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Sri Lanka Institute of Information Technology

B.Sc. Honours Degree in Information Technology

Specialized in Information Technology

Final Examination
Year 1, Semester 2 (2019)

IT1090 – Information Systems and Data Modelling (ISDM)

Duration: 2 Hours

October 2019

Instructions to Candidates:

- The paper is preceded by a 10 minutes reading time
- This paper has 4 questions.
- Answer all questions in the booklet given.
- The total mark for the paper is 100.
- This paper contains 7 pages, including the cover page.
- Electronic devices capable of storing and retrieving text, including calculators and mobile phones are not allowed.

Question 1 [Total: 25 Marks]

a. "Information systems are the software and hardware and related components that support data-intensive applications."

Assume that you are been hired to develop a pharmacy management system using image processing technologies to scan and read the prescriptions issued by a medical doctor. The proposed system will be operational at Unity Chemists where all operations/ services will be available to the customers 24X7.

i. Identify the components of the proposed pharmacy management system to Unity Chemists. (10 Marks)

ii. Identify the types of end-users of the proposed pharmacy management system to Unity Chemists. (2 Marks)

iii. Explain TWO possible benefits gained by the proposed pharmacy management system to Unity Chemists. (2 Marks)

b. "The iDoors are capable of ventilating the property by using temperature and humidity sensors, combining its action with lighting control systems already in place. Furthermore, it is capable of notifying the service technician of the exact type of error experienced, integrating a post delivery service to transform a garage into a letterbox or even installing cheap consumer charging stations into private garages."

i. Identify a type of modern Information System narrated above. (1 Mark)

ii. Briefly explain the capabilities of such Information Systems. (2 Marks)

c. While analyzing the requirements to develop the pharmacy management system in part a) for Unity Chemists, assume that you were able to gather the information about the pharmacy management process of the company. Model the below pharmacy management process of Unity Chemists using standard business process mapping tools.

(8 Marks)

The pharmacy management process starts by receiving the prescription from the customer. The prescription consists of name of the patient, age, date issued, drug name, dosage, duration and doctor's signature and seal. The pharmacist takes the prescription and scan it through the prescription scanner where the system reads the information which takes 10 seconds and automatically checks the validity of the prescription by checking the doctor's information and drug information. If the doctor's information is not verified the systems sends an alert of "forged prescription" and the prescription is returned to the customer by pharmacist. Upon reading the drug details, if the drug is not available in the system, a notification is displayed as "drug unavailable" and the prescription is returned to the customer by pharmacist. For verified prescriptions, the system calculates the amount of drug to be issued based on the dosage and the duration and alert the drug inventory to issue the drugs and the inventory will be updated. Bill will be calculated based on the price of the drug available on the drug inventory and the system automatically prints a bill for the drugs. Once the customer pays the bill the sales information will be updated, and the drugs will be issued by the pharmacist. Upon drug issuing the pharmacy management process will be closed.

Question 2 [Total: 25 Marks]

Part A **(15 Marks)**

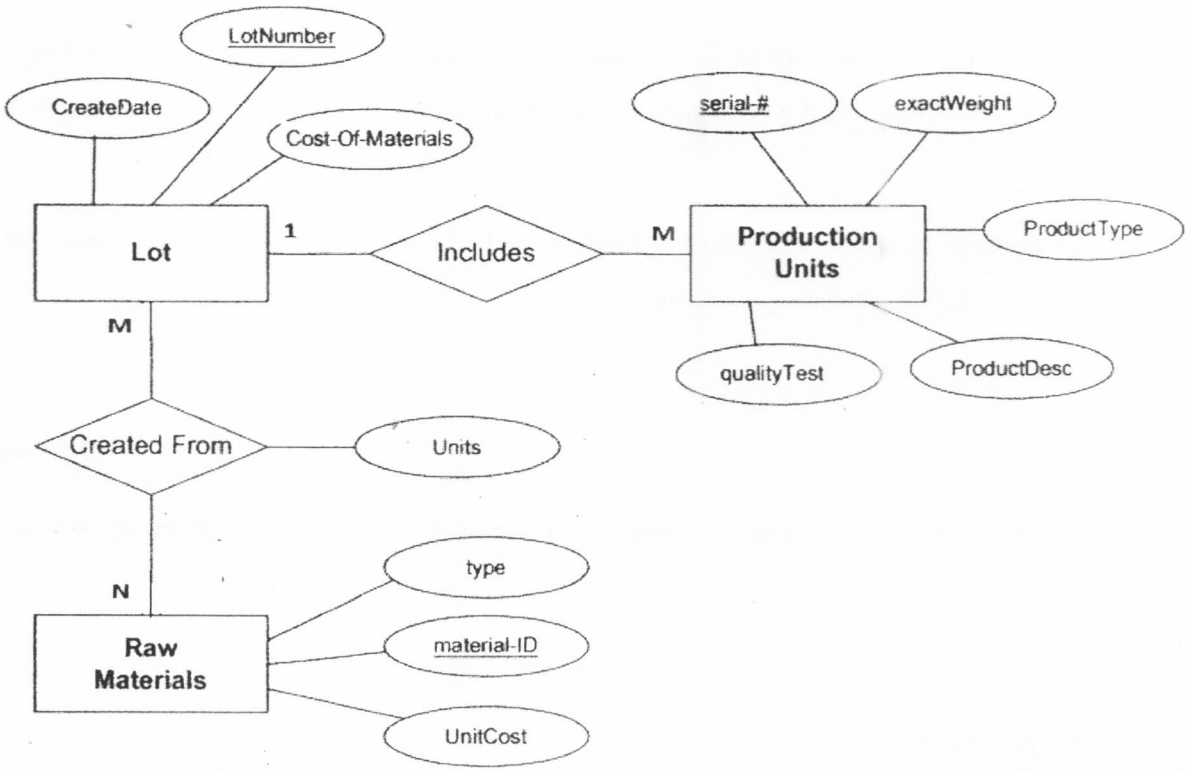
XYZ is a company that maintains up-to-date information about the processing and current location of each shipped item. Shipped items are the heart of the Product Tracking Information System of the company. Shipped items are characterized by a unique item number, a weight, dimensions, insurance amount, destination, and a final delivery date. Shipped items are received into the XYZ system at a single retail center. Retail centers are characterized by their type, unique ID, and address. Shipped items make their way to their destination through one or more transportation events. These transportation events are characterized by a unique schedule number, a type of delivery (ex: flight, truck), and a delivery route.

