

**KAKARAPARTI BHAVANARAYANA COLLEGE (AUTONOMOUS)**

(Sponsored by S.K.P.V.V. Hindu High Schools' Committee)

Kothapeta, Vijayawada -1

**A College with Potential for Excellence (CPE)**

ISO: 9001-2015

NAAC "A" Grade in Cycle 3

**TEACHING - LEARNING – INNOVATIVE METHODS**

**2018-2023**

**DEPARTMENT OF COMPUTER SCIENCE**



**BEST PRACTICES**

***Topic: Hardware & Network***

***Submitted by: Suresh Sir***

***Date:***

***LECTURER INCHARGE***

## **Title: Hardware & Network**

### **(Department of Computer Science and Application)**

Department Extension Programme (Computer department) is a programme that forms integral part of higher and Technical education. The Best Practice programme is Conducted Regularly from 2018 to till date. The Department of Computer Science aspires to focus on the overall personality development of the students along with the academic excellence. It is one of the best practices used to ventilate the goals of the department as well as the College-the empowerment of rural students. The Practice aims at to bring about social changes.

### **Objectives of the Practices:**

- ❖ The objective of this course is to provide the participant much needed knowledge of computer hardware and networking, enabling them to identify and rectify the on board computer hardware, software and network related problems in Engine Room Integrated Automation systems and Navigational equipment on Bridge.
- ❖ With the help of this course the participant will be able to understand the hardware specifications that are required to run operating system and various shipboard application programs.
- ❖ Also, upgrading of existing hardware/software as and when required. The main aspect of this program is to eliminate cost for the shore technician boarding the vessel to trouble shoot, install/configure the application program and network related problems and there by charging exorbitant fees to ship owners/managers.

### **The Context**

- ❖ Students who have their 10+2 and to gain expertise in a field while pursuing further studies.
- ❖ Entry-level graduates from any field or background and willing to become hardware and networking specialist.
- ❖ Non-technical individuals who wish to purpose a successful career in IT and computer fields.
- ❖ Computer / IT technicians who wish to become certified professionals in hardware and networking fields.
- ❖ IT professionals who wish to migrate from their traditional job positions.
- ❖ Business managers who want to gain hardware and networking skills to add more value to their organizations IT infrastructures.

## **The Practice**

- ❖ Read and interpret technical parameters / documentation, plan and organize work processes, identify necessary materials and tools.
- ❖ Perform task with due consideration to safety rules, accident prevention regulations and environmental protection stipulations.
- ❖ Apply professional knowledge & employability skills while performing the job and modification & maintenance work.
- ❖ Check the system specification and application software as per requirement of the design of job.
- ❖ Document the technical parameter related to the task undertaken

## **Objectives of Hardware and Software:**

On successful completion of this course a participant shall be able to:

- ❖ Understand basic concept & structure of Computer Hardware & Networking Components.
- ❖ Identify the existing configuration of the computers & peripherals.
- ❖ Upgrading the same as & when required.
- ❖ Apply their knowledge about computer peripherals to identify/rectify problems on board.
- ❖ Integrate the PC's into Local Area Network & re-install OS & various shipboard applications.
- ❖ Perform routine maintenance, upgrades of virus definitions, set schedules etc.
- ❖ Manage data backup & restore operations.
- ❖ Analyse &/or troubleshoot communication problems related to Engine Room Automation & various Navigational Bridge Equipment.

## **Evidence of Success**

**The student will able to know the Basic of Computer assembling and trouble shooting.**

This course will provide the brief knowledge of Computer networking and trouble shooting.

## **Learning Outcomes**

- ❖ Identify the hardware components of a computer.
  - Lists the hardware components such as processor, memory, disk, main board, etc.
  - Explains the features (speed, capacity, etc.)of the hardware components of a computer.
  - Explains the relationships between the components of a computer and how data are transferred among the components.

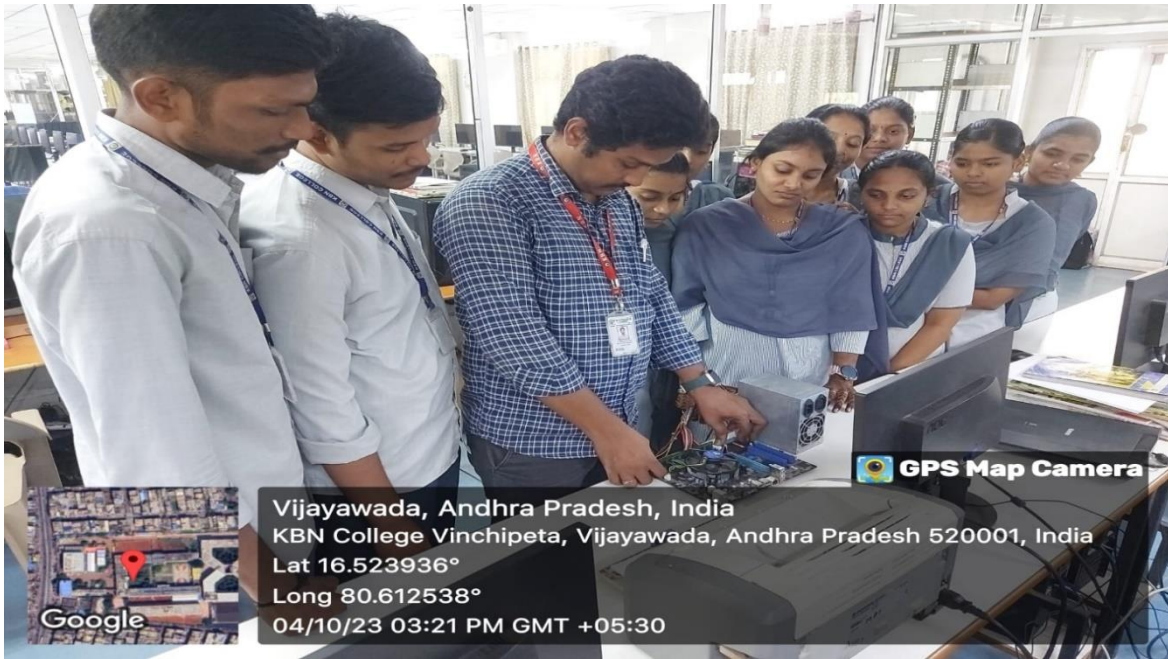
- ❖ Identify the peripheral devices outside computer.
  - Uses computer using input devices, such as keyboard and mouse.
  - Transfers data outside the computer using output devices, such as screen and printer.
  - Saves files to removable devices and loads files from removable devices.
  - Connects to the Internet using network cards.
  - Identify the software's running on a computer.
  - Identifies BIOS and changes settings in BIOS.
  - Lists jobs of operating system.
  - Uses the Windows and Linux operating systems.
  - Tests the performance of hardware components on some specific programs.

### **Problems encountered and resources required**

We strongly recommend a computer fewer than 5 years old.

