### Storage of Databases:

Databases are stored on various types of storage media, each with its own characteristics. The choice of storage media depends on factors such as performance requirements, capacity, and cost. Common storage media include:

### Records, Blocks, and Files:

1. \*\*Records:\*\*

- \*\*Definition:\*\* A record is a collection of related data items treated as a unit.

- \*\*Example:\*\* In a student database, a record might contain information about a single student.

2. \*\*Blocks:\*\*

- \*\*Definition:\*\* A block is a contiguous sequence of records that are stored together.

- \*\*Example:\*\* A block of records might be read from or written to storage as a single unit for efficiency.

3. \*\*Files:\*\*

- \*\*Definition:\*\* A file is a collection of records or data items.

- \*\*Example:\*\* A file in a database could be a table containing multiple records.

### Spanning and Unspanning Records:

- \*\*Spanned Record:\*\*

- A record that is allowed to span multiple blocks.

- \*\*Unspanned Record:\*\*

- A record that is stored within a single block.

### Pile Files:

- \*\*Definition:\*\*

- A pile file is an unorganized collection of records where new records are simply added to the end of the file.

### Sorted Files:

- \*\*Definition:\*\*

- A sorted file is an organized collection of records arranged in a specific order based on one or more key fields.

### Hash Files:

- \*\*Definition:\*\*

- A hash file uses a hash function to map keys to locations where data can be stored or retrieved quickly.

### Static versus Dynamic Hashing:

1. \*\*Static Hashing:\*\*

- \*\*Definition:\*\*

- Fixed number of buckets in the hash table.

- If a bucket becomes full, overflow handling is needed.

- \*\*Pros:\*\*

- Simplicity.

- Predictable performance.

- \*\*Cons:\*\*

- Can lead to uneven distribution.

2. \*\*Dynamic Hashing:\*\*

- \*\*Definition:\*\*

- The number of buckets can dynamically change.

- Redistributes data when necessary.

- \*\*Pros:\*\*

- Handles varying data sizes efficiently.

- \*\*Cons:\*\*

- More complex to implement.

Understanding the characteristics of storage media, file organizations, and hashing techniques is crucial for designing efficient database systems. The choice of these components can impact the performance, scalability, and reliability of the database.