MONASH University
Information Technology

FIT2094-FIT3171 Databases

2021 Semester Summer B

Assignment 1B - Normalisation and Logical Database Design

Monash Dental (MD)

FIT2094 Learning Outcomes: 2, 3, 4 (see Unit Preview)

FIT3171 Learning Outcomes: 2, 4, 5 (see Unit Preview)

Assignment weighting: 15%

Assignment marked out of 100 and released as a grade out of 15

This task continues the work you have started in assignment 1A by refining/extending the model you developed and implementing it as a set of tables under your Monash Oracle database account.

Since this is an ongoing development process based on your assignment 1A submission and marker feedback, **you must ensure that your assignment 1A submission and the marker feedback remains confidential and is only seen by yourself and the FIT2094-FIT3171 teaching staff**.

Assignment 1B's brief must be read in conjunction with the assignment 1A brief - i.e. your final model must encompass both sets of requirements. You may modify your assignment 1A conceptual model in any manner you wish as you work through assignment 1B, provided your final model meets both sets of requirements.

In developing your final logical data model, composite attributes present on your conceptual model must be expanded into their component simple attributes, unless otherwise directed. If the supplementary material presented in this document does not guide you in deciding the components you may make any reasonable decision on their simple component attributes.

Further discussions with Monash Dental have revealed the points listed below:

- MD has a strict policy that patients must pay for an appointment immediately on its completion. Non private insured patients will pay 100% of the cost of the appointment. Patients who have dental insurance will have part of their account paid by the insurer

and will be required to pay the remainder (the balance), if any, of the account themselves. An account may be paid in full by the insurer depending on the policy the patient holds. Where a payment is made by an insurer, MD is only interested in recording that the payment was made by an insurer, they do not need to record which insurer made which payment. A unique payment number is assigned to each payment.

- MD records, for each provider, the charges month to date that they have generated and the charges year to date that they have generated. Both these figures are an accumulation of the *actual charges* made by the provider month to date and year to date.

Monash Dental have provided several forms, depicted below, which they make use of, showing some of the data they wish to record:

- a *sample* 'Daily Provider Running Sheet' which shows appointments for a specific dentist on a particular day (Figure A), and
- two *sample* 'Appointment Completion' reports (Figures B1 and B2).

MONASH DENTAL
DAILY PROVIDER RUNNING SHEET

Report Date: 10/01/2021

Provider Code: XIL002
Provider Name: Dr Jane Xilu

Provider Registration Number: DENT0242
Provider First Registered Date: 25 September 2007
Provider Registration Status: ☑ Registered ☐ Suspended ☐ Cancelled

Provider Month to Date Total Charge: $2528
Provider Year to Date Total Charge: $2528

Appointment Date Time	Patient Number	Patient Name
10/01/2021 9:15	852	Jack Wilsons
10/01/2021 9:45	924	Lily Wu
10/01/2021 10:30	1001	Mary Wilhelm
10/01/2021 11:30	1013	Kate Hills
10/01/2021 14:15	998	William Kohl

Figure A

MONASH DENTAL
APPOINTMENT COMPLETION REPORT - Sample 1

Patient Number: 1001   **Patient Name:** Mary Wilhelm

Appointment: **Date:** 10th January 2021 **Time:** 10:30 AM

Provider Code: XIL002   **Provider Name:** Dr Jane Xilu

Appointment Location (Room): 8   **Appointment Type:** Long

Service Code	Description	Standard Fee	Fee Charged
9875	Check up	54.85	54.85
2348	Extraction	134.08	165.00
1207	Filling	109.70	145.60
1091	Scale and Clean	86.50	86.50
	Total Appointment Cost		$451.95

APPOINTMENT PAYMENT:

Payment No	Payment From	Amount Paid
123456	Insurer	$205.00
123457	Patient	$246.95

Figure B1

MONASH DENTAL
APPOINTMENT COMPLETION REPORT - Sample 2

Patient Number: 1002   **Patient Name:** Peter Green

Appointment: Date: 10th January 2021 **Time:** 10:30 AM

Provider Code: WUM001   **Provider Name:** Dr Mary Wu

Appointment Location (Room): 6   **Appointment Type:** Short

Service Code	Description	Standard Fee	Fee Charged
9875	Check up	54.85	54.85
	Total Appointment Cost		$54.85

APPOINTMENT PAYMENT:

Payment No	Payment From	Amount Paid
123612	Patient	$54.85

Figure B2

REMEMBER you must keep up to date with the Ed Assignment 1B forum where further clarifications may be posted (this forum is to be treated as your client).

