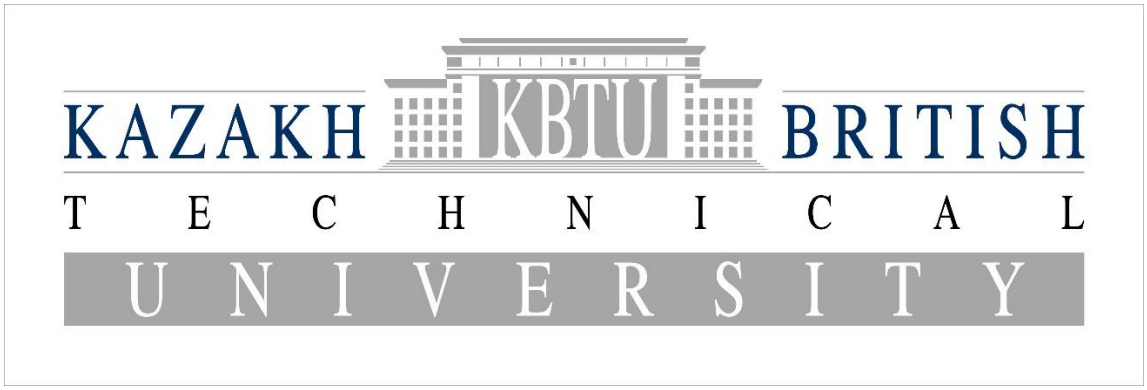

Kazakh-British Technical University
Faculty of Information Technology

Laboratory Work №4

Prepared by: Maratuly T.

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Almaty, 2021

Exercise 1.

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

b) What is the entity-relationship **(ER) data model?**

Answers:

a)

- **Initial phase -** characterize fully the data needs of the perspective database users. On the initial step, we understand what we want to storage, with which data we will work.
- **Second phase** – choosing the data model which we will use. This time we will use ER model. Translating the requirements into a conceptual schema of the database. Start building the model. Fully developed conceptual schema indicates the functional requirements of the enterprise.
- **Final phase –** move from the built diagram, known which tables, data we need to creation everything in database. The Final phase consists of **Logical phase** where based on it we decide about Computer Science decision (what relation schemas should we have and how should the attributes be distributed), Business decision (what attributes should we record in the database) and Database design. Additionally, **Physical design** – deciding on the physical layout of the database.

b)

Entity-relationship model helps model an enterprise as a collection of **entities** and **relationships.** It is a design of a database that can later be implemented as a database. By **"entities"** we mean a "thing" or "object" in the enterprise that is distinguishable from other objects that are described by a set of attributes. By **"relationship"** we mean association among several entities. The ER model is represented in forms of diagrams.

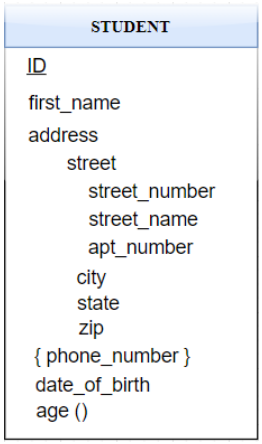
Exercise 2

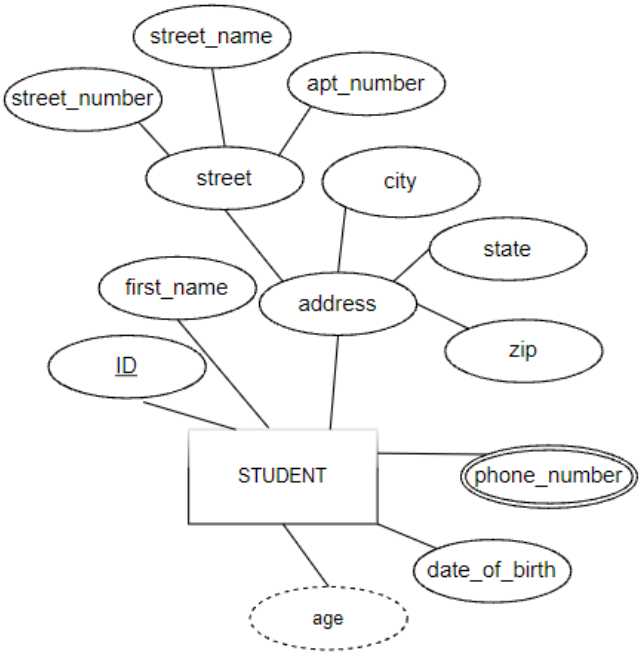
a) Create entity "**Student**" with at least 5 attributes (One for each type of attribute: **simple, composite, derived, multivalued**)

b) Create entities **"University", "Course", "Dormitory", "Teacher", "Office of the Registrar"** with at least 3 attributes each. (Entity types should be correct on data model)

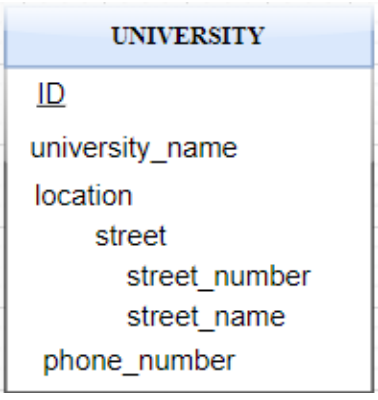
Answer:

a) **Derived:** date_of_birth → age(). **Composite:** student_address (street (street_number, street_name, apt_number), city, state, zip). **Simple:** student_id, first_name. **Multivalued:** phone_number



