

Assignment Part 1: Designing a Database for Commonwealth Transport Services

ASSIGNMENT TITLE: Database Model for Commonwealth Transport Services

Student 1	s-number:	Full name:
Student 2	s-number:	Full name:
Student 3	s-number:	Full name:
Course Code:		Workshop/Lab day & time:
Tutor's Name:		Date submitted:

Marks obtained: _____. [For marker to fill up.]

PLAGIARISM

Plagiarism: occurs when the work of another is represented, intentionally or unintentionally, as one's own original work, without appropriate acknowledgement of the author or the source. See more at

<https://www.griffith.edu.au/academic-integrity/information-for-students/what-is-plagiarism>.

Plagiarism is a serious offence. Refer to the following document on Student Academic Misconduct:

<http://policies.griffith.edu.au/pdf/Student%20Academic%20Misconduct%20Policy.pdf>.

Declaration

Except where appropriately acknowledged, this assignment is our own work, has been expressed in our own words and has not previously been submitted for assessment. We have also retained a copy of this assessment piece for our own records.

Student 1:	Student 2:	Student 3:

Table of Contents

Table of Contents 2

List of Illustrations 2

Statement of Completion: 2

Synopsis 3

Entity Relationship Diagram 3

Assumptions 4

Normalization

 a) Relational data structures that translates the ER diagram 4

 b) Normalization 5

Relational Database Schema 8

List of Illustrations

Figure1: Entity Relationship Diagram 3

Statement of Completion:

All tasks have been completed.

Synopsis

The purpose of this assignment is to create the database design for the Commonwealth Transport Services (CTS), a private company, specializes in providing transportation services to various events which is recently has been sub-contracted by the Commonwealth Games Federation to transport officials during the Commonwealth Games in 2022.

