Assignment4
ER Model
Database Systems Spring 2023

Due Date: Before the start of the class (8th May 2023)

Draw an ER\EER diagram for the problems given below. Ensure that you indicate all cardinality constraints and your diagram should not contain redundant entity sets, relationships, or attributes. If you need to make any assumptions, include them in your answer.

TOTAL MARKS 70

Question 1: Draw the ER model for the basic information given below. Use the Chen Notation for cardinality and participation constraint. (10 points)

All Pakistan Software association holds workshops in collaboration with different software houses. They wish to record detailed information regarding the following aspects.

- Intellect delivering workshop – They wish to record complete details about the person who delivers lectures in workshop. Record ID, Name, Email, Address (street, city, state, zip code), Contact number,current job, and qualification details.
- Workshop – Record workshop ID, Year, Theme and Venue.
- Venue – The venue can be some university, hotel or conference room in a software house. We need to record LocationID, Name, Address (street, city, state, zip code) and Contact number.
- Participants – For a participant, record ParticipantID, Name, Designation, Affiliating Institute and Charges.

The participating entities have come up with the following rules:

- A total of 200 participants are allowed in each workshop each year on a first come, first served basis.
- Charges vary with the designation of the participant.
- Accommodation is not provided by any host and other expenses are also not entertained.

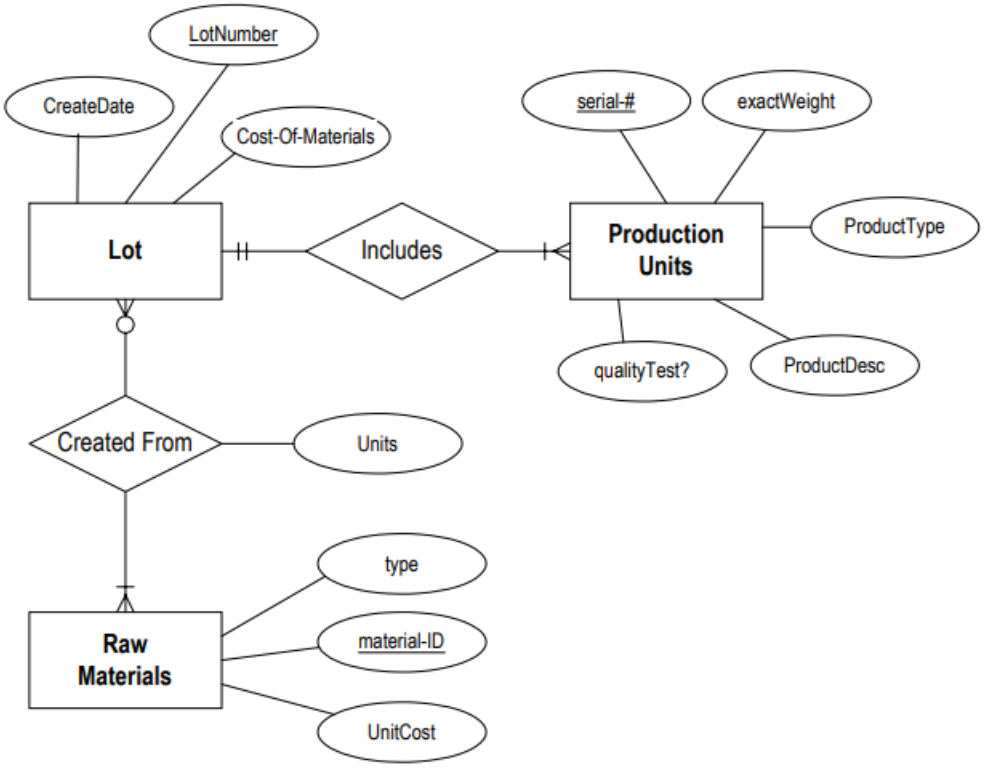
Question 2: Draw the ER model using Chen Notation for cardinality and participation constraint. (10 points)

UPS prides itself on having up-to-date information on the processing and current location of each shipped item. To do this, UPS relies on a company-wide information system. Shipped items are the heart of the UPS product tracking information system. Shipped items can be characterized by item number (unique), weight, dimensions, insurance amount, destination, and final delivery date. Shipped items are received into the UPS system at a single retail center. Retail centers are characterized by their type, uniqueID, and address. Shipped items make their way to their destination via one or more standard UPS transportation events (i.e., flights, truck deliveries). These transportation events are characterized by a unique scheduleNumber, a type (e.g, flight, truck), and a deliveryRoute. Please create an Entity Relationship diagram that captures this information about the UPS system. Be certain to indicate identifiers and cardinality constraints.

