CISCO SYSTEMS

IT Essentials I :
PC Hardware and Software
v3.1

Student Manual and Worksheets

Labs

Lab 1.3.8: Getting to Know Windows

Estimated Time: 10 Minutes

Objective

Upon completion of this lab, the student will have been introduced to the proper way of shutting down Windows and navigating the Windows interface, as well as using Windows Help features.

Equipment

The following equipment is required for this exercise:

- Lab computer with Windows 98 installed

Scenario

In order to help a friend out with Windows, the student will need to become more familiar with the Windows Graphical User Interface (GUI).

Procedures

Knowing how to use the Windows interface will help in nearly any job today. Most computers in the workplace have a version of Microsoft Windows installed on them. To work in a Windows environment, the user should have a firm grasp of several skills. Examples include resizing windows, creating and deleting icons, working with files and folders, and navigating the Start button (Shutdown, Run, Search, Settings, Documents, and Programs).

Step 1

If the lab computer is not already on, boot it up now. If you are prompted for a login name and password when Windows has booted, use the username and password assigned by the instructor.

Step 2

At the Windows Desktop, become familiar with the Windows interface in order to make troubleshooting faster and easier. Take a minute to click the **Start** button and look through the items that are listed in the menu.

What options are listed under the **Find** menu?

_____

_____

_____

Step 3

Try running the Calculator program by selecting **Start** > **Programs** > **Accessories** > **Calculator**. Enter a few simple test calculations to see how it works. Try using both the mouse and the numeric keypad. When finished, click the **X** on the top right corner of the Calculator program to close it.

Step 4

Now try the help system that is built into Windows. Help is organized into separate books, and includes a search feature so that specific topics can be located quickly. To begin, click on the **Start** button and then click **Help**. This will open a window with a list of categories that outline the major areas that Help covers.

Click on the **Search** tab, and enter one or more words relating to the topic that needs research. Do a search for the word "resize".

After completing a search for "resize", what topics does **Help** display?

_____

_____

_____

_____

There is also an **Index** tab, which lists all help items alphabetically.

Step 5

There are different ways of resizing a window in order to minimize it or maximize it. In order to see more of a help item in one screen, resize the window. The fastest way to view a window in full screen is to click the **Maximize** button. The Maximize button is the middle button on the top right corner of the window.

To return the window to its original size, click the **Restore** button. The Restore button replaces the Maximize button when the window is in full screen.

Maximize   Restore

Minimize Close   Minimize Close

To resize the window to a custom size, grab the edges or corners of a window by first moving the mouse cursor to the edge or corner of the window. When the double-arrow appears, click and hold the mouse button and drag the window to the desired size.

To properly shutdown Windows, click the **Start** button, and select **Shut Down** from the menu. Select **Shut Down** from the list and click the **OK** button. The computer should always be shutdown using this method. Important data that is stored in memory while the system is running needs to be written to the hard disk before turning off the computer. Do not turn the computer off until a message displays indicating that it is safe to do so. Newer operating systems will automatically turn off power when the shutdown process is complete.

Troubleshooting

The Windows Help feature is a valuable tool when the technician needs information on a specific topic. If there is something in Windows that the user needs to research, using the **Help** feature can answer a lot of questions.

Reflection

What is the proper way to shutdown Windows?

_____

_____

_____

_____

Why is it important to shutdown Windows properly instead of just pressing the power button?

_____

_____

_____

_____

Lab 1.5.3: Boolean Operations

Estimated Time: 25 Minutes

Objective

Upon completion of this lab, the student will have been introduced to the AND, OR, NOR, and NOT Boolean operations. The student will also be able to calculate the output of different combinations of Boolean operations based on input.

Equipment

This is a written exercise. No equipment is necessary.

Scenario

The student is given a circuit board diagram. In order to figure out what each logic gate does, the student must understand how Boolean operations function.

Procedures

This lab will help the student learn to work with Boolean operations. Computers use Boolean operations to make calculations based on inputs of 0 (OFF) and 1 (ON). 0s and 1s are represented in computer microchips and the bus on the motherboard by the presence or absence of voltage. The student will perform some basic calculations using the AND, OR, NOR, and NOT Boolean operations to get a better idea of how computers work internally. Complex combinations of these operations take place constantly in computers within millionths of a second.

Step 1

The Boolean operations of AND, OR, NOR, and NOT work as follows:

0 OR 0 is 0	0 AND 0 is 0	0 NOR 0 is 1	NOT 0 is 1
0 OR 1 is 1	0 AND 1 is 0	0 NOR 1 is 0	NOT 1 is 0
1 OR 0 is 1	1 AND 0 is 0	1 NOR 0 is 0	
1 OR 1 is 1	1 AND 1 is 1	1 NOR 1 is 0	

The corresponding "truth tables" allow a compact way to represent these operations:

OR	0	1
0	0	1
1	1	1

AND	0	1
0	0	0
1	0	1

NOR	0	1
0	1	0
1	0	0

Note: AND, OR, and NOR are called binary operations (not to be confused with binary numbers) because the operations require two inputs. NOT is called a unary operation

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because it has only one input.

Look at the following combination of Boolean operations and determine the output.

(1 AND 0) OR (0 AND 1)

Compute the operations in parentheses first. 1 AND 0 is 0. 0 AND 1 is 0. So the solutions is 0 OR 0, which is 0.

As a second example, try to compute the following Boolean operations.

NOT [(1 AND 0) NOR (0 OR 1)] AND 1

Work from the inner parentheses toward the outer parentheses. Also, the NOT applies to the expression that follows it (the NOT does not apply to anything that appears after the "]"). So, following these instructions, the result is NOT [0 NOR 1] AND 1, which is equivalent to NOT [0] AND 1, which is the same as 1 AND 1. This gives the result of 1.

Step 2

For each of the following combinations of Boolean operations, compute the final output based on the rules for AND, OR, NOR, and NOT. Refer to the truth tables above for help on how to compute any given Boolean operation.

Solve for the output. The answer should be a 0 or a 1.

Input: NOT (1 AND 0) AND 1

Output: _____

Input: 1 NOR {NOT [0 OR (1 NOR 1)]}

Output: _____

Input: 0 AND {1 AND [1 OR (0 NOR 0)] AND 0} (Remember to work left to right through the expression.)

Output: _____

Input: 1 AND NOT {[0 OR (1 OR 0)] NOR [1 AND NOT (0)]}

Output: _____

Troubleshooting

As a PC Technician, understanding how data is stored in a computer can be a great troubleshooting tool.

Reflection

How are Boolean operations used in computer systems?

_____

Lab 1.5.9: Converting Numbers Overview

Estimated Time: 25 Minutes

Objective

Upon completion of this lab, the student will be able to identify the places in binary and decimal numbers and know the value of each. Also, the student will work with powers of ten and relate them to decimal places, as well as work with powers of two and relate them to binary places. Finally, the student will manually convert between simple binary numbers and decimal numbers and describe the differences between binary and decimal number systems.

Equipment

This is a written lab exercise. No equipment is necessary.

Scenario

Having sharp skills in number systems will aid in a career as an IT professional. With the ability to convert numbers without the use of a calculator, the student will be able to solve problems that may arise quickly and easily.

Procedures

This lab will help the student learn to work with the binary number system. The student will convert binary numbers (Base 2) to decimal numbers (Base 10) and then from decimal to binary. Computers and networking equipment, such as routers, use binary numbers. A binary number is a series of BITS (short for Binary Digits) that are either ON (a binary 1) or OFF (a binary 0). They are encoded internally in the PC on microchips and on the computer motherboard bus as electrical voltages. Understanding binary numbers and how they relate to decimal numbers is critical to understanding how computers work internally.

Step 1

The decimal number system is based on powers of ten. This exercise will help to develop and understand how the decimal number system is constructed. With Base 10, the right-most place has a value of one (as with Base 2). Each place moving to the left is valued ten times more. Ten to the zero power is one ($10^0 = 1$), 10 to the first power is 10 ($10^1 = 10$), 10 to the second power is 100 ($10^2 = 10 \times 10 = 100$), ten to the third power is 1000 ($10^3 = 1000$), and so on. Just multiply the number in each place with the value of each place (for example, $400 = 4 \times 10^2 = 4 \times 100$). Remember that any number (other than zero) to the zero power is one.

The following chart shows how the decimal number system represents the number 352,481. This will help in understanding the binary number system.

Exponent	10^5	10^4	10^3	10^2	10^1	10^0
Expanded	100000	10000	1000	100	10	1
Numeral	3	5	2	4	8	1
	3 x 100,000	5 x 10,000	2 x 1,000	4 x 100	8 x 10	1 x 1

The number 352,481, if read from left to right in expanded decimal form, is (3 x 100,000) + (5 x 10,000) + (2 x 1,000) + (4 x 100) + (8 x 10) + (1 x 1), for a total of 352,481 (a six-digit number).

Here is another way to look at it that makes it easier to add up the decimal number values:

Position of digit (from right)	Value of bit position (10^X or ten to the power of)	Number value from 0 to 9	Calculation	Decimal Value
1st Decimal Digit	10^0 or 1	1	1 x 1	1
2nd Decimal Digit	10^1 or 10	8	8 x 10	80
3rd Decimal Digit	10^2 or 100	4	4 x 100	400
4th Decimal Digit	10^3 or 1,000	2	2 x 1,000	2,000
5th Decimal Digit	10^4 or 10,000	5	5 x 10,000	52,000
6th Decimal Digit	10^5 or 100,000	3	3 x 100,000	300,000
Decimal Value (Total of 6 digits)				352,481

Step 2

Binary means "two" and each digit in a binary number can only have two values (0 or 1). Understanding Binary numbers is key to understanding how computers work. The value of each binary digit, or bit, is based on powers of two.

This exercise will help develop an understanding of powers of two, which is what all computers and data communications use. With Base 2, the right-most place has a value of 1 (as with Base 10). Each place moving to the left is valued two times more. Two to the zero power is one ($2^0 = 1$), two to the first power is two ($2^1 = 2$), two to the second power is four ($2^2 = 4$), two to the third power is eight ($2^3 = 8$), and so on. Just multiply the number in each place (either a 0 or a 1) by the value of each place (for example, $8 = 2^3 = 1 \times 8$) and add up the total. Remember that any number (except zero) to the zero power is one.

Binary Number Conversion Example

The following table shows the detailed calculations (starting from the right side) to convert the binary number 10011100 into a decimal number.

Position of digit (from right)	Value of bit position (two to the power of)	Is bit a One (on) or a Zero (off)	Calculation	Decimal Value
1st Binary Digit	$2^0 = 1$	0	0 x 1	0
2nd Binary Digit	$2^1 = 2$	0	0 x 2	0
3rd Binary Digit	$2^2 = 4$	1	1 x 4	4
4th Binary Digit	$2^3 = 8$	1	1 x 8	8
5th Binary Digit	$2^4 = 16$	1	1 x 16	16
6th Binary Digit	$2^5 = 32$	0	0 x 32	0
7th Binary Digit	$2^6 = 64$	0	0 x 64	0
8th Binary Digit	$2^7 = 128$	1	1 x 128	128
Decimal Value. (Sum total of 8 bits)				156

Step 3

Look at the binary number bit status. If there is a 1 in a given position add the value shown. If there is a 0 in a given position then do not add it.

Solve for the decimal value.

