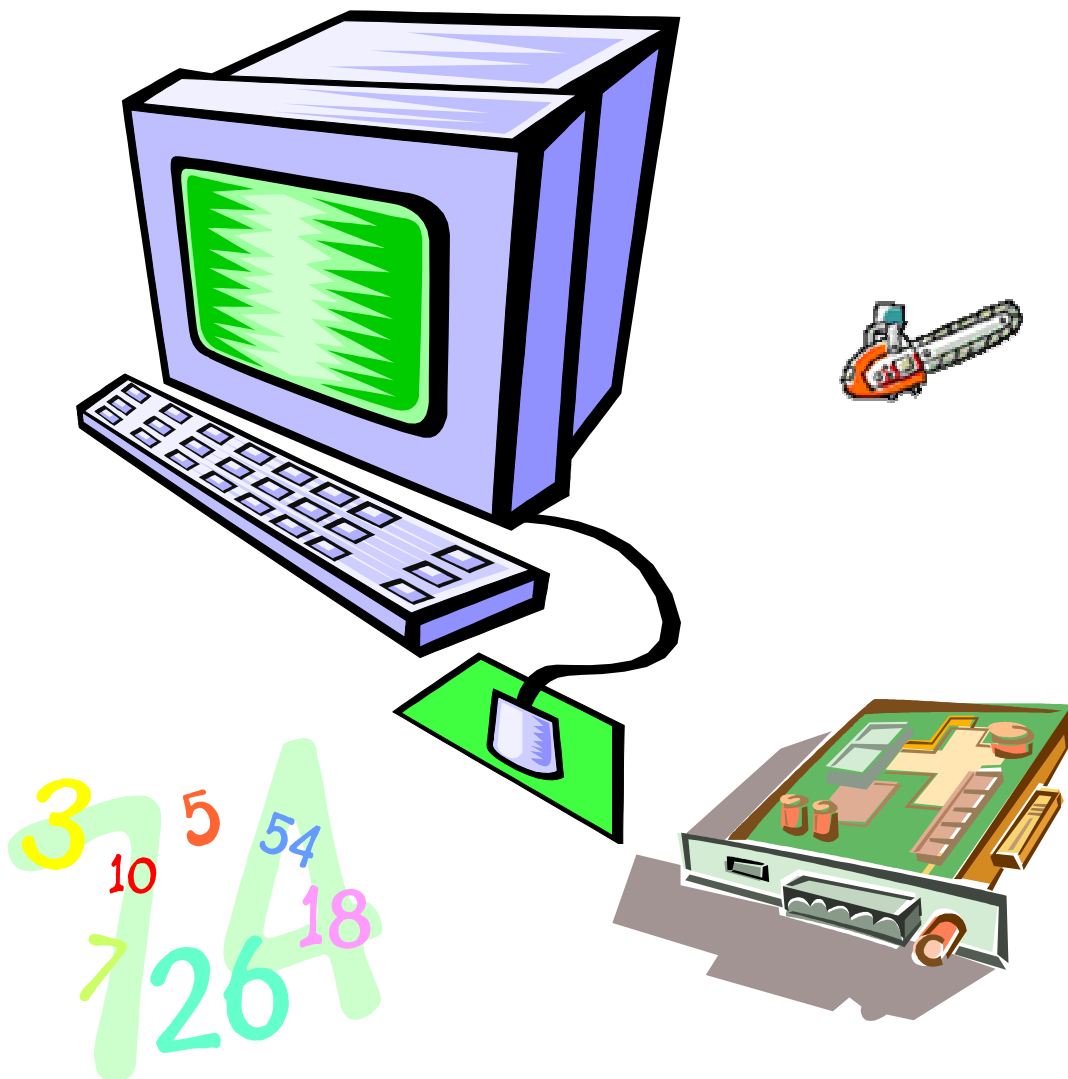


# Cisco

## IT Essentials 1

### Chapter 1 Revision



## Windows Desktop Environment

### **Computer Systems and Programs**

Computer Systems consist of hardware and software components. Hardware is the physical equipment such as the case, floppy disk drives, keyboards, monitors, cables, speakers, and printers.

