Systems architecture

CPU

“Central Processing Unit”

“The main part of the computer, consisting of the registers, ALU and control unit.”

Von Neumann Architecture

“Traditional computer architecture that forms the basis of most digital computer systems. Instructions are fetched, decoded and executed one at a time.”

Systems architecture

MAR

“Memory Address Register”

“Holds the address of data ready for use by the memory data register. or the address of an instruction passed from the program counter. Step 2 of the fetch, decode, execute cycle.”

Systems architecture

MDR

“Memory Data Register”

Holds the data fetched from or to be written to the memory. Step 3 of the fetch, decode, execute cycle.”

Systems architecture

PC

“Program Counter”

“Holds the address of the next instruction. Step 1 of the fetch, decode, execute cycle.”

Accumulator

“Holds the result of calculations.”

Systems architecture

ALU

“Arithmetic Logic Unit”

“Performs calculations e.g. x = 2 + 3 and logical comparisons e.g. IF x > 3 in the CPU.”

Systems architecture

CU

“Control Unit”

“Decodes instructions. Sends signals to control how data moves around the CPU.”

Cache

“Memory in the processor providing fast access to frequently used instructions and data.”

F-D-E Cycle

“Fetch-Decode-Execute Cycle”

“The complete process of retrieving an instruction from store, decoding it and carrying it out. Also known as the instruction cycle.”

Clock Speed

“Measured in Hertz, the clock speed is the frequency at which the internal clock generates pulses. The higher the clock rate, the faster the computer may work. The “clock” is the electronic unit that synchronises related components by generating pulses at a constant rate.”

Cache Size

“A part of the main store between the central processor and the rest of the memory. It has extremely fast access, so sections of a program and its associated data are copied there to take advantage of its short fetch cycle. The larger the size of the cache the more that can be copied and stored here without having to go back to slower main memory (RAM), this has a significant impact on the speed of processing.”

Cores

“A part of a multi-core processor. A multi-core processor is a single component with two or more independent actual CPUs, which are the units responsibly for the fetch-decode-execute cycle.”

Embedded System

“A computer which has been built to solve a very specific program and is not easily changed. For example the operating system placed inside a washing machine, microwave or set of traffic lights.”

Computational Thinking

“The thought processes involved in formulating a problem and expressing its solution(s) in such a way that a computer—human or machine—can effectively carry out.”

Algorithms

Abstraction

“The process of separating ideas from specific instances of those ideas at work. Computational structures are defined by their meanings, while hiding away the details of how they work. Abstraction tries to factor out details from a common pattern so that programmers can work close to the level of human thoughts, leaving out details which matter in practice, but are immaterial to the problem being solved.”

Decomposition

“The process by which a complex problem or system is broken down into parts that are easier to conceive, understand, program and maintain.”

Algorithmic Thinking

“A way of getting to a solution by identifying the steps needed.”

Programming techniques

Variable

“A value that can change, depending on conditions or on information passed to the program.”

Programming techniques

Constant

“A value that cannot be altered by the program during normal execution, i.e., the value is constant.”

Programming techniques

Inputs

“Any information or data which goes into a system.”

Programming techniques

Outputs

“Any information of data which leaves a system.”

Assignments

“Giving a variable or constant a value. e.g. counter = 0”

Programming techniques

Sequence

“One of the 3 basic programming constructs. Instructions happening one after the other in order is sequence.”

Selection

“One of the 3 basic programming constructs. Instructions which can evaluate a Boolean expression and then branch the code to one or more alternatives paths is branching / selection.”

Iteration

“One of the 3 basic programming constructs. A selection of code which can be repeated either a set number of times (count controlled) or a variable number of times based on the evaluation of a Boolean expression (condition controlled) is iteration.”