1.

a)

- Initial phase - characterize fully the data needs of the prospective database users.
- Second phase - when every data requirement is stored and analyzed, the next thing that we need to do is creating a conceptual database plan and choosing a data model.
- Final Phase - implementation of the database from an abstract data model.

b)

Entity Relationship Model

• Models an enterprise as a collection of entities and relationships

▪ Entity: a “thing” or “object” in the enterprise that is distinguishable from other objects

• Described by a set of attributes

▪ Relationship: an association among several entities.

2.

a)

Student
Student_id Name First_name Last_name Date_of_birth {Email_address} Age()

b)

University
Name Students Departments

Teacher
ID Name First_name Last_name Universities Discipline

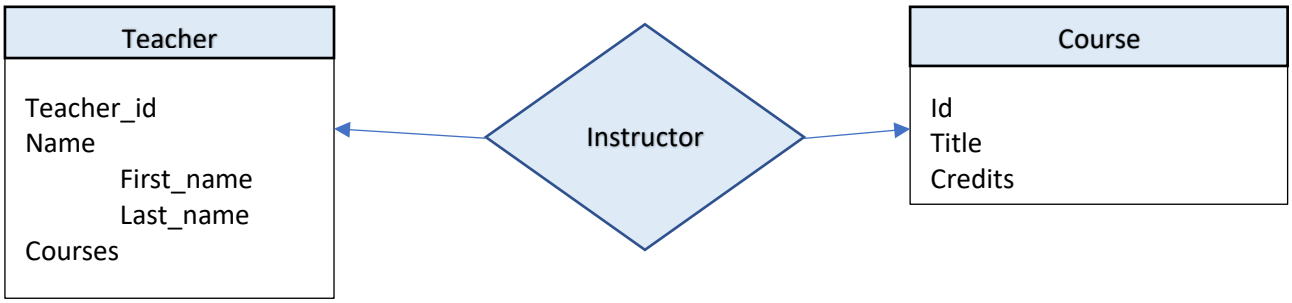
Course
Title Instructors Credits

Office of the Registrar
ID University Address

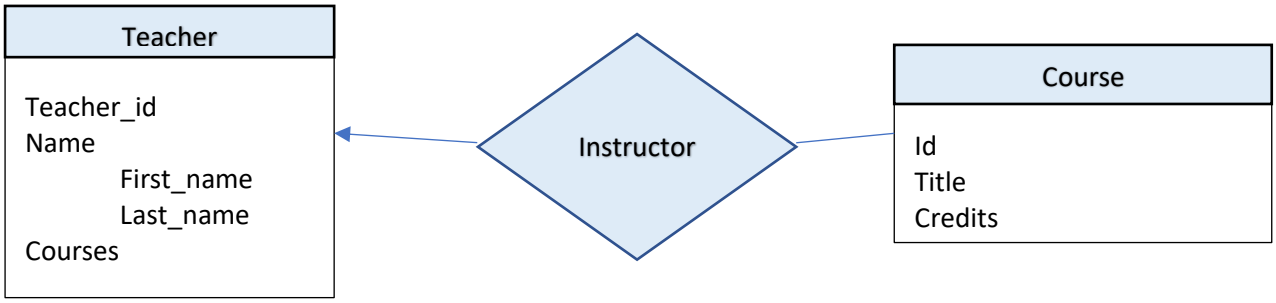
Dormitory
University Address Capacity

3.

