

Past-paper walk-through

Database Concepts ■ 8.1

eXercise

Questions in this set

- 9618/11 N25 Q2 ■ 13 marks
- 9618/12 N25 Q4 ■ 10 marks
- 9618/13 N25 Q5 ■ 16 marks
- 9618/11 J25 Q5 ■ 13 marks
- 9618/11 N24 Q2 ■ 17 marks
- 9618/12 N24 Q6 ■ 12 marks
- 9618/11 J24 Q6 ■ 15 marks
- 9618/12 J24 Q4 ■ 11 marks

Reading the mark scheme

- **B1** a mark that stands on its own – the point is either made or not.
- **M1** a *method* mark: the right approach, even if the number is wrong.
- **A1** an *answer* mark, and it usually needs its M mark first.
- **C1** a working mark on the way to the answer.
- **//** separates answers the examiner accepts equally.
- **ecf** = error carried forward: a later part is marked on your own earlier answer.
- **owtte** = “or words to that effect” – the wording need not match.

Question 2

9618/11 N25 ■ Q2 ■ 13 marks

A relational database, WORKEXPERIENCE, stores data about students and the companies where they complete work experience.

Students can complete multiple work experience placements but can only complete one placement at a time.

Students can complete more than one placement at the same company.

Part of the database is shown:

STUDENT(StudentID, FirstName, TelephoneNumber, UniversityName)

PLACEMENT(PlacementID, StudentID, CompanyID, StartDate, EndDate, Complete)

COMPANY(CompanyID, CompanyName, MaxStudentsPerPlacement)

(a) Complete the entity-relationship (E-R) diagram for the database WORKEXPERIENCE.

Question 2

(b) Explain why the database WORKEXPERENCE is in Third Normal Form (3NF). [2]

(c)(i) Write a Structured Query Language (SQL) script to delete all placements that have been completed. [2]

(c)(ii) Write an SQL script to return the total number of placements completed by the student with ID LDEA01 at the company with ID NEAM. The total should be given an appropriate name. [4]

(d) The database tables are repeated here:

STUDENT(StudentID, FirstName, TelephoneNumber, UniversityName)

PLACEMENT(PlacementID, StudentID, CompanyID, StartDate, EndDate, Complete)

COMPANY(CompanyID, CompanyName, MaxStudentsPerPlacement)

Explain what is meant by referential integrity, and how it applies to this database. [3]

Question 2

PlacementID	StudentID	CompanyID	StartDate	EndDate	Complete
PC001	LDEA01	MSCM	01/01/2023	12/07/2023	TRUE
PC002	LDEA01	MSCM	01/04/2024	08/05/2024	FALSE
PC003	ALAU02	NEAM	09/03/2020	10/03/2021	FALSE
PC004	LOLI75	GOUZ	07/06/2018	11/09/2018	TRUE

Solution 2

(a)

Mark scheme

- 1 mark for each correct relationship, max 2 marks

Solution 2

(b)

Mark scheme

- 1 mark per bullet point, max 2 marks
- ■ There are no repeating groups of attributes
- ■ There are no many-to-many relationships
- ■ There are no partial key dependencies // no non-key dependencies // no transitive dependencies

Solution 2

(c)(i)

Mark scheme

- 1 mark per bullet point, max 2 marks
- ■ DELETE FROM and correct table
- ■ Correct condition
- Example answer:
- DELETE FROM PLACEMENT
- WHERE Complete = TRUE;

Solution 2

(c)(ii) Mark scheme

- 1 mark per bullet point, max 4 marks
- ■ SELECT COUNT any appropriate field
- ■ AS and an appropriate name
- ■ FROM and correct table and WHERE and one correct condition
- ■ Two AND clauses with the other two correct conditions
- Example answer:
- SELECT COUNT (CompanyID)
- AS TotalPlacements

Solution 2

- FROM PLACEMENT
- WHERE CompanyID = "NEAM"
- AND StudentID = "LDEA01"
- AND Complete = TRUE;
- 4
- October/November
- 2025

Solution 2

(d) Mark scheme

- 1 mark per bullet point, max 3 marks
- Generic mark points (max 2)
 - ■ Referential integrity ensures that related data is consistent
 - ■ Referential integrity ensures that every foreign key has a corresponding primary key
 - ■ Referential integrity provides for cascading update / delete

Solution 2

- ■ Referential integrity ensures that if a primary key is deleted or modified all linked records in foreign table will be deleted or modified // Referential integrity stops "orphaned records"—records in a table that point to an entry in another table that no longer exists
- Specific mark points (max 2) for good examples e.g.
- ■ CompanyID is a foreign key in PLACEMENT table and is dependent on the primary key CompanyID in COMPANY table
- ■ If a record is deleted from the STUDENT table, then all records with the same StudentID will be deleted from the PLACEMENT table
- ■ If a CompanyID is modified in the company table, all records with that
- CompanyID in the placement table will also be modified

Solution 2

- 3
- October/November
- 2025

Question 4

9618/12 N25 ■ Q4 ■ 10 marks

A relational database, SHIPPING, stores data about the ships in a company and the containers that are carried on the ships.