- ❖ Processor: Minimum 1 GHz; Recommended 2GHz or more
- ❖ Ethernet connection (LAN) OR a wireless adapter (Wi-Fi)
- ❖ Hard Drive: Minimum 32 GB; Recommended 64 GB or more
- ❖ Memory (RAM): Minimum 1 GB; Recommended 4 GB or above
- ❖ Sound card w/speakers
- ❖ Some classes require a camera and microphone

**2022-23**



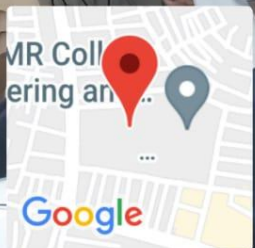
2021-22



2020-21



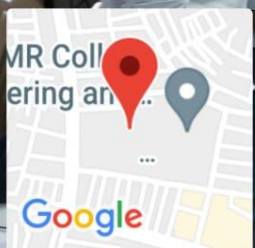
GPS Map Camera



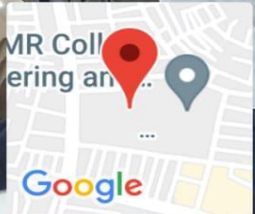
**Vijayawada, Andhra Pradesh, India**  
Opposite Sinivas Mahal theatre, KBN college road, 520001, Vinchipeta,  
Vijayawada, Andhra Pradesh 520001, India  
Lat 16.523963°  
Long 80.612601°  
26/03/20 02:10 PM



GPS Map Camera

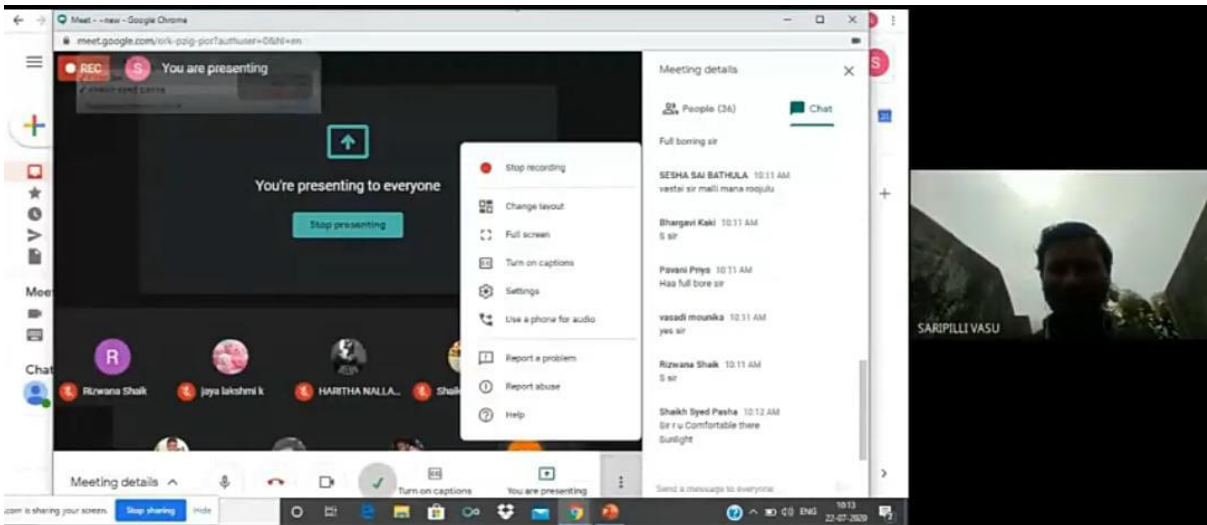
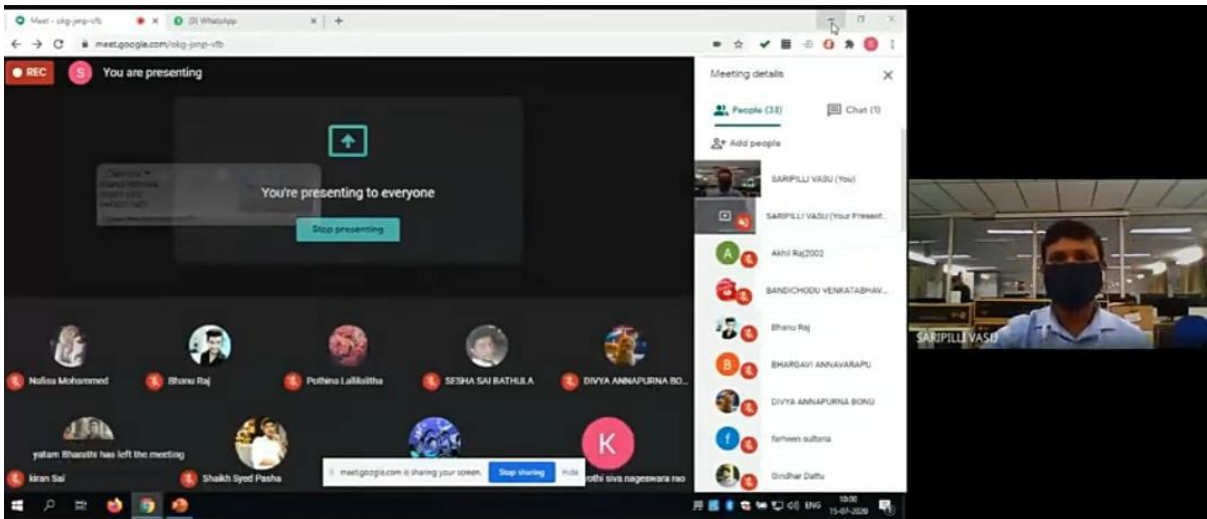


**Vijayawada, Andhra Pradesh, India**  
Opposite Sinivas Mahal theatre, KBN college road, 520001, Vinchipeta,  
Vijayawada, Andhra Pradesh 520001, India  
Lat 16.523966°  
Long 80.612598°  
26/03/20 02:10 PM



**Vijayawada, Andhra Pradesh, India**  
 Opposite Sinivas Mahal theatre, KBN college road, 520001, Vinchipeta,  
 Vijayawada, Andhra Pradesh 520001, India  
 Lat 16.523963°  
 Long 80.612601°  
 26/03/20 02:10 PM

## 2019-2020





## 2018-2019



### **Hardware and Network**

#### **Objectives of the practice:**

- ❖ To literate the weaker sections of the rural areas from the shackles of the perennial, economic, social and educational constraints.
- ❖ To provide social dimension to the educational system of the college and include social responsibility and commitment among students
- ❖ To bring forth the team spirit and leadership qualities of the Students and broaden their social outlook that helps them work for the welfare of the community

#### **The Context:**

AMBAPURAM, TADEPALLI, GAPALAGUDEM are amidst the labyrinth of tiny villages, some with very thin population and incredibly with lowest percentage of literacy. Ignorance and illiteracy estrange them from the fast moving hi-tech world. Hence it is imperative on the part of the department of computers to extend its service and give exposure which is the dire

need of the people. Computer department is dauntless in launching well-planned activities. It has chosen 3 villages to ensure wholesome development of the villages within 6 kms from the college. It has taken all appropriate measures to empower the rural students in particular and women in general to progress in their life.

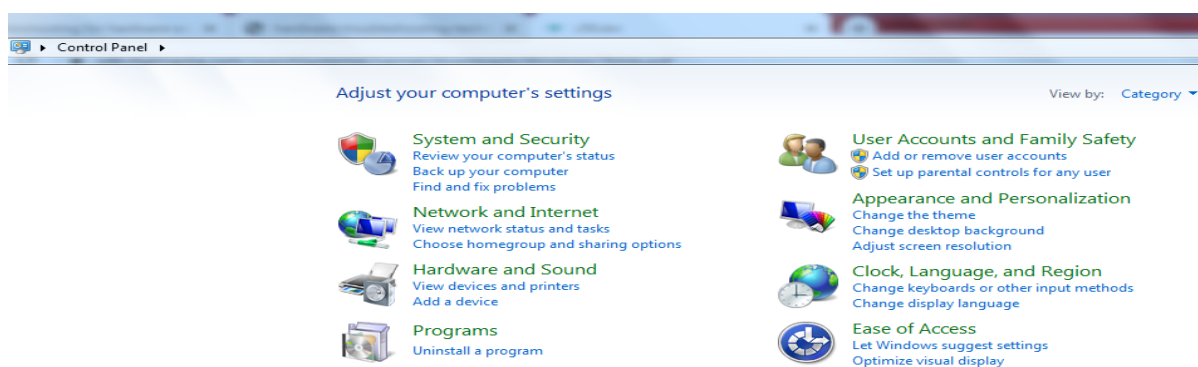
Whenever you have a hardware problem that's causing a device to misbehave or just not work at all, finding an updated driver will usually be your best bet. But even before you do that, you might want to try Windows built-in Troubleshooting tools to see if they can resolve the problem.

