LABORATORY MANUAL

17CSL58-DATABASE APPLICATION LAB

2019-20

ATRIA
INSTITUTE OF TECHNOLOGY

DEPARTMENT OF INFORMATION SCIENCE & ENGINEERING
ATRIA INSTITUTE OF TECHNOLOGY
Adjacent to Bangalore Baptist Hospital
Hebbal, Bengaluru-560024

SYLLABUS

DATABASE APPLICATIONS LABORATORY

Subject Code: 17CSL58   IA Marks: 20
No. of Practical Hrs. / Week: 011+2P   Exam Hours: 03
Total No. of Practical Hours: 40   Exam Marks: 80

PART-A: SQL Programming (Max. Exam Marks. 50)

• Design, develop, and implement the specified queries for the following problems using Oracle, MySQL, MS SQL Server, or any other DBMS under LINUX/Windows environment.

• Create Schema and insert at least 5 records for each table. Add appropriate database constraints.

PART-B: Mini Project (Max. Exam Marks. 30)

• Use Java, C#, PHP, Python, or any other similar front-end tool. All applications must be demonstrated on desktop/laptop as a stand-alone or web based application (Mobile apps on Android/IOS are not permitted.)

PART –A

SQL Programming

1.Consider the following schema for a Library Database:
BOOK(Book_id, Title, Publisher_Name, Pub_Year)
BOOK_AUTHORS(Book_id, Author_Name)
PUBLISHER(Name, Address, Phone)
BOOK_COPIES(Book_id, Branch_id, No-of_Copies)
BOOK_LENDING(Book_id, Branch_id, Card_No, Date_Out, Due_Date)
LIBRARY_BRANCH(Branch_id, Branch_Name, Address)
Write SQL queries to
1. Retrieve details of all books in the library – id, title, name of publisher, authors, number of copies in each branch, etc.
2. Get the particulars of borrowers who have borrowed more than 3 books, but from Jan 2017 to Jun 2017.
3. Delete a book in BOOK table. Update the contents of other tables to reflect this data manipulation operation.
4. Partition the BOOK table based on year of publication. Demonstrate its working with a simple query.
5. Create a view of all books and its number of copies that are currently available in the Library.

2.Consider the following schema for Order Database:
SALESMAN(Salesman_id, Name, City, Commission)
CUSTOMER(Customer_id, Cust_Name, City, Grade, Salesman_id)
ORDERS(Ord_No, Purchase_Amt, Ord_Date, Customer_id, Salesman_id)
Write SQL queries to
1. Count the customers with grades above Bangalore's average.
2. Find the name and numbers of all salesman who had more than one customer.
3. List all the salesman and indicate those who have and don't have customers in their cities (Use UNION operation.)
4. Create a view that finds the salesman who has the customer with the highest order of a day.
5. Demonstrate the DELETE operation by removing salesman with id 1000. All his orders must also be deleted.

3.Consider the schema for Movie Database:
ACTOR(Act_id, Act_Name, Act_Gender)
DIRECTOR(Dir_id, Dir_Name, Dir_Phone)
MOVIES(Mov_id, Mov_Title, Mov_Year, Mov_Lang, Dir_id)
MOVIE_CAST(Act_id, Mov_id, Role)
RATING(Mov_id, Rev_Stars)
Write SQL queries to
1. List the titles of all movies directed by 'Hitchcock'.
2. Find the movie names where one or more actors acted in two or more movies.
3. List all actors who acted in a movie before 2000 and also in a movie after 2015 (use JOIN operation).
4. Find the title of movies and number of stars for each movie that has at least one rating and find the highest number of stars that movie received. Sort the result by movie title.
5. Update rating of all movies directed by 'Steven Spielberg' to 5.

4.Consider the schema for College Database:
STUDENT(USN, SName, Address, Phone, Gender)
SEMSEC(SSID, Sem, Sec)
CLASS(USN, SSID)
SUBJECT(Subcode, Title, Sem, Credits)
IAMARKS(USN, Subcode, SSID, Test1, Test2, Test3, FinalIA)
Write SQL queries to
1. List all the student details studying in fourth semester 'C' section.
2. Compute the total number of male and female students in each semester and in each section.
3. Create a view of Test1 marks of student USN '1BI15CS101' in all subjects.
4. Calculate the FinalIA (average of best two test marks) and update the corresponding table for all students.
5. Categorize students based on the following criterion:
   If FinalIA = 17 to 20 then CAT = 'Outstanding'
   If FinalIA = 12 to 16 then CAT = 'Average'
   If FinalIA< 12 then CAT = 'Weak'
   Give these details only for 8th semester A, B, and C section students.

5.Consider the schema for Company Database:
EMPLOYEE(SSN, Name, Address, Sex, Salary, SuperSSN, DNo)
DEPARTMENT(DNo, DName, MgrSSN, MgrStartDate)
DLOCATION(DNo,DLoc)
PROJECT(PNo, PName, PLocation, DNo)
WORKS_ON(SSN, PNo, Hours)
Write SQL queries to
1. Make a list of all project numbers for projects that involve an employee
   whose last name is 'Scott', either as a worker or as a manager of the
   department that controls the project.
2. Show the resulting salaries if every employee working on the 'IoT' project is
   given a 10 percent raise.
3. Find the sum of the salaries of all employees of the 'Accounts' department, as
   well as the maximum salary, the minimum salary, and the average salary in
   this department
4. Retrieve the name of each employee who works on all the projects
   controlledby department number 5 (use NOT EXISTS operator).
5. For each department that has more than five employees, retrieve the
   department number and the number of its employees who are making more
   than Rs. 6,00,000.