Entity Relationship Diagram

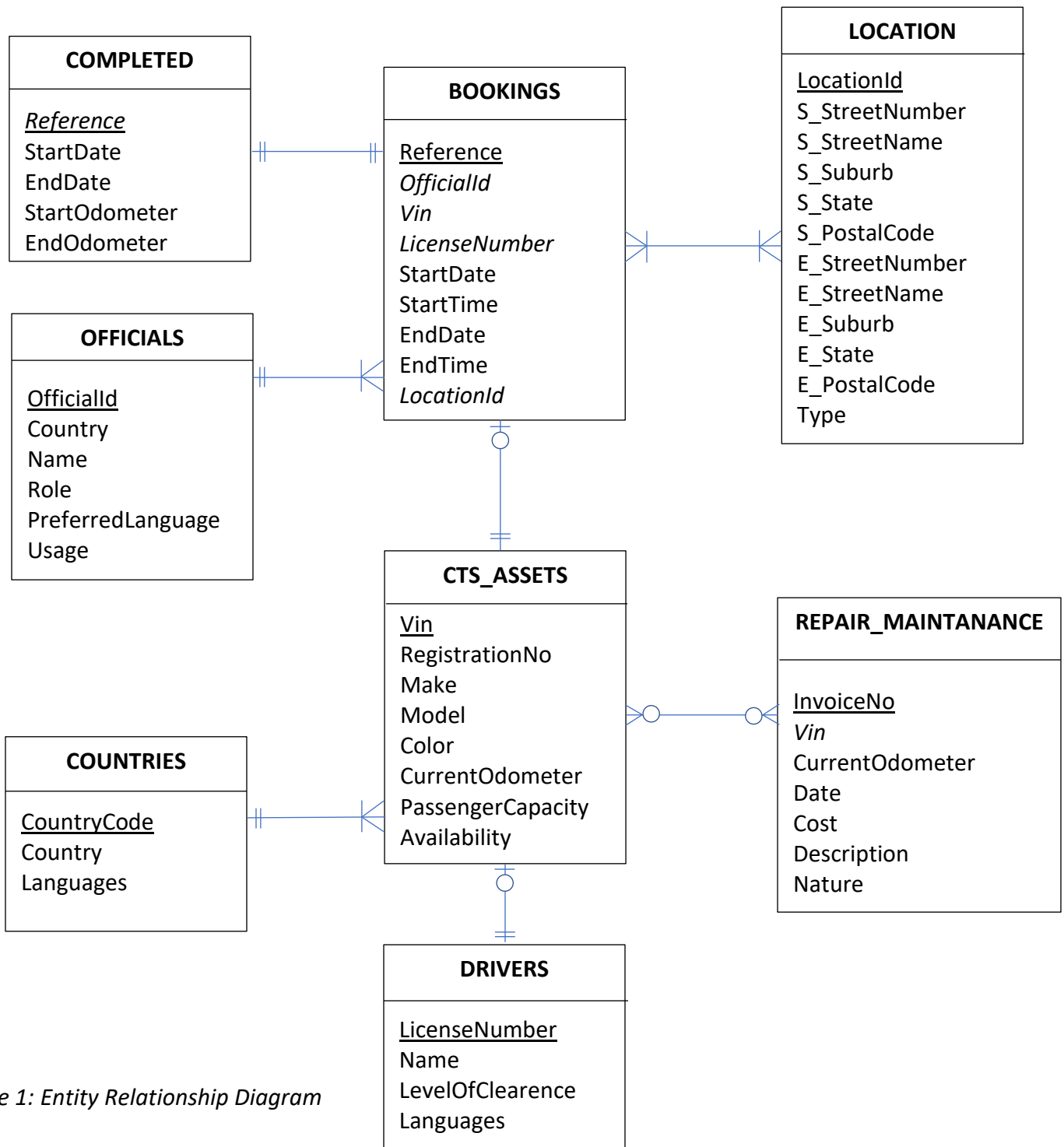


Figure 1: Entity Relationship Diagram

Assumptions

1. Each country must get the service from the CTS and each country can have several vehicles to use but each vehicle will be allocated only per a single country official.
2. Each official can make one or many bookings according to their needs.
3. Vehicles either can be available or under one or many repairs/maintenances.
4. Vehicle must have a driver to be used but there can be freely available drivers as well.
5. All the bookings should have a vehicle but vehicles can be either booked or freely available.
6. All the bookings must have locations of picking and dropping and each location can be for a single booking or for a multiple booking.
7. To have a completed service it must have previously booked and each booking must fall into the completed slot.

Normalization


a) Relation Schema

1. CTS_ASSETS (Vin, RegistrationNo, Make, Model, Color, CurrentOdometer, PassengerCapacity, Availability)
2. DRIVERS (LicenseNumber, Name, LevelOfClearence, Languages)
3. REPAIR_MAINTANANCE (InvoiceNo, Vin, CurrentOdometer, Date, Cost, Description, Nature)
4. COUNTRIES (CountryCode, Country, Languages)
5. OFFICIALS (OfficialId, Country, Name, Role, PreferredLanguage, Usage)
6. BOOKINGS (Reference, *OfficialId*, *Vin*, *LicenseNumber*, StartDate, StartTime, EndDate, EndTime, *LocationId*)
7. LOCATIONS (LocationId, S_StreetNumber, S_StreetName, S_Suburb, S_State, S_PostalCode, E_StreetNumber, E_StreetName, E_Suburb, E_State, E_PostalCode, Type)
8. COMPLETED (Reference, StartDate, EndDate, StartOdometer, EndOdometer)

b) Normalization

1. CTS_ASSETS


<u>Vin</u>	RegistrationNo	Make	Model	Color	CurrentOdometer	PassengerCapacity	Availability
------------	----------------	------	-------	-------	-----------------	-------------------	--------------



This relational data structure is in a 3rd NF

2. DRIVERS

<u>LicenseNumber</u>	Name	LevelOfClearence	Languages
----------------------	------	------------------	-----------



This relational data structure is not in any Normalization:

- o It is because Languages is a multi-valued attribute because it contains a nested relation.
- o Remove the attribute that violates 1NF and place it in a new relation with the primary key and create a new relation for the nested relation

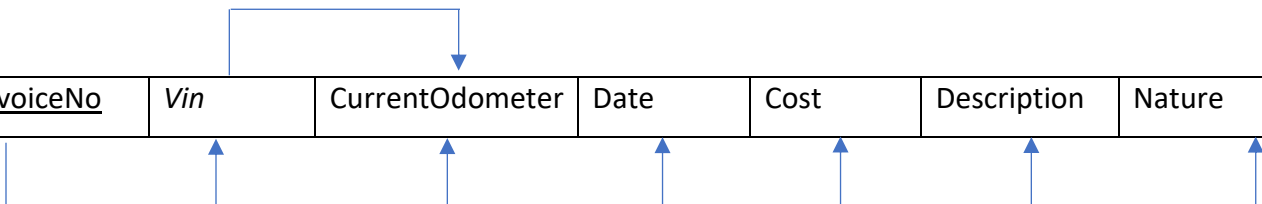
- ✓ DRIVERS (LicenseNumber, Name, LevelOfClearence)
- ✓ LANGUAGE_SECTION (LicenseNumber, Language)

Now this relational data structure is in 1NF

Finally, this new relational data structure is in a 3rd NF.