To get help on programs, hardware, and drivers, open the Troubleshooting applet from the Control Panel

Each of the items in this Control Panel applet provides a troubleshooting wizard that can automatically search for, detect, and potentially fix problems. The applet offers the following groups:

**Programs:** Launch the Program Compatibility Wizard, which enables you to apply settings to programs to make them run as if they were running in an earlier version of Windows. For example, you can potentially run a Windows 98 program under Windows 7 by configuring its compatibility settings for Windows 98. This group also includes items for troubleshooting printers, Media Player, and Internet Explorer.

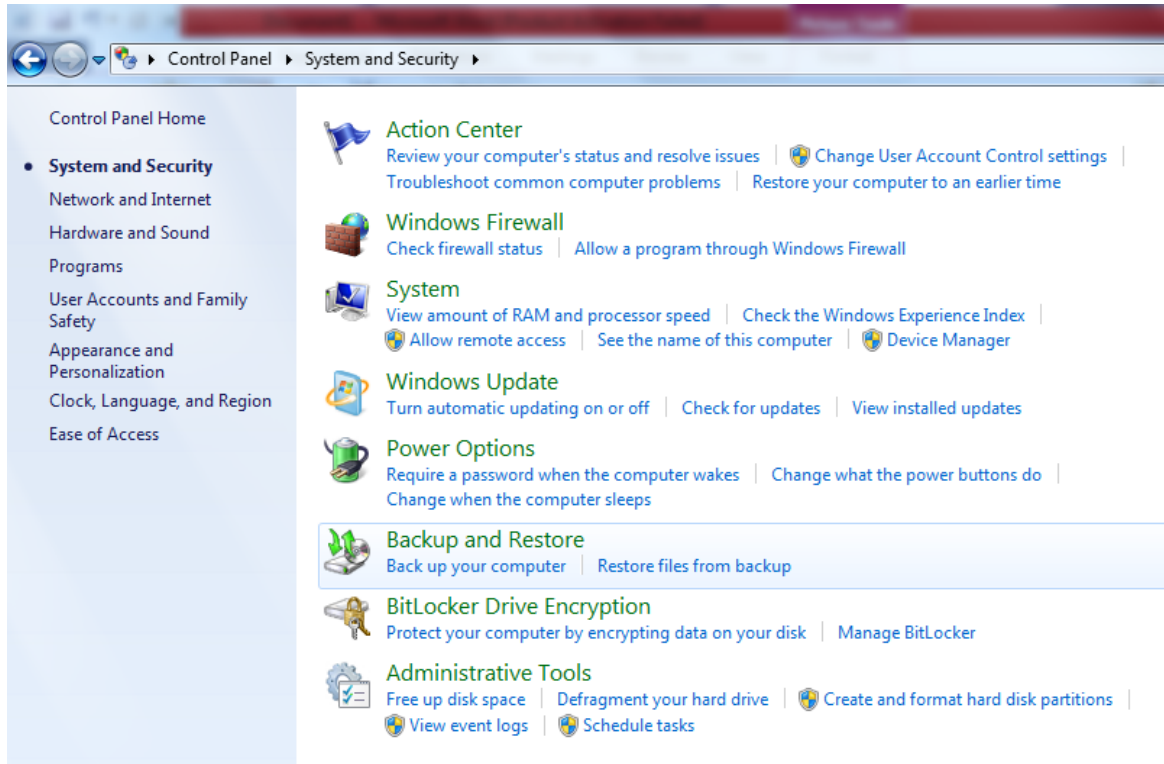
The Troubleshooting applet provides options for troubleshooting hardware and driver issues.



- ❖ **Hardware and Sound:** Use the Hardware and Sound item to scan for hardware changes and troubleshoot problems with general devices, printers, network adapters, and audio devices.
- ❖ **Network and Internet:** Troubleshoot problems connecting to the Internet or accessing shared files and folders on a local area network. Also troubleshoot Homegroup, incoming network connections, and DirectAccess.
- ❖ **Appearance and Personalization:** Troubleshoot problems with the Windows Aero desktop visual effects (such as transparent windows).

- ❖ **System and Security:** Troubleshoot problems with Windows Update, modify power settings, check for computer performance issues, and run maintenance tasks including cleaning up unused files and shortcuts. Also check search and indexing problems, and adjust performance settings.

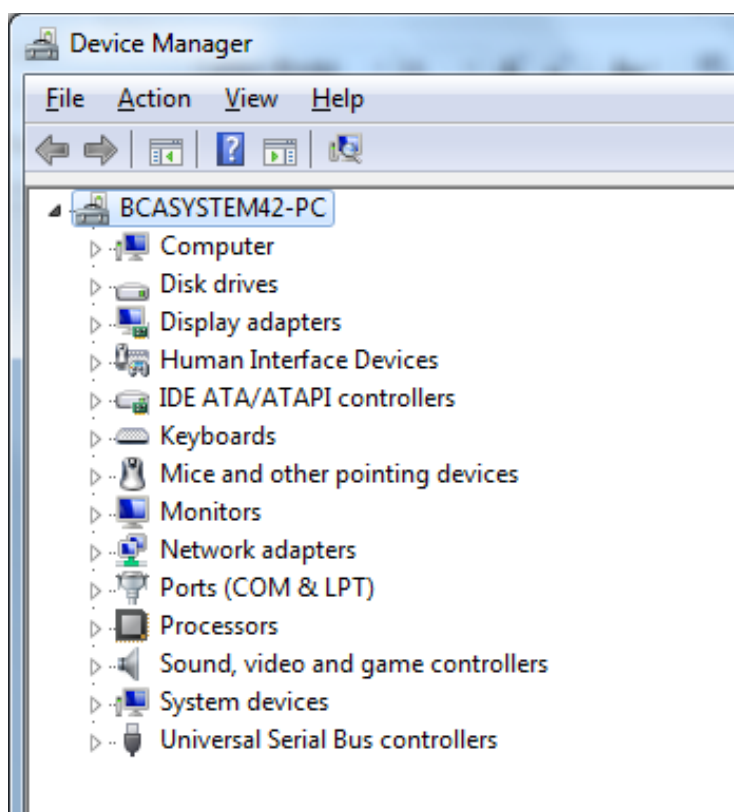
## The System and Security category



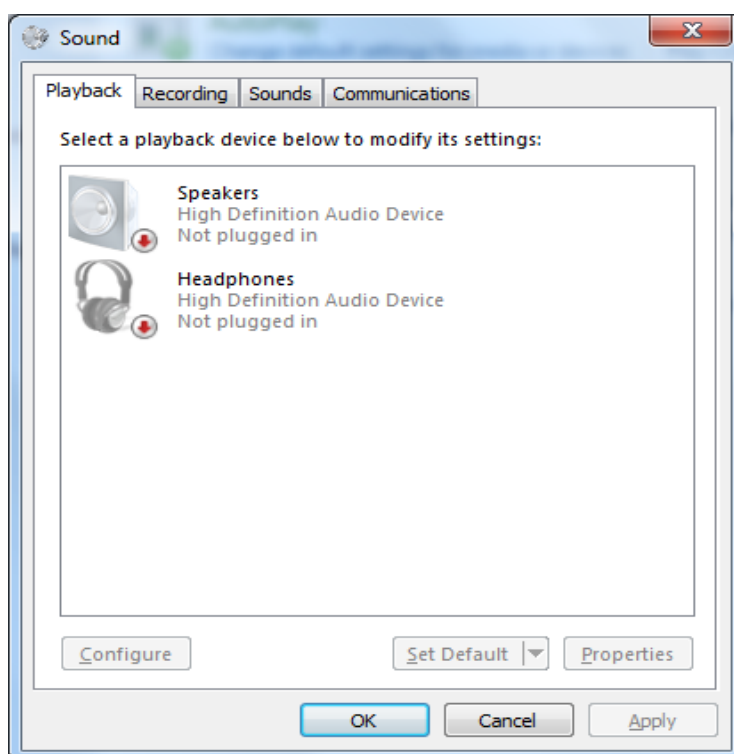
A second alternative is to troubleshoot from the hardware device's Properties dialog box in Device Manager. To open Device Manager, tap **Start**, type **dev**, and click **Device Manager**. Or click the **Start** button, right-click **Computer**, and choose **Properties**. Then click the **Device Manager** link on the left side of the screen. In Device Manager:

1. Right-click the name of the device that's causing problems and choose **Properties**.
2. If the device shows an error in the Device Manager use that information to begin troubleshooting. For example, if Device Manager indicates that there is no driver installed, try installing or reinstalling the device's driver.
3. If needed, use the options on the **Driver** tab to reinstall the drivers for the device. You can also disable the device from this tab and eliminate potential conflicts with other devices.
4. On the **Resources** tab check for a conflict message under **Conflicting Device List** and resolve problems by reassigning resources to the conflicting devices, or by disabling one of them. Note that not all hardware devices will have a **Resources** tab.

