

**Kazakh-British Technical University**

Faculty of Information Technology

Laboratory Work №4

Prepared by: Maratuly T.

.

**Almaty, 2021**

**Exercise 1.**

1. What are the main phases in the database design? What is done on each development phase?
2. What is the entity-relationship **(ER)** **data model?**

Answers:

* **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**

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

1. **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

Text

Description automatically generated

Diagram

Description automatically generated

1. **University:**

Graphical user interface, application

Description automatically generated

**University** (id, university\_name, location ( street ( street\_number, street\_name) ), phone\_number )

**Course:**

Graphical user interface, text, application, chat or text message

Description automatically generated**Course** (id, course\_name, number\_of\_credits, department\_name)

**Dormitory:**

Graphical user interface, text

Description automatically generated**Dormitory** (id, dormitory\_name, rooms\_number, location (street (street\_number, street\_name)), { room\_types }, day\_of\_builtm ,existence\_years)

Graphical user interface, application

Description automatically generated**Teacher:**

**Teacher** ( id, full\_name (first\_name, last\_name), teached\_experience\_years, city)

**Office\_of\_registrar :**

Text

Description automatically generated

**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.

Diagram, polygon

Description automatically generated

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

Diagram

Description automatically generated

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

Diagram

Description automatically generated

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

Diagram

Description automatically generated

**Exercise 4**

Diagram

Description automatically generatedCreate ER data model with relations using data from the second task.

**Exercise 5**

**![Diagram

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