Revision

11.2A Information systems

Objectives of the first section

Database basics	• describe relational databases and their purpose • define data types when creating a database • use the terms attribute, object, index, record, table and tuple to describe databases • explain the difference between primary composite and foreign key
Database Normalization	• Bring connections to the third normal form (3NF)
Entity Relationship Diagrams	• Define the connections between tables in database • Create an entity-relationship (ER) model
SQL (query language)	• Explain the purpose of data dictionary • Compare the data definition language (DDL), and the data manipulation language (DML) • Describe the basic SQL queries for working with tables in a database: CREATE, ALTER and DROP • Describe the basic SQL queries for working with one table in a database: SELECT, UPDATE, INSERT and DELETE • Use SQL SELECT for data selection in more tables

QQQ

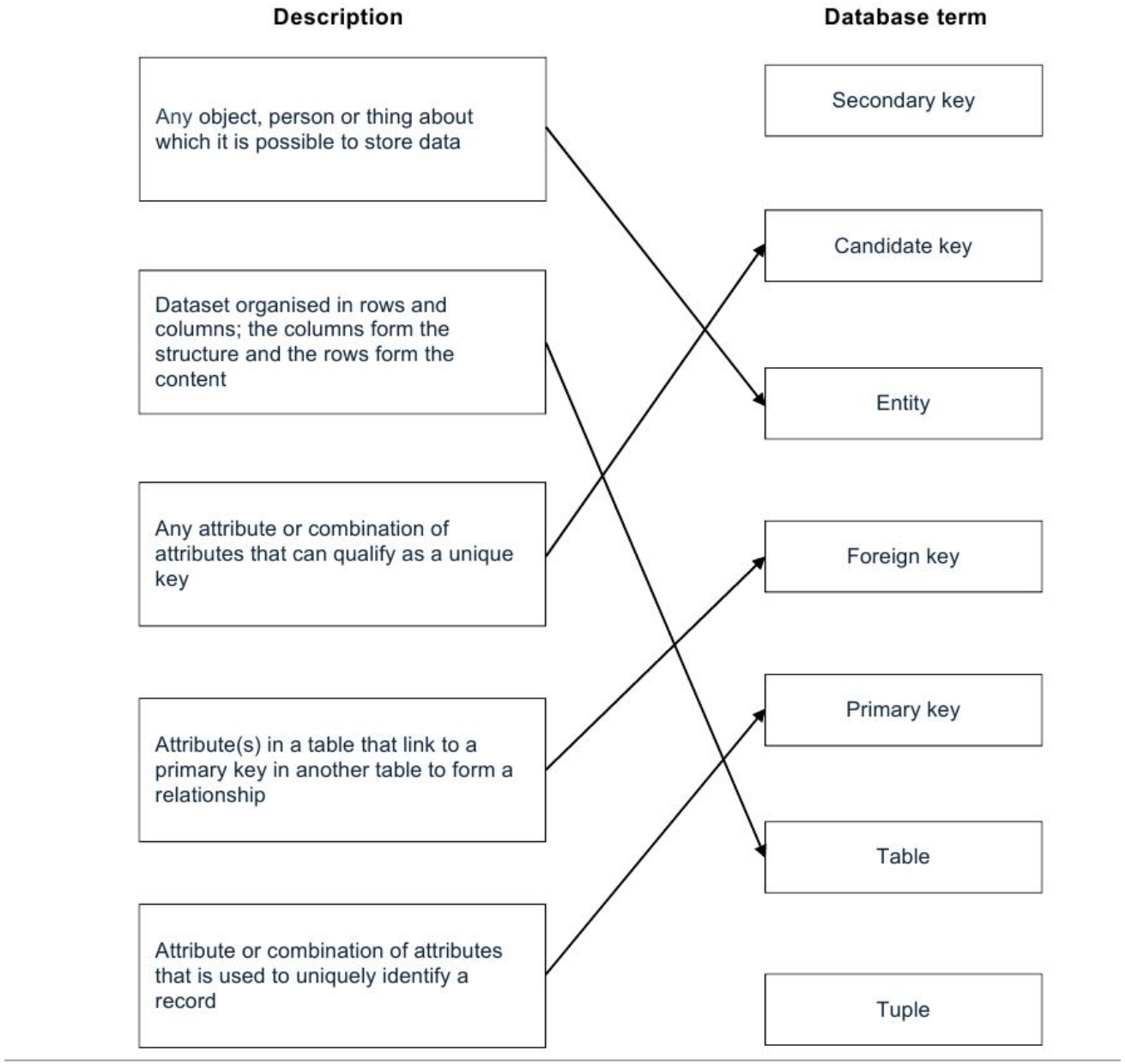
1 (a) Five descriptions and seven relational database terms are shown below.