Part B: Mini project

*For any problem selected, write the ER Diagram, apply ER-mapping rules, normalize the relations,
and follow the application development process.
*Make sure that the application should have five or more tables, at least one trigger and one stored
procedure, using suitable frontend tool.
*Indicative areas include; health care, education, industry, transport, supply chain, etc.

VIVA QUESTIONS

1. What is database?

A database is a logically coherent collection of data with some inherent meaning, representing some aspect of real world and which is designed, built and populated with data for a specific purpose.

2. What is DBMS?

It is a collection of programs that enables user to create and maintain a database. In other words it is general-purpose software that provides the users with the processes of defining, constructing and manipulating the database for various applications.

3. What is a Database system?

The database and **DBMS** software together is called as Database system.

4. Advantages of DBMS?

Ø Redundancy is controlled.

Ø Unauthorised access is restricted.

Ø Providing multiple user interfaces.

Ø Enforcing integrity constraints.

Ø Providing backup and recovery.

5. Disadvantage in File Processing System?

Ø Data redundancy & inconsistency.

Ø Difficult in accessing data.

Ø Data isolation.

Ø Data integrity.

Ø Concurrent access is not possible.

Ø Security Problems.

6. Describe the three levels of data abstraction?

The are three levels of abstraction:

Ø Physical level: The lowest level of abstraction describes how data are stored.

Ø Logical level: The next higher level of abstraction, describes what data are stored in database and what relationship among those data.

Ø View level: The highest level of abstraction describes only part of entire database.

7. Define the "integrity rules"

There are two Integrity rules.

Ø Entity Integrity: States that "Primary key cannot have NULL value"

Ø Referential Integrity: States that "Foreign Key can be either a NULL value or should be Primary Key value of other relation.

8. What is extension and intension?

Extension -

It is the number of tuples present in a table at any instance. This is time dependent.

Intension -

It is a constant value that gives the name, structure of table and the constraints laid on it.

9. What is System R? What are its two major subsystems?

System R was designed and developed over a period of 1974-79 at IBM San Jose Research Center. It is a prototype and its purpose was to demonstrate that it is possible to build a Relational System that can be used in a real life environment to solve real life problems, with performance at least comparable to that of existing system.

Its two subsystems are

Ø Research Storage

Ø System Relational Data System.

10. How is the data structure of System R different from the relational structure?

Unlike Relational systems in System R

Ø Domains are not supported

Ø Enforcement of candidate key uniqueness is optional

Ø Enforcement of entity integrity is optional

Ø Referential integrity is not enforced

11. What is Data Independence?

Data independence means that "the application is independent of the storage structure and access strategy of data". In other words, Theability to modify the schema definition in one level should not affect the schema definition in the next higher level.

Two types of Data Independence:

Ø Physical Data Independence: Modification in physical level should not affect the logical level.

Ø Logical Data Independence: Modification in logical level should affect the view level.

NOTE: Logical Data Independence is more difficult to achieve

12. What is a view? How it is related to data independence?

A view may be thought of as a virtual table, that is, a table that does not really exist in its own right but is instead derived from one or more underlying base table. In other words, there is no stored file that direct represents the view instead a definition of view is stored in data dictionary.

Growth and restructuring of base tables is not reflected in views. Thus the view can insulate users from the effects of restructuring and growth in the database. Hence accounts for logical data independence.

13. What is Data Model?

A collection of conceptual tools for describing data, data relationships data semantics and constraints.

14. What is E-R model?

This data model is based on real world that consists of basic objects called entities and of relationship among these objects. Entities are described in a database by a set of attributes.

15. What is Object Oriented model?

This model is based on collection of objects. An object contains values stored in instance variables with in the object. An object also contains bodies of code that operate on the object. These bodies of code are called methods. Objects that contain same types of values and the same methods are grouped together into classes.

16. What is an Entity?

It is a 'thing' in the real world with an independent existence.

17. What is an Entity type?

It is a collection (set) of entities that have same attributes.

18. What is an Entity set?

It is a collection of all entities of particular entity type in the database.

19. What is an Extension of entity type?

The collections of entities of a particular entity type are grouped together into an entity set.

20. What is Weak Entity set?

An entity set may not have sufficient attributes to form a primary key, and its primary key compromises of its partial key and primary key of its parent entity, then it is said to be Weak Entity set.

21. What is an attribute?
It is a particular property, which describes the entity.

22. What is a Relation Schema and a Relation?
A relation Schema denoted by R(A1, A2, …, An) is made up of the relation name R and the list of attributes Ai that it contains. A relation is defined as a set of tuples. Let r be the relation which contains set tuples (t1, t2, t3, ...,tn). Each tuple is an ordered list of n-values t=(v1,v2, ..., vn).

23. What is degree of a Relation?
It is the number of attribute of its relation schema.

24. What is Relationship?
It is an association among two or more entities.

25. What is Relationship set?
The collection (or set) of similar relationships.