BDA203 Advanced Database Systems **SEMESTER 1, 2023**

ASSIGNMENT – DATABASE SYSTEM: CONCEPTUAL, LOGICAL, PHYSICAL, AND IMPLEMENTATION

Due date	: ~~24th~~ 26th February 2023 by ~~11:55~~ 2:00pm.
Release date	: 06th February 2023
Weighting	: 25% of total marks for the subject
Type	: Group Assignment (to be completed in pairs)
Penalty for late submission	: 5 marks per day

A. RATIONALE

This assignment has been designed to assess students' ability to model data, by constructing an entity-relationship diagram and a relational data model for a particular scenario. This assignment addresses the following learning objectives for this subject:

- CLO2: Discuss issues in the design, development and management of enterprise-level database systems based on current literature
- CLO3: Use SQL for definition, manipulation, and control of a database system to solve business problems

B. ASSIGNMENT EVALUATION

These criteria will be used to evaluate your assignment submission:

- The assignment is well presented. Professional presentation structure (Executive summary, table of content, introduction, main body, conclusion, and references), language, and logical arguments to be incorporated;
- The problem description is appropriate and the approach for the solution chosen is comprehensively presented. Each section to include a section paragraph explaining the objective of the section;
- Appropriate entities are identified;
- Appropriate conceptual data model is constructed;
- The relational data model is consistent with the conceptual data model;
- Attributes are correctly identified;
- The primary keys, foreign keys, and constraints are correctly identified;
- Complete system catalogue is presented
- Assumptions are listed.

C. REQUIREMENTS

You are to create a comprehensive database management system including conceptual data model, physical data model, and database implementation from a given business description. This assignment is to be carried out and reported in a pair.

D. SUBMISSION

You are required to submit two documents in PDF format:

Document 1: Report with all the required tasks listed in order. List clearly which student is responsible for which item.

Student A: (B123456)
Student B: (B123457)
File 1 name format: BDA203_A1_Student ID 1_ Student ID 2_Report
File 1 name example: BDA203_A1_B123456_B123457_Report

Document 2: SQL Scripts used to create the database

File 2 name format: BDA203_A1_Student ID 1_ Student ID 2_SQL
File 2 name example: BDA203_A1_B123456_ B123457_SQL

Submit the two documents to the LMS by the due date. Only one submission with two files is required for your team.

FlexIS (Case Study)

The Covid-19 pandemic and the need for physical distancing and isolation resulted in worldwide adoption of "work from home" practices. As organizations resume returning to the workplace, many employees have requested to continue working from home or a hybrid model where they practice a combination of work from home and work from office during the work week. The Malaysian government has in fact made amendments to the employment act to include flexible working hours, to be effective from September 1, 2022 (Tan, 2022). Employees can now write in to request for flexible working arrangements (FWA), and employers will review their requests.

Some challenges that might be faced in the implementation are handling and approving requests for flexible working arrangements and managing the schedules of various employees. Once employees have been granted the FWA, it would be up to the organization to manage the implementation so as to enable a productive and cost-efficient working environment.

FlexIS is an information system that has been proposed to record and manage employee requests for flexible work within an organization. Employees will write to their supervisors, who will review the requests and decide on whether to allow it. If the requests are approved, the employees will have to submit their daily schedule so that the supervisors will know where they are and what they will be working on. In this way, the productivity of the employees can be tracked so that the organization can determine if the flexible working arrangements have been a success.

