Relational Databases and SQL

Keyword	Definition
Flat file	Stores s single table of data inside a single text file
Relational	Contains multiple tables
Primary key	A field that stores unique data for each record in a table
Foreign key	A field in a table that references the primary key of another table
SQL (Structured Query Language)	A language which allows you to create, query, update and delete data to and from a database

Relationships

The customers and appointments have a relationship formed through the CustomerID

Customers

CustomerID
FirstName
LastName
Mobile

Appointments

AppointID
CustomerID
Date
Time

Data Types

Integer (whole number)

Real, Float, Decimal (number with a decimal component)

Date, Time, Datetime (to store dates and times)

Char (fixed length string up to 8,000 characters)

Varchar (variable length string up to 8,000 characters)

Text (variable length string up to 2 GB of data)

Primary Keys

Primary key

Field name	Data type
ContactID	int / autonumber
FirstName	Varchar
LastName	Varchar
Nickname	Varchar
DateOfBirth	DateTime
PhoneNumber	Varchar

Database Concept

Table name: Animals

Field

Field name

Table

Record

Animal	Length	TopSpeed
Brown bear	2.48	21.7
Elk	1.4	45.1
Lion	2.8	49.7
Pig	0.9	10.9

SQL keywords

- All animal names in alphabetical order
  SELECT Animal FROM Animals
  ORDER BY Animal ASC
- All animal names and weights that are over 1000 kg
  SELECT Animal, Weight_kg FROM Animals WHERE Weight_kg > 1000
- All animals, including all fields that are over 2 m
  SELECT * FROM Animal WHERE Height_m > 2
- Change the Giraffe height from 5.5 to 5.6
  UPDATE Animals SET Height_m = 5.6 WHERE Animal = 'Giraffe'
- Remove the record for the Sealion
  DELETE FROM Animals WHERE Animal = 'Sealion'

Animals

Animal	Height_m	Weight_kg
Rhino	1.8	2000
Giraffe	5.5	1800
Emu	1.8	55
Llama	1.7	200
Sea lion	2.4	360

Writing a query in SQL

SELECT … (list the fields to be displayed)

FROM … (specify the table name)

WHERE … (list the search criteria)

Types of Relationships

- One-to-one
- Many-to-many
- One-to-many

Relational Databases and SQL

The SELECT statement

MemberID	FirstName	Surname	Gender	Town
1	David	Johnson	M	Ipswich
2	Christine	Bates	F	Woodbridge
3	Jasmine	Hamid	F	Ipswich
4	Peter	Okello	M	Colchester
5	Stephen	Hines	M	Woodbridge

The table above is named members

The following SQL statement will select all the records and fields from the table

SELECT MemberID, FirstName, Surname, Gender, Town
FROM members

The WHERE clause

SELECT FirstName, Surname
FROM members
WHERE Town = 'Ipswich'

FirstName	Surname
David	Johnson
Jasmine	Hamid

Sorting using ORDER BY

For **ascending** order

SELECT * FROM members
ORDER BY Surname **ASC**

For **descending** order

SELECT * FROM members
ORDER BY Surname **DESC**

Updating records

How could you change all 3 year old pets to be 4?

Dogs

DogID	Name	Breed	Colour	Gender	Age
1	Coco	Labrador	Brown	M	3
2	Milly	Spaniel	Black	F	5
3	Sasha	Retriever	Golden	F	4
4	Mark	Labrador	Black	M	3
5	Marlee	Retriever	Golden	F	2
6	Alfie	Spaniel	Brown	M	6
7	Georgie	Labrador	Brown	M	4

UPDATE Dogs SET Age = 4 WHERE Age = 3

Deleting records

How could you delete all Brown Labradors from the **Dogs** table?

DELETE FROM Dogs WHERE Breed = 'Labrador' AND Colour = 'Brown'

Joining two tables

Owners

OwnerID	Firstname	Lastname	DogID
1	Sophie	Marsh	1
2	Joshua	Allen	3
3	Mia	Heath	4
4	Alfie	Hayes	5
5	Nathan	Morgan	2
6	Niamh	McCarthy	7
7	Phoebe	Ross	6

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- A query can be made which selects information from two tables
  - How do you think you select the owner and dog names for all four year old dogs using the keywords SELECT, FROM, WHERE and AND?

SELECT Owners.Firstname, Owners.Lastname, Dogs.Breed
FROM Owners, Dogs
WHERE Owners.DogsID = Dogs.DogsID
AND Dogs.Age = 4