1.a) What are the main phases in the database design? What is done on each development phase?

Initial phase -- characterize fully the data needs of the prospective database users.
Second phase -- choosing a data model

• Applying the concepts of the chosen data model • Translating these requirements into a conceptual schema of the database. • A fully developed conceptual schema indicates the functional requirements of the enterprise. ▪ Describe the kinds of operations (or transactions) that will be performed on the data.

Final Phase -- Moving from an abstract data model to the implementation of the database

• Logical Design – Deciding on the database schema. ▪ Database design requires that we find a "good" collection of relation schemas. ▪ Business decision – What attributes should we record in the database? ▪ Computer Science decision – What relation schemas should we have and how should the attributes be distributed among the various relation schemas?

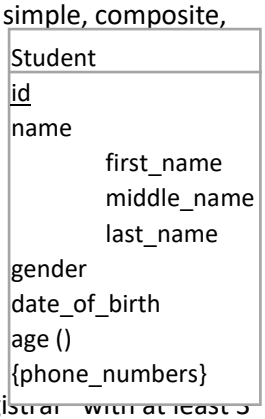
• Physical Design – Deciding on the physical layout of the database.

a) What is the entity-relationship (ER) data model?
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 • Represented diagrammatically by an entity-relationship diagram.

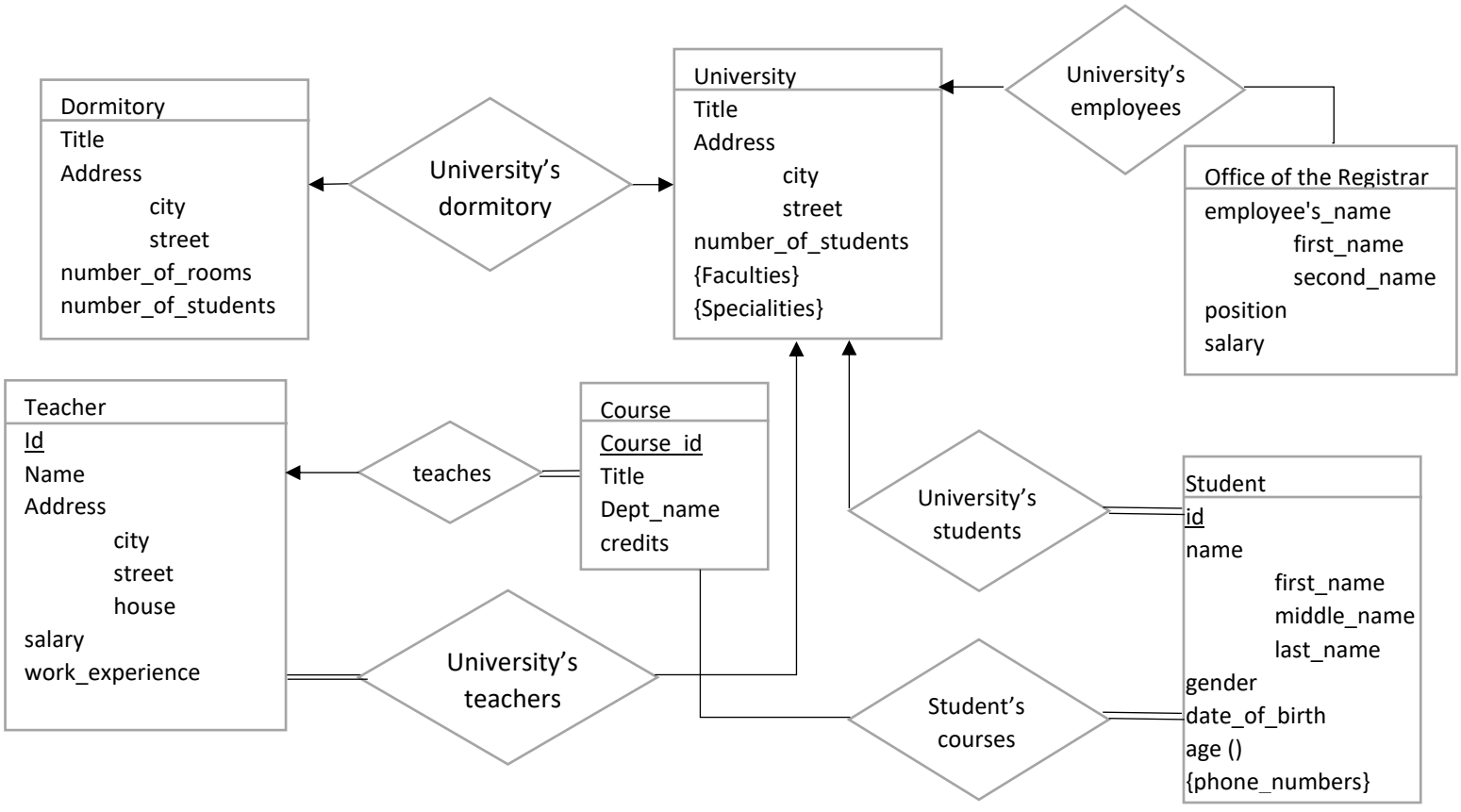
2. a) Create entity "Student" with at least 5 attributes (One for each type of attribute: simple, composite, derived, multivalued)

