BU Bournemouth University

Faculty of Science and Technology
Department of Computing & Informatics

Unit Title: Data Management (COMP5001)		
Assessment Title: Assignment - Data Management		
Unit Level: 5	Assessment Number: 1 of 2	
Credit Value of Unit: 20	Date Issued: 19/09/2022	
Unit Leader: Dehao Wu	Submission Due Date: 18/11/2022	Time: 12:30 PM
Other Marker(s): N/A	Submission Location: Turnitin	
Quality Assessor (QA): Jiankang Zhang	Feedback Method: Turnitin	

This is an individual assignment which carries 50% of the final unit mark.

ASSESSMENT TASK
You are required to solve all the 4 problems below and include the methodology followed and the solutions in your report.

PROBLEM 1 (25 marks)
A department in a university wants to build a database to record and manage the information of its students and faculty members.

Following the analysis of the requirements, the following observations were made:
- The department has a department name, location, and contact information. The department has many faculty members. Department has both faculties and students.
- Every faculty member has a faculty ID, name, email address and office number. Faculty may have multiple degrees. The faculty's contract is either tenure track or non-tenure track. Faculty teaches courses. One faculty teaches one or more courses.
- Some faculties drive to work. For those who drive, each faculty has one car registered. A car has its colour, make, and unique plate number. Each registered car is issued with a parking permit. The parking permit could be either an annual or daily payment basis.
- Students are undergraduate and postgraduate. Students have their student ID, student name, programme name, email address, contact number, and home address. The home address has the house number, street name, and postcode. They need to select courses each semester. Each course has a unique course ID, credit, and assessment. Assessment could be either coursework, paper exam, or mixed. Students take the assessment and receive grades.
- Some students take part-time jobs in the department. The jobs could be either teaching assistant or graduate assistant.

Draw an Enhanced Entity Relationship diagram (**EER diagram**) for this project. Be sure to indicate the various attributes of each entity and relationship set, and the relationship multiplicities.

The notation illustrated in Figure 1 below must be used. Single or double lines should be used, independently of the default illustration in Figure 1, depending on the completeness of the specialisation. Additional lines or symbols could be used where necessary.
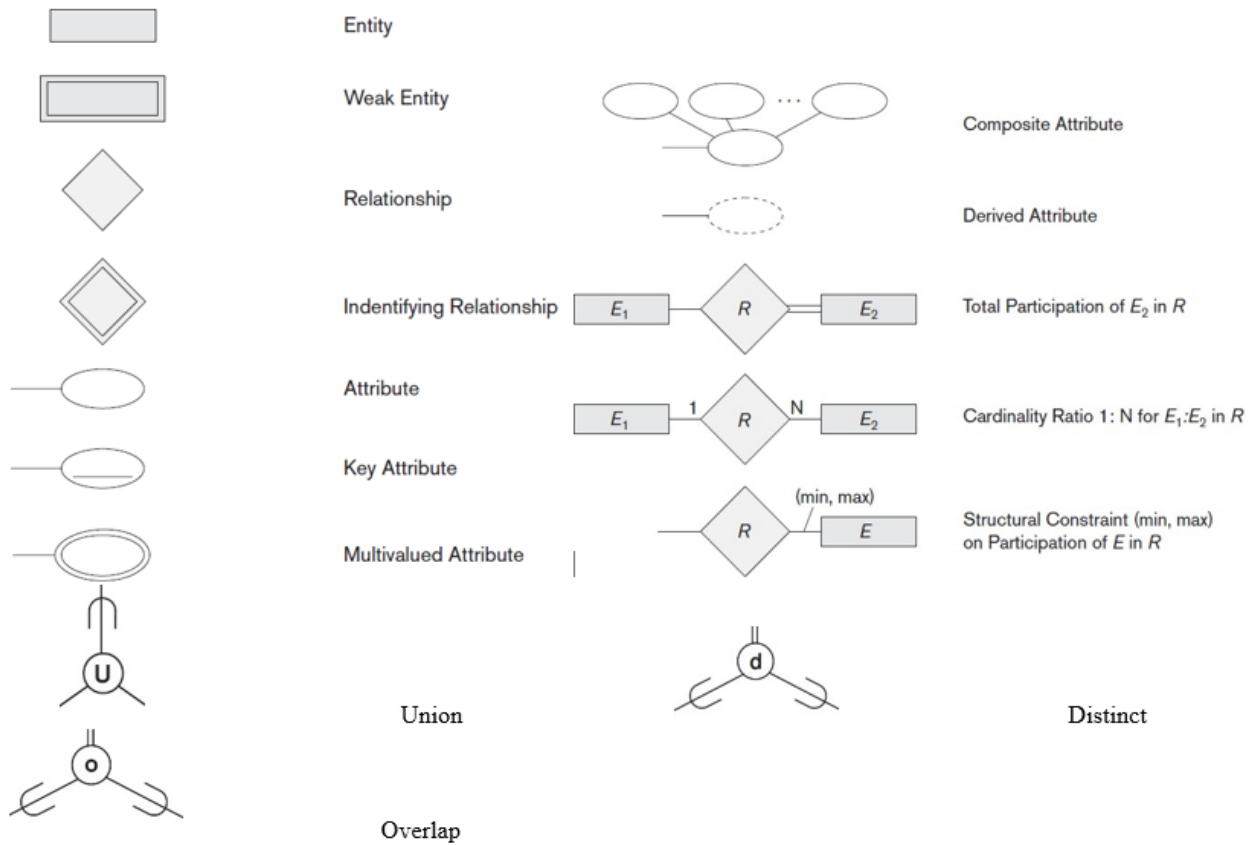
Figure 1. ER and EER diagram - symbols

