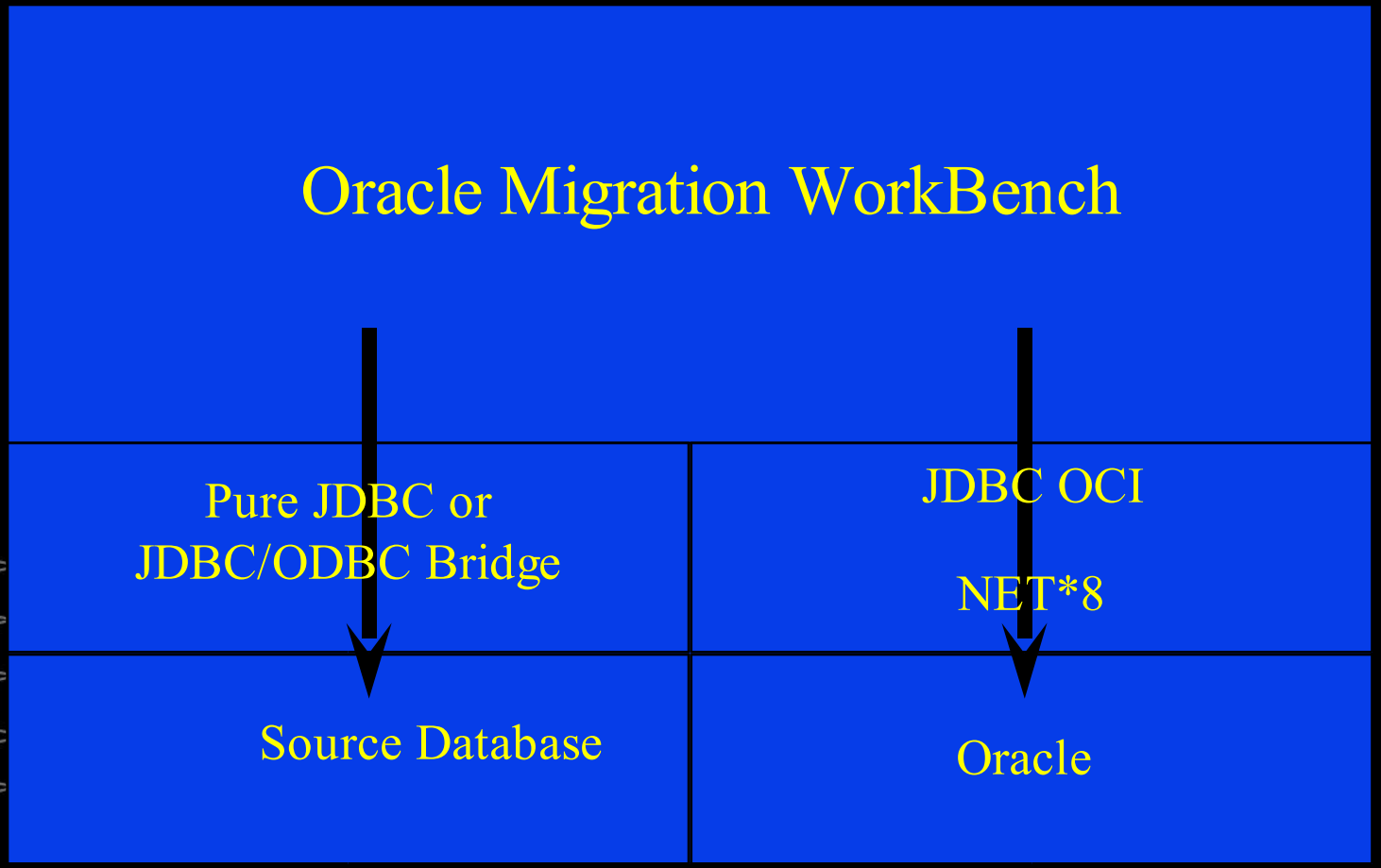
Oracle Migration Workbench

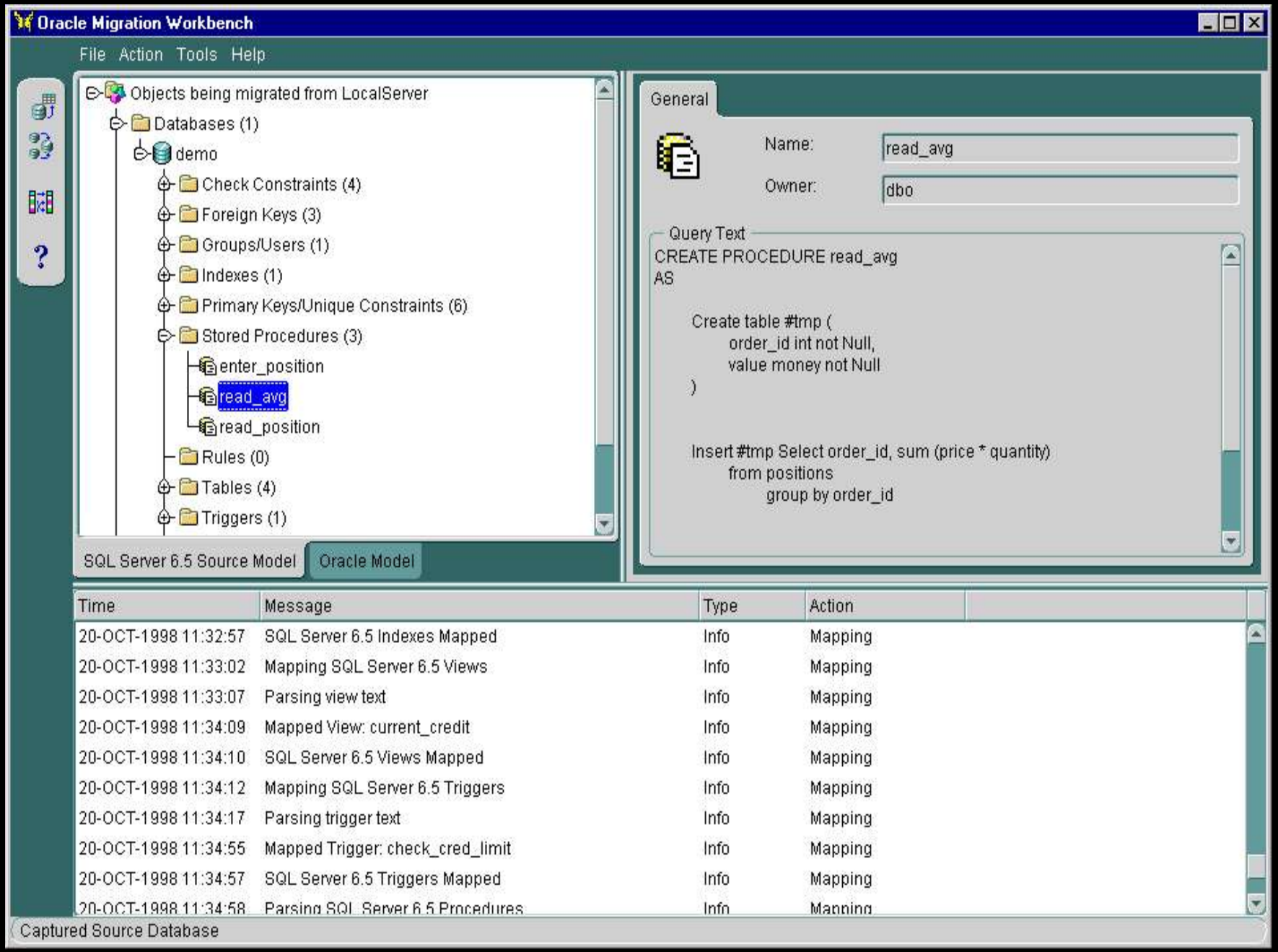
Migratable Objects in the database

- 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

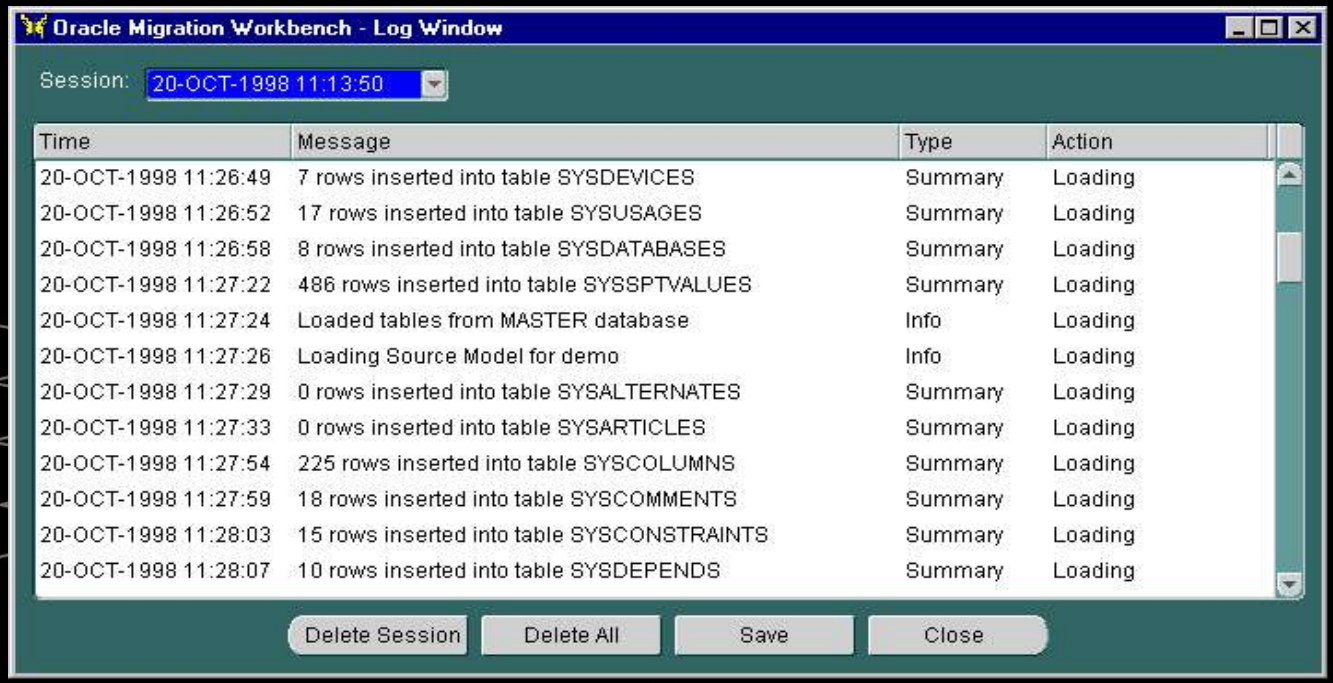



Oracle Migration Workbench
File Action Tools Help
Objects being migrated from LocalServer
Databases (1)
demo
Check Constraints (4)
Foreign Keys (3)
Groups/Users (1)
Indexes (1)
Primary Keys/Unique Constraints (6)
Stored Procedures (3)
enter_position
read_avg
read_position
Rules (0)
Tables (4)
Triggers (1)
SQL Server 6.5 Source Model
Oracle Model
General
Name: read_avg
Owner: dbo
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
Captured Source Database

