Keywords: Autumn 1 Computer Science

Topic Title: Computer Architecture, Data representation	
Keyword	**Definition**
1.1 Systems Architecture	
1.1.1 Architecture of the CPU	
Fetch-execute Cycle	Instructions are fetched one by one from main memory, decoded, and then executed by the processor. This cycle repeats until the program is complete
CPU (Central Processing Unit)	A chip within the computer which controls the operation of all parts of the computer and decodes then executes program instructions.
ALU (Arithmetic Logic Unit)	The part of the CPU responsible for arithmetic and logical operations.
Processor Cache	High speed memory built into the CPU. Instructions are copied to cache memory allowing them to be accessed more quickly and therefore increasing the speed of the CPU.
Register	A small area of memory within the CPU where data is stored temporarily to avoid the delay in copying to and from main memory,
Von Neumann Architecture	The design on which most computers are based. It defines several registers along with the fetch-execute cycle and how the CPU interacts with main memory.
MAR (Memory Address Register)	A register. It contains the address of the instruction currently being read from or written to main memory.
MDR (Memory Data Register)	A register. It contains the instruction which has just been copied from main memory.
Program Counter	A register. It contains the address of the next instruction to be fetched from memory. It is updated each time a new instruction is fetched to contain the address of the next needed instruction.
Accumulator	A register. Stores the result of the last operation.
1.1.2 CPU Performance	
Clock Speed	How many instruction cycles the CPU can deal with in a second. Measured in MHz or GHz. Faster is better.
Cache Size	The larger the amount of cache the CPU has the more instructions it can store without having to transfer to main memory and therefore the faster it will perform.
Cores	Some CPUs have more than one core, each containing its own ALU and registers and therefore capable of carrying out instructions independently. The more cores, the more instructions the CPU can process at once and therefore the faster it performs.
1.1.3 Embedded Systems	

Embedded System	Specialist hardware and software build into a device with a single specific purpose. They are usually found within appliances such as washing machines.

1.2 Memory and Storage

1.2.1 - Primary Storage (Memory)

Primary Storage	Also known as memory. Holds the data, programs and instructions currently in use.
RAM	Random Access Memory. Stores programs and data before they are processed by the CPU. Read/write memory, meaning the contents can be changed. The contents are lost when the computer is turned off.
ROM	Read Only Memory. Data can be retrieved but not changed and the contents are not lost when the computer is turned off. Used to store programs for embedded system
Volatile Memory	Data stored in volatile memory is lost when the computer is turned off.
No-Volatile Memory	Data stored in non-volatile memory is not lost when the computer is turned off.

Virtual Memory	Space on the computer's hard drive used as main memory (RAM). Virtual memory is slower than main memory.

1.2.2 Secondary Storage

Optical Storage	A type of secondary storage which stores data on a spinning plastic or metal disk. Data is read from and written to the disk using a laser.
Magnetic Storage	A type of secondary storage which uses magnetic fields to store data. A read/write head reads and writes data from the media.
Solid State Storage	A type of secondary storage which uses flash memory to store data. They have no moving parts and are much faster than optical or magnetic storage.
HDD (Hard Disk Drive)	A magnetic storage drive which can store large amounts of data and is often the main method of secondary storage in personal computers. The drive contains a number of internal disks and a read/write head used to read and write data.
DVD (Digital Versatile Disk)	A high capacity optical storage disk commonly used for video storage. A range of capacities are available up to 17GB
CD (Compact Disk)	An optical storage disk often used to store music. Capacity is usually around 800mb
SSD (Solid State Drive)	A solid state storage drive which carries out the function of a traditional HDD. They are much faster than HDDs and less easy to damage as they have no moving parts. They are also more expensive and usually lower capacity.

1.2.3 Units

Bit	The smallest unit of storage, containing a binary 1 or 0.
Nibble	4 bits (half a byte)
Byte	8 bits
Kilobyte (KB)	1000 bytes
Megabyte (MB)	1000 KB
Gigabyte (GB)	1000MB
Terabyte (TB)	1000GB
Petabyte (PB)	1000TB
Binary	A number system used by computers. It contains only two symbols, 0 and 1 and is also known as base 2.

1.2.4 Data Storage	
Denary	The number system most often used by people. It uses the digits 0 to 9 and is also known as base 10 or decimal.
Positive Number	A number greater than 0.
Negative Number	A number less than 0.
Integer	A whole number without a decimal point or fraction. E.g. 1, 100 or 88122
Overflow Error	This happens when not enough space has been allocated to store the results of a calculation. For example, if one byte has been allocated but the result is 9 bits long.
Hexadecimal	A number system used by computers. It contains only two symbols, 0 and 1 and is also known as base 2.
Binary Shift	A process used to preform maths on binary numbers. It involves moving all the digits to the left or right.
Most Significant Bit	The furthest left digit in a string of binary numbers, its position means it has the highest value.
Least Significant Bit	The furthest right digit in a string of binary numbers, its position means it has the lowest value.
Character	A single symbol, for example a letter, number or punctuation mark.

Character Set	A system for representing characters in binary, each character is assigned a unique binary number.
ASCII	American Standard Code for Information Interchange. A 7 bit character set used to represent characters.
Unicode	A much larger character set created to overcome the limited number of characters available in ASCII. It includes many different language characters as well as other symbols such emojis.
Pixel	Short for Picture Element. Pictures on a computer are divided into a grid, with each square in the grid being one pixel which can be a single colour.
Metadata	Additional data about a file such as when it was created or who created it. Commonly used with photos to store things like the make of camera or location the photo was taken.
Colour Depth	The amount of bits available for colours in an image. The higher the colour depth the more colours available and therefore the more realistic the image will appear.
Resolution	The number of pixels an image is divided into. The higher the resolution, the more pixels in the image and the clearer it will be.
Sample Rate	The number of samples taken in one second. This is measured in hertz (Hz), 1Hz is one sample per second. The higher the sample rate, the more samples per second and therefore the higher the quality of the file.
Bit Depth	The number of bits available for each sample. The higher the bit depth, the more bits available and therefore the better the quality.
Analogue	A continuously varying signal, usually represented as a curved line. Examples include sound or temperature recordings.
1.2.5 Compression	
Compression	A way of reducing the size of a file. It is often used with photos, music and video files.
Lossy Compression	A compression method which reduces the file size by removing certain data. The original file cannot be restored from the compressed version but the file is reduced by more than with lossless compression.
Lossless Compression	A compression method which reduces the file size without losing any data. The original file can be restored from the compressed version, but the file size is not reduced by as much.