3. REPAIR_MAINTANANCE

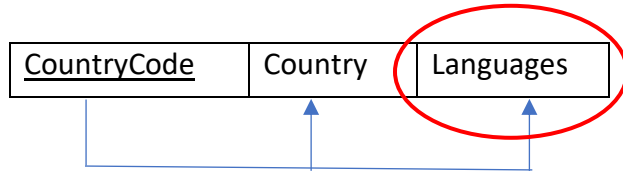
<u>InvoiceNo</u>	Vin	CurrentOdometer	Date	Cost	Description	Nature
------------------	-----	-----------------	------	------	-------------	--------



This relational data structure is in a 2ND NF:

- o InvoiceNo -> Vin, Date, Cost, Description, Nature
- o Vin -> CurrentOdometer
- o There is a transitive functional dependency among InvoiceNo, Vin, and CurrentOdometer. The CurrentOdometer is related to the Vin which is a foreign key therefore it is not in 3NF.
- o However, CurrentOdometer doesn't introduce big redundancy (only one attribute), so there is no need to decompose this table into two.

4. COUNTRIES



This relational data structure is not in any Normalization:

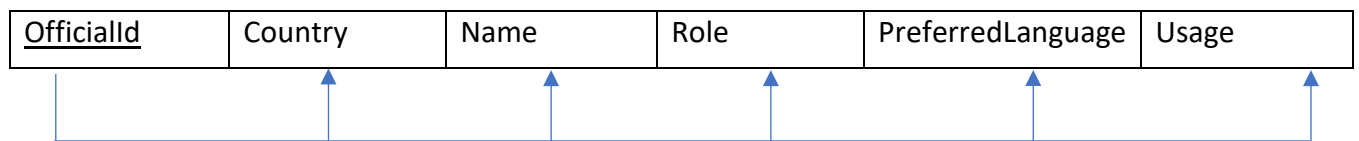
- o It is because Languages is a multi-valued attribute because it contains a nested relation.
- o Remove the attribute that violates 1NF and place it in a new relation with the primary key and create a new relation for the nested relation

- ✓ COUNTRIES (CountryCode, Country)
- ✓ COUNTRY_LANGUAGES (CountryCode, Language)

Now this relational data structure is in 1NF

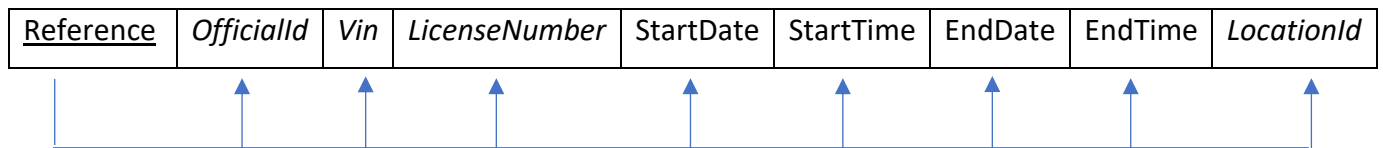
Finally, this new relational data structure is in a 3rd NF.

5. OFFICIALS



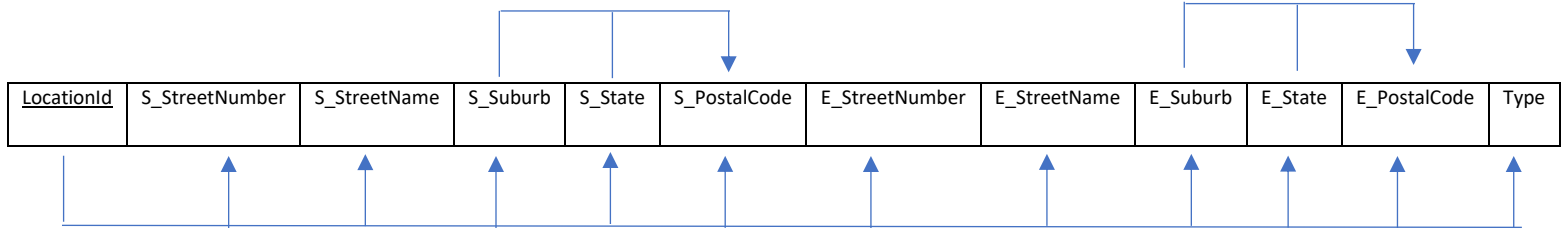
This relational data structure is in a 3rd NF

6. BOOKINGS



This relational data structure is in a 3rd NF

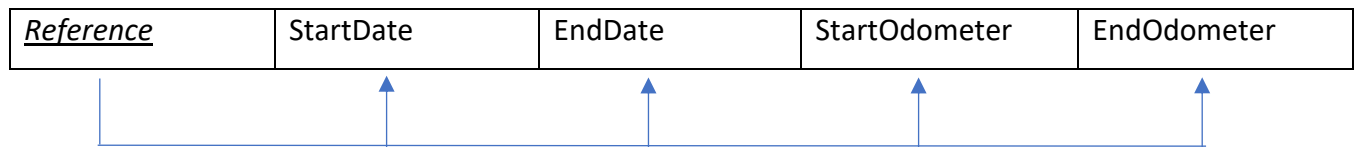
7. LOCATIONS



This relational data structure is in a 2ND NF:

- o LocationId ->, S_StreetNumber, S_StreetName, E_StreetNumber, E_StreetName, type
- o S_Suburb, S_State -> S_PostalCode
- o E_Suburb, E_State -> E_PostalCode
- o E stands for the End and S stands for the Start.
- o There are two transitive functional dependencies among LocationId, S_Suburb, S_State, E_Suburb, E_State, S_PostalCode and E_PostalCode. The S_PostalCode and E_PostalCode are related to the Suburb and the State therefore it is not in 3NF.
- o However, S_PostalCode and E_PostalCode don't introduce big redundancy (only two simple attributes), so there is no need to decompose this table into two.

8. COMPLETED



This relational data structure is in a 3rd NF

Relational Database Schema

Table Name	Field	Type	Description
CTS_ASSETS	Vin	VARCHAR (20)	PRIMARY KEY
	RegistrationNo	VARCHAR (6)	
	Make	VARCHAR (10)	
	Model	VARCHAR (10)	
	Color	VARCHAR (10)	
	CurrentOdometer	INT	
	PassengerCapacity	INT (2)	
	Availability	ENUM	ENUM ('YES', 'NO')
DRIVERS	LicenseNumber	VARCHAR (18)	PRIMARY KEY
	Name	VARCHAR (20)	
	LevelOfClearence	ENUM	ENUM ('1', '2', '3', '4')
	Languages	BLOB (20)	ISO639-1 FORMAT ONLY
REPAIR_MAINTANANCE	InvoiceNo	INT	PRIMARY KEY NOT NULL AUTO_INCREMENT
	Vin	VARCHAR (20)	FOREIGN KEY REFERENCES CTS_ASSETS(Vin)
	CurrentOdometer	INT	
	Date	DATE	FORMAT: DD-MM-YYYY
	Cost	DOUBLE	
	Description	VARCHAR (100)	
	Nature	ENUM	ENUM ('R', 'M')
COUNTRIES	CountryCode	BLOB (2)	PRIMARY KEY ISO3166-1 FORMAT ONLY
	Country	VARCHAR (10)	
	Languages	BLOB (20)	ISO639-1 FORMAT ONLY
OFFICIALS	OfficialId	VARCHAR (10)	PRIMARY KEY
	Country	VARCHAR (10)	
	Name	VARCHAR (20)	
	Role	VARCHAR (10)	
	PreferredLanguage	CHAR (2)	ISO639-1 FORMAT ONLY
	Usage	VARCHAR (10)	
BOOKINGS	Reference	VARCHAR (15)	PRIMARY KEY
	OfficialId	VARCHAR (10)	FOREIGN KEY REFERENCES OFFICIALS(OfficialId)
	Vin	VARCHAR (20)	FOREIGN KEY REFERENCES CTS_ASSETS(Vin)
	LicenseNumber	VARCHAR (18)	FOREIGN KEY REFERENCES DRIVERS(LicenseNumber)
	StartDate	DATE	FORMAT: DD-MM-YYYY

	StartTime	TIME	FORMAT: HH:MM:SS
	EndDate	DATE	FORMAT: DD-MM-YYY
	EndTime	TIME	FORMAT: HH:MM:SS
	LocationId	INT	FOREIGN KEY REFERENCES LOCATIONS(LocationId)
LOCATIONS	LocationId	INT	PRIMARY KEY NOT NULL AUTO_INCREMENT
	S_StreetNumber	VARCHAR (6)	
	S_StreetName	VARCHAR (30)	
	S_Suburb	VARCHAR (15)	
	S_State	VARCHAR (4)	
	S_PostalCode	VARCHAR (5)	
	E_StreetNumber	VARCHAR (6)	
	E_StreetName	VARCHAR (30)	
	E_Suburb	VARCHAR (15)	
	E_State	VARCHAR (4)	
	E_PostalCode	VARCHAR (5)	
	Type	VARCHAR (10)	
COMPLETED	Reference	VARCHAR (15)	PRIMARY KEY FOREIGN KEY REFERENCES BOOKINGS(Reference)
	StartDate	DATE	FORMAT: DD-MM-YYYY
	EndDate	DATE	FORMAT: DD-MM-YYYY
	StartOdometer	INT	
	EndOdometer	INT	