The term software describes the programs that are used to operate the computer system. Computer software, also called programs, instructs the computer on how to operate. These operations may include identifying, accessing, and processing information. Essentially, a program is a sequence of instructions that describe how data is to be processed. Programs vary widely, depending on the type of information that is to be accessed or generated.

### **The Operating System**

An operating system (OS) is a program that manages all the other programs in a computer. It also provides the operating environment with the applications that are used to access resources on the computer. Operating systems perform basic tasks like recognizing input from the keyboard or mouse, sending output to the video screen or printer, keeping track of files on the drives, and controlling peripherals such as printers and modems. The Disk Operating System (DOS), Windows 98, Windows 2000, Windows NT, Linux, Mac OS X, DEC VMS, and IBM OS/400 are all examples of operating systems.

Operating systems are platform-specific, meaning they are designed for uses with different types of computers. For instance, the Windows operating system (3.1, 95, 98, 2000, XP, or NT) is designed for use with an IBM-compatible personal computer often referred to as a PC. The Mac OS, on the other hand, will only work with Macintosh computers. PC and Macintosh are called platforms. A platform is the computer system on which programs can run.

### **Overview of Software Applications**

Application	Use / Description
Word Processor	A word processor is an application that creates, edits, stores, and prints documents. All word processors can insert or delete text, copy, cut, paste, and define margins. Word processors that only support these features are called text editors. Most word processors support additional features that enable the manipulation and formation of documents in very sophisticated ways. Microsoft Word is a popular spreadsheet application.
Spreadsheets	In a spreadsheet, numerical data is stored in cells that are arranged on a grid. Cells are referred to by their position in this grid according to the column and row they occupy (such as A3). Excel is a popular spreadsheet application.
Databases	A database is a collection of data that is organized so that its contents can be easily accessed, managed, and updated. It is an electronic filing system. Microsoft Access, Oracle Database, and FileMaker are all examples of database applications. PC databases fall into two distinct categories, flat-file and relational.
Graphics Applications	Graphics applications are used to create or modify graphical images. The two types include object-based or vector-based and bitmaps or raster images.
Presentation Applications.	Presentation applications, also known as business graphics, permit the organizing, design, and delivery of presentations in the form of slide shows and reports. Bar charts, pie charts, graphics, and other types of images can be created based on data that is imported from spreadsheet applications. Microsoft PowerPoint is a popular presentation application.

## Starting Programs in Windows.

The Start button is located on the Windows taskbar in the lower left hand corner of the Windows desktop. Imbedded in it are several useful Windows features. Clicking on the **Start** button will easily access these options.

### Run

The Run feature is another method of starting a program, instead of clicking the program's shortcut icon on the desktop or on the list of programs within the Programs directory. Access the Run feature by clicking on Start and choosing Run. This will open a command line entry space into which the program name and any parameters that are needed can be entered as in a DOS prompt window.

**Note:** This feature is used often by the IT Technician to access the command editor and to execute diagnostic routines like ping

## Switching between programs.



desired window.

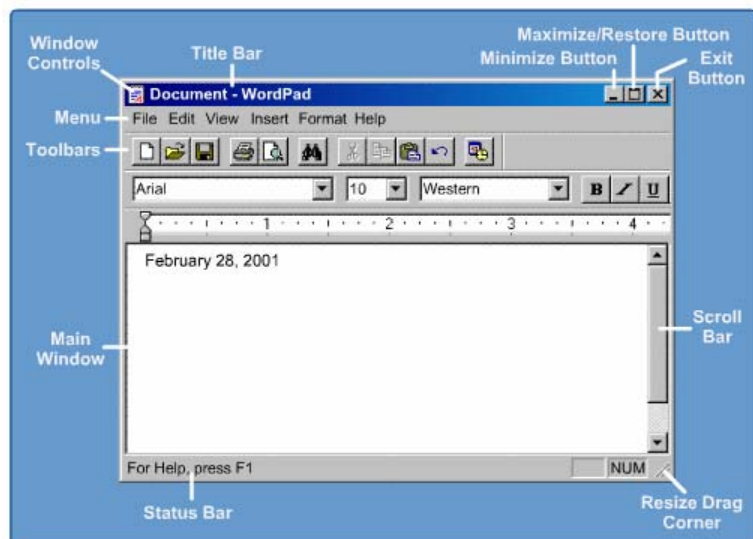
When more than one window is open, the user can switch between windows by pressing **Alt + Tab**. As shown in that picture there, a window pops up that indicates which applications are open. While holding down the **Alt** button, keep pressing **Tab** to find the