The database has the following tables:

CONTAINER(ContainerID, Type, Weight, OwnerName, ShipID)

SHIP(ShipID, Type, Capacity, ShipName)

(a) Describe the relationship between the two tables. Refer to the primary and foreign keys in your answer. [2]

(b) The table CONTAINER needs an additional field to store the data for the last inspection date.

Write a Structured Query Language (SQL) script to add **one** field to the table CONTAINER to store the date of last inspection of the container, for example 08/07/2019. [2]

Question 4

- (c)** Write an SQL script to return the number of containers stored in the database for the ship with the name Caledonia. [4]
- (d)** Describe the purpose of a developer interface in a Database Management System (DBMS). [2]

Solution 4

(a)

Mark scheme

- 1 mark per bullet point, max 2 marks
- ■ The relationship between SHIP and CONTAINER is one-to-many (1:M)
- ■ The primary key ShipID in the SHIP table is linked to the foreign key
- ShipID in the CONTAINER table

Solution 4

(b)

Mark scheme

- 1 mark per bullet point, max 2 marks
- ■ ALTER TABLE statement
- ■ Including the additional field with a suitable field name and suitable field type
- Example answer
- ALTER TABLE CONTAINER
- ADD InspectionDate DATE;

Solution 4

(c) Mark scheme

- 1 mark per bullet point, max 4 marks
- ■ SELECT COUNT statement
- ■ Using the correct tables
- ■ Joining the tables
- ■ The condition for the name
- Example Answer 1:
 - SELECT COUNT(ContainerID)
 - FROM CONTAINER, SHIP

Solution 4

- WHERE CONTAINER.ShipID = SHIP.ShipID
- AND ShipName = "Caledonia";
- Example Answer 2:
- SELECT COUNT(ContainerID)
- FROM CONTAINER INNER JOIN SHIP
- ON CONTAINER.ShipID = SHIP.ShipID
- WHERE ShipName = "Caledonia";

Solution 4

(d) Mark scheme

- 1 mark per bullet point, max 2 marks
- ■ To allow the user to create / modify / delete tables // maintain the database
- ■ To allow the user to set up / modify relationships
- ■ To allow the user to create a form for data input
- ■ To allow a user to add tools to a form // for example, drop-down boxes / buttons etc.
- ■ To allow a user to design a report (to show the output in an organised manner)
- ■ To allow a user to add a menu to enable a choice of different actions

Solution 4

- ■ To allow a user to inspect the database contents and metadata
- ■ ... by creating and/or running different SQL queries
- 2
- October/November
- 2025

Question 5

9618/13 N25 ■ Q5 ■ 16 marks

A company creates a relational database to store data about its customers.

The database, REVIEWS, stores data about the customers, products, complaints and staff.

The database has four tables:

CUSTOMER(CustomerID, CustomerFirstName, CustomerLastName,
CustomerEmail)

PRODUCT(ProductID, ProductName, ProductDetail, Price, Rating)

COMPLAINT(ComplaintID, ProductID, CustomerID, ComplaintDetails,
StaffID)

STAFF(StaffID, StaffFirstName, StaffLastName, Department,
RemoteWorker)

(a) Complete the entity-relationship (E-R) diagram for the database REVIEWS.

Question 5

CUSTOMER

PRODUCT

COMPLAINT

STAFF

[3]

Question 5

StaffID	StaffFirstName	StaffLastName	Department	RemoteWorker
1	Ralph	Jura	E	Yes
2	Luca	Emcee	A	Yes
3	Darwin	Acula	F	No

Question 5

9618/13 N25 ■ Q5 ■ 16 marks

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PRODUCT(ProductID, ProductName, ProductDetail, Price, Rating)

COMPLAINT(ComplaintID, ProductID, CustomerID, ComplaintDetails, StaffID)

STAFF(StaffID, StaffFirstName, StaffLastName, Department, RemoteWorker)

(b) Some example data from the STAFF table is shown.

Question 5

StaffID	StaffFirstName	StaffLastName	Department	RemoteWorker
1	Ralph	Jura	E	Yes
2	Luca	Emcee	A	Yes
3	Darwin	Acula	F	No

Write a Structured Query Language (SQL) script to define the table STAFF.

[4]

Question 5

9618/13 N25 ■ Q5 ■ 16 marks

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PRODUCT(ProductID, ProductName, ProductDetail, Price, Rating)

COMPLAINT(ComplaintID, ProductID, CustomerID, ComplaintDetails, StaffID)

STAFF(StaffID, StaffFirstName, StaffLastName, Department, RemoteWorker)

(c) Products are given a rating between 1 and 10 inclusive.