Student
Simple student_id, date_of_birth
Composite name: first_name, middle_name,last_name
Derived age()
Multivalued {phone_numbers}

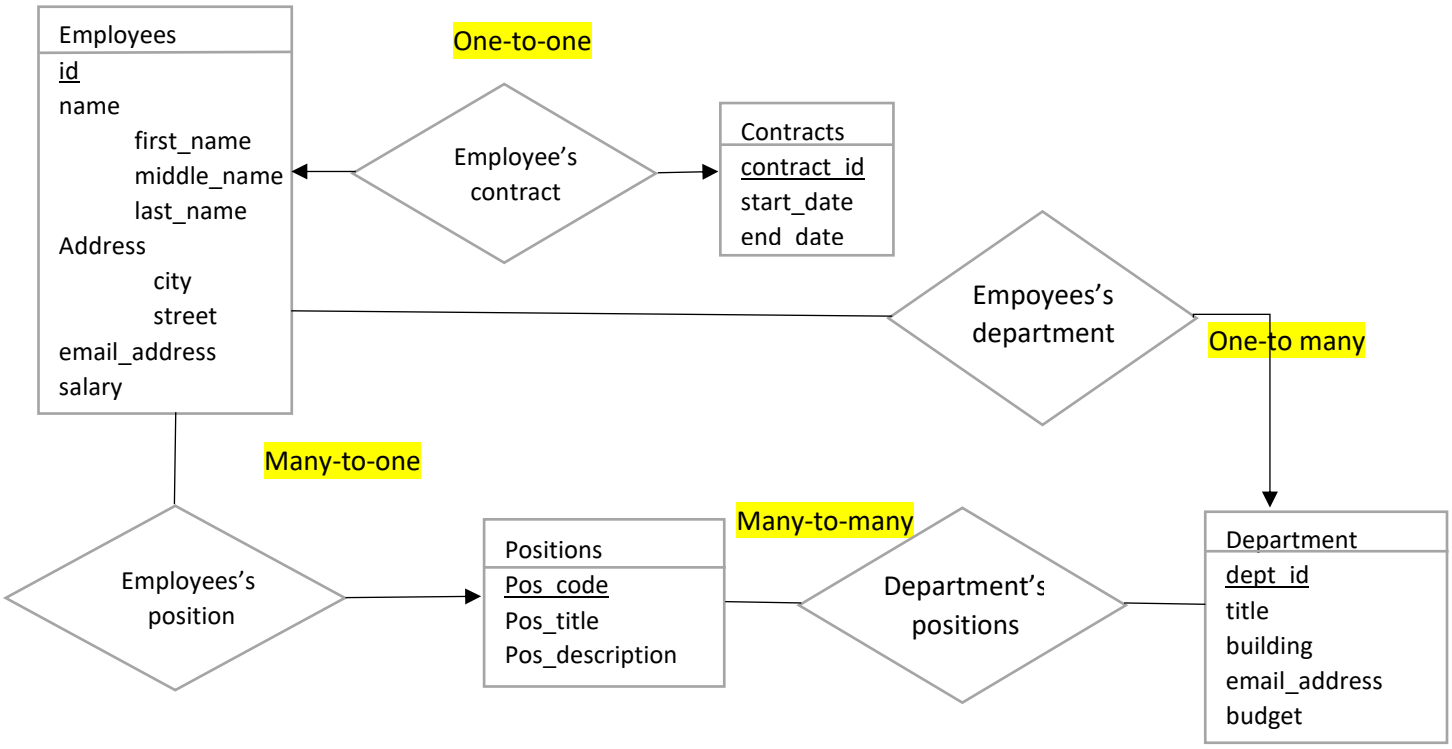


b) Create entities "University", "Course", "Dormitory", "Teacher", "Office of the Registrar" with at least 5 attributes each. (Entity types should be correct on data model)

4. Create ER data model with relations using data from the second task.



3. Give examples for one-to-many, one-to-one, many-to-many, many-to-one relations. (Draw the examples as a scheme)



5. Create ER data model for IT company. (At least 5 entities and 8 relations)