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ITSE 1450

Module 9 Questions

1  
A data structure is a specialized format for organizing, processing, retrieving, and storing data in a computer system. It is a collection of data values, the relationships among them, and the functions or operations that can be applied to the data. Data structures are critical for efficiently managing and using large datasets, and they can vary in complexity from simple arrays and lists to more elaborate constructions like trees, graphs, and hash tables. Each structure is designed to optimize specific operations such as searching for a data item, adding a new data item, or deleting an existing one.

2  
A Database Management System (DBMS) includes a data storage engine that stores and retrieves data, a query processor to execute queries, a transaction management system for maintaining data integrity, and security mechanisms for access control and data protection.  
  
3.  
Simplicity: Clean and uncluttered designs that focus on essential content.

Consistency: Uniform design elements and layouts across all pages for a cohesive look.

Mobile Optimization: Ensuring the design works flawlessly on mobile devices.

Clear Call-to-Action: Direct and noticeable calls-to-action guiding user behavior.

Content Hierarchy: Logical arrangement of content using headings, bullet points, and spacing for easy scanning.

Engaging Visuals: High-quality images and videos that complement the text content.

Interactive Feedback: Immediate response to user actions, like hover effects or form validation messages.

Security: Implementing secure protocols and privacy measures to protect user data.  
  
4  
Primary Key: Think of it as the main identifier for each row in a table, like a Social Security Number for each person. It uniquely identifies a record and cannot be duplicated.

Candidate Key: These are keys that have the potential to be the primary key. For example, both a passport number and a driver's license number could serve as unique identifiers.

Secondary Key: This key is used mainly for sorting and searching purposes, like sorting accounts by last name rather than account number.

Foreign Key: It’s a link between two tables. For example, a user’s table might have an ID, and this ID might appear in a purchases table to show which user made each purchase.

5.  
ERDs are crucial tools in both business analysis and database design. They serve as a blueprint for a database system, outlining how data is interconnected and organized. In business analysis, ERDs help stakeholders understand data flow and relationships, aiding in decision-making and process optimization. For developers, ERDs provide a clear structure for database creation, ensuring that all necessary relationships and data requirements are captured and effectively implemented in the database architecture. They are essential in planning and communicating the structure of data systems.  
  
6.  
To convert an unnormalized design to 1NF, you need to ensure that each table in the database has only atomic (indivisible) values and each record is unique. This involves:

* Eliminating Repeating Groups: Transform any repeating group of fields into a separate table. For example, if you have a table with multiple phone number fields for a single person, you would create a new table for phone numbers.
* Ensuring Unique Records: Add a primary key to each table. If the unnormalized table doesn't have a unique identifier for each record, you should create one to ensure that each row is unique.
* Flattening Nested Tables: If the table contains nested tables (tables within tables), these should be flattened out into separate tables linked by foreign keys.

7.  
In data design, codes are used as a means of efficiently representing and organizing complex information. They serve as shorthand symbols or abbreviations to simplify data entry, reduce storage requirements, and facilitate faster data processing. For instance, in a customer database, instead of storing lengthy descriptions of customer types, short codes like "B2B" for business-to-business customers or "B2C" for business-to-consumer customers can be used. This not only economizes on space but also standardizes data entries, making them easier to sort, query, and analyze. Additionally, codes are integral in establishing relationships between different data elements across tables in a relational database, thereby enhancing data integrity and accuracy.  
  
8.  
Data Warehousing: A data warehouse is a centralized system for storing, integrating, and retrieving large volumes of data across an organization, typically used for reporting and analysis.

Data Mining: Data mining entails extracting valuable information from large datasets to identify patterns, predict trends, and make data-driven decisions.  
  
9.  
  
Alternatively, March 15, 2019, can be represented as an absolute date in numerical format, such as "20190315". This continuous string of numbers eliminates any confusion that might arise from different date formats and is particularly useful in programming and data processing contexts.  
  
10.  
  
In the context of data protection, permissions function as a set of rules that define how data can be accessed or manipulated by different users or systems. They are applied to databases, files, or specific data sets to restrict access based on user identity or group membership. For instance, sensitive financial records might be accessible only to users with specific finance-related permissions. This system of permissions is crucial for maintaining the confidentiality and security of data, preventing unauthorized access or alterations.