



**Information Systems
Database Systems (Higher)
Homework Questions**

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INFORMATION SYSTEMS

HIGHER

DATABASE SYSTEMS

Homework Sheet 1

Write answers to each of the following questions in your homework jotter. If a question asks you to describe or explain, you are expected to write your answer in sentences and not just give one word answers.

1 Explain what is involved in converting unnormalised data through first, second and third form normalisation.

2 (a) What problems are likely to occur if data is not reduced to at least first normal form?

(b) What problems can occur if data is not normalised to second normal form?

(c) What problems can occur if data is not reduced to third normal form?

3 Convert the relation shown in the table below into third normal form.

In this example, costs are per portion.

Seaview Hotel

ROOM SERVICE

Order Number: 231

Waiter Number: 4

Room: 23

Waiter Name: Gault R

ORDER DETAILS

Menu Reference	Menu Description	Quantity	Cost
13	Duck Soup	2	4.75
9	Chicken Soup	1	4.85
26	Mussels	3	9.50
56	Roast Chicken	3	12.50

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Homework Sheet 2

- 1 (a) The relation in the table below is unnormalised.

Customer #	Item Code	Description	Quantity	Unit Price
21643	JH74	Stapler	3	5.86
	UM92	Ruler	24	0.23
	VW87	4 part dividers	5	0.45
79901	JH74	Stapler	4	5.86
	NA38	Ring Binder	12	0.49

- (i) Which columns of the table hold repeating data?
(ii) Explain why it is inefficient to hold repeating data in a table.
- (b) The relation below is in 1NF.
- (Member Number
Member Name
Member Address
Membership Code
Membership
Description)
- (i) Give an example of an insertion anomaly that could occur as a result of this decision.
(ii) Give an example of a deletion anomaly that could occur.
- (Member Number
Book Number
Book Title
Book Author
Date Borrowed)
- (iii) Give an example of an amend anomaly that could occur.
- (c) (i) Reduce the 1NF relation described in part (b) to 2NF.
(ii) Reduce this 2NF relation to 3NF.

- 2 (a) Explain the importance of the data dictionary.
(b) What information is added to the data dictionary during data analysis?
(c) What information is added to the data dictionary during database design?
(d) How does the information added during the design stage differ from the information added during the analysis stage?

- 3 (a) Produce a data dictionary to show decisions made during the analysis phase of database development for system described in Exercise 17 number 2. Show *only* the Booking and Client Activity entities.
(b) Produce a data dictionary to show design decisions for the same entities.

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Homework Sheet 4

- 1 (a) Convert the following unnormalised library data into first normal form.

Member #	Member Name	Item Number	Borrow Date
24786	Swan, Chris	1324352	12/03/99
11765	Davis, Jo	4215463	13/03/99
		5421546	
		2253884	
57861	Kerr, Sam	3132456	13/03/99

- (b) From this example, which data is –
(i) duplicate data
(ii) repeating data?
- (c) What would be the primary key for the new relation created during the normalisation process?
- (d) Produce the data dictionary that would be generated during data analysis.
- (e) Produce the detailed data dictionary that would be created during database design. You should assume that Access will be used to implement the database.

- 2 (a) Describe how entities are held in Access.
(b) Describe the facility of Access that is used to sort and search the data.
(c) Describe the Access facility that is used to produce hardcopies of selected data.
(d) Describe a use made of the Access form facility in a library.

- 3 A relation is reduced to 1NF. The analysts are deciding whether or not to bother reducing the relation to 2NF. The relation is shown below.

Application (Application #
Applicant #
Applicant Surname
Applicant Initial
Applicant Address
Course Code
Course Title
Date Application received)

Qualification (*Application #
Qualification #
Qualification Name
Qualification Level
Grade Achieved)

- (a) Give an example of an insertion anomaly that would occur if the relation was left in 1NF.
(b) Give an example of a deletion anomaly that would occur if the relation was left in 1NF.
(c) Give an example of an amend anomaly that would occur if the relation was left in 1NF.

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Homework Sheet 5

- 1 (a) Consider the relation described below.
- Pupil (Pupil ID
Pupil Surname
Pupil First name
Pupil Class
Pupil Reg Teacher
Purchase Item
Item Code
Item Cost
Date of purchase) } repeating data
- (a) Reduce this relation to First Normal Form.
- (b) Write down the name of the concatenated key in the new relation.
- (c) How do we remove concatenated keys from a relation?
- (d) Give an example of an insertion anomaly that will occur if this relation is not reduced to 2NF.
- (e) Give an example of a deletion anomaly that will occur if this relation is not reduced to 2NF.
- (f) Give an example of an amend anomaly that will occur if this relation is not reduced to 2NF.
- (g) Reduce this relation to 3NF.
- (h) Draw the E/R diagram for the 3NF relation.
- 2 In the above relation, data is being stored about pupil purchases.
- (a) Explain the importance of validity checking when entering data into a relational database.
- (b) Give three different examples of validity checks that could be performed on the data in this system.
- (c) Describe possible restrictions on the naming of fields in a RDBMS.
- (d) Explain the importance of indexing in a relational database.
- (e) Why is it important to enforce referential integrity in relations between tables of a database?