Draw a line to link each description to its correct database term.

Description	Database term
Any object, person or thing about which it is possible to store data	Secondary key
Dataset organised in rows and columns; the columns form the structure and the rows form the content	Candidate key
Any attribute or combination of attributes that can act as a unique key	Entity
Attribute(s) in a table that link to the primary key in another table to form a relationship	Foreign key
Attribute or combination of attributes that is used to uniquely identify a record	Primary key
	Table
	Tuple

[5]

Answer


Description
Database term
Any object, person or thing about which it is possible to store data
Dataset organised in rows and columns; the columns form the structure and the rows form the content
Any attribute or combination of attributes that can qualify as a unique key
Attribute(s) in a table that link to a primary key in another table to form a relationship
Attribute or combination of attributes that is used to uniquely identify a record
Secondary key
Candidate key
Entity
Foreign key
Primary key
Table
Tuple

QQQ

(c) The `CLASS` table has primary key `ClassID` and stores the following data:

ClassID	Description	StartDate	ClassTime	NoOfSessions	AdultsOnly
DAY01	Yoga beginners	12/01/2016	11:00	5	TRUE
EVE02	Yoga beginners	12/01/2016	19:00	5	FALSE
DAY16	Circuits	30/06/2016	10:30	4	FALSE

Write an SQL script to create the `CLASS` table.

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.....[6]

Answer

(c) An example of a script is shown, but different syntax may be used.

```
CREATE TABLE CLASS (
    ClassID VARCHAR(5),
    Description VARCHAR(30),
    StartDate DATE,
    ClassTime TIME,
    NoOfSessions INT,
    AdultsOnly BIT,
    PRIMARY KEY(ClassID)
);
```

Mark as follows:

1 mark for `CREATE TABLE CLASS` and `();`
1 mark for `PRIMARY KEY(ClassID)`
1 mark for both `ClassID VARCHAR(5),` and `Description VARCHAR(30),`
1 mark for both `StartDate DATE,` and `ClassTime TIME,`
1 mark for `NoOfSessions INT,`
1 mark for `AdultsOnly BIT,`

[6]

QQQ

(d) The doctor with the ID of 117 has recently been allocated a new `DoctorID` of 017.

(i) Write an SQL script to update this doctor's record in the database.

`UPDATE` .....

`SET` .....

`WHERE` .....

[3]

(ii) Describe why this update could cause problems with the existing data stored.

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.....[2]

(e) Write an SQL script to display the date and time of all appointments made by the patient with the `PatientID` of 556.

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.....[3]

Answer

7(d)(i)	**One mark** per line
	
	`UPDATE DOCTOR`
	`SET DoctorID = '017'`
	`WHERE DoctorID = '117';`
		3

7(d)(ii)	**1 Mark** per bullet, max 2 ∞ Referential integrity should be maintained // Referential integrity could be violated. ∞ Data becomes inconsistent ∞ There may be records in the `APPOINTMENT` table showing doctor ID 117 ∞ The `APPOINTMENT` table might not be automatically updated ∞ Records in the `APPOINTMENT` table will become orphaned	**Max 2**

7(e)	**One mark** per line
	
	`SELECT AppointmentDate, AppointmentTime`
	`FROM APPOINTMENT`
	`WHERE PatientID = '556';`
		3

QQQ

7 A company takes customer service for its clients very seriously.

The client

- The client names are unique.

A visit

- The company arranges a date for a visit to gather feedback from a client.
- A visit to a client never takes more than one day.
- Over time, the client receives many visits.

Staff (Interviewers)

- One or more staff attend the visit.
- If there is more than one staff member visiting, each performs a separate interview.

Interviews

- Each interview is classified as either 'general' or by some specialism, for example, marketing, customer service or sales.
- A report is produced for each interview, `InterviewText`.
- Each interview is conducted by a single staff member.

The client, visit, staff and interview data will be stored in a relational database.

(a) (i) Underline the primary key for each table in the following suggested table designs.

```
STAFF(StaffID, StaffName, Department)

CLIENT(ClientName, Address, Town)

VISIT(ClientName, VisitDate)

INTERVIEW(ClientName, VisitDate, StaffID, SpecialistFocus, InterviewText)
```

[3]

(ii) For each of the pairs of entities, A, B and C, draw the relationship between the two entities.

