



Tutorial Letter 202/2/2018

Database Design

ICT3621

Semester 1

School of Computing

IMPORTANT INFORMATION:

This tutorial letter contains important information
about your module.

CONTENTS

	<i>Page</i>
1 INTRODUCTION	3
2 ASSIGNMENT TWO SOLUTION	4
3 CONCLUSION	9

1 INTRODUCTION

Dear Student

This tutorial letter provides the solution for assignment 1 for first semester 2018. The marking of the assignments did not focus on the memo solely, but it took it took consideration the presentation of your answers since other questions were more of application questions.

Please note that this assignment provides 80% towards your semester mark and assignment one provided 20% towards your semester mark. Please expect a letter or confirmation from examination department whether you qualify for examination or not. If you did not receive it, please contact examination department. Please check the contact details of examination department using UNISA official website. The confirmation will further provide the details of the venue, date of examination to name few and what is it you need to bring when you are going to write an examination for this module. There are rules that are provided by examination department, make sure that you adhere to those rules.

You have an e-tutor for this module. Please make sure that you make use of your e-tutor when preparing for examination. You are free to visit your primary lecture to discuss content related issues for this module. You will need to make an appointment prior visiting your primary lecture. You are also free to contact your lecture for this module through email and telephone, but the lectures are not always at the office because they have other departmental commitments. The details are updated on the welcome page for this module within myUnisa. Please make sure you visit myUnisa more often during the preparation for examination especially the e-tutor site and the module site.

We wish you all the best for the upcoming examination

GOOD LUCK

Regards

Your lecturers

2 ASSIGNMENT TWO SOLUTION

Question 1:

[25]

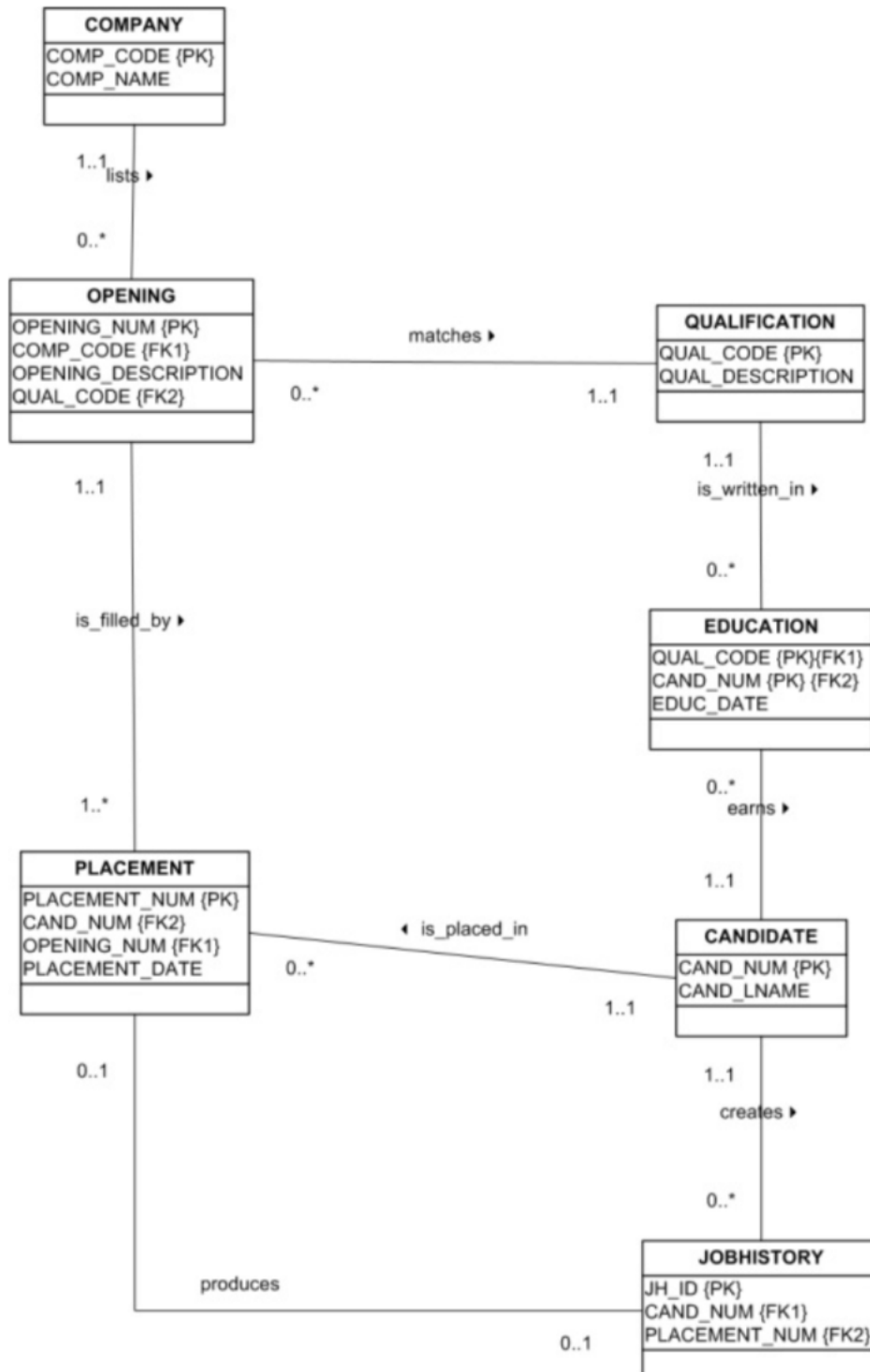
Different retail stores have seasons whereby they are busy and it is known as Peak Periods. A company known Nxumalo Employment Corporation (NEC) provides human resource services to different retail stores. Nxumalo Employment Corporation places the temporary workers into different retail stores during peak periods. The description of the operations that were provided by their managing director.

