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

Assignment Part 1:
Designing a Database for Commonwealth Transport Services

ASSIGNMENT TITLE: Designing a Database for Commonwealth Transport Services

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Course Code: 2814ICT		**Workshop/Lab day & time:** Wed 10-11:50am
Tutor's name: Nosheen Munir		**Date submitted:** 17/04/2020

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

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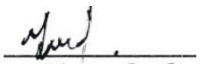
Declaration

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:**
Name: Rachel Moon	Name: Sean Frommelt	Name: Muhammad Jawad
Signature: 	Signature:	Signature: 
Date: 10.04.2020	Date: 15.04.2020	Date: 16.04.2020

Note: All students in the group must sign this first page, scan the signed page, and then place at the beginning of the assignment.

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Acknowledgements:

1) Mohammad Awrangjeb
2) Nosheen Munir

Entity Relationship Diagram

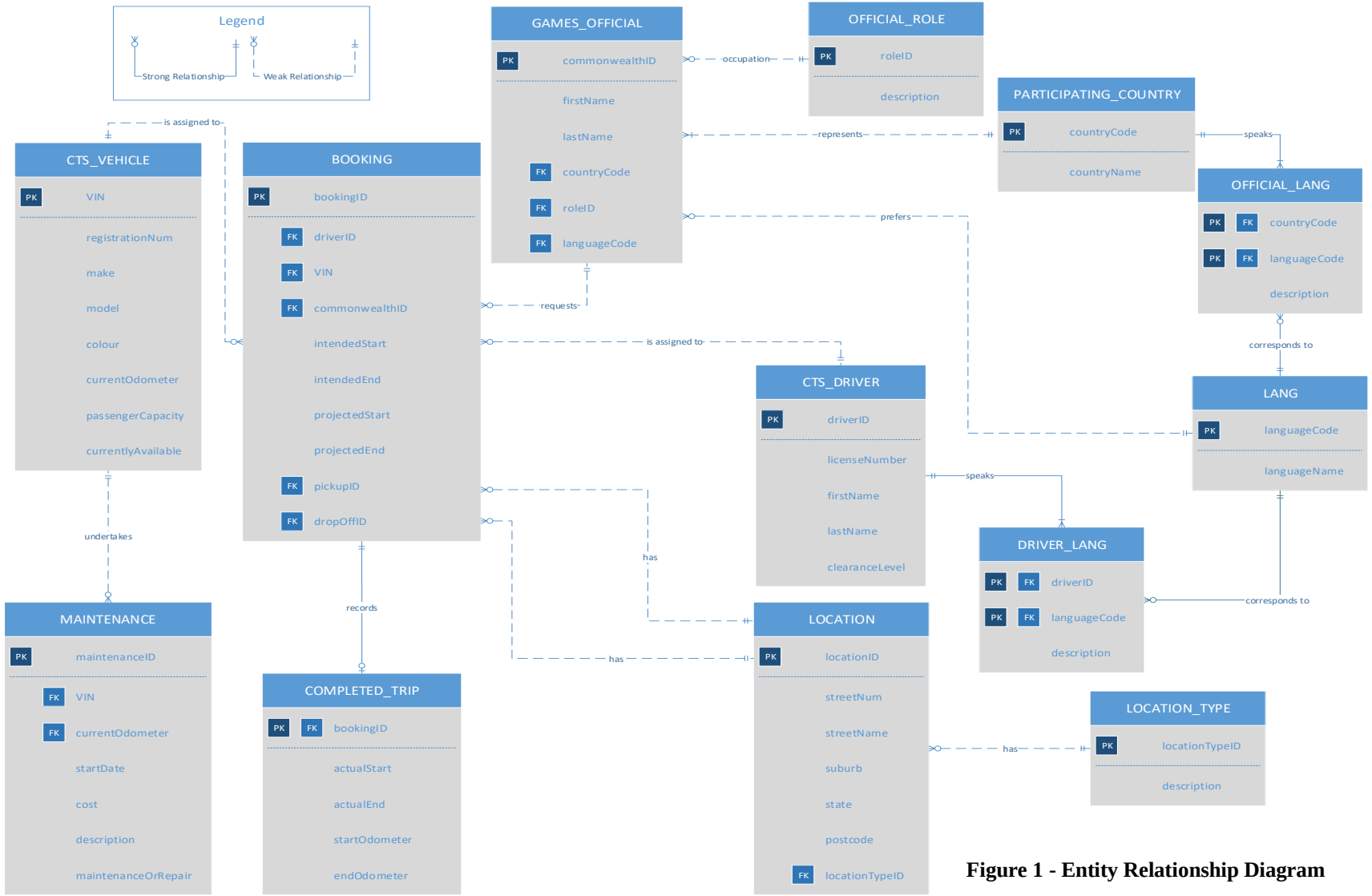

Figure 1 - Entity Relationship Diagram

Assumptions

- The modality on the GAMES_OFFICIAL side of the relationship with PARTICIPATING_COUNTRY is **mandatory**. The assumption made was that for a country to participate in the Commonwealth Games, there needs to be at least one official representing that country.

- The modality on the COMPLETED_TRIP side of the relationship with BOOKING is **optional**. The assumption made was that bookings can be arranged in advance or be in progress, meaning that COMPLETED_TRIP does not exist for that instance of BOOKING yet.

- The modality on the CTS_VEHICLE side of the relationship with MAINTENANCE is **mandatory.** The assumption made was that for an instance of MAINTENANCE to exist, a vehicle must be assigned to that instance of MAINTENANCE.

- The modality of the GAMES_OFFICIAL side of the relationship with OFFICIAL_ROLE is **optional**. The assumption made was that a country may or may not have brought an official with a certain role. E.g. Canada does not have a Physiotherapist, whereas Australia does.

- The cardinality and modality of the OFFICIAL_ROLE side of the relationship with GAMES_OFFICIAL is **one** and **mandatory** respectively. The assumption made is that a GAMES_OFFICIAL must have a role, and can only have one role.

