

CS11: Relational Database Management Systems

(5 Hours- 4 Credits)

Unit I:

Overview of database systems: Managing Data – A Historical Perspective – File Systems Versus a DBMS – Advantages of a DBMS – Describing and Storing Data in a DBMS – Queries in a DBMS – Transaction Management – Structure of a DBMS – People Who Work with Databases. **Introduction to database design:** Database Design and ER Diagrams – Entities, Attributes, and Entity Sets – Relationships and Relationship Sets – Additional Features of ER Model – Conceptual Design with the ER Model.

Unit II:

The relational model: Introduction to the Relational Model – Integrity Constraints over Relations – Enforcing Integrity Constraints – Querying Relational Data – Logical Database Design: ER to Relational – Introduction to Views – Destroying / Altering Tables and Views.

Relational algebra and calculus: Preliminaries – Relational Algebra: Selection and Projection – Set Operations – Renaming – Joins – Division Relational Calculus: Tuple Relational Calculus – Domain Relational Calculus.

Unit III:

SQL queries, constraints, triggers: The Form of a Basic SQL Query - UNION, INTERSECT, and EXCEPT – Nested Queries – Aggregate Operators – Null Values – Complex Integrity Constraints in SQL – Triggers and Active Databases – Designing Active Databases

Unit IV:

Schema refinement and normal forms: Introduction to Schema Refinement – Functional Dependencies – Reasoning about FD's – Normal Forms – Properties of Decompositions – Normalization – Schema Refinement in Database Design – Other Kinds of Dependencies.

Unit V:

Overview of transaction management: The ACID Properties – Transactions and Schedules

– Concurrent Execution of transactions – Lock Based Concurrency Control – Performance of Locking – Transaction Support in SQL – Introduction to Crash Recovery.

Security and authorization: Introduction to Database Security - Access Control – Discretionary Access Control – Mandatory Access Control – Security for Internet Applications – Additional Issues Related to Security.

Text book:

Database Management Systems, Raghu Ramakrishnan and Johannes Gehrke, McGraw Hill International Edition, Third Edition, 2003.

Unit I : Chapters 1.1 – 1.9, 2.1 – 2.5

Unit II : Chapters 3.1 – 3.7, 4.1 – 4.3

Unit III : Chapters 5.2 – 5.9

Unit IV : Chapters 19.1 – 19.8

Unit V : Chapters 16.1 – 16.7, 21.1 – 21.6384

Reference Books:

1. Database Management Systems - Alexis Leon and Mathews Leon, Vikas Publishing, Chennai, 2002.
2. Database Management Systems - G.K. Gupta, McGraw Hill Education, 4th reprint 2015, Pearson Education Asia, 2001.
3. Database System Concepts – Abraham Silberschatz, Henry F.Korth, S.Sudarshan, 6th Edition, McGraw Hill, 2010.
4. Database Management Systems – R.Pannarselvam, 2nd Edition, PHI Learning, 2015.
5. Database Systems Models, Languages, Design and application Programming - R.Elmasri and S.B.Navathe, 6th Edition, Pearson Education, 2013.
6. Teach yourself SQL in 21 days - Ryan K.Stephens, Ronald Plew Bryan Morgan and Jeff Perkins, 2nd Edition, SAMS Publishing.

CS12: Operating System (5 Hours- 4 Credits)

Unit I:

Introduction to Operating Systems: Introduction, What is an Operating systems, Operating system components and goals, Operating systems architecture. Process Concepts: Introduction, Process States, Process Management, Interrupts, Interprocess Communication.

Unit II:

Asynchronous Concurrent Execution: Introduction, Mutual Exclusion, Implementing Mutual Exclusion Primitives, Software solutions to the Mutual Exclusion Problem, Hardware solution to the Mutual Exclusion Problem, Semaphores. Concurrent Programming: Introduction, Monitors.

Unit III:

Deadlock and Indefinite Postponement: Introduction, Examples of Deadlock, Related Problem Indefinite Postponement, Resource concepts, Four Necessary conditions for Deadlock, Deadlock solution, Deadlock Prevention, Deadlock Avoidance with Dijkstra's Banker's algorithm, Deadlock Detection, Deadlock Recovery.

Processor Scheduling: Introduction, Scheduling levels, Preemptive Vs Non Preemptive Scheduling Priorities, Scheduling objective, Scheduling criteria, Scheduling algorithms.

Unit IV:

Real Memory Organization and Management: Introduction, Memory organization, Memory Management, Memory Hierarchy, Memory Management Strategies, Contiguous Vs Non-Contiguous Memory allocation, Fixed Partition Multiprogramming, Variable Partition multiprogramming.

