

Department of Computer Technology and Information Systems
CTIS483- Database Administration Syllabus

Course Details

Credits	4
ECTS Credits	6
Prerequisite	CTIS259
Semester	2016-2017 Spring
Instructor E-mail Room, Phone Office Hours	Fusun Yürüten fusun@ctp.bilkent.edu.tr E116, 290 5322
Assistant E-mail Room, Phone	Efe Can Yılmaz efecan.yilmaz@bilkent.edu.tr E114, 290 5337
Lecture hours	4
Lab hours	1
URL (web pages)	Moodle pages

MINIMUM REQUIREMENTS TO QUALIFY FOR THE FINAL EXAM:

20 pts. Over 65 (The assessment percentage completed before the final exam).

50% for the attendance.

Course Description

Oracle Database Architecture, Database Installation, Creating Database Using DBCA, Database Instances, ASM Instances, Network Environment, Storage Structures, User Security, Concurrency Control Mechanisms, Database Auditing and Maintenance, Performance Management, Backup and Recovery Concepts, Moving Data, Database Restart. Whole content will be explained in Oracle environment and students will have rights to take [Oracle Database 11g: Administration I 1Z0-052](#) exam as part of the Oracle Academy membership, and be able to take **Oracle Database 11g Administrator Certified Associate (OCA)**. (Four hours lecture, two hours lab.)

Aim

The aim of this course is to introduce students to the basic database management administration concepts and practice on the Oracle environment. This course give chance to students to take “**Oracle Database 11g Administrator Certified Associate (OCA)**” certificate which is very valuable for their professional life.

Course Objectives

Successful students will be able to:

- Installing Oracle Software
- Creating an Oracle Database Using DBCA
- Managing Database instances and ASM instances
- Managing and controlling database network environment
- Define and devise transaction management, concurrency control, crash recovery components
- Managing storage structures
- Controlling user security
- Designing Database backup and recovery procedures
- Take Decisions related with Database Maintenance

Course Outline:

- Oracle Database Architecture
- Database installation and creation. (use DBCA)
- Managing Database instances and ASM instances
- Oracle Network environment
- Database storage structures
- User security
- Concurrency control
- Database auditing
- Database maintenance
- Crash Recovery

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Lerarning Outcomes

LEARNING OUTCOMES	ASSESSMENTS
Design, model and install any database management systems by using Oracle database as sample.	Quiz, midterm, final
Plan, design, construct, control and manage database instances, database network environment, storage structures, user security, database backup and recovery, database maintenance	Quiz, Midterm, final
Define and devise transaction management, concurrency control, crash recovery components	Quiz, Midterm, final
Examine and perform data base administration roles and operations by using Oracle database system as a sample.	Quiz, midterm, final
Compare and contrast by examining the database systems and new trends in data storage, data retrieval and maintenance techniques.	Presentaion and Report, performance

Text Book:

- **Student Guides for Oracle Database Administration.** Year/Edition: 2010 Aug
 Title: Oracle Database 11g: Administration Workshop 1 (Volume 1 and 2)

Reference Books:

- **Physical Database Design**, Lightstone/Teorey/Nadeau, MorganKaufman, 2007, Publisher: ELSEVIER
- **Database Design and Implementation**, Edward Sciore, Wiley, 2008
- **Concurrency Control and Recovery in Database Systems**, Bernstein/Hadzilacos/Goodman, 1987, Addison-Wesley
- **Fundamentals of Data Base Management Systems**, Elmasri/Navathe, Pearson International Edition
- **Data Base Systems, Design, Implementation and Management**, Rob, Coronel, Thomson Course Technology
- **Databases and Transaction Processing**, Lewis, Bernstein, Kifer, Addison Wesley, 2001
- **Concepts of Data Base Management**, Pratt/Adamski, Thomson Course Technology
- **Database Management Systems**, Ramakrishnan/Gehrke, McGraw-Hill

Types of Instruction

- Lecture
- Exercise Course
- Practical
- Laboratory Work
- Independent Studies
- Guided Personal Study

Teaching Methods

- Lecture
- Presentations
- Practical session
- Case studies
- Exercises
- Independent study
- Assignment

Instructional Techniques and Tools

- Lecturing
- Problem solving
- Project based
- Interactive
- Hands-on

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Assessments and Grading:

Midterm (2)	20% each
Quiz(s) (1)	15%
Performance	5%
Presentation	15%
Final	25%

GRADING:

85	100	A
80	84	A-
75	79	B+
70	74	B
65	69	B-
60	64	C+
55	59	C
50	54	C-
45	49	D+
40	44	D
0	39	F

Lab Aim, Grading, Details

The aim of the lab is to practice on all the given topics in Oracle environment. Student knowledge, practice and applications will be completed in the lab hours.

Make-up Policy

There is a single make-up for all midterms and there will be no makeup but re-take exam for final. Makeup exam will be given one day before the final exams.

Attendance:

Attendance to the course hours and laboratory hours will not be graded. But they will affect the performance grade.