Normalisation

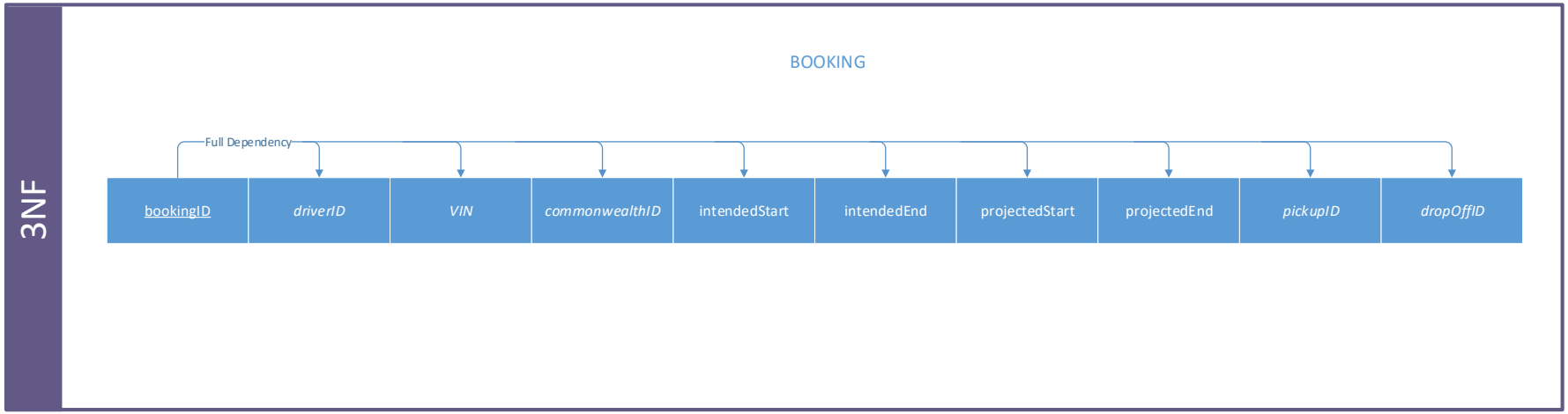

Figure 2 - Dependency Diagram - Booking

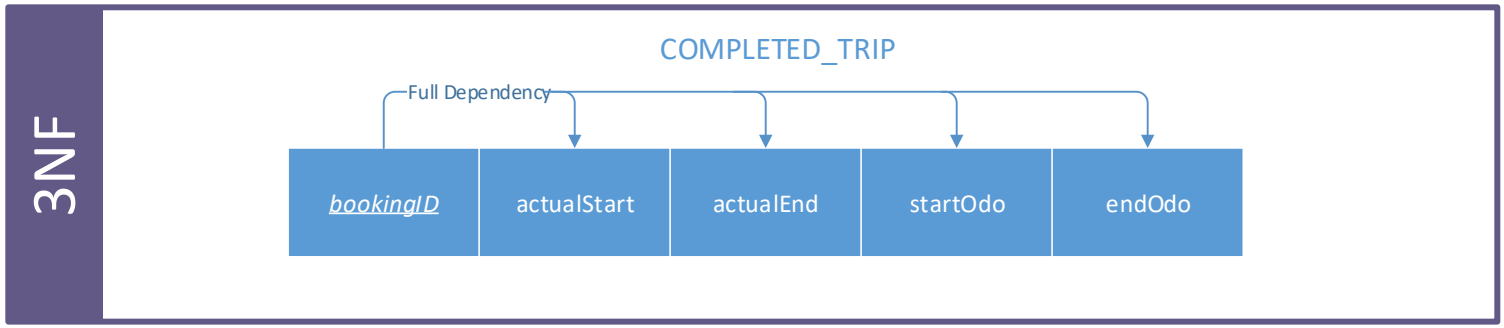

Figure 3 - Dependency Diagram - Completed Trip

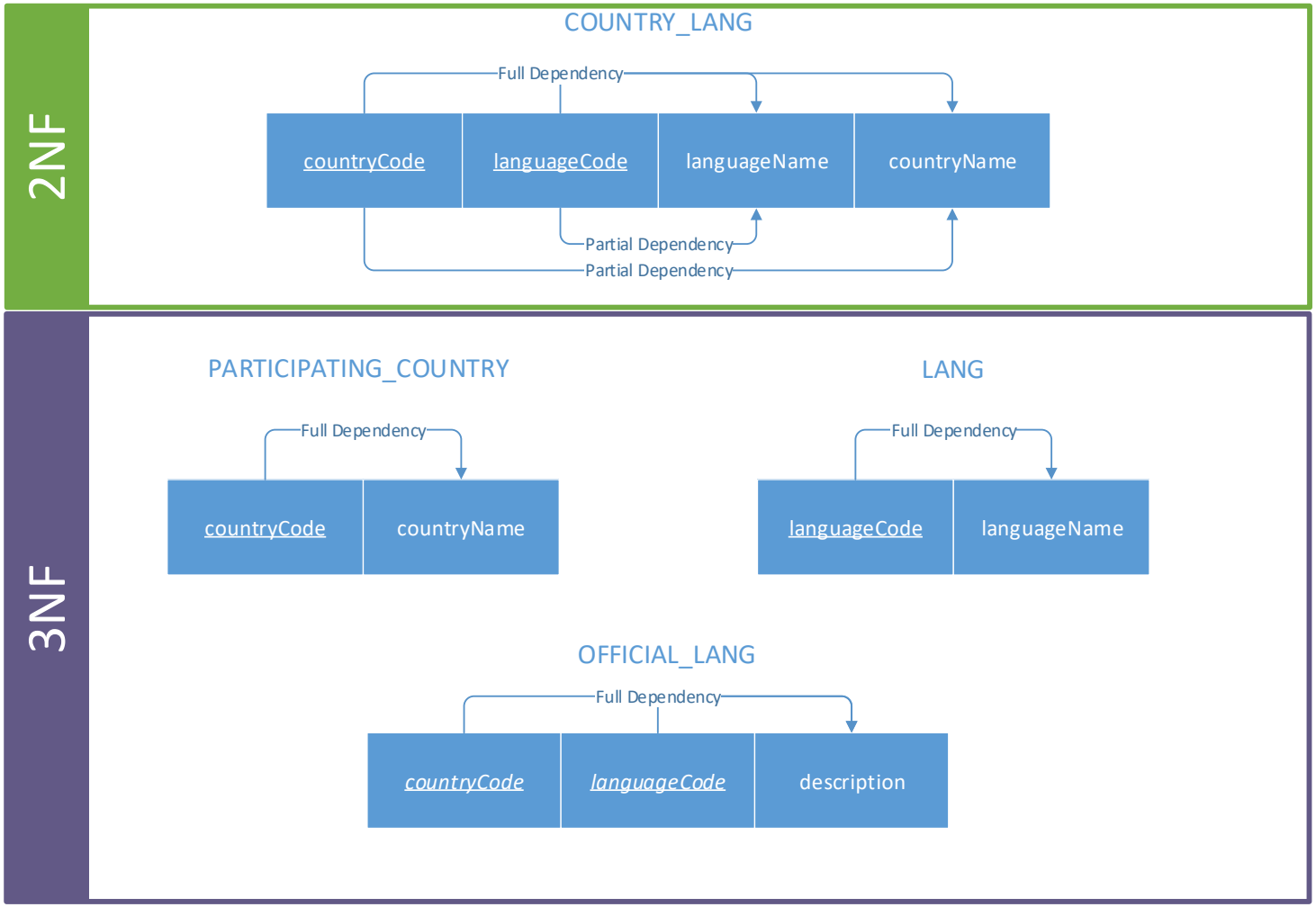

Figure 4 - Dependency Diagram - Country Language

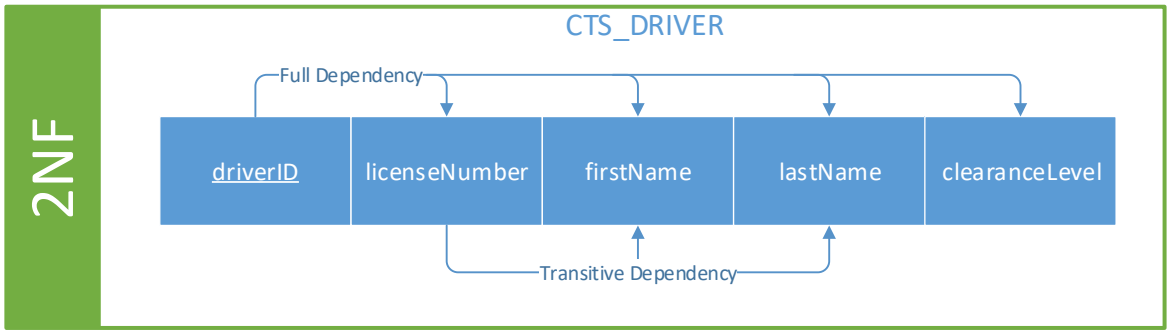

Figure 5 - Dependency Diagram - CTS Driver

As can be seen in Figure 5 the "CTS_DRIVER" table remains in 2nd normal form. There is a transitive dependency that exists between licenseNumber, firstName and lastName. It has been determined that it would be more beneficial to keep this table in 2nd normal form, as decomposing this table would introduce unnecessary complexity and would increase difficulty in referencing information from this entity.

