CS105.3 – Database Management Systems

Tutorial 2

Entity Relationship Diagram

Draw Entity Relationship Diagrams (ERD) for the following scenarios. You can make additional assumptions on entities, attributes, relationships etc. Mention the assumptions you made on each scenario.

Scenario 1:

A university requires a database to store information about students, lecturers, degree programs, and modules. Each student has a unique student id, name, address, contact number, NIC etc. Each degree program has multiple offerings. Each student is enrolled to a single offering of a degree program and studies multiple modules. Start date, end sate and number of students of each offering should be handled within the system along with a unique offering code. Database needs to track details about degree programs like name of the degree, faculty, number of years etc. Each module has a module code, name, number of credits, level, semester etc. Each degree contains multiple modules and same module can be offered in multiple degree programs. One lecturer can conduct many modules and one module can be conducted by several lecturers. University conducts examinations for most of the modules while some modules are assignment based. Details about examinations like exam date, start time, end time, duration etc. are stored in the database. One student can sit for the same examination three times if he fail in the first attempt. System should track the details of student results within the database. University needs to keep details about the guardian of each student within the database including their name, NIC, contact number and relationship to student.

Scenario 2:

A company database keeps track of a company's employees, departments, and projects. The company is organized into departments. Each department has a unique number, a unique name, number of employees and a particular employee who manages the department. It keeps track of the start date when that employee began managing the department. A department may have several locations. A department controls a number of projects, each of which has a unique number, a unique name, and a single location. It store each employee's name, social security number, address, salary, gender, and birth date. An employee is assigned to one department, but may work on several projects, which are not necessarily controlled by the same department. It keeps track of the current number of hours that an employee works on each project. It also keeps track of the direct supervisor of each employee who is another employee. It wants to keep track of the dependents of each employee for insurance purposes. It keeps each dependent's first name, sex, birth of date, and relationship to the employee.

Scenario 3:

A general hospital consists of a number of wards. Each ward has a unique ward number, a name and number of patients in that ward. A doctor is assigned to a single ward but a ward can have many doctors. A ward hosts a number of patients. Each patient's admission number (unique), name, address, telephone number and the date of admission is stored. The hospital DB stores the prescribed treatments for a patient. Each treatment has a unique number and description. It also keeps tracks of the treatment dosage for each patient. One patient may be treated more than one treatment and the same treatment can be given to many patients. The hospital also keeps tracks of the hospital ID number of each doctor (unique), name, address, telephone number and specialization of each doctor. A patient is assigned to one doctor but a doctor can treat many patients.

Scenario 4:

A record company wishes to use a computer database to help with its operations regarding its performers, recordings and song catalogue. Songs have a unique song number, a non-unique title and a composition date. A song can be written by a number of composers; the composer's full name is required. Songs are recorded by recording artists (bands or solo performers). A song is recorded as a track of a CD. A CD has many songs on it, called tracks. CDs have a unique record catalogue number, a title and must have a producer (the full name of the producer is required). Each track must have the recording date and the track number of the CD. A song can appear on many (or no) CDs, and be recorded by many different recording artists. The same recording artist might re-record the same song on different CDs. A CD must have only 1 recording artist appearing on it. CDs can be released a number of times, and each time the release date and associated number of sales is required.

Scenario 5:

Assume there is a library system with the following properties. The library contains one or several copies of the same book. Every copy of a book has a copy number and is located at a specific location in a shelf. A copy is identified by the copy number and the ISBN number of the book. Every book has a unique ISBN, a publication year, a title, an author, and a number of pages. Books are published by publishers. A publisher has a name as well as a location. Within the library system, books are assigned to one or several categories. A category can be a subcategory of exactly one other category. A category has a name and no further properties. Each reader needs to provide his/her family name, his/her first name, his/her city, and his/her date of birth to register at the library. Each reader gets a unique reader number. Readers borrow copies of books. Upon borrowing the return date is stored.