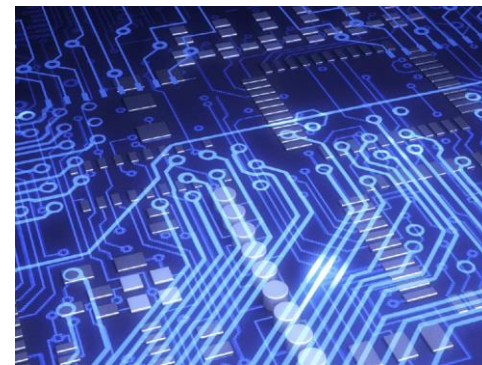


# COMPUTER SCIENCE

## Knowledge Organiser

### Unit-1: Systems architecture



**“The will to succeed is important, but what’s more important is the will to prepare.”**

Bobby Knight (NBA Coach)

## ***Computer Science Command Words***

### **Add**

In computer science, if you are asked to add, you need to join one thing to something else to increase the size, number or amount.

### **Solve**

In computer science, if you are asked to solve something, you need to get the answer(s) using algebraic and/or numerical and/or graphical methods.

### **Convert**

In computer science, if you are asked to convert something, you need to change the form, character or function of something.

### **Analyse**

In computer science, if you are asked to analyse something, you need to bring out the essential elements or structure. You will be expected to identify parts and relationships, making sense of the information to reach conclusions.

### **Explain**

In computer science, if you are asked to explain something, you need to give a detailed account, including the reasons or causes.

### **Define**

In computer science, if you are asked to define something, you need to give the precise meaning of a word, phrase, concept or physical quantity.

### **Describe**

In computer science, if you are asked to describe something, you need to give a detailed account or picture of a situation, event, pattern or process.

### **Justify**

In computer science, if you are asked to justify something, you need to give valid reasons or evidence to support an answer or conclusion.

### **Calculate**

In computer science, if you are asked to calculate something, you need to get a numerical answer and show the relevant stages of your working.

### **Show**

In computer science, if you are asked to show something, you need to give steps in a derivation or calculation.

### **Evaluate**

In computer science, if you are asked to evaluate something, you need to assess the limitations and possible consequences/implications; make comments/judgements about ideas, work, solutions or methods in relation to selected criteria.

### **Compare**

In computer science, if you are asked to compare, you need to give an account of the similarities and differences between two (or more) items or situations, referring to each of them throughout.

### **Discuss**

In computer science, if you are asked to discuss something, you need to offer a considered and balanced review which includes a range of arguments, factors or hypotheses. Opinions or conclusions should be presented clearly and supported by appropriate evidence.

### **State**

In computer science, if you are asked to state something, you need to give a specific name, value or other brief answer without explanation or calculation.

### **Give**

In computer science, if you are asked to give, you need to present information which determines the importance of an event or issue. Quite often, you will be asked to show causation.

### **Complete**

In computer science, if you are asked to complete something, you need to provide all necessary or appropriate parts.

### **Identify**

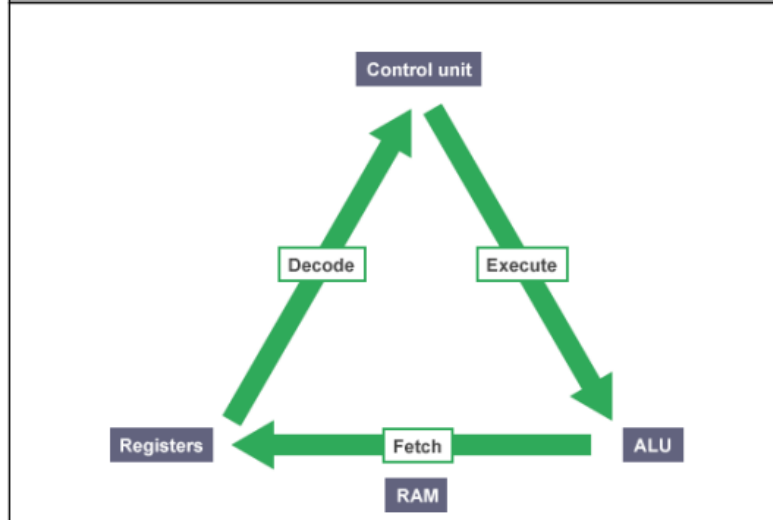
In computer science, if you are asked to identify something, you need to provide an answer from a number of possibilities. You will need to recognise and briefly state a particular factor or feature.