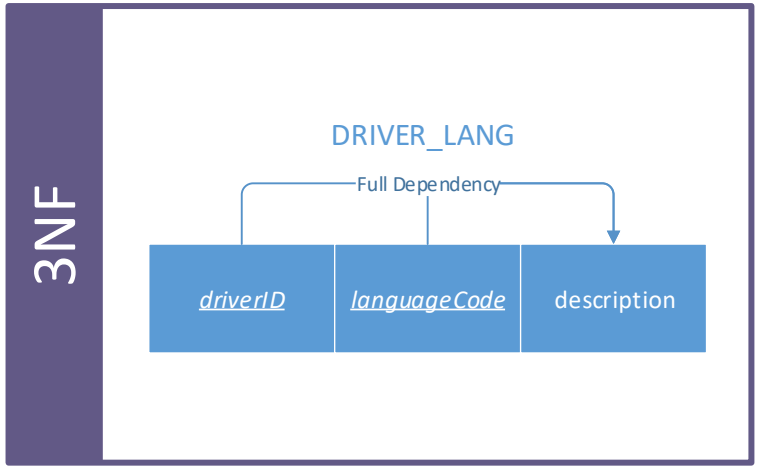

Figure 6 - Dependency Diagram - Driver Language

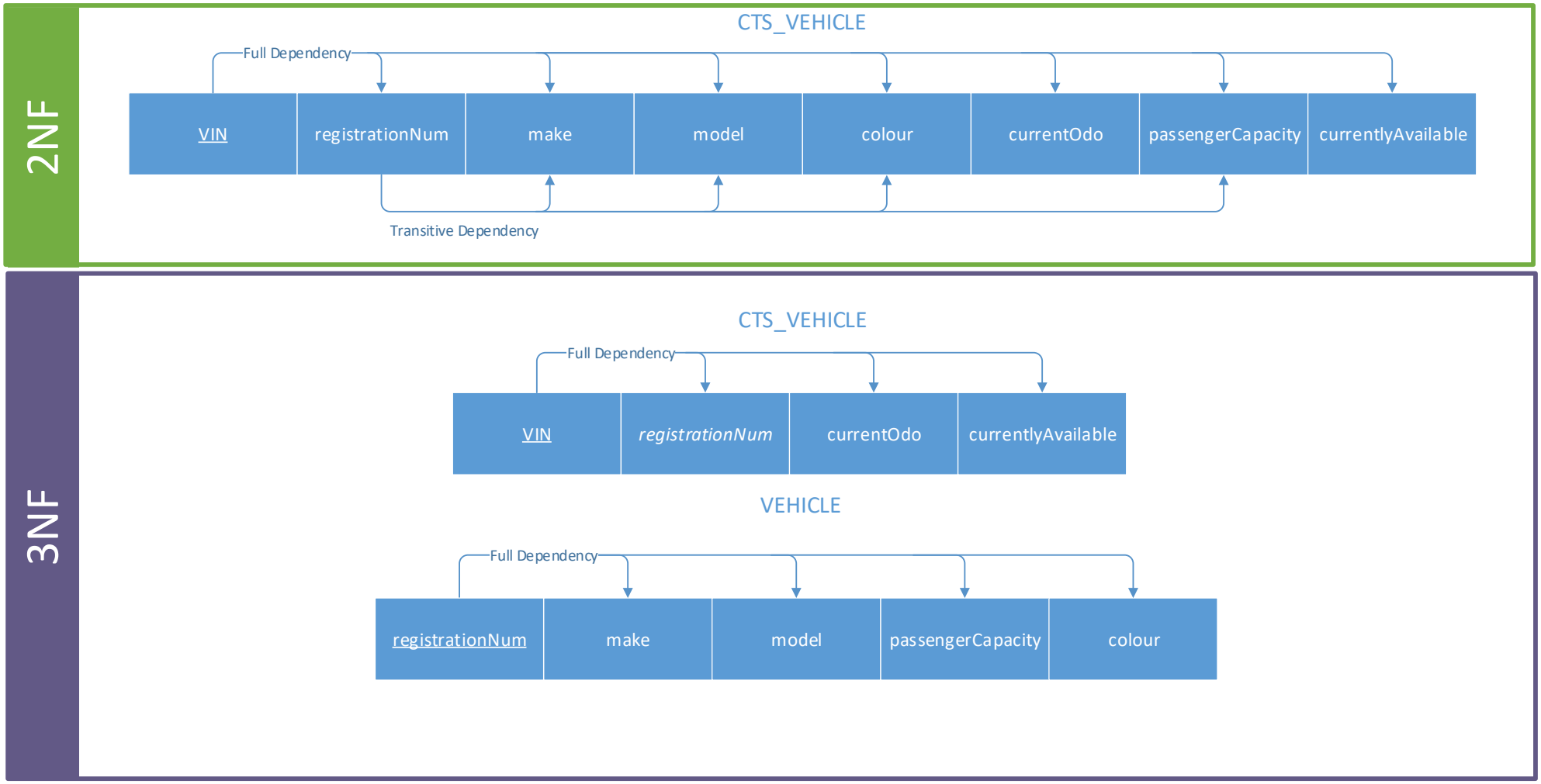

Figure 7 - Dependency Diagram - CTS Vehicle

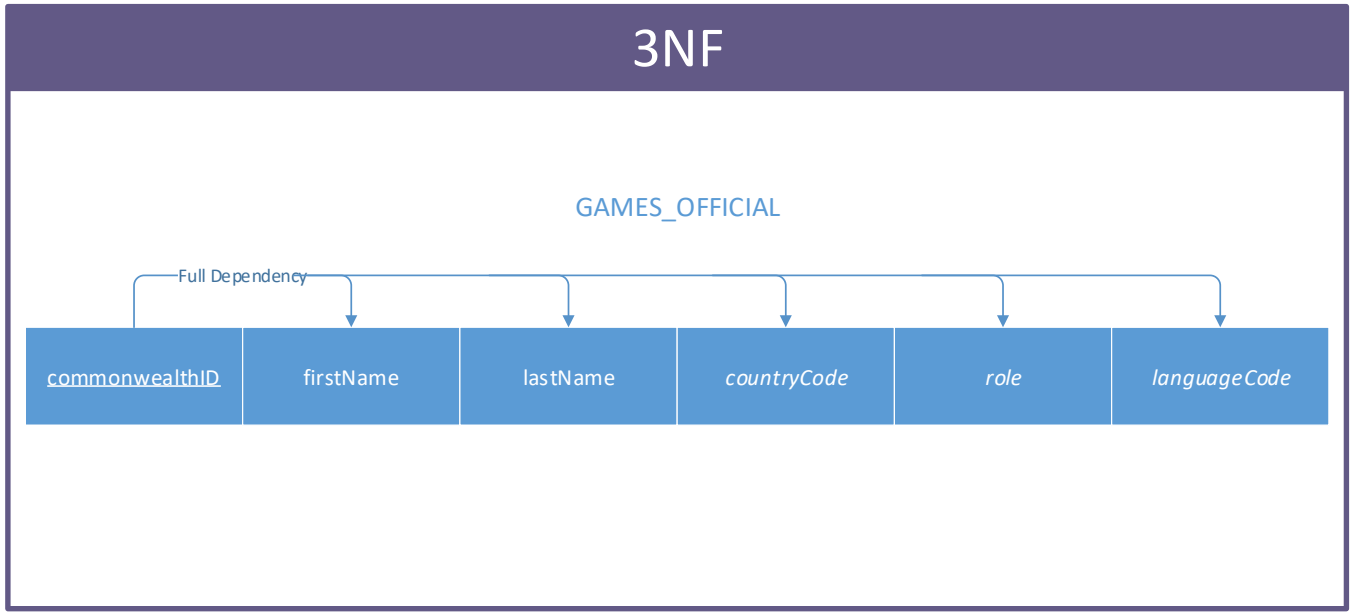

Figure 8 - Dependency Diagram - Games Official

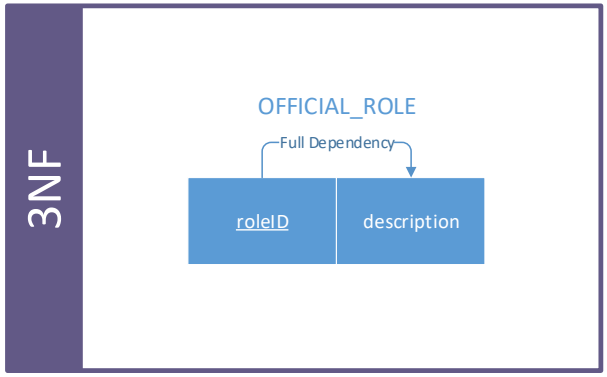

Figure 9 - Dependency Diagram – Official Role

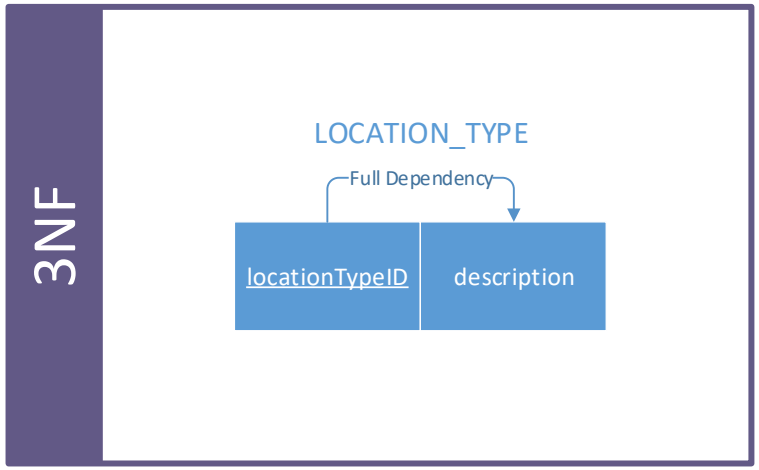

Figure 10 - Dependency Diagram - Location Type

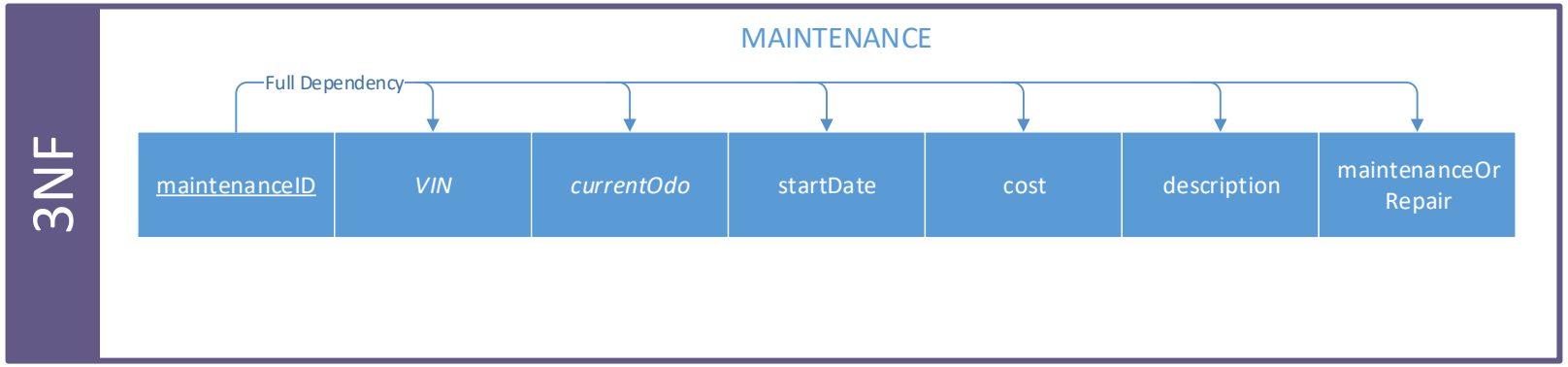