Virtual Memory Management: Introduction, Page Replacement, Page Replacement Strategies, Page Fault Frequency (PFF) Page replacement, Page Release, Page Size.

Unit V:

Disk Performance Optimization: Introduction, Why Disk Scheduling is necessary, Disk Scheduling strategies, Rotational optimization.

File and Database Systems: Introduction, Data Hierarchy, Files, File Systems, File Organization, File Allocation, Free Space Management, File Access control.

Text Book:

Operating Systems, Deitel & Deitel Choffnes, Pearson education, Third edition, 2008.

Unit I : Chapter 1: 1.1, 1.2, 1.12, 1.13 & Chapter 3: 3.1, 3.2, 3.3, 3.4, 3.5

Unit II : Chapter 5: 5.1, 5.2, 5.3, 5.4(up to 5.4.2), 5.5, 5.6 & Chapter 6: 6.1, 6.2

Unit III : Chapter 7: 7.1, 7.2, 7.3, 7.4, 7.5, 7.6, 7.7, 7.8, 7.9, 7.10

Chapter 8: 8.1, 8.2, 8.3, 8.4, 8.5, 8.6, 8.7

Unit IV : Chapter 9: 9.1, 9.2, 9.3, 9.4, 9.5, 9.6, 9.8, 9.9

Chapter 11: 11.1, 11.5, 11.6, 11.8, 11.9, 11.10

Unit V : Chapter 12: 12.1, 12.4, 12.5, 12.6

Chapter 13: 13.1, 13.2, 13.3, 13.4, 13.5, 13.6, 13.7, 13.8

Reference Books:

1. An introduction to Operating systems concepts and Practice, Pramod Chandra P. Bhatt, PHI, Second Edition, 2008.
2. Operating System Concepts, Abraham Silberschatz Peter Galvin Greg Gagne, 6th edition Windows XP Update, Wiley India edition, 2007.
3. Operating Systems Principles and Design, Pal Choudhury, PHI Learning, 2011.
4. Operating Systems, A Concept Based Approach Dhananjay M.Dhamdhare Tata Mc Graw Hill, 3rd Edition, 2012.

CS13: Software Engineering

(5 Hours- 4 Credits)

Unit I:

Introduction to Software Engineering: Some Definitions – Some Size factors – Quality and Productivity Factors – Managerial Issues. **Planning a Software Project:** Defining the Problem – Developing a Solution Strategy – Planning the Development Process – Planning an Organizational Structure – Other Planning Activities.

Unit II:

Software Cost Estimation: Software Cost Factors – Software Cost Estimation Techniques – Staffing-Level Estimation – Estimating Software Maintenance Costs.

Unit III:

Software Requirements Definitions: The Software Requirements Specification – Formal Specification Techniques – Languages and Processors for Requirements Specification.

Unit IV:

Software Design: Fundamental Design Concepts – Modules and Modularization Criteria – Design Notations – Design Techniques – Detailed Design Considerations – Real-Time and Distributed System Design – Test Plans – Milestones, Walkthroughs, and Inspections - Design Guidelines.

Unit V:

Verification and Validation Techniques: Quality Assurance – Static Analysis – Symbolic Execution – Unit Testing and Debugging – System Testing – Formal Verification.

Software Maintenance: Enhancing Maintainability During Development – Managerial Aspects of Software Maintenance – Configuration Management – Source-Code Metrics – Other Maintenance Tools and Techniques.

Text book:

Software Engineering Concepts, Richard Fairley, Tata McGraw Hill Publishing Company Limited, New Delhi, 1997.

Unit I : Chapters: 1.1 – 1.4, 2.1-2.5

Unit II : Chapters: 3.1 - 3.4

Unit III : Chapters: 4.1 – 4.3

Unit IV : Chapters: 5.1 – 5.9

Unit V : Chapters: 8.1, 8.3 – 8.7, 9.1 – 9.5

Reference Books:

1. Software Engineering – K.L.James, Prentice Hall of India Pvt. Ltd., New Delhi, 2009.

2. Fundamentals of Software Engineering – Rajib Mall, Prentice Hall of India Pvt. Ltd., New Delhi, 2003.

3. Software Engineering (A Practitioner's Approach) - Roger. S.Pressman. McGraw Hill Publication, International Edition, 5th Edition. 2001.

CS14: Lab 9: Relational Database Management Systems

(6 Hours- 4 Credits)

The following concepts must be introduced to the students:

DDL Commands

- Create table, alter table, drop table

DML Commands

- Select, update, delete and insert statements
- Condition specification using Boolean and comparison operators (and, or, not, =, <, >, <=, >=)
- Arithmetic operators and aggregate functions (Count, Sum, Avg, Min, Max)
- Multiple table queries (join on different and same tables)
- Nested select statements
- Set manipulation using (any, in, contains, all, not in, not contains, exists, not exists, union, intersect, minus, etc.)
- Categorization using group by.....having
- Arranging using order by

1). Create a table Student-master with the following fields client_no, name, address, city, state, pincode, remarks, bal_due with suitable data types.