Document windows can also be selected by clicking the desired document on the desktop taskbar, which displays at the bottom of the screen.

## The Application Window

**Title Bar** – Displays the name of the document and application. In this example, it is "Document - WordPad". Also located in the title bar are the Minimize, Maximize, and Exit buttons that will be discussed in this chapter.

**Menu Bar** – Contains menus for manipulating the document, such as creating new documents, copying text, inserting images, and so on. To see the menu for each item, click on a button. A drop-down menu displays.



**Status Bar** – Located at the bottom of the window, the status bar shows useful information, such as page number, whether the file is being saved, how to access the Help feature, and so on.

**Scroll Bar** – Windows may have scroll bars that appear on the right side, the bottom of the window, or both. These scroll bars appear when the document is too large to be viewed entirely on one screen. Clicking on the arrows on either end of the scroll bar moves the images or text through the window. Clicking and dragging the scroll bar moves the images or text even more quickly through a window.

## Working with Icons.

### Creating Shortcuts (Icons).

To create a shortcut (icon), navigate to the program or file in Windows Explorer. Right-click the program or file and select **Create Shortcut**. The shortcut icon will appear as the last item. This icon can be moved using cut/paste or drag and drop. An icon can be created right on the desktop. Right-click on the desktop and select **New > New Shortcut** or **Create Shortcut**. Enter the path for the program or file and the shortcut will display on the desktop.

### Moving Icons.

To move the created icon or another desktop icon to another position on the desktop, click on it and then drag it to the desired location. The icon becomes semi-transparent while being dragged. To restore the icon to full intensity, click outside of it. If the icon does not move, disable the **Auto Arrange** function on the desktop. To do this, right-click on an empty space of the desktop and uncheck the **Auto Arrange**. Shortcut icons can be created for frequently used programs like web browsers, word processors, spreadsheets, and instant messengers.

### Selecting Multiple Icons.

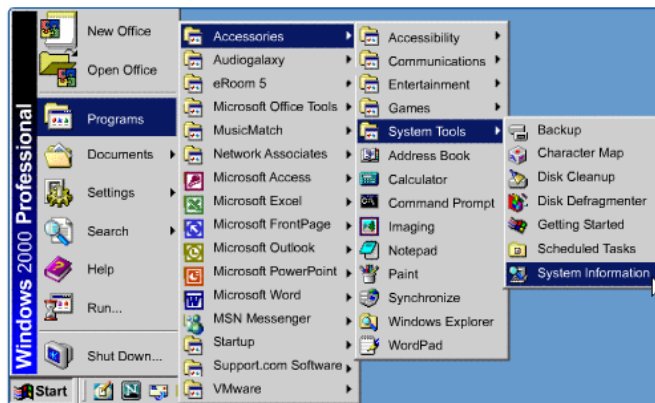
To select several icons at once to move, hold down the **Ctrl** key and click on all the icons that are to be moved. Then, drag the group of icons to the new location and let go of the mouse button. Deselect the icons by clicking on an empty part of the desktop.