Use Device Manager to help troubleshoot hardware problems.



The Resources tab.



### Dealing with Error Messages:

Error messages come in all forms, from simple warnings to the stop errors and “the blue screen of death,” which causes the computer to stop dead in its tracks. The more serious errors are often accompanied by one or more of the following pieces of information:

- ❖ An error number: An error number will often be a hexadecimal number in the format 0x00000xxx where the italicized numbers could be any numbers in the message.
- ❖ Symbolic error name: Symbolic error names are usually shown in all uppercase with underlines between words, such as PAGE\_FAULT\_IN\_NONPAGED\_AREA.
- ❖ Driver details: If a device driver caused the problem, you might see a filename with a .sys extension in the error message.
- ❖ Troubleshooting info: Some errors will have their own built-in troubleshooting advice, or a Help button. Use that information to learn more about what went wrong.

Whenever you get an error message that you can't solve just by reading the advice presented on the screen, go to <http://support.microsoft.com> and search for the error number, or the symbolic error name, the driver name, or some combination of words in the text or troubleshooting of the error message.

If searching Microsoft's support site doesn't do the trick, consider searching the entire Internet using Google or Bing. You never know, someone out there may have had the same problem and posted the solution somewhere on the Internet. When using a search engine, provide as much detail as possible to get the best results for your problem.

### **Performing a Clean Boot:**

The biggest problem with hardware errors is that even a tiny error can have seemingly catastrophic results, like suddenly shutting down the system and making it difficult to get the system started again. Clean booting can also help with software problems that prevent the computer from starting normally or cause frequent errors.

Not for the technologically challenged, this procedure is best left to more experienced users who can use it to diagnose the source of a problem that's preventing the computer from starting normally. The procedure for performing a clean boot is as follows:

**Note:** A clean boot is not the same as a clean install. During a clean boot, you may temporarily lose some normal functionality. But once you perform a normal startup, you should regain access to all your programs and documents, and full functionality.

- Close all open programs and save any work in progress.
- At the Windows desktop, click Start and enter msconfig.
- The System Configuration Utility opens.
- On the General tab, choose Selective Startup and make sure the Load Startup Items check box is cleared.
- Click the Services tab.
- Select Hide All Microsoft Services and click the Disable All button.
- Click OK and click Restart to reboo0074

To return to normal startup after diagnosis, open the System Configuration Utility. On the Services tab, click Enable All. On the General tab, choose Normal Startup and click the OK button.

### **Using the System Recovery Options:**

For more severe problems that require repairing an existing Windows 7 installation, troubleshooting startup issues, system and complete PC restoration, using Windows Memory Diagnostic Tool, or getting to a command prompt, you'll need to use the System Recovery Options. This method should only be used by experienced users who can perform such tasks from a command prompt. To boot from the Windows disc, first make sure that the drive is enabled as a boot device in the BIOS with a higher priority than any hard drives. Insert the Windows disc into the drive. Restart the computer and follow these steps:

1. During the POST, watch for the Press Any Key to Boot from CD or DVD prompt, and tap a key.
2. After all files load from the disc, click the Next button on the page that is prompting for language, currency, and keyboard type.
3. On the next page, click the Repair Your Computer link near the bottom of the page.
4. Windows will bring up the System Recovery Options dialog box, which looks for an existing installation of Windows 7. If your system requires special hard drive controller drivers, you can click the Load Drivers button so your installation of Windows 7 can be located. If you see your version of Windows 7 in the list box, select it and click the Next button.
5. The next window shows all of your options for recovery.

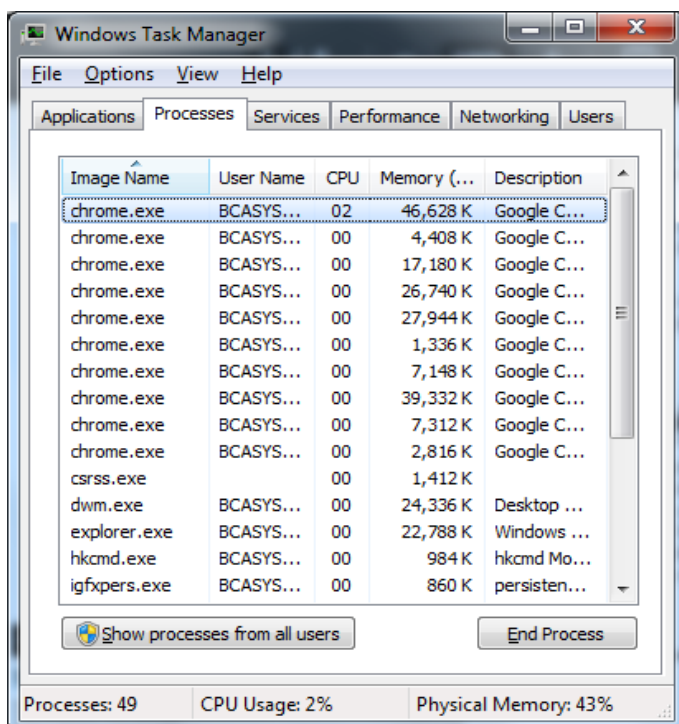
The System Recovery Options window provides different troubleshooting tools based on your set of circumstances:

- **Startup Repair:** Use this option if your system won't start up. This could be for any number of reasons including a bad or misconfigured driver, an application that attempts to start at startup but causes the system to hang, or a faulty piece of hardware.
- **System Restore:** System Restore restores back to a designated restore point. By default, Windows is making restore points of your computer that store the state of your system. You'll be able to choose a restore point for your system from a previous day when you knew your system was performing correctly. The System Restore option will not alter any of your personal data or documents.

- **System Image Recovery:** For this feature to work, you would need to have done a backup in the past. Windows will search hard drives and DVDs for valid backups to restore from.
- **Windows Memory Diagnostic:** Some of the issues you may be experiencing may be the result of memory problems. Windows Memory Diagnostic Tool will perform tests against the RAM  
 In your system to see if there are any problems. For this tool to run, click the link, which will prompt you to restart your computer now and check for problems or to check for problems the next time you restart.
- **Command Prompt:** The Command Prompt option is for experienced users who need to access the file system and run commands specific to Windows 7. Only choose this option if you're sure you need it, and be careful when using the Command Prompt. When you're finished using the System Recovery Options, you can click either Shut Down or Restart to exit. For additional information on System Recovery Options, use Help and Support and search on System Recovery Options.

### Troubleshooting Performance Problems:

Task Manager sorting the processes based on CPU percentage.



This section covers basic troubleshooting in terms of using Task Manager and Control Panel tools to monitor and troubleshoot performance. Keep in mind that hardware and software go hand in hand, so performance problems can be caused by either one. For example, if a device is malfunctioning or improperly configured, it can lead to performance problems. Likewise, having too many programs running at one time can eat up valuable memory and processor time,

also foiling performance. So, don't assume that performance problems are always caused by hardware or software — the problem could well be one, the other, or both.

If your CPU Usage chart consistently runs at a high percentage in Task Manager, you may be running two or more firewalls. Most likely, you'll need to disable and remove any third-party firewalls, or disable the built-in Windows Firewall. Also, scan your system for viruses, adware, and other malware, and remove all that you can find to eliminate their resource consumption. If neither of the previous suggestions fixes your problem, you may need to see if an individual process is keeping your system overly busy. To do this, use one of these methods to start the Task Manager:

- ❖ With Windows running and while logged on to the computer, press Ctrl+Alt+Del and click Start Task Manager.
- ❖ Click Start and type taskmgr to locate and start Task Manager.
- ❖ Right-click the taskbar and click Start Task Manager.

