

SIR C.R.REDDY COLLEGE OF ENGINEERING, ELURU
DEPARTMENT OF INFORMATION TECHNOLOGY
COURSE HANDOUT
DATABASE MANAGEMENT SYSTEMS
III/IV B.Tech., First Semester, A.Y. 2019 – 2020

Course Title : DATABASE MANAGEMENT SYSTEMS
Course Coordinator : P.RAMAIAH CHOWDARY
Team of Instructors : SINGLE INSTRUCTOR

COURSE DESCRIPTION:

Behind the development and design of this course is to know how to design, manipulate and manage databases. The course participants are exposed to the various forms, types and models of database systems to enable them make viable choices. Supportive and complimentary concepts of managing data and documents are thoroughly examined to give a wholesome view of data/information management. The ultimate aim is to encourage the usage of database management systems for effective data management.

COURSE OBJECTIVE

After completing this course, the student should be able to:

- An understanding of the needs for and uses of database management systems in business. An understanding of the context, phases and techniques for designing and building database information systems in business.
- An understanding of the components of a computerized database information system (application).
- An ability to correctly use the techniques, components and tools of a typical database management system, such as Access or Oracle, to build a comprehensive database information system (application).
- An ability to design a correct, new database information system for a business functional area and implement the design, in either Access or Oracle.

An introductory understanding of some advanced topics in database management, e.g., object-relational databases and design, distributed databases, database administration (security, backup and restore, tuning) and data warehousing.

COURSE OUTCOMES

After completing this course, the student should be able to:

- Explain the advantages of the database approach, compared to traditional file processing.
- Describe the components of a typical database environment.
- Describe the purpose of database analysis, design, and implementation activities.
- Draw simple data models that show the scope of a database.
- Draw an E-R diagram to represent common business situations.
- Recognize when to use subtype/super type relationships in data modeling.
- Develop a super type/subtype hierarchy for a realistic business situation.
- Transform an E-R (or EER) diagram to a logically equivalent set of relations.
- Create relational tables that incorporate entity integrity and referential integrity constraints.
- Define a database using the SQL data definition language.
- Write single table queries using SQL commands.
- Compare and contrast the object-oriented model with the E-R and EER models.

SYLLABUS

UNIT-I: An Overview of Database Management, Introduction- What is Database System What is Database-Why Database- Data Independence- Relation Systems and Others- Summary, Database system architecture, Introduction- The Three Levels of Architecture-The External Level- the Conceptual Level- the Internal Level- Mapping- the Database Administrator-The Database Management Systems- Client/Server Architecture.

UNIT-II: The E/R Models, The Relational Model, Relational Calculus, Introduction to Database Design, Database Design and Er Diagrams-Entities Attributes, and Entity Sets-Relationship and Relationship Sets-Conceptual Design With the Er Models, The Relational Model Integrity Constraints Over Relations- Key Constraints –Foreign Key Constraints-General Constraints, Relational Algebra and Calculus, Relational Algebra- Selection and Projection- Set Operation, Renaming – Joins- Division- More Examples of Queries, Relational Calculus, Tuple Relational Calculus- Domain Relational Calculus.

UNIT-III: Queries, Constraints, Triggers: The Form of Basic SQL Query, Union, Intersect, and Except, Nested Queries, Aggregate Operators, Null Values, Complex Integrity Constraints in SQL, Triggers and Active Database.

UNIT-IV: Schema Refinement (Normalization) : Purpose of Normalization or schema refinement, concept of functional dependency, normal forms based on functional dependency(1NF, 2NF and 3 NF), concept of surrogate key, Boyce-codd normal form(BCNF), Lossless join and dependency preserving decomposition, Fourth normal form(4NF).

UNIT-V: Transaction Management and Concurrency Control: Transaction, properties of transactions, transaction log, and transaction management with SQL using commit rollback and savepoint. Concurrency control for lost updates, uncommitted data, inconsistent retrievals and the Scheduler. Concurrency control with locking methods : lock granularity, lock types, two phase locking for ensuring serializability, deadlocks, Concurrency control with time stamp ordering : Wait/Die and Wound/Wait Schemes, Database Recovery management : Transaction recovery.