### Renaming Icons.

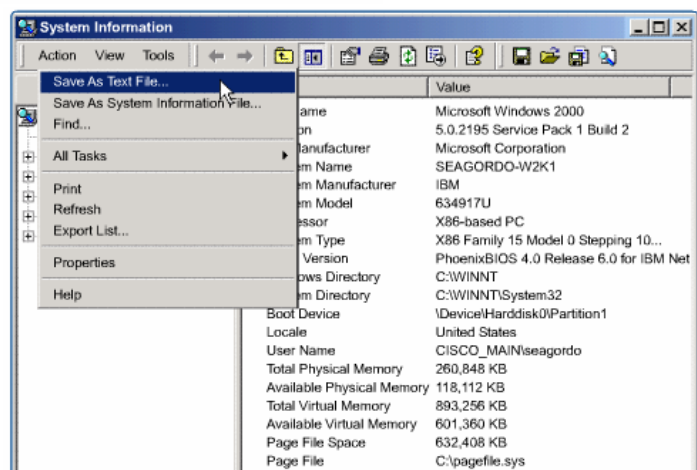
There are two ways to rename an icon. The first way is to simply click once on the name under the icon as . Then type in a new name. Click on an empty part of the desktop to complete the action. The Second way is to right-click on the icon and select the **Rename** option.

## Viewing a computer's basic system information

To view information about the system in Windows 2000, go to the **Start** menu and choose **Programs > Accessories > System Tools > System Information**.



The window that opens gives the operating system (OS) name and version, the system manufacturer and model, the processor type and manufacturer, the BIOS version, and the memory. The image below shows the window that displays. It will also show how to view information such as the type of operating system, the processor type, and the type and amount of Random Access Memory (RAM) that is installed. This information is valuable to the PC technician for troubleshooting and for updating the system or applications.



## **Laboratory Safety and Tools**

### **Workspace practices that help reduce ESD potential.**

The workspace should be situated away from carpeted areas because carpets can cause the build up of electrostatic charges. If distance from carpeting is not possible, the carpeted surface could be covered with a plastic anti-static mat such as those commonly used under desk chairs. Using ESD protection tools such as a wrist strap and a mat, which are commonly sold in kits, can largely eliminate this type of danger.

When working with components, lay the mat on the workspace next to or under the system case. The mat is then clipped to the case to provide a grounded surface on which parts can be placed as they are removed from the system. Always handle all components by their edges. Avoid touching pins, chips, or anything else made of metal, so that the chance of producing a damaging electrostatic discharge will be reduced. Reducing the potential for electrostatic discharge reduces the likelihood of damage to delicate circuits or components.

Avoid touching the computer screen for any reason while it is turned on. Even brief touches to an active screen can put an electrostatic charge in the hand that can discharge through the keyboard.

### **Using a Wrist Strap**

A wrist strap is a device that is attached to the technician's wrist and clipped to the metal system chassis on which the work is being done. The wrist strap prevents ESD damage by channelling static electricity from the person to the ground.

After putting the wrist strap on, allow 15 seconds to pass before touching any sensitive electronic components with bare hands. This pause allows the wrist strap to neutralize the static electricity that already exists on a person's body. ESD potential can also be reduced by not wearing clothing made of silk, polyester, or wool. These fabrics tend to build static charges.

A wrist strap can only offer protection from ESD voltages carried on the body. ESD charges on clothing can still cause damage. Therefore, avoid making contact between electronic components and clothing. If static shocks are still being experienced in the workspace while working near a computer, try using a fabric softener or using an anti-static spray on clothing. Be certain to spray clothes and not the computer. A wrist-grounding strap does not discharge electrostatic charges that have built up on hair, so take precautions to ensure that hair does not rub across any of the components.

### **When should a wrist strap not be used for grounding?**

There are some exceptions to wearing a wrist strap in order to provide a safe ground. A wrist strap is never worn when working on a monitor or when working on a computer power supply. Monitors and power supplies are considered replaceable components. Only highly skilled professionals will attempt to open and repair them.

**Warning:** The components described should not be opened whether or not a wrist strap is worn, as this could expose a person to danger.

