MONASH University
Information Technology

94 Databases

3 Semester 2

Assignment 1 - Database Design - Monash Cabins (MC)

Monash Cabins is a chain of resorts (holiday destinations) located around Australia. At each of these resorts, MC provides cabin-based accommodation for its guests – any given resort consists of several independent cabins. A resort is located in a particular town. MC maintain details of points of interest (POI) in the local area that guests might wish to visit. Each POI is associated with only one town.

For each town in which a resort or point of interest is located MC records the town name, the state the town is located in, the latitude and longitude of the centre of the town, the average summer and winter day temperatures, the town's elevation above sea level and its population. MC only records details of towns which have a resort or point of interest. MC does not record a town's postcode since they are only interested in it as a location but not as a postal location.

For points of interest MC records the street and town in which it is located, the name of the point of interest (eg. Merimbula Aquarium), a brief description of the point of interest, its opening hours (if appropriate), and the type of point of interest (cafe, museum, restaurant, national park etc). The opening hours are recorded as the time at which the POI opens and the time at which it closes, only one set of these times are recorded (ie the POI is assumed to open and close at the same time all year). Each POI is only classified as one type of point of interest, for example, a cafe in a national park will be classified as a cafe. A scan of the potential MC data has indicated that some towns contain two POIs of the same name.

Each resort is assigned a unique resort id. MC has several resorts in some towns and only a single resort in others depending on the location's popularity. Each resort has a name (eg. Merimbula Beach Cabins). A resort's street address and town name are recorded. MC also records for each resort the star rating of the resort, which is determined from the average of all guest reviews, whether guests may bring their pet dog/s while staying at the resort and if the resort manager lives at the resort. Each resort has a single manager. MC assigns a manager id to each manager and records the manager's name, postal address (including town and postcode) and the manager's contact phone number. Some managers live on site (ie. at the resort); others live at their own private residence, however, MC does not need to record the manager's residential address, only their postal address. Where a location has several resorts, a manager may manage several different resorts.

Each resort consists of a number of cabins – the cabins are numbered starting from cabin 1 at each resort. MC records how many bedrooms there are in each cabin, the sleeping capacity of the cabin (how many people it can sleep) and a description of the cabin to provide potential guests with some details to assist their decision making.

MC guests, those staying in the cabins, are assigned a unique guest number when they first register with MC. The guest's name, address, country, email and contact phone number are recorded. A guest makes a booking with MC by choosing the resort they wish to stay at and the cabin they wish to stay in. They are required to provide the date they wish to book from and the date they wish to stay to. They also supply MC with the number of adults, the number of children and the number of infants (people under the age of 2 years old) who will be staying. MC record the total charge for the particular booking, which is based on the rate and the number of days of the guests stay.

Guests are offered the opportunity to provide a review of the resort - they are not required to do so, but if they do, they provide a comment and a rating from 1 (poor) to 5 (outstanding). These reviews are treated as general reviews of the resort rather than being related to a particular cabin or stay. A guest may complete many reviews of a particular resort during their stay. The review may also be made after the guest has left the resort. The date of the review is recorded (a guest is not permitted to complete two reviews on the same day).

The rates charged for a cabin depend on the cabin itself (some cabins have special features such as a spa) and the time of the year in which the guest is staying. For example, for seaside resorts, the highest rates are charged in the peak summer period (eg Jan & Feb) when demand is at its highest. The rate for each cabin is recorded for each of these charge periods – rate periods may vary between different locations. Where a booking spans several rate periods, the booking is charged at the rate which applies on the first day of the booking.

When a guest vacates a cabin, MC use contract cleaners to clean the cabin. MC maintain a running sheet, for each resort, to record cleaning activity (a small sample of this is shown below):

Monash Cabins Cabin Cleaning Running Sheet

Resort ID: 56
Resort Name: Merrimbula Beach Cabins
Resort Address: 56 The Spike Rd, Merrimbula, 2548

Cabin No	Standard Cabin Cleaning Time (mins)	Date Cleaned	Contract Cleaner Details				Actual Cabin Cleaning Time (mins)	Cleaning Charge
			Contractor No	First	Last	Contract Rate		
12	60	01/07/2018	23	William	Xui	$20.50	60	$20.50
13	80	01/07/2018	23	William	Xui	$20.50	90	$30.75
15	60	01/07/2018	23	William	Xui	$20.50	30	$10.25
12	60	08/07/2018	45	Mary	Green	$22.00	60	$22.00
13	80	08/07/2018	45	Mary	Green	$22.00	85	$31.17
12	60	15/07/2018	23	William	Xui	$20.50	55	$18.79
15	60	15/07/2018	23	William	Xui	$20.50	55	$18.79

Document A

A cleaning contractor is assigned a unique contractor number when first taking up work with MC. Contract cleaners may work as casual staff or fixed term staff. Fixed-term staff sign a contract to clean for a set period of time such as three or six months. Casual cleaners are not locked into any fixed period to clean, they are available on a weekly basis as work is available or suits them. Casual cleaners are contacted when work is available to clean a particular cabin and may accept or reject the job. Contra[illegible]ift between these two modes depending on what suits them better.