## Knowledge Organiser - 1.1 Systems Architecture

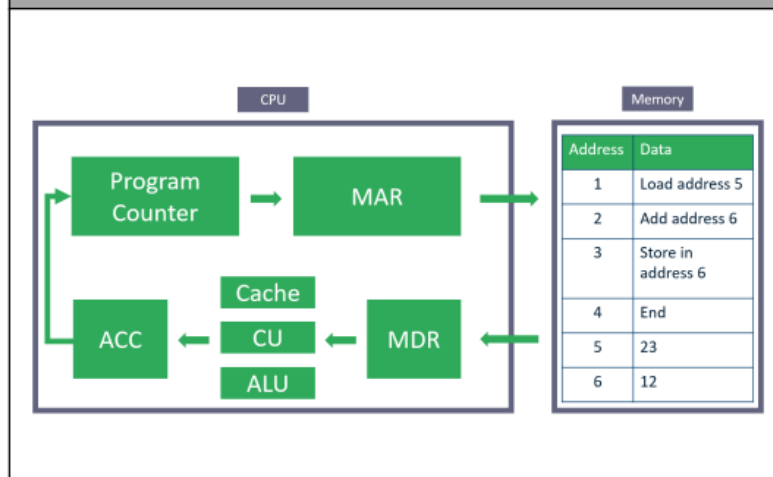
## Key vocabulary

|                 |                                                                                                                                     |
|-----------------|-------------------------------------------------------------------------------------------------------------------------------------|
| CPU             | <b>Central Processing Unit.</b><br>Fetches – Decodes – Executes instructions.                                                       |
| CU              | <b>Control Unit.</b> Manages the components of the CPU.                                                                             |
| ALU             | <b>Arithmetic and Logic Unit.</b> Carries out basic mathematics and comparisons.                                                    |
| Cache           | Super fast memory located next to the CPU. Stores commonly used data & instructions.                                                |
| Registers       | Small memory containers inside the CPU.                                                                                             |
| MAR             | <b>Memory Address Register.</b> Stores the address of the next instruction.                                                         |
| MDR             | <b>Memory Data Register.</b> Stores the data fetched from the main memory (RAM).                                                    |
| Program Counter | A register that records the current instruction being executed.                                                                     |
| Accumulator     | A register used by the (ALU) to store the results of calculations.                                                                  |
| Clock Speed     | The speed of a computer's CPU, measured in hertz. This indicates the number of fetch-decode-execute cycles that can run per second. |
| Cores           | A processing unit within a CPU. CPUs can have multiple cores.                                                                       |
| Embedded System | A special purpose computer built into another device.                                                                               |

## Fetch – Execute Cycle



## Von Neumann Architecture



## Knowledge Organiser - 1.2 Memory &amp; Storage



| Units    |              |                         |
|----------|--------------|-------------------------|
| Unit     | Abbreviation | Value                   |
| Petabyte | PB           | 1000 <sup>5</sup> bytes |
| Terabyte | TB           | 1000 <sup>4</sup> bytes |
| Gigabyte | GB           | 1000 <sup>3</sup> bytes |
| Megabyte | MB           | 1000 <sup>2</sup> bytes |
| Kilobyte | KB           | 1000 bytes              |
| Byte     | B            | 8 bits                  |
| Nibble   | N            | 4 bits                  |
| Bit      | b            | 0 or 1                  |

| Capacity Calculations |                                                |
|-----------------------|------------------------------------------------|
| Moving between units  | * By 1000 to move down<br>/ By 1000 to move up |
| Sound file size       | Sample rate * duration * bit depth             |
| Image file size       | Colour depth * image height * image width      |
| Text file size        | Bits per character * number of characters      |

| Key vocabulary       |                                                                                                                                                                                                                                                  |
|----------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Primary Storage      | Volatile memory used to store currently used data and instructions.                                                                                                                                                                              |
| RAM                  | <b>Random access memory.</b> This is volatile memory that is constantly being written to and read from. It does not retain its contents without a constant supply of power. When a computer is turned off, everything stored in its RAM is lost. |
| ROM                  | <b>Read only memory.</b> This is non-volatile memory or storage containing data that cannot be changed.                                                                                                                                          |
| Virtual Memory       | A section of a secondary storage which is temporarily used as RAM.                                                                                                                                                                               |
| Secondary Storage    | Non-volatile memory used for long-term storage of programs and data.                                                                                                                                                                             |
| Optical Storage      | Storing and reading data from a disc using a laser. Examples include CD, DVD, Blu-ray.                                                                                                                                                           |
| Magnetic Storage     | Storing and reading data from a hard drive disc using magnetism.                                                                                                                                                                                 |
| Solid State Storage  | Storing and reading data using electricity                                                                                                                                                                                                       |
| Capacity             | The maximum amount of data that a device can contain.                                                                                                                                                                                            |
| Compression          | A method of reducing file sizes, particularly in digital media such as photos, audio and video.                                                                                                                                                  |
| Lossy Compression    | A form of compression that reduces digital file sizes by removing data.                                                                                                                                                                          |
| Lossless Compression | A form of compression that encodes digital files without losing detail. Files can also be restored to their uncompressed quality.                                                                                                                |