Write an SQL script to return only the ProductID, ProductName and

ComplaintDetails for all products with a rating of 5 or less. The results need to be displayed in descending order of rating.

[5]

Question 5

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PRODUCT(ProductID, ProductName, ProductDetail, Price, Rating)

COMPLAINT(ComplaintID, ProductID, CustomerID, ComplaintDetails, StaffID)

STAFF(StaffID, StaffFirstName, StaffLastName, Department, RemoteWorker)

(d) A Database Management System (DBMS) is used to maintain and manage the database.

Describe **two** ways in which the DBMS can be used to ensure the security of the customer data.

1.

Question 5

2.

[4]

Solution 5

(a)

Mark scheme

- 1 mark for each correct relationship, max 3 marks

Solution 5

(b) Mark scheme

- 1 mark per bullet point, max 4 marks
- ■ Create table with opening and closing brackets and commas separating the attributes
- ■ Appropriate data types for StaffFirstName, StaffLastName and
- Department
- ■ Appropriate data types for StaffID and RemoteWorker
- ■ Primary key correctly defined
- Example Answer 1:

Solution 5

- CREATE TABLE STAFF(
 - StaffID INTEGER,
 - StaffFirstName VARCHAR,
 - StaffLastName VARCHAR,
 - Department CHAR,
 - RemoteWorker BOOLEAN,
 - PRIMARY KEY (StaffID)
-);
- Example Answer 2:
- CREATE TABLE STAFF(

Solution 5

- StaffID INTEGER NOT NULL PRIMARY KEY,
- StaffFirstName VARCHAR,
- StaffLastName VARCHAR,
- Department CHAR,
- RemoteWorker BOOLEAN
-);
- 4
- October/November
- 2025

Solution 5

(c) Mark scheme

- 1 mark per bullet point, max 5 marks
- ■ SELECT and the correct attributes
- ■ FROM and the correct tables
- ■ Tables joined correctly
- ■ Correct condition for the rating
- ■ Correct ORDER BY clause
- Example Answer 1
- `SELECT PRODUCT.ProductID, ProductName, ComplaintDetails`

Solution 5

- FROM PRODUCT, COMPLAINT
- WHERE PRODUCT.ProductID = COMPLAINT.ProductID
- AND Rating <=5
- ORDER BY Rating DESC;
- Example Answer 2
- SELECT PRODUCT.ProductID, ProductName, ComplaintDetails
- FROM PRODUCT INNER JOIN COMPLAINT
- ON PRODUCT.ProductID = COMPLAINT.ProductID
- WHERE Rating <=5
- ORDER BY Rating DESC;

Solution 5

(d) Mark scheme

- One mark for identification of method one mark for corresponding description max 4 marks
- ■ Authentication methods / passwords / biometrics / 2-factor authentication can be implemented
- ■ ... which prevents unauthorised access to the customer's data
- ■ Access rights / privileges can be set
- ■ ... so that only those with correct permissions can read / edit customer's data
- ■ Regular backups can be scheduled

Solution 5

- ■ ... so that a second copy of the customer's data is available in case of loss/damage
- ■ The data can be encrypted
- ■ ... so that the customer's data cannot be understood by anyone who gains unauthorized access
- ■ Different views can be created
- ■ ... so that not everyone can see the customer's data
- 4
- October/November
- 2025

Question 5

9618/11 J25 ■ Q5 ■ 13 marks

A company builds and sells furniture to customers. The company stores data about customers, their payment cards and their furniture orders in a database.

The database, FURNITURE, has the following tables:

CUSTOMER(CustomerID, Name, Phone)

CUSTOMER_CARD_DATA(CardID, CustomerID, CardType, CardNumber, EndDate)

ORDER(OrderID, CustomerID, TotalCost, Paid, OrderDate, Complete)

ORDER_ITEM(OrderItemID, OrderID, Type, Height, Width, Depth, Details)

The primary keys are underlined in each table.

The attribute Complete in the table ORDER stores the Boolean value TRUE if the order has been built and FALSE if the order has not been built.

(a) Complete the entity-relationship (E-R) diagram for the database.

[3]

Question 5

	Table	Foreign key
1		
2		

Question 5

9618/11 J25 ■ Q5 ■ 13 marks

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ORDER_ITEM(OrderItemID, OrderID, Type, Height, Width, Depth, Details)

The primary keys are underlined in each table.

The attribute Complete in the table ORDER stores the Boolean value TRUE if the order has been built and FALSE if the order has not been built.

(b) Identify one attribute in the table CUSTOMER_CARD_DATA that could be a candidate key.

[1]