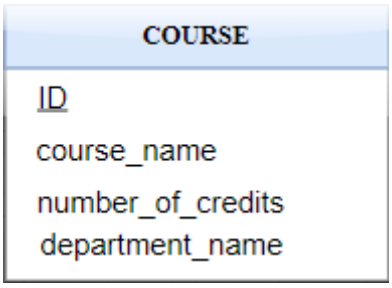


b) **University:**



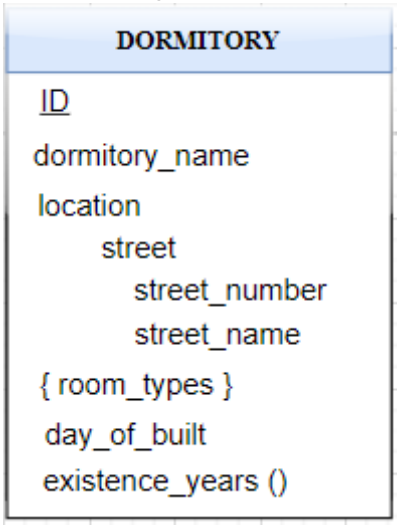
University (id, university_name, location (street (street_number, street_name)), phone_number)

Course:



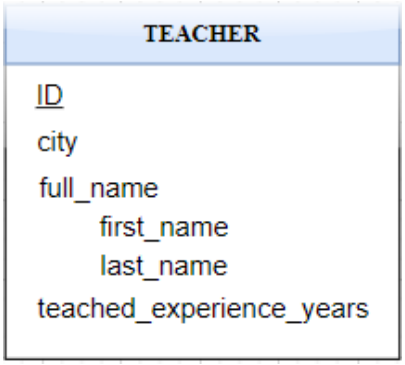
Course (id, course_name, number_of_credits, department_name)

Dormitory:



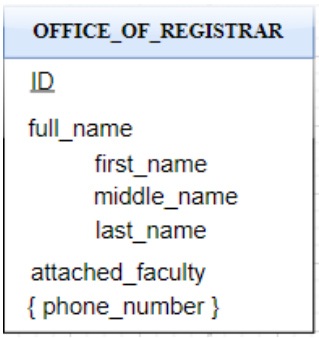
Dormitory (id, dormitory_name, rooms_number, location (street (street_number, street_name)), { room_types }, day_of_builtm ,existence_years)

Teacher:



Teacher (id, full_name (first_name, last_name), teached_experience_years, city)

Office_of_registrar :



Office of the registrar (id , full_name (first_name, middle_name, last_name), attached_faculty, phone_number)

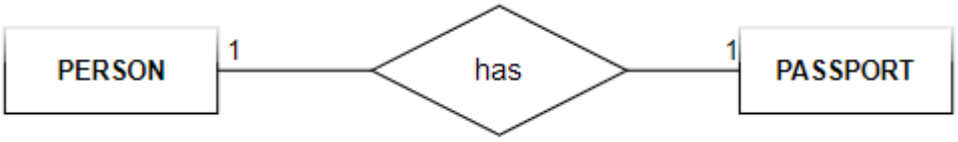
Exercise 3

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

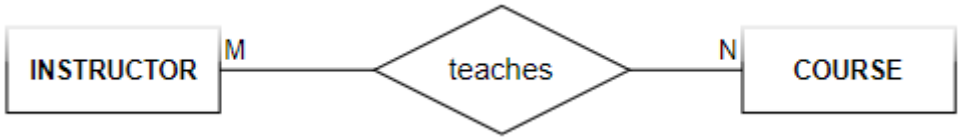
Answer:

One-to-many (Instructor – student) one instructor is an advisor for many students, but one student can have only one instructor.

One-to-one (Person – passport) a person has only one passport and a passport is given to only one person



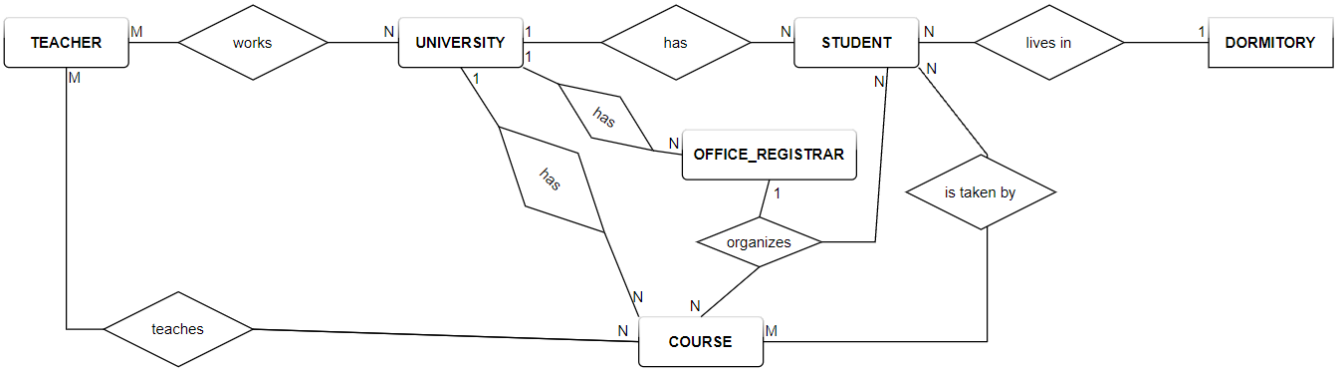
many-to-many (Instructor - Course) each instructor teaches zero or more courses and each course is taught by one or more Instructors



many-to-one (Student – College) many students study in a single college.

Exercise 4

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



Exercise 5

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