Important Elements

EQUATIONS & FORMULAS:

- No specific equations or formulas were mentioned in the text.

KEY CONCEPTS:

- Data vs Information: Data is raw and unorganized facts, while information is processed, structured data that provides context and enables decision making.

- Database Management System (DBMS): A collection of interrelated data and programs to access the data, providing a way to store and retrieve information conveniently and efficiently.

- Three Schema Architecture: A DBMS architecture that includes the physical level (describing how data is stored), logical level (describing the design of the database), and view level (providing personalized views for different users).

DIAGRAMS & FLOWCHARTS:

- The ER diagram in the Entity-Relationship Model section shows the graphical representation of entities, relationships, attributes, and cardinality ratios, serving as a blueprint for designing a database schema. This diagram helps in visualizing the structure of the database and how different entities are connected.

EQUATIONS & FORMULAS:

KEY CONCEPTS:

- Specialisation: Involves grouping entities with distinctive features to refine the database blueprint.

- Generalisation: Involves creating a new generalized entity set to avoid data repetition for common attributes.

- Attribute Inheritance: Both Specialisation and Generalisation involve attributes of higher level entity sets being inherited by lower level entity sets.

- Participation Inheritance: If a parent entity set participates in a relationship, its child entity sets will also participate in that relationship.

- Aggregation: Technique used to show relationships among relationships by treating them as higher-level entities.

DIAGRAMS & FLOWCHARTS:

- The text mentions using a triangle component to depict the "is-a" relationship between superclass and subclass. This diagrammatic representation helps visualize the hierarchical relationship between entities in a database design.

EQUATIONS & FORMULAS:

- No specific equations or formulas provided in the text.

KEY CONCEPTS:

- Normalisation: Normalisation is a database optimisation technique used to eliminate redundancy and undesirable characteristics like insertion, update, and deletion anomalies by dividing composite attributes into individual attributes and ensuring data integrity.

- Functional Dependency (FD): Functional Dependency is a relationship between attributes in a relation where the value of one attribute determines the value of another attribute.

DIAGRAMS & FLOWCHARTS:

- No diagrams or flowcharts provided in the text.

EQUATIONS & FORMULAS:

- No equations or formulas are provided in the text.

KEY CONCEPTS:

- Normalization: The process of organizing a database to reduce redundancy and improve data integrity.

- Transaction: A unit of work done against the database in a logical sequence.

- ACID Properties: Consistency criteria for ensuring the integrity of transactions in a database.

- Indexing: A method used to optimize the performance of a database by minimizing disk accesses required for queries.

- NoSQL Databases: Non-tabular databases that store data differently than relational tables, providing flexible schemas and scalability.

DIAGRAMS & FLOWCHARTS:

- No diagrams or flowcharts are described in the text.

KEY CONCEPTS:

- NoSQL databases store data differently than relational databases and come in various types such as document, key-value, wide-column, and graph.

- NoSQL databases are schema-free, flexible, and can handle large amounts of data with high user loads.

- NoSQL databases do not support ACID properties in general, except for some databases like MongoDB.

- NoSQL databases can be optimized for specific use cases such as key-value stores for shopping carts and user profiles, column-oriented stores for analytics, document-based stores for e-commerce platforms, and graph-based stores for social networks and knowledge graphs.

DIAGRAMS & FLOWCHARTS:

- The text does not contain any specific diagrams or flowcharts.

EQUATIONS & FORMULAS:

- No specific equations or formulas provided in the text.

KEY CONCEPTS:

- Load balancing: Distributing incoming network traffic across multiple servers to ensure no single machine is overloaded.

- High availability: Refers to the amount of time a database is considered available, often achieved through techniques like clustering and load balancing.

- Clustering: Splitting requests among multiple computers to handle user requests and ensure high availability.

DIAGRAMS & FLOWCHARTS:

- The text does not contain any specific diagrams or flowcharts.

EQUATIONS & FORMULAS:

KEY CONCEPTS:

- CAP Theorem: The CAP theorem states that a distributed system can only provide two of three properties simultaneously: consistency, availability, and partition tolerance. It formalizes the tradeoff between consistency and availability when there's a partition.

DIAGRAMS & FLOWCHARTS:

- The Master-Slave Database Concept: This concept involves having a Master database where write operations are directed, and Slave databases where read operations are done. This architecture helps optimize IO in a system and distribute data efficiently. It is a pattern in the Database Scaling Patterns.