

Batch: A1 Roll No.: 16010123012

Experiment No. 1

Title: Database application description and Design of Entity-Relationship diagram

Objective: To comprehend the data requirements of the application and design the Entity-Relationship (ER) diagram for the database

Expected Outcome of Experiment:

CO1: Comprehend the Characteristics of Relational Database Management Systems.

CO2: Create Relational Database Designs Based on Entity-Relationship Models.

Books/ Journals/ Websites referred:

1. G. K. Gupta : "Database Management Systems", McGraw – Hill
 2. Korth, Silberchatz, Sudarshan : "Database Systems Concept", 6th Edition , McGraw Hill
 3. Elmasri and Navathe, "Fundamentals of Database Systems", 5th Edition, PEARSON Education.
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Pre Lab/ Prior Concepts:

ER Model:

The ER data model was developed to facilitate the database design by allowing specification of an enterprise schema that represents the overall logical structure of the database. The ER model is one of the several data models. The semantic aspect of the model lies in its representation of the meaning of the data. The ER model is very useful many database design tools drawn on concepts from the ER model. The ER model employs 3 basic notations: entity set, relationship set and attributes.

Example Case Study: List the data requirements for the database of the company
Case Study : A company which keeps track of employee, department and projects.
The database designers provide the following description

1. The company is organized into departments. Each department has unique name, unique number, and particular employee to manage the department. We keep track of the start date and the employee begins managing the department. The department has several locations.
2. The department controls a number of projects each of which has a unique name, unique number and a single location.
3. We store each employee's name, social security number, address, salary, gender and dob. An employee is assigned one department but may work on several projects which are not necessarily controlled by the same department. We keep track of the department each employee works on each project and for insurance purpose. We keep each dependents first name, Gender, dob and relation.

Procedure for doing the ER diagram experiment

1. Identifying the Entities-Strong and weak entities (Nouns from the problem definition)
Based on the requirements, we can identify four initial entity types in the COMPANY database:
 - DEPARTMENT
 - PROJECT
 - EMPLOYEE
 - DEPENDENT
2. Identify attributes of the Entity- keys, partial key, simple, composite, multivalued, derived (characteristics of the entities)

The initial attributes shown are derived from the requirements description

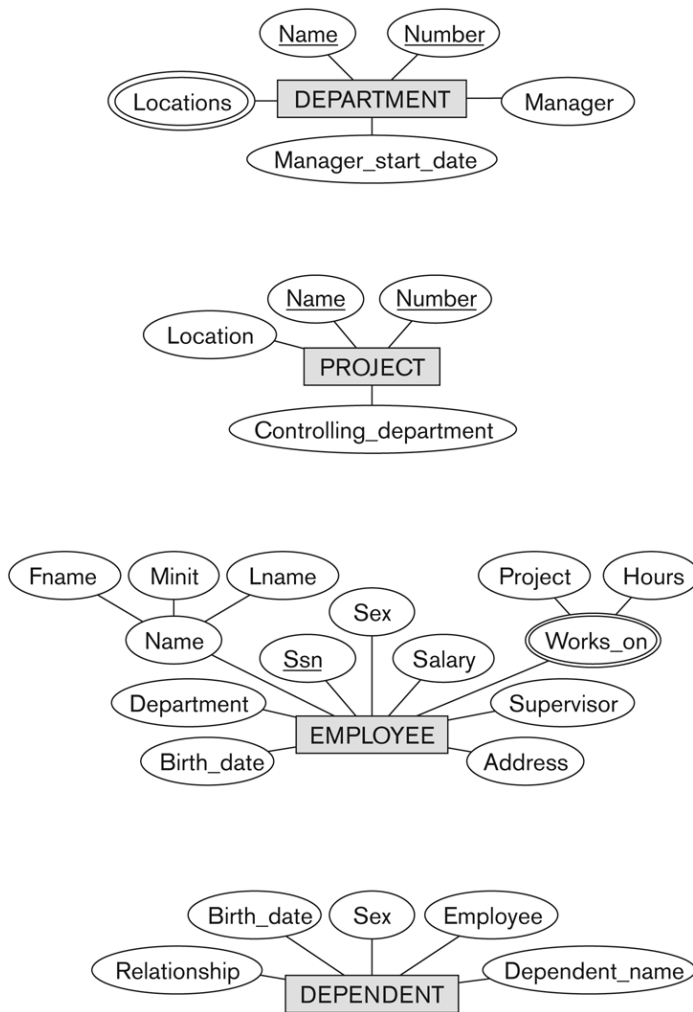


Figure 3.8

Preliminary design of entity types for the COMPANY database. Some of the shown attributes will be refined into relationships.

