# Free report on computer architecture

Design, Architecture

## The Von Neumann architecture

The Von Neumann architecture can be described as a model of design for a digital computer which has a stored program. The main characteristic of the model is that there is only one storage structure which is the memory that holds both the data and the program.

Some components of the model include the Memory, which holds both the data to be processed and data concerning the program processing the data. This memory is the Random Access Memory in modern computers.

The control unit manages the process of moving both the data to be processed and the program processing the data into and out of the memory . the control unit also deals with the executing of program instructions.

## The input-output deals with the transferring of information to and from the machine.

The arithmetic logical unit is the part of the architecture that is involved in computations on the data inputted. The bus is the conduit that shows the pattern of flow of information between the components of the architecture model.

the model has a number of characteristics which include the fact that the code and data (which includes the variables and input/output are organized into discrete regions, addresses, bytes or words. also, the both the code instructions and all the data have memory addresses. there is also a need to move instructions to the register in order to execute them. moreover, there is also a need to move results compiled by registers back to the memory before it can be saved. also, at the level of the machine or assembler, the granularity of instructions is smaller than the granularity at the MATLAB level

which means that each MATLAB instruction is equivalent to many machine instructions. the compiler and operating system also keeps both data and instructions in memory which is organized in such a way that it does not get mixed up. the model is also in such a way that if the execution of a program goes beyond its legal last function, there could be unwanted effects because this could lead to overwriting of other instructions or overwriting of other data that was initially stored in the memory.

## Boolean Operators

Boolean operators are used by the logic unit of the computer to perform arithmetic operations. The result of these calculations is decisions taken by the computer. The logical operation that the computer performs is most ties a comparison among the different types of data: numbers, special characters or letters. The logical operations test for some conditions.

The equal-to condition is used by the computer to compare two values and thereafter the computer determines if these two values are equal.

## The less-than condition is used by the computer to compare if one value is less than the other.

The greater-than condition is used by the computer to test if one value is greater than the value. Moreover, it is possible for the computer to simultaneously test more than one condition in a calculation. A combination of these three logical conditions gives rise to another set of new logical conditions which the computer can test for. In total, there are six logical relationships that computers use in calculations. they include greater than, less than, equal to, not equal to, greater than or equal to and less than or equal to.

## System Bus

The system bus is the part of the computing system that is concerned with the transfer of data from one component of the computer to another component whether inside a computer or between one computer and another. The internal bus helps in connecting all the internal components of the computer such as the central processing unit and the memory to the motherboard. They are also referred to as local buses. The internal bus is a modular unit because its actions are not dependent on the rest of the computer operations.

The external bus on the other hand (also known as the expansion bus) facilitates the connection of other peripherals with the computer. Such peripherals include the printer, the visual display unity, the mouse, keyboard and other peripherals. This allows communication between the computer and these peripherals.

## Memory Types

Computer memory can be classified based on their ability to retain memory over time. It can be classified into volatile memory and non-volatile memory (Larson, 2013).

Volatile memory refers to computer memory that needs power to maintain the information in the stored state. These semi-conductor memory is usually either in the form of Static Random Access memory (SRAM) or Dynamic Random Access Memory. The Static Random Access memory is able to retain the stored memory for as long as power is connected to the memory. It is also easy to interface to and it utilized six transistors per bit. The Dynamic Random Access memory on the other hand, needs regular cycles of being

refreshed in order sustain the contents of the memory in a stored state. It is also more complicated to interface to. However, a major advantage is that it uses only one transistor per but which makes it easy to store higher density of information (Larson, 2013), (Versi, 2013).

Non-volatile memory, however, refers to computer memory that can retain the stored information even when they are not consuming power. They are able to retain the information stored on them for a long period of time examples of such type of memory includes the Read-Only memory, flash memory, hard drives and optical discs (Versi, 2013).

## Computer Storage Types

Storage devices can also be categorized on the basis of their connection to the computer. They can either be primary storage devices or secondary storage devices (Stanek, 2009) , (URI. edu, 2013).

Primary storage devices are devices that are directly connected, internally to the computer. Secondary storage devices, on the other hand, are attached to the computer as peripheral devices. They can be removed at any point in time.

## These two types of storage devices have their advantages and disadvantages.

Primary storage devices give prompt access to information because they are always connected to the computer system. Examples are the internal Hard disk Drive, the CD-RAM drive and the floppy disk drive.

Secondary storage devices on the other hand, offer portability as they allow information to be easily carried about. Examples include an external hard drive, Compact disks and flash drives. However, portability often

compromises safety sometimes. These devices are more prone to damage because they are being carried about. They can also be stolen because of their small sizes. However, secondary storage devices offer an excellent option for backing up data.

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