**SWEN432: Advanced Database Design and Implementation 2017**

**Assignment 1**

**1. [10 marks] List the database write and update requests the application requires using plain English.**

**Drivers table:**

To insert account for each railway vehicle driver;

To update the driver’s password only if the correct current password is provided;

To update the driver’s current\_position by the name of a station when the driver comes to work at a station, or by the vehicle\_id of the vehicle when the driver and the vehicle are assigned to the same service, or by ‘not\_available’ when the driver deregisters from work;

To update the driver’s skill when the driver qualifies to drive a new vehicle;

**Vehicles table:**

To insert the information of each vehicle;

To update the vehicle’s status when the vehicle is available (value is the current location shown as the name of station) or unavailable (value is ‘in\_use’, ‘maintenance’ or ‘out\_of\_order’).

**Counter table:**

To update the daily and total distance travelled for each vehicle when one service reaches the destination station;

**Time tables (every line is a table):**

To insert or update the information about lines, services, and stations.

**Data Points table:**

To insert the information about the time, speed, and the position of an operational vehicle every 10 seconds when the vehicle’s engine has been started;

**2. [12 marks] List the read requests the application requires using plain English.**

**Drivers table:**

To read the current password in the database to verify the password the driver provides;

To read the current\_position to calculate the number of days per month a driver registered at work for payroll calculation at the end of a month;

To read the current\_position and skill of drivers to find one available driver before allocation of Vehicles and Drivers to Services;

**Counter table:**

To read the daily and total distance travelled for each vehicle for planning the maintenance;

**Vehicles table:**

To read the status of vehicles to find one available vehicle before allocation of Vehicles and Drivers to Services;

**Time tables (every line is a table):**

To read the information of all time tables to publish the time table for passengers;

To read the data of departure stations with all services departing from a station for allocation of Vehicles and Drivers to Services;

**Data Points table:**

To read the information of data points to confirm departure time of a service to be displayed on station screens for passengers’ convenience;

To read the information of data points to find the closest (regarding latitudes) stations in the north and direction.

**3. [9 marks] Consider Cassandra data model design guidelines we discussed in lectures and list names of database tables the application requires using plain English. Recall, Cassandra tables strongly depend on requested queries. If there is no queries needing a table, the table should not exist. (Don’t invent queries to justify the existence of any tables.) After each table name, list those queries you identified in your answer to question 2 that use the table.**

**Drivers table:**

To query the current password in the database to verify the password the driver provides;

To query the number of days per month a driver registered at work for payroll calculation at the end of a month;

To query one available driver before allocation of Vehicles and Drivers to Services;

**Counter table:**

To query the daily and total distance travelled for each vehicle for planning the maintenance;

**Vehicles table:**

To query one available vehicle before allocation of Vehicles and Drivers to Services;

**Time tables (every line is a table):**

To query the information of all time tables to publish the time table for passengers;

To query the data of departure stations with all services departing from a station for allocation of Vehicles and Drivers to Services;

**Data Points table:**

To query departure time of a service to be displayed on station screens for passengers’ convenience;

To query the closest (regarding latitudes) stations in the north and direction.

**4. [20 marks] Create data model using CQL 3 statements that support the requirements. To answer questions, use Cassandra CCM. In your answers, copy your CCM and CQL commands.**

**a. [5 marks] Create a cluster and a keyspace that will satisfy infrastructure and availability requirements above.**

**b. [15 marks] Define tables listed in your answer to question 3 above. For the table definitions include any non default property settings. Optimize your database solution just for iPhone application queries you identified in question 2 above.**

**5. [20 marks] Provide CQL3 statements to support each of the application write and update requests you specified in Question 1 above. Show the consistency level before each write and update statement.**

**6. [29 marks] Provide CQL3 statements to support each of the application read requests you specified in Question 2 above. Show the consistency level before each read statement. In your answer copy your CQL statement and the result produced by Cassandra from the screen.**