Once you're in Task Manager, click the Processes tab and then click Show Processes from All Users. This will list all of the processes running on the system. Next, sort the information in the grid based on CPU, as shown in Figure 50-5. Just click the CPU column to sort by CPU utilization.

You should be able to identify the process that is using the majority of your CPU. You have a couple of options at this point:

- ✓ Use the name of the process under the Image Name column to search the Internet to see if the process is a valid file or a potential virus. If it is a virus of some form, you'll need to update your virus definitions and rerun your virus scan. If it does not appear to be a virus, you'll need to contact the vendor who provided the software to see if they can help troubleshoot the problem.
- ✓ Short term, you can right-click the process and choose End Process. Sometimes applications run into problems or situations the developer never imagined and the process gets stuck in a loop, which taxes the CPU. Restarting the application will reset the process, hopefully avoiding the circumstances that put the application in a loop.

## **Wrap-Up**

Many thousands of hardware devices are available that you can use with Windows, and no one rule that applies to troubleshooting all of them. So you'll likely have to consider all of



your resources. Be sure to check the manual that came with the hardware device first. If that doesn't work, the device manufacturer's Web site will likely be your next best bet. When you need to ask a question, post a question in the appropriate newsgroup in Microsoft Communities.

## **Parts of a Computer and Their Functions**

Going over the parts of a computer and their functions will help you understand all the vital components that make up a computer.

It's a great place to start if you want to begin learning about computers. Not only is it a good entry point, but it's also something good to know for curiosity's sake.

Knowing what the part is, is good, but we will explain each part's function, which will give you a firmer understanding of them.

### **Parts of a computer with their functions**

Here is a complete list of all the common computer hardware components and common peripherals used with them.

#### **1. The computer case**



This is the part that holds all of the internal components to make up the computer itself.

It is usually designed in such a manner to make fitting a motherboard, wiring, and drives as easy as possible. Some are designed so well that it is easy to make everything look tidy and presentable too.

Cases come in all different shapes and sizes to accommodate various types of computer components and satisfy the consumer's needs.

Design elements can vary from being plain to extremely elaborate. You can get a plain grey case or one that has colored lighting everywhere to make it look spectacular.

Cases, like most things, vary in quality. You can get them made from cheap metals or good quality materials that provide you with a sturdy design.

### **List of computer case sizes (known as form factor):**

- **Very small form factor:** Supports Mini ITX motherboards
- **Small form factor:** Supports micro ATX motherboards.
- **Standard form factor:** Supports standard ATX motherboards.
- **Larger form factors:** Supports ATX and XL-ATX motherboards.

## **2. Motherboard**



The motherboard is the main board that is screwed directly inside the computer case. All other cards and everything else plugs directly into the motherboard, hence its name.

The CPU, RAM, drives, power supply, and more all get connected to it.

Its function is to integrate all the components so they can communicate and operate together.

A good motherboard offers a wide amount of connectivity options. It also has the least amount of bottlenecks possible. This allows all the components to operate efficiently and to fulfill their maximum potential as they were designed to do.

Obviously, as the physical size is reduced, it begins to limit connectivity options and functionality.

Motherboards come in the following sizes:

Motherboard	Dimensions
Pico-ITX	3.9 inch x 2.9 inch   100mm x 72mm
Nano-ITX	4.7 inch x 4.7 inch   120mm x 120mm
Mini-ITX	6.7 inch x 6.7 inch   170mm x 170mm
Micro-ATX	9.6 inch x 9.6 inch   244mm x 244mm
Standard-ATX	12 inch x 9.6 inch   305mm x 244mm
XL-ATX	EVGA: 13.5 inch x 10.3 inch   343mm x 262mm Gigabyte: 13.58 inch x 10.31 inch   345mm x 262mm Micro-Star: 13.6 inch x 10.4 inch   345mm x 264mm

### 3. CPU: Central Processing Unit



The CPU is basically like the brain of a computer. It processes all the information on a computational level.

It takes information from the RAM and processes it to perform the tasks required from the computer.

It is usually seated in a socket that utilizes a lever or a latch with a hinged plate with a cut out in the center to secure it onto the motherboard.

It has many copper pads underneath it for the socket contacts to push up against them to make electrical contact.

There are other ways CPUs can be attached to the motherboard.

Here are some common examples:

- **ZIF (Zero Insertion Force):** Although this a more desirable socket, they are mostly found on older computer motherboards. A lever-operated mechanism to clamp the pins of the processor.
- **PGA (Pin Grid Array):** It is also a ZIF socket but has a different pin pitch and contains a different pin count.
- **LGA (Land Grid Array):** More commonly found on motherboards today. A levered hinged plate with a center cut-out clamps down on the processor.
- **BGA (Ball Grid Array):** The CPU is soldered directly onto the motherboard. This makes it a non-user swappable part. It is susceptible to bad connectivity.

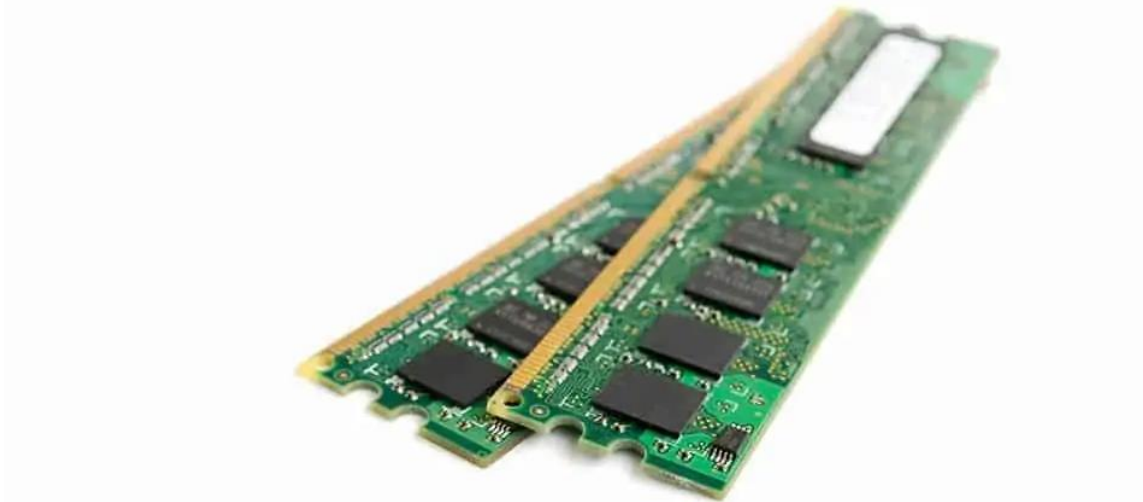
A processor generates a decent amount of heat, especially when it is working under high loads.

It will run even hotter when it is set to a higher clock speed to make it run faster. This is called overclocking.

This is why a heatsink and fan assembly are required to draw the heat away from the processor and distribute it to thin sheets or fins of metal for the fan to cool down.

There are so many different types of processors. The top manufacturers of computers are Intel, AMD, and NVidia.

#### **4. RAM: Random Access Memory**



RAM is a data storage device that can provide fast read and write access. RAM is also volatile, which means that it loses all the stored data when power is lost.

The RAM keeps data ready for the CPU to process. The speed of the RAM is a big contributor to the overall speed of a computer.

It plugs directly into a long slot that has contacts on either side of the slot.

It, too, has a clock speed, just like a processor. So, it can also be overclocked to deliver increased performance beyond the intended specification.

Certain RAM modules are sold with a heat spreader. It helps dissipate the heat from the individual memory ICs, keeping them cooler.

RAM has evolved like any other component. RAM used on the motherboard often uses DDR (Double Data Rate) SDRAM (Synchronous Dynamic Random Access Memory) type memory.

