5915 Database Design – COLT1, 2022

ASSIGNMENT 1

Due date: Friday week 7 at 11.59 pm

This assignment has 100 marks which constitutes **13%** of the total marks for this unit.

General Information

This is an individual assignment and each student is responsible for both the submission and the outcome.

Instructions:

1. Late submission, unless authorised by the lecturer, WILL NOT be marked.
2. **Plagiarism will attract severe penalties in accordance with the guidelines as university of Canberra polices.**
3. An electronic copy of this assignment should be submitted via the Canvas site using the assignment drop box by the due date and time.
4. You need to use **Draw io or any other modelling software of your choice** to create your EER model and then save it as (**jpg OR pdf file**).
5. Be sure to maintain regular back-ups for any models or material prepared with the aid of software. Loss of files will not be accepted as an excuse for non-completion of this assignment.
6. **Part 2 has two questions.**
7. **This assignment has three parts.**

PART 1 - Modelling (50 marks)

The purpose of this assignment is to provide you with experience in **analysing and designing a solution for a database system**. This assignment will help you to understand the nature and purpose of **data analysis and conceptual design**.

Read the description of the scenario below and its business operations then answer the questions below.

Problem Description

UC College(UCC) is part of the University of Canberra. Our students share the same campus and have access to all the same facilities, which provides an authentic and exciting introduction to university life. UCC offers pathway programs that enable access to the University of Canberra. The amazing students in the DipIT program 😉have been asked to design a database system that organises the information to run UC College operations and administration.

You want to create a database system, which would track courses, classes enrolment, classes allocation, rooms booking, staff allocation and the progress of students in UCC, etc...

Requirements

The university offers different degrees, such as PhD, Masters, Bachelor and Diploma, and each degree has one or more courses. UCC provides different diploma courses for the diploma degree, and each course is identified by a unique code it also has a name or description and a total number of credit points, for example for the DipIT, the course code is 935AA, and the description is Diploma of Information Technology, and the course credit points is 24. All students must enrol in at least one course offered by UCC.

When a student applies to study at UCC, firstly, they need to submit an application, then they will be given a unique student ID. After that, they need to provide the following details: First name, Surname, Preferred Given Name, Date of Birth, Email Address, Gender, mailing address (Number & Street, Suburb / Town, State, Country, Postcode), Telephone number.

Their application will be given a unique application ID and other information will be stored such as the date of the application, the degree, and the course. The student is allowed to submit one or more applications by using their unique student ID.

For a certain application, if the student fulfils the entry requirements, the admission office sends them their offer letter which also has a unique number along with the following details: the degree, the course, the course start date, the course end date, the course fees, and duration in months. After that, the student has the choice to either accept or reject the offer.

The course consists of many units, and each unit can be taught in one or more courses. Each unit has the following attributes: the unit code, the unit description and the unit credit points.

In UCC, the timetable is prepared in the beginning of each Trimester, and it contains the following details: The academic year, the Trimester (*also known as COLTR short for College Trimester, the academic year consists of three Trimesters COLTR1, COLTR2 and COLTR3*), the Trimester's start

and end date, the exams period's start and end date, the orientation day's date, the census day's date, the class free week's start and end date.

UCC staff can be either admin staff or academic, and the staff member under each category can be either full time or sessional. Each staff member is identified by a staff ID and the database stores the following information for each staff member: First name, Surname, Preferred Given Name, Date of Birth, Email Address, Gender, mailing address (Number & Street, Suburb / Town, State, Country, Postcode), Telephone number, job title. A staff member cannot be a full time and sessional and cannot be academic and admin at the same time. For fulltime admin staff, the system stores their job start date and the salary, and for sessional admin staff it stores their contract start and end date and the hourly rate.

For fulltime academic staff, the system stores their job start date, salary, and teaching load, and for sessional academic staff it stores their contract start and end date and the hourly rate.

UCC uses the university facilities, UC campus has many buildings with unique numbers, and each building has one or more levels (A, B, C…), and each level has one or more rooms, and each room is identified by a unique number (e.g., 5B74 means Building 5, Level B, Room 74). There are different types of rooms such as office, meeting or teaching room (laboratory or computer lab or lecture theatre). Only the teaching room is used for teaching, and the system stores each room capacity and what facilities provided in the room, such as recording, sound system, computers, etc. The teaching room may have no facilities or may have more than one depending on the purpose of the room.