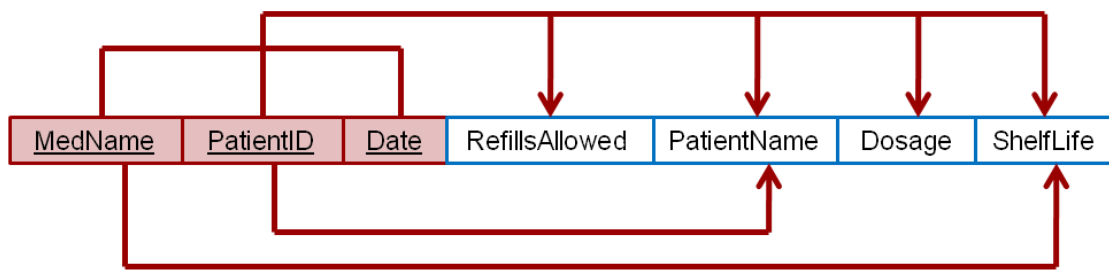
- NEC has a file of candidates who are willing to work
- If the candidate has worked before, there is a job history for that particular candidate. Each time a candidate works then an additional job history is added to the candidate
- The candidates have a qualification and at times single candidate earns more than one qualification. The same qualification can be earned by different candidates
- NEC provides services to different retail stores
- Every time a retail store requests a candidate to work for them, they create a file or folder which contains information such as file ID, retail name, required qualification, start date, end date and the rate
- The opening of a file requires a one specific qualification
- When a particular candidate has that particular qualification, he or she is given that particular job and entry placement Record File is made. This file contains the candidate ID, total numbers of hours to work and the rate of the job. In addition to that, an entry on the job history is made for that particular candidate
- An opening can be filled by many candidates and a single candidate can fill more than one opening

Create an ERD diagram using UML notation for this particular organisation, please ensure the following

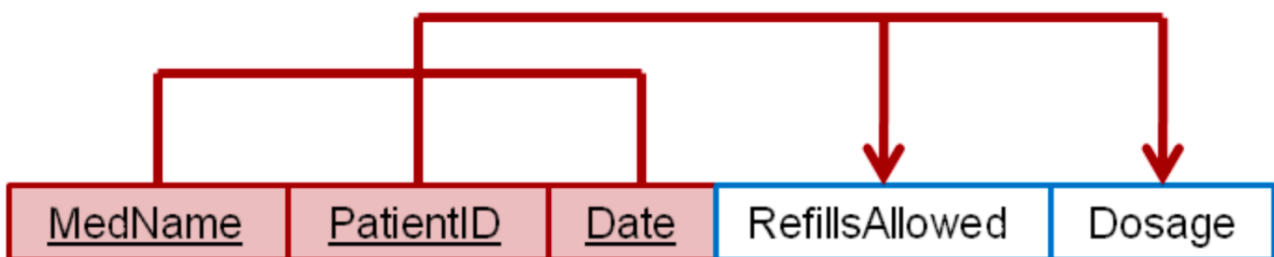
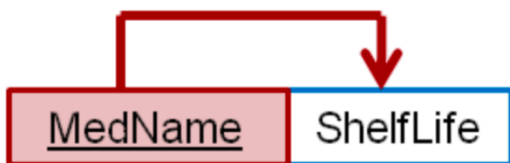
- Correct notation is used
- All the relationships are represented
- All the entities are represented and are clearly marked how they relate to other entities.
- List the activities and example using the current ERD developed of the activities followed when creating an ERD

Solution:



Question 2:**[20]**

2.1. Use the above diagram, create a database that which tables are at least 2NF showing the dependency diagram for each table (11)



2.2. When is a table in 3NF? (2)

- It is in second normal form
- It contains no transitive dependencies

2.3. What is a partial dependency? Which what normal form is it associated with? (3)

Partial dependency exists when there is a functional dependence in which the determinant is only part of the primary key. It is associated with first normal form

2.4. What are three data anomalies which result into data redundancy and provide a way to eliminate it? (4)

- Update anomalies:
- Insertion anomalies
- Deletion anomalies

When the insertion, update or delete is performed, needs to be done automatically on the other sites when the data is existing

Question 3:**[20]**

The major reason for using DBMS is to ensure the integrity and consistency of the data within the database system. The functions of the DBMS are transparent to the end user and are achieved mostly through the usage of a DBMS. Discuss DBMS and every function of a DBMS.