As the database designer of the database of XYZ product tracking information system, model the Entity Relationship diagram to capture this information.

Part B **(10 Marks)**

Production tracking is an important part in many manufacturing environments like pharmaceuticals, industry and children's toys. The following ER diagram captures relationships between production lots (or batches), individual production units, and raw materials.

Construct the relational database schema for the following ER diagram.



Question 3 [Total: 25 Marks]

Part A (15 Marks)

Consider the following relational schema and the set of non-trivial functional dependencies F1.

PLAYER (Player-no, Player-name, Team, Team-color, Player-position, Team-captain)

F1 = { Player-no → Player-name, Player-position, Team;

Team → Team-color, Team-captain}

When considering the total set of functional dependencies it can be identified that Player-no can uniquely determine all the attributes of PLAYER. So, Player-no is the only candidate key for the relation.

2NF

In which Normal Form the schema PLAYER is in? If the schema is not in 3NF convert it to a schema in 3NF level. Explain your answer.

UNF
| no repeat groups -> PLA YER (Player-no, Player-name, Team, Team-color, Player-positio ,Team-captain)
1NF
|no partition dependency -> PLA YER (Player-no, Player-name, Team, Team-color, Player-positio ,Team-captain)
2NF
|yes transitive dependency
3NF
PLA YER1 (Player-no, Player-name, Team, Player-position)
PLA YER2 (Team, Team-color, Team-captain)

there is not repetition group ----> 1NF
there is not partial dependency ----> 2NF
there is transitive dependency ----> 3NF

Part B (10 Marks)

Consider the following database schema and construct the given queries in **Relational Algebra**.

Supplier (sid, sname, address)

Catalog (sid, pid, cost)

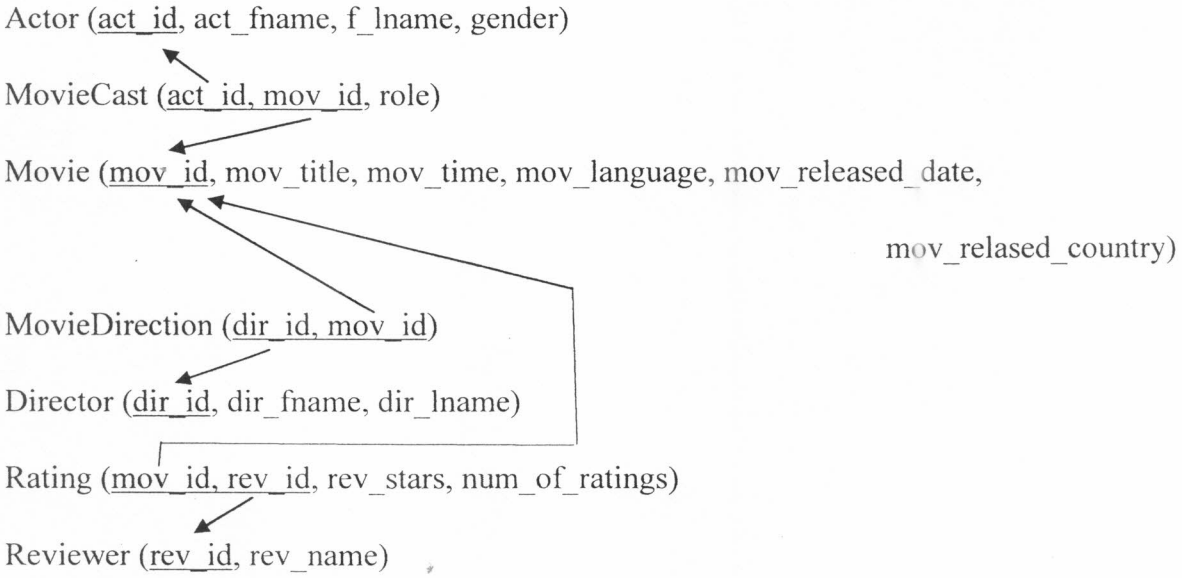
Part (pid, pname, color)

a. Find the names of suppliers who supply some red part. (05 Marks)

b. Find the IDs of suppliers who supply some red part and some green part. (05 Marks)

Question 4 [Total: 25 Marks]

Consider the following database schema for a Movie database, and construct the given queries in **SQL**.



a. Find the movies which were released before year 2015. **(4 Marks)**

b. List the first and last names of all the actors who were cast in the movie 'Annie Hall', and the roles they played in that production. Sort the result according to the ascending order of the actor's first name. **(7 Marks)**

c. Find the highest-rated movie, and list its title, year, rating, and releasing country. **(7 Marks)**

d. Find the movie title, movie year and the number of actors who acted in the movie, for each of the movie done in English language. **(7 Marks)**