3. Identify relationships (verbs)

A **relationship** relates two or more distinct entities with a specific meaning.

- For example, EMPLOYEE John Smith *works on* the ProductX PROJECT, or EMPLOYEE Franklin Wong *manages* the Research DEPARTMENT.

Relationships of the same type are grouped or typed into a **relationship type**.

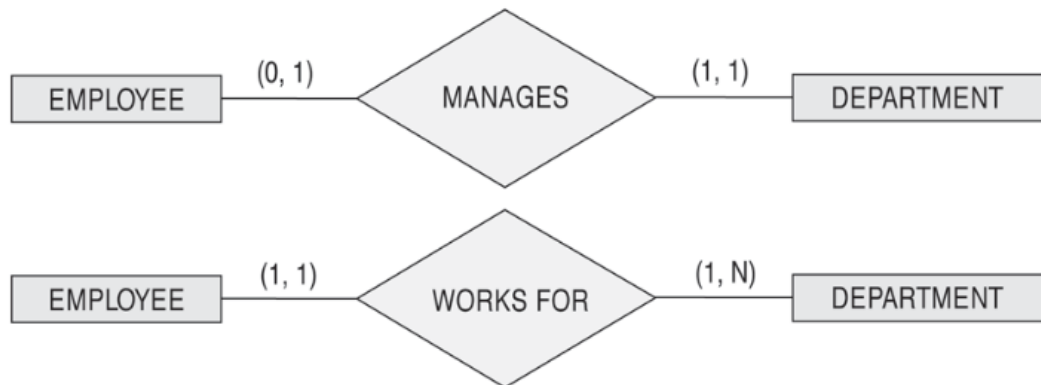
- For example, the WORKS_ON relationship type in which EMPLOYEEs and PROJECTs participate, or the MANAGES relationship type in which EMPLOYEEs and DEPARTMENTs participate.

The degree of a relationship type is the number of participating entity types.

- Both MANAGES and WORKS_ON are *binary* relationships.

In ER diagrams, we represent the *relationship type* as follows:

- Diamond-shaped box is used to display a relationship type
- Connected to the participating entity types via straight lines



Read the min,max numbers next to the entity type and looking **away from** the entity type

Listed below with their participating entity types:

- WORKS_FOR (between EMPLOYEE, DEPARTMENT)
- MANAGES (also between EMPLOYEE, DEPARTMENT)
- CONTROLS (between DEPARTMENT, PROJECT)
- WORKS_ON (between EMPLOYEE, PROJECT)
- SUPERVISION (between EMPLOYEE (as subordinate), EMPLOYEE (as supervisor))
- DEPENDENTS_OF (between EMPLOYEE, DEPENDENT)

ER- Diagram for company Case Study Database:

