THE UNIVERSITY OF SYDNEY

School of Computer Science

COMP9120 Database Management Systems

Assignment 1: Conceptual Modelling & Logical DB Design

Group assignment (12%)

Introduction

The purpose of this assignment is to provide you with experience in conceptual and relational database modelling. You are given a domain description for the Brisbane 2024 Olympics System (BOS). There are 2 high level tasks in this assignment:

- Create an Entity Relationship Diagram (ERD) that captures the business concepts and requirements conveyed in this description,
- Translate your ER diagram into a logical database design including relational database schema creation, key constraints and integrity constraints.

This is a group assignment for teams of 3 people per group. You must be enrolled in an assignment group on Canvas. You must inform the unit coordinator if you have not formed a group by Week 6.

Please also keep an eye on your email and Ed for any announcements that may be made.

Submission Details

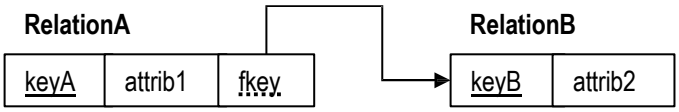
The submission of your solution is due at 11:59pm on Friday 8/10/2021 (end of Week 8). You must submit the items for submission (detailed below) via Canvas.

Items for submission

Please submit your solution to Assignment 1, in the 'Assignment' section of the unit's Canvas site by the deadline, including the following four files:

1. Firstly, you should submit an assignment coversheet as a PDF document (.pdf file suffix) which is available for download from this link on Canvas.
2. Secondly, you are required to submit your conceptual model in the form of an E-R diagram using the lecture notation, formatted as a PDF document (.pdf file suffix). **Please justify your choices for entity types, relationship types, attributes, primary keys, constraints and design specialities**.
3. Thirdly, you should submit an SQL file (.sql file suffix) containing all DDL statements necessary to fully instantiate a working database based upon your ER diagram, and DML statements to populate each relation. Your file should run without errors in PostgreSQL 9.5. You can annotate your statements using '--' at the start of lines for comment. You should group your statements for ease of reading (e.g. by keeping all table constraints within the relevant CREATE TABLE statement rather than declaring them externally, if possible).

4. Lastly, you should submit another pdf document (.pdf file suffix) including the **relational model (RM) diagram** that provides a visual model of your database schema. The figure below summarises the syntax to use for the RM diagram.



Task 1: Domain Description for Entity Relationship Diagram (ERD) Modelling

Due to some bureaucratic errors it turns out that Paris is not meant to host the 2024 Olympics, and based upon Australia's previous success with Sydney 2000 Olympics, the executive committee have decided to bring forward Brisbane 2032 instead. As a database consultant, you have been engaged at the last moment with designing the Brisbane Olympics System (BOS) to support the Olympics 2024 games in Brisbane, Queensland.

The BOS database system should host a number of indispensable details. A key part of implementing this successfully is making it easy for users to find athletes and sporting events. The system must allow users to easily search for athletes by name, and browse sporting events that have been scheduled at various dates and times at different venues. You need to track information about all the sporting events that are to be held, including who the participants are (including their home country and birth country), what the events are, and what the results are. The types of information to be recorded for an event encompass the name, which sport the event is for, the result type (whether it is time-based or score-based), however the system needs to cater for Brisbane 2024 Olympics only excluding all other past nor future Olympics games.

As well as the athletes, you need to keep a record of the sporting officials who run the events (referee games, judge performance, awarding medals), so that we know who is doing what at each event. Similar to athletes, we need to know the names, date of birth, age, gender, email address and home country of each official, but officials do not participate in the sporting events.

Each sporting event takes place at specific times at a venue, located in or near to Brisbane, and across Queensland. As many as fourteen new sports venues in Brisbane, seven on the Gold Coast and five on the Sunshine Coast will receive government funding as part of major development for this international event. This includes the $1-billion redevelopment of the existing cricket stadium in Woolloongabba, Brisbane, to serve as the main stadium featuring the athletics games, and more prominently the Olympics opening and closing ceremonies.

Additionally, athletes and officials stay at accommodation villages that are spread across the state. Each contingent from each country will be allocated an accommodation village for the entire duration of this event. For both venues and accommodation villages we need to capture the location details, its GPS position (longitude and latitude), build date, build cost, along with a short, memorisable unique name (such as 'Suncorp Stadium'). Every location should have a specific address in a suburb, several of which may be in the same area, for example, 'Kangaroo Point', 'Fortitude Valley' and 'Woolloongabba' would be in the 'Inner Brisbane' area.

Considering the large numbers of people running and participating in different events, it is necessary to organise frequent transfers between different venues and accommodation villages. A fleet of vehicles will be commissioned for such purpose. Each vehicle will have its own unique alphanumeric code, type (either a van, minibus, or bus) and be built with a fixed capacity. These vehicles will be scheduled to run transfer journeys from one venue to another, at specific arrival and destination times. Athletes and officials will be able to book themselves or be booked onto these journeys, and we need to be able to track these bookings.

