Course Name: **A Level (1st Sem)** Subject : **Introduction to DBMS**
Topic: **ERD – Example (Part 9)** Date: **15-Apr-2020**

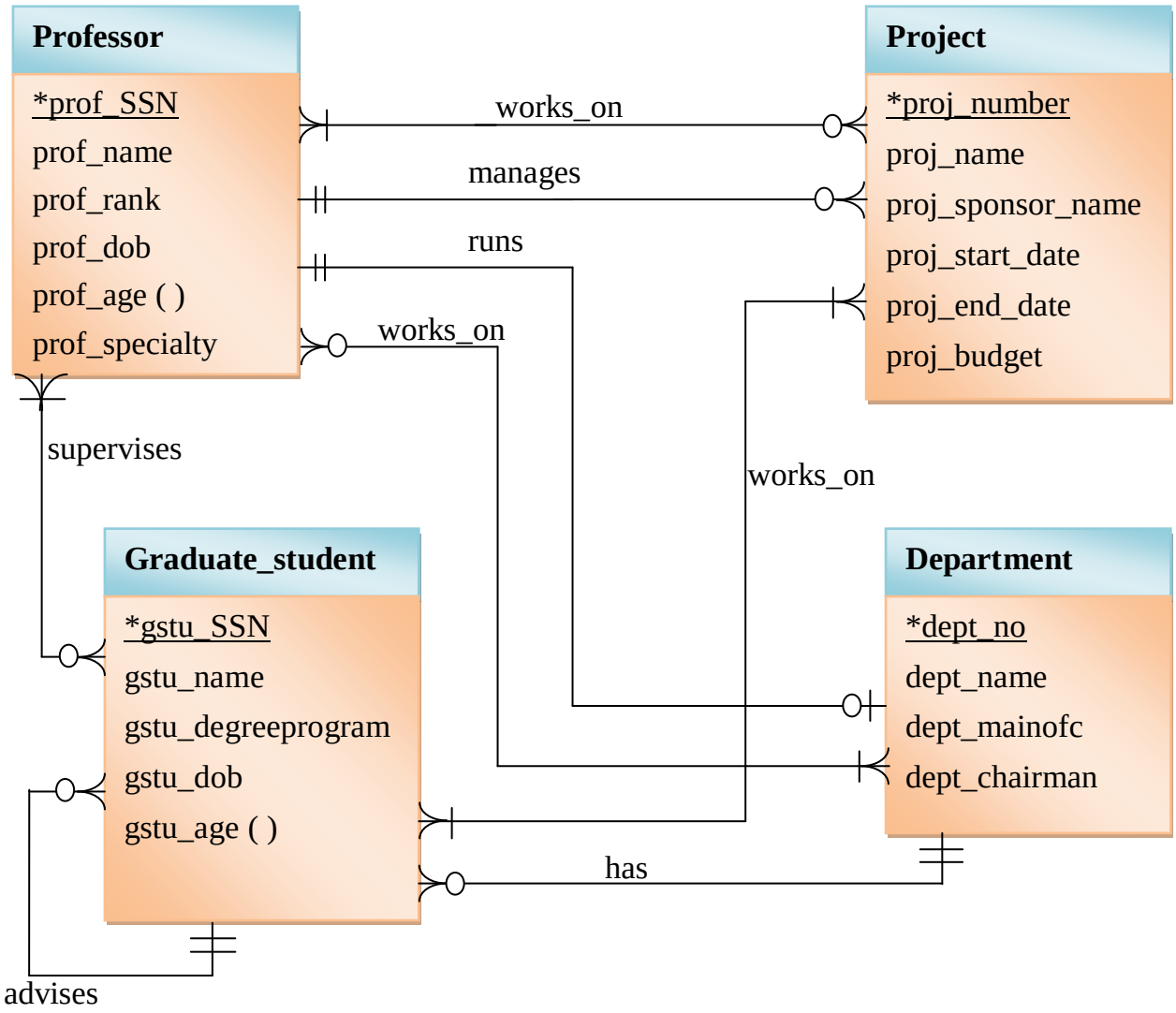
ERD – Example

Que. Consider the following information about a university database:

- 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).
- 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.

Design and draw an ER diagram using crow's foot notations that capture the information about the university. Be sure to indicate any key and participation constraints.

Ans. ERD using Crow's Foot Notations



Explanation:

As we all know that ERD comprises of Entities, attributes and relationship among entities.

Therefore, the following four entity set and their attributes are identified:

1. **Professor :** prof_SSN, prof_name, prof_rank, prof_dob, prof_age, prof_specialty
2. **Project :** proj_number, proj_name, proj_sponsor_name, proj_start_date, proj_end_date, proj_budget

3. **Graduate_student :** gstu_SSN, gstu_name, gstu_degreeprogram, gstu_dob, gstu_age
4. **Department :** dept_no, dept_name, dept_mainofc, dept_chairman

The following relationships set and participation constraints are identified:

Relationships types and Entities involved in	**Participation Constraints**
• **Many *Professor* works_on Many *Project*** A professor can work on multiple projects and a project can have multiple professors associated with it.	Total: Project Partial: Professor The participation of entity set *Professor* in *works_on* relationship set is partial because every *Professor* is not supposed to work in the *Project*. It is possible that only some of the *Professor* entities are related to the *Project.* The participation of entity set *Project* in *works_on* relationship set is total because every *Project* is expect to relate at least one *Professor*.
• **One *Professor* manages Many *Project*** Each project is managed by on professor and a professor can manage multiple projects.	Total: Project Partial: Professor Participation of *Project* entity set is total because every project must be managed by one professor, but participation of *Professor* entity set is partial because only some of the professors are supposed to manage the project not all the professors.
• **One *Professor* runs One *Department*** department has a professor who runs the department	Total: Department Partial: Professor Explain it by yourself as above.
• **Many *Professor* works_on Many *Department*** A professor can work on multiple department on time percentage basis, and a department can have multiple professor.	Total: Professor Partial: Department Explain it by yourself as above.

• **Many *Graduate_student* works_on Many *Project*** Each project is worked on by one or more graduate students and Graduate students can work on multiple projects.	Total: Graduate_student Total: Project Explain it by yourself as above.
• **One *Graduate_student* has Many *Department*** Graduate students have one major department.	Total: Graduate_student Partial: Department Explain it by yourself as above.
• **Many *Professor* supervises Many *Graduate_student*** A student can be supervised by many professors and a professor supervises many students.	Total: Graduate_student Partial: Professor Explain it by yourself as above.
• **One *Graduate_student* advises Many *Graduate_student*** Senior graduate students advises many graduate students, but a student is advised by single senior graduate student.	Partial: Graduate_student Total: Graduate_student Explain it by yourself as above.

Exercise:

1. Suppose you are given the following requirement for simple database for the National Hockey League (NHL):

- The NHL has many teams. Each team has name, city, a coach, a captain and set of players.
- Each player belongs to only one team. Each player has a name, a position (such as left wing or goalie), a skill level, and set of injury records.
- A team captain is also a player.
- A game is played between two teams (referred to as host team and guest team and has a date (such as May 11th, 1999) and a score (such as 4 to 2).

Construct a clean and concise ER diagram (using chen and crow's foot notations both) for NHL database. List your assumptions and clearly indicate the cardinality mappings as well as any role indicators in your ER diagram.