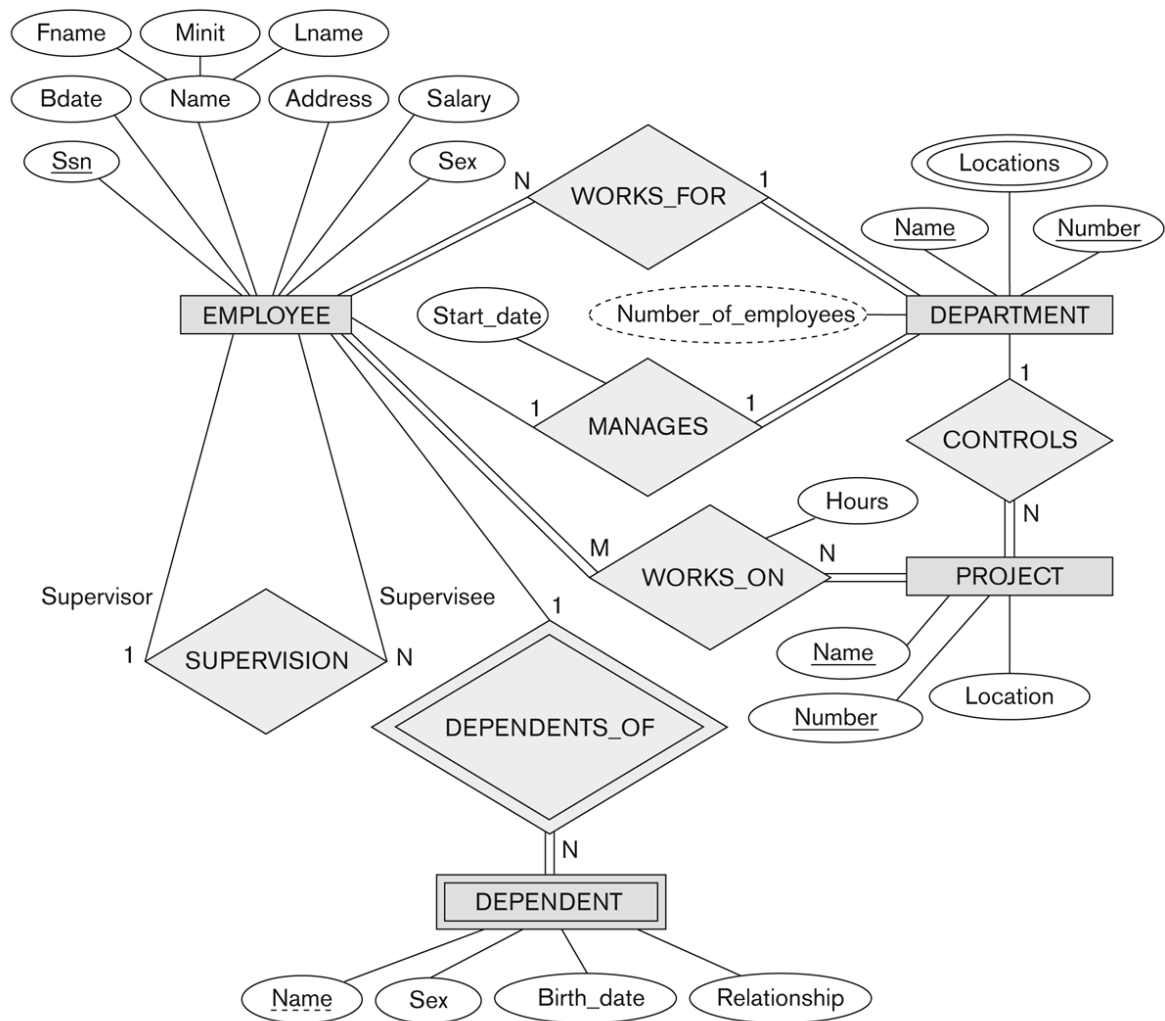
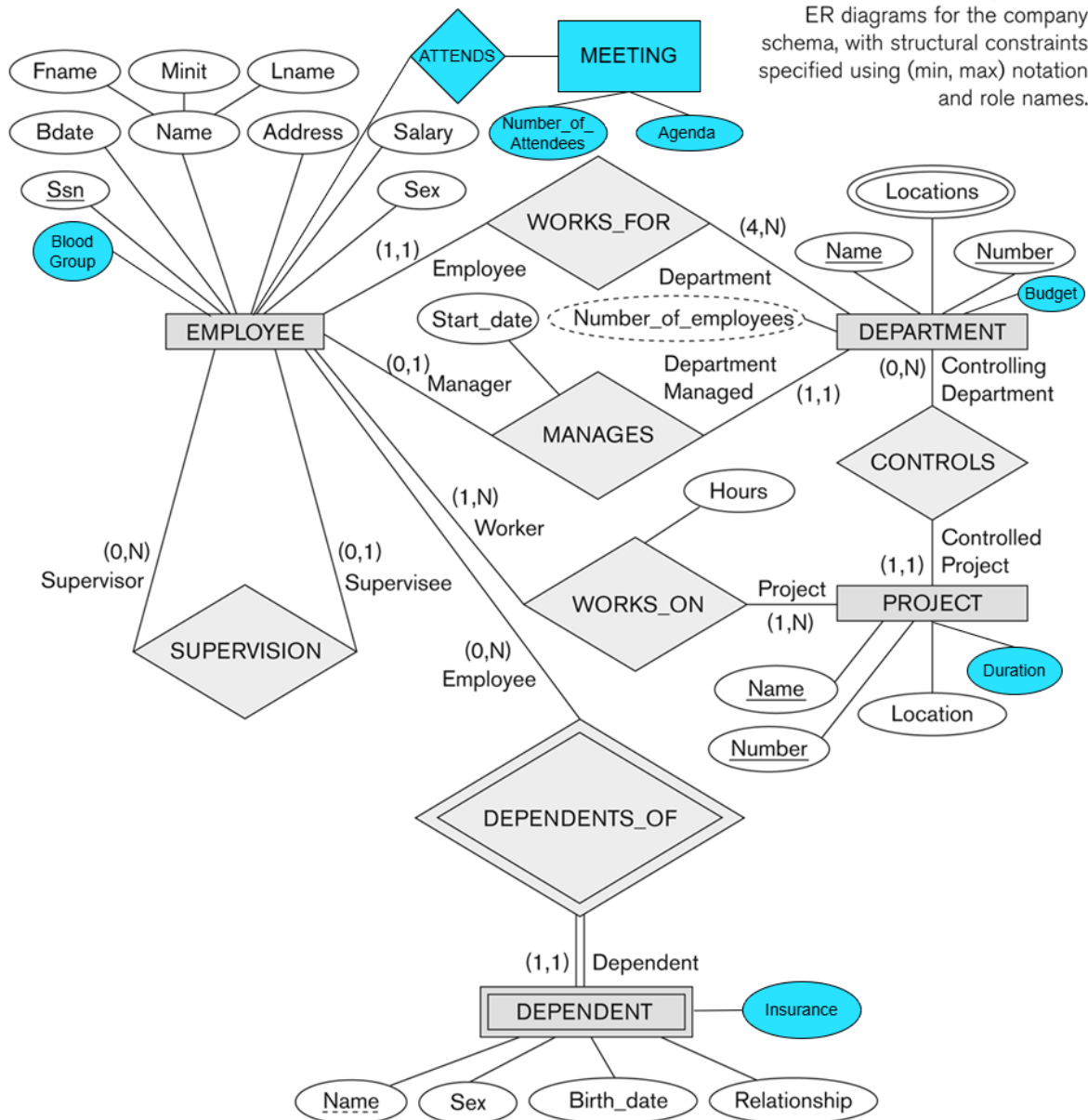


