

INFO151 2020-T1  
Assignment 4 (30%)

1. BuildingWork Pte Ltd supplies workers to building projects. A table consists of the employee and project from BuildingWork Pte Ltd is given below. Examine the table and the conditions carefully then answer the questions below.

Assumptions and constraints: EMP\_ID is unique for each worker. PROJ\_ID is unique for each project. A project can have more than one worker. Employee first name is not unique. The hourly rate for a particular job type is fixed. A worker can work for more than one project but has only one job type.

PROJ_ID	PROJ_NAME	EMP_ID	EMP_FNAME	JOB_TYPE	HOUR_RATE
1135	Zulu	16	Smith	H25	20
1135	Zulu	33	Smith	H27	20
1188	Voyager	30	Jenny	H26	30
1188	Voyager	16	Smith	H25	20

- (a) Discuss a potential update anomaly of the above table with an example. [2 marks]  
(b) Construct the 1NF dependency diagram, name all the dependencies and indicate the primary key. [8 marks]

PROJ_ID	PROJ_NAME	EMP_ID	EMP_FNAME	JOB_TYPE	HOUR_RATE
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- (c) Convert the 1NF table to 3NF tables. You must show the progress from 2NF to 3NF. Indicate all the PKs and FKs in the normalised tables. [10 marks]

2. An administrator uses a spreadsheet to record student information is shown in Table Q2 (in page 4). The following constraints are given:
- A student can only register for a single degree programme.
  - A student can only change his degree programme after a full year.
  - The course title can change after a full year.

- Convert the spreadsheet into a table containing attributes, then identify the primary key in the table. [4 marks]
- Draw all the dependencies and identify the type of dependency for the 1NF table. [8 marks]
- Normalise the table into 3<sup>rd</sup> normal form. You must show the progress from 1NF to 2NF, and then to 3NF. Indicate all the primary keys and foreign keys in the normalised tables. [8 marks]
- Write the DDL to create the normalised tables and *indicate the sequence* of creating the tables. **Provide a screenshot for each table you created.** Use appropriate entity names for example Student, Grade, etc. to represent the normalised tables respectively. Use only the affinity data type for the attributes in the tables. [8 marks]
- Write the DML in a *correct sequence* to insert all the data shown in the sample spreadsheet into the respective tables. Provide a screenshot of each table after the insert. Use only the single insert method. [6 marks]
- Write the SQL to show only the name of the student who has the maximum number of “D” grade. Use the table names you have created in (d). (Note: Your SQL may show no result with the current data.) [6 marks]

3. A table to record the information of Dentists, Patients, and Appointments in a clinic is given below.

DentistNo	DentistName	PatientNo	PatientName	PatientPhone	AppointmentDate	AppointmentTime	AppointmentFee
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On a single day each patient can have more than one appointment. It is known that DentistNo is unique for each dentist. PatientNo is unique for each patient. PatientNo must not be used as a composite key. A patient is allowed to see any dentist.

- Use examples with data to illustrate why the above table is not a good database solution with respect to *insert, delete and update* anomalies. [6 marks]
- What is the entity relationship between Dentist and Patient? Provide examples with data to illustrate the relationship. [2 marks]
- Provide a normalised 3NF solution. You must show the progress from 1NF to 2NF, and then to 3NF. Indicate all the primary keys and foreign keys in the normalised tables. [10 marks]
- If the constraint changes such that a patient can only see a particular dentist, are there any changes to the 3NF tables? Explain your answer to get the full mark. [2 marks]

**Submission Instructions:**

- (1) Submit your assignment as a PDF file only (to avoid misalignment in the diagrams).
- (2) Use VISIO, Draw.IO or other software to draw diagrams, hand drawn diagram will NOT be accepted.
- (3) For each question, you must clearly indicate the answer for each part, any part that is missing will receive 0 marks.
- (4) Any diagrams and representation method that are not the same as those taught in workshop and lecture will receive 0 marks.

Table Q2 for question 2

Student ID	Name	Date of Birth	Gender	Address	Phone	Email	Degree	Year	Course No	Title	Credits	Grade
MI47007	James Boon	7/07/1977	Male	10 Downing Street, Wellington	22007007	JB007@gmail.com	Bachelor of Commerce	2020	INFO151	Databases	15	A+
MI47007	James Boon	7/07/1977	Male	10 Downing Street, Wellington	22007007	JB007@gmail.com	Bachelor of Commerce	2020	ECON130	Microeconomic Principles	15	A+
MI47007	James Boon	7/07/1977	Male	10 Downing Street, Wellington	22007007	JB007@gmail.com	Bachelor of Commerce	2020	FCOM111	Government, Law and Business	15	B+
MI47007	James Boon	7/07/1977	Male	10 Downing Street, Wellington	22007007	JB007@gmail.com	Bachelor of Commerce	2020	INFO101	Foundations of Info Systems	15	C
MI47007	James Boon	7/07/1977	Male	10 Downing Street, Wellington	22007007	JB007@gmail.com	Bachelor of Technology	2019	INFO141	Systems Analysis	15	C
MI47007	James Boon	7/07/1977	Male	10 Downing Street, Wellington	22007007	JB007@gmail.com	Bachelor of Technology	2019	INFO151	Databases & SQL	15	WD
MI47007	James Boon	7/07/1977	Male	10 Downing Street, Wellington	22007007	JB007@gmail.com	Bachelor of Technology	2019	MGMT101	Introduction to Management	15	B+
MI47007	James Boon	7/07/1977	Male	10 Downing Street, Wellington	22007007	JB007@gmail.com	Bachelor of Technology	2019	QUAN102	Statistics for Business	15	A+