

INFO90002 Exam Revision No 4

Q1. ER Modelling

Tea Time

Tea Time is a platform for tea lovers. To use the system, users must install the Tea Time app on their phone and set up a user profile that contains: a login name (their email address), password (encrypted and stored as a string of 64 characters), short screen name e.g. "DonkeyKong64" (which other users will see), profile photo, and a "My Cuppa" entry - their favourite tea type, chosen from a list of standard drink names such as "Peppermint Tea" and "Black Tea with Honey". We plan to have up to 2 million customers (end users) accessing the system.

While a user's phone is switched on, the Tea Time app sends the phone's current location to the server once per minute. We store these, so that the system knows where a given user is "now", as well as the history of where the user has been.

All locations in this system are recorded as a pair of numbers representing latitude and longitude. Latitudes are between -90 and 90 degrees (south pole to north pole) while longitudes are between -180 and 180 degrees (west or east of the prime meridian in Greenwich). We will use a precision of 4 decimal places, which is about 11 metres at the equator. For example, the Doug McDonell building at UniMelb is at latitude -37.7989, longitude 144.9627.

The names, locations and opening hours of about 1200 tea stores are available via the app. Users can browse stores either in an alphabetical list or via a map. When viewing a store's profile, users can see reviews and photos uploaded by other users, and the store's average rating. The store's opening hours are recorded as an opening and closing time for each day of the week (for example, a café might open Mondays 8am to 6pm, Tuesdays 9:30am to 7pm, and so on). Each café stores a menu of the teas it sells: these must be drawn from our standard list mentioned above.

Users can rate stores. A rating consists of a whole number between 0 and 10, along with an optional piece of text (up to about 30 words). A given user can only rate a given tea store once. Users can mark particular stores as favourites. These can be viewed in a list. Users can later "unfavourite" the tea store if they wish, and yet later "favourite" it again. We keep a history of these favourites and unfavourites. Customers can use the app to order drinks from a tea store. To do this a user first selects a tea store, then chooses how many of each tea type(s) they want from the store's menu. We keep track of when orders are placed and when customers later pick up the order.

Your task:

For the Tea Time scenario, draw a ***physical*** data model.

Q2 – SQL

Student

id	givenName	familyName
10001	Alice	Smith
10002	Bob	Singh
10003	Charlie	Nguyen
10004	Dan	Williams
10005	Eve	Brown
10006	Frank	Jones
10007	Grace	Wilson
10008	Heidi	Taylor
10009	Ian	Lee
10010	Judy	Tran

Calendar

day	hour	description
Mon	9	
Mon	10	
Mon	11	
Mon	12	
Mon	13	lunch
Mon	14	
Mon	15	
Mon	16	
Tue	9	
Tue	10	

Availability

Student	day	hour
10001	Wed	10
10002	Wed	10
10003	Wed	10
10002	Wed	11
10003	Wed	11
10003	Wed	13

Your task:

Questions 2A-E require you to write one single SQL statement per question. Do not use views or temporary tables. Format code for ease of reading. Ensure user-friendly output by ordering and renaming columns where appropriate.

2.1 Change student 10001's name to "Alison Smythe".

2.2 For each letter A to Z, list that letter along with a count of how many family names begin with the letter.

It is ok to omit letters with which no name begins.

2.3 Is student 10001 free on Wednesdays at 10am? Answer 'yes' or 'no'.

2.4 List each student's name, along with a count of how many timeslots they have marked as being free.

Be sure to include students who have not marked any free times.

2.5 List any students who are free at ALL times.

Q3 - Database Administration

3.1 Using an SQL DML Update statement explain the purpose and operation of the database buffer cache

Q4 - NoSQL

4. Explain the difference between a key-value database and a document database

Q5 - Transactions

5. What is a transaction deadlock? Use an example, with a diagram to explain your answer?

Q6. Distributed Databases

6. Describe how synchronous updates work and one advantage and disadvantage of this approach.

Q7. Applications

7. There are problems with giving end users an SQL interface to access a database. Describe two distinct problems, and for each, how providing application software to users solves the problem.