Components inside a monitor can hold a charge for a long time, even after the monitor has been unplugged from its external power source. The amount of voltage that a monitor can contain, even when turned off and unplugged is enough to kill. Wearing a wrist strap helps heighten the risk of contacting the monitor's dangerous electric current. The cathode ray tube (CRT) in the monitor is charged to as much as 20,000 volts or more. This charge can last for weeks after the monitor is turned off.

It may be necessary when assembling a computer system to test electrical signals on a motherboard or its components. In addition, testing the external power environment is often necessary. A troublesome power source can cause difficulties for the plugged in computer systems. That thing on the right is a Fluke 110 Multimeter, which is used to test high-voltage devices. In addition to the outlet tester and digital multimeter, wrap plugs should be part of the standard equipment kept in the workspace. These plugs are also referred to as loop back plugs, or loop back connectors.



## **Connecting Computer Systems**

The PC as a standalone device may be adequate for a home computer, but businesses, government offices, and schools need to exchange information and share equipment and resources. In order to do this, a method was developed to connect individual computers. This method is called networking. A network is simply a group of computers that are connected so that their resources can be shared. Schools have networks.

Computers used by students, teachers, and administrators are all connected. This saves the expense of having to buy peripheral equipment like printers for each computer. For instance, when a homework assignment is being printed in the school computer lab, the printer is being shared with all of the students. It would be very expensive if a school bought a printer for every computer. In addition, a network allows users to share files. If work is being done on a group project, a file can be saved to a central computer called a server. This file can then be accessed from any other student computer in the school.

**Networks are not limited to just a building or school campus. Networks can be an entire school district or all of the offices in a company. A school, for example, is connected to a main district office, as are all the other schools in a district. The Internet is the ultimate network, connecting millions of smaller networks.**

## **Birth of the Internet**

As the Cold War between the West and the (former) Soviet Union intensified in the 1960s, the U.S. Department of Defense (DoD) recognized the need to establish communications links between major U.S. military installations. The primary motivation was to maintain communications if a nuclear war resulted in the mass destruction and breakdown of traditional communications channels. Major universities, such as the University of California and the Massachusetts Institute of Technology (MIT), were also involved in networking projects.

The DoD funded research sites throughout the United States, and in 1968, the Advanced Research Projects Agency (ARPA) contracted with Bolt, Beranek, and Newman, Inc. (BBN), a private company, to build a network based on the packet switching technology that had been developed for better transmission of computer data.

## **The Growth Begins in the 1970s**

When the Advanced Research Projects Agency Network (ARPANET) project began, no one anticipated that the network would grow to the extent that it did. Throughout the 1970s, more nodes or access points were added, both domestically and abroad.

## **More is Better in the 1980s**

In 1983 the ARPANET was split, and Military Network (MILNET), which was integrated with the Defense Data Network (DDN), took 68 of the 113 existing nodes. The DDN had been created the previous year.

The Domain Name System (DNS) was introduced in 1984, providing a way to map friendly host names to IP addresses. It was much more efficient and convenient than previous methods. These methods are discussed in Chapter 8, "Hardware Fundamentals for Servers". In 1984, there were more than 1,000 host computers on the network.

During the last half of the 1980s, networking increased considerably. For instance, the National Science Foundation (NSF) created supercomputer centers in the United States at Princeton, the University of California, the University of Illinois, and Cornell University. The Internet Engineering Task Force (IETF) was also created during this time. By 1987, there were 10,000 hosts on the network, and by 1989, that number increased to over 100,000.

## **Math for a Digital Age**

### **Introduction to algorithms**

An algorithm is a systematic description or method of exactly how to carry out a series of steps to complete a certain task. Computers use algorithms in practically every function they perform.

Algorithms are step-by-step procedures that perform a specific task. Computers use algorithms to speed up and simplify procedures. Most of the algorithms used by computers are fairly complex and require some background in computer science to understand.

### **Euclidean Algorithm**

One example already seen is the Euclidean algorithm. This is essentially the algorithm that is used to do long division (when dividing two numbers). Other algorithm techniques are the number conversion techniques described previously. The reality is that vacuuming the carpet or sweeping the garage could both be algorithms if there is a systematic way that these tasks are carried out each time. The term does not have to be used rigidly.

