

**ASSIGNMENT TITLE:** Database Model for Commonwealth Transport Services

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| 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:

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| 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:** |
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**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**

**LOCATION**

LocationId

S\_StreetNumber

S\_StreetName

S\_Suburb

S\_State

S\_PostalCode

E\_StreetNumber

E\_StreetName

E\_Suburb

E\_State

E\_PostalCode

type

**COMPLETED**

*Reference*

StartDate

EndDate

StartOdometer

EndOdometer

**BOOKINGS**

Reference

*OfficialId*

*Vin*

*LicenseNumber*

StartDate

StartTime

EndDate

EndTime

*LocationId*

**OFFICIALS**

OfficialId

Country

Name

Role

PreferredLanguage

Usage

**CTS\_ASSETS**

Vin

RegistrationNo

Make

Model

Color

CurrentOdometer

PassengerCapacity

Availability

**REPAIR\_MAINTANANCE**

*InvoiceNo*

*Vin*

CurrentOdometer

Date

Cost

Description

Nature

**COUNTRIES**

CountryCode

Country

Languages

**DRIVERS**

LicenseNumber

Name

LevelOfClearence

Languages

**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**

1. Relation Schema
2. CTS\_ASSETS (Vin, RegistrationNo, Make, Model, Color, CurrentOdometer, PassengerCapacity, Availability)
3. DRIVERS (LicenseNumber, Name, LevelOfClearence, Languages)
4. REPAIR\_MAINTANANCE (InvoiceNo, *Vin*, CurrentOdometer, Date, Cost, Description, Nature)
5. COUNTRIES (CountryCode, Country, Languages)
6. OFFICIALS (OfficialId, Country*,* Name, Role, PreferredLanguage, Usage)
7. BOOKINGS (Reference, *OfficialId, Vin, LicenseNumber,* StartDate, StartTime, EndDate, EndTime, *LocationId)*
8. LOCATIONS (LocationId, S\_StreetNumber, S\_StreetName, S\_Suburb, S\_State, S\_PostalCode, E\_StreetNumber, E\_StreetName, E\_Suburb, E\_State, E\_PostalCode, type)
9. COMPLELTED (*Reference*, StartDate, EndDate, StartOdometer, EndOdometer)
10. Normalization
11. CTS\_ASSETS

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Vin | RegistrationNo | Make | Model | Color | CurrentOdometer | PassengerCapacity | Availability |

This relational data structure is in a 3rd NF

1. DRIVERS

|  |  |  |  |
| --- | --- | --- | --- |
| LicenseNumber | 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.

1. REPAIR\_MAINTANANCE

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| InvoiceNo | *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.

1. COUNTRIES

|  |  |  |
| --- | --- | --- |
| CountryCode | Country | 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

* 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.

1. OFFICIALS

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| OfficialId | Country | Name | Role | PreferredLanguage | Usage |

This relational data structure is in a 3rd NF

1. BOOKINGS

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Reference | *OfficialId* | *Vin* | *LicenseNumber* | StartDate | StartTime | EndDate | EndTime | *LocationId* |

This relational data structure is in a 3rd NF

1. LOCATIONS

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| LocationId | S\_StreetNumber | S\_StreetName | S\_Suburb | S\_State | S\_PostalCode | E\_StreetNumber | E\_StreetName | E\_Suburb | E\_State | E\_PostalCode | type |

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

E stands for the End and S stands for the Start.

o There is 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 and 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.

1. COMPLELTED

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| *Reference* | StartDate | EndDate | StartOdometer | EndOdometer |

This relational data structure is in a 3rd NF

**Relational Database Schema**

|  |  |  |  |
| --- | --- | --- | --- |
| **Table Name** | **Field** | **Type** | **Description** |
| CTS\_ASSETS | Vin |  |  |
|  | RegistrationNo |  |  |
|  | Make |  |  |
|  | Model |  |  |
|  | Color |  |  |
|  | CurrentOdometer |  |  |
|  | PassengerCapacity |  |  |
|  | Availability |  |  |
|  |  |  |  |
| DRIVERS | LicenseNumber |  |  |
|  | Name |  |  |
|  | LevelOfClearence |  |  |
|  | Languages |  |  |
|  |  |  |  |
| REPAIR\_MAINTANANCE | InvoiceNo |  |  |
|  | Vin |  |  |
|  | CurrentOdometer |  |  |
|  | Date |  |  |
|  | Cost |  |  |
|  | Description |  |  |
|  | Name |  |  |
|  |  |  |  |
| COUNTRIES | CountryCode |  |  |
|  | Country |  |  |
|  | Languages |  |  |
|  |  |  |  |
| OFFICIALS | OfficialId |  |  |
|  | Country |  |  |
|  | Name |  |  |
|  | Role |  |  |
|  | PreferredLanguage |  |  |
|  | Usage |  |  |
|  |  |  |  |
| BOOKINGS | Reference |  |  |
|  | OfficialId |  |  |
|  | Vin |  |  |
|  | LicenseNumber |  |  |
|  | StartDate |  |  |
|  | StartTime |  |  |
|  | EndDate |  |  |
|  | EndTime |  |  |
|  | LocationId |  |  |
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