**(#1)1.**

**System Software:**  
System Software is the type of software which is the interface between application software and system. Low level languages are used to write the system software. System Software maintains the system resources and gives the path for application software to run. An important thing is that without system software, system can not run. It is a general purpose software.

System Software is a set of programs that control and manage the operations of computer hardware. It also helps application programs to execute correctly.

System Software are designed to control the operation and extend the processing functionalities of a computer system. System software makes the operation of a computer more fast, effective, and secure. Example: Operating system, programming language, Communication software, etc.

**Application Software:**  
Application Software is the type of software that runs as per user request. It runs on the platform which is provided by system software. High level languages are used to write the application software. Its a specific purpose software.

The main difference between System Software and Application Software is that without system software, system can not run on the other hand without application software, system always runs.

Application Software is a program that does real work for the user. It is mostly created to perform a specific task for a user.

Application Software acts as a mediator between the end-user and System Software. It is also known as an application package. This type of software is written using a high-level languagelike C, Java, VB. Net, etc. It is a user-specific and is designed to meet the requirements of the user.

|  |  |  |
| --- | --- | --- |
| S.NO | System Software | Application Software |
| 1. | System Software maintain the system resources and give the path for application software to run. | Application software is built for specific tasks. |
| 2. | Low level languages are used to write the system software. | While high level languages are used to write the application software. |
| 3. | Its a general purpose software. | While its a specific purpose software. |
| 4. | Without system software, system can’t run. | While without application software system always runs. |
| 5. | System software runs when system is turned on and stop when system is turned off. | While application software runs as per the user’s request. |
| 6. | Example of system software are operating system, etc. | Example of application software are Photoshop, VLC player etc. |
| 7. | System Software programming is complex than application software. | Application software programming is simpler as comparison to system software. |

2.

**1. Arithmetic Logic Unit (ALU)**

The ALU is the part of a CPU that performs all arithmetic computations including addition, subtraction, multiplication, and division. The Arithmetic Logic Unit also performs all logical operations. The ALU is a literally the fundamental building block of the CPU, and even the simplest processors contain an ALU.

Today's modern CPUs and graphics processing units (GPUs) in graphic cards have very complex ALUs, and some contain a number of ALUs.

In some CPUs an individual ALU is further divided into two units called an arithmetic unit (AU) and a logic unit (LU). Some processors even contain more than one AU. Normally the ALU has direct input and output access to the processor controller, main system memory (RAM), and input/output devices.

In a nutshell an ALU works by loading data from what is called input registers, then an external Control Unit tells the ALU what operation to perform on that data, and finally the ALU stores its result into an output register.  At this point the data is moved between the registers and the memory via a data path called a bus.

**2. Control Unit**

The CPUs control unit is responsible for executing or storing the results coming out of the ALU. Within the CPU, the control unit performs the functions of fetch, decode, execute, and store.

The control unit communicates with both the arithmetic logic unit (ALU) and memory, and literally directs the entire computer system to carry out, or execute, stored program instructions.

In a nutshel here is how a control unit works. Basically a control unit fetches or retrieves an instruction from memory and then analyzes the instruction it fetched before deciding how it should be processed. Depending on the action required, the control unit will then send segments of the original instruction to the appropriate section of the processor.

**3. Registers**

Registers are the temporary storage areas for instructions or data within the processor. Registers are basically special storage locations somewhat similar to a computer’s memory though contained within the processor and exceptionally faster.

Registers work under the direction of the control unit to accept, hold and transfer instructions or data and perform arithmetic or logical comparisons at a high rate of speed.

Metaphorically speaking, the control unit uses the CPUs data storage registers similar to the way a cashier at a local market would conveniently store money away in a cash register to be used temporarily for transactions.

3. Generations of computers

## FIRST GENERATION: VACUUM TUBES (1940–1956)

The first[computer systems](https://www.webopedia.com/definitions/computer-system/) used vacuum tubes for circuitry and[magnetic drums](https://www.webopedia.com/definitions/magnetic-drum/) for main[memory](https://www.webopedia.com/definitions/memory/), and they were often enormous, taking up entire rooms. These computers were very expensive to operate, and in addition to using a great deal of electricity, the first computers generated a lot of heat, which was often the cause of malfunctions. The maximum internal storage capacity was 20,000 characters.

First-generation computers relied on[machine language](https://www.webopedia.com/definitions/machine-language/), the lowest-level[programming language](https://www.webopedia.com/definitions/programming-language/) understood by computers, to perform operations, and they could only solve one problem at a time. It would take operators days or even weeks to set up a new problem. Input was based on punched cards and paper tape, and output was displayed on printouts.