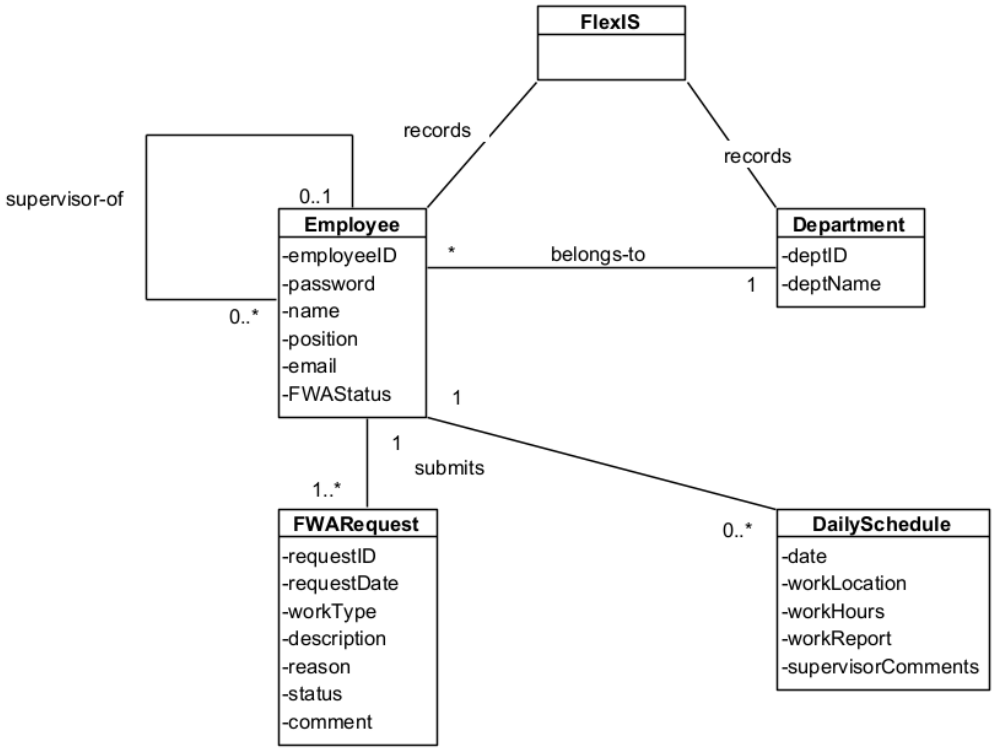


Figure 1: FlexIS class diagram

You are required to write a comprehensive report describing how database system can be used, and what advantages it provides. Your report must include the following items:

Task 1: System Analysis [15 marks, CL02, C6]

Individual task.

Each student to discuss in up to ONE page: -

a. Appraise the use of database system to support FlexIS users.

b. Evaluate and assess relational Database Systems highlighting their advantages and disadvantages.

c. Compile and produce TWO (2) important challenges in implementing database systems in the current context, after Covid 19.

- Note for (b) and (c): You are required to cite at least TWO and FIVE information sources respectively (journal papers, conference papers, reputed organizational websites, and/or universities) about the relevant topics: advantages and disadvantages, and challenges in implementing database systems.
- Write your report with suitable citations and provide a list of references at the end of your report. Please refer to 'APA Referencing' file.

Task 2: Conceptual and Logical Design [15 marks, CL02, C6]

Group task.

a. Design a conceptual model by using a data modeler.

b. Write the logical relational data model for your ER model in 3NF, identifying clearly the primary key and foreign keys. Your logical data model should be presented in the following format:

TABLENAME (attribute1, attribute2, attribute3 ...)

PRIMARY KEY: attribute1

FOREIGN KEY: attribute3 REFERENCES table_name (attribute name)

NOTE: You are required to add **two (2) additional attributes** to each table and justify your addition.

If any, Check Constraints can be included.

Task 3: Physical Database Design [15 marks, CL03, C3]

Group task.

a. Construct final database model showing the tables, columns, data types, relationships, primary keys, foreign keys. Explicitly indicate the 'cardinalities' of all relationships in your diagram (i.e.: One-to-one, one-to-many or many-to-many). Include the additional attributes created in Task 2.

b. Produce a data dictionary for the FlexIS system. Example template below

Table	Attribute	Format	Description	Constraints
Table Name				*Field_1 primary key not null*
				Field_2 check values between 0 – 9999
				Field_3 foreign key references Table_name (Field_name) on delete cascade.

Task 4: Implementation [15 marks, CL03, C3]

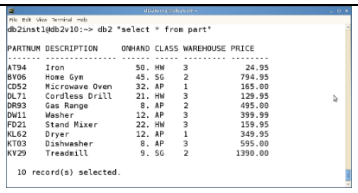
Individual Task

Compose your database and write the SQL scripts to create the tables for the tables you are responsible for (**Student A**: Employee, FWARequest; **Student B**: Department, DailySchedule, FlexIS), with suitable constraints, including:

- Primary Key Constraints
- Foreign Key Constraints

- General constraints to check valid values, default values, etc.
- Insert minimum six (6) records for each table.

Indicate clearly which tables each student is responsible for. For **each** student, fill out the table below:

Student Name	
List of tables	
SQL Statements (All queries to create tables and insert records	Note - format writing for SQL statements: Courier new, size 10, single spacing.
Results (Provide snapshot for each table showing the inserted records)	

Task 5: Data Manipulation [15 marks, CL03, C3]

Individual task.