MC maintain a record [illegible]y for all cleaners (a small sample of this record is shown below):

Mo[illegible]aning Contractor Rates History

Contractor No: 23
First Name: William
Last Name: Xui
Postal address: PO Box 100
Pambula, 2549
Phone: 01234456789

Contract Dates		Contract Hourly Rate	Contract Type
Start Date	End Date		
12/07/2017	31/12/2017	$22.00	Casual
05/01/2018	30/03/2018	$18.50	Fixed
01/05/2018	28/09/2018	$20.50	Fixed

Contractor No: 45
First Name: Mary
Last Name: Green
Postal address: 13 Narrow Lane
Merrimbula, 2548
Phone: 0789123456

Contract Dates		Contract Hourly Rate	Contract Type
Start Date	End Date		
01/07/2018		$22.00	Casual

Documents B and C

TASKS

Please ENSURE your name and ID are shown on every page of any document you submit. If a document is a multipage document, such as for the normalisation, please also make sure you include page numbers on every page.

Moodle Part A Submission:

1. Using LucidChart, prepare a **FULL conceptual model** (Entity Relationship Diagram) for Monash Cabins (MC).
   - For this FULL conceptual model, *include what you see as identifiers (keys) for each entity only (other attributes are **not required**) and all relationships.*
   - **Surrogate keys must not be added to this model**. *Participation and connectivity for all relationships must be shown on the diagram*.

   This initial conceptual model must be submitted to Moodle as Assignment 1 Part A by 5 PM Monday of week 6. If this submission is not made by this date you will not be able to submit Assignment 1 Part B.

   No marks are awarded for this submission, your tutor will provide feedback and guidance based on your submitted initial model which should be integrated into your continuing work in Part B (which is graded).

Moodle Part B Submission:

2. Perform **normalisation to 3NF** for the data depicted in the sample Cleaning Running Sheet (Document A) and the sample Contract History (Documents B and C - note that documents B and C are two samples of the same document).

   During normalisation, you must:
   - **Not** add surrogate keys to the normalisation.
   - You should include all attributes (not remove any attribute as derivable)
   - Clearly show UNF, 1NF, 2NF and 3NF.
   - Clearly identify the Primary Key in all relations.
   - Clearly identify the partial and transitive dependencies (if they exist) in all 1NF relations. You may use a dependency diagram or alternative notation (see the normalisation tutorial sample solution for a possible alternative representation).

   Your attribute names as used in your normalisation and those on your conceptual/logical models must be consistent i.e. the same name used on each for the same property.

3. Using LucidChart, prepare a **FULL conceptual model** (Entity Relationship Diagram) for Monash Cabins (MC).
   - For this FULL conceptual model, *include what you see as identifiers (keys) for each entity, **all required attributes** and all relationships.* This full model will be based on your feedback from your Part A submission, the normalisation above and further reading of the case study. It may be necessary to revise/update this model while developing your logical model in part 4 below.
   - **Surrogate keys must not be added to this model**. *Participation and connectivity for all relationships must be shown on the diagram*.

4. Based on the final full version of your conceptual model, **prepare a logical level design** for the Monash Cabins database.
    - The logical model must be drawn using the Oracle Data Modeler. The information engineering or Crow's foot notation must be used in drawing the model.
    - All entities depicted must be in 3NF
    - All attrib[illegible]mented in the database.
    - Sequen[illegible]generate numeric primary keys and check clauses must be [illegible] where appropriate.
    - Be sure [illegible]d as part of your model.
5. **Generate the s[illegible]base** in Oracle Data Modeler and use the schema to create the datab[illegible]account. The ***only*** edit you are permitted to carry out to the generated s[illegible]header comment/s containing your details (student name/id) and drop sequence commands.
    - Capture the output of the schema statements using the spool command.
    - Ensure your script includes drop table and sequence statements at the start of the script.
    - Name the schema file as **mc_schema.sql.**

Submission Requirements

Due: Monday 27th August (Week 6) 5PM

The following files are to be submitted:

- A single page p[illegible]r initial version of your conceptual model. Name the file **mc_initial_**[illegible]s file must be created via File - Download As - PDF from LucidChar[illegible] capture.

