Term 3 Database Modelling Worksheet 1 : ER Diagrams

DB Terms (Synonyms) :
Table, Relation, Entity
Record, Row, Tuple
Attribute, Field, Column

Data Integrity: The accuracy (,security) and consistency of the data.

Normalisation: The process of organising data in a database to **reduce redundancy** and **maintain data integrity.**

Please complete ALL questions.

For each question, you are given a context. You will then have to use this context to answer 2 general questions:

A. Draw an initial **ER-diagram** that describes the main entities and their relationships for the given context.

B. Describe the **relations** corresponding to each context **after normalisation to 3NF**.

Note: you should define all assumptions made (that are outside of the specification of the given context). These assumptions cannot contradict the given context.

1. In a school (e.g., a JC), many subjects are taught. For each such subject, there may be 1 or more classes, with each such class containing several students (at least 3) and 1 teacher.
    Every subject has a subject head, who is also a teacher.

2. A company rents holiday apartments to customers. A customer usually makes a booking a number of months before the start of the rental period. The customer pays a deposit at the time of the booking and the balance (the remaining money owed) a month before the start of the rental.

At the time of the booking, the company records the following data:
- Customer name and address, if the customer has not made a booking before
- Customer reference code
- Booking date
- Rental start date
- Rental completion date
- Apartment type
- Deposit Taken

Apartment types are coded as follows:
- A1 for 1-bedroom apartment
- A2 for 2-bedroom apartment
- A3 for 3-bedroom apartment

Each apartment type has its own daily rental.

Each apartment has a unique number.

Each customer may make more than one booking.

3. A firm hires vehicles to customers. A customer usually makes a booking a number of weeks before the start of the hire period. The customer pays a deposit at the time of the booking and the balance when they return the vehicle from hire.

At the time of the booking, the firm records the following data:

- customer data, including a customer reference code
- booking date
- hire start date
- hire return date
- type of vehicle
- deposit taken

Vehicle types are coded as follows:

- Small car – SC
- Large car – LC
- Utility vehicle – UV

Each vehicle type has its own daily charge, for each day of the hire period.

Each vehicle has a unique registration.

Customers may make more than one booking. The software will not allow a customer to make more than one booking for the same start date.

The document below is an example of an invoice printed for the customer when they return the vehicle and pay the balance due.

INVOICE

Yi Ling Tan
12 The Street
The District
753352

Customer Reference: TAN60876

Booking Date: 13/06/2016
Vehicle registration: 5BFE3571H
Vehicle type: UV

Start date	Return date	Days charged	Vehicle rate	
21/07/2016	28/07/2016	8	$ 85.50	$ 684.00
			Deposit Paid:	$ 100.00
			Amount Due:	$ 584.00

4. A researcher has proposed to maintain a database for keeping track of the references to literature (i.e., references consisting of papers and articles and books). There are 3 primary forms of references: Journal Papers, Conferences Papers and Books. Examples of these are as follows:

- Quinlan, J. R. (1986). Induction of decision trees. Machine learning, 1(1), 81-106.

This is a Journal paper. It contains the name(s) of the author(s), the year of publication, the title of the paper, the name of the journal, the volume and issue (i.e., vol(issue)) in question, and finally, the specific pages within the journal for the paper in question.

- Bensusan, H. (1998). God doesn't always shave with Occam's razor — learning when and how to prune. In the 10th European Conference on Machine Learning, 119-124.

This is a Conference paper. It contains the name(s) of the author(s), the year of publication, the title of the paper, the name of the conference proceedings where it appears, and finally, the specific pages within the conference proceedings for the paper in question.

- Russell, S. J., & Norvig, P. (2016). Artificial intelligence: a modern approach. Pearson Education Limited.

This is a Book reference. It contains the name(s) of the author(s), the year of publication, the title of the book, and finally the name of the publisher.

Your database is to be modelled to store references to each of the 3 types of literature.