

1. What is the difference between a process and a thread?

Answer:

- **Process:** An independent program with its own memory space.
 - **Thread:** A lightweight unit of a process that shares the same memory space.
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2. Explain the concept of normalization in databases.

Answer:

Normalization is the process of organizing data to minimize redundancy. It involves dividing a database into two or more tables and defining relationships between them to increase data integrity.

3. What are the four pillars of Object-Oriented Programming (OOP)?

Answer:

1. **Encapsulation:** Bundling data with methods.
 2. **Abstraction:** Hiding complex implementation details.
 3. **Inheritance:** Deriving new classes from existing ones.
 4. **Polymorphism:** Ability to take many forms, allowing methods to do different things based on the object it is acting upon.
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4. Differentiate between overloading and overriding.

Answer:

- **Overloading:** Same method name with different parameters within the same class.
 - **Overriding:** Subclass provides a specific implementation of a method already defined in its superclass.
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5. What is a deadlock? How can it be prevented?

Answer:

A deadlock is a situation where two or more processes are unable to proceed because each is waiting for the other to release resources. Prevention strategies include:

- Avoiding circular wait.
 - Implementing resource hierarchy.
 - Using timeout mechanisms.
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6. Explain ACID properties in DBMS.

Answer:

1. **Atomicity:** Transactions are all-or-nothing.
 2. **Consistency:** Transactions lead from one valid state to another.
 3. **Isolation:** Concurrent transactions do not interfere.
 4. **Durability:** Once a transaction is committed, it remains so.
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7. What is the difference between primary key and unique key in SQL?

Answer:

- **Primary Key:** Uniquely identifies each record; cannot be null.
 - **Unique Key:** Ensures all values are unique; can have one null value.
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8. Describe the OSI model layers.

Answer:

1. **Physical:** Hardware transmission.
 2. **Data Link:** Node-to-node data transfer.
 3. **Network:** Routing of data.
 4. **Transport:** End-to-end connections.
 5. **Session:** Managing sessions.
 6. **Presentation:** Data translation.
 7. **Application:** Network services to applications.
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9. What is the difference between stack and queue data structures?

Answer:

- **Stack:** Last-In-First-Out (LIFO); elements added/removed from the top.
 - **Queue:** First-In-First-Out (FIFO); elements added at the rear and removed from the front.
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10. Explain the concept of virtual memory.

Answer:

Virtual memory is a memory management technique that gives an application the impression it has contiguous working memory, while in reality, it may be fragmented and spread across physical memory and disk storage.
