Introduction to Databases

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A database is . . .

- a logically coherent collection of data,
- representing some aspect of the world known as a miniworld or universe of discourse, which is
- created for a specific purpose and group of users.

A database management system (DBMS) allows us to create and maintain databases on a computer.

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Data and Metadata

- Data
  - Records
  - Data elements
- Metadata – "data about data"
  - Types of data elements
  - Structure of records
  - Constraints

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Database Development

1. Requirements analysis
2. Conceptual design
3. Logical design
4. Physical design

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The Database Approach

- Self-describing data - metadata stored with data
- Insulation between data and programs, and data abstraction
- Multiple views of the data
- Shared data and multiuser transaction processing

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Database Users

- Database administrators
- Database designers
- End users
- System analysts and programmers

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Capabilities of a DBMS

- Controlling Redundancy
- Restricting unauthorized access
- Providing persistent storage for data objects
- Providing efficient query processing
- Providing backup and recovery
- Providing multiple user interfaces
- Reperesenting relationships among data
- Enforcing integrity constraints
- Permitting inference and action through rules and triggers

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History of Database Technology

- Hierarchical and network systems
- Relational databases (focus of this course)
- Object-oriented databases
- XML
- New applications: media storage (e.g., video, images), data mining, spatial/GIS, time series
- Big data and NOSQL

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