Exponent	2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0
Bit Position	8	7	6	5	4	3	2	1
Value	128	64	32	16	8	4	2	1
Binary Number Bit	1	0	0	1	1	1	0	0

Decimal Value: _____

Exponent	2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0
Bit Position	8	7	6	5	4	3	2	1
Value	128	64	32	16	8	4	2	1
Binary number bit status	1	1	1	0	0	0	1	1

Decimal Value: _____

Exponent	2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0
Bit Position	8	7	6	5	4	3	2	1
Value	128	64	32	16	8	4	2	1
Binary number bit status	0	1	1	1	0	0	0	0

Decimal Value: _____

Exponent	2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0
Bit Position	8	7	6	5	4	3	2	1
Value	128	64	32	16	8	4	2	1
Binary number bit status	1	1	0	1	1	0	1	0

Decimal Value: _____

Step 4

Convert the decimal values of 209, 114, 58, and 165 to the binary equivalents. To do this, look at the decimal value and then subtract binary values starting from 128 (the highest value binary bit for these number). If the number is larger than 128 then put a 1 in the 128 (or 2^7) column. Subtract 128 from the number and then see if there is 64 or greater left over. If there is, put a one there. Otherwise, put a zero and see if there is 32 or greater left over. Continue until all eight bits are defined as either a zero or a one.

Exponent	2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0
Bit Position	8	7	6	5	4	3	2	1
Value	128	64	32	16	8	4	2	1
Binary number bit status								

Binary Value of 209: _____

Exponent	2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0
Bit Position	8	7	6	5	4	3	2	1
Value	128	64	32	16	8	4	2	1
Binary number bit status								

Binary Value of 114: _____

Exponent	2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0
Bit Position	8	7	6	5	4	3	2	1
Value	128	64	32	16	8	4	2	1
Binary number bit status								

Binary Value of 58: _____

Exponent	2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0
Bit Position	8	7	6	5	4	3	2	1
Value	128	64	32	16	8	4	2	1
Binary number bit status								

Binary Value of 165: _____

Step 5

Check the answers by converting the numbers back to decimal.

Troubleshooting

Learning how to calculate binary numbers without the use of a calculator is an important skill in the IT Industry. The ability to perform number conversions can save time, especially in the field where calculators are not always available.

Reflection

Using the system learned to solve decimal to binary conversion, convert the decimal number 255 to binary.

_____

_____

_____

Lab 2.3.6: Motherboard Identification

Estimated time: 30 Minutes

Objective

This lab will focus on identifying motherboards, removing motherboards, replacing motherboards, and using the motherboard manuals to identify a number of the system components.

Equipment

The following equipment is required for this exercise:

- A system board (either mounted in a case or not)

- Internet access

- Motherboard manuals

- ID software or local vendor contact

Scenario

A student has just been hired by a PC repair center and has begun your training. PC technicians need to be able to remove and replace motherboards either in an upgrade situation or due to a motherboard failure.

Procedures

If the system board has been diagnosed as needing replacement, there are a few guidelines that must be followed. Place the system on an antistatic mat and use an antistatic wrist strap. Verify that the system power cord is not attached.

All necessary safety precautions need to be followed carefully concerning power supplies and electrostatic discharge.

Step 1

Gain access to the motherboard. If the motherboard is installed in a case, remove the case cover.

Step 2

If needed, remove components and/or cabling to gain access to the motherboard manufacturer's name and ID number. Be sure to carefully record these connections so they can be properly replaced.

Note: These numbers may be difficult to find and hard to read, so look carefully. As the student become familiar with different manufacturers, it will become easier.

Due to variations in motherboards, not all of the following information may be available. On others, additional information may be available. Check with the instructor about the system.

Step 3

Record the following information from the motherboard of the computer.

Components	Available? (Y/N)	Name/ Type (if applicable)
1. Motherboard Manufacturer		
2. Motherboard Model Number		
3. Form Factor (physical size and layout)		
4. Type of CPU Installed		
5. Types of CPUs Supported (socket or slot)		
6. Chipset		
7. BIOS Manufacturer		
8. BIOS Battery		
9. ISA or EISA (number and type)		
10. PCI (number and type)		
11. AGP or AGP Pro (number and type)		
12. Jumpers		
13. DIP settings		

Troubleshooting

A quick check on the motherboard manufacturer's website will provide information regarding the motherboard BIOS and whether there is an upgrade available.

Reflection

The ability to properly identify all the components of a motherboard will prove to be very useful when troubleshooting in the field.

Where is the first place to look to determine the manufacturer of a motherboard?

_____

Lab 2.3.8: Identifying ROM and BIOS Chips

Estimated time: 30 Minutes

Objective

This lab will focus on the student's ability to locate and identify the ROM chip, BIOS chip, and BIOS manufacturer on a motherboard.

Equipment

The following equipment is required for this exercise:

- A complete motherboard

- Motherboard manuals

- Internet access for research

Note: A functioning system is not necessary to complete this lab. Be sure to observe proper care concerning power supplies and ESD.

Scenario

A client from a few months ago recently purchased a used computer. The client wants to install an expansion card into the machine to add some video editing capabilities. Before purchasing an expansion card, the client wants to make sure that the BIOS will support it.

Procedures

BIOS – The Basic Input-Output System is a ROM chip that has built-in commands, which allow the system to power-up and perform a self-test of its hardware before turning over control to the operating system.

ROM – Read-Only Memory, as its name implies, can be read, but not changed. It is used to store basic information the computer needs to operate (for example, the BIOS).

Determine the manufacturer and version number of the BIOS. Research the BIOS manufacturer's website to see if there are newer versions available. Also, examine the physical ROM chip to help answer the questions below.

Step 1

Describe the physical appearance of the ROM chip and its location on the board:

_____

_____

_____

Step 2

What type of BIOS is used?

Manufacturer:	
Version/Type:	
Battery Type:	
Rewrite-able?	

Step 3

If an Internet connection is available, visit the manufacture's website and list the version number and any new features that are supported.

_____

_____

_____

Step 4

Can the BIOS be upgraded?

_____

_____

_____

Step 5

What are the steps that must be taken to upgrade the BIOS?

_____

_____

_____

_____

_____

Troubleshooting

Use extreme caution when flashing the BIOS. Make sure to use the correct file and that it is not corrupt. If the BIOS is flashed with the incorrect BIOS type or with a corrupt file, the board may be rendered inoperable.

Reflection

1. How many BIOS manufacturers are in the list?

_____

_____

2. Why is the BIOS needed?

_____

_____

Lab 2.3.9: Identifying Computer Expansion Slots

Estimated time: 20 Minutes

Objective

Upon completion of this lab, the student will be able to identify safety issues, specifications, and components relating to expansion slots. The student will also be able to list the advantages and disadvantages of each expansion slot.

Equipment

The following equipment is required for this exercise:

- Motherboard and motherboard manuals

- Expansion cards

- Internet access for research

Scenario

Bob has purchased a used computer and is trying to determine what type of video card and other expansion cards can be installed. Help Bob figure out what is currently installed so that he can make an educated decision when he is ready to buy new expansion cards.

Procedures

An expansion slot is a long, thin, socket connection, located on a motherboard or riser board, which allows various cards to be added to a computer. These cards may include devices such as modems, sound cards, and network interface cards (NICs). Expansion slots allow the life of a computer to be extended, since new technology can be added as it becomes available.

Verify that the power cord is disconnected and that the anti-static wrist strap is in place. Remove the system case from the computer.

Step 1

Locate the expansion slots on the motherboard (or riser card) and list them:

1.	4.
2.	5.
3.	6.

Step 2

Using the available resources, identify any expansion cards that are installed:

1.	4.
2.	5.
3.	6.

Troubleshooting

Occasionally when a PC is shipped from one location to another, an expansion card may become unseated. Verify that all expansion cards are properly seated as well as all connectors properly plugged in before turning the unit on.

Reflection

What type of expansion cards would be installed in a PCI slot?

_____

_____

What is the speed difference between PCI and ISA expansion slots?

_____

_____

Lab 2.4.2: Identifying RAM and RAM Sockets

Estimated time: 40 Minutes

Objective

This lab will focus on the identification of various types of Random Access Memory (RAM) and RAM sockets.

Equipment

The following equipment is required for this exercise:

- A functioning computer system with two DIMMS installed and the proper tools to remove the computer cover

- Manual for the motherboard used in the computer

- (Optional) RAM Tester. If unsure of the operation of the RAM tester, ask the instructor for further instruction.

Scenario

Fred would like to upgrade the amount of RAM in his PC, but he is not sure how to locate it or how to determine how much RAM is installed. Help him determine how much RAM he has so he can figure out how much more to buy.

Procedure

Random Access Memory is memory used by the CPU to store open files and active applications temporarily. RAM is volatile, meaning that any information stored in it is lost when the system is powered-down. RAM comes in small expansion board forms with varying numbers of edge connectors. The RAM boards (also called sticks) are made in 30, 72, 168, or 184 pin configurations. They are referred to as SIMMs or DIMMs, depending on the chip density. Many times, the only information to be gained visually is the manufacturer's name. This is why a quality RAM tester is a critical piece of diagnostic equipment for PC repair shops.

Observe proper care concerning power supplies and ESD

Step 1

Boot the system and record the POST amount of RAM.
_____

Step 2

Shut down the system and follow all the safety steps in removing the cover of the computer.

Step 3

After gaining access to the motherboard, note the position of the RAM slots and whether they are in use, making notes in the journal.

SLOT TYPE:	
TOTAL NUMBER OF SLOTS:	
NUMBER OF SLOTS OPEN:	
TOTAL RAM CAPACITY	

Step 4

Record the information about the installed RAM sticks in the table below.

MANUFACTURER:	
TYPE:	
CAPACITY: (each)	
SPEED:	
TOTAL CAPACITY INSTALLED:	
POSITION:	

Step 5

Refer to the motherboard manual or search the Internet for the type and range of RAM chips that can be installed on this computer.

Step 6

If there are two sticks of RAM installed, remove one of the RAM sticks, noting the location and orientation of the stick.

Step 7

Put the cover of the computer back on the computer and plug in the power cords. Restart the computer system. Note the POST-test RAM amount. _____

Step 8

Shut down the system and follow all the safety steps in removing the computer cover.

Step 9

Reinstall the RAM stick that was removed in Step 6.

Step 10

Put the cover of the computer back on the computer and plug in the power cords. Restart the computer system. Note the POST-test RAM amount. _____

Step 11

Reflect in the journal about any special considerations to be aware of as the RAM memory is installed.

Attach copies of any additional research material used in completing this worksheet before handing in this assignment.

Troubleshooting

Take extreme caution when working with RAM. ESD is one of the most common problems when working on computers. Make sure to have an antistatic wrist strap on at all times, and make sure to be properly grounded. The chips on a RAM module are built for 3.3 volts. If a static discharge is large enough to see a spark, it is 3000 volts.

Reflection

Was an antistatic wrist strap use while working with RAM modules?

_____

What other types of RAM are there besides the type installed in the PC worked on?

_____

Lab 2.5.2: Video Card Identification

Estimated time: 35 Minutes

Objective

The major features and specifications of different video cards will be discussed in this lab. After completion of this lab, the student will be able to identify the video card by any markings on the card. These markings may include a manufacturer's name or part number. Some cards may be identified only by the physical layout of the card.