### **Dijkstra Algorithm**

A popular algorithm used by networking devices on the Internet is the Dijkstra algorithm. This algorithm is used to find the shortest path between a specific networking device and all other devices in its "routing domain". It uses bandwidth as a means of measuring the shortest path.

### **Encryption Algorithm**

Another common type of algorithm is an encryption algorithm. These algorithms are used to prevent hackers from viewing data as it passes through the Internet. One example of such an algorithm is used by 3DES (pronounced "triple dez"), an encryption standard used to secure connections between networking devices and hosts. Further details about 3DES are outside the scope of this course.

## **Workspace cleaning supplies**

Although a new system will not need to be cleaned during the assembly process, over time, computer systems can gather dust and other residues. Dust particles themselves may contain chemical residues that can degrade or short-circuit chips, contact surfaces, and wire contacts. Oil from human fingers can contaminate or corrode a sensitive electrical connection. Even perspiration from skin contains chemical salts that can corrode electrical connections. This is another very good reason to hold all electronic boards by their edges, and not where the metal contacts are located.

**Caution:** Do not confuse isopropyl alcohol with rubbing alcohol. **Rubbing alcohol** is relatively impure and can actually contaminate electrical connections. Swabs that resemble typical cotton swabs, but have a foam or chamois cloth on the end, should be used together with isopropyl alcohol. Cotton swabs should not be used, as they shred and leave strands on the components.

**Measurement related terminology.**

<b>bit</b>	A bit is the smallest unit of data in a computer. A bit can take the value of either one or zero, and it is the binary format in which data is processed by computers.
<b>byte</b>	A byte is a unit of measure that is used to describe the size of a data file, the amount of space on a disk or other storage medium, or the amount of data being sent over a network. One byte consists of eight bits of data.
<b>nibble</b>	A nibble is half a byte or four bits
<b>kilobyte (KB)</b>	A kilobyte is 1024 (or approximately 1000) bytes.
<b>kilobytes per second (kBps)</b>	A measurement of the amount of data transferred over a connection. For example, a network connection. kBps is a data transfer rate of approximately 1,000 bytes per second.
<b>kilobit (Kb)</b>	A kilobit is 1024 (or approximately 1000) bits.
<b>kilobits per second (kbps)</b>	kbps is a measurement of the amount of data transferred over a connection. For example, a network connection. kbps is a data transfer rate of approximately 1,000 bits per second.
<b>megabyte (MB)</b>	A megabyte is 1,048,576 bytes (or approximately 1,000,000 bytes).
<b>megabytes per second (MBps)</b>	A common measurement of the amount of data transferred over a connection. For example, a network connection. MBps is a data transfer rate of approximately 1,000,000 (10 <sup>6</sup> ) bytes
<b>megabits per second (Mbps)</b>	A common measurement of the amount of data transferred over a connection. For example, a network connection. Mbps is a data transfer rate of approximately 1,000,000 (10 <sup>6</sup> ) bits per second.
<b>hertz (Hz)</b>	Hertz is a unit of measurement of frequency. It is the rate of change in the state or cycle in a sound wave, alternating current, or other cyclical waveform. Hertz is synonymous with cycles per second and it is used to describe the speed of a computer microprocessor.
<b>megahertz (MHz)</b>	One million cycles per second. This is a common measurement of the speed of a processing chip.
<b>gigahertz (GHz)</b>	One billion (1,000,000,000) cycles per second. This is a common measurement of the speed of a processing chip.

A common error is confusing KB with Kb and MB with Mb. Note that a capital B indicates bytes while a lower case b indicates bits. Similarly, multipliers greater than one are capitalized and multipliers less than one are lower case. For example, M=1,000,000 and m=0.001.

## Number Conversions.

### **Converting Decimal to Binary**

To convert a decimal number to binary, the idea is to first find the biggest power of 2 that will “fit” into the decimal number. Consider the decimal number 35. Starting with the largest number,  $2^6$ , or 64, is too big, so place a “0” in that column.