PROBLEM 2 (25 marks)

Convert the following Entity Relationship diagram illustrated in Figure 2 into a relational schema. Include a description of the steps followed for the conversion, as well as an explanation of how these steps where applied for this Entity Relationship Diagram.

Be sure to indicate all primary (underline) and foreign key (*) references. That is, your answer should look similar to this:

```
TABLENAME(attribute1, attribute2*, attribute3 …. )
```
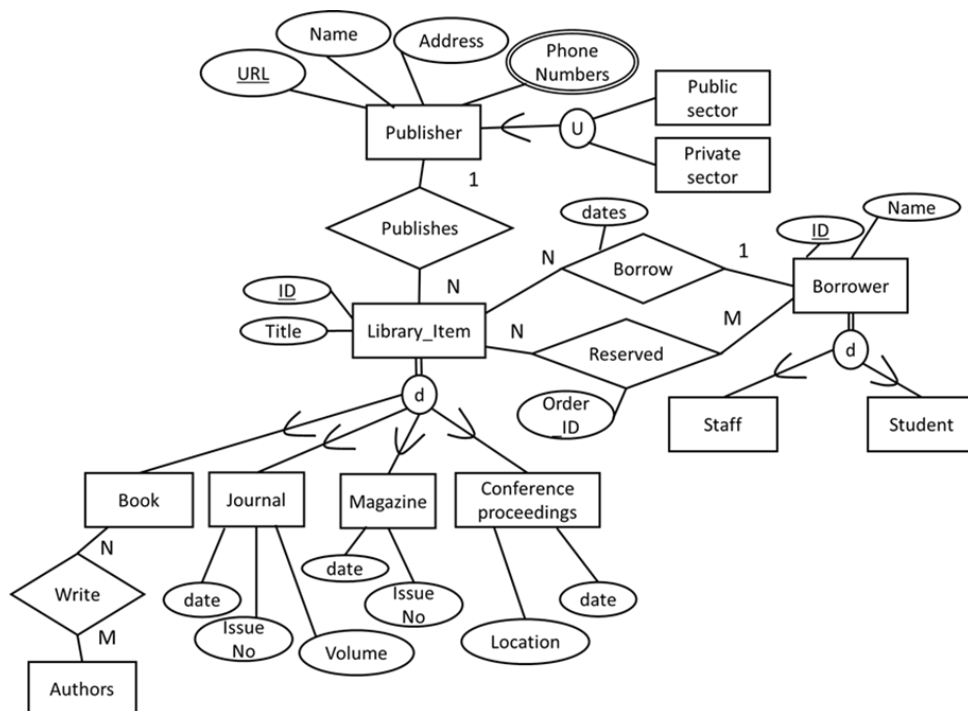