Please be careful to **ensure you do not post anything which includes your reasoning, logic or any part of your work to this forum**, *doing so violates Monash plagiarism/collusion rules* and has significant academic penalties.

You are free to make assumptions if needed however they must align with the details here and in the assignment forums and must be clearly documented (see the required submission files).

TASKS

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

GIT STORAGE

All working files, as you work on this assignment task, *must be stored in GIT and must show a clear history of development*. Your work for this task **MUST** be saved in your local repo in your Assignment 1B folder *and regularly pushed to the FIT GitLab server to* build this history of development. Any submission with less than three pushes to the FIT GitLab server will incur a grade penalty of 10 marks.

Before submission via Moodle you **must** log into the web interface of the GitLab server and ensure your files are present.

All source documents must be available in your FIT GitLab server account and must not be modified in any manner following your submission. For example with your normalisation you are required to submit a PDF copy of your work, however your source documents (MS Word, Pages or an MS Word export from Google Docs) **must exist in your FIT GitLab account for your work to be acceptable for marking.**

Task to complete:

1. Perform **normalisation to 3NF** for the data depicted in the sample documents. Note that only one normalisation is required for the function room evaluation, you have been provided with two samples so you can appreciate some of the variety which occurs.

    The approach you are required to use is the same approach as shown in the normalisation tutorial solution. *The normalisation must be carried out form by form, beginning by you representing the document you are working on as a **single** UNF form*.

    During normalisation, you must:

    ○ **Not** add surrogate keys.
    ○ Include all attributes (you must **not remove** any attribute as derivable)
    ○ Clearly show UNF, 1NF, 2NF and 3NF.
    ○ Clearly identify the Primary Key in all relations.
    ○ Clearly identify **all dependencies** at the various normalisation stages (Partial at 1NF, Transitive at 2NF and Full at 3NF). You may use a dependency diagram or

alternative notation (see the normalisation tutorial sample solution for a possible alternative representation). If none exist you must note this by stating: *No partial dependencies present* and/or *No transitive dependencies present*

○ If required, carry out attribute synthesis.

The attribute names used in your normalisation and those on your subsequent logical model must be the same.

2. Based on your assignment 1A conceptual model, your markers feedback, your reading of this case study and the normalisations you carried out in step 1 above, **prepare a logical level design** for the Monash Dental 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. Your logical model must **not** show datatypes.
○ All relations depicted must be in 3NF
○ You are required to add at least one surrogate key to your design (you are free to select the most appropriate relation to make this change in)
○ All attributes must be commented *in the database* (ie. the comments must be part of the table structure, not simply comments in the schema file).
○ Check clauses/look up tables must be applied to attributes where appropriate.
○ You **MUST** include the legend as part of your model. If your laptop username is a nickname please edit the legend panel to show your actual name
○ Note that your GIT repository must clearly indicate your development history with multiple commits/pushes as you work on your model

3. **Generate the schema for the database** in Oracle Data Modeler and use the schema to create the database in your Oracle account. The *only* edit you are permitted to carry out to the generated schema file is to add header comment/s containing your details (student name/id) and the commands to spool/echo your run of the script. In generating your schema file ensure you:

○ Capture the output of the run of your schema statements using the spool command.
○ Ensure your script includes drop table statements at the start of the script.
○ Name the schema file as **md_schema.sql.**

Submission Requirements

Assignment 1B:

Due: Wednesday 3rd February 2021 4 PM AEDT

The following files are to be submitted and **must exist** in your FITGitLab server repo, *along with the source documents from which they were generated*:

- A **pdf** document showing your full normalisation of the sample Monash Dental documents showing all normal forms (UNF, 1NF, 2NF and 3NF). Name the file **md_normalisation.pdf**

- A single page **pdf** file containing the final logical Model you created in Oracle Data Modeler. Name the file **md_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 **md_oraclemodel.zip.**

    - Part of the assessment of your submission will involve your marker extracting your model from this zip, opening it in SQL Developer Data Modeler, engineering to a new Relational model and from this your marker will generate a schema which will then be compared with your submitted schema (they must be the same for your schema to be accepted). For this reason your **model must be able to be opened by your marker and contain your full model** *otherwise your task 2 and 3 will not be able to be fully marked resulting in significant loss of marks*. For this reason, you **MUST** carefully check that your model is complete - ensure you 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. Please view the video on Moodle under session 6 which demonstrates this process.