The next largest number,  $2^5$ , or 32, is smaller than 35. Place a “1” in that column. Now, calculate how much is left over by subtracting 32 from 35. The result is 3.

Next, ask if 16 (the next lower power of 2) fits into 3. Because it does not, a “0” is placed in that column.

The value of the next number is 8 which is larger than 3, so a “0” is placed in that column too.

The next value is 4 which is still larger than 3, so it too receives a “0”.

The next value is 2 which is smaller than 3. Because 2 fits into 3, place a “1” in that column. Now subtract 2 from 3, which results in 1.

The value of the last number is 1, which fits in the remaining number left. Thus, place a “1” in the last column.

128	64	32	16	8	4	2	1
0	0	1	0	0	0	1	1

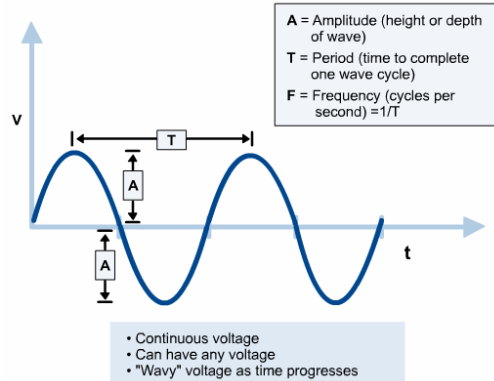
### Binary to Hex Conversion

To convert a binary number to hexadecimal, group the number into groups of four bits at a time, starting from the right. Then convert each group of four bits into hexadecimal, thus producing a hexadecimal equivalent to the original binary number.

Binary	Hexadecimal
0000	0
0001	1
0010	2
0011	3
0100	4
0101	5
0110	6
0111	7
1000	8
1001	9
1010	A
1011	B
1100	C
1101	D
1110	E
1111	F

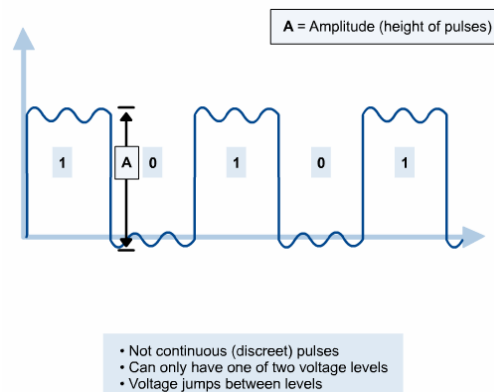
## Analog and digital systems.

As time goes on, the world is becoming more and more digital.



### **Analog**

The world used to depend entirely on analog processes, machinery, and communications for its functions (see Figure 1). The variables that characterize an analog system may have an infinite number of values.



### **Digital**

In binary arithmetic, as used on modern computers, only two values are allowed: 0 and 1. Computers and cable modems are examples of digital devices (Figure 2). Digital devices are gradually replacing analog devices.

## **Basic Computer Operation**

### **Turning on the PC**

To turn on a PC, there is an external switch (or pair of switches that must be activated) in order to power up the computer. The rear switch, if included, provides the physical connection between the house power (via the wall outlet) and the computer power supply. This switch has to be on prior to turning on the front switch. Most PCs will have a single switch in the front that is activated to provide power.

The monitor will also have a power switch in most cases. Usually this is in the front or lower right portion of the display case. Switches can be push-on/off, or rocker switches. They are manufactured to withstand thousands of on/off cycles, typically outlasting the PC itself.

Starting a computer is also referred to as booting the system. A **cold boot** is performed when the PC is turned on using the power button. At the end of this process the Windows operating system desktop will be displayed.

### **Restarting the PC**

Restarting a PC that has already been powered up is referred to as a **warm boot**. This can be achieved by pressing the reset button on the front panel. Alternatively, press **Ctrl + Alt + Delete**, and click **Restart** from the menu that displays.