Figure 3.2

An ER schema diagram for the COMPANY database. The diagrammatic notation is introduced gradually throughout this chapter.

ER DIAGRAM WITH NEW ENTITY AND ATTRIBUTES



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SCHEMA

EMPLOYEE						
Name	Address	Salary	Sex	Bdate	Employee id	Blood Group
Mike	Hawkins	100000	M	15-10-1984	1234	A-
Steve	Brooklyn	150000	M	24-10-1980	5678	B+
Sergio	Madrid	200000	M	22-02-1990	9101	O-

NAME		
First Name	Middle Name	Last Name
Mike	Ted	Hopper
Steve	Bucky	Rogers
Sergio	Alvaro	Marquinos

DEPENDENTS				
Name	Sex	Bdate	Relationship	Insurance
El	F	11-10-2008	Daughter	10000
Peggy	F	12-11-1984	Wife	15000
Raquel	F	01-03-1991	Wife	20000

DEPARTMENT			
Name	Location	Dep. No	Budget
Accounts	1st Floor	11	12.5 Cr
Marketing	2nd Floor	7	25 Cr
IT	3rd Floor	4	47 Cr

PROJECTS			
Name	Project No.	Location	Duration
Webverse	234	Paris	4 months
Techtangle	245	LA	11 months
RTMS	112	San Jose	7 months