## SECOND GENERATION: TRANSISTORS (1956–1963)

The world would see[transistors](https://www.webopedia.com/definitions/transistor/) replace vacuum tubes in the second generation of computers. The transistor was invented at Bell Labs in 1947 but did not see widespread use in computers until the late 1950s. This generation of computers also included hardware advances like magnetic core memory, magnetic tape, and the magnetic disk.

The transistor was far superior to the vacuum tube, allowing computers to become smaller, faster, cheaper, more energy-efficient, and more reliable than their first-generation predecessors. Though the transistor still generated a great deal of heat that subjected the computer to damage, it was a vast improvement over the vacuum tube. A second-generation computer still relied on punched cards for[input](https://www.webopedia.com/definitions/input/) and printouts for[output](https://www.webopedia.com/definitions/output/).

### From Binary to Assembly

Second-generation computers moved from cryptic[binary](https://www.webopedia.com/definitions/binary/) language to symbolic, or[assembly](https://www.webopedia.com/definitions/assembly/), languages, which allowed programmers to specify instructions in words.[High-level programming languages](https://www.webopedia.com/definitions/high-level-language/) were also being developed at this time, such as early versions of[COBOL](https://www.webopedia.com/definitions/cobol/) and[FORTRAN](https://www.webopedia.com/definitions/fortran/). These were also the first computers that stored their instructions in their memory, which moved from a magnetic drum to magnetic core technology.

## THIRD GENERATION: INTEGRATED CIRCUITS (1964–1971)

The development of the[integrated circuit](https://www.webopedia.com/definitions/integrated-circuit-ic/) was the hallmark of the third generation of computers. Transistors were miniaturized and placed on[silicon](https://www.webopedia.com/definitions/silicon/)[chips](https://www.webopedia.com/definitions/chip/), called[semiconductors](https://www.webopedia.com/definitions/semiconductor/), which drastically increased the speed and efficiency of computers.

Instead of punched cards and printouts, users would interact with a third generation computer through[keyboards](https://www.webopedia.com/definitions/keyboard/) and[monitors](https://www.webopedia.com/definitions/monitor/) and[interfaced](https://www.webopedia.com/definitions/interface/) with an[operating system](https://www.webopedia.com/definitions/operating-system/), which allowed the device to run many different[applications](https://www.webopedia.com/definitions/application-software/) at one time with a central program that monitored the memory. Computers, for the first time, became accessible to a mass audience because they were smaller and cheaper than their predecessors.

## FOURTH GENERATION: MICROPROCESSORS (1971–PRESENT)

The[microprocessor](https://www.webopedia.com/definitions/microprocessor/) ushered in the fourth generation of computers, as thousands of integrated circuits were built onto a single silicon chip. The technology in the first generation that filled an entire room could now fit in the palm of the hand. The Intel 4004 chip, developed in 1971, integrated all the components of the computer, from the[central processing unit](https://www.webopedia.com/definitions/cpu/) and memory to input/output controls, on a single chip.

In 1981,[IBM](https://www.webopedia.com/definitions/ibm/) introduced its first personal computer for the home user, and in 1984[Apple](https://www.webopedia.com/definitions/apple-computer/) introduced the Macintosh. Microprocessors also moved out of the realm of[desktop computers](https://www.webopedia.com/definitions/desktop-computer/) and into many areas of life as more and more everyday products began to use the microprocessor chip.

As these small computers became more powerful, they could be linked together to form networks, which eventually led to the development of the Internet. Each fourth-generation computer also saw the computer development of[GUIs](https://www.webopedia.com/definitions/gui/), the[mouse](https://www.webopedia.com/definitions/mouse/), and[handheld](https://www.webopedia.com/definitions/hand-held-computer/) technology.

## FIFTH GENERATION: ARTIFICIAL INTELLIGENCE (PRESENT AND BEYOND)

Fifth generation computer technology, based on artificial intelligence, is still in development, though there are some applications, such as[voice recognition](https://www.webopedia.com/definitions/voice-recognition/), that are being used today. The use of[parallel processing](https://www.webopedia.com/definitions/parallel-processing/) and superconductors is helping to make artificial intelligence a reality. This is also so far the prime generation for packing a large amount of storage into a compact and portable device.

[Quantum computation](https://www.webopedia.com/definitions/quantum-computing/) and molecular and[nanotechnology](https://www.webopedia.com/definitions/nanotechnology/) will radically change the face of computers in years to come. The goal of fifth-generation computing is to develop devices that will respond to[natural language](https://www.webopedia.com/definitions/natural-language/) input and are capable of learning and self-organization.