- a) Create another table supplier_table from client_master. Select all the fields and rename client_no with supplier_no and name with supplier_name.
- b) Insert data into client_master
- c) Insert data into supplier_master from client_master.
- d) Delete the selected row in the client_master.

2)' Create a table sales_order with s_order_no and product_no as primary key. Set other fields to store client number, delivery address, delivery date, order status.

- a. Add a new column for storing salesman number using ALTER Command.
 - b. Set the s_order_no as foreign key as column constraints.
 - c. Set the s_order_no as foreign key as table constraints.
 - d. Enforce the integrity rules using CHECK.
- 3). Create a table student_master with the following fields name, regno, dept and year with suitable data types. Use Select command to do the following.
- a. Select the student's name column.
 - b. Eliminate the duplicate entry in table.
 - c. Sort the table in alphabetical order.
 - d. Select all the Students of a particular department.
- 4 Create a table sales_order_details with the s_order_no as primary key and with the following fields: product_no, description, qty_ordered, qty_disp, product_rate, profit_percent, sell_price, supplier_name.388
- a. Select each row and compute sell_price*.50 and sell_price*1.50 for each row selected.
 - b. Select product_no, profit_percent, Sell_price where profit_per is not between 10 and 20 both inclusive.
 - c. Select product_no, description, profit_percent, sell_price where profit_percent is not between 20 and 30.
 - d. Select the suppliername and product_no where suppliername has 'r' or 'h' as second character.

Perform the following queries:

- a. Query to display Employee Name, Job, Hire Date, Employee Number; for each employee with the Employee Number appearing first.
- b. Query to display unique Jobs from the Employee Table.
- c. Query to display the Employee Name concatenated by a Job separated by a comma.
- d. Query to display all the data from the Employee Table. Separate each Column by a comma and name the said column as THE_OUTPUT.389
- e. Query to display the Employee Name and Salary of all the employees earning more than \$2850.
- f. Query to display Employee Name and Department Number for the Employee No= 7900.
- g. Query to display Employee Name and Salary for all employees whose salary is not in the range of \$1500 and \$2850.
- h. Query to display Employee Name and Department No. of all the employees in Dept 10 and Dept 30 in the alphabetical order by name.
- i. Query to display Name and Hire Date of every Employee who was hired in 1981.
- j. Query to display Name and Job of all employees who don't have a current Manager.
- k. Query to display the Name, Salary and Commission for all the employees who earn commission.
- l. Sort the data in descending order of Salary and Commission.
- m. Query to display Name of all the employees where the third letter of their name is _A'.
- n. Query to display Name of all employees either have two _R's or have two _A's in their name and are either in Dept No = 30 or their Manger's Employee No = 7788.

- o. Query to display Name, Salary and Commission for all employees whose Commission Amount is 14 greater than their Salary increased by 5%.
- p. Query to display Name, Hire Date and Salary Review Date which is the 1st Monday after six months of employment.
- q. Query to display Name and calculate the number of months between today and the date each employee was hired.
- r. Query to display Name with the 1st letter capitalized and all other letter lower case and length of their name of all the employees whose name starts with 'J', 'A' and 'M'.390
- s. Query to display Name, Department Name and Department No for all the employees.
- t. Query to display Unique Listing of all Jobs that are in Department # 30.
- u. Query to display Name, Job, Department No. And Department Name for all the employees working at the Mumbai location.
- v. Query to display Name, Dept No. And Salary of any employee whose department No. and salary matches both the department no. and the salary of any employee who earns a commission.
- w. Query to display the Highest, Lowest, Sum and Average Salaries of all the employees
- x. Query to display the Employee No. And Name for all employees who earn more than the average salary.
- y. Query to display Employee Number and Name for all employees who work in a department with any employee whose name contains a 'T'.
- 6). Create a table master_book to contain the information of magazine code, magazine name and publisher. Weekly/biweekly/monthly, price. Write PL/SQL block to perform insert, update and delete operations on the above table.
- 7 Create a table to contain phone number, user name, address of the phone user. Write a function to search for a address using phone numbers.
- 8 Create a table stock to contain the item-code, item-name, current stock, date of last purchase. Write a stored procedure to seek for an item using item-code and delete it, if the date of last purchase is before 1 year from the current date. If not, update the current stock.
- 9 Create a table to store the salary details of the employees in a company. Declare the Cursor to contain employee number, employee name and net salary. Use Cursor to update the employee salaries.
- 10 Create a table to contain the information about the voters in a particular constituency. Write a proper trigger to update or delete a row in the table.

