IT2040 – Database Management Systems   **Semester 1, 2025**

Tutorial 01

1. Explain the advantages of using a database approach in comparison to the file- processing system?

2. Briefly explain each main step in the process of designing a DB for an application domain.

3. Consider the following requirements for a university database:

   - A Person has a NIC (unique), age and a name.
   - Professor is a Person with the following attributes: rank and research specialty.
   - Projects have a project number (unique), a sponsor (e.g. NSF), a starting date, ending date and a budget.
   - Graduate students are also persons. Graduate students need to store information about the degree program (e.g. M.S. or Ph.D.) that they are enrolled.
   - Each project is managed by one professor (known as the project's principal investigator).
   - A project must have a principal investigator.
   - Each project is worked on by one or more professors (known as co-investigators).
   - Professors can manage and/or work on multiple projects.
   - Each project is worked on by one or more graduate students (known as project's research assistants).
   - Graduate students can work on multiple projects.

   Draw an ER diagram considering the scenario above.

4. Draw an EER diagram to cater the following requirements.

   The members of an online auctioning site are identified by a unique member id and their names, email addresses, phone numbers and postal addresses should be maintained. A member may be a buyer or a seller. A buyer has a shipping address and a seller has a bank account number and routing number. Items are posted by a seller. When the seller posts the item a bid may be placed by buyers. A bidding price and the time of bid placement is recorded. The person with the highest bid price is declared as the winner and the buyer can then buy the item. Items are identified by a unique item number assigned by the system. Items are also described by an item title, an item description, a starting bid price and bidding increment. Item has a category with a category number. A category is identified by the category number and the item number together.

5. Draw an EER diagram to cater the following requirements.

   Professors have an SSN, a name, an age, a rank, and a research specialty. Projects have a project number, a sponsor name (e.g., NSF), a starting date, an ending date, and a budget. Graduate students have an SSN, a name, an age, and a degree program (e.g., M.S. or Ph.D.). Each project is managed by one professor (known as the project's principal investigator).

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Each project is worked on by one or more professors (known as the project's co-investigators). Professors can manage and/or work on multiple projects. Each project is worked on by one or more graduate students (known as the project's research assistants). When graduate students work on a project, a professor must supervise their work on the project. Graduate students can work on multiple projects, in which case they will have a (potentially different) supervisor for each one. Departments have a department number, a department name, and a main office. Departments have a professor (known as the chairman) who runs the department. Professor's work in one or more departments, and for each department that they work in, a time percentage is associated with their job. Graduate students have one major department in which they are working on their degree. Each graduate student has another, more senior graduate student (known as a student advisor) who advises him or her on what courses to take.