(#2) 1.

**What is computer security?**

Computer security basically is the protection of computer systems and information from harm, theft, and unauthorized use. It is the process of preventing and detecting unauthorized use of your computer system.

There are various types of computer security which is widely used to protect the valuable information of an organization.

**What is Computer Security and its types?**

One way to ascertain the similarities and differences among Computer Security is by asking what is being secured. For example,

Information security is securing information from unauthorized access, modification & deletion

Application Security is securing an application by building security features to prevent from Cyber Threats such as SQL injection, DoS attacks, data breaches and etc.

Computer Security means securing a standalone machine by keeping it updated and patched

Network Security is by securing both the software and hardware technologies

Cybersecurity is defined as protecting computer systems, which communicate over the computer networks

It’s important to understand the distinction between these words, though there isn’t necessarily a clear consensus on the meanings and the degree to which they overlap or are interchangeable.

So, Computer security can be defined as controls that are put in place to provide confidentiality, integrity, and availability for all components of computer systems. Let’s elaborate the definition.

**Components of computer system**

The components of a computer system that needs to be protected are:

Hardware, the physical part of the computer, like the system memory and disk drive

Firmware, permanent software that is etched into a hardware device’s nonvolatile memory and is mostly invisible to the user

Software, the programming that offers services, like operating system, word processor, internet browser to the user

**The CIA Triad**

Computer security is mainly concerned with three main areas:

**Confidentiality** is ensuring that information is available only to the intended audience

**Integrity** is protecting information from being modified by unauthorized parties

**Availability** is protecting information from being modified by unauthorized parties

In simple language, computer security is making sure information and computer components are usable but still protected from people or software that shouldn’t access it or modify it.

**Computer security threats**

Computer security threats are possible dangers that can possibly hamper the normal functioning of your computer. In the present age, cyber threats are constantly increasing as the world is going digital. The most harmful types of computer security are:

Viruses

Virus - What is Computer Security?- edurekaA computer virus is a malicious program which is loaded into the user’s computer without user’s knowledge. It replicates itself and infects the files and programs on the user’s PC. The ultimate goal of a virus is to ensure that the victim’s computer will never be able to operate properly or even at all.

Computer Worm

worm - What is Computer Security? - EdurekaA computer worm is a software program that can copy itself from one computer to another, without human interaction. The potential risk here is that it will use up your computer hard disk space because a worm can replicate in greate volume and with great speed.

Phishing

Disguising as a trustworthy person or business, phishers attempt to steal sensitive financial or personal information through fraudulent email or instant messages. Phishing in unfortunately very easy to execute. You are deluded into thinking it’s the legitimate mail and you may enter your personal information.

Course Curriculum

Cyber Security Course

Botnet

botnet - What is Computer Security? -EdurekaA botnet is a group of computers connected to the internet, that have been compromised by a hacker using a computer virus. An individual computer is called ‘zombie computer’. The result of this threat is the victim’s computer, which is the bot will be used for malicious activities and for a larger scale attack like DDoS.

Rootkit

Rootkit - What is Computer Security? - EdurekaA rootkit is a computer program designed to provide continued privileged access to a computer while actively hiding its presence. Once a rootkit has been installed, the controller of the rootkit will be able to remotely execute files and change system configurations on the host machine.

Keylogger

keylogger - What is Computer Security? - EdurekaAlso known as a keystroke logger, keyloggers can track the real-time activity of a user on his computer. It keeps a record of all the keystrokes made by user keyboard. Keylogger is also a very powerful threat to steal people’s login credential such as username and password.

These are perhaps the most common security threats that you’ll come across. Apart from these, there are others like spyware, wabbits, scareware, bluesnarfing and many more. Fortunately, there are ways to protect yourself against these attacks.

2.

**1. Network Interface Card**

**Network adapter** is a device that enables a computer to talk with other computer/network. Using unique **hardware addresses (MAC address)**encoded on the card chip, the data-link protocol employs these addresses to discover other systems on the network so that it can transfer data to the right destination.

There are **two types of network cards**: **wired and wireless**. The wired NIC uses cables and connectors as a medium to transfer data, whereas in the wireless card, the connection is made using antenna that employs radio wave technology. All modern laptop computers incorporated wireless NIC in addition to the wired adapter.

