# Practice Sheet
# Lecture 1: Chapter 1 and 2

1. Explain the three-schema-architecture with an illustrative diagram.
2. What is Data Independence? Explain the different types of data independence with examples.
3. Consider the following scenarios and explain whether they achieved logical data independence or physical data independence:
   a. You added a new column called "age" in the employee table of the company database. The company uses an Employee management system for attendance, leaves, salary, projects etc. The "age" information will not appear to any users using the system.
   b. Your company is upgrading their system. They previously used HDD (hard disk drive) for data storage. Now they shifted to SSD(solid state drive) for more efficient data management. The company uses a Database System for employee attendance, leaves, salary, projects etc.
4. Explain the difference between Schema and State with an example. Mention which of the following tasks will impact the schema and which will impact the state of a database:
   a. Insert a column in a table
   b. Insert new data or row in a table.
   c. Change the position of a column in a table
   d. Retrieve some data from the table.
   e. Delete a column from the table.
   f. Delete an existing data from a table.
   g. Change the name of a column
   h. Change the data type of a column
   i. Change the data value in a particular row/column.

5. State three differences between file-based approach and database approach for data management.
6. State two advantages of database approach for data management.
7. Consider the following scenarios and explain with respect to the given informations and conditions whether you should use a database approach or a file-based approach for data management:
   a. You will collect and store the birthdays and phone numbers of all your close relatives. You have around 60 close relatives. You are not concerned about security and you are the only one who will access this data.
   b. You are hired by the government to collect and store information about all citizens in the country. The data should not be accessed by everybody. Multiple government offices will need to access different data for different purposes.
8. Explain program-data independence with an example.
9. Explain Data Abstraction.
10. Explain Data Model. State and Explain the different types of Data Models.

11. Explain DDL and DML. State which of the following tasks are DDL and which are DML with brief explanation:
    a. Insert a column in a table
    b. Insert new data or row in a table.
    c. Change the position of a column in a table
    d. Retrieve some data from the table.
    e. Delete a column from the table.
    f. Delete an existing data/row from a table.
    g. Change the name of a column
    h. Change the data type of a column
    i. Change the data value in a particular row/column.

12. State at least two roles of each of the following actors on the scene: database administrator, database designer, software engineer and end user.

13. State which type of actor on the scene (database administrator, database designer, software engineer or end user) is described/required in the following scenarios.
    a. You want to create a new online food delivery service. You are a business graduate and have no idea regarding databases. You need to hire someone who will help organize the data of your organization and service. Which type of actor on the scene will you hire and why?
    b. You want to create a new online food delivery service. The data organization and modeling is completed. Now you want to hire someone who will implement the database and develop your food delivery app. Which type of actor on the scene will you hire and why?
    c. You have launched an online food delivery service. The app is up and running. Now you need to hire someone who will provide technical support and will monitor the performance and usage of your database. Which type of actor on the scene will you hire and why?
    d. An actor on the scene sent you feedback regarding your food delivery app's interface. He said that his profile picture is being cropped incorrectly after uploading in the system. Which type of actor on the scene is described here?

—-------------------------------Go through solution only after you tried yourself—---------------------------

**IMPORTANT NOTE: Paraphrasing or just reiterating what is written in the question itself, is not an appropriate explanation. So, if any question requires an explanation, it must elaborate beyond what is written in the question.**

Answer 1, 2, 5, 6, 8, 9, 10, 12:
Use slides for explanation and own examples where examples are required.

    a. Logical Data Independence. Adding an age column changes the conceptual schema, but since it does not appear to users, the external schema remains unchanged.
    b. Physical Data Independence. Changing the data storage type will change the internal schema, but the database structure remains unchanged, so the conceptual schema remains unchanged.

Use slides for explanation of schema and state, and own examples
    a. Insert a column in a table - Schema
    b. Insert new data or row in a table. - State
    c. Change the position of a column in a table - Schema
    d. Retrieve some data from the table. - State
    e. Delete a column from the table. - Schema
    f. Delete an existing data from a table. - State
    g. Change the name of a column - Schema
    h. Change the data type of a column - Schema
    i. Change the data value in a particular row/column. -- State

    a. File based approach. Small amount of data that is not expected to change much. High security not required and multiple user access not required. The database approach has additional financial costs, it is not required to use a database approach since a file based approach is sufficient.
    b. Database approach. Authorized access required, large amounts of data that may change frequently, multiple user access with different views and functionality required. File based approach is not sufficient to meet the above requirements.

Use slides for explanation of ddl and dml.
    a. Insert a column in a table - ddl, structure/schema is changing.
    b. Insert new data or row in a table. - dml, values/state of a database are changing.
    c. Change the position of a column in a table - ddl, structure/schema is changing.
    d. Retrieve some data from the table. - dml, values/state of a database is being accessed.
    e. Delete a column from the table. - ddl, structure/schema is changing.
    f. Delete an existing data/row from a table. - dml, values/state of a database are changing.
    g. Change the name of a column - ddl, structure/schema is changing.
    h. Change the data type of a column - ddl, structure/schema is changing.
    i. Change the data value in a particular row/column. - dml, values/state of a database are changing.

    a. database designer - the designer will collect the data requirements and use data models to plan the organization of the data in the database.
    b. software engineer - The software engineer will use a DBMS and other programming languages to create the database and the app respectively.

c.  database administrator(DBA) - After the food delivery app is created the DBA will monitor who is accessing the database, for what purpose. They will also monitor the performance of the database and address any issues. In case of any database errors, they will provide the technical support to fix the problem.
d.  end user - The end user is directly using the interface of the app and they will provide feedback when they encounter problems related to the app's interface.