Knowledge Organiser 2.2 : Programming Fundamentals 2

1. Storing Data in Records

In Text Files	• Stored on the secondary storage (hard disk/SSD/flash).
	• Used to store data when the application is closed.
	• Useful for small volumes of data. E.g. configuration files.
	• Each entry is stored on a new line or separated with an identifier such as a comma or tab.
	• Can require a linear search to find/read data which is slow (if there is no order to the data or record structure).
	• Structured text files E.g. CSV, XML & JSON are popular for storing and exchanging data between applications
In Arrays and Lists	• Stored in RAM.
	• Used to store data when a program is running.
	• Useful for small volumes of data an algorithm is using.
	• Can be single or multi-dimensional allowing for tables of data to be stored.
	• Uses indexes to refer to data items.
	• Efficient algorithms or linear searches can be used to find data
In Databases	• Often stored on remote servers.
	• Often used to store data shared by many users, e.g. ticket booking system.

2. SQL

SELECT	which fields to be returned. * can be used to indicate all fields
FROM	which table. Databases can have more than one table, each with their own unique name
WHERE	records meet a condition. LIKE and % can be used as a wildcard

3. Arrays

Definition	An array is a series of memory locations – or 'boxes' – each of which holds a single item of data, but with each box sharing the same name. All data in an array must be of the same data type
Use	• Indexes usually start at 0 for the first data item (known zero indexed).
	• Arrays may be single or multiple dimensions.

4. Sub programs

Why Use them	• Larger programs are developed as a set of sub-programs called subroutines.
	• Structuring code into sub-programs makes the code easier to read and debug.
	• Each sub-program can easily be tested.
	• Sub-programs can be saved into libraries and reused in other programs

5. Random Numbers

Deterministic	Programs that run on computer systems are deterministic – with exactly the same inputs they should produce exactly the same outputs.
Real World	Randomness is easy to produce in the real world – spinning a wheel, rolling a dice and so on are millennia-old techniques but producing the same randomness in a computer program is actually rather tricky
Computer	• Computers do not produce random numbers at all
	• They use complex mathematical techniques to produce a series of numbers that may appear random but are really only an approximation to randomness (called pseudo-random numbers)