Figure 2. The ER diagram of a library database

PROBLEM 3 (25 marks)

For the ER diagram illustrated in Figure 2 of Problem 2, the management team of the library wants to make the database available to the public, so that people can access the library database. In order to facilitate fast access to the database, you are required to do the following:

1. Discuss the different implementation options (using generalisation or specialisation for multiple relations) you have when converting the database to a relational schema. Are there any advantages or disadvantages of the different choices one might select, and if yes, what are these?
2. Identify one table that is a good candidate for horizontal partitioning. Give an example SQL code for this partitioning. Use imaginary data for writing the corresponding queries. Explain why you chose to partition this table.
3. Identify a good candidate for vertical partitioning. Give an example SQL code for this partitioning. Use imaginary data for writing the corresponding queries. Explain why you chose to partition this table.

PROBLEM 4 (25 marks)

Given a relation R{A, B, F} with the following set of functional dependencies which are known to be correct:

AB -> F

B -> F

Determine the following (you must show the steps followed for determining the solution):

1. Determine the candidate keys for the relation R.
2. Explain whether the relation R is in BCNF or not, if not, decompose it into a collection of BCNF relations.

SUBMISSION FORMAT

A single document in **PDF (.pdf)** format. The word count limit for each question is **250 words.** The word count limit for this document is **1,000 words, excluding references, tables, figures, diagrams and appendices**

MARKING CRITERIA

The following criteria will be used to assess the assignment:

Indication about maximum possible marks:

Problem 1 (25%, ILO: 1,2,4):
- Having correct entity types or relationship types: 4 marks
- Having correct entity or relationship attributes: 4 marks
- Having correct cardinalities: 4 marks
- Having correct keys: 4 marks
- Having correct multiplicities: 3 marks
- Having correct Specialisations: 3 marks
- Having correct modelling of a part: 3 marks

Problem 2 (25%, ILO: 2, 3, 4):
- Having correct table: 5 marks
- Having all correct entity or relationship attributes: 10 marks
- Having all correct keys: 5 marks
- Use correct more tables than necessary: 5 marks

Problem 3 (25%, ILO: 2, 3, 4, 5):
- Question 3-1: 7 marks
- Question 3-2: 9 marks
- Question 3-3: 9 marks

Problem 4 (25%, ILO: 1, 2, 4):
- Question 4-1: 15 marks (Derivation steps for solutions are required)
- Question 4-2: 10 marks (Derivation steps for solutions are required)

A pass is achieved when there is evidence of sufficient knowledge of techniques for optimising database performance, creating database models and understanding the relevant algorithms or steps.

A higher mark is achieved when there is evidence of a holistic understanding of techniques for optimising database performance, creating database models and the relevant algorithms or steps, including a clear outline of the methodology followed.

INTENDED LEARNING OUTCOMES (ILOs)
This unit assesses your ability to:

1. Evaluate alternative strategies for distributed database design.
2. Understand and apply techniques for optimising database performance.
3. Discuss the advantages and disadvantages of different data and database models.
4. Analyse a complex data modelling problem and apply entity modelling techniques and normalisation to construct a suitable relational data model.
5. Understand data warehousing and the data mining process including a selected set of data mining techniques.

