CSc 484
Database Management Systems

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Exam #2 - Review

Review for Exam #2

- Database Design Process

- Requirements collection and analysis
- Conceptual design
  - Choose a data model, translate the requirements into a conceptual schema of the database, by applying the concepts of the chosen data model
  - E-R (Entity-Relationship) model is typically used to represent the conceptual design
- Logical design
  - Map the high-level conceptual schema onto the implementation data model of the database system that will be used
  - Relational data model
- Physical design

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- Entity-Relationship Model
  - No Enhanced Entity-Relationship Model

- Entity set
  - Strong entity set
  - Weak entity set
- Attributes
  - Simple attribute
  - Complex attribute
    - Composite
    - Multi-valued
    - Derived
- Relationship set

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- Entity-Relationship Model
  - No Enhanced Entity-Relationship Model

- Structural constraints
  - Mapping cardinalities
    - One-to-one
    - One-to-many
    - Many-to-one
    - Many-to-many
  - Participation constraint
    - Total
    - Partial

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- Logical Design
  - E-R model -> Relational model

- For each entity set and for each relationship set, there is a unique schema to which we assign the name of the corresponding entity set or relationship set
  - Specify primary key and foreign key (if there are any) for each relation
  - Relationship set between weak entity set and its identifying entity set
  - Combination of schemas

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- Normalization

- Decomposition

- Functional dependencies

- 1NF, 2NF, 3NF, BCNF, …

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- Accessing SQL from a Programming Language

- Two approaches to accessing SQL from a general-purpose programming language
  - Dynamic SQL
  - Embedded SQL

- Database connectivity
  - JDBC
  - ODBC

- General usage
  - Steps involved – no programming

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- Security

- Counter Measures
  - Authorization
  - Access controls
  - Views
  - Backup and recovery
  - Integrity
  - Encryption
  - RAID technology

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- NoSQL – Document databases

- Important characteristics of large-scale data management systems
  - Scalability, Cost, Flexibility, Availability

- CAP theorem
  - Consistency, Availability, Partition protection

- ACID and BASE
  - Atomicity, Consistency, Isolation, and Durability
  - Basically Available, Soft State, Eventually Consistent

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- Assignment 3

- The process of designing database using E-R model
  1. identify entity sets
  2. decide appropriate attributes for each entity set
  3. build relationship sets between entity sets
  4. remove redundant attributes

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- Assignment 4

- Functional dependencies
  - Derived from the information about the system
  - Independent from any normal form relations
- UNF -> 1NF
  - Remove repeating groups :
- 1NF -> 2NF
  - Remove partial dependencies
- 2NF -> 3NF
  - Remove transitive dependencies
  - There is no non-primary-key attributes transitively dependent on the primary key, so no decomposition needed in this step

Exam #2

- Thursday, May 2nd
  - 11:30 AM – 1:30 PM

- Build an ER model for a given problem
- Derive relational schema from ER diagram
- Normalize given relations to 3NF relations
- Short answers