RAM Amount always comes in powers of 2, so you will always see numbers like 16GB, 32GB, or 64GB of RAM to mention some examples.

## **5. Graphics Card**



A graphics card processes the data from the motherboard and sends the appropriate information to the monitor for it to be displayed.

It can do so using an HDMI, DisplayPort, DVI, or VGA connector.

A graphics card can also be referred to as a video card or a display card.

It takes the burden of all the video processing from the main CPU. This gives a computer a big boost in performance.

Because of the large processing requirements for a gaming graphics card, fans are almost a given.

A graphics card plugs into a PCI Express (Peripheral Component Interconnect Express) slot on the motherboard. It is a serial expansion bus slot capable of a high amount of bandwidth in two directions.

A graphics card has a GPU (Graphics Processing Unit) which is the main component that requires cooling.

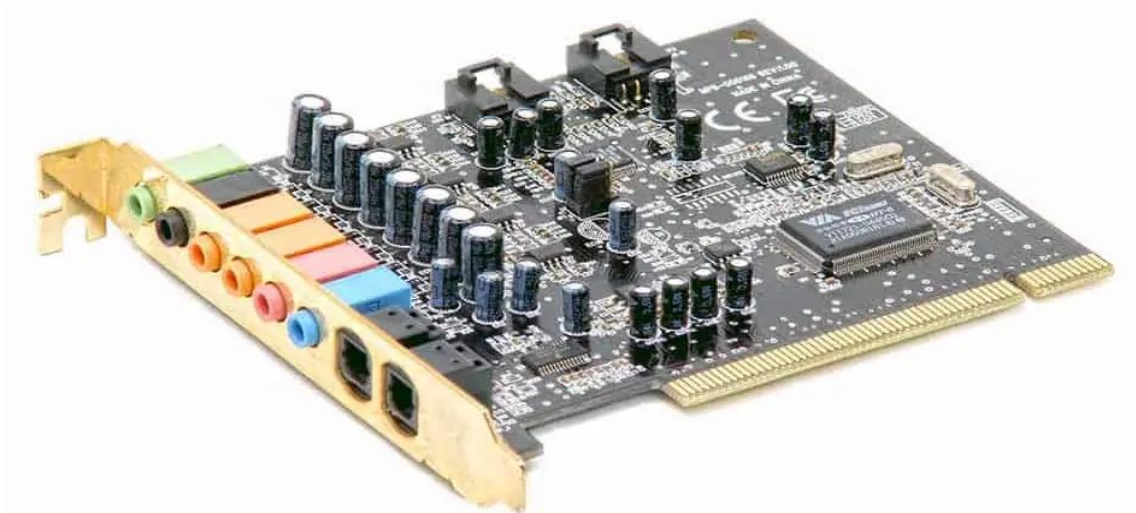
A GPU is slower than a CPU, but it is designed to deal with mathematical operations required for video rendering.

The amount of memory on the card varies depending on the manufacturer's design.

Graphics cards use GDDR (Graphics Double Data Rate) SDRAM, which is specially designed to optimize graphics performance.

GDDR is built to handle a higher bandwidth compared to plain DDR ram.

## 6. Sound Card



Most of the time, the sound chip built into the motherboard is used for audio output.

But, if you are a sound enthusiast or prefer higher detailed audio while playing a game, you might be inclined to use a sound card.

Sound cards plug into a computer in multiple ways. It can be through USB, PCI slot, or PCI Express x 1 slot.

External DACs have gained a lot more popularity and help deliver clearer and more defined audio.

They connect up using an IO cable like a USB cable to your computer or laptop and provide a line out for your speakers or headphones.

A sound processing chip on the card does all of the audio processing and is usually not a very powerful processor.

A sound card can offer a wide range of connectivity with various audio equipment.

A few examples could be optical audio, 1/4 inch jack, or RCA connectors.

## 7. Hard Drive



A hard drive is found in most computers. It's usually a mechanical drive that stores all the data.

Apart from storing data, it can also be used as a boot drive to run the operating system from it.

An operating system is a software program that makes a computer useable like Microsoft Windows, for example. The biggest vulnerability of a mechanical drive is its physically fragile nature.

One bump the wrong way can destroy a whole drive. A mechanical hard drive contains one or more platters that spin anywhere between 5200 to 10000 RPM (revolutions per minute).

The read and write heads are spaced only about 0.002 (51 micro M) inches away from the platter.

This gives you an idea about the physical limitations regarding its fragile nature.

Small areas on the platter can be arranged to represent a 1 or a 0. It can be changed using the drive head to alter the material to represent the correct value magnetically.

There are various categories of hard drives made for various real-world applications.

Some examples include:

- General use for desktops or laptops.
- Gaming optimized for desktops or laptops.
- General high capacity storage.
- NAS Devices.
- Servers.



- Video recording.

## 8. SSD: Solid State Drive



An SSD is also a type of hard drive, but it doesn't have any moving parts. It consists of a bank of flash memory that can hold a reasonable amount of data.

While SSD's are increasing in size all the time, they aren't cost-effective for storing large amounts of data.

A mechanical drive has a cheaper gigabyte to dollar ratio.

However, the SSD is a high-performance drive. It's fast and cannot be as easily damaged by dropping it or taking a few knocks.

SSDs are available as 2.5-inch laptop encapsulated drives as well as an M.2 SSD as the most commonly used kinds on the market.

That's why I always recommend SSD's for portable-type computers where possible. You can read more about whether or not SSD's are worth it in our other article.

## 9. PSU: Power Supply Unit



A power supply mounts inside the computer case. This converts the AC mains supply from the wall socket and supplies the correct DC voltages to all the components inside the computer.

A computer power supply supplies the following voltages:

- **+3.3v**: This voltage is supplied to the motherboard.
- **+5V**: This voltage is supplied to the motherboard and other internal components.
- **+12V**: This voltage is supplied to the motherboard and other internal components.
- **-12V**: This voltage is supplied to the motherboard.

You get different wattage ratings for power supplies. The higher the wattage, the higher the electrical current that can be made available to parts that need it.

The higher you go in Watts, the more the power supply will be likely to cost.

A power supply also comes with its own cooling fan. This helps all the internal components to stay cool when the power supply is subjected to bigger loads.

If you would like to know more about a power supply and its lifespan, I have written an article discussing it more in-depth.

## **10. Monitor or Visual Display Unit (VDU)**



A monitor is what you use to visualize the graphics data sent from the computer's graphics card.

There are various types of monitors on the market. The most commonly used is a LED-backlit LCD monitor.

There are also a variety of different sizes with different aspect ratios. The aspect ratio is simply the ratio between height and width.

For example, a 16:9 aspect ratio monitor will have 16 parts wide to 9 parts in height.

There are also curved monitors, but they are more expensive.

Monitors also have a fast response time to keep up with the high demands required to eliminate delays with user input for gaming.

## 11. Keyboard



A keyboard is one of the ways to communicate with a computer. Typing a key from the keyboard sends a small portion of data to tell the computer which key was pressed.

The computer can use this information in many ways. An example could be a command or a character that can be used in a document.

There are two main different types of keyboards. Mechanical and membrane types.

## 12. Mouse



A mouse allows the user to move a pointer displayed on the monitor and experience a more intuitive interaction with the computer.

These days mice have more buttons than the common three.

However, the three main buttons allow the user to select, grab, scroll and access extra menus and options.

A computer mouse can be wired or wireless. The latter obviously requires batteries.

Optical mice of today allow for very accurate precision and smooth movement.

### **Common external peripherals**

Here are some common peripherals that get connected to a computer and that extend their usefulness.

### **Printer**



A printer can take an image sent by a computer and deliver it onto a sheet of paper.

It does this by using the data from the computer, and by either using toner or ink, it deposits one of these in a controlled and accurate manner to form the image.

## **Scanner**



A scanner can take anything on paper and scan it to produce a replicated digital image.

This is also very handy for saving physical photos that you want to preserve.

Once the photo is stored digitally, it won't decay as a physical photo does over time.