**Network Card Speed**

Network Interface card, one of the main computer network components, comes with different speeds, 10Mbps, 100Mbps, and 1000Mbps, so on. Recent standard **network cards built with Gigabit** (1000Mbps) connection speed. It also supports to connect slower speeds such as 10Mbps and 100Mbps. However, the speed of the card depends on your LAN speed.

For example, if you have a switch that supports up to 100Mbps, your NIC will also transfer a data with this same speed even though your computer NIC has still the capability to transfer data at 1000Mbps (1Gbps). In modern computers, network adapter is integrated with a computer motherboard. However if you want advanced and fast Ethernet card, you may buy and install on your computer using the **PCI slot** found on the motherboard (desktop) and **ExpressCard slots** on laptop .

**2. Hub**

Hub is a device that splits a network connection into multiple computers. It is like a distribution center. When a computer request information from a network or a specific computer, it sends the request to the hub through a cable. The hub will receive the request and transmit it to the entire network. Each computer in the network should then figure out whether the broadcast data is for them or not.

Currently Hubs are becoming obsolete and replaced by more advanced communication devices such as **Switchs and Routers**.

**3. Switch**

Switch is a telecommunication device grouped as one of computer network components. Switch is like a Hub but built in with advanced features. It uses **physical device addresses** in each incoming messages so that it can deliver the message to the right destination or port.

Like Hub, switch don’t broadcast the received message to entire network, rather before sending it checks to which system or port should the message be sent. In other words switch connects the source and destination directly which increases the speed of the network. Both switch and hub have common features: Multiple RJ-45 ports, power supply and connection lights.

**4. Cables and connectors**

Cable is one way of transmission media which can transmit communication signals. The wired network typology uses special type of cable to connect computers on a network.

There are a number of solid transmission Media types, which are listed below. - **Twisted pair wire**

It is classified as Category 1, 2, 3, 4, 5, 5E, 6 and 7. Category 5E, 6 and 7 are high-speed cables that can transmit 1Gbps or more. -

**Coaxial cable**

Coaxial cable more resembles like TV installation cable. It is more expensive than twisted-pair cable but provide high data transmission speed.

**Fiber-optic cable**

It is a high-speed cable which transmits data using light beams through a glass bound fibers. Fiber-optic cable is high data transmission cable comparing to the other cable types. But the cost of fiber optics is very expensive which can only be purchased and installed on governmental level.

**5. Router**

When we talk about computer network components, the other device that used to **connect a LAN with an internet connection is called Router**. When you have **two distinct networks** (LANs) or want to share a single internet connection to multiple computers, we use a Router.

In most cases, recent routers also include a switch which in other words can be used as a switch. You don’t need to buy both switch and router, particularly if you are installing small business and home networks.

There are two types of Router: **wired and wireless**. The choice depends on your physical office/home setting, **speed**and **cost**.

**6. Modems**

A modem enables you to connect your computer to the available internet connection over **the existing telephone line**. Like NIC, **Modem is not integrated with a computer motherboard**. It comes as separate part which can be installed on the PCI slots found on motherboard.

A modem is not necessary for LAN, but required for internet connection such as dial-up and DSL.

There are some types of modems, which differs in **speed and transmission rate**. Standard PC modem or Dial-up modems (56Kb data transmission speed), Cellular modem (used in a laptop that enables to connect while on the go), **cable modem (500 times faster than standard modem)** and DSL Modems are the most popular.

3.

## Hardware

The term hardware refers to mechanical device that makes up computer. Computer hardware consists of interconnected electronic devices that we can use to control computer’s operation, input and output.

Hardware refers to the physical components of a computer. Computer Hardware is any part of the computer that we can touch these parts. These are the primary electronic devices used to build up the computer. Examples of hardware in a computer are the Processor, Memory Devices, Monitor, Printer, Keyboard, Mouse, and the Central Processing Unit.

## Software

A set of instructions that drives computer to do stipulated tasks is called a program. Software instructions are programmed in a computer language, translated into machine language, and executed by computer.

Software is a collection of instructions, procedures, documentation that performs different tasks on a computer system. we can say also Computer Software is a programming code executed on a computer processor. The code can be machine-level code or the code written for an operating system. Examples of software are Ms Word, Excel, Power Point, Google Chrome, Photoshop, MySQL etc.

Software can be categorized into two types −

* System software
* Application software

### System Software

System software operates directly on hardware devices of computer. It provides a platform to run an application. It provides and supports user functionality. Examples of system software include operating systems such as Windows, Linux, Unix, etc.

### Application Software

An application software is designed for benefit of users to perform one or more tasks. Examples of application software include Microsoft Word, Excel, PowerPoint, Oracle, etc.