Equipment

The following equipment is required for this exercise:

- ESD wrist strap

- Standard tool kit

- Lab workstation with AGP video card installed

- Internet access

- Manufacturer manuals

Scenario

The student is an avid gamer and wishes to compare the features of all the video cards available. Since the latest and greatest video card is needed for the latest and greatest games, special attention has to be paid to the manufacturer and performance specifications of each video card.

Procedures

A video adapter, or card, is an expansion card that allows the computer to display images on a monitor. It also determines the monitor depth and resolution. The need for the video card is determined by the intended use of the system. For example, a system used for gaming will need a much more advanced card than one used for word processing.

Step 1

After removing the system case, remove the video card from the expansion slot. When working with video cards, like any other component on the inside of a computer, take special care to be grounded and make sure to use an antistatic wrist strap. If the video card is damaged, the computer will be useless until a new video card is installed.

Research and supply the following information:

Manufacturer:	
Model number:	
URL site:	
Key features:	
System requirements:	
Cost:	

Terms

Research the following terms using these and other Internet resources:

- http://www.techweb.com/encyclopedia

- http://www.webopedia.com/

AGP port:

_____

_____

_____

_____

EDO RAM:

_____

_____

Pixel:

_____

_____

Refresh rate:

_____

_____

Resolution:

_____

_____

Troubleshooting

When working with video cards, like any other component on the inside of a computer, take special care to be grounded and make sure to use an antistatic wrist strap. If the only video card is damaged, the computer will be useless until a new video card is installed.

Reflection

Did any of the video cards that were worked with have a heat sink or a fan on the
Graphics Processing Unit (GPU)?

_____

_____

Are video cards with a heat sink or fan on the GPU available?

_____

Why would having a separate processor on a video card help performance?

_____

_____

Lab 3.3.4: The Computer Case and Power Supply

Estimated time: 45 Minutes

Objective

In this lab, identify the type of computer case to be used, the form factor of the unit, and the voltage selector switch on the power supply. The inventory of all the components that will be installed in the computer case will also be discussed. Finally, motherboard standoffs will be installed to prepare the case for the installation of the motherboard.

Equipment

The following equipment is required for this exercise:

- ESD wrist strap

- Tool kit and screws

- Computer case with power supply

- Motherboard standoffs and screws

- Motherboard & manual

- Devices that will not be installed yet, but are referenced:

  - CD-ROM, Sound Card, Modem, NIC, RAM, Hard Drive with IDE Cable, Floppy Drive with Cable, Mouse, Keyboard, Monitor

Scenario

The student is assembling a personal computer for a friend, and is ready to prepare the case for the installation of the motherboard.

Procedures

Be sure to wear the antistatic wrist strap during the entire installation process. One end should be looped snugly around the wrist, with the other end attached to an unpainted metallic part of the computer case. This will prevent electrostatic discharge, which can be extremely hazardous to computer devices.

Step 1

The first step in the assembly process is to create an inventory of all computer components that will be installed into the computer.

Lay out the computer components that will be used in the labs for this module.

Gather all the information necessary to fill out the inventory sheet below.

Computer Identification	Name: _____ Number: _____
Case	Number of 3.5" bays _____ 5.25" bays _____ Manufacturer: _____
Motherboard	Manufacturer: _____ Model: _____ Bus Speed_____ MHz Form Factor _____ AT _____ ATX Chipset Manufacturer:_____ Model: _____ BIOS Manufacturer:_____ Version: _____ Does the CPU use a socket or a slot? _____ How many CPU socket/slots are there? _____ How many ISA slots are there? _____ How many PCI slots are there? _____ How many EIDE connectors are there? _____ How many floppy connectors are there? _____ How many serial ports are there? _____ How many parallel ports are there? _____ Is there an AGP slot? _____ How many USB ports are there? _____ How many other ports or slots are there? _____ What kind(s) are they? _____
CPU	Manufacturer: _____ Model: _____ Speed _____ MHz
Memory	_____ 30-pin SIMMs _____ 72-pin SIMMs _____ 168-pin DIMMs _____ 160 pin RIMMs _____ 184-pin RIMMs _____ Others: _____ How many memory slots are there? _____ What is the fastest type of memory supported? _____ What is the maximum memory supported? _____
Hard Drive	Manufacturer: _____ Model: _____ Size _____ Cylinders _____ Heads _____ SPT _____ Interface Type _____ IDE _____ SCSI

CD-ROM	Manufacturer: _____
	Model: _____
	Speed: _____
	Interface Type _____ IDE _____ SCSI

| **Floppy Disk Drive** | Manufacturer: _____ |

| **Monitor** | Manufacturer: _____ |
| | Model Number: _____ |

Video Card	Manufacturer: _____
	Model: _____
	Memory _____ MB
	ISA _____
	PCI _____
	On Board_____

Sound Card	Manufacturer: _____
	Model: _____
	ISA _____
	PCI _____
	On Board _____

| **Mouse** | Type _____ PS/2 _____ Serial _____ USB |

| **Keyboard** | Connector _____ 5-pin DIN or _____ 6-pin mini DIN _____ USB (Make sure it matches the connector on the Motherboard). |

Power Supply	AT _____
	ATX _____
	Other _____
	Power Supply Wattage _____

Step 2

Examine the screws that will be used for the case.

Are the screws Phillips, Flathead, Posidriver, or Torx? _____

Examine the computer case. Is it an AT or ATX case? _____

Briefly describe the difference between an AT and an ATX case:

_____

_____

Is the case a desktop, mini-tower, mid-tower, or a full tower?

_____

Step 3

Most computer cases come complete with a power supply. However, not all cases are built for the United States market and therefore may not be set for the correct voltage. Look in the back of the case for the voltage selector switch. If in the United States, make sure that the switch is set to 115 volts. Adhere to the local power requirements when selecting the voltage for the power supply.

Step 4

Power supplies are rated by wattage, which is usually between 250 and 300 watts. What is the power supply rating for the case? _____

Step 5

Attach the motherboard standoffs to the case. Standoffs are small pegs made of a non-conductive material that helps avoid short circuits by preventing the motherboard from touching the case. Look at the holes on the motherboard to help place the standoffs in the proper locations.

Troubleshooting

An equipment list can help solve problems before they start. If there is an item missing, it will be discovered before the job is half done.

Reflection

Were all areas of the inventory list able to be filled out? _____

Explain any difficulties with the installation.

_____

_____

Lab 3.5.3: Motherboard Installation

Estimated time: 45 Minutes

Objective

Upon completion of this lab, the motherboard will be placed into the case and secured. The CPU, the heat sink, the LEDs, and the memory will also be installed.

Equipment

The following equipment is required for this exercise:

- ESD wrist strap and antistatic mat

- Tool kit and screws

- Motherboard & manual

- CPU with fan and heat sink

- Thermal grease

- RAM (use the appropriate type for the motherboard)

Scenario

The case for a friend's computer should be ready for the next step. Continue to work on installing the CPU and RAM.

Procedures

Be sure to wear an antistatic wrist strap for this lab and use extreme care. One discharge of static electricity could render a motherboard useless. In this lab, continue to work on the PC that is being built and properly install the motherboard, CPU, heat sink, CPU fan, and RAM.

Step 1

Lay the motherboard down on the antistatic mat. Identify the CPU socket on the motherboard. The CPU socket is keyed so that the CPU may only be inserted one way.

What CPU type does the motherboard support? _____

Step 2

Pick up the CPU and locate pin one. Note that the CPU may only be inserted one way into the CPU socket.

Install the CPU into the CPU socket. If the CPU is being installed into a Zero Insertion Force (ZIF) socket, no force is necessary. If any force has to be applied, the CPU is not lined up correctly.

After the CPU is seated, adjust the CPU socket lever until it is in the locked position.

When the lever is locked the CPU is secure.

Who is the manufacturer of the CPU? _____

Step 3

Attach the cooling fan to the heat sink. Use the four screws that came with the cooling fan to attach the fan securely to the top of the heat sink.

Note: Some heat sinks are already equipped with a fan and will not need to be secured with screws.

Is the heat sink being installed attached with screws? _____

Step 4

To attach the fan-heat-sink assembly to the CPU, lay the heat sink down on the CPU and align the heat sink clips to their correct positions on the CPU socket. If necessary, rock the heat sink into position until one side of the heat sink is locked down to the outside of the CPU socket. Next, push down the other clip until it locks. After both sides of the heat sink are clipped, the heat sink will be secured to the CPU.

Caution: Using a screwdriver may be necessary to secure the heat sink clips, but do not apply excessive force. If the screwdriver slips off the clips, it may damage the motherboard*.*

Step 5

Attach the power connection for the heat sink fan to the motherboard. Use the motherboard manual to identify the fan power pins on the motherboard. Connect the fan power leads to these pins and making sure they are secure and in the correct orientation.

Step 6

Install the memory. When installing the memory, the first step is to identify the memory sockets. Use the motherboard manual to identify the memory sockets.

Examine the memory sockets and the memory chip(s). Memory and associated sockets are keyed to ensure proper installation. Take the memory and line it up with the socket. Slowly seat the memory into socket one. It may help to rock the memory into the socket until secure by gently pushing alternately on the ends of the chip. Remember, just as with the installation of the CPU, if too much force is exerted the motherboard can be damaged or destroyed.

If more than one memory chip is to be installed, follow the instructions in the manual for the motherboard to add more. It is common for the next memory chip to be placed in socket two. Refer to the motherboard manual for specific information.

Step 7

Install the motherboard. Align the motherboard with the standoffs and set it in the case. The motherboard may have to be pushed back slightly against the I/O plate to get it to line up correctly. Once the motherboard is seated, use the proper screws to secure it to the case. Do not over-tighten the screws or the board may be damaged.

Step 8

Connect the front panel LEDs to the motherboard. The motherboard connects to the LEDs on the front panel of the computer case to give the operational status of the computer. For example, a green LED on the front panel indicates that the computer is running.

Use the video demonstration and the manual for the motherboard to identify all of the LED pin outs.

Connect each LED wire to the appropriate pin outs.

Troubleshooting

Proper installation of the cooling fan is absolutely necessary with newer processors. Newer processors run at very high temperatures that can cause diminished performance or be destroyed if not cooled properly.

Reflection

What would happen if the CPU fan stopped during normal computer operations?

_____

_____

What was the most difficult component to install? Why?

_____

_____

Lab 3.6.4: Floppy Drive, Hard Drive, DVD, and CD-ROM Installation

Estimated time: 45 Minutes

Objective

In this lab, the student will install the floppy drive, hard drive, and CD-ROM drive. The student will also install the ribbon cables for each drive and the audio cable for the CD-ROM.

Equipment

The following equipment is required for this exercise:

- The same computer case which has been worked on

- ESD wrist strap

- Safety glasses

- Tool kit and screws

- Floppy drive with ribbon cable

- Hard drive with ribbon cable

- CD-ROM with ribbon cable and audio cable

- DVD-ROM

Scenario

Continue to install the components necessary to complete a friend's computer.

Procedures

When installing devices that use ribbon cables to communicate with the motherboard, such as hard drives and floppy drives, it is important to note the location of pin one. Examine the ribbon cable and find the red stripe on one side of the cable. Pin one is found on the side of the ribbon with the red stripe. The motherboard documentation should show the location of pin one for each connector, and pin one is also usually labeled on the motherboard for each connector.