The flatbed scanner is the most commonly used today.

There are many all-in-one devices also known as multifunction devices which have printer and scanning capabilities in one reasonably compact product.

## **Computer Speakers**



Computer speakers can connect up to the sound card at the rear of the computer.

Another way they can be connected is by a monitor that already has built-in speakers.

Generally, the sound quality is poor from a monitor's speakers. That's why most people buy a set of computer speakers to have on their computer desk.

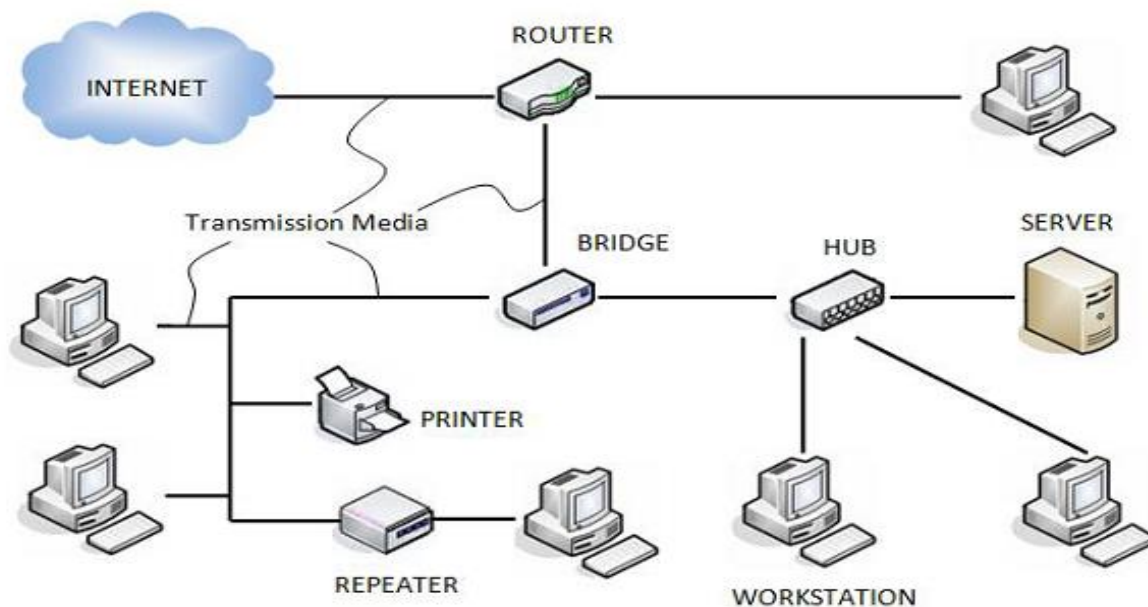
---

---

## Computer Network Components

Computer networks components comprise both physical parts as well as the software required for installing computer networks, both at organizations and at home. The hardware components are the server, client, peer, transmission medium, and connecting devices. The software components are operating system and protocols.

The following figure shows a network along with its components –



**COMPUTER NETWORK COMPONENTS**

## Hardware Components

- **Servers** –Servers are high-configuration computers that manage the resources of the network. The network operating system is typically installed in the server and so they give user accesses to the network resources. Servers can be of various kinds: file servers, database servers, print servers etc.

- **Clients** – Clients are computers that request and receive service from the servers to access and use the network resources.
- **Peers** – Peers are computers that provide as well as receive services from other peers in a workgroup network.
- **Transmission Media** – Transmission media are the channels through which data is transferred from one device to another in a network. Transmission media may be guided media like coaxial cable, fibre optic cables etc; or maybe unguided media like microwaves, infra-red waves etc.
- **Connecting Devices** – Connecting devices act as middleware between networks or computers, by binding the network media together. Some of the common connecting devices are:

**a. Routers:**

[Routers](#) guide and direct network data, using packets that contain various kinds of data—such as files, communications, and simple transmissions like web interactions. The data packets have several layers, or sections, one of which carries identifying information such as sender, data type, size, and most importantly, the destination IP (Internet protocol) address. The router reads this layer, prioritizes the data, and chooses the best route to use for each transmission.

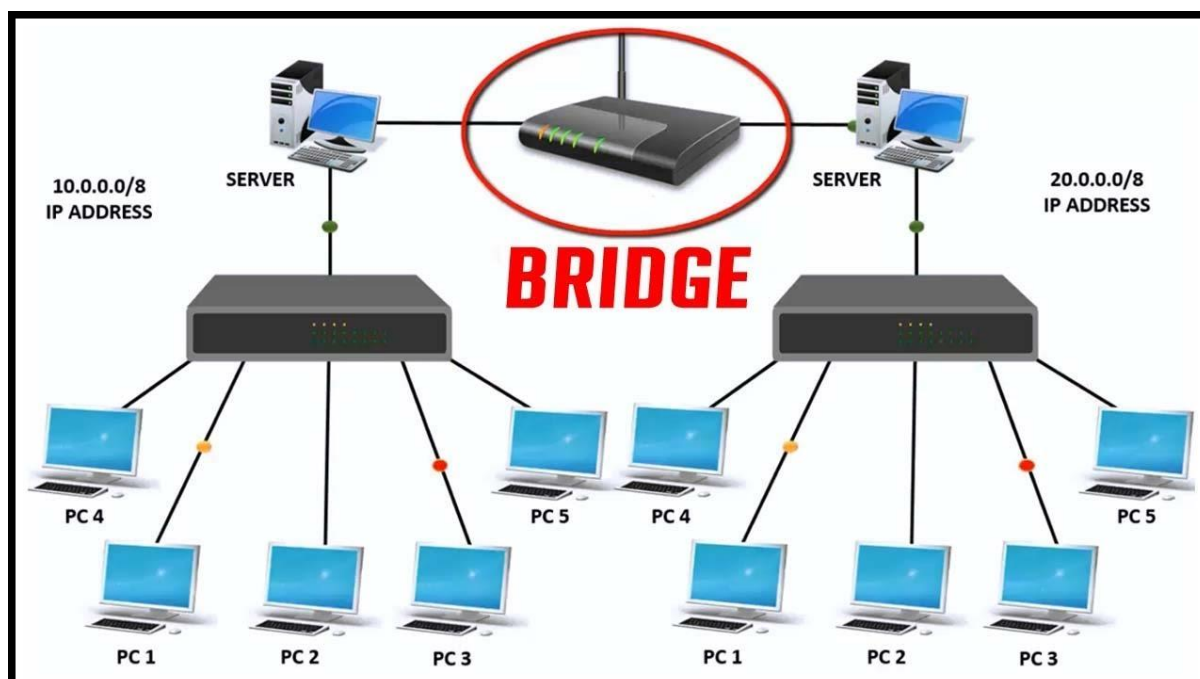


**b. Bridges:**

Bridges are used to connect two subnetworks that use interchangeable protocols. It combines two LANs to form an extended LAN. The main difference between the bridge and repeater is that the bridge has a penetrating efficiency.

## Working of Bridges

A bridge accepts all the packets and amplifies all of them to the other side. The bridges are intelligent devices that allow the passing of only selective packets from them. A bridge only passes those packets addressed from a node in one network to another node in the other network.



### c. Hubs:

Hubs are networking devices operating at a physical layer of the OSI model that are used to connect multiple devices in a network. They are generally used to connect computers in a LAN.