QUESTIONS ABOUT THE BRIEF
Questions about the brief will be handled during the seminars/lab sessions. An email will be used for handling questions about the brief (dwu@bournemouth.ac.uk) when no seminar/lab session is scheduled between the time the questions arise and the submission deadline.

Unit Leader Signature   Dehao Wu

PENDING EXTERNAL EXAMINER REVIEW
This version of the coursework assessment brief has been approved internally by Bournemouth University. However, **please note** that it is yet to be approved by the unit's external examiner. Therefore, there may be some minor changes made to this assessment brief as a result of external examiner comments.

A **new version** of the brief will be published by the Unit Leader and an announcement will be posted on Brightspace to notify you once the final version has been made available.

Help and Support
Undergraduate Coursework Assessments

If a piece of coursework is not submitted by the required deadline, the following will apply:
1. If coursework is submitted within 72 hours after the deadline, the maximum mark that can be awarded is 40%. If the assessment achieves a pass mark and subject to the overall performance of the unit and the student's profile for the level, it will be accepted by the Assessment Board as the reassessment piece. This ruling will apply to written coursework and artefacts only; This ruling will apply to the first attempt only (including any subsequent attempt taken as a first attempt due to exceptional circumstances).
2. If a first attempt coursework is submitted more than 72 hours after the deadline, a mark of zero (0%) will be awarded.
3. Failure to submit/complete any other types of coursework (which includes resubmission coursework without exceptional circumstances) by the required deadline will result in a mark of zero (0%) being awarded.

The Standard Assessment Regulations can be found on **Brightspace or via** https://www1.bournemouth.ac.uk/students/help-advice/important-information (under Assessment).

Exceptional Circumstances

If you have any valid **exceptional circumstances** which mean that you cannot meet an assignment submission deadline and you wish to request an extension, you will need to complete and submit the online Exceptional Circumstances Form together with appropriate supporting evidence (e.g. GP note) normally **before the coursework deadline**. Further details on the procedure and links to the exceptional circumstances forms can be found on **Brightspace or via** https://www1.bournemouth.ac.uk/students/help-advice/looking-support/exceptional-circumstances. Please make sure that you read these documents carefully before submitting anything for consideration. For further guidance on exceptional circumstances please contact your Programme Leader.

Referencing

You must acknowledge your source every time you refer to others' work, using the **BU Harvard Referencing** system (Author Date Method). Failure to do so amounts to plagiarism which is against University regulations. Please refer to https://libguides.bournemouth.ac.uk/bu-referencing-harvard-style for the University's guide to citation in the Harvard style. Also be aware of Self-plagiarism, this primarily occurs when a student submits a piece of work to fulfill the assessment requirement for a particular unit and all or part of the content has been previously submitted by that student for formal assessment on the same/a different unit. Further information on academic offences can be found on **Brightspace** and from https://www1.bournemouth.ac.uk/discover/library/using-library/how-guides/how-avoid-academic-offences

Additional Learning Support

Students with **Additional Learning Needs** may contact the Additional Learning Support Team. Details can be found here: https://www1.bournemouth.ac.uk/als

Primary Research (Undergraduate Levels)

You should not be conducting any primary research (i.e. carrying out an investigation to acquire data first-hand, for example, where it involves approaching participants to ask questions or to participate in surveys, questionnaires, interviews, observations, focus groups, etc.) unless otherwise specified in the brief. However, if there is a genuine requirement to collect primary research data you will require ethical approval before doing so. In the first instance, please discuss with the Unit Leader. The collection of primary data without appropriate ethical approval is a serious breach of Bournemouth University's Research Ethics Code of Practice and will be treated as Research Misconduct.

IT Support

If you have any problems submitting your assessment please contact the IT Service Desk - +44 (0)1202 965515 - immediately and before the deadline.

Disclaimer

The information provided in this assignment brief is correct at time of publication. In the unlikely event that any changes are deemed necessary, they will be communicated clearly via e-mail and Brightspace and a new version of this assignment brief will be circulated.