Step 1

Locate a 3.5" bay which is accessible from the front of the computer case. This is where the floppy drive will be installed. If there is a cover for this 3.5" bay, reach inside the case and push out the cover.

Step 2

Install the floppy drive and line it up with the 3.5" bay. Slide it in until the front of the drive lines up with the front of the computer case, and the screw holes on the floppy drive line up with the side rails on the case. Use the proper screws and secure the floppy drive to

---

the case. A long screwdriver may be needed to reach the backside of the floppy drive.

Step 3

Install the hard drive.

Note: The 3.5" cover for the hard drive bay does not have to be removed. Line up the hard drive with the lower 3.5" bay. Slide the hard drive in until the screw holes line up with the case rails. Use the proper screws and secure the hard drive to the case.

Step 4

Install the CD-ROM into any of the 5.25" bays. In most computer cases the 5.25" bays are the upper bays.

Locate the 5.25" bay that will be used for the CD-ROM. If there is a cover for this bay, reach inside the case and push out the cover. Retrieve the CD-ROM from the parts inventory and slide it in from the front of the case. Push it back until it is flush with the case and the screw holes line up with the case rails. Use the proper screws and secure the CD-ROM to the case.

Step 5

The floppy drive is connected to the motherboard with a thirty-four pin, two-connector ribbon cable that has a twist in it. The twist identifies one of the floppy drives as drive "A:\". Only one floppy drive will be used during this installation. A second floppy drive could be connected to the second connector on the ribbon cable and it would be assigned as the "B:\" drive.

Select the proper ribbon cable for the floppy drive. Take one end of the ribbon cable and connect it to the back of the floppy drive. Take the other end and connect it to the floppy connector on the motherboard. Do not use excessive force when inserting the ribbon cable. Also, make sure the plug is oriented correctly according to pin one.

Step 6

The CD-ROM is attached using an IDE, forty-pin, forty-conductor ribbon cable. The CD-ROM cable typically has three connectors. One for the motherboard and the other two are for devices.

Select the proper ribbon cable for the CD-ROM. Take one end of the ribbon cable and connect it to the back of the CD-ROM. Take the other end and connect it to the IDE2 connector on the motherboard. Do not bend the motherboard with excessive force when inserting the ribbon cable.

Step 7

Connect the audio cable that came with the CD-ROM. Attach one end of the cable to the CD-ROM and the other end to the motherboard. Usually, the audio cable connectors are notched and will plug-in only one way. If this is not the case, simply insert the connectors whichever way they can go in.

If no sound comes out after the computer is powered up and the CD-ROM is tested, make sure that the volume is turned up on the speakers; otherwise, simply go back in the box, pull out the audio cable and reverse the sides. Always consult the manuals that

come with components for additional direction on installations.

Step 8

The DVD-ROM is also attached using an IDE, forty-pin, forty-conductor ribbon cable. Using the same cable as the CD-ROM connect the DVD-ROM using the last connection on the IDE cable available.

Step 9

The hard drive is attached using an IDE, forty-pin, eighty-conductor ribbon cable. The hard drive ribbon cable looks similar to the CD-ROM cable. However for each conductor it has an associated ground wire, which is why it has 80 (instead of 40) conductors. This cable can fit into a CD-ROM and visa versa, but the hard drive will not work properly if they are switched. The easiest way to tell the difference between the CD-ROM ribbon cable and the hard drive cable is to feel them. Since the hard drive cable has eighty-conductors it is not as coarse as the CD-ROM cable.

Select the proper ribbon cable for the hard drive. Take one end of the ribbon cable and connect it to the back of the hard drive. Take the other end and connect it to the IDE1 connector on the motherboard. Do not bend the motherboard when inserting the ribbon cable.

Step 10

The power cables are attached to the motherboard and each drive. Examine the power cables that extend from the power supply. There will be one large connector and several smaller connectors. The large 20-pin (ATX 1) attaches to the motherboard, the smaller connectors attach to the drives.

Most power supplies support four IDE drives and two floppy drives. The connectors for the floppy drives and for the IDE drives (CD-ROM, DVD-ROM and hard drive) are different. Examine the back of each drive. Find the power connectors on the back of each drive and connect the correct power cable to each one.

Next, connect the ATX power connector. Use caution when attaching the ATX cable. Do not bend the motherboard.

Troubleshooting

If the floppy ribbon cable is keyed (can plug in only one way), but the floppy drive does not have a keyed slot, check for a punch-out on the drive that can be removed to make room for the keyed slot. Otherwise, a non-keyed floppy ribbon cable will be necessary and can be purchased at a local computer supply store.

Reflection

Briefly summarize the differences between the floppy drive and hard drive ribbon cables:

_____

_____

Write one tip that was learned from the material or in class that helped with the installation of the components in this lab.

_____

_____

_____

Lab 3.7.1: Video Card Installation and System Booting

Estimated time: 30 Minutes

Objective

Upon completion of this lab, the student will have installed the video card. The student will also have connected the mouse, keyboard, and monitor. If everything is installed properly, the student should be able to turn on the computer at the end of this lab.

Equipment

The following equipment is required for this exercise:

- ESD wrist strap

- Tool kit and screws

- Video card

- PS/2 mouse

- PS/2 Keyboard

- 15" monitor

- 3.5" DOS boot floppy

- Motherboard manual

Scenario

A friend cannot wait any longer for the computer to be finished. It is time to put the finishing touches on the machine and start it up.

Procedure

Before powering up a computer, it is extremely important to properly seat all of the expansion cards. If a card is not properly seated when the computer is turned on, it will malfunction. Also, excessive force when seating an expansion card can damage the motherboard, so the job must be done carefully.

Step 1

Recall from chapter two that video cards are built for either the PCI slot or the AGP slot. Check the video card that is included in the equipment inventory. In the space below describe the video card. Include how much video RAM is on the card and whether it is a PCI or an AGP card.

_____

_____

To install the video card, first remove the slot protector from the back of the computer

case. Locate the AGP slot or an available PCI slot. Remove the slot protector by removing the screw that holds it in place.

Step 2

Insert the video card into the AGP or PCI slot. If necessary, rock it gently until it is seated on the motherboard. After the video card is seated, line up the hole in the video card bracket with its corresponding hole in the computer case. Use a case screw to secure the video card to the computer case.

Note: Never leave a slot open without a card in it. Leaving a slot open will cause poor air circulation in the case and some components may overheat.

Step 3

Before closing the computer case, review the following checklist:

____ Are there any loose screws in the computer case?

____ Have all tools have been removed from the computer case?

____ Is the voltage selector switch in the correct position?

____ Is the CPU seated completely?

____ Is the fan secured?

____ Is the fan plugged in?

____ Is the memory in the correct slot, and is it fully seated?

____ Are all of the drives in the correct position and secured to the chassis?

____ Are the ribbon cables fully seated and connected to the correct drives?

____ Is the audio cable connected to the CD-ROM drive correctly?

____ Is the ATX 1 power cable in the right position and has it been latched down?

After completing the checklist, put the computer case together. Attach all of the case panels and secure them with the appropriate screws.

Step 4

Locate the two PS/2 ports on the back of the computer. One port is designated for the mouse and the other for the keyboard. Look closely at these ports. On newer motherboards there is an icon for the mouse and keyboard. Also, each port may be color-coded. It is purple for the keyboard and green for the mouse. Plug the mouse and keyboard into their respective ports by lining up the pins and pinholes and pushing on the connections. Do not push too hard, but make sure they are inserted all the way.

Step 5

Locate the monitor and place it near the computer. Examine the video card adapter that was installed in Step 1. It will be a 15-pin female connector. Examine the monitor

connector. It will be a 15-pin male connector. Line up the pins to the pinholes and connect the monitor cable to the video adapter. Most cables come with monitor screws already attached. Tighten these screws evenly until the monitor cable is attached to the video card.

Step 6

Now plug in the computer power cable. On ATX models there will be a power switch on the back of the computer and a power button on the front. Turn on the power switch first. The computer will not power up unless both the switch and the button are on.

Now, push the power button on the front panel of the computer. This will power-up the computer. Some front panel LEDs will turn on, and the power supply fan will start spinning.

Step 7

Press the appropriate key to cause the computer to go into the BIOS setup mode. Some BIOS manufacturers use a different key, or key combination, to enter BIOS configuration mode. When first powering up the computer, a message displays that says something similar to "Press **F3** to enter Setup". If this message does not display, consult the manual for the motherboard for the correct button or sequence of keys to push.

When the computer goes into BIOS setup, the main menu screen displays. Run through the BIOS settings below and then boot the computer from a bootable floppy disk.

Move around the screen using the arrow keys until the Standard CMOS menu item is highlighted. Press the **Enter** key to open the Standard CMOS features screen. In this screen the time, date and the type of drives this computer will recognize can be change.

Check to see if the BIOS recognizes Drive A. Does it show Drive A as a 1.44M, 3.5" floppy? _____

Check to see if there is a Drive B. Since a second floppy drive was not connected when the system was built, you should not find one.

To leave the BIOS setup, hit the **Esc** key. A prompt will come up that asks, "Do you want to quit without saving?" Press the **Y** key for yes.

Step 8

In this step, the computer is booted from a floppy disk. Restart the computer and insert the 3.5" bootable floppy disk. If the standard BIOS settings have not been altered, the computer will look for the operating system in the following order:

1) Removable media

2) Hard drive

3) CD-ROM

During normal operations the computer is booted without a floppy disk. Therefore, the computer will skip the floppy drive and find the operating system on the hard drive.

Recall from chapter two that DOS is a command line operating system. After the

computer boots, the screen will display an "A:\>" prompt. There will not be any windows or icons visible.

Use the DOS boot disk to check some basic functions of the computer. Run the following DOS commands and write out the results of each:

Type "dir", then press **Enter**.

What are the results of typing this command?

_____

_____

_____

_____

Troubleshooting

Did the computer boot correctly? _____

If not, go over the checklist again. Have the instructor or lab aide look over the system.

How many beeps were heard?

_____

_____

If the computer did not boot correctly, what steps were taken to troubleshoot it?

_____

_____

Reflection

Did everything go as expected? If not, why not?

_____

_____

What would have made the construction of the computer easier? Describe a tip or technique that you learned when building this computer that could be used in the future.

_____

_____

_____

Lab 4.2.3: Basic DOS Commands

Estimated time: 30 Minutes

Objective

Upon completion of this lab, the student will be able to navigate the DOS command line. The student will also be able to perform basic file management tasks such as creating directories and files, navigating through directories, displaying content of directories, and displaying and changing file attributes.