Database Management Systems (DBMS) is the collection of programs that manages the database structure and control access to the data stored in the database. A database resembles a very well-organized electronic filing cabinet in which powerful software (DBMS) helps manage the cabinets' contents

Functions of a DBMS:

- Data dictionary management: DBMS stores the definitions of data elements and their relationships (metadata) in the dictionary. Different programs that access the data in the database work through the DBMS.
- Data storage management: DBMS creates and manages the complex structures required for data storage by relieving the user from a difficult task of defining and programming the physical data characteristics. Data storage management is further used for performance tuning.
- Data transformation and presentation: DBMS transforms entered data to conform to required data structures. DBMS relieves the developer of the chore of distinguishing between the logical data format and the physical format.
- Security management: DBMS creates a security system that enforces user security and data privacy. Security rules determine which users can access the database, which data items each user can access and which data operations (read, add, delete or modify) the user can perform.
- Multiuser access control: It is used to provide data integrity and data consistency; the DBMS uses sophisticated algorithms to ensure that multiple users can access the database concurrently without compromising its integrity.
- Backup and recovery management: The DBMS provides backup and data recovery to ensure data safety and integrity. The DBMS systems provide special utilities that allow the DBA to perform routine and special backup and restores procedures.
- Data integrity management: DBMS promotes and enforces integrity rules, minimizing data redundancy and maximizing data consistency. The data relationships stored in the data dictionary are used to enforce data integrity. Ensuring data integrity is important in transaction-oriented database systems.
- Data access languages and application programming interfaces: DBMS provides data access through query language which is nonprocedural language. It allows the user to specify what must be done without specifying how it should be done.
- Database communication interface: DBMS accepts end-user requests via multiple, different networks environments.

Question 4:**[20]**

4.1. The main objective of normalization process is to ensure that each table conforms to the concept of well-formed relations. List four characteristics of the table that conform to normalization. (4)

- Each table represent a single subject
- No data item will be unnecessarily stored in more than one table
- All nonprime attributes in a table are dependent on the primary key – the entire primary key and nothing but primary key
- Each table is void insertion, update and or deletion anomalies which ensures the integrity and consistency of the data.

4.2. Improving the design of the database is important. It is done in order to improve database's ability to provide information and on enhancing its operational characteristics. List and discuss the issues or aspects that needs to be considered in order to improve database design (16)

- Evaluate primary key assignments:
- Evaluate naming conventions
- Refine attribute atomicity
- Identify new attributes
- Identify new relationships
- Refine primary keys as required data granularity
- Maintain historical accuracy
- Evaluate using derived attributes

Question 5:**[15]**

5.1. Although database systems yield considerable advantages over previous data management approaches. Database management do provide significant disadvantages that are overlooked more often. Discuss disadvantages of database system (10)

- Increased costs: Database systems require sophisticated hardware and software and highly skilled personnel. The cost of maintaining the hardware, software and personnel required to operate and manage the database system can be substantial.
- Management complexity: Database systems interfaces with many different technologies and have significant impact on a company's resources and culture. The changes introduce by the adoption of database system must be properly managed to ensure that it helps to advance the company objectives.
- Maintaining currently: To maximize the efficiency of the database system, you must keep your system current by performing frequent updates and apply the latest patches and security measures to all the components.
- Vendor dependencies: Given the heavy investment in technology and personnel training, companies might be reluctant to change the database vendors. Vendors are less likely to offer pricing point advantages to existing customers and those customers might be limited in their database system components
- Frequent upgrade/ replacement cycles: DBMS vendors frequently upgrade their products by adding new functionality. These new additional functionalities usually come with a new software upgrade.

Some of these versions upgrades comes with new hardware upgrades. The upgrades costs money and that will include the cost of training the personnel and purchasing of the new hardware

5.2. List five characteristics of Big Data and NoSQL Database (5)

- They are not based on the relational model and SQL, hence the name NoSQL.
- They support distributed database architectures
- They provide high scalability, high availability and fault tolerance
- They support very large amount of sparse data
- They are geared toward performance rather than transaction consistency

3 CONCLUSION

The marking of assignments was focusing on the answers you have supplied and how you have structured your answers. Please make sure that you are contact examination department to check if you qualify for examination. You are free to contact your lecture regarding the marking of your assignment.