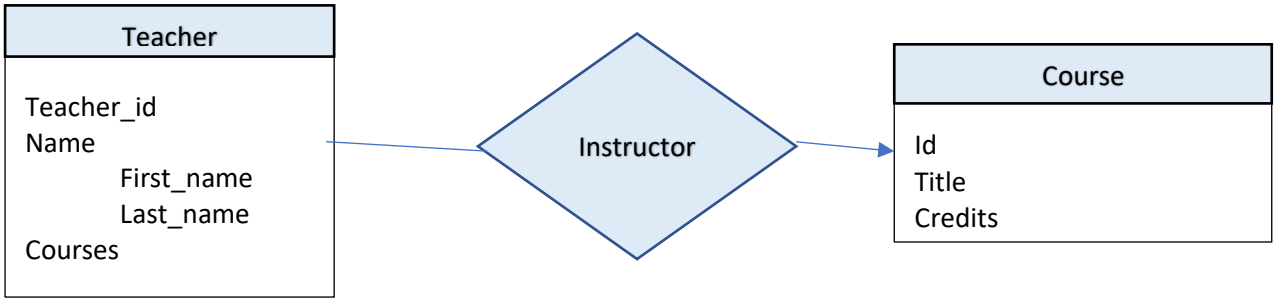
One-to-one



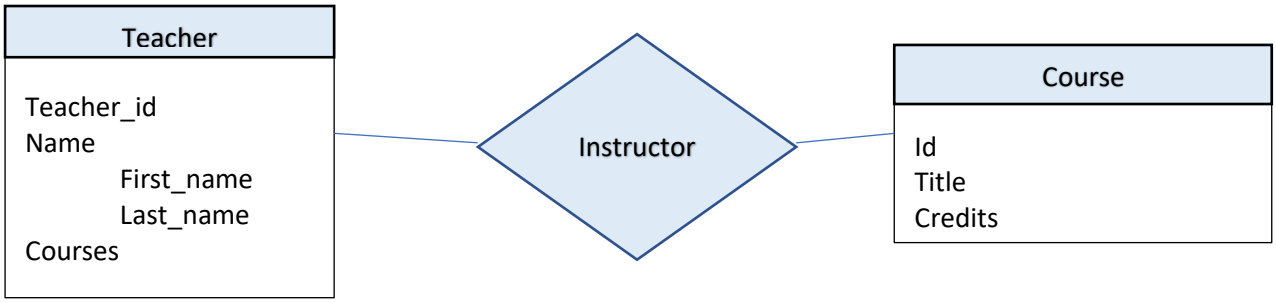
One-to-many



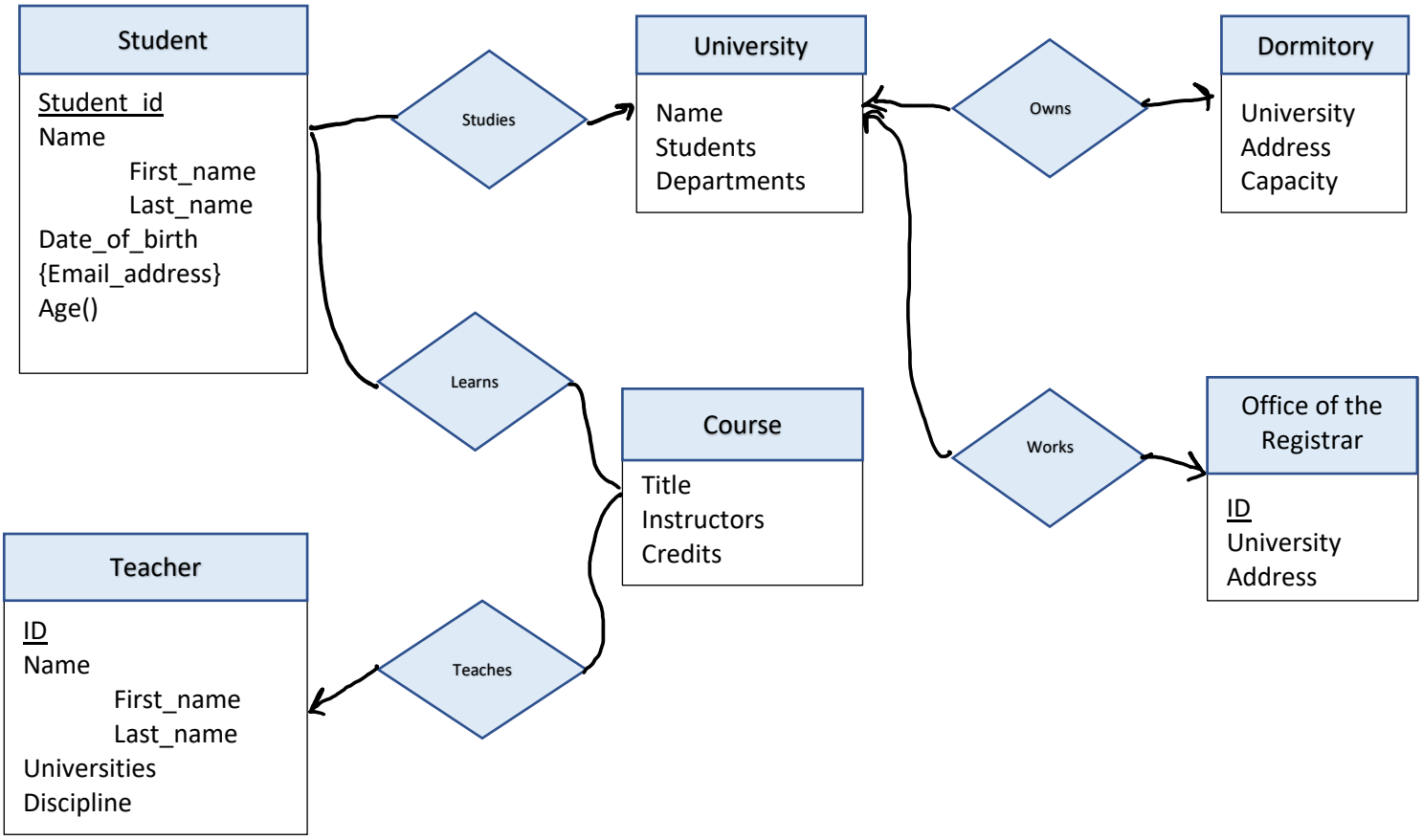
Many-to-one



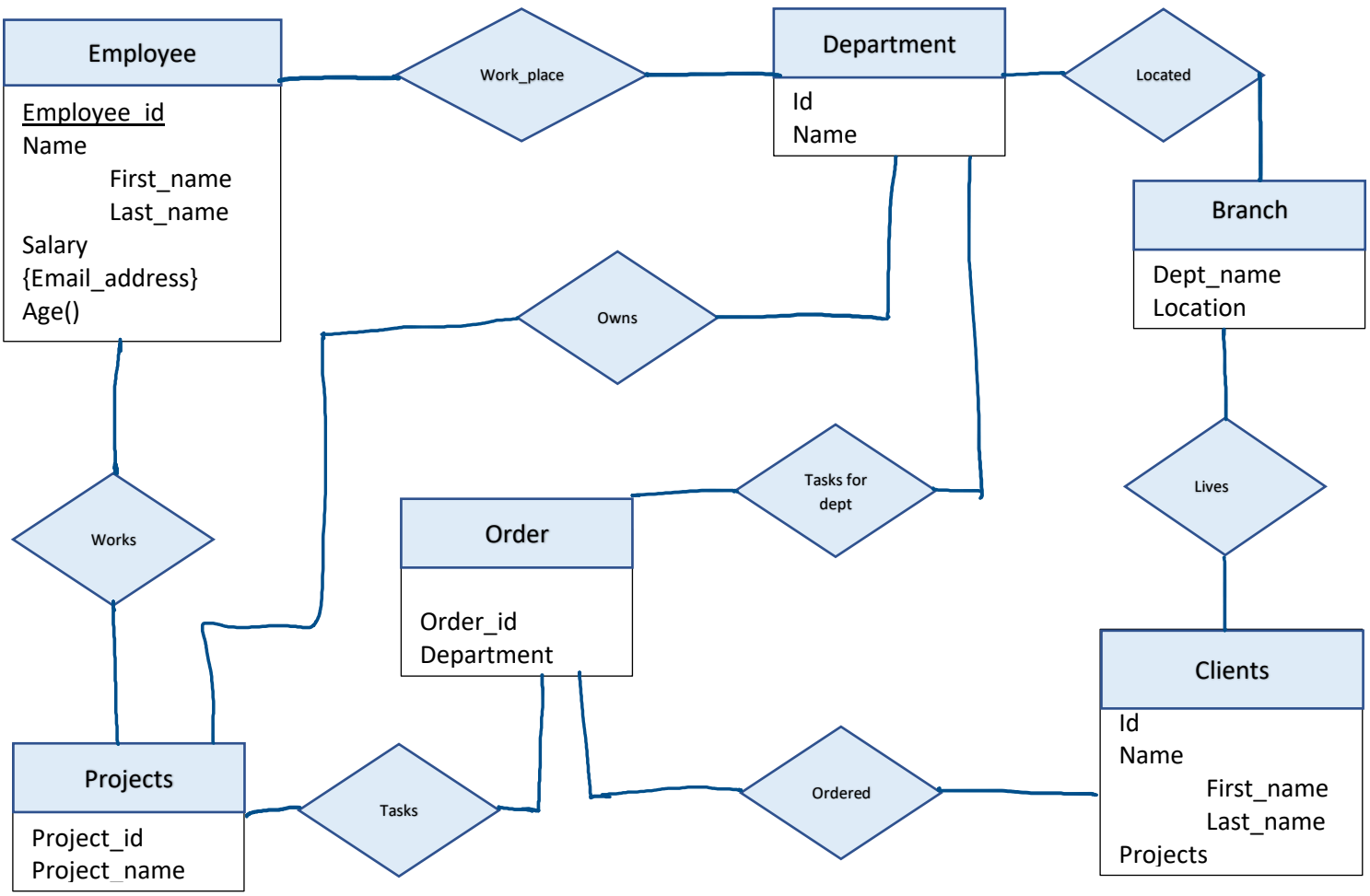
Many-to-many



4.


Student
Student_id
Name
First_name
Last_name
Date_of_birth
{Email_address}
Age()
Studies
University
Name
Students
Departments
Owns
Dormitory
University
Address
Capacity
Learns
Course
Title
Instructors
Credits
Works
Office of the Registrar
ID
University
Address
Teacher
ID
Name
First_name
Last_name
Universities
Discipline
Teaches

5.


Employee
Employee_id
Name
First_name
Last_name
Salary
{Email_address}
Age()
Work_place
Department
Id
Name
Located
Branch
Dept_name
Location
Owns
Works
Tasks for dept
Lives
Order
Order_id
Department
Clients
Id
Name
First_name
Last_name
Projects
Projects
Project_id
Project_name
Tasks
Ordered