Equipment

The following equipment is required for this exercise:

- A computer with a version of DOS running

Scenario

A manager has asked the student to create a directory structure using the DOS command line. The manager wants a directory created in which documents for the upcoming inventory will be kept. The directory structure the manager wants created is **C:\IT\pcs**. The manager has also asked that a read-only test file be created.
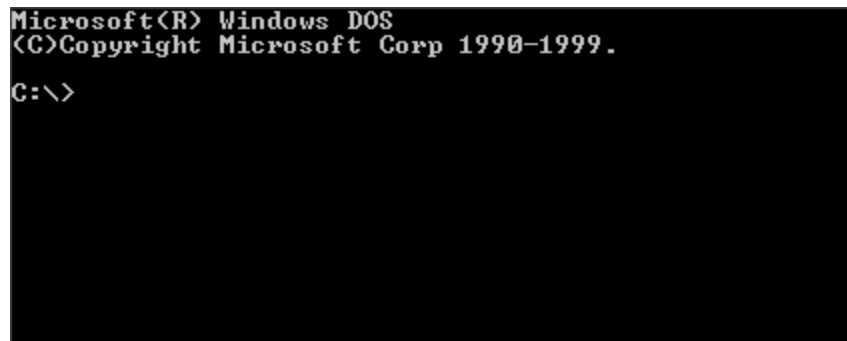
Procedures

The following steps detail the process of managing files by using the DOS command line. Basic DOS commands will be used to carry out the task presented by the manager. At the end, the newly created directories and files that have been created will be safely deleted.

Step 1

There are a few different ways to access the DOS prompt (command line). The most common way is to boot into a version of Windows, press **Start** > **Run** > then type "command". It can also be accessed by pressing **Start** > **Programs** > **Accessories** >and selecting **Command Prompt**. If Windows will not load, the DOS prompt can be accessed by pressing **F8** during the boot process and then selecting "Safe mode with command prompt".

As illustrated in Figure [1], when DOS is accessed, the window displays the "C" prompt (C:\>).

Figure [1] DOS prompt

Step 2

At the "C" prompt, type in "dir" to show a list of the directories located on this drive.

```
C:\>dir

 Volume in drive C has no label
 Volume Serial Number is 3608-11F7
 Directory of C:\

SOURCE          <DIR>          01-07-02  10:38a  SOURCE
COMMAND  COM          93,890   04-23-99  10:22p  COMMAND.COM
WIN98           <DIR>          01-07-02  10:47a  WIN98
NETLOG   TXT          31,966   01-07-02  11:23a  NETLOG.TXT
CONFIG   SYS               0   01-07-02  11:42a  CONFIG.SYS
AUTOEXEC BAT               0   01-07-02  11:26a  AUTOEXEC.BAT
SCANDISK LOG           5,412   02-26-02  10:59a  SCANDISK.LOG
MYDOCU~1        <DIR>          01-07-02  11:43a  My Documents
PROGRA~1        <DIR>          01-07-02  10:47a  Program Files
         5 file(s)         131,268 bytes
         4 dir(s)     1,674,170,368 bytes free

C:\>_
```

Figure [2] Using the **dir** command

As seen in Figure [2], the **dir** command will list directories and various files. Directories are specified with the <DIR> notation that precedes the file/directory. The **dir** command also displays the volume name, free space, and total files and directories present.

Step 3

To create directories in DOS, use the **md directory_name** or **mkdir directory_name** command. Type "md IT" to create the IT directory.

C:\>**md IT**

Step 4

Next, display the IT directory using the **dir** command at the root (C:\>). Figure [3] shows the newly created IT directory.

Figure [3] Creating a Directory in DOS

Step 5

To change directories use the `cd directory_name` or `chdir directory_name` command. For example, to access the "IT" directory, type in "C:\>**cd IT**". Typing this command will change the "C" prompt to C:\IT>.

Step 6

The command prompt should now be C:\IT>. The next task is to create another directory called "pcs".

What command should be used to make this directory?

_____

_____

Step 7

Navigate to the newly created "pcs" directory.

What command would be used to change to the "pcs" directory?

_____

_____

What will the command line look like?

_____

_____

Step 8

To create a file in DOS, use the **copy con** *filename* command. This command will copy a file from the console (con) and place it in the directory. The console in this case is the screen. After this command is type, there will be a blank line on the command prompt. Next, type in text that will be saved in the newly created file. When finished typing in the message, hold down the Control key (**<Ctrl>**) press the **Z** key and then press the **Enter** key. This key combination will end the message and DOS will display "1 file(s) copied".

```
C:\IT\pcs>copy con sample.txt

This is an inventory test document

<Ctrl>+Z

<Enter>

1 file(s) copied
```
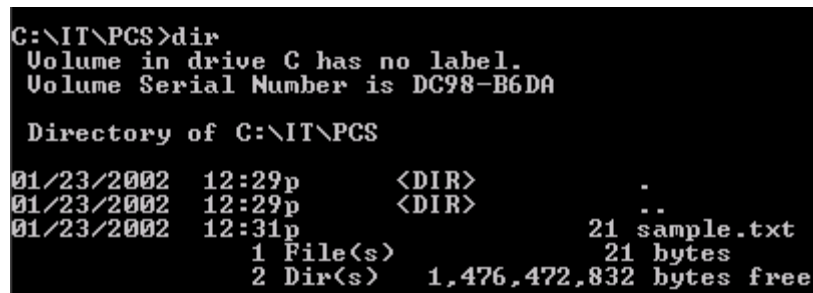
Step 9

Display the contents of the "pcs" directory. The newly created sample.txt in the directory will be displayed. Figure [4] shows the DOS output for **dir** command in the "pcs" directory.


```
C:\IT\PCS>dir
 Volume in drive C has no label.
 Volume Serial Number is DC98-B6DA

 Directory of C:\IT\PCS

01/23/2002  12:29p       <DIR>          .
01/23/2002  12:29p       <DIR>          ..
01/23/2002  12:31p                   21 sample.txt
               1 File(s)             21 bytes
               2 Dir(s)   1,476,472,832 bytes free
```

Figure [4] **dir** command showing the newly created file.

Step 10

Next, display the attributes for the sample.txt file. In order to display the attribute(s) of a file, type in attrib filename. Valid attribute values are:

- R – Read Only file attribute

- A – Archive file attribute

- S – System file attribute

- H – Hidden file attribute

What command would be typed in to order display the attributes of sample.txt?

_____

What are the attribute(s) of sample.txt?

_____

To change, or remove an attribute use the **attrib [-/+]** *attribute_value*
filename command. The minus (-) option will remove an attribute value from a file and
the plus (+) option will add an attribute value to a file. As discussed early, valid attribute
values are R (read-only), A (archive), S (system), and H (hidden).

What command would change the attribute value of the sample.txt file to a read-only file?

_____

Troubleshooting

If a command is unclear or forgotten, DOS can provide useful command information.
DOS can provide general command syntax or detailed information about a specific
command. The command to list all available commands is c:\>**help**. This command
can be used at any level within the DOS structure. To find specific information about a
command, including proper syntax and optional parameters, use the c:\>*command /?*
command.

Reflection

What is the command to make a directory?

_____

What is the command to delete or remove a directory?

_____

List the four different attributes a file can be assigned?

_____

_____

Lab 4.2.4: Creating a DOS Boot Disk

Estimated time: 25 Minutes

Objective

Upon completion of this lab, the student will know which files are necessary to make a floppy disk bootable. The student will also learn the commands necessary to create a boot disk.

Equipment

The following equipment is required for this exercise:

- Operational computer with Windows 98 or earlier installed

- A blank floppy diskette

Note: This lab will not work with Windows ME, Windows 2000, or Windows XP.

Scenario

As a computer technician, the student will need to create a boot disk in order to prepare a computer for installation. This disk will include utilities such as fdisk and format so that a hard drive can be prepared for an operating system.

Procedures

Formatting prepares the disk for use. For DOS, make a bootable disk using the same version of DOS that is on the hard drive.

Note: Use caution to not accidentally format the hard drive.

Step 1

If the computer is not already booted and at a DOS prompt boot it now. Put a floppy diskette into the drive and format the floppy diskette using the following command:

```
C:\> format A:/
```

Which three files are necessary in order to make the disk bootable?

_____, _____, _____

Step 2

Leave the diskette in the drive and reboot the system. This process will test the disk to make sure it is bootable.

Did the system successfully boot to a prompt? _____

What does the prompt look like? _____

Step 3

When the system boots using Microsoft's DOS, the five files involved are autoexec.bat, command.com, config.sys, io.sys, and msdos.sys.

Assuming all five files are available on a bootable disk, what order are these files accessed when the system is booted?

1. _____

2. _____

3. _____

4. _____

5. _____

Step 4

In addition to the five files mentioned above, there are certain utilities that can be helpful when working with a computer that does not have an operating system:

- DEFRAG.EXE

- EDIT.COM (which may also require QBASIC.EXE if using an older version of DOS)

- FDISK.EXE

- FORMAT.COM

- MEM.EXE

- SCANDISK.EXE

- SYS.COM

- UNDELETE.EXE

Troubleshooting

A computer is often restarted without removing the floppy disk from the floppy drive. If the disk is not bootable (does not have io.sys, msdos.sys, and command.com), then an error message is displayed that says "Non-System disk or disk error. Replace and strike any key when ready". It is possible that the user did not use the /S switch if this message is received after formatting a disk. Double-check that the disk has the proper files on it to make it bootable.

Reflection

List any other utilities that would be useful on a boot disk:

_____

_____

Lab 5.1.6: Changing File Views in Windows (showing file extensions)

Estimated time: 20 Minutes

Objective

Upon completion of this lab, the student will be able to change the file view based on needs or preferences.

Equipment

The following equipment is required for this exercise:

- A computer running Windows (95,98, 2000, or XP)

Scenario

While navigating through some folders, the student realizes that the files and sub-folders could be arranged better. It is decided that the default display is not the best visual display for the files. In this lab, the student will change the File view to the preferred view.

Procedures

Changing the file view in Windows can reveal important information about files and sub-folders. Users can find information on file size, file type, and time and date of the last modifications. Also, the view can be configured based on personal preferences. View preferences include thumbnails, list, and large or small icons. Configuring the file view is especially helpful when a folder contains numerous files and/or sub-folders. Folder contents can be neatly displayed according to preference or needs, making navigation easier.

Step 1

Start the computer into the Windows desktop environment.

Step 2

Double-click on the **My Computer** icon on the desktop to open the window.

Step 3

While the cursor is pointed at a blank space in the My Computer window, right-click and then select the **View** option. Figure [1] displays the right-click menu.
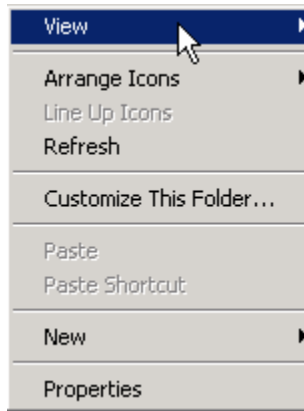
Figure [1] Selecting the View Option

When selecting the **View** option, what parameters are available?

_____

_____

Step 4

Next, select the **View** parameter for the files. Notice how icons in the folder change.

What information is displayed when the Details option is selected?