Question 3: Draw the ER model using Chen Notation for cardinality and participation constraint. The basic information is as follows:(10 points)

At a local Furniture workshop, each product (described by product number, name, description, and cost) is composed of three or more components (described by component number, description, and unit of measure), and components are used to make one or many products. In addition, assume that components are used to make other components, and that raw materials are also considered to be components. In both cases of components, we need to keep track of how many components go into making something else. Draw an ER model for this situation, and place minimum and maximum cardinalities on the diagram.

Question 4: Production tracking is important in many manufacturing environments (e.g., the pharmaceuticals industry, children's toys, etc.). The following ER diagram captures important information in the tracking of production. Specifically, the ER diagram captures relationships between production lots (or batches), individual production units, and raw materials. Please convert the ER diagram into a relational database schema. Be certain to indicate primary keys and referential integrity constraints. **(10 points)**



Question 5: Draw the Entity Relationship model using Chen Notation for cardinality and participation constraint. The basic information is as follows: (20 points)

Hospital Technology (HT) is an IT services company supporting medical practices with a variety of computer technologies to make medical offices more efficient and less costly to run. Medical offices are rapidly becoming automated with electronic medical records, automated insurance claims processing and prescription submissions, patient billing, and other typical aspects of medical practices. In this assignment, you will address only insurance claims processing. Your assignment is to draw an ER model to represent each phase of the development of an insurance claims processing database and to answer questions that clients might raise about the capabilities of the application the database supports in each phase.

Phase 1.
The first phase deals with a few core elements. Draw an ER to represent this initial phase, described by the following:

i. A patient is assigned a patient ID and you need to keep track of a patient's gender, date of birth, name, current address, and list of allergies.
ii. A staff member (doctor, nurse, physician's assistant, etc.) has a staff ID, job title, gender, name, address, and list of degrees or qualifications.
iii. A patient may be included in the database even if no staff member has ever seen the patient (e.g., family member of another patient or a transfer from another medical practice). Similarly, some staff members never have a patient contact that requires a claim to be processed (e.g., a receptionist greeting a patient does not generate a claim).
iv. A patient sees a staff member via an appointment. An appointment has an appointment ID, date and time of when the appointment is scheduled or when it occurred, date and time when the appointment was made, and a list of reasons for the appointment.

Note that in the part (iii) above the information about multiple members of the same family may need to be stored in the database because they are all patients. Actually, there is a broader need. Medical practice may need to recognize various people related to a particular patient (e.g., spouse, child, caregiver, power of attorney, an administrator at a nursing home, etc.) who can see patient information and make emergency medical decisions on behalf of the patient. Augment your model to represent the relationships between people in the database and the nature of any relationships

Phase II. In this phase, you will extend the database design to begin to handle insurance claims. Draw a revised
ER model to your answer to the previous phase, to represent the expanded second phase database:

i. Each appointment may generate several insurance claims (some patients are self-pay, with no insurance coverage). Each claim is for a specific action taken in the medical practice, such as seeing a staff member, performing a test, administering a specific treatment, etc. Each claim has an ID, a claim code (taken from a list of standard codes that all insurance companies recognize), the date the action was done, date the claim was filed, amount claimed, the amount paid on the claim, and optionally, a reason code for not paying the full amount, and the date the claim was (partially) paid.
ii. Each patient may be insured under policies with many insurance companies. Each patient policy has a policy number, possibly a group code, a designation of whether the policy is primary, secondary, tertiary, or whatever in the sequence of processing claims for a given patient, and the type of coverage (e.g., medicines, office visits, outpatient procedures).

iii. A medical practice deals with many insurance companies because of the policies for their patients. Each company has an ID, name, mailing address, IP address, and company contact person.

iv. Each claim is filed under exactly one policy with one insurance company. If for some reason a particular action with a patient necessitates more than one insurance company to be involved, then a separate claim is filed with each insurance company (e.g., a patient might reach some reimbursement limit under her primary policy, so a second claim must be filed for the same action with the company associated with the secondary policy)

Question 6: Draw the enhanced ER model, and don't forget to specify cardinality and participation constraints. The basic information is as follows: (10 points)

An AIT company provides offering to its customers. Offerings are of two separate types: products and services. Offerings are identified by an offering ID and an attribute of description. In addition, products are described by product name, standard price, and date of first release; services are described by name of the company's unit responsible for the service and conditions of service. There are repair, maintenance, and other types of services. A repair service has a cost and is the repair of some product; a maintenance service has an hourly rate. Fortunately, some products never require repair. However, there are many potential repair services for a product. A customer may purchase an offering, and the company needs to keep track of when the offering was purchased and the contact person for that offering with the customer. Unfortunately, not all offerings are purchased. Customers are identified by customer ID and have descriptive data of name, address, and phone number. When a service is performed, that service is billed to some customer. Because some customers purchase offerings for their clients, a customer may be billed for services he or she did not purchase, as well as for ones that were purchased. When a customer is billed for a service (although some may never require a service of any type), the company needs to keep track of the date the service was performed, the date the bill is due, and the amount due.