**Laboratory Exercise 3.1 - Drawing E-R Diagrams**

Using a drawing tool, draw an E-R diagram for the Employee-Project-Department example described below.

Note: Drawing tool software such as Microsoft Visio or similar products should be used for this laboratory exercise. If these are not available, the drawing tool in Microsoft Word or the Windows Paint program may be used.

1. Consider the entity set Employee with attributes empId, socSecNo, empName, jobtitle, and salary.

a. Show how the entity set and its attributes would be represented on an E-R diagram.



b. Identify all candidate keys for the entity set.

- {empId}

- {SocSecNo}

- {empName, jobtitle} and {empName, salary} could also be composite candidate keys if they are unique when composed.

c. Identify a primary key for the entity set and underline it on the E-R diagram.

- Primary key could be either empId or SocSecNo since both are unique values but I will choose empId as the PK.



2. Assume in the same enterprise as in question 1, that there is an entity set called Project with attributes projName, startDate, endDate, and budget.

a. Show how this entity set and its relationship to Employee would be represented on the E-R diagram. Assume you want to represent the number of hours an employee is assigned to work on a project, and show that in the diagram.

 - I am assuming that there are no other projects with the same name, and I am using the key projName is the primary key in this entity.

- In the case of other projects with the same name I could use one of the composite keys such as {projName, startDate}, {projName, endDate} and {projName, budget} as the primary key, and in that case those would be the candidate keys, of course if they are unique.

b. Stating any necessary assumptions, make a decision about the cardinality and participation constraints of the relationship, and add appropriate symbols to the E-R diagram.



- Every project must have an employee and every employee must work on a project, so this is a total participation for both employee and project entities set.

- A employee can work on many projects, and a project can have many employees working on it, so this is a M:N relationship.

3. Assume there is another entity called Department to be added. Each employee works for only one department. Projects are not directly sponsored by a department. Making up attributes as needed, add this entity and appropriate relationship(s) and symbols to the E-R diagram.



- Works for is a M:1 relationship that connects employees to departments. Each employee works for only one department, and a department might or might not have employee working for it but it can also have many employees.

- Employees have total participation of Department since every employee must be assigned to work for a department. However, Department might or might not have an employee working for it, so this is a partial participation.