UNIT-VI: Overview of Storages and Indexing, Data on External Storage- File Organization and Indexing – Clustered Indexing – Primary and Secondary Indexes, Index Data Structures, Hash-Based Indexing – Tree-Based Indexing, Comparison of File Organization

TEXT BOOKS:

1. Introduction to Database Systems, CJ Date, Pearson
2. Data base Management Systems, Raghurama Krishnan, Johannes Gehrke, TATA McGraw Hill 3rd Edition
3. Database Systems - The Complete Book, H G Molina, J D Ullman, J Widom Pearson

REFERENCES BOOKS:

1. Data base Systems design, Implementation, and Management, Peter Rob & Carlos Coronel 7th Edition.
2. Fundamentals of Database Systems, Elmasri Navrate Pearson Education
3. Introduction to Database Systems, C.J.Date Pearson Education

COURSE PLAN

Lecture No.	Learning objectives	Topics to be covered	SOURCE
UNIT- 1			
1	Introduction to DBMS	DBMS- Database system Applications - Database	TB
2	Overview	Basic Concepts and Conceptual Database Design	TB
3	File system vs. DBMS	Example with explanation – disadvantages of file system-	TB
4	Advantages of DBMS	Advantages of DBMS – Disadvantages of DBMS	TB
5	Storage data	Storage manager	TB
6	Queries	Data Models, Schemes & Instances, Query processor	TB
7	Transaction Management	Data Independence, Database Languages & Interfaces	TB
8	DBMS structure	Database System Architecture – diagram with explanation, Database users and Administrator.	TB
UNIT- 2			
9	E-R model	E-R Diagrams –symbols with explanation – Alternative ER Notations – ER diagram with relationships E-R Diagrams Example with explanation	TB
10	Entities, Attributes and Entity sets	Basic concepts – entity set – attributes relationship set – Types of relationships constraints – Mapping cardinalities - keys	TB
11	Relationship and Relationship sets	relationship set – Types of relationships constraints – Mapping cardinalities - keys	TB
12	Features of ER model	E-R Diagrams Example with explanation, Cardinality of Relationships, Types of Attributes Strong and Weak Entity Sets	TB

13	Conceptual database design with ER model	Participation Constraints, Specialization, Generalization and Aggregation Translating your ER Model into Relational Model	TB
14	Relational model	Introduction to relational databases – example with explanation	TB
15	Integrity constraints	. SQL fundamentals - Integrity constraints – Types – Domain integrity constraints – Entity integrity constraints – Referential integrity constraints with example	TB
16	Querying relation data	Basic structure query language	TB
17	Logical database design	entity sets, key constraints	TB
18	Views	Views – creations of views – Rename the columns of a view – Update table join views – destroying a view – Example with explanation	TB
19	Relational Languages	Relational Model, Languages & Systems: Relational Data Model Relational Model Concepts, Relational Model Constraints, Relational Algebra	TB
20	Algebra	Relational Algebra – Basic operations – Additional operations – Extended operations Relational Algebra – Example with explanation – Difference between join and Cartesian product	TB
21	Calculus	Domain Relational Calculus, Tuple Relational Calculus	TB
UNIT-3			
22	SQL	SQL – A Relational	TB

		Database Language, Data Definition in SQL:SQL Queries: The form of a basic SQL query, Union, intersect, and except, Aggregate operators Specifying Constraints, View and Joins in SQL, Specifying Constraints Introduction to nested queries	
23	Embedded SQL	Advanced SQL features Embedded SQL– Dynamic SQL - example with explanation- Missing Information	TB
24	Cursors	Iterative Statements - Cursors - Explicit Cursors	TB
25	ODBC and JDBC	Data base connectivity using java script, drivers, JDBC, ODBC	TB
26	Triggers	Triggers - Def – syntax – Parts of trigger – example with explanation	TB
27	Active database	Introduction to Distributed Databases and Client/Server Databases – Typical distributed database system – Architecture of distributed system – Types of Transaction – Local transaction – Global transaction – types of distributed databases – Homogeneous– Heterogeneous problems of distributed system	TB
UNIT-4			
28	Schema refinement	Schema-introduction	TB
29	FDs	Relational database design introduction – Redundancy – decomposition - Functional Dependencies – Types	TB
30	Normal forms	Normalization Introduction	TB
31	Normalization	Types of normalization -	TB