Write the SQL Scripts to populate the tables with meaningful data, then write THREE (3) queries for EACH student to retrieve the information required by the stakeholders.

For **each** query, fill out the table below:

Student A/B and student name	Student A/ Student B and the Name of the student.
SQL Reference ID (eg: Task 5-SQL 1)	*Document 1 is to include only the SQL reference ID. All SQL statements to be included in Document 2.*
Purpose / Description	*Description of the objective/purpose of the SQL statement.*
SQL Statement	SQL Script
Output (Provide snapshot)	Screen shot of the SQL output.

You will be graded based on the complexity of your queries. Your SQL statements should demonstrate use of advanced concepts: GROUP BY/HAVING, scalar functions (including date/time functions), subqueries and multi-table joins.

Task 6: Procedural SQL [20 marks, CL03, C3]

Individual task.

Create procedural SQL statements that is relevant to your tables. You may be required to create an additional table.

a. One trigger
b. One function
c. One stored procedure

For **each** program, fill out the table below:

Student A/B and Name	
PL/SQL reference ID (eg: Task 6-PL/SQL1)	
Purpose of PL/SQL	
PL/SQL Statement	
Output (Provide snapshot)	
Remark	Note – provide explanation on how to run/test the program.

Follow the submission, writing and formatting guidelines as stated in Section E below.

E. SUBMISSION

- A set of professional compiled documents with Cover Page, Feedback Page, Table of Contents, answer of all tasks, Marking Scheme, and List of References.
- Format writing: All materials must be produced in a written format using Times New Roman, size 12, 1.5 lines spacing. Paragraph alignment: Justify. Except for SQL queries, PL/SQL statements must be written using Courier New, size 10, 1.0 (single) spacing.
- Page setup: margin - 2.5cm for top, right, and bottom margin, 3cm for left margin. Paper size: A4 (210 x 297 mm).
- There should be a caption at the bottom of each picture/graphic/diagram/chart, and a caption above of each table. Besides, additional explanations might be required.
- The penalty imposed for submission without cover page, feedback page or marking scheme page is five marks.
- All sources must be declared. Failure to state the source of any part of your report will be penalized according to the University's regulations. You are to use APA referencing in body text, and to use appropriate heading and numbering system in the body. You should refer to several sources (conference paper, journal papers, and white reports).

BDA203 Marking Scheme Assignment - Database System: Semester 1, 2023

Name Student A: StudentID A:

Name Student B: StudentID B:

Task	CLO Assessed	Allocated Marks	Student A	Student B
Task 1: System Analysis [15 marks, CL02, C6] Task 1: Discussions on system analysis clear and comprehensive. Citations were used as advised.	CLO2	15		
Task 2: Conceptual and Logical Design [15 marks, CL02, C6] Task 2: Logical Database Design Matches ER Model, with primary, foreign and any alternate keys defined. The model is 3NF and includes referential integrity existence constraints. Two additional attributes added/justified.	CLO2	15		
Task 3: Physical Database Design [15 marks, CL03, C3] Task 3: Physical Database Design Tables are designed with appropriate column types and constraints for primary key, foreign key, referential integrity and check/other constraints.	CLO3	15		
Task 4: Implementation [15 marks, CL03, C3] Task 4: Implementation Tables are created with appropriate column types and constraints for primary key, foreign key and check/other constraints. All requirements satisfied as per specification.	CLO3	15		
Task 5: Data Manipulation [20 marks, CL03, C3] The SQL statements are related to solving the problem discussed in task 1. The SQL statements demonstrate use of advanced concepts: GROUP BY/HAVING,	CLO3	15		

scalar functions (including date/time functions), subqueries and joins. All requirements satisfied as per specification.				
Task 6: Procedural SQL [20 marks, CL03, C3] Task 6: PL/SQL Trigger, function and stored procedure relevant to the system and correctly defined and tested. All requirements satisfied as per specification.	CLO3	20		
TOTAL		**100**		
Late submission (-5 marks per working day) Deductions (-5 per each error): Issues with professional presentation, referencing errors, not meeting requirements/standards as per specification etc.				
TOTAL MARKS OUT OF 100		100		

Note: Individual tasks must be distinct.

