



FACULTY OF SCIENCE

ACADEMY OF COMPUTER SCIENCE & SOFTWARE ENGINEERING

MODULE IFM2A10/IFM02A2
INFORMATICS 2A

CAMPUS APK

EXAM 24 MAY 2019

ASSESSORS

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INTERNAL MODERATOR

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DURATION 120 minutes

MARKS 100

PLEASE TAKE CAREFUL NOTE OF THE FOLLOWING:

1. Answer ALL questions in the ANSWER SHEET supplied.
 2. Do NOT write in pencil. Anything in pencil WILL NOT BE MARKED.
 3. Write neatly and legibly.
 4. Answers must pertain to the material covered during the course of the module.
 5. NO calculators may be used.
 6. This question paper consists of 6 (including this cover page) pages.
 7. This question paper consists of 6 question sections.
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Question 1

EventHelpers is a company that specializes in event medical assistance. They can handle any type of medical emergency. The company has a range of employees from first aiders to paramedics with degrees. EventHelpers has contacted you to help them design the database so that they can keep track of which employees went to which events. The company provided you with the following details:

- A first aider has a certificate, which indicates the expiration date of the certificate. The certificate has to be renewed every three (3) years.
- A paramedic has a degree that does not expire.
- The company needs the ID, Name, Surname, Contact details, and the address of each employee.
- The company sends several medical assistants, a few first aiders and, depending on the size of the events, 1-3 ambulances, to each event.
- Each medical assistant is paid per hour based on their qualification.

To book EventHelpers for an event, the following details are required:

- The name of the event.
- The time and date of the event.
- The address of the event.
- The number of expected people at the event.

Because most events don't have an end time, the company only invoices the events afterward. To invoice an event, they will need to know which medical assistants were at which event and how many hours they have worked.

1.1 Draw an Extended Entity Relationship model to model the storage of the [20] information provided above.

Question 2

- 2.1 Define the following three (3) terms:
- a) Data [1]
 - b) Information [1]
 - c) Knowledge [1]
- 2.2 What are the five (5) components that a database system is composed of? [5]
- 2.3 What is a business rule? [1]
- 2.4 Provide one (1) example of a business rule from the scenario in Question 1. [1]
- [10]**

Question 3

- 3.1 Discuss the difference between Degree and Cardinality. [2]
- 3.2 What is the Degree of the Employee table? [1]
- 3.3 Discuss the difference between a Superkey and a Secondary key. [2]
- 3.4 Name and Discuss five of Dr. Codd's relational database rules. [10]
- [15]**

Question 4

- 4.1 Briefly discuss the three stages of database design. [6]
- 4.2 Discuss the properties of a Transaction. [5]
- 4.3 Define lock granularity. [1]
- 4.4 Discuss the difference between a database level and a row level lock granularity. [2]
- 4.5 What is the purpose of the locking feature? [1]
- [15]**

Question 5

The Johannesburg Athletic Club Association (JACA) is an organisation that encourages the city's population to join athletic clubs by discounting the amount that each athlete spends on the registration fee of each race based on the club that the athlete is a part of.

The organisation would like you to assist them in tracking the discount they need to provide to the top three runners of each race. They have given you a spreadsheet with an extract of some races and the runners involved.