Task 2: Relational Database Design & Modelling

Your second task is to design and create a relational database schema based on the Entity Relationship Diagram (ERD) modelled from the first task. In particular, your solution should include:

- Tables and attributes with appropriate data types to capture all information in the model (please use the

same names as in your ER diagram for naming tables and attributes);

- Appropriate PRIMARY KEY, UNIQUE, FOREIGN KEY constraints for all tables;
- Correct foreign key specifications including ON DELETE clauses where suitable;
- Appropriate additional integrity constraints expressed by means of NOT NULL or CHECK clauses;
- INSERT statements to populate each relation with at least one record, to demonstrate a database instance consistent with the ER model.

Additional details

In addition to the model captured through your ER diagram, the following details apply:

1. All attributes capturing name should always have values.
2. Fields in a tuple that are used to capture dates and times should always have values.
3. Athletes and sporting officials must have a specified email address.
4. Capacity of a vehicle used for transfer journeys between different venues should always have values greater than zero, but not exceed 23 passengers.
5. All attributes in a tuple relating to details about a venue and accommodation village should always have values, and build cost should always be larger than nil.

Escaping PostgreSQL keywords in DDL

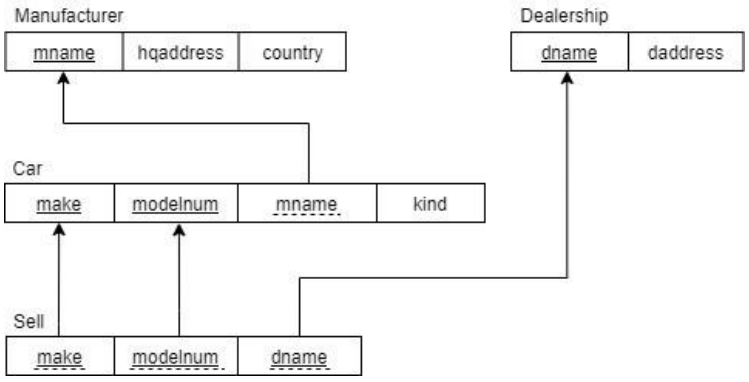
If you need to escape PostgreSQL keywords like "Table", you will need to use double quotes.

e.g. CREATE TABLE "Table" (…);

Q&A

Q: How to draw the link from foreign key in a table to its referenced candidate key in another table if the foreign key contains more than one attributes?

A: You should draw it in a similar way to the following RM diagram (specifically, see the Sell table).



Marking

This assignment is worth 12% of your final grade for the unit of study. Your group's submission will be marked according to the attached rubric (see last section of this assignment description).

Group member participation

If members of your group do not contribute sufficiently, you should alert the unit coordinator as soon as possible. The course instructor has the discretion to scale the group's mark for each member as follows:

Level of contribution	Proportion of final grade received
No participation.	0%
Full understanding of the submitted work.	50%
Minor contributor to the group's submission.	75%
Major contributor to the group's submission.	100%

Marking Rubric

Your submissions will be marked according to the following rubric, with a maximum possible score of 12 points.

	Novice (0 – 0.5 pt)	Competent (1 – 1.5 pts)	Proficient (2 pts)
ERD Notation & Core Model	Big mistakes in the usage of ER notation. Less than competent model of the given scenario.	Good usage of E-R notation with a few mistakes. Some entities, relationships, or attributes were not correctly captured by the model.	Proficient usage of the E-R notation. The core model was very well designed, and all the main entities, relationships and attributes were correctly captured by the model.
ERD Constraints	Many constraints were incorrectly captured in the model. No constraints captured at all.	Some constraints (key / total participation constraints on relationship types, etc.) were correctly included in the model, but with minor mistakes	All appropriate constraints were modelled correctly
ERD Design Specialities	Majority of design specialities used were inappropriate or incomplete. No design specialities were used.	At least one useful ISA, weak entity or aggregation used appropriately. Minor or no mistakes on design specialities used.	All design specialities were used appropriately
Relational Mappings	Less than competent schema of the given scenario	All main entities and relationships were mapped correctly to relations, with reasonable choice of data types for most attributes	The core model was very well mapped to a relational schema and good choice of data types for all attributes
Key Constraints & Semantic Constraints	Major issues with key constraints, or no key constraints captured at all. Major issues with integrity constraints, or no integrity constraints given.	Primary keys and foreign keys were defined appropriately, but with minor mistakes. Integrity constraints such as CHECK or NOT NULL were defined correctly, but with minor mistakes.	All the necessary primary keys and foreign keys were defined correctly, including appropriate ON DELETE clauses. All the necessary integrity constraints for the model were defined correctly.
Example Data & RM Diagram	No example data given or yielded multiple errors. No RM diagram submitted, or major issues with the RM diagram.	Some table example data missing or generated an error. RM diagram does not exactly match the relational schema created by the submitted SQL file.	Database fully populated with a consistent and correct set of data. RM diagram exactly matches the relational schema created by the submitted SQL file (Note: semantic constraints and example data are not required in the RM diagram).