Figure 11 - Dependency Diagram - Maintenance

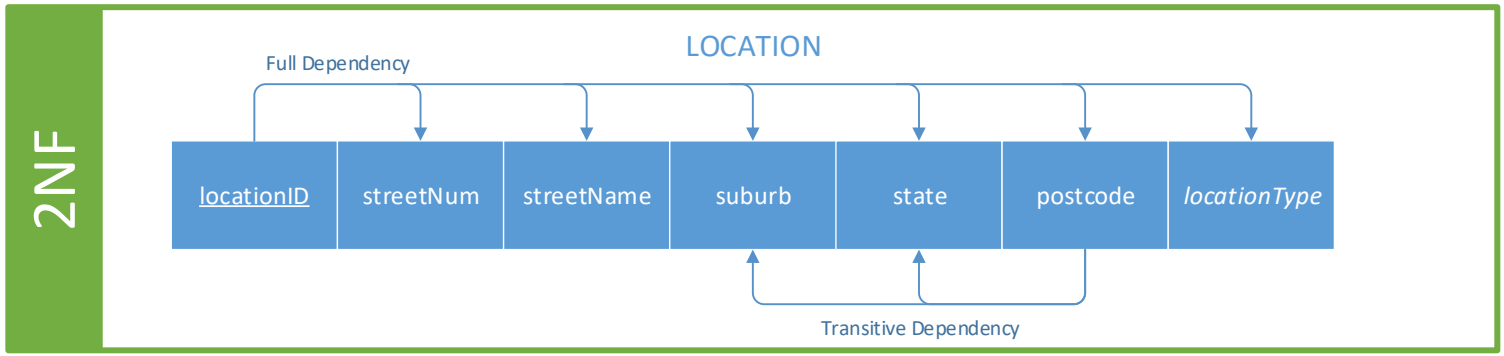

Figure 12 - Dependency Diagram - Location

As can be seen in Figure 12 the 'LOCATION' table remains in 2nd normal form, as to decompose this table any further would be unnecessary. It is important to keep all the attributes of the location in one table for the sake of referencing and it would introduce unnecessary complexity to remove the transitive dependencies.

Relational Database Schema