_____

_____

Step 5

After selecting the View option, set this view for all folders. To do this, select **Tools** > **Folder Options**. Figure [2] displays this process.
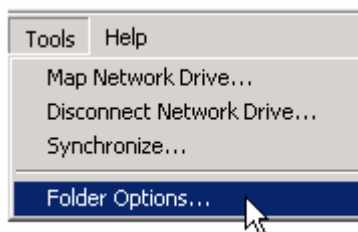

Figure [2] Selecting the Folder Options

After you select **Folder Options** from the Tool menu, the Folder Options display box will appear. Figure [3] shows the Folder Options display box.
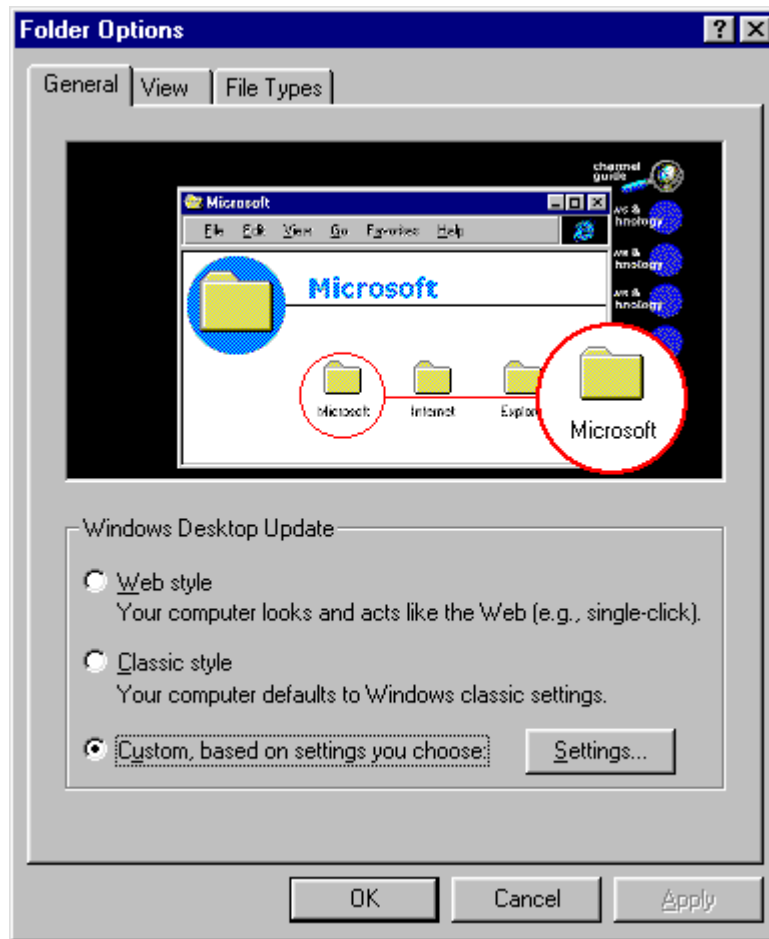
Figure [3] Folder Options display box

Next, select the **View** tab. What options are available in the View tab?

_____

_____

From the View tab, select the **Like Current Folder** command button. Selecting this button will make the view in the current folder universal throughout the drive.
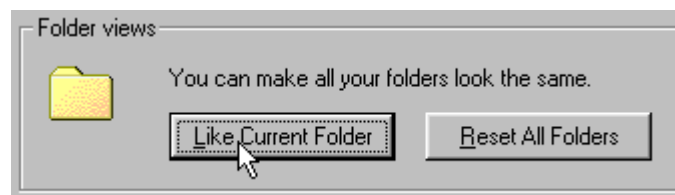

Figure [4] Folder Options display box

Troubleshooting

Changing a file view customizes the preferences. Also, important details and system files can be viewed using advanced options in the Folder Options window. System files are usually hidden to protect against accidental deletion, but there will be times when it will be necessary to configure these files.

Reflection

How can files in a folder be rearranged?

_____

_____

Why would a user want to change the folder view settings?

_____

_____

Lab 5.1.7: Text Editing and File Management

Estimated time: 30 Minutes

Objective

In this lab, the student will be introduced to creating a file in Notepad, saving it to the hard drive, then creating a folder on a floppy disk and moving the file from the hard drive to the floppy disk.

Equipment

The following equipment is required for this exercise:

- Lab Computer with Windows 98 or earlier installed

- 3.5 inch floppy disk

Scenario

A text file needs to be edited for testing a floppy drive that has been installed. To do this, a file will need to be created, edited, and moved from one location to another.

Procedures

Users manage and create files with an operating system. Some of these tasks include updating, renaming, moving, and deleting files.

Step 1

From the Windows desktop, click on the **Start** button, then move the cursor to **Programs** > **Accessories** and then click **Notepad**.

Step 2

Once Notepad is open and on the desktop, type any message within the editing area. Type just a few sentences and then click on the **File** menu and select **Save As**. This will open a new window, which will allow the user to choose the location of the text file.

The default location is My Documents. If the My Documents folder is not the default, use the "Save In" drop-down box to choose My Documents. With My Documents as the folder, type "testfile.txt" within the "File name" text box and then click the **Save** button.

Step 3

The file is now saved on the computer. Notepad can be closed without losing any data.

To manage files on the computer, open a file manager application such as Windows Explorer. This application can be found in the programs menu by clicking on the **Start** button and then selecting **Programs** and then **Windows Explorer**.

Note: An alternate way to open Windows Explorer is to right-click on the **Start** button and choose **Explore**.

Step 4

Using the left windowpane in Windows Explorer, locate the My Documents folder where the text file "testfile.txt" is saved.

Locate the My Documents folder and click on it to display the contents on the right windowpane. As with most things in Windows, there is more than one way to rename a file.

The more conventional way to rename a file is to select the file by clicking on it once. Then, with the file "testfile.txt" selected, go to the File menu of Windows Explorer and select **Rename**. This will outline the filename with a box and highlight the name of the file. Now type a new file name for the file, such as "newname.txt". After the file is renamed, press the **Enter** key to complete the changes.

The other way to rename a file in Windows is to right-click on the filename itself and select **Rename** from the drop-down menu. Use this method to rename the file back to the original name "testfile.txt".

Both methods work equally well. It is a matter of personal preference as to which way is used.

Step 5

Insert a formatted floppy disk into the floppy drive. Navigate Windows Explorer to the 3.5-inch floppy drive icon in the left windowpane. When selected, the contents of the floppy disk will display in the right windowpane. There are two ways to create a new folder on the floppy disk.

The first way is to go to the File menu, select **New**, and then in the submenu that appears, click **Folder**. This will create an empty folder that will need to be named. In the same way that the text file was renamed, name the folder "my test folder" and press **Enter** to complete the process.

The second way to create a folder is to right-click in the right windowpane, select **New**, and then select **Folder**.

Step 6

To move a file from one location to another is a simple process. There are several ways to accomplish this.

To move the text file that was created earlier to the folder that was created on the floppy disk, navigate Windows Explorer to the My Documents folder on the computer. From there, select the "testfile.txt" file and then go to the Edit menu and select **Cut**.

Now navigate Windows Explorer to the folder that was created on the 3.5 inch floppy. Highlight the folder that was created, then go to the Edit menu and select **Paste**.

The file will be moved from the My Documents folder to the floppy disk. To verify that it was moved, navigate Windows Explorer back to the My Documents folder to make sure that the file is not there anymore. Then navigate back to the floppy and make sure that the document "testfile.txt" appears on the floppy.

Troubleshooting

Knowing how to cut, copy, and paste quickly will save a lot of time when working within the Windows environment. There are shortcuts to many of the commands within Windows. To cut a file without clicking on the Edit menu or right-clicking, simply select a file and type the key combination **Ctrl-X**. Holding the **Ctrl** key and pressing **X** when a file is selected does the same thing as selecting **Cut** from the Edit menu.

Try this with all of the shortcut commands.

Reflection

List a method used to copy or move files from one location to another by using the mouse only:

_____

Lab 5.4.2: Hard Drive Preparation Using FDISK and FORMAT

Estimated time: 30 Minutes

Objective

Upon completion of this lab, the student will be able to partition the hard drive. The student will also be able to install the three system files onto the hard drive to make it a bootable drive.

Note: This procedure will erase any current information on the hard drive of the lab computer. Before proceeding, make sure to use only components that can be erased and copied to.

Equipment

The following equipment is required for this exercise:

- A lab computer

- Bootable floppy disk with DOS **FDISK** and **FORMAT** files

Scenario

A new hard drive has been installed and it needs to be prepared for the operating system. In order to do this, the DOS **FDISK** and **FORMAT** commands will need to be used.

Procedures

After installing a hard drive into a computer, it must be prepared in order for the computer to communicate with it during the boot process. Using the DOS commands **FDISK** and **FORMAT**, the hard drive can be partitioned and prepared for communication and usage.

Step 1

Boot up the computer using a bootable floppy disk with the **FDISK** and **FORMAT** files on it.

Step 2

To create and remove partitions, first start the **FDISK** program. Type **FDISK** at the prompt and then press **Enter**. Once the application starts, select option 4 to check and verify current partitions before attempting to delete any partitions.

Now select the partition type to delete from the menu that displays. They are Primary DOS partition, Extended DOS partition, Logical DOS drives in the Extended partition, and a Non-DOS partition.

If there are logical drives defined in the Extended partition, they need to be removed before the Extended partition is removed. To delete any partition, simply select the option that correlates with the partition to be removed and follow the directions on the screen.

Step 3

Once all the partitions have been removed from the drive, return to the main menu and select option 1 to create a DOS partition. Then from the next menu, select option 1 to create a Primary DOS partition. From there, follow the on-screen directions to finish creating the Primary DOS partition.

At this point, exit FDISK and then restart the computer with the floppy disk still in the drive.

Note: Make sure to set the Primary drive to "Active".

Step 4

Once the computer has restarted, it is time to format the partition that was just created. To do this, type "format C: /s" from the command prompt. This tells the format program to make the C drive usable for DOS. The "/s" copies system files to the hard drive during formatting, so that it is bootable.

The program will give the option of formatting the drive. This will erase anything that is on the drive. Since the drive is empty, type "Y" for "Yes" and press **Enter** to continue.

Step 5

When the format is complete, enter the student's name when asked to enter a "volume label". When the format is complete and the command prompt is returned, restart the computer without the bootable floppy inserted to make sure that the computer will boot from the hard drive.

Troubleshooting

Sometimes a third party formatting application is necessary when dealing with certain partition types. If a hard drive will not let a partition be removed, consider purchasing a third party product such as Power Quest's "Partition Magic". It is available in most computer software stores.

Reflection

List the three files required for booting a DOS formatted disk:

_____, _____, _____

What other DOS commands will transfer these system files from one drive to another?

_____

Lab 5.5.5: Windows OS Installation

Estimated time: 60 Minutes

Objective

Upon completion of this lab, the student will be able to install Windows 98.

Equipment

The following equipment is required for this exercise:

- A computer with a partitioned and formatted hard drive

- A bootable floppy disk with CD-ROM drivers or a bootable CD-ROM drive

- Windows 98 Second Edition Install CD

Scenario

A friend has a computer, and is not sure how to install an operating system.

Procedures

In order for a computer to be useful, it needs an operating system installed. The most commonly used operating system is Microsoft Windows. This exercise will take about an hour to complete. Follow the steps below to install Windows 98.

Note: The same procedures may be used to install other versions of Windows. However, there may be some significant differences during the setup process.

Step 1

Depending on whether or not the computer supports bootable CDs, a bootable floppy disk with CD-ROM support will need to be inserted in order to get started. If the computer supports bootable CDs, simply insert the Windows 98 Installation CD and boot the computer. If a message displays prompting to press any key in order to boot from the CD, press any key to get started.

Step 2

If the computer needs to be booted from a floppy disk, insert the disk and turn the computer on. Once the computer has booted, there should be a DOS prompt that looks like "A:\>". To begin the installation, change the directory to the CD-ROM drive by typing "D:" and then pressing **Enter**. Then type "setup" and press **Enter** to begin the installation.