ES1.1: Client / Server Computing

(5 Hours – 4 Credits)

Unit I:

Basic concepts of Client/Server – Characteristics – File Servers – Database servers – Transaction servers- Groupware servers – Objective servers – Web servers – Fat servers or fat clients – 2 tier versus 3 tier – Client/Server building blocks – Operating system services. Base services – Extended services – Server scalability – Client Anatomy.

Unit II:

NOS Middleware – Peer-to-peer communications – RPC – MOM Middleware –

MOM versus RPC - The fundamentals of SQL and relational databases – Server architecture – Stored procedures, triggers and rules.

Unit III:

Online transaction processing – Decision support systems – OLTP versus DSS: programming effort, database needs – Data warehouses – Elements - Hierarchies – Replication versus Direct access – Replication mechanism – EIS/DSS Tools – Client/server transaction processing – transaction models – TP Monitors – Transaction management standards.

Unit IV:

Groupware – Components – Distributed objects and components – CORBA: components – Object Management Architecture – Services – Business objects.

Unit V:

Client/server Distributed system management – components – Management application – The Internet Management Protocols – OSI Management Framework – The Desktop Management Interface – X/Open Management Standards – Client/server application development tools – Client/Server Application Design.

Text book:

Dan Harkey, Jeri Edwards and Robert Orfali, The Essential Client Server Survival Guide, 2nd Edition,. Galgotia Publications Pvt. Ltd., 2000.

Reference books:

1. Dawna Travis Dewire, Client/Server computing, Tata McGraw Hill.
2. Jafferey D. Schank, Novell's guide to Client/Server Application and Architecture, BPB Publications.
3. Robert Orfali, Dan Harkey and Jeri Edwards, The Essential Client/Server Survival Guide, Galgotia Publications Pvt. Ltd., 2002.

SBS 5: Lab 10: Python Programming

(2 Hours - 2 Credits)

List of Exercises for Python Programming:

Section: A (Simple programs)

1. Write a menu driven program to convert the given temperature from Fahrenheit to Celsius and vice versa depending upon user's choice.
2. WAP to calculate total marks, percentage and grade of a student. Marks obtained in each of the three subjects are to be input by the user. Assign grades according to the following criteria:
Grade A: Percentage ≥ 80
Grade B: Percentage ≥ 70 and < 80
Grade C: Percentage ≥ 60 and < 70
Grade D: Percentage ≥ 40 and < 60
Grade E: Percentage < 40
3. Write a menu-driven program, using user-defined functions to find the area of rectangle, square, circle and triangle by accepting suitable input parameters

from user.

4. WAP to display the first 'n' terms of Fibonacci series.
5. WAP to find factorial of the given number.
6. WAP to find sum of the following series for n terms: $1 - 2/2! + 3/3! - \dots - n/n!$
7. WAP to calculate the sum and product of two compatible matrices.395

Section: B (Visual Python)

All the programs should be written using user defined functions, wherever possible.

1. Write a menu-driven program to create mathematical 3D objects
 - i. curve
 - ii. sphere
 - iii. cone
 - iv. arrow
 - v. ring
 - vi. cylinder
2. WAP to read n integers and display them as a histogram.
3. WAP to display sine, cosine, polynomial and exponential curves.
4. WAP to plot a graph of people with pulse rate p vs. height h. The values of p and h are to be entered by the user.
5. WAP to calculate the mass m in a chemical reaction. The mass m (in gms) disintegrates according to the formula $m=60/(t+2)$, where t is the time in hours. Sketch a graph for t vs. m, where $t \geq 0$.
6. Input initial velocity and acceleration, and plot the following graphs depicting equations of motion:
 - i. velocity wrt time ($v=u+at$)
 - ii. distance wrt time ($s=u*t+0.5*a*t*t$)
 - iii. distance wrt velocity ($s=(v*v-u*u)/2*a$)

Reference Books

1. T. Budd, Exploring Python, TMH, 1st Ed, 2011
2. John V. Guttag, Introduction to computation and programming using Python, Revised and Expanded edition, PHI, 2015
2. Python Tutorial/Documentation www.python.org 2015
3. Allen Downey, Jeffrey Elkner, Chris Meyers, How to think like a computer scientist: learning with Python , Freely available online.2012
4. <http://docs.python.org/3/tutorial/index.html>
5. <http://interactivepython.org/courselib/static/pythonds>
6. <http://www.ibiblio.org/g2swap/byteofpython/read/>