Due: Wednesday 12t[illegible]k 8) 5PM

The following files are to be submitted:

- A single page pdf file containing your final version of your conceptual model. Name the file **mc_conceptual.pdf**. This file must be created via File - Download As - PDF from LucidChart, do not use screen capture.
- A pdf document showing your full normalisation of documents A, B and C showing all normal forms (UNF, 1NF, 2NF and 3NF). Name the file **mc_normalisation.pdf**
- A single page pdf file containing the final logical Model you created in Oracle Data Modeller. Name the file **mc_logical.pdf**. This pdf must be created via File - Data Modeler - Print Diagram - To PDF File from within SQL Developer, do not use screen capture.
- A zip file containing your Oracle data modeler project (in zipping these files be sure you include the .dmd file and the folder of the same name). Name the file **mc_oraclemodel.zip.**
  - This model must be able to be opened by your marker and contain your full model ***otherwise your task 4 will not be marked***. For this reason, you should carefully check that your model is complete - you should take your submission archive, copy it to a new temporary folder, extract your submission parts, extract your model and ensure it opens correctly ***before*** submission.
- A schema file (CREATE TABLE statements) generated by Oracle Data Modeller. Name the file **mc_schema.sql**
- The output from SQL Developer spool command showing the tables have been created. Name the file **mc_schema_output.txt**
- A pdf document containing any assumptions you have made in developing the model or comments your marker should be aware of. Name the file **mc_assumptions.pdf**

Note that there are ***seven required files***. These files must be zipped into a single zip file named a1-<yourauthcateid1>.zip e.g., a1-xyz123.zip before the assignment due date/time. Submit the a1-xyz123.zip to Moodle before the due date.

Late submission will incur penalties as outlined in the unit guide.

Marking Rubric

	Outstanding (Range D - HD)	Adequate (Range P - C)	Not Adequate (N)
Identify the data requirements to support an organisations operations from the supplied case study and expresses these via a database conceptual model. (50)	All MC operations are suppo • [illegible] of • [illegible] t • [illegible] s • [illegible] d • [illegible] ve not been added • All/most required relationships have been captured • All/most required cardinality and participation constraints have been captured	Some MC operations are not supported. • Majority of required entities are present • Majority of required attributes and keys have been captured • Surrogate keys have not been added • Majority of required relationships have been captured • Majority of required cardinality and participation constraints have been captured	Many of the MC operations are not supported. • None or few of the required entities are present • None or few of the required attributes and keys have been captured • Surrogate keys have been added • None or few of the required relationships have been captured • None or few of the required cardinality and participation constraints have been captured
Understand and follow a database design methodology.(25)	All/majority of the design processes have been correctly followed: • All/most Normalisation processes are correct • Dependency diagrams have been provided and match normalisation. • ER diagram mapped to logical model with only minor errors/omissions. • SQL Developer Relational model correctly generated from the logical model • Sequences have been created to provide numeric primary keys where required	Some of the design processes have been correctly followed: • Majority of Normalisation processes are correct • Dependency diagrams have been provided and match normalisation in majority of situations. • ER diagram mapped to logical model with only small number of errors/omissions. • SQL Developer Relational model correctly generated from the logical model • Sequences have been created to provide numeric primary keys where required in the majority of situations	Few of the design processes have been correctly followed: • Significant errors during the Normalisation processes • Dependency diagrams not provided or have major errors • ER diagram mapped to logical model with errors/omissions. • SQL Developer Relational model not correctly generated from the logical model • Sequences have not been created to provide numeric primary keys where required

	Outstanding (Range D - HD)	Adequate (Range P - C)	Not Adequate (N)
Understand and apply the relational model principles into practise. (15)	All relational model princi  follow • Al th • Al Fo cc • All/most data integrity requirements (Entity, Referential, Domain) have been correctly identified.	Most relational model principles have been followed: • Majority of entities are in third normal form. • Majority of Primary and Foreign keys are correctly identified. • Majority of data integrity requirements (Entity, Referential, Domain) have been correctly identified.	Few of the relational model principles have been followed: • None or few of the entities are in third normal form. • None or few of the Primary and Foreign keys are correctly identified. • None or few of the data integrity requirements (Entity, Referential, Domain) have been correctly identified.
Able to generate and modify a schema given a logical model in SQL Developer. (5)	The DDL script was executed without errors.		The DDL script was executed with errors.
Able to correctly use the required notation convention and be consistent in its usage. (5)	All notations in the model are consistent.	Some notations in the model are consistent.	Few notations in the model are consistent.