Assignment No.: __1__

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Assignment Cover Sheet

Student Information (For group assignment, please state names of all members)		**Grade/Marks**
Name	**ID**	

Module/Subject Information		**Office Acknowledgement**
Module/Subject Code	BDA203	
Module/Subject Name	Advanced Database Systems	
Lecturer/Tutor/Facilitator	Chinthake Wijesooriya	
Due Date	26th February 2023	
Assignment Title/Topic	Assignment – Database System	
Intake (where applicable)		
Word Count	n/a	**Date/Time**

Declaration

- ☐ I/We have read and understood the Programme Handbook that explains on **plagiarism**, and I/we testify that, unless otherwise acknowledged, the work submitted herein is entirely my/our own.
- ☐ I/We declare that no part of this assignment has been written for me/us by any other person(s) except where such collaboration has been authorized by the lecturer concerned.
- ☐ I/We authorize the University to test any work submitted by me/us, using text comparison software, for instances of plagiarism. I/We understand this will involve the University or its contractors copying my/our work and storing it on a database to be used in future to test work submitted by others.

Note: 1) The attachment of this statement on any electronically submitted assignments will be deemed to have the same authority as a signed statement.
2) The Group Leader signs the declaration on behalf of all members.

Signature:	Date:
E-mail:	

Feedback/Comments*	
Main Strengths	
Main Weaknesses	
Suggestions for improvement	
	Student acknowledge feedback/comments
Grader's signature	Student's signature:
Date:	Date:

Note:

1) A soft and hard copy of the assignment shall be submitted.
2) The signed copy of the assignment cover sheet shall be retained by the marker.
3) If the Turnitin report is required, students have to submit it with the assignment. However, departments may allow students up to **THREE** (3) working days after submission of the assignment to submit the Turnitin report. The assignment shall only be marked upon the submission of the Turnitin report.

*Use additional sheets if required

TABLE OF CONTENTS (SAMPLE)

REFERENCES (SAMPLE)

Appalla, P., Kuthadi, V. M., and Marwala, T. (2017). An Efficient Educational Data Mining Approach to Support E-Learning. *Wireless Networks*, 23(4), 1011-1024.

Burgos, C., Campanario, M. L., de la Peña, D., Lara, J. A., Lizcano, D., and Martínez, M. A. (2017). Data Mining for Modeling Students' Performance: A Tutoring Action Plan to Prevent Academic Dropout. *Computers & Electrical Engineering*, 1-16.

Chuan, W. (2016). Research on the Fuzzy Model of E-Learning Based Data Mining and Data Mining Technology under the Environment of Cloud Computing. *International Conference on Communication and Electronics Systems (ICCES)*. 21 October 2016: Coimbatore, India, 1-5.

Cigdem, H., and Topcu, A. (2015). Predictors of Instructors' Behavioral Intention to Use Learning Management System: A Turkish Vocational College Example. *Computers in Human Behavior*, 52, 22-28.

Clark, R. C., and Mayer, R. E. (2016). *E-Learning and the Science of Instruction: Proven Guidelines for Consumers and Designers of Multimedia Learning.* USA: John Wiley & Sons.

Cobo, G., García-Solórzano, D., Morán, J. A., Santamaría, E., Monzo, C., and Melenchón, J. (2012). Using Agglomerative Hierarchical Clustering to Model Learner Participation Profiles in Online Discussion Forums. *Proceedings of the 2nd International Conference on Learning Analytics and Knowledge*. 29 April 2012: Vancouver, BC, Canada, 248-251.

Connolly, T. M., and Begg, C. E. (2014). *Database Systems: A Practical Approach to Design, Implementation, and Management.* (6 ed.). England: Pearson.

Dean, M., Schreiber, G., Bechhofer, S., van Harmelen, F., Hendler, J., Horrocks, I., et al. (2004). Owl Web Ontology Language Reference [Electronic Version]. Retrieved on 5 February 2017, from https://www.w3.org/TR/owl-ref/

Dou, D., Wang, H., and Liu, H. (2015). Semantic Data Mining: A Survey of Ontology-Based Approaches. *2015 IEEE International Conference on Semantic Computing (ICSC)*. 7 February 2015: Anaheim, CA, USA, 244-251.

Notes:

- *The sample above include books, journal papers, conference papers, proceedings, online references.*
- *ONLY refer papers, journals, and books for the last five years.*
- *Electronic resources (blogs, websites, electronic articles, etc.) are NOT allowed.*
- *Order by author name (ascending order).*
- *MUST follow the APA referencing style.*
  Please find the 'APA Referencing Workshop' in new LMS/e-learning for your reference.