2814ICT – DATA MANAGEMENT
7003ICT – DATABASE MANAGEMENT
School of Information & Communication Technology
Trimester 1, 2020

Assignment Part 1:
Designing a Database for Commonwealth Transport Services

Aims

To gain experience in designing a database using Entity Relationship Diagram (ERD), Normalisation, and Relational Database modelling techniques.

Learning Objectives

In the process of this assessment task you will:

- plan, schedule and execute project tasks with a view to improving your personal and group productivity;
- gain awareness of the typical challenges related to the design of practical databases;
- learn that database design is an iterative process; and
- use the ERD, Normalisation techniques, and Relational models to develop elegant logical models for a database;

Due date:	Week 7, 17 April Friday, 5:00 PM One submission per group, file named as 'a1-<Student_ID>.pdf'. Any student's ID in the group is fine. Each group member will have a short presentation or viva.
Late submission:	Any submission after the due date will receive **a deduction of 10% per day**. Standard university policy will apply for all late submissions. See the course website/profile for detail.
Marks:	(a) Group submission: a total 100 marks and it is worth 10% out of the total assessment, plus (b) individual viva/presentation: 5% out of the total assessment.
Extensions:	An extension will only be **considered** with supporting documentation from a health professional **and** if the problem/illness occurred **within the week prior to the due date**. If an extension is granted the extension will then equal the number of days specified on the doctor's certificate, with a *maximum limit of five (5) working days*.
Authorship:	This assignment is a **Group assignment** and it shall be completed by **the students in each group** only. The final submission must be identifiably the work of the individual group members. Breaches of this requirement will result in an assignment not being accepted for assessment and may result in the offending student or students being required to present before the Disciplinary Committee.

Introduction

Commonwealth Transport Services (CTS), a private company, specialises in providing transportation services to various events. Recently, it has been sub-contracted by the Commonwealth Games Federation to transport officials during the Commonwealth Games in 2022. The company now realises that it needs a modern computerised system for efficient and reliable management and documentation of its services. CTS has hired you as a database professional to design and develop a database system which can meet CTS's needs as specified below.

Business Rules

- CTS owns a fleet of vehicles, which vary from sedans to vans. The table below shows a *small* sample of CTS's vehicle assets:

Commonwealth Transport Vehicle Assets
July 30, 2015

Vehicle Identification Number (VIN)	Registration Number	Make	Model	Colour	Current Odometer	Passenger Capacity
SANFDAE11U1286116	459 ABC	Volvo	XC90 SE Premium	White	897	4
SB2252300ADTT00644	297 JMB	Toyota	Camry	Silver	5629	5
SD2252300BDU00040	510 RAK	Honda	Odyssey	Black	563	7
SK30URHHAAS217472	918 YYH	Ford	Transit Luton	White	4451	2
SMDAEN11U1286256	973 OML	Audi	A1	Silver	7761	3
SM30URHHAS153052	226 DRG	Mercedes	Sprinter	White	3097	2

- Vehicles require regular maintenance and repair. When a vehicle is maintained or repaired the vehicle's odometer reading, the date when the maintenance or repair is started, the final cost, and a brief description of the action is recorded. CTS also records the nature of the action as Maintenance (M) or Repair (R).

- CTS maintains the list of countries participating in the Games and the major languages spoken in those countries. A country may have several spoken languages. Countries are identified by the ISO3166-1 [1] two-character codes. Similarly, CTS uses ISO639-1 [2] two-character codes for languages. For example, the codes for the country Australia and language English (EN) are AU and EN, respectively.

- Games officials from all participating countries use CTS's services. CTS records the name of the country that an official is representing, the official's Commonwealth ID (8 characters), his/her name, role at the Games (e. g. head-coach, judge, physician etc.) and the official's preferred language. An official may use CTS's services multiple times (even during a single day); the only limiting factor is whether a suitable vehicle is available at the time they wish to travel.

