CS27020 Assignment: Ski Lifts and Pistes

This assignment counts for 30% of the marks for CS27020

Released: Tues 4/2/14
Deadline: **4pm Fri 28/02/14**

Introduction

A ski resort provides information to tourists about pistes and ski lifts. Your task is to design and implement a back-end relational database to support this.

Assignment

Your task is as follows.

1. Study the sample data below. Create un-normalized structures that list the attributes to be stored in your database. Identify primary keys to your un-normalized structures. Specify functional dependencies between attributes.

   [10 marks]
2. Bring your un-normalized structures to 3rd normal form following the steps shown in lectures (see Bottom up Analysis - Llandwp College Example.) Each normalization step should be documented.

   [10 marks]
3. Implement your 3rd normal form relations as a PostgreSQL Database and implement some SQL queries to show your database in action. You can use your PostgreSQL login to do this. If you are accessing PostgreSQL from off-campus, you may need to set up a vpn (see http://www.aber.ac.uk/en/is/computers/vpn/) It is also ok to use PostgreSQL on your own computer – but don't spend lots of time installing and configuring PostgreSQL. Write SQL queries that will return
   - the pistes served by a given lift;
   - the lift(s) that provide access to a given piste;
   - the lifts that are currently operating;
   - the pistes that are currently open, together with the lifts that are currently operating and that provide access to those pistes.

   [10 marks]

To maximise your opportunity to succeed with this assignment, take a few minutes to look at the guidance at the end of this document. If you are at all unsure about bottom-up analysis, look back at the Llandwp College example from the semester 1 lectures. You may also find it helpful to revisit worksheets 2 and 3 from semester 1.

Submission

Completed work, consisting of a single pdf document containing:

1. Your un-normalized structures, with primary keys and functional dependencies
2. Documentation showing how the un-normalized structures were brought to third normal form using the functional dependencies
3. A typescript or collection of screenshots demonstrating a PostgreSQL implementation of your database with queries to illustrate its operation

must be uploaded to Blackboard by **4pm** on **Friday Feb. 28th 2014**.

Feedback will be returned on Friday March 28th 2014.

In case of any personal, financial or health problems affecting this coursework, please provide a special circumstances form to your year coordinator (for second year students in the Department of Computer Science, this is Nigel Hardy, nwh@aber.ac.uk).

Late submissions should be uploaded to the late submissions area in Blackboard; this will open shortly after 4pm on Feb. 28th 2014.

If you have specific questions relating to the assignment itself, please contact Edel Sherratt, eds@aber.ac.uk

Pistes and Lifts – sample data

Piste	Grade	Length (Km)	Fall (m)	Lifts	Open?
Zwischenholzabfahrt	medium	3	440	Schoenjochbahn I ESL-Fiss-Moeseralm	Yes
Moeseralmabfahrt	medium	2.5	400	ESL-Fiss-Moeseralm Rastlift	No
Schoenjochabfahrt	medium	4	510	Schoenjochbahn II Plazoerlift Schoenjochlift	Yes
Sattelkopf-Suedabfahrt	medium	4	350	Waldlift Sattelkopflift	Yes
Sattelkopf-Nordabfahrt	difficult	1.5	220	Sattelkopflift	Yes
Moeserabfahrt	easy	0.5	80	Moeserlift	Yes
Wonneabfahrt	medium	1.5	280	Schoenjochbahn I Wonnelift	No
Rastabfahrt	medium	1	150	Rastlift	No
Waldabfahrt	hard	3	420	Waldlift	Yes
Ladisabfahrt	easy	3.5	290	ESL-Ladis-Fiss	Yes
Verbindungsabfahrt	easy	2	70	Schoenjochbahn I Wonnelift	Yes
Plazoerabfahrt	medium	3	360	Schoenjochbahn II Plazoerlift	No
Schoengampabfahrt	medium	3.5	420	Schoengamplift	Yes
Schoenjochpiste	easy	1	70	Schoenjochbahn II Plazoerlift	Yes
Almabfahrt	medium	4	370	Schoenjochbahn II Plazoerlift Almlift	No

Lift	Type	Summit (m)	Rise (m)	Length (m)	Operating
Schoenjochbahn I	gondola	1920	440	1600	Yes
ESL-Fiss-Moeseralm	chair	1850	400	1700	No
ESL-Ladis-Fiss	chair	1510	290	2700	No
Waldlift	tow	1850	420	1200	Yes
Rastlift	tow	1900	150	400	Yes
Schoenjochbahn II	gondola	2436	516	1350	Yes
Sattelkopflift	tow	2100	220	1000	No
Moeserlift	tow	1930	80	400	Yes
Wonnelift	tow	2080	280	1000	Yes
Plazoerlift	tow	2450	360	1350	Yes
Schoenjochlift	tow	2509	70	420	No
Schoengamplift	tow	2509	420	1340	Yes
Almlift	tow	2250	370	1180	No

Guidance for tackling the assignment

Un-normalized structures and functional dependencies

An adequate solution to this part of the assignment will present unnormalized structures, and will indicate the primary key, any alternative candidate keys, repeating groups of attributes and important functional dependencies.

A very good or excellent solution will include an English sentence describing each functional dependency, and will justify the choice of primary key.

Bottom up analysis, resulting in 3rd normal form relations

An adequate solution will carry out each step correctly based on the attributes and functional dependencies identified in the first part of the assignment.

A very good or excellent solution will provide a coherent and accurate explanation of each step in terms of the functional dependencies.

Implementation as a PostgreSQL database

An adequate solution will implement the normalized relations as tables, and will include some queries.

A very good or excellent solution will include the 'create table' statements with appropriate primary and foreign key constraints to implement your 3rd normal form relations from part two of the assignment. It will also give reasons for the choice of data types for the fields in the tables and will justify the choice of queries to demonstrate the database in action.