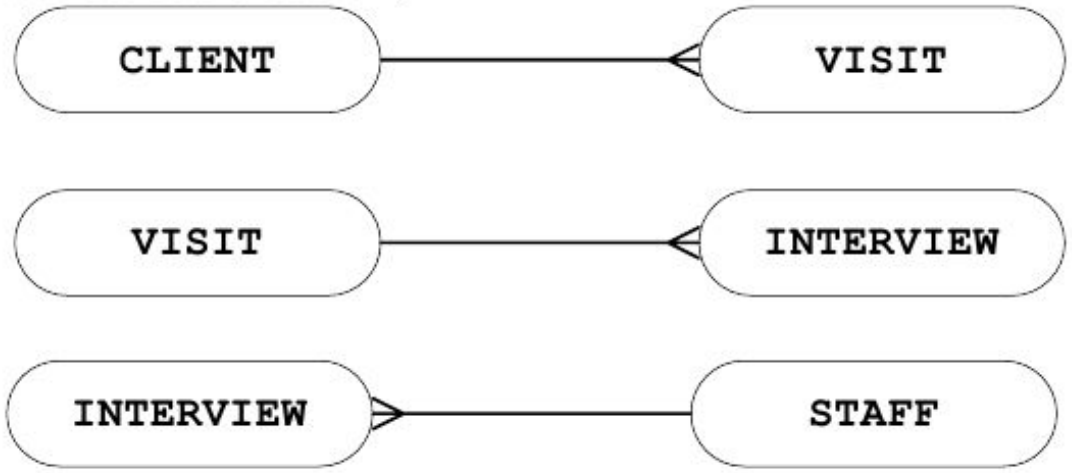
A	CLIENT	VISIT
B	VISIT	INTERVIEW
C	INTERVIEW	STAFF

[3]

Answer

Question	Answer	Marks

7(a)(i)	**1 Mark** for correct primary key identified in both `STAFF` and `CLIENT`
	`STAFF(StaffID, StaffName, Department)`
	`CLIENT(ClientName, Address, Town)`
	
	1 Mark for correct primary key identified in `VISIT`
	`VISIT(ClientName, VisitDate)`
	
	1 Mark for correct primary key identified in `INTERVIEW`
	`INTERVIEW(ClientName, VisitDate, StaffID, SpecialistFocus, InterviewText)`
		3

7(a)(ii)	**1 Mark** for each correct relationship 	**3**

QQQ

(b) The company decides to produce a visit report, `VisitReportText`, for each visit made.

This text will be produced from the one or more interview texts obtained at the visit.

State how one or more of the given table designs can be changed to add this attribute.

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.....[1]

(c) Client ABC Holdings are now trading under the name of Albright Holdings.

(i) Write an SQL script to update this client's record in the database.

```
UPDATE .....
SET .....
WHERE .....
```
[3]

(ii) Describe why this update could cause problems with the existing data stored.

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.....[2]

Answer

7(b)	**1 Mark** for correct answer Add attribute `VisitReportText` to table `VISIT`

7(c)(i)	**1 Mark** for each correct line
	
	`UPDATE CLIENT`
	`SET ClientName = 'Albright Holdings'`
	`WHERE ClientName = 'ABC Holdings';`

7(c)(ii)	**1 Mark** per bullet, max 2 ∞ Referential integrity should be maintained // Referential integrity could be violated ∞ Data becomes inconsistent ∞ There may be records in the `VISIT` and `INTERVIEW` tables / other tables with client name ABC Holdings

QQQ

7 A social media website has a relational database, WEBDATA, that stores the site's information.

The database has three tables to store users' details, and details of the images and text that they post.

USER(UserName, FirstName, SecondName, DateOfBirth)

PHOTO(PhotoID, UserName, Comment, UploadDate)

TEXTPOST(PostID, UserName, DateOfPost, TheText)

(b) A database administrator decides to enforce referential integrity.

Use an example from the database WEBDATA to explain what is meant by **referential integrity**.

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.....[3]

Answer

Question	Answer	Marks
7(b)	**1 mark** per bullet to **max 2** for explanation ∞ Referential integrity is making sure tables do not try to reference data which does not exist // A value of one attribute of a table exists as a value of another attribute in a different table ∞ A primary key cannot be deleted unless all dependent records are already deleted ∞ Cascading delete ∞ A primary key cannot be updated unless all dependent records are already updated ∞ Cascading update / edit ∞ Every foreign key value has a matching value in the corresponding primary key ∞ The foreign keys must be the same data type as the corresponding primary key **1 mark** for a suitable example e.g. ∞ A `UserName` cannot be deleted from the `USER` table if they have a related photo/textpost ∞ If `UserName` is updated in `USER` table, it must also be updated in `PHOTO` and `TEXTPOST` tables ∞ Cannot create/edit a record in `TEXTPOST` / `PHOTO` without a matching entry in `USER` table	**3**

Past Paper