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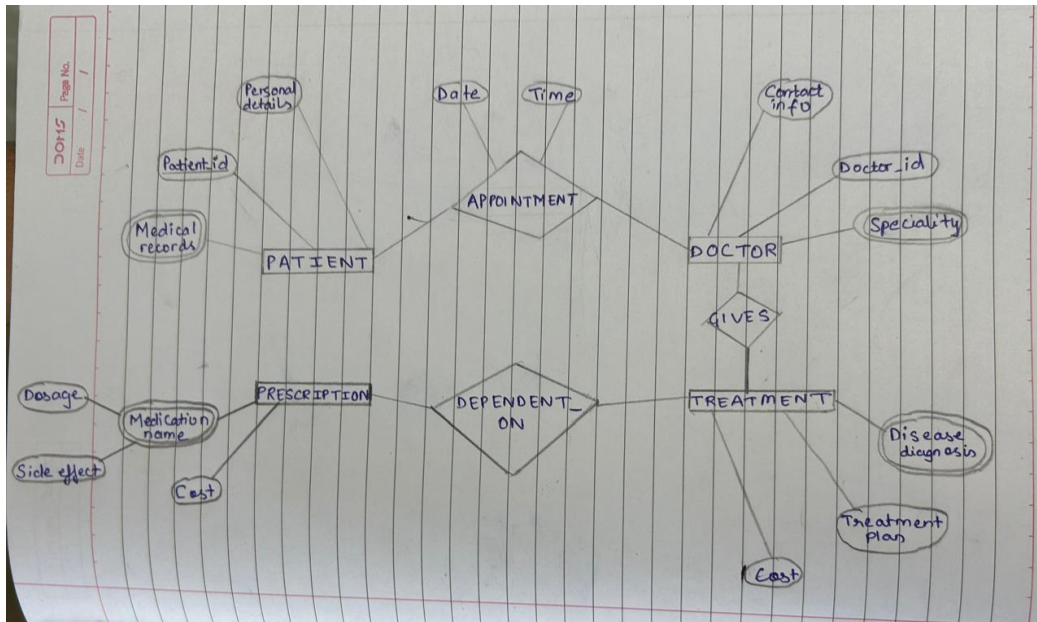
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MEETING	
No. of Attendees	Agenda
11	Budget
23	Progress
10	New Project

Problem Definition of student case study:

The system is designed for a hospital to manage patient, ^{doctor,} appointments, treatments, prescriptions and old medical records.
Patients can schedule appointments with doctors.
Doctors diagnose patients for treatments, check their medical records and provide them with prescriptions.
Hospital maintains record of patients, doctors, treatments and prescriptions.
Treatments are provided to patients individually.
Hospital manages contact info, details about staff.

Entity Relationship Model w.r.t Problem definition



1. ENTITY

Patient, Doctor, Appointment, Prescription, Treatment

2. ATTRIBUTES

Patient: Patient_id, Personal details, Medical records

Doctor: Doctor_id, Contact info, Specialty

Appointment: Date, Time

Prescription: Medication name, Dosage, Side effects, Cost

Treatment: Disease diagnosis, Treatment plan, Cost

3. RELATIONSHIPS WITH PARTICIPATING ENTITIES

APPOINTMENT: Connects PATIENT and DOCTOR

DEPENDENT-ON: Connects PRESCRIPTION and TREATMENT

GIVES: Connects DOCTOR and TREATMENT

4. RELATIONSHIPS WITH CONSTRAINTS AND ROLES

APPOINTMENT:

One PATIENT can have multiple appointments with different DOCTORS (One-to-Many)

One DOCTOR can have appointments with multiple PATIENTs (One-to-Many)

GIVES: Each DOCTOR provides treatments (One-to-Many)

DEPENDENT-ON:

Each TREATMENT is associated with multiple PRESCRIPTIONS and each PRESCRIPTION depends on a treatment (Many-to-Many)

Conclusion: We have successfully completed this experiment and learned how to draw schema for ER diagram. We also learnt about the basics of ER diagram and how to draw it.