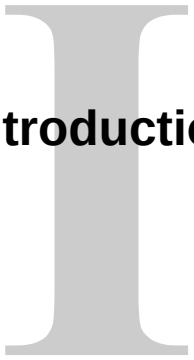
Introduction



Course Objectives

After completing this course, you should be able to:

- Configure the Oracle Database for optimal recovery
- Back up and recover a database (and its parts) with Recovery Manager (RMAN)
- Use flashback technology to view past states of data and to revert objects to a past state
- Identify burdensome database sessions and poorly performing SQL
- Use an appropriate and flexible memory configuration
- Configure resource allocations among sessions and tasks
- Schedule jobs to run inside or outside the database
- Use compression to optimize database storage and duplicate a database

ORACLE

Course Objectives

In this course, you learn to:

- Secure the availability of your database by using appropriate backup and recovery strategies
- Diagnose and repair data failures with flashback technology
- Monitor and manage major database components, including memory, performance, and resources
- Automate DBA tasks with the scheduler
- Manage space to optimize database storage and to be able to respond to growing space requirements

Suggested Schedule

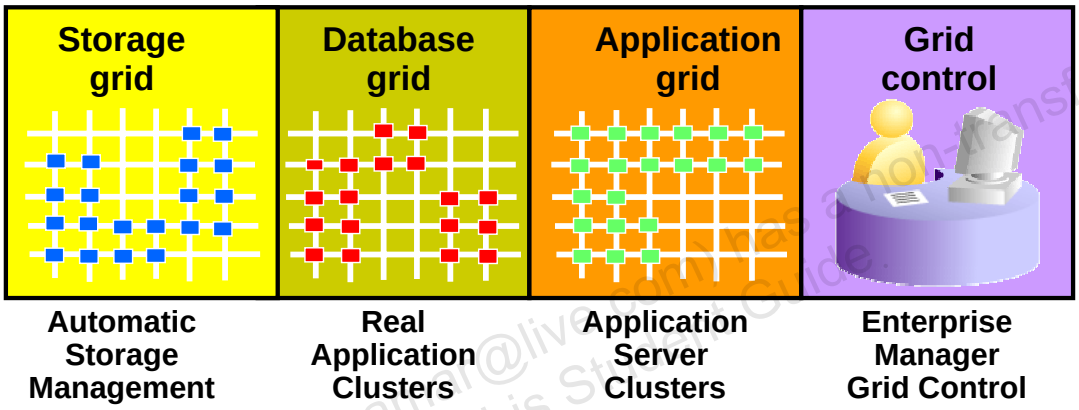
Day	Lessons	Day	Lessons
1	1. Core Concepts and Tools of the Oracle Database 2. Configuring for Recoverability 3. Using the RMAN Recovery Catalog 4. Configuring Backup Settings	4	13. Managing Memory 14. Managing Database Performance 15. Managing Performance by SQL Tuning 16. Managing Resources 17. Automating Tasks with the Scheduler
2	5. Creating Backups with RMAN 6. Restore and Recovery Tasks 7. Using RMAN to Perform Recovery 8. Monitoring and Tuning RMAN	5	18. Managing Space 19. Managing Space for the Database 20. Duplicating a Database
3	9. Diagnosing the Database 10. Using Flashback Technology I 11. Using Flashback technology II 12. Performing Flashback Database		

Suggested Schedule

This schedule is just a very general outline. Your instructor will determine the actual class schedule.

Oracle Database 11*g*: "*g*" Stands for Grid

- Open Grid Forum (OGF)
- Oracle's grid infrastructure:
  - Low cost
  - High quality of service
  - Easy to manage



ORACLE

Oracle Database 11*g*: "*g*" Stands for Grid

Open Grid Forum (OGF) is a standards body that develops standards for grid computing. It comprises a set of committees and working groups that focus on various aspects of grid computing. The committees and working groups are composed of participants from academia, the research community, and (increasingly) commercial companies. You can see the website of OGF at http://www.ogf.org.

Oracle has created the grid computing infrastructure software that balances all types of workloads across servers and enables all those servers to be managed as one complete system. Grid computing can achieve the same very high level of reliability as mainframe computing because all components are clustered. But unlike mainframes and large UNIX symmetric multiprocessing (SMP) servers, a grid can be built with open system technologies, such as Intel processors and the Linux operating system, at a very low cost.

Oracle's grid computing technology includes:

- Automatic Storage Management (ASM)
- Real Application Clusters (RAC)
- Application Server Clusters
- Enterprise Manager Grid Control

Oracle Database 11*g*: "*g*" Stands for Grid (continued)

Automatic Storage Management spreads database data across all disks, creates and maintains a storage grid, and provides the highest input/output (I/O) throughput with minimal management costs. As disks are added or dropped, ASM redistributes the data automatically. (There is no need for a logical volume manager to manage the file system.) Data availability increases with optional mirroring, and you can add or drop disks online.