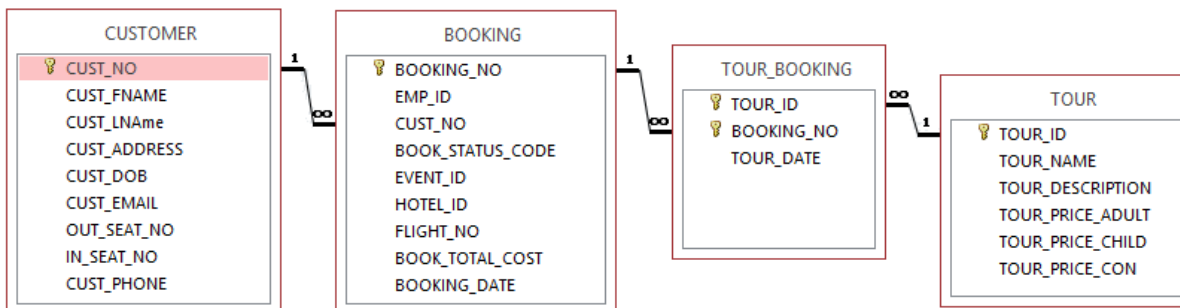
RACE	DATE	FEE	RUNNER	TIME	CLUB	CLUB DISCOUNT	DISCOUNTED FEE
The Winter Half Marathon	5 May 2015	R250.00	Njabulo Dube	1H:07	Bramfie Runners	7%	R232.50
			Pule Mabuti	1H:11	Rosbank Nike Club	5%	R237.50
			Roanna Smith	1H:24	Bramfie Runners	5%	R237.50
The Spring-Spring Half Marathon	2 Sept 2015	R200.00	Erlinda Buckman	1H09	Team Vitality	5%	R190.00
			Dominick Mkhize	1H12	Soweto Running Club	5%	R190.00
			Dannette Camillo	1H19			R200.00
The Colour Run	18 Nov 2015	R400.00	Sibongile Mbele	0H38	Soweto Running Club	5%	R380.00
			Sebastian Bass	0H40	Bramfie Runners	7%	R372.00
			Thabiso Mohapi	0H43	Bramfie Runners	7%	R372.00

- 5.1 In which Normal Form is the above table? Explain how you arrived at your answer. [2]
 - 5.2 Explain the steps to convert an unnormalized table into 1st Normal form. [3]
 - 5.3 Explain the conditions required for a table to be in BCNF Normal form. [2]
 - 5.4 Explain where 4th Normal form is usually used. [2]
 - 5.5 Which Normal form will have the least number of anomalies? [1]
 - 5.6 Convert the given table into 3rd Normal form. Write your answer as a relation Schema. [5]
 - 5.7 Define Normalization [3]
 - 5.8 Define Denormalization [2]
- [20]**

Question 6

The entity relationship diagram below models the components of a database belonging to the South African Film Writers' Association. The database allows SAFWA to keep track of movies filmed in South Africa, developed by domestic and international studios.

The MS Access database diagram below shows the tables created for a travel agent company called TravelSpace. They implemented their database to keep track of their customer's bookings for the different trips they have available. The company offers multiple tours which can be booked by many different customers. Given the diagram below, answer the following questions by providing SQL statements.



- 6.1 Write the SQL statement used to CREATE the TOUR_BOOKING table. [4]
- 6.2 Count how many tours are offered by TravelSpace. Count only the tours whose adult price is over R5000. [2]
- 6.3 List all customers' names (first and last name) and their booking information (booking number, date and status code). Make use of an INNER JOIN. [4]

EduVarsity, a university which prides itself in its efforts to provide their students with the academic support, has just hired you to develop the information system they will be using to keep track of the students that have signed up for extra classes at the university.

They have brought you in to specifically help them design the database their information system will be using. As part of your design job, the EduVarsity managers asked you to provide an Entity Relationship Diagram to show the structure of the database.

They would like the database to keep track of the students who have used the system to register for extra classes. Details such as their student number, first name, last name, and date of birth are to be stored for every student that registers.

The university has lecturers involved in their academic support programme. The designed database should be able to store details on the lecturers such as first name, last name and highest qualification.

Each lecturer can provide many extra class sessions, although according to university policy, each of the extra class sessions should only be conducted by a single lecturer. For each extra class session, the database should store the subject of the class (e.g. Geography, Maths, Informatics, etc.), the level of the module (e.g. 1A, 2B, 3A, etc.), and the date in which the extra class sessions started.

The students at EduVarsity may register to attend extra class sessions at any time during the semester. The managers at the university would like to know the date at which each student registers to attend extra class sessions. An extra class session can be registered for by multiple students, and each of the students may register to attend the different extra class sessions they want.

Given the information above, draw an ER Diagram showing the following:

- Entities,
- Attributes,
- All key attributes,
- Data types for each attribute, and
- All relationships between the entities

NB: You may use one of the standardised ERD notations.

6.4 Draw an ERD diagram based on the information provided above.

[10]

[20]

TOTAL 100

END