Here are the answers to the practice questions:

1. The three schema architecture refers to the separation of a database into three levels - internal schema,  onceptual schema, and external schema. The internal schema describes the physical storage structure of the database. The conceptual schema describes the structure of the entire database for a community of users. The external schema describes the view of the database for each individual user group. This separation allows for data independence, where changes to schema at one level do not affect the schema at another level.

2. Data independence refers to the ability to modify the schema at one level without having to modify the schema at another level. There are two types of data independence:

    a. Logical data independence: Modifications to the conceptual schema do not affect the external schemas. For example, adding a new column to a table changes the conceptual schema but not the external view.

    b. Physical data independence: Changes to the internal schema do not affect the conceptual schema. For example, changing the index structures or file storage format affects only the internal schema.

3.

    a. Adding an age column changes the conceptual schema, but since it does not appear to users, the external schema remains unchanged. This achieves logical data independence.

    b. Changing the storage from HDD to SSD changes the internal schema, but the database structure remains unchanged, so the conceptual schema remains unchanged. This achieves physical data independence.

4. Schema refers to the overall logical structure of the database - the relationship between tables, constraints, indexes, etc. It defines how data is organized in the database. State refers to the actual data or values stored in the database at a given point in time.

    Insert column - Affects schema

    Insert row - Affects state

    Change column position - Affects schema

    Retrieve data - Affects state

    Delete column - Affects schema

Delete row - Affects state

Rename column - Affects schema

Change data type - Affects schema

Update value - Affects state

5. Differences between file-based and database approaches:
    a. Data redundancy: More redundant data in file-based systems
    b. Data isolation: Database integrates data into a central repository
    c. Concurrent access: Better support for concurrent access in databases
    d. Querying and analysis: More powerful querying and analysis capabilities in databases
    e. Integrity and security: Better enforcement of integrity constraints and security in databases
6. Advantages of database approach:
    a. Reduced data redundancy
    b. Data consistency and integrity
    c. Support for concurrent access by multiple users
    d. Improved data sharing
    e. Enforced security via access control
    f. Powerful querying and analysis capabilities
7. For personal data of 60 relatives, file-based approach is sufficient as data volume is low and no concurrent access needed.

   For large-scale government data, database approach is more suitable due to large data volume, need for concurrent access, and security requirements.

8. Program-data independence refers to the ability to modify a program without having to modify the database structure it operates on. For example, changing a SQL query in an application will not require changes to the database schema. This allows programs to be developed independently from the database structure.

9. Data abstraction refers to the concept of separating the logical representation of data (the abstract properties) from the physical representation (how it is stored). This allows programs to operate on a conceptual level without worrying about how data is stored.

10. A data model defines how data is represented and accessed. Some types of data models are:

    a. Hierarchical model - data organized in a tree structure

b. Network model - more flexible graph-based structure
c. Relational model - data stored in relations (tables)
d. Object-oriented model - data represented as objects and classes

11.

a. DDL:
    1. Create/drop table
    2. Create/drop index
    3. Alter table schema
b. DML
    i. Insert row
    ii. Update row
    iii. Delete row
    iv. Retrieve data

12.

Insert column - DDL

Insert row - DML

Change column position - DDL

Retrieve data - DML

Delete column - DDL

Delete row - DML

Rename column - DDL

Change data type - DDL

Update value - DML