- A schema file (CREATE TABLE statements) generated by Oracle Data Modeller. Name the file **md_schema.sql**

- The output from SQL Developer spool command showing the tables have been created. Name the file **md_schema_output.txt**

- A pdf document containing any assumptions you have made in developing the model or comments your marker should be aware of. If you have made no assumptions submit the document with a single statement saying "No assumptions made". Name the file **md_assumptions.pdf**

These files must be *submitted as individual files* **i.e. you must upload to Moodle six separate files as named above** (the six files must *not* be zipped into a single archive) before the assignment due date/time.
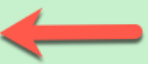
Late submission will incur penalties at the rate of 5 marks deduction per 12 hours or part thereof.

Please note we **cannot mark any work on the FITGitLab Server**, you need to ensure that you submit correctly via Moodle since it is only in this process that you complete the required student declaration without which work **cannot be assessed**.

It is your responsibility to **ENSURE** that the files you submit are the correct files - we strongly recommend after uploading a submission, and prior to actually submitting in Moodle, that you download the submission and double-check its contents.

Your assignment **MUST** show a status of "Submitted for grading" before it will be marked.

Submission status

Attempt number	This is attempt 1.
Submission status	Submitted for grading
Grading status	Not graded

If your submission shows a status of "Draft (not submitted)" it will not be assessed and **will incur late penalties after the due date/time**.

Please *carefully* read the documentation under "Assignment/Tutorial Task Submission" on the Moodle Assessments page.

Marking Rubric

	Outstanding (Range HD)	Adequate (Range P - D)	Not Adequate (N)
Understand and follow normalisation methodology [30 marks]	All/majority of the normalisation steps have been correctly followed: ● All/most normalisation processes are correct ● Dependency diagrams have been provided and match normalisation. ● Normalisation result is correctly integrated into logical model	Some of the normalisation steps have been correctly followed: ● Majority of Normalisation processes are correct ● Dependency diagrams have been provided and match normalisation in the majority of situations. ● Majority of normalisation result is correctly integrated into logical model	Few of the normalisation steps have been correctly followed: ● Significant errors during the Normalisation processes ● Dependency diagrams not provided or have major errors ● Normalisation result is not correctly integrated into logical model
Identify the data requirements to support an organisation's operations from the supplied case study and express these via a database logical model. [50 marks]	All MD operations are supported: ● All/most required relations identified. ● All relations are in 3NF ● All/most required relationships have been captured by placing FK in correct relation ● All/most required cardinality and connectivity have been captured ● All/most data types and data integrity requirements (Entity, Referential, Domain) have been correctly identified	Some of the MD operations are supported: ● Majority of relations identified. ● Majority of relations are in 3NF ● Majority of required relationships have been captured by placing FK in correct relation ● Majority of required cardinality and connectivity have been captured ● Majority of data types and data integrity requirements (entity, referential, domain) have been correctly identified	Few of the MD operations are supported: ● None/few of relations identified. ● Majority of relations are not in 3NF ● None/few required relationships have been captured. Majority of FKs are placed in incorrect relations. ● None/few of required cardinality and connectivity have been captured ● None/few of data types and data integrity requirements (entity, referential, domain) have been correctly identified

	Outstanding (Range HD)	Adequate (Range P - D)	Not Adequate (N)
Able to generate a relational model and schema given a logical model in SQL Developer. [10 marks]	All/majority of the schema generation processes have been correctly followed: ● SQL Developer Relational model correctly generated from the logical model ● All drop commands, database comments and spool command included ● No "extra" edit in schema file ● The DDL script was executed without errors.	Some of the schema generation processes have been correctly followed: ● SQL Developer Relational model correctly generated from the logical model ● Some of drop commands, database comments and spool command included ● The DDL script was executed without errors.	Few of the schema generation processes have been correctly followed: ● SQL Developer Relational model not correctly generated from the logical model ● There is "extra" edit (other than identity information and set echo/spool commands) in schema file ● The DDL script was executed with errors.
Able to correctly use the required notation convention and be consistent in its usage. See pages 12 and 14 of the session 6 tutorial document [10 marks]	All notations in the model are consistent and follow FIT2094-FIT3171 Logical Model standards.	Most notations in the model are consistent and follow FIT2094-FIT3171 Logical Model standards.	Few notations in the model are consistent or follow FIT2094-FIT3171 Logical Model standards.
Able to correctly push all files to FITGitLab server with a development history of **at least three pushes of your model**.			If less than three pushes (for the model) showing a clear development history, a grade deduction of 10 marks applied.