

GCSE Computer Science

Topic 2.2 Programming (3)

Databases	A data structure where data is held in tables made up of fields (columns) and records (rows). Databases can be flat file (one table for every piece of data) or relational (different tables holding data about specific items) Relational databases have tables which are linked together by key fields.
Field	Used to store a category of data e.g. name, age, address. All data in the same field must be the SAME data type.
Record	A record stores particular data about a particular item. Data in the same record can be DIFFERENT data types.
Primary key	Each record in a database should have a primary key. A primary key is a unique piece of data per record. This makes it easier to search for and distinguish between data records.

Array	An array is a data structure that stores multiple items of data, called elements, which are all of the same data type, under one name (an identifier) * Arrays are like lists.
Element	Each piece of data in an array is called an element – each element can be accessed using its position (or index) in the array.
Creating & working with an array	<pre> ARRAY subjects [2] subjects [0] = "Computer Science" subjects [1] = " Maths" print(subjects[0]) subjects [2] = "Science" </pre>

EXAMPLE: The numbers below are stored in an array called scores[]. Write an algorithm that will add 3 to each number of the scores[] array.

4	12	32	18	21	11	9	14	24
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For loop will run on each element of the array.

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FOR k = 0 to 8
  scores[k] = scores[k] + 3
NEXT k
        
```

Adds 3 to the element in position k of the array.

Sub program	<p>Sub programs are a self contained sequence of code, which perform a specific task.</p> <ul style="list-style-type: none"> • They used to save time and simplify code & avoid repeating code. • They make testing a program easier & give your code more structure.
Procedure	Procedures are sets of instructions stored under one name. When you want your program to do the whole set of instructions you need to 'call' the name of the procedure.
Function	Functions are similar to procedures, but the main difference is a FUNCTION ALWAYS RETURNS A VALUE.
Parameter	Parameters are special variables used to pass values into a subprogram.
Argument	Arguments are the actual values , stored in the parameters.

SQL	A set of commands that can be used to create, update and query (search) databases.
SELECT	SELECT : Used to tell the database what information you want to retrieve.
FROM	FROM : Tells the database which tables to look in for the data you are searching for. SELECT * FROM hotels SELECT hotel_name FROM hotels SELECT rooms, price_in_pounds FROM hotels
WHERE	Used to filter the results. The WHERE statement specifies conditions that must be met before data is retrieved. SELECT * FROM hotels WHERE hotel_rating >=4.1
AND / OR LIKE %	SELECT hotel_name FROM hotels WHERE bathroom = "En-suite" AND price_in_pounds < 45 SELECT hotel_name, price_in_pounds WHERE hotel_name LIKE "%Hotel"

Variables can be local or global

- 1) All variables have a **scope** (either local or global) — the scope of a variable tells you **which parts** of the program the variable can be used in.
 - Local variables can only be used **within the structure** they're declared in — they have a **local scope**.
 - Global variables can be used **any time** after their declaration — they have a **global scope**.
- 2) Variables declared inside a **sub program** are **local variables**. They are **invisible** to the rest of the program — this means that they can't be used **outside** the function.

Table: hotels

ID	hotel_name	hotel_rating	rooms	bathroom	price_in_pounds
1	Water Lodge	2.3	50	En-suite	42
2	Fire Inn	4.2	64	Shared	42
3	Earthen House	4.4	215	En-suite	39
4	Windy Hotel	3.5	150	Shared	57
5	River Hotel	3.8	180	Shared	46

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What I need to know:

- Describe what is meant by a 'database'.
- Define the term 'field'.
- Define the term 'record'
- State what is meant by a primary key.
- Describe what SQL is used for.
- State the function of the SELECT command.
- State the function of the FROM command
- Outline the function of the command 'SELECT *'
- Describe what the WHERE command is used for
- State the function of the % wildcard .
- Define the term 'array'.
- Define the term 'element'
- Write the code required to create an array, add 3 elements and then print out the first element.
- Describe what is meant by a sub program.
- Outline the benefits of using sub-programs.
- Define the terms 'function' and 'procedure' and state the main difference between the two.
- Define the term 'parameter'.
- Define the term 'argument'
- Describe what is meant by the scope of a variable.
- State the difference between a local and global variable.

The cars table below shows some data on the used cars that a car dealership has in stock.

CarID	Registration	Make	Type	Price	Engine_size
1	NF09 APY	Stanton	Hatchback	2500	1.4
2	SZ15 LUY	Fenwick	Saloon	4800	1.8
3	FQ55 ALW	Stanton	Hatchback	1700	2.1
4	SQ57 TTW	Fenwick	Estate	2300	2.8
5	NZ12 MBE	Stanton	Saloon	5200	1.8

- a) How many records does this table have?
..... [1]
- b) Explain the difference between a record and a field.
.....
.....
..... [2]

A comic book store keeps information about each of its comics in a database. The table below shows the first two entries from the comics table.

ID Number	Title	Publication date	Length	Genre	Rating
0001	Hike of hope	04-05-2015	82	Adventure	5
0002	Voyage of Destiny	05-09-2015	65	Science Fiction	4

- a) i) Identify a suitable field in the table above to use as a primary key.
..... [1]
- ii) Explain why database tables use primary keys.
..... [2]

Write an SQL query to return:

- i) the titles of all Science Fiction comics.
..... [2]
- ii) the titles and lengths of all the comics that have fewer than 50 pages and a rating of 3.
..... [2]
- iii) all the fields for comics with titles that begin with the letter H.
..... [2]

Kerry owns a cupcake shop which sells the following flavours of cupcake:
Vanilla Banana Strawberry Cherry Caramel

a) Write some code that will create a one-dimensional array called cupcakes which displays this list of cupcakes in the order they appear above.

Write a line of code to output the first item in the list.

Kerry wants to change the cherry cupcake for a raspberry one. Write a line of code to do this.