GCSE OCR

Computer Science
J277

7

Introduction to SQL

Unit 7 Programming

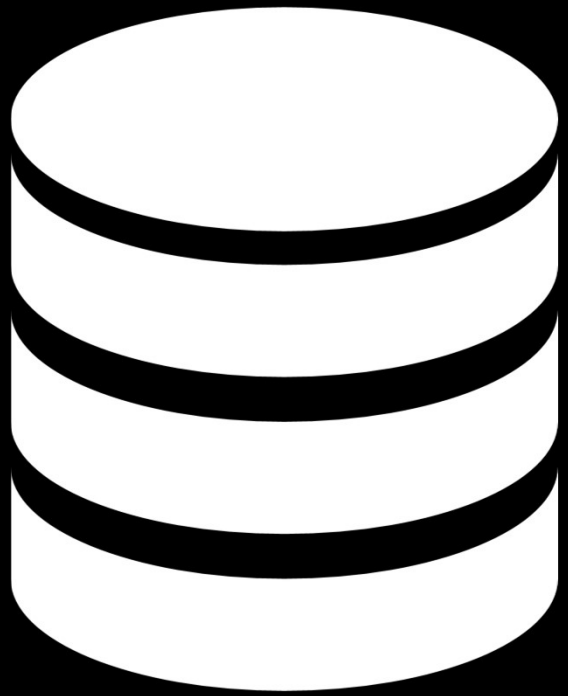
PG ONLINE

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

Copyright

Licence agreement