AIM :- To draw a sample ENTITY RELATIONSHIP DIAGRAM diagram for real project or system.

THEORY
Entity Relationship Diagrams are a major data modeling tool and will help organize the data in your project into entities and define the relationships between the entities. This process has proved to enable the analyst to produce a good database structure so that the data can be stored and retrieved in a most efficient manner.

Entity
A data entity is anything real or abstract about which we want to store data. Entity types fall into five classes: roles, events, locations, tangible things or concepts. E.g. employee, payment, campus, book. Specific examples of an entity are called instances. E.g. the employee John Jones, Mary Smith's payment, etc. Relationship A data relationship is a natural association that exists between one or more entities. E.g. Employees process payments. Cardinality defines the number of occurrences of one entity for a single occurrence of the related entity. E.g. an employee may process many payments but might not process any payments depending on the nature of her job.

Attribute
A data attribute is a characteristic common to all or most instances of a particular entity. Synonyms include property, data element, and field. E.g. Name, address, Employee Number, pay rate are all attributes of the entity employee. An attribute or combination of attributes that uniquely identifies one and only one instance of an entity is called a primary key or identifier. E.g. Employee Number is a primary key for Employee.

AN ENTITY RELATIONSHIP DIAGRAM METHODOLOGY: (One way of doing it)

1. Identify Entities	Identify the roles, events, locations, tangible things or concepts about which the end-users want to store data.
2. Find Relationships	Find the natural associations between pairs of entities using a relationship matrix.
3. Draw Rough ERD	Put entities in rectangles and relationships on line segments connecting the entities.
4. Fill in Cardinality	Determine the number of occurrences of one entity for a single occurrence of the related entity.
5. Define Primary Keys	Identify the data attribute(s) that uniquely identify one and only one occurrence of each entity.
6. Draw Key-Based ERD	Eliminate Many-to-Many relationships and include primary and foreign keys in each entity.
7. Identify Attributes	Name the information details (fields) which are essential to the system under development.
8. Map Attributes	For each attribute, match it with exactly one entity that it describes.
9. Draw fully attributed ERD	Adjust the ERD from step 6 to account for entities or relationships discovered in step 8.
10. Check Results	Does the final Entity Relationship Diagram accurately depict the system data?

A SIMPLE EXAMPLE
A company has several departments. Each department has a supervisor and at least one employee. Employees must be assigned to at least one, but possibly more departments. At least one employee is assigned to a project, but an employee may be on vacation and not assigned to any projects. The important data fields are the names of the

departments, projects, supervisors and employees, as well as the supervisor and employee number and a unique project number.

 1. **Identify Entities** The entities in this system are Department, Employee, Supervisor and Project. One is tempted to make Company an entity, but it is a false entity because it has only one instance in this problem. True entities must have more than one instance.

 2. **Find Relationships We construct the following Entity Relationship Matrix:**

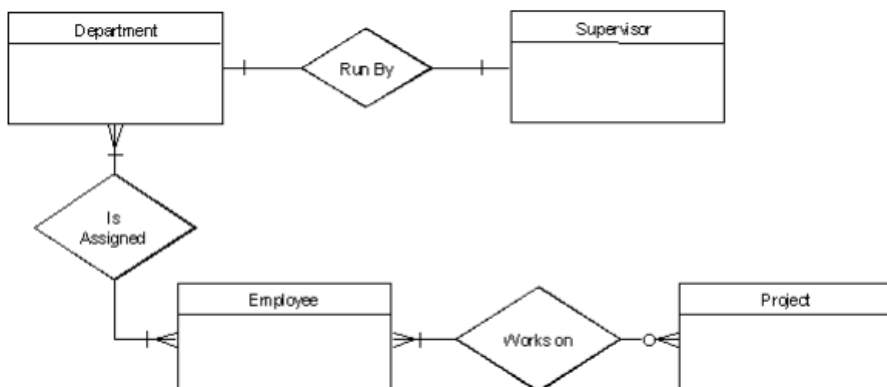|	Department	Employee	Supervisor	Project
Department		is assigned	run by	
Employee	belongs to			works on
Supervisor	runs			
Project		uses		

3. Draw Rough ERD

We connect the entities whenever a relationship is shown in the entity Relationship Matrix.
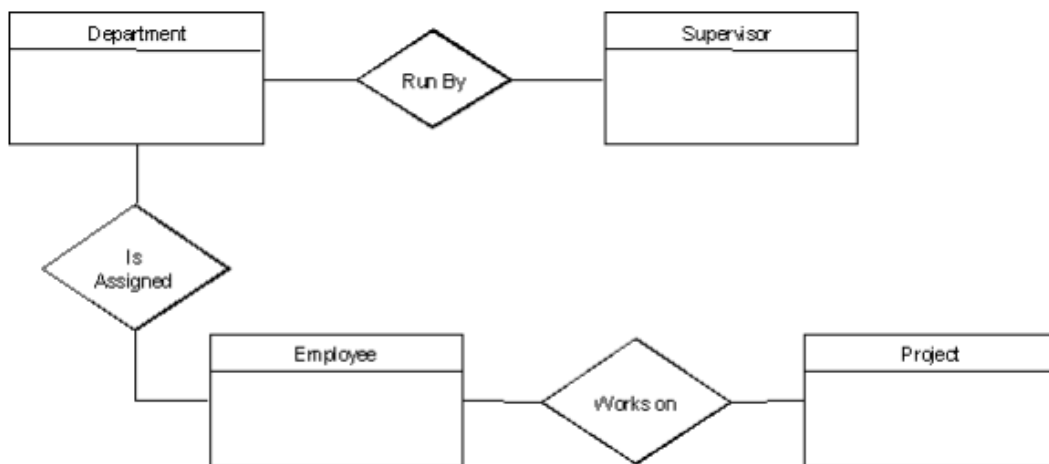
4. Fill in Cardinality
From the description of the problem we see that:
- Each department has exactly one supervisor
. - A supervisor is in charge of one and only one department.
- Each department is assigned at least one employee.
- Each employee works for at least one department.
- Each project has at least one employee working on it.
- An employee is assigned to 0 or more projects.