Academic Integrity

Each student has a responsibility to understand, accept and comply with the university's standards of academic conduct as set forth by the Code of Academic Conduct, as well as policies established by the schools and colleges. Cheating, collusion, misconduct, fabrication, and plagiarism are considered serious offense. "Student Code Of Discipline" is presented in the web page:

<http://www.bilkent.edu.tr/bilkent/admin-unit/hukukm/edisiplin.html>

Weekly outline: (based on a semester with 14 full weeks)

Wk.	DATE	Lecture	LABS
01	6-10 Feb.	Introduction Exploring the Oracle Database Architecture (CH1) <ul style="list-style-type: none"> Connecting to a server Oracle Database Server Architecture Instance: Database Configurations 	
02	13-17 Feb.	<ul style="list-style-type: none"> Memory structures- Shared Pool MS – Buffer Cache MS-Redo Log Buffer MS- Large Pool MS- Java Pool/Streams Pool MS-PGA 	Lab 1: Installing your Oracle Software (CH2) <ul style="list-style-type: none"> Database administrator (DBA) role and typical tasks and tools Oracle software installation Oracle Grid Infrastructure installation for a standalone server
03	20-24 Feb.	Transactions <ul style="list-style-type: none"> Properties (ACID Rules) Life Cycle Concurrency control <ul style="list-style-type: none"> Why do we need concurrency control? Types of concurrency control mechanisms Basic samples Crash Recovery Components. <ul style="list-style-type: none"> Undo and Redo operations Examples for different component behaviors Deadlocks QUIZ	Lab 2: Creating an Oracle Database Using DBCA•(CH3) <ul style="list-style-type: none"> Oracle database software Installation Creating an Oracle Database using DBCA (Data Base Configuration Assistant) Database creation scripts with the DBCA Database design templates management with the DBCA Additional tasks with the DBCA

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04	27 Feb.-3 March	CH1- Part2 <ul style="list-style-type: none"> • Process Structures • Background processes -Database Writer Process (DBWn) • BP- Log Writer Process(LWR) • BP-Checkpoint Process (CKPT) 	Lab 3: Install Oracle Software & Creating an Oracle Database Using DBCA-continue with students laptops.
05	6-10 March	<ul style="list-style-type: none"> • BP-System Monitor Process(SMON) • BP-Process Monitor Process(PMON) • BP-Recoverer Process • BP-Archiver Process(ARCn) • Process Startup Sequence • Database Storage Architecture • Logical and physical storage structures • Segments, Extents and Blocks • Table spaces and Data files • SYSTEM and SYSAUX Table spaces • ASM storage components • Interacting with an Oracle Database Managing the Database instance (CH4) <ul style="list-style-type: none"> • Database initialization parameters modification • Stages of database startup • Database shutdown modes and options • Alert log • Using Trace Files • Dynamic performance views • Data Dictionary views • Data dictionary from SQL Expert 	Lab 4: Understanding the COMMIT/ROLLBACK/LOCKING
06	13-17 March	Managing the ASM instance (CH5) <ul style="list-style-type: none"> • Benefits of using ASM • ASM instance processes and parameters • Interaction between database instances and ASM • ASM instance dynamic performance views • ASM system privileges • ASM disk groups • ASM disks • Allocation units • ASM files • Extent Maps • Striping granularity • Fine-Grained Striping • ASM Failure groups • Stripe and mirror example • Failure example • Managing disk groups • Adding disk to disk groups • Alter commands • ASM disk group compatibility • Disk Group Attributes • ASM Fast Mirror Resync Overview 	Lab5: (CH4) Starting and stopping Database control (Start and stop the Oracle database and components) Oracle Enterprise Manager Database Home page Using SQL*Plus View Parameters Database Startup and Shutdown credentials Viewing Alert Log
07	20-24 March	Configuring the Oracle Network environment (CH6) <ul style="list-style-type: none"> • Creating additional listeners • Creating Oracle Net Service aliases • Configuring connect-time failover • Controlling the Oracle Net Listener • Using tnsping to test Oracle Net connectivity • Shared servers versus dedicated servers Managing Database Storage Structures (CH7) <ul style="list-style-type: none"> • Storage of table row data in blocks • Oracle-Managed Files (OMF) • Enlarging the database 	LAB 6: (CH5) Manage ASM users (Enterprise Manager) Start/Stop ASM instance (SQL *Plus) Start/Stop ASM instance (srvctl) Start/Stop ASM instance (asmcmd) Create and drop disk groups Adding disk to disk groups ASM Management Using Enterprise Manager Disk Group Attributes Retrieving ASM Meta data
08	27-31 March	MIDTERM 1 Administering User security (CH8) <ul style="list-style-type: none"> • Create and manage database user accounts: <ul style="list-style-type: none"> i. Authenticate users 	Lab 7: (CH6) Listener control utility Using srvctl to start stop the listener Listener home page