		First Normal Forms, Second Normal Forms Third Normal Forms Boyce Codd Normal Form Dependency Preservation Multi-valued Dependencies and Fourth Normal Form Join Dependencies and Fifth Normal Form	
32	Decomposition	Explanation with example	TB
UNIT-5			
33	Transaction management	Transaction Concepts – example – state transaction diagram – definition – example with explanation	TB
34	Concurrent execution of transactions	ACID Properties – Types of failures – reason for transaction failures – SQL facilities – Transaction control language- Commit – rollback – save point – example with explanation.	TB
35	Crash recovery	Stealing Frames and Forcing Pages Recovery-Related Steps during Normal Execution	TB
36	Concurrency control	Concurrency – Introduction – Three concurrency problems – The lost update problem – the uncommitted dependency problem – The inconsistent analysis problem -SQL Facilities for recovery – Concurrency – Need for Concurrency	TB
37	Lock management	Locking Protocols – Two Phase Locking – Exclusive lock – Shared locks – use lock – solve the problem	TB
38	Locking techniques	Locking Protocols – Two Phase Locking Intent Locking – Deadlock Serializability Recovery Isolation Levels	TB
UNIT-6			

39	Overview of Storages and Indexing	Overview of Storages and Indexing	TB
40	Data on External Storage-	Data on External Storage-	TB
41	File Organization and Indexing	File Organization and Indexing	TB
42	Clustered Indexing	Clustered Indexing	TB
43	Primary and Secondary Indexes	Primary and Secondary Indexes	TB
44	Index Data Structures,	Index Data Structures,	TB
45	Hash-Based Indexing	Hash-Based Indexing	TB
46	Tree-Based Indexing	Tree-Based Indexing	TB
47	Comparison of File Organization	Comparison of File Organization	TB

SELF-LEARNING TOPICS

Unit	Self Learning Topic	Source
Unit-1	DB users, admin roles	TB
Unit-2	E-R modeling	TB
Unit-4	Normalization	TB

EVALUATION SCHEME:

Test	Marks
Internal Test-1	15
Internal Test-2	15
Internal Marks	Average of 80% of best internal and 20% of other internal test (15)
Assignment-1	5
Assignment-2	5
Assignment Marks	2 Assignments (10)

External exam	70
Total	100

Notices:

Answers for questions in internal and external examinations will be available in the Department Library of Information Technology. Any circulars related to course will be displayed in notice boards of Department of Information Technology.

Method of Evaluation:

Continuous Assessment Examination: Yes / No

Assignments: Yes / No

Questions in class room: Yes / No

Quiz as per University Norms: Yes / No

Others:

- Make the students to draw E-R diagrams for the problems on the board
- Make the students to design different database tables on different database softwares

On completion of the course the student shall be able to:

- Describe the purpose of database analysis, design, and implementation activities
- Draw an E-R diagram to represent common business situations
- Transform an E-R (or EER) diagram to a logically equivalent set of relations.

List out any new topic(s) or any innovation you would like to introduce in teaching the subject in this semester:

Lecture No.	Learning objectives	Topics to be covered	Resources
1.	Introduction to PL/SQL - Advantages	PL/SQL introduction	W3Schools.com
2.	Variables - Constants - Records - Conditional Statements	syntax, execution, data types , variables	W3Schools.com
3.	Iterative Statements - Cursors - Explicit Cursors	Cursor usage ,implementation, examples	W3Schools.com
4.	Procedures - Functions - Parameters-Procedure, Function	Procedure usage, implementation, Examples, functions	W3Schools.com

5.	Exception Handling - Triggers	Trigger concept, implementation	W3Schools.com
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Guidelines to study the subject:

1. Students are expected to know and understand the fundamentals and how to work with Microsoft Office Tools such as MS-Access, MS-Excel to store data.
2. Students are expected to know and understand the fundamentals of database designing software's available in the lab.
3. Students are advised to observe the Real-Time Software project work and implement the same design issues when the class work is going on.

Expected date of completion of the course and remarks, if any:

Unit Number: 1	29-JUNE-2019
Unit Number: 2	13-JULY-2019
Unit Number: 3	4-AUG-2019
Unit Number: 4	14-SEPT-2019
Unit Number: 5	30-SEPT-2019
Unit Number: 6	9-OCT-2019