Table Name	Field	Type	Description
BOOKING	bookingID	CHAR(10)	PRIMARY KEY
	driverID	CHAR(6)	FOREIGN KEY REFERENCES CTS_DRIVER(driverID)
	VIN	CHAR(17)	FOREIGN KEY REFERENCES CTS_VEHICLE(VIN)
	commonwealthID	CHAR(8)	FOREIGN KEY REFERENCE GAMES_OFFICIAL(commonwealthID)
	intendedStart	DATETIME	**Format:** DD-MM-YYYY hh:mm:ss
	intendedEnd	DATETIME	**Format:** DD-MM-YYYY hh:mm:ss
	projectedStart	DATETIME	**Format:** DD-MM-YYYY hh:mm:ss
	projectedEnd	DATETIME	**Format:** DD-MM-YYYY hh:mm:ss
	pickupID	CHAR(10)	FOREIGN KEY REFERENCES LOCATION(locationID)
	dropOffID	CHAR(10)	FOREIGN KEY REFERENCES LOCATION(locationID)
CTS_VEHICLE	VIN	CHAR(17)	PRIMARY KEY
	registrationNum	VARCHAR(8)	NOT NULL
	make	VARCHAR(20)	NOT NULL
	model	VARCHAR(20)	NOT NULL
	colour	VARCHAR(10)	NOT NULL
	currentOdometer	INT(7)	NOT NULL
	passengerCapacity	INT(2)	NOT NULL
	currentlyAvailable	CHAR(1)	CHECK (currentlyAvailable = Y or N) NOT NULL
PARTICIPATING_COUNTRY	countryCode	CHAR(2)	PRIMARY KEY
	countryName	VARCHAR(50)	NOT NULL