5. Define Primary Keys

The primary keys are Department Name, Supervisor Number, Employee Number, Project Number.

6. Draw Key-Based ERD

There are two many-to-many relationships in the rough ERD above, between Department and Employee and between Employee and Project. Thus we need the associative entities Department-Employee and Employee-Project. The primary key for Department-Employee is the concatenated key Department Name and Employee Number. The primary key for Employee Project is the concatenated key Employee Number and Project Number.

7. Identify Attributes

The only attributes indicated are the names of the departments, projects, supervisors and employees, as well as the supervisor and employee NUMBER and a unique project number.

8. Map Attributes

Attribute	Entity	Attribute	Entity
Department Name	Department	Supervisor Number	Supervisor
Employee Number	Employee	Supervisor Name	Supervisor
Employee Name	Employee	Project Name	Project
		Project Number	Project

9. Draw Fully Attributed ERD
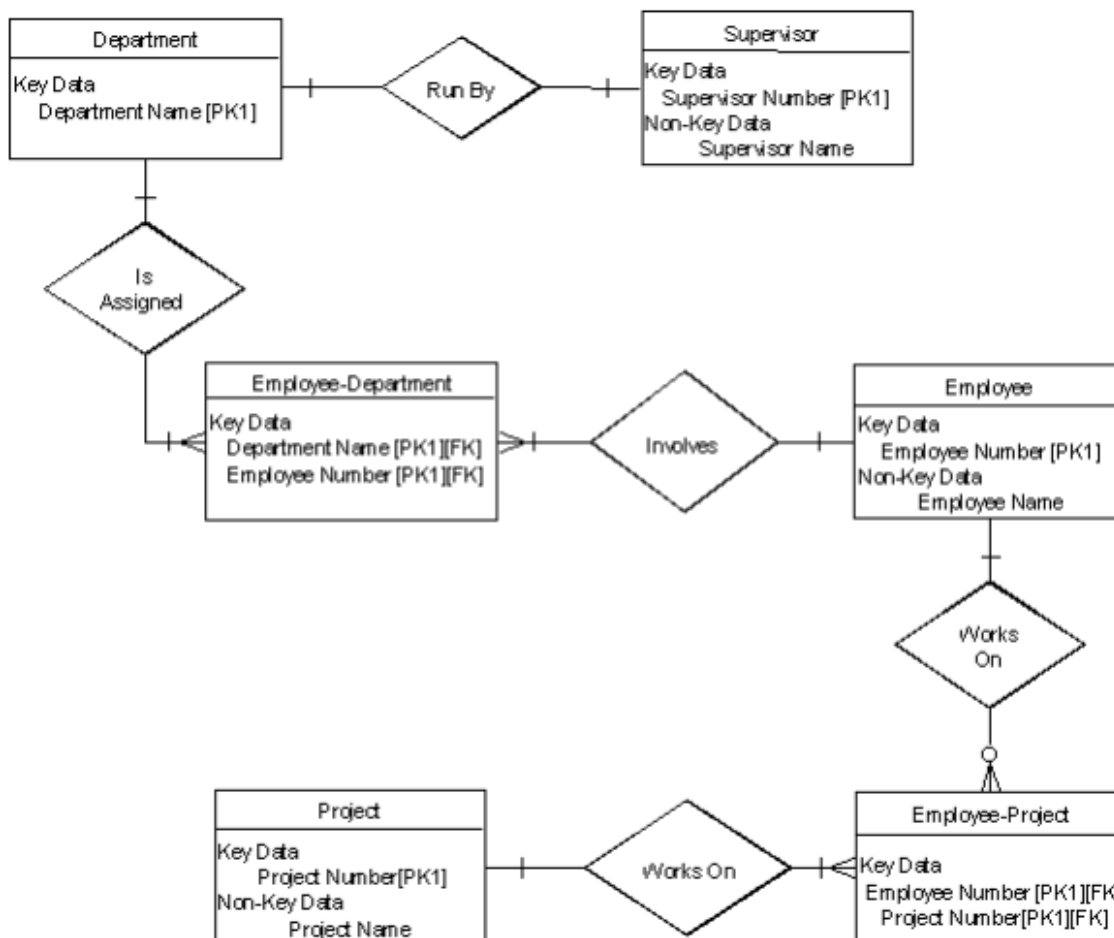
10. Check Results

The final ERD appears to model the data in this system well.