**a. What is a Distributed Database Management System (DDBMS)? How does the client-server architecture differ from the peer-to-peer architecture in distributed databases?**

**b. What is autonomy in the context of distributed databases? Compare the levels of autonomy in client-server and peer-to-peer DDB architectures.**

**c. Define distribution and autonomy in distributed database systems. Explain the client-server and peer-to-peer architectures with appropriate examples to illustrate their differences.**

**a.** What are global directory issues in Distributed Database Systems (DDBS)? How do horizontal and vertical fragmentation differ in terms of structure and data distribution?

**b.** Describe the key distribution design issues in DDBS. Explain horizontal fragmentation along with its benefits and challenges in a distributed environment.

**c.** Discuss the distribution design issues in DDBS. Explain vertical fragmentation with a suitable example. How is vertical fragmentation different from horizontal fragmentation?

**a.** What is semantic data control in a database system? Describe the different types of views in DBMS with suitable examples.

**b.** Why is data security important in distributed systems? Explain the concept of distributed authorization control with an example.

**c.** What is meant by distributed authorization control? Discuss the differences between centralized and distributed integrity control with relevant examples.

**a.** Describe the steps involved in query processing in a database system. Explain the query decomposition process with a suitable example.

**b.** What are the common problems encountered during query processing in distributed database systems? Illustrate your answer with examples.

**c.** How is a query processed in a distributed database system? Outline the steps of query decomposition and explain each step with an appropriate example.

The schemas are given as below.

* **Employee(EmpID, Name, Age, DeptID, Salary)**
* **Department(DeptID, DeptName, Location)**
* **Project(ProjectID, ProjectName, DeptID)**
* **WorksOn(EmpID, ProjectID, Hours)**

**a.** Using relational algebra, solve the following problems:

* Retrieve the **names and ages** of employees who earn **more than $80,000**.
* Find all **employee IDs** and their corresponding **project IDs** for employees who work **more than 40 hours**.
* List the **names of employees** who are assigned to the project with **ProjectID = 101**.

b. Using relational algebra, solve the following problems:

* Retrieve the **names of employees** who work in departments located in **"Kathmandu"**.
* Find the **names of projects** that are handled by the **same department** as the one where employee with EmpID = 105 works.
* List the **names of employees** who work on **at least one project** and earn **less than $60,000**.

c. Using relational algebra, solve the following problems:

* Find the **names of employees** who work on **projects managed by the "Finance" department**.
* Retrieve the **names of employees** who work on **all projects** assigned to their department.
* List the **names and salaries** of employees who work on **more than one project**.

1. Write an SQL query to find the **departments** where the **average salary** of employees is **greater than $75,000**.
2. Write an SQL query to list the **names of employees** along with the **names of the projects** they are working
3. Write an SQL query to find the **names of employees** who earn **more than the average salary** of all employees.
4. Define the **ACID properties** of a database transaction. Explain the significance of each property in ensuring reliable transaction processing. Check if the below schedule is conflict serializable or not

|  |  |  |
| --- | --- | --- |
| T1 | T2 | T3 |
| R(X)  R(Z)  W(X)  W(Z) | R(Y)  R(Z)  W(Z) | R(Y)  R(X)  W(Y) |

1. What is **conflict serializability** in database systems? How does it help in determining whether a schedule of transactions maintains consistency?
2. Explain dirty ready and lost update issues with examples.
3. What do you mean by shared lock and exclusive lock? Explain various phases and process involved in two-phase locking protocol.
4. What do you mean by database reliability? What are the different types of failures in database. Explain different measures of relaiblity with examples
5. What do you mean by fault tolerance? What are the different approaches to handle failures in database. Explain
   1. Explain write ahead logging protocol . Explain 2 phase and 3 phase commit relaibilty protocols
6. Explain parallel DBMS techniques. Explain parallel execution problem .
7. Explain one distriubed query optimization algorithm.what do you eman by localization of distributed data.

SHORT note

1. Distributed cost model
2. Timestamp based concurrency control
3. Deadlock management