Note: The CD-ROM drive letter might be different depending on the computer, so make any necessary adjustments.

Step 3

The Microsoft Windows 98 Setup screen will display a few different options:

- To set up Windows now press **Enter**.

- To learn more about Setup before continuing, press **F1**.

- To quit Setup without installing Windows, press **F3**.

- Press **Enter** to install Windows 98.

Step 4

Prior to the installation, Windows Setup needs to run Scandisk in order to make sure that there are not any problems with the hard drive. Press **Enter** to continue and wait for the graphical setup interface to display.

Once the Windows 98 Setup screen displays, most of the installation will be automated. However, the following steps will walk the student through the areas that will require information to be gathered.

Step 5

After Windows Setup runs Scandisk, a series of prompts will be presented that lead the user through the installation process. When the Windows 98 Setup Wizard displays select the directory where Windows 98 is installed. Select the checkbox that says, "C:\WINDOWS".

Windows will then prepare this directory.

Step 6

Next, a series of Setup Options will be prompted for the installation of Windows 98.

What are the available options available for installing Windows 98?

_____

_____

_____

_____

For the purpose of this lab, select **Typical** and then press **Next**.

Step 7

Windows will then prompt the user with options for installing system components. Select the check box to install the most common components and then press **Next**.

Step 8

Setup will then give the option to identify the computer.

What parameters can be defined to identify the computer?

_____

_____

_____

The user can either leave the default computer identification or enter custom information.

Step 9

The Windows 98 Setup Wizard will then ask for the location. Make the appropriate selection and continue.

Step 10

Setup will then prompt to Start Copying Files. Press **Next** to continue.

Step 11

At this point, a bar graph will appear and begin to count up to 100 percent. Speed will vary with system hardware. Carefully read the software license. Select **Yes** to agree with the license. Windows Setup will then prompt for the CD-KEY. This information will be with the Certificate of Authenticity on the CD case.

Enter the key exactly and click **Next** to continue. Click **Finish** to start using Windows 98.

Step 12

Windows will run through a series of automatic hardware detection features. This process of detecting hardware will usually take a few minutes. When Windows finishes detecting your hardware, select date and time properties. Continue through the Setup and when prompted reboot the machine.

Step 13

This should successfully complete the installation of Windows 98.

Troubleshooting

It is possible for Windows Setup to not finish the installation properly. If for some reason there is a problem, try running setup again. Additional help and resources are available on Microsoft website at http://www.microsoft.com/.

Reflection

Did the Windows installation complete successfully? _____

Make note of any tips or tricks learned during the installation:

Lab 5.6.1: Troubleshooting 101

Estimated time: 20 Minutes

Objective

Upon completion of this lab, the student will have learned some basic troubleshooting skills.

Equipment

This lab requires a pen or pencil.

Scenario

The questions below will assist with problem solving.

Procedures

Troubleshooting is an important part of a technician's job. Troubleshooting must be approached in a systematic way. One way to do this is by looking at the most obvious things first. Overlooking the obvious can cost time and money. Remember that every time a technician goes into the computer, there is a risk of damaging the computer.

Step 1

Write down the steps a technician should take if a printer is not printing. Put them in order, starting with what a technician should check first.

_____

_____

_____

_____

_____

Step 2

Write down the steps a technician should take if a file cannot be saved onto a floppy diskette. Put them in order, starting with what a technician should check first.

_____

_____

_____

_____

_____

Step 3

Write down the steps a technician should take if a monitor is not displaying anything. Put them in order, starting with what a technician should check first.

_____

_____

_____

_____

_____

Step 4

Write down the steps a technician should take if the computer will not turn on. Put them in order, starting with what a technician should check first.

_____

_____

_____

_____

_____

Troubleshooting

When approaching a computer that is reportedly broken, try to rule out the obvious first. Make sure the unit is turned on and that all components are plugged in properly. Also, it may help to ask the user of the system what the last thing being done on the computer was before it failed.

Reflection

Troubleshooting requires a systematic approach to solve problems. Choose a problem that is not computer related. An example might be the toaster does not toast bread. List the steps that should be taken to solve this problem. Is a systematic approach useful in solving non-computer related problems?

_____

_____

_____

_____

Lab 5.6.4: Installing a Driver

Estimated time: 20 Minutes

Objective

Upon completion of this lab, the student will be able to install the driver for a rollerball mouse. The same process is used when installing any new device on a system.

Equipment

The following equipment is required for this exercise:

- Lab computer with Windows 98 or earlier operating system

- A rollerball mouse with the driver disk

Scenario

A new rollerball mouse has been purchased and needs to be installed.

Procedures

Make sure that the proper drivers for the operating system being used have been installed. Drivers built for Windows 95 may install properly on a Windows 98 platform, but could cause undesirable results.

Step 1

From the Windows 9x Desktop, go to **Start** > **Settings** > **Control Panel**.

Step 2

On the Control Panel, double-click on the **Add New Hardware** icon. This will start the Add New Hardware Wizard. Read the onscreen display and click the **Next** button to continue.

Step 3

The Hardware Wizard will search for Plug and Play devices. Click the **Next** button to continue. When the search is complete, the Wizard will ask if it can search for devices that are not Plug and Play compatible. Select "No, I want to select the hardware from a list" and then click **Next**.

Step 4

A list of hardware devices to choose from will display. Select the device that most closely matches the device being installed, which would be a "Mouse" in this exercise. Once the device is selected, click **Next**.

Step 5

If the latest driver is on a CD-ROM or floppy disk, insert it into the computer. Click the **Have Disk** button and then either type the path to the driver or click the browse button to find the exact location of the driver. Once the driver is selected, click the **OK** button to

---

continue.

At this time, the Wizard will display a list consisting of any number of devices, which should match the device being installed. Select the one that the device most closely matches, then click **Next**.

Step 6

Follow the rest of the onscreen instructions in order to complete the installation process. When the driver has been installed, Windows will need to be restarted for the changes to take effect. If a dialogue box displays to restart, click **Yes**. Otherwise, click the **Start** button, select the **Shut Down** option, and then shutdown the computer.

Step 7

Once the computer has been shut down, remove the current mouse and plug the new rollerball mouse into the PS/2 port. When it has been plugged in properly, turn on the computer. Test the new device at the Windows desktop. If the device does not respond, see the troubleshooting section of this lab.

Troubleshooting

It is important to use the correct driver when installing a device. For example, a new sound card will most likely not work, or will work improperly. If the wrong drivers are installed.

Also, using the latest driver is a good practice to follow. When installing a new device, check the manufacturer's web site for the latest drivers available for their product.

If there are problems with the mouse pointer, verify that it is properly connected and the mouse pointer is clean and free of any dust or debris. If the problem still exists after verifying the connection and cleaning, try restarting the machine. Rebooting the machine will refresh and reload the mouse pointer drivers. This should resolve most problems associated with the mouse pointer devices. However, if the problem still exists, the driver might need to be updated. To update the driver, simply repeat the steps outlined in this lab with the latest driver found on the Internet.

Reflection

Were there any problems installing the drivers for this device? _____

If so, explain how the problem was solved:

_____

_____

_____

_____

Lab 5.6.5: Create a Startup Disk

Estimated time: 15 Minutes

Objective

Upon completion of this exercise, the student will be able to create a Windows startup disk.

Equipment

The following equipment is required for this exercise:

- Computer with Windows 98 or earlier installed

- One 3.5 inch blank diskette

Scenario

The Windows operating system has been installed, but a Windows startup disk was not made during the installation.

Procedures

Once the operating system is up and running, create a Windows 98 startup disk. If for some reason Windows will not load, the boot disk may be necessary to begin the troubleshooting process.

Note: In this lab, use the built-in functionality of Windows to create a Windows startup disk. A boot disk can be made by copying the necessary startup files on to a floppy disk.

Step 1

From the Windows desktop, go to **Start** > **Settings** > **Control Panel**.

What is the general purpose of the Control Panel?

_____

_____

_____

Step 2

Once the Control Panel displays, double-click on the **Add/Remove Programs** icon. In the Add/Remove Programs Properties window, select the **Startup Disk** tab.

Step 3

Click the **Create Disk** button. A status bar will display indicating it is preparing the files needed for the startup disk. If the cab files are not available, Windows will prompt for the Windows Installation CD.

Step 4

When the files for the startup disk have been collected, Windows will prompt the user to label a disk and insert it into the drive. Click the **OK** button.

Step 5

Once the startup disk has been created, write-protect the disk by moving the switch to the open position. The switch is located on the back of the disk at the top left corner.

Why is it important to write-protect a bootable floppy disk?

_____

_____

Step 6

To finish the process, reboot the system to make sure the diskette works.

Troubleshooting

A bootable floppy disk is often needed while working on computers. If the operating system will not start, a floppy disk will be used to view the contents of the hard drive and begin the troubleshooting.

Reflection

What three files are needed in order for a floppy disk to boot properly?

_____

_____

_____

Lab 6.2.1a: Creating Users Accounts in Windows 2000

Estimated time: 30 Minutes

Objective

Upon completion of this lab, the student will be able to create users and groups as well as assign properties to each.

Equipment

The following equipment is required for this exercise:

- A computer with Windows 2000 Professional installed

Scenario

A coworker needs to use a shared computer that contains sensitive files. In this case, it is a good idea to set up a user account for her.

Procedures

Being able to create users and then organizing those users into groups is an essential task when working with Windows 2000. A user account enables a system administrator to log in and access the resources of the computer as well as have a custom environment to work in. A group is simply a collection of users. In this lab, both users and groups will be created.

Step 1

From the Control Panel, select the Users and Passwords applet. Click on the **Advanced** tab, and then click on the **Advanced** button. What is the title of the window that just opened?

_____

Step 2

In the Local Users and Groups window, select the Users folder in the left pane. From the Action menu, select **New User**.

What options are available in the New User dialog box?

_____

_____

_____

_____

_____

Step 3

In the New User dialog box, fill out the information for a new user named LocalUser. For the password, just use the word "password". Uncheck the box that says, "User must change password at next logon", and then click the **Create** button.

Using the same process, create a second user named LocalUser2. When finished, click the **Close** button.

Step 4

Test the user account by logging off the current user and then logging back in using the username that was just created.

Did the user account work properly? _____

If the user account did not log in properly, see the troubleshooting section.

Troubleshooting

If the user account was not created or if it is disabled, retrace the steps necessary to create a new user account and double-check that everything is setup properly.

Reflection

Why is it necessary to have separate user accounts on a local machine?

_____

_____

_____

_____

Lab 6.2.1b: Assigning Permissions in Windows 2000

Estimated time: 30 Minutes

Objective

In this exercise, the student will learn how to assign NTFS permissions to folders.

Equipment

The following equipment is required for this exercise:

- A computer running Windows 2000 formatted with NTFS

Scenario

The boss needs a folder structure created and permissions assigned to the folders.

Procedures

The ability to manage folders and assign access rights is an important capability of operating systems. This capability helps ensure data integrity by defining the level of user access.

Step 1

First, create a folder and name it Chemistry. Within the Chemistry folder create an Experiments and a Laboratory folder. Within the Chemistry\Experiments folder create a Week3 folder. Refer to lab 6.2.1 to create the LocalUser1 and LocalUser2 user accounts. In the first part of the lab, assign permissions to folders based on these folders, users, and groups that are created. In the second part of the lab, log on to the system as one of the users and test these NTFS permissions.