Oracle's **Real Application Clusters** runs and scales all application workloads on a cluster of servers and offers the following features:

- **Integrated clusterware:** This includes functionality for cluster connectivity, messaging and locking, cluster control, and recovery. It is available on all platforms that are supported by Oracle Database 10*g*.
- **Automatic workload management:** Rules can be defined to automatically allocate processing resources to each service both during normal operations and in response to failures. These rules can be dynamically modified to meet the changing business needs. This dynamic resource allocation within a database grid is unique to Oracle RAC.
- **Automatic event notification to the mid-tier:** When a cluster configuration changes, the mid-tier can immediately adapt to instance failover or availability of a new instance. This enables end users to continue working in the event of instance failover without the delays typically caused by network timeouts. In the event of new instance availability, the mid-tier can immediately start load balancing connections to that instance. Oracle Database 10*g* Java Database Connectivity (JDBC) drivers have the "fast connection failover" functionality that can be automatically enabled to handle these events.

Oracle WebLogic Application Grid works with any application server - including Oracle WebLogic Server, IBM WebSphere Application Server, and JBoss Application Server - or in a pure grid environment without an application server. Oracle WebLogic Application Grid provides extreme and predictable application scalability and performance. With capacity on demand, Oracle WebLogic Application Grid can linearly scale out middleware infrastructure from a few to thousands of servers. Through its in-memory data grid solution, it provides fast access to frequently used data. Leveraging this grid capability, computation can be done in parallel, further improving application performance.

Enterprise Manager Grid Control manages gridwide operations that include managing the entire stack of software, provisioning users, cloning databases, and managing patches. It can monitor the performance of all applications from the point of view of your end users. Grid Control views the performance and availability of the grid infrastructure as a unified whole rather than as isolated storage units, databases, and application servers. You can group hardware nodes, databases, and application servers into single logical entities and manage a group of targets as one unit.

Note: In this course, you use Enterprise Manager Database Console to manage one database at a time.

Grid Infrastructure for Single-Instance

Grid Infrastructure for Single-Instance is introduced with Oracle Database 11*g* Release 2 (11.2)

- Is installed from the clusterware media, separate from the Oracle database software
- Contains Oracle Automatic Storage Management (ASM)
- Contains Oracle Restart—a high availability solution for nonclustered databases
  - Can monitor and restart the following components:
    - Database instances
    - Oracle Net listener
    - Database services
    - ASM instance
    - ASM disk groups
    - Oracle Notification Services (ONS/eONS) for Data Guard

ORACLE

Grid infrastructure for Single-Instance

Grid Infrastructure for Single-Instance is introduced with Oracle Database 11*g* Release 2. It is installed from the clusterware media, separate from the Oracle database software and now includes Oracle Automatic Storage Management and a new feature called Oracle Restart.

Oracle Restart is designed to improve the availability of your Oracle Database. It implements a high availability solution for single instance (nonclustered) environments only. For Oracle Real Application Cluster (Oracle RAC) environments, the functionality to automatically restart components is provided by Oracle Clusterware. Oracle Restart can monitor the health and automatically restart the following components:

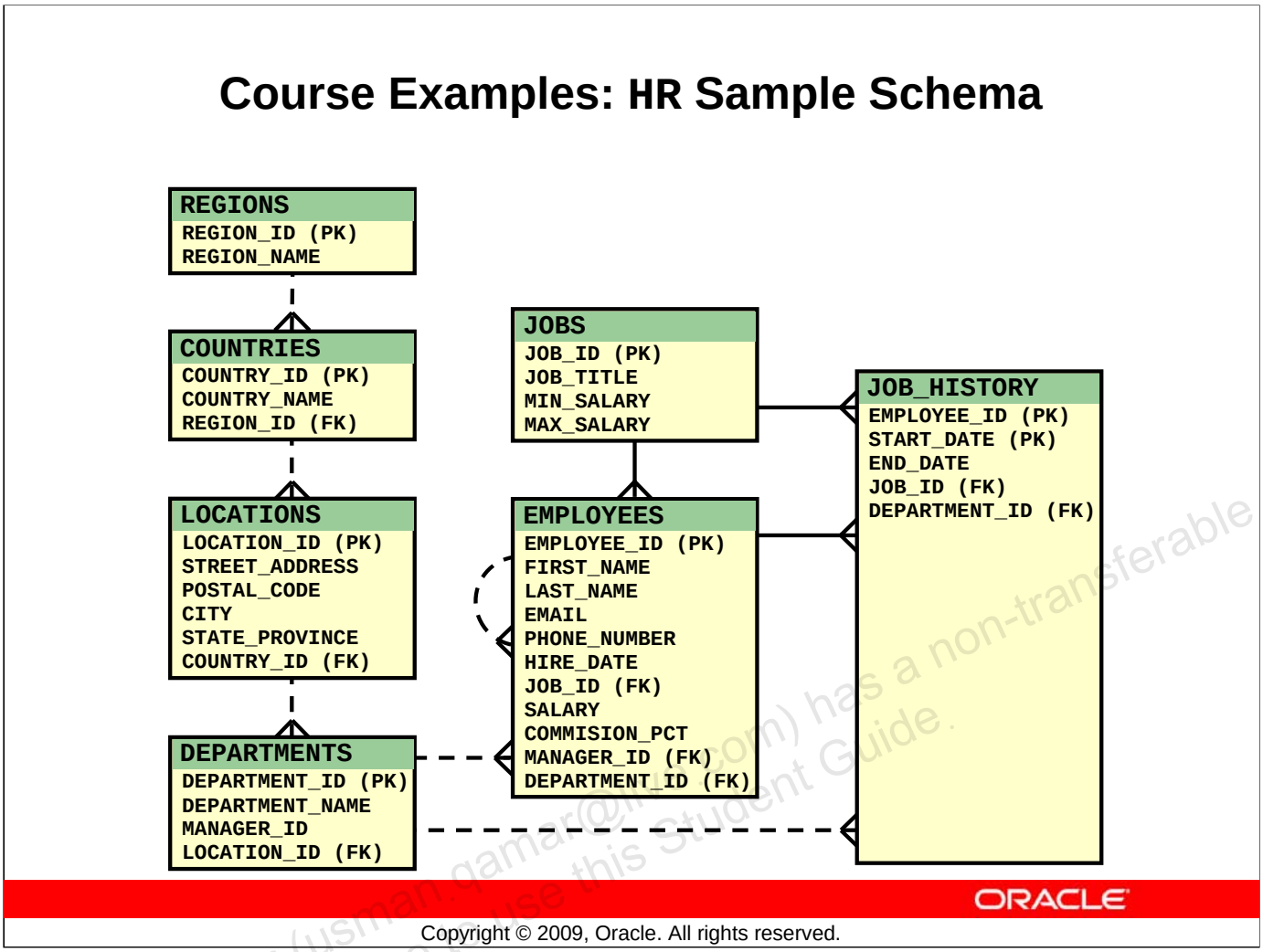
- Database Instances
- Oracle Net Listener
- Database Services
- ASM Instance
- ASM Disk Groups
- Oracle Notification Services (ONS/eONS) for Data Guard

Oracle Restart ensures that the components are started in the proper order, in accordance with component dependencies. If a component must be shut down, it ensures that the dependent components are cleanly shut down first. Oracle Restart runs out of the Oracle Grid Infrastructure home, which you install separately from Oracle Database homes.

Grid infrastructure for Single-Instance (continued)

Some glossary definitions (for your ease of reference):

- A **database instance** is the combination of the system global area (SGA) and background processes. An instance is associated with one and only one database. In an Oracle Real Application Clusters configuration, multiple instances access a single database simultaneously.
- An **Oracle Net listener** is a process that listens for incoming client connection requests and manages network traffic to the database.
- A **database service** is a user-created service that is managed by Oracle Clusterware. A database service may be offered on one or more RAC instances, and managed on per-instance basis (with respect to starting/stopping the service). Only services that are managed by Oracle Clusterware are able to be part of a Performance Class. Services created with the DBMS_SERVICE package are not managed by Oracle Clusterware.
- An **ASM instance** is built on the same technology as an Oracle Database instance. An ASM instance has a System Global Area (SGA) and background processes that are similar to those of Oracle Database. However, because ASM performs fewer tasks than a database, an ASM SGA is much smaller than a database SGA. ASM instances mount disk groups to make ASM files available to database instances; ASM instances do not mount databases.
- An **ASM disk groups** consists of one or more ASM disks, which are managed as a logical unit. I/O to a disk group is automatically spread across all the disks in the group.
- An **Oracle Notification Services** (ONS) is a publish-and-subscribe service for communicating information about all Fast Application Notification (FAN) events.



Course Examples: HR Sample Schema

The examples used in this course are from a human resources (HR) application, which can be created as part of the starter database.

The following are some principal business rules of the HR application:

- Each department may be the employer of one or more employees. Each employee may be assigned to only one department.
- Each job must be a job for one or more employees. Each employee must be currently assigned to only one job.
- When an employee changes his or her department or job, a record in the `JOB_HISTORY` table records the start and end dates of the past assignments.
- `JOB_HISTORY` records are identified by a composite primary key (PK): the `EMPLOYEE_ID` and the `START_DATE` columns.

Notation: PK = Primary Key, FK = Foreign Key

Solid lines represent mandatory foreign key (FK) constraints and dashed lines represent optional FK constraints.

The `EMPLOYEES` table also has an FK constraint with itself. This is an implementation of the business rule: Each employee may be reporting directly to only one manager. The FK is optional because the top employee does not report to another employee.