In the timetable, units are offered each year and trimester, some units may not be offered every trimester. When a unit is offered, the number and the type of classes must be identified as well as the class size and the number of hours for each class and what type of facilities are needed for that class, the class may require one or more facilities, below is an example:

Year	Trimester	Unit code	Unit name	Type	Class size	Number of hours	Facilities needed
2022	COLTR1	5915	Database Design	Lecture 1	50	2	Lecture recording, projector
2022	COLTR1	5915	Database Design	Lecture 2	50	2	Lecture recording, projector
2022	COLTR1	5915	Database Design	Tutorial 1	20	2	Computers, Projector
2022	COLTR1	5915	Database Design	Tutorial 2	30	2	Computers, Projector

When the timetable is finalized for all units, the rooms' booking process starts and the classes will be allocated on certain days and times into the university rooms based on the requirements shown in the table above (Class size, Number of hours, Facility needed).

After booking the rooms, the academic staff will be assigned to teach the classes, each class is taught by one teacher, and the teacher may teach one or more classes.

After allocating the classes and the teachers, the timetable will be published online, and the students can start enrolling themselves. A student is allowed to enrol in the same unit only once per academic year and academic trimester.

After finishing the enrolment, the students can start the allocation process by selecting the days and times for their classes.

Requirements

(a) Represent the data requirements of the above system as a Conceptual data model (Enhanced ERD). State any assumptions necessary to support your design.
(25 Marks)

(b) Identify the main entities and provide the **description of all entities.**
(**5 Marks)**

(c) Provide **description of relationships** and the multiplicity between all the entities described in (b)
(**9 Marks)**

(d) Provide the **description of all attributes** for all entities from part (b).
(**6 Marks)**

(e) Determine primary key attributes for each strong entity.
(**5 Marks)**

****For parts (b), (c) and (d) you need to use the suitable data dictionary, for more information please refer to Week 4 Lecture 01B notes to see the structure of the required data dictionary for each part.**

PART 2 - Normalisation (45 Marks)

Q1: The following relation lists the **MovieReleaseRatingDetails** in a relational database.

(35 Marks)

MovieReleaseRatingDetails

movieNo	movieName	Year	SeasonNo	SeasonName	watchingRateRank	watchingRate	catchPhrase
102	Airplane	2019	1	Summer	1	Very low	I am serious. And don't call me Shirley
102	Airplane	2019	2	Winter	2	Very low	I am serious. And don't call me Shirley
102	Airplane	2019	3	Spring	3	Very low	I am serious. And don't call me Shirley
103	Friday	2019	1	Summer	5	High	Bye, Felicia
103	Friday	2019	2	Winter	4	Considerable	Bye, Felicia
103	Friday	2020	3	Spring	3	Moderate	Bye, Felicia
104	TERMINATOR 2: JUDGEMENT DAY	2019	1	Summer	1	Very low	Hasta la vista…baby.
1114	TERMINATOR 2: JUDGEMENT DAY	2020	1	Summer	2	Low	Hasta la vista…baby.

Requirements

(a) The above table is not normalized; hence, it is subject to update anomalies. Using the data in the table, provide examples of insertion, modification and deletion anomalies. **(12 marks)**

(b) Identify the candidate keys of the above relation and select one of them as the primary key. **(5 marks)**

(c) Identify the functional dependencies on the alternate keys as well as the primary key. **(4 marks)**

(d) Using the functional dependencies identified in part (c), normalise the above relation to 3NF and identify the primary and foreign keys in your 3NF relations (include data in the normalised tables). **(14 marks)**

Q2: In the following scenario, answer the questions below: **(10 Marks)**

The table R (A, B, C, D, E, F, G, H, I, J, K) holds the following functional dependencies:

FD1 A, B, E → C, D, F, G, H, I, J, K

FD2 K → F, D

FD3 H → I

FD4 A → G

Requirements

(a) What is the primary key in the table R? **(2 Marks)**

(b) Name the partial dependencies and the transitive dependencies if there is any in R. **(2 Marks)**

(c) Is the table R in the 1NF or in the 2NF or in 3NF, and why? **(2 Marks)**

(d) Normalize the table up to the 3NF. **(2 Marks)**

(e) Identify the primary and foreign keys in your 3NF relations. **(2 Marks)**

PART 3 – Assignment presentation (5 marks)

This work must be originally yours, DO NOT share others' answers and **DO NOT** share yours with others, and you are expected to present your assignment to your tutor and answer their questions. **In case you fail to demonstrate your understanding for your solution, further action will be taken.**

ASSIGNMENT SUBMISSIONS

By the due date, you need to submit the following files via Canvas:

1. **Your design documents for Part1:**
   1.1. The Conceptual EERD as a **pdf or image** format.
   1.2. Data Dictionary in **Word file**.
2. Your answers for Part 2 in a **Word file**.
3. **Your files must be very well organized and reflect how professional you are (No handwritten submission will be accepted).**