- CTS Vehicles are driven by the company's drivers. The driver's name, licence number (18 characters in length) and the level of clearance granted to the driver are recorded. The clearance levels are digits from 1 to 4 representing the security clearance of the driver (4 is the highest level of clearance).

- In addition, CTS records (using ISO639-1 language codes) the languages that a driver speaks – some drivers speak several languages. The employee organising a booking will try to match the language of an official with that of the driver.

- Before using a vehicle, it must be booked. This booking will take place via a computer program to be created; you are not concerned with this program. However, the back-end database needs to support such an activity. Transport bookings require the assignment of a suitable driver to a suitable vehicle matching the needs of the official. The intended start date and time and projected end date and time are recorded when a booking is first placed. The pickup location and drop off location are also recorded.

- Locations are specified using its address (street number, street name, suburb, state and post code) and type (Hotel, Airport, and Aquatic Centre, etc.).

- After the completion of a trip, the booking reference number, the actual start date and time and actual end date and time are recorded. CTS also records the start odometer reading and the end odometer reading.

- To assist vehicle assignment, CTS requires that the new system be capable of indicating whether a vehicle is currently available. The vehicles that are out on a trip or out of service due to maintenance or repair should be flagged as not available.

Assessable Tasks

a) Group Submission

From the CTS's business requirements specified above, prepare a document according to the followings:

1. Use the supplied template for your Assignment submission.
2. An appropriate *title page* that includes the signatures of all students in the group and an acknowledgement of all students and staff you have spoken to about the assignment.
3. *A table of contents* and page numbers.
4. An ERD using **Crow's Foot** notation. The diagram should include:
    a) all entities, attributes, and relationships (including names) ;
    b) primary keys (underlined) and *foreign keys* (italic) identified;
    c) cardinality and modality (optional / mandatory) symbols; and
    d) assumptions you have made, e.g., how you arrived at the cardinality and/or participation for those not mentioned or clear in the business description, etc.
5. Normalisation of the relations which identifies:
    a) dependency diagram for each relation
    b) the *level* of *Normalisation* achieved for each relation
    c) the *reasons* for any relation that is **NOT** maintained in 3NF.
6. Relational database schema that translate your ERD and include:
    a) *relation* (table) names,
    b) *attribute* (column) names and *data types* (as required by XAMPP or UwAmp),

c) *length* of each field & its *description* (e.g., if it is a primary key, a foreign key referring to another table or format, etc.)
d) *primary* and *foreign* keys identified;

7. A bibliography, containing all resources used to complete the assignment. If no resources have been used please indicate this appropriately.

b) Individual Presentation / Viva

In the week of the submission due date, students in each group will be required to attend the workshop/lab in-person. The tutor will assess each student via a brief presentation / viva.

Assessment Criteria and Marking Overview

Task a: **The Group Submission**	**Marks**
Presentation How clear and well-presented your submission is.	**10**
ERD Adherence to the standard of the course, assumptions made, inclusion of correct primary and foreign keys, appropriate entities, relationships, and attributes.	**50**
Normalisation Appropriate interpretation of each normal form, arguments for leaving the schema in the normal form you consider optimal.	**20**
Conversion of ERD to relational database schema Schema is a correct translation of the ERD submitted with appropriate tables, columns, primary keys, and foreign keys, field type & format, etc.	**20**
Sub-total	**100**
Out of 10% of the total assessment	**10**

Task b: **Individual Presentation / Viva**	**Marks**
Correct answers to questions related to the assignment / submission.	**5**
Sub-total	**5**
Out of 5% of the total assessment	**5**

Mark deductions	**Marks**
If a student submits assignment individually, not as part of a group. Maximum deduction of marks.	**-2**

References:

[1] Country Codes, https://en.wikipedia.org/wiki/ISO_3166-1. Last accessed on 21 July 2017.
[2] Language Codes, https://en.wikipedia.org/wiki/List_of_ISO_639-1_codes. Last accessed on 21 July 2017.