MAINTENANCE	maintenanceID	CHAR(10)	PRIMARY KEY
	VIN	CHAR(17)	FOREIGN KEY REFERENCES CTS_VEHICLE(VIN)
	currentOdometer	INT(7)	FOREIGN KEY REFERENCES CTS_VEHICLE(currentOdometer)
	startDate	DATETIME	**Format:** DD-MM-YYYY hh:mm:ss
	cost	FLOAT(9,2)	
	description	VARCHAR(200)	
	maintenanceOrRepair	CHAR(1)	CHECK (maintenanceOrRepair = R or M), NOT NULL
GAMES_OFFICIAL	commonwealthID	CHAR(8)	PRIMARY KEY
	firstName	VARCHAR(20)	NOT NULL
	lastName	VARCHAR(20)	NOT NULL
	countryCode	CHAR(2)	FOREIGN KEY REFERENCES PARTICIPATING_COUNTRY(countryCode)
	roleID	CHAR(4)	FOREIGN KEY REFERENCES OFFICIAL_ROLE(roleID)
	languageCode	CHAR(2)	FOREIGN KEY REFERENCES LANG(languageCode)
OFFICIAL_ROLE	roleID	CHAR(4)	PRIMARY KEY
	description	VARCHAR(150)	NOT NULL
COMPLETED_TRIP	bookingID	CHAR(10)	PRIMARY KEY, FOREIGN KEY REFERENCES BOOKING(bookingID)
	actualStart	DATETIME	**Format:** DD-MM-YYYY hh:mm:ss
	actualEnd	DATETIME	**Format:** DD-MM-YYYY hh:mm:ss
	startOdometer	INT(7)	NOT NULL
	endOdometer	INT(7)	CHECK (endOdometer > startOdometer), NOT NULL

DRIVER_LANG	driverID	CHAR(6)	PRIMARY KEY, FOREIGN KEY REFERENCES CTS_DRIVER(driverID)
	languageCode	CHAR(2)	PRIMARY KEY, FOREIGN KEY REFERENCES LANG(languageCode)
	description	VARCHAR(100)	NOT NULL
OFFICIAL_LANG	countryCode	CHAR(2)	PRIMARY KEY, FOREIGN KEY REFERENCES PARITICIPATING_COUNTRY(countryCode)
	languageCode	CHAR(2)	PRIMARY KEY, FOREIGN KEY REFERENCES LANG(languageCode)
	description	VARCHAR(100)	NOT NULL
LANG	languageCode	CHAR(2)	PRIMARY KEY
	languageName	VARCHAR(50)	NOT NULL
LOCATION	locationID	CHAR(10)	PRIMARY KEY
	streetNum	INT(10)	NOT NULL
	streetName	VARCHAR(50)	NOT NULL
	suburb	VARCHAR(30)	NOT NULL
	state	VARCHAR(3)	CHECK (state = QLD, NSW, SA, WA, TAS, NT, ACT), NOT NULL
	postcode	CHAR(4)	NOT NULL
	locationTypeID	CHAR(4)	FOREIGN KEY REFERENCE LOCATION_TYPE(locationTypeID)
LOCATION_TYPE	locationTypeID	CHAR(4)	PRIMARY KEY
	description	VARCHAR(100)	NOT NULL
CTS_DRIVER	driverID	CHAR(6)	PRIMARY KEY
	licenseNumber	CHAR(18)	NOT NULL
	firstName	VARCHAR(20)	NOT NULL
	lastName	VARCHAR(20)	NOT NULL
	clearanceLevel	INT(1)	CHECK (currentlyAvailable = 1 - 4), NOT NULL

Table 1 - Relational Database Schema