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		<ul style="list-style-type: none"> ii. Assign default storage areas (table spaces) <ul style="list-style-type: none"> • Administer authentication • Grant and revoke privileges (system & object privileges) • Create and manage roles • Predefined roles • Create and manage profiles: <ul style="list-style-type: none"> i. Implement standard password security features ii. Control resource usage by users <ul style="list-style-type: none"> • Supplied password verification Function • Assigning quotas to users • Principle of least privilege • Protect privileged Accounts 	Net services administration page Creating listener Database service registration Configuring service aliases Advanced connection options (CH7) Managing Database Storage Structures Exploring storage structure Creating new table space Storage for Table spaces Altering / actions/drop / view table space & contents
09	3-7 April	Managing Data Concurrency (CH9) <ul style="list-style-type: none"> • Locking mechanism • Oracle data concurrency management • Enque mechanism • Monitoring and resolving locking conflicts Managing Undo Data (CH10) <ul style="list-style-type: none"> • DML and undo data generation • Monitor and administer undo data • Difference between undo data and redo data • Configuring undo retention • Undo retention guarantee • Undo Advisor 	Lab 8: (CH8) Administering Users Creating a user Authenticating user Lock/unlock accounts, Reset password Grant/revoke privileges Create and manage roles User profiles Implementing password security features/create password profile Password verification function Assigning quotas to users
10	10-14 April	Implementing Oracle Database Auditing (CH11) <ul style="list-style-type: none"> • DBA responsibilities for security and auditing • Standard database auditing • DBA responsibilities for security and auditing • Standard database auditing • Specifying audit options • Audit information • Value-based auditing • Fine-Grained Auditing • FGA Guidelines • SYSDBA Auditing • Maintaining the audit trail • Oracle Audit Vault Database Maintenance (CH12) <ul style="list-style-type: none"> • Managing optimizer statistics • Preferences for Gathering Statistics • Managing the Automatic Workload Repository (AWR) • Statistic Levels • Automatic Database Diagnostic Monitor (ADDM) • Advisory framework • Automated Maintenance Tasks • Server-generated alerts • Setting alert thresholds • Reacting to alerts • Alert types and clearing Alerts 	Lab 9: (CH9) Detecting Lock conflicts Resolving Lock conflicts (CH10) Managing Undo segments Changing Undo Table space to fixed size General Undo Information Using Undo advisor Viewing Systems Activity
11	17-21 April	MIDTERM 2 Performance Management (CH13) <ul style="list-style-type: none"> • Use Enterprise Manager to monitor performance • Use Automatic Memory Management (AMM) • Use the Memory Advisor to size memory buffers • View performance-related dynamic views • Troubleshoot invalid and unusable objects 	Lab 10: (CH 11) Configuring Audit Trail Specify audit Options Default Auditing Enterprise Manager Audit Page Using and maintaining audit page/information Value-Based Auditing (CH 12) Proactive Maintenance Viewing Alert History Using Manager Optimizer Statistics Page Enterprise Manger and AWR Managing AWR

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			ADDM Findings/Recommendations EM and Advisors Automated Maintenance Tasks Setting thresholds Creating and testing Alert Alert notifications
12	24-28 April	Backup and Recovery Concepts (CH14) <ul style="list-style-type: none"> • Types of failure that can occur in an Oracle database(statement/user process/network/User/Instance failures) • Flashback Technology • Ways to tune instance recovery (Redo Log files/Log Writer) • Using MTTR Advisor • Media failure • Configuring recoverability • Configuring the fast recovery area • Checkpoints, redo log files, and archive log files • Achiever process • Configuring ARCHIVELOG mode Performing Database Backups (CH15) <ul style="list-style-type: none"> • Consistent database backups • Oracle Secure Backup • User Managed Backup • Recovery Manager (RMAN) • Backing Up the Control File to a Trace File 	Lab 11: (CH13) Performance Management (CH14) Backup & Recovery
13	1-5 May	Performing Database Recovery (CH16) <ul style="list-style-type: none"> • Opening a Database • Keeping a Database Open • Data Recovery Advisor • Loss of Control file/Redo Log file/data file /noncritical data file /system _critical data file • Data failure examples • Data recovery advisor • Recovery: <ul style="list-style-type: none"> i. Control file ii. Redo log file iii. Data file 	Lab 12: (CH15) Performing Backups (CH16) Performing DB Recovery
14	8-12May	Moving Data (CH17) <ul style="list-style-type: none"> • Ways to move data • Directory objects • Using SQL*Loader to load data from a non-Oracle database (or user files) • Using external tables to move data via platform-independent files • General architecture of Oracle Data Pump • Using Data Pump Export and Import to move data between Oracle databases <ul style="list-style-type: none"> i. 	Lab 13: (CH17) Moving Data
15		FINAL	

Remaining Topics for OCA Exam:

Working with support Enterprise Manager Support Workbench

- My Oracle Support
- Log service requests (SR)
- Manage patches
 - ii. Apply a patch
 - iii. Stage a patch

Oracle Restart