

## SECP1513: Technology Information System

## **Mind Map Chapter 5**

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Databases are systems designed for the electronic storage of data, allowing for efficient access and manipulation. They facilitate the organization of data in a structured manner, enabling users to retrieve Electronic Data Storage, Access, and and update information easily. Manipulation The manipulation of data includes operations such as inserting, updating, deleting, and querying data. Data can be categorized into three main types: structured, semi-structured, and unstructured. Structured data is highly organized and easily searchable, often found in relational databases. Semi-structured data does not conform to a Data Types rigid structure but still contains tags or markers to separate data elements. Unstructured data lacks a predefined format, making it more challenging to analyze, such as Data analysts play a crucial role in assessing text documents or multimedia files. data quality, cleaning datasets, and developing automation and machine learning scenarios. Data is organized hierarchically, progressing from characters to fields, records, tables, and Data Analyst ultimately databases. They are responsible for transforming raw data Database Basics into actionable insights that inform business strategies. Characters are the smallest unit of data, which Data Organization combine to form fields (e.g., names, dates). Roles in Data Analytics Essential skills for data analysts include proficiency in data analysis techniques, Fields are grouped into records, which are then technical knowledge of database systems, and organized into tables, forming the foundation of familiarity with analytical tools. a database. Skills Required Strong problem-solving abilities and attention Key fields serve as unique identifiers for to detail are also critical for success in this role. records within a database, ensuring that each entry can be distinctly recognized. Key Fields Examples of key fields include Social Security Data collection involves gathering information Numbers (SSN) and Employee IDs, which from various sources, including online prevent duplication and maintain data integrity. platforms, internal systems, and community inputs. Databases can process data in two primary ways: batch processing and real-time Data Collection Effective data collection is crucial for ensuring processing. that the analysis is based on accurate and relevant information. Batch processing involves collecting data over a period and processing it all at once, which Once collected, data must be organized using Processing can lead to delays. tools like spreadsheets or specialized software to facilitate analysis. Real-time processing allows for immediate data processing, providing instant access to updated **Data Organization** Proper organization helps in structuring data information. for easier access and manipulation during the analysis phase. Data cleaning is the process of identifying and The hierarchical database model organizes correcting errors in the dataset to ensure data in a tree-like structure, where each node completeness and accuracy. has a single parent. This step is vital for maintaining data integrity Data Cleaning Hierarchical Model This model is efficient for representing one-toand improving the reliability of the analysis many relationships but can be rigid and difficult **Data Analytics Process** results. to navigate for complex data. Data analysis involves examining the organized The network database model allows for manydata to draw insights and support decisionto-many relationships, enabling multiple paths making processes. between data points. Data Analysis Analysts use various techniques and tools to Network Model This flexibility supports more complex interpret the data and identify trends or relationships but can complicate data Introduction to anomalies. management and retrieval. **Databases** The relational database model stores data in tables that can be linked through key fields, promoting data integrity and reducing redundancy. **Database Models Data Visualization** Relational Model SQL (Structured Query Language) is commonly used for querying and managing relational Data Visualization & Warehousing The multidimensional database model utilizes data cubes to represent data across multiple dimensions, facilitating complex data analysis. Data Warehousing Multidimensional Model This model is particularly useful for applications like data warehousing and business intelligence. The object-oriented database model is designed for unstructured data, using objects A Database Management System (DBMS) and classes to represent data entities. consists of several key components that work together to manage data effectively. Object-oriented Model This model supports complex data types and relationships, making it suitable for The engine is responsible for data storage, applications requiring rich data representation. retrieval, and management operations. Data definition (schema) defines the structure of the database, including tables and Individual databases are personal databases typically used on microcomputers for individual users. Data manipulation tools, such as SQL and Components of DBMS **Individual Databases** They are designed for simplicity and ease of Query-by-Example, allow users to interact with use, often supporting basic data management Application generation tools help create user Company databases are centralized systems interfaces and applications that utilize the that allow multiple users to access shared data from a central server. **Database Management Systems** Data administration involves managing user (DBMS) Company Databases These databases support collaboration and rights, security, and overall database data consistency across an organization. **Types of Databases** Distributed databases store data across Data analytics involves examining large sets of multiple locations, which can enhance data to uncover patterns, trends, and insights. performance and reliability. Big data presents challenges such as data Distributed Databases quality, privacy concerns, and scalability issues. They require sophisticated management to Data Analytics ensure data consistency and integrity across different sites. Various types of analytics include descriptive, diagnostic, predictive, and prescriptive Commercial databases are large-scale analytics, each serving different purposes in databases that often require subscription decision-making. access for users. **Commercial Databases** They provide extensive data resources and are

commonly used in research, marketing, and

business intelligence.

Data visualization is the practice of converting

Effective visualization helps communicate

insights clearly and allows stakeholders to

Data warehousing refers to the centralized

storage of data from multiple sources,

The ETL (Extract, Transform, Load) process is

essential for moving data into the warehouse,

ensuring it is clean and structured for analysis.

relationships.

the data.

database.

maintenance.

designed for analysis and reporting.

complex data into visual formats, such as

charts and dashboards, to enhance

grasp key findings quickly.

understanding.