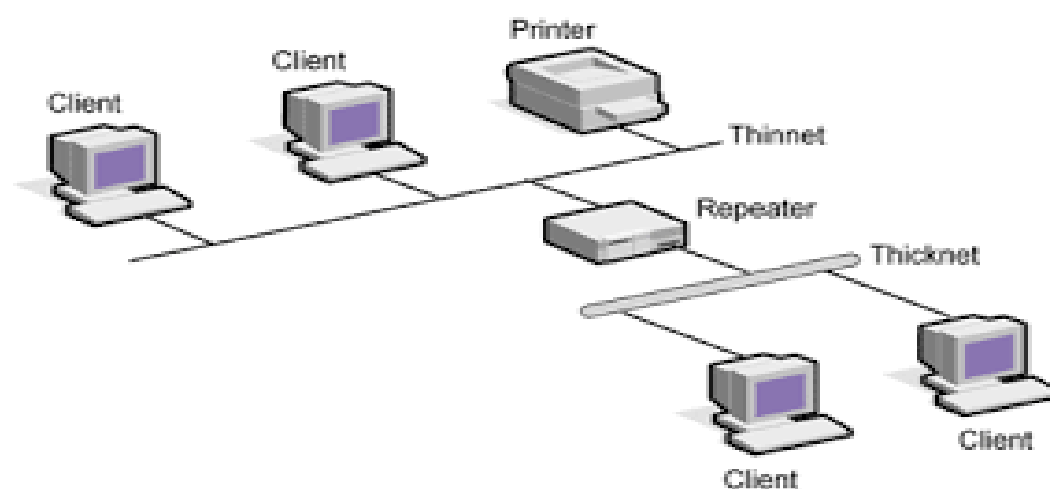
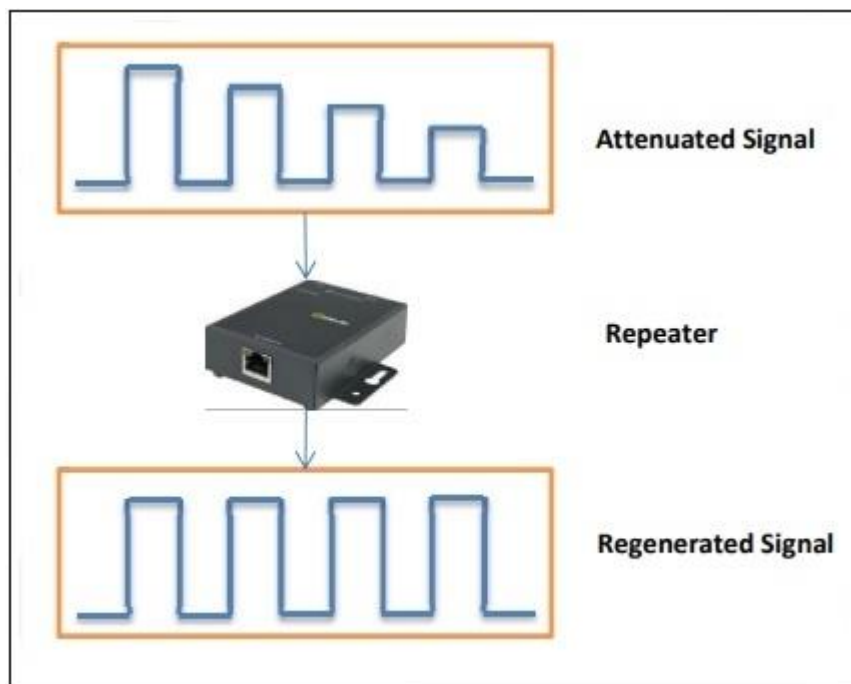
A hub has many ports in it. A computer which intends to be connected to the network is plugged in to one of these ports. When a data frame arrives at a port, it is broadcast to every other port, without considering whether it is destined for a particular destination device or not.



### d. Repeaters:



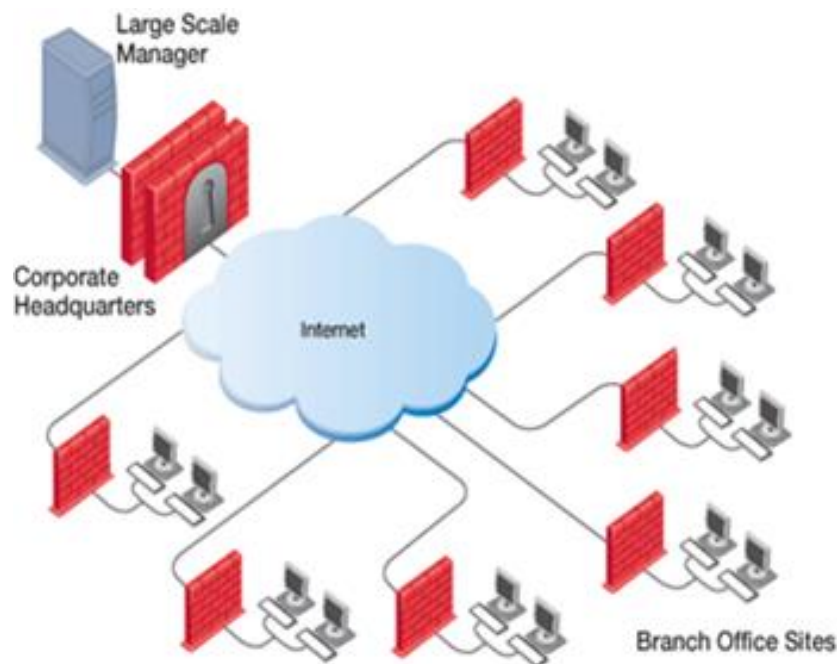
Repeaters are network devices operating at physical layer of the OSI model that amplify or regenerate an incoming signal before retransmitting it. They are incorporated in networks to expand its coverage area. They are also known as signal boosters.



#### e. Gateways:

A gateway is a [network node](#) used in telecommunications that connects two networks with different transmission [protocols](#) together. Gateways serve as an entry and exit point for a network as all data must pass through or communicate with the gateway prior to being routed. In most [IP](#)-based networks, the only traffic that does not go through at least one gateway is traffic flowing among nodes on the same local area network ([LAN](#)) segment.

The term default gateway or network gateway may also be used to describe the same concept.



#### f. Switches:

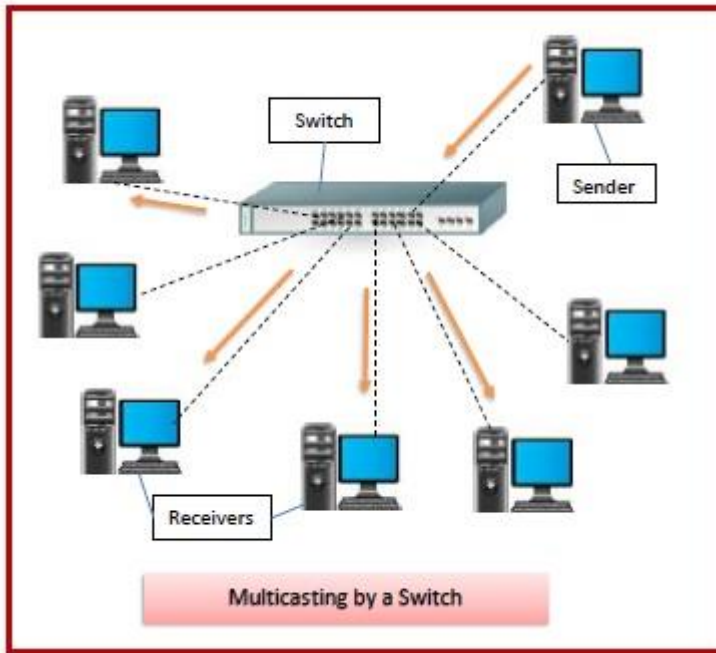
Switches are networking devices operating at layer 2 or a data link layer of the OSI model. They connect devices in a network and use packet switching to send, receive or forward data packets or data frames over the network.

A switch has many ports, to which computers are plugged in. When a data frame arrives at any port of a network switch, it examines the destination address, performs necessary checks and sends the frame to the corresponding device(s). It supports unicast, multicast as well as broadcast communications.

NETGEAR 5 Port Network Switch



ComputerHope.com



## Software Components

- **Networking Operating System** – Network Operating Systems is typically installed in the server and facilitate workstations in a network to share files, database, applications, printers etc.
  - **Protocol Suite** – A protocol is a rule or guideline followed by each computer for data communication. Protocol suite is a set of related protocols that are laid down for computer networks. The two popular protocol suites are –
    - a. OSI Model ( Open System Interconnections)
    - b. TCP / IP Model
- 
-