Migration Workbench
Logging

10g

- Log Information is Persistent
- Conversion Problems can be revisited



Oracle Migration Workbench Architecture

10g

- Framework of services
- MWSDK Public API
- MWSDK Plugins

Informix 7.3

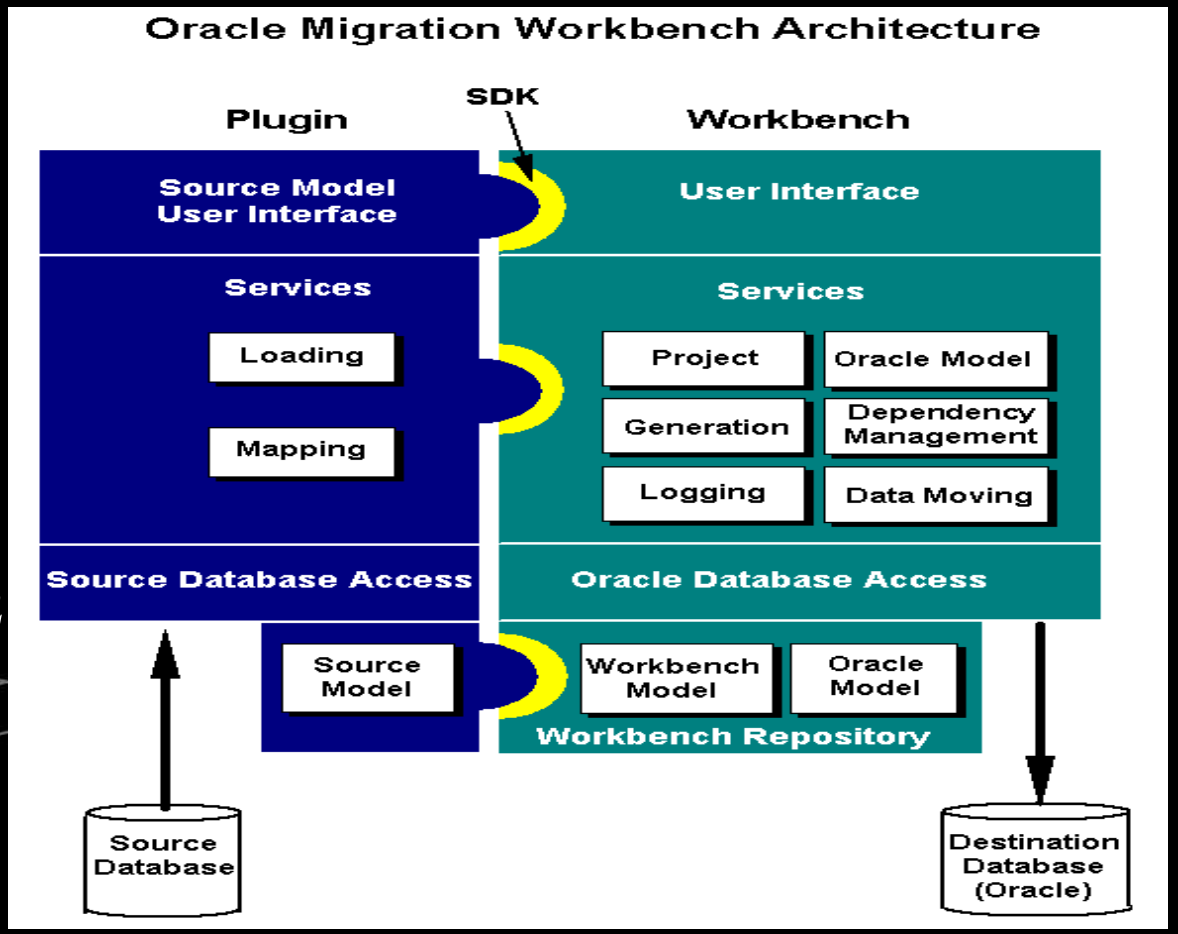
SQL Server 6.5/7.0/2000

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

Oracle Migration Workbench
Workflow

10g

Capture Wizard

- Step 1 Select Server
- Step 2 Select Source Databases
- Step 3 Load and Map Source Model

Migration Wizard

- Step 4 Customize Mapping Options
- 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

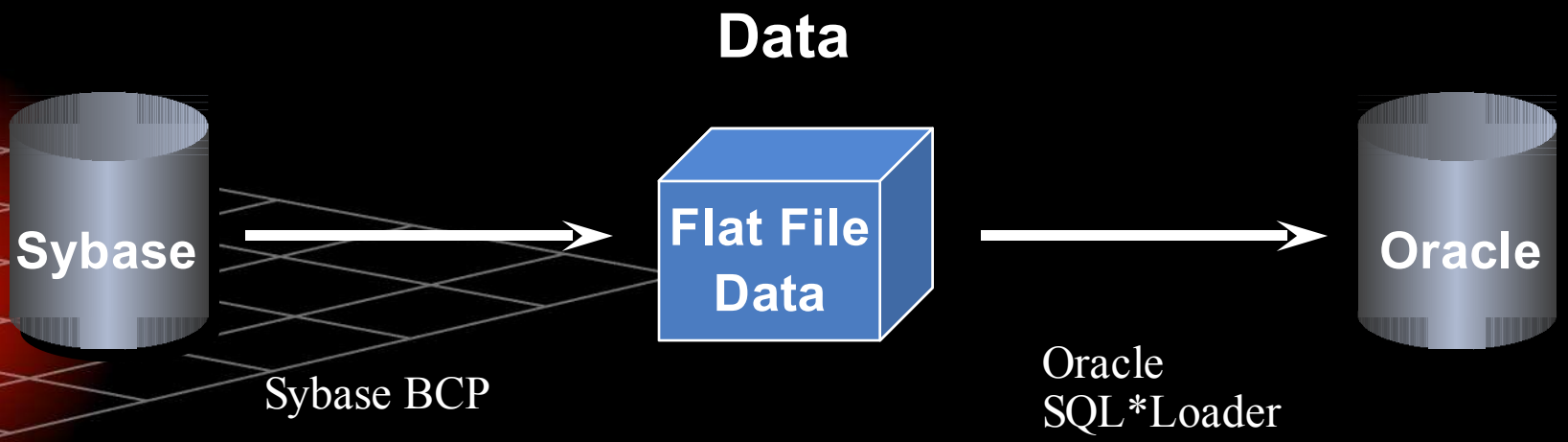
Oracle Migration Workbench
Capabilities

- 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

10g

Dump data from tables to flat files



Application Migration - Server side 10g

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

Typical Migration Projects

Migration Methodology

Comparison of Oracle and other RDBMS

What Oracle Migration Workbench does

Migration of the Application – Some Typical Cases

Resources

Application Migration - Client side 10g

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 10g
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

10g

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

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

Resources

10g

- **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.htı
  - 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

- 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

- **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/

10g

Questions?

ORACLE