

GCSE OCR

Computer Science
J277

7

Introduction to SQL

Unit 7 Programming



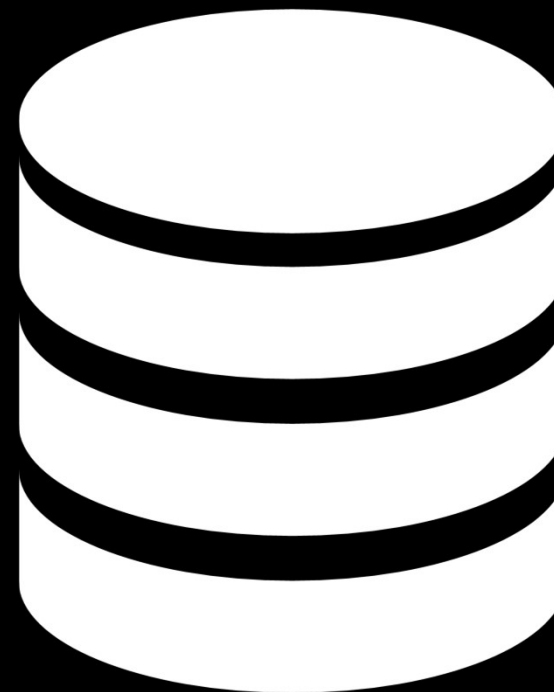
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Objectives

- Use SQL (Structured Query Language) statements to search for data:
 - Formulate criteria involving AND, OR and LIKE
 - Use SELECT, FROM, WHERE, ORDER BY statements
 - Use the wildcard *

Starter

- In the previous topic you saw how data could be stored and accessed using a file
 - Where else can data be stored and accessed?
 - Give some examples from the real world that use such a system



Starter

Answers

- Data can be stored in a structured way in **databases**
- Examples include:
 - **Social media content**
 - **Internet shopping sites – for products, prices, descriptions etc.**
 - **School student records**
 - **Tax records**



What is SQL?

- SQL stands for Structured Query Language
- It is a language which allows you to create, query and add data to databases
 - SQL is used within most Database Management Systems, including MySQL, SQL Server and MS Access
 - SQL queries can be used within high level programming languages such as Python, Visual Basic or C#



Writing a query using SQL

- The SQL syntax for querying a database is:

SELECT ... (list the fields to be displayed)

FROM ... (specify the table name)

WHERE ... (list the search criteria)

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
```

Using a wild card

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

- You can use a “wild card” * to mean “all columns”

```
SELECT *  
FROM members
```

- You can select specific columns in a query:

```
SELECT FirstName, Surname  
FROM members
```


The WHERE clause

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 WHERE clause is used to select only records satisfying a specified condition:

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

- What is the result of this query?

The WHERE clause

Answers

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

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

- Query result:

FirstName	Surname
David	Johnson
Jasmine	Hamid



Operators in the WHERE clause

- You have already used some of these operators in queries:

= != > < >= <= AND, OR, NOT

- You can use these operators in SQL queries:

```
SELECT *  
FROM members  
WHERE Town = 'Colchester' OR Town = 'IPSWICH'
```

```
SELECT FirstName, Surname  
FROM members  
WHERE (Town = 'Colchester' OR Town = 'IPSWICH') AND  
Gender = 'F'
```

Operators in the WHERE clause

- You can also use the following in SQL queries:

BETWEEN between an inclusive range

LIKE search for a pattern

For example:

```
SELECT *  
FROM members  
WHERE Surname LIKE 'H*'
```

This selects all members whose surname begins with H

Note the wildcard ***** in the LIKE string which acts as a substitute for zero, one or more characters

SELECT queries

- Look at the following table named “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

- Write SQL queries to find:
 - All the names and breeds of female dogs
 - All fields for dogs older than four (including those aged four)

SELECT queries

Answers

- Dogs table

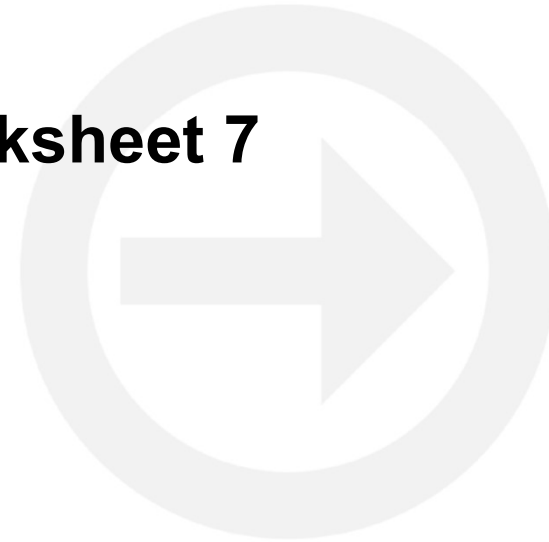
DogID	Name	Breed	Colour	Gender	Age
1	Coco	Labrador	Brown	M	3
2	Milly	Spaniel	Black	F	5
3	Sasha	Retriever	Golden	F	4
4	Mark	Labrador	Black	M	3
5	Marlee	Retriever	Golden	F	2
6	Alfie	Spaniel	Brown	M	6
7	Georgie	Labrador	Brown	M	4

- All the names and breeds of female dogs
 - `SELECT Name, Breed FROM Dogs WHERE Gender='F'`
- All fields for dogs older than four (including those aged four)
 - `SELECT * FROM Dogs WHERE Age >= 4`



Worksheet 7

- Now complete **Task 1** on **Worksheet 7**



Sorting: the ORDER BY keyword

- **ORDER BY** allows a query to sort data by ascending or descending order

- For **ascending** order

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

- For **descending** order

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


Sorting

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

- What will the result be for the following query?

```
SELECT FirstName, Surname  
FROM members  
ORDER BY Town ASC
```

Result of sorting

Answers

- Result after execution of the statement:

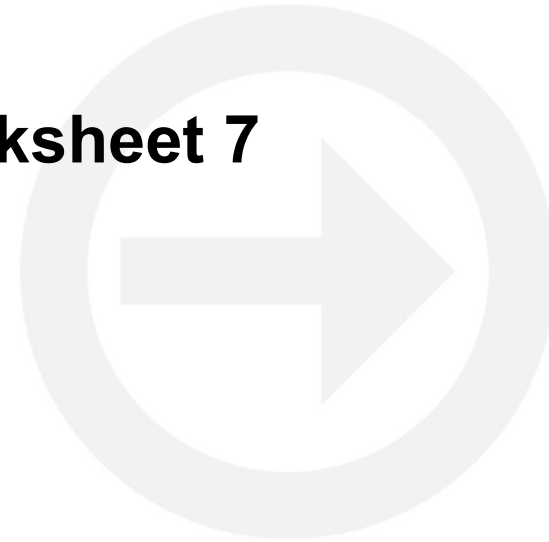
```
SELECT FirstName, Surname, Town  
FROM members  
ORDER BY Town ASC
```

FirstName	Surname	Town
Peter	Okello	Colchester
David	Johnson	Ipswich
Jasmine	Hamid	Ipswich
Christine	Bates	Woodbridge
Stephen	Hines	Woodbridge



Worksheet 7

- Now complete **Task 2** on **Worksheet 7**



Plenary

- Look at the table called Animals on the right
- In pairs create queries for the following:
 - All animal names in alphabetical order
 - All animal names and weights that are over 1000 kg
 - All animals, including all fields that are over 2 m

Animals

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



Plenary

Answers

- 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`

Animals

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



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