The following table shows the final structure that will be created.

Folder Name and Path	Groups	Permissions
Chemistry	Users group	Read & Execute
	Administrators Group	Full Control
Chemistry\Experiments	Users group	Read & Execute
	Administrators Group	Full Control
Chemistry\Experiments\Week3	Users group	Read & Execute
	Administrators Group	Full Control
	LocalUser2	Modify
Chemistry\Laboratory	Users group	Read & Execute
	Administrators Group	Full Control

Step 2

Log on with the administrator account or with an account that has administrator rights, and navigate to the folders that were created according to the scenario.

When at the folder, right-click the folder that permissions need to be modified on, and then clicks **Properties**. The Properties box should be displayed for the folder with the "General" tab view.

Click on the **Security** tab.

Step 3

Next click the **Add** button to add permissions to user accounts or groups. The **Add** button window will display the Select Users, Computers, or Groups window. Verify that the correct computer name is entered.

In the name box, select the name of one of the user accounts or groups that was listed in the scenario, and then click the **Add** button. This process will need to be repeated for each user account and group that is listed (for the appropriate folder) in the previously mentioned table.

Step 4

Click **OK** when finished. The Properties dialog box for the folder will redisplay.

If the Properties box contains user accounts and groups that are not listed in the scenario they will need to be removed by selecting them and then clicking **Remove**.

Step 5

This step will specify the permissions for the folders in the scenario. For all user accounts and groups that are listed for the folder in the scenario, select the user account or group that corresponds to the folder under Name. Then under Permissions, select the **Allow** box or the **Deny** box next to the appropriate permissions that are listed for that folder in the scenario.

Click **OK** to save the changes and close the Properties box.

Repeat this procedure and continue to assign permissions for each folder listed in the scenario.

Close all the boxes and log off of Windows.

Step 6

Log on as LocalUser1 and navigate to the Chemistry\Experiments\Week3 folder. Try to create a file in the Week 3 folder.

Could this file be created? _____

Log off of Windows and log back on as LocalUser1, then navigate to the Chemistry\Experiments\Week 3 folder. Try to create a file in the Week 3 folder.

Could this file be created? _____

Log off of Windows and log back on as Administrator, and then navigate to the Chemistry\Experiments folder. Try to create a file in the Experiments folder.

Could this file be created? _____

Log off Windows and log back on as LocalUser, then navigate to the Chemistry\Experiments folder. Try to create a file in the Experiments folder.

Were you able to create this file? _____

Log off of Windows and log back in a Local User2, then navigate back to the Chemistry\Experiments folder. Try to create a file in the Experiments folder.

Could this file be created? _____

Troubleshooting

Assigning NTFS permissions can be a confusing task when dealing with large amounts of data that can be spread out over large volumes. It is a good idea to keep the process as simple as possible. When a drive or volume is formatted with NTFS, the Full Control permission is assigned to the Everyone group. Change this default permission and assign other appropriate NTFS permissions in order to control access to the folders and files on the network.

Reflection

Why would permissions be used on a computer?

_____

_____

_____

Lab 6.2.4: Creating an Emergency Repair Disk in Windows 2000

Estimated time: 20 Minutes

Objective

In this lab, the student will learn how to create and use an emergency repair disk.

Equipment

The following equipment is required for this exercise:

- A computer system running Windows 2000

- A blank 3.5 inch floppy disk

Scenario

An emergency repair disk needs to be created so that it can be used in the event of a computer malfunction. The disk will also have to repair the file systems if they become damaged.

Procedures

In the first part of this lab, the emergency repair disk will be created. In the second part of the lab, the emergency repair disk will be used.

Step 1

Run the Backup program. Go to **Start** > **Programs** > **Accessories** > **System Tools** > **Backup**. Click the **Emergency Repair Disk** button on the Welcome tab.

Insert a blank formatted disk into Drive A.

Check the box labeled "Also Backup The Registry To The Repair Directory".

Click **OK**. Remove the disk and label it "Emergency Repair Disk" and include the current date.

Step 2

Insert the Windows 2000 CD and boot from the CD.

Press **R** to use the Emergency Repair Disk.

When presented with a Fast or Manual option, press **F** to select the Fast option. Press **Enter** to use the emergency repair disk. Insert the emergency repair disk and press **Enter**.

Once the files have been repaired, reboot the operating system.

Troubleshooting

If the disk is not the proper type, there might be some difficulty during the emergency repair disk creation process. Make sure to use a 3.5-inch HD formatted floppy disk.

Reflection

Why is the Emergency Repair Disk important in the troubleshooting process?

_____

_____

_____

Lab 6.4.3: Installation Demonstration of Windows 2000

Estimated time: 90 Minutes

Objective

In this exercise, the student will learn how to install the Windows 2000 operating system.

Equipment

The following equipment is required for this exercise:

- A computer with a blank hard disk

- Windows 2000 installation CD

Scenario

The computer file system has become corrupt because the user installed software that was infected with a virus. During installation of the software, the virus deleted all of the files on the hard drive. The operating system will need to be reinstalled.

Procedures

In this lab, the student will learn how to install the Windows 2000 Professional Operating System.

Step 1

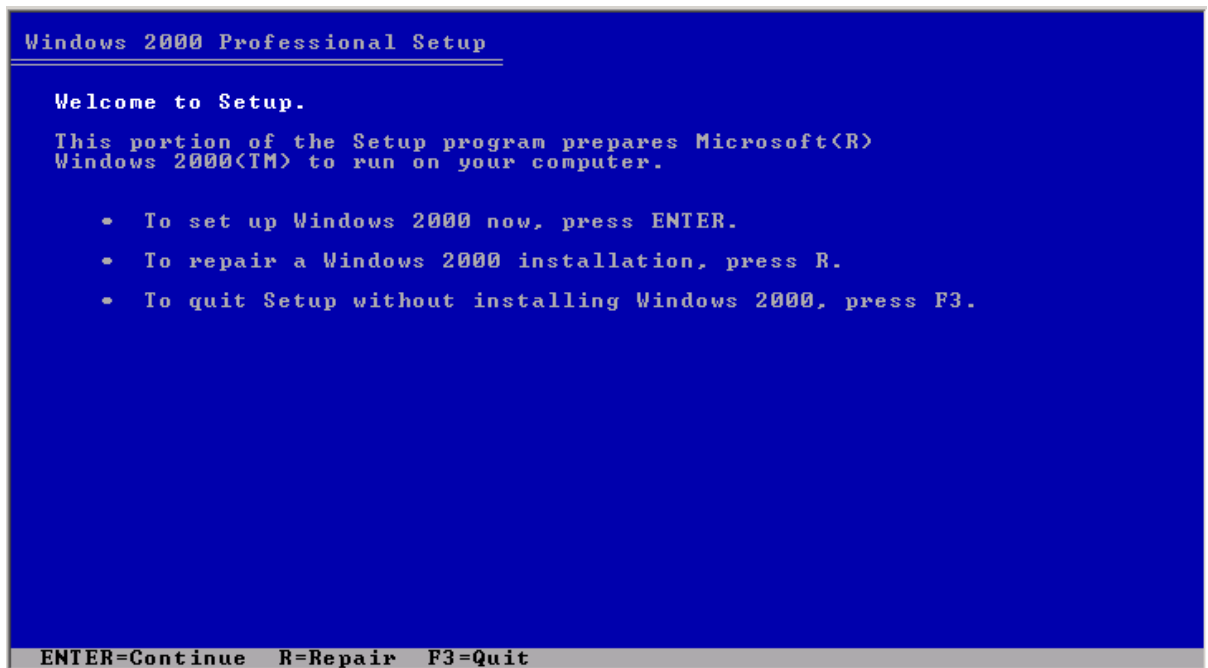Insert the CD into the CD-ROM drive.

Next, configure the system BIOS boot sequence to boot from the CD-ROM first. Keep the CD in the drive and restart the computer.

When the system starts up, watch for the message "Press Any Key to Boot from CD". When the message appears, press any key on the keyboard and boot the system from the CD.

The Windows 2000 Setup Screen will display and load the necessary files.

```
Windows 2000 Setup
_____




















 Setup is loading files (Machine Identification Data)...
```
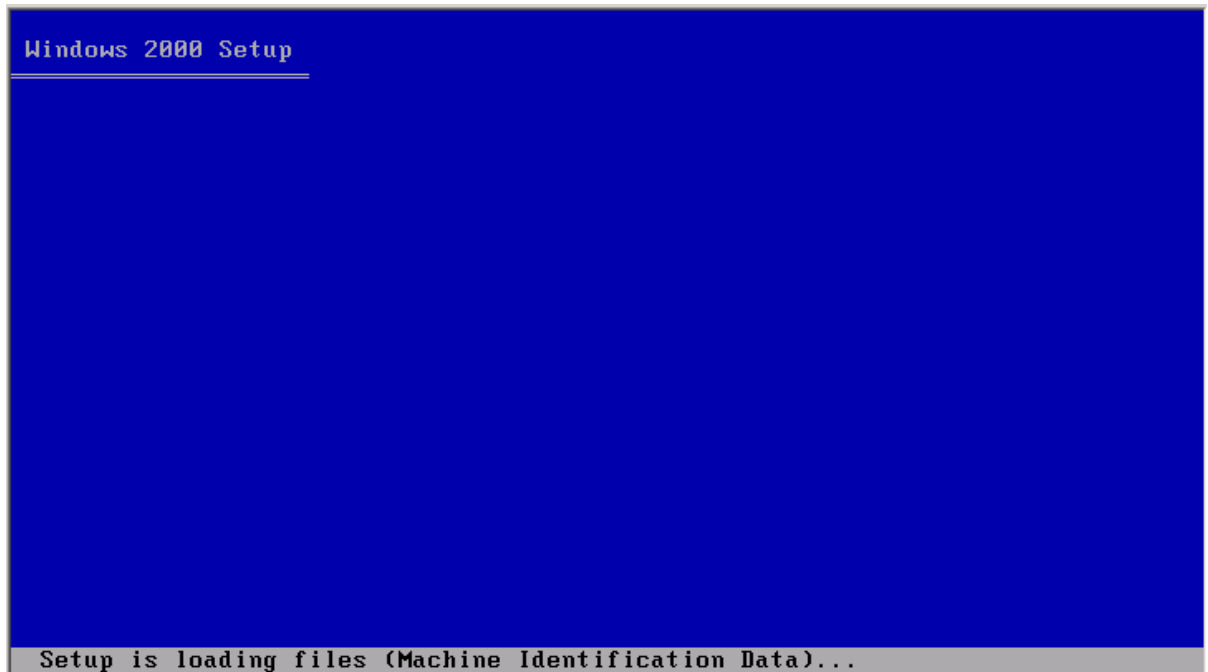
This screen will display for a few minutes while the files are copied to the hard drive.
The Welcome to Setup screen displays next. Press **Enter** to proceed with the installation.

```
Windows 2000 Professional Setup
_____

   Welcome to Setup.

   This portion of the Setup program prepares Microsoft(R)
   Windows 2000(TM) to run on your computer.

       •   To set up Windows 2000 now, press ENTER.

       •   To repair a Windows 2000 installation, press R.

       •   To quit Setup without installing Windows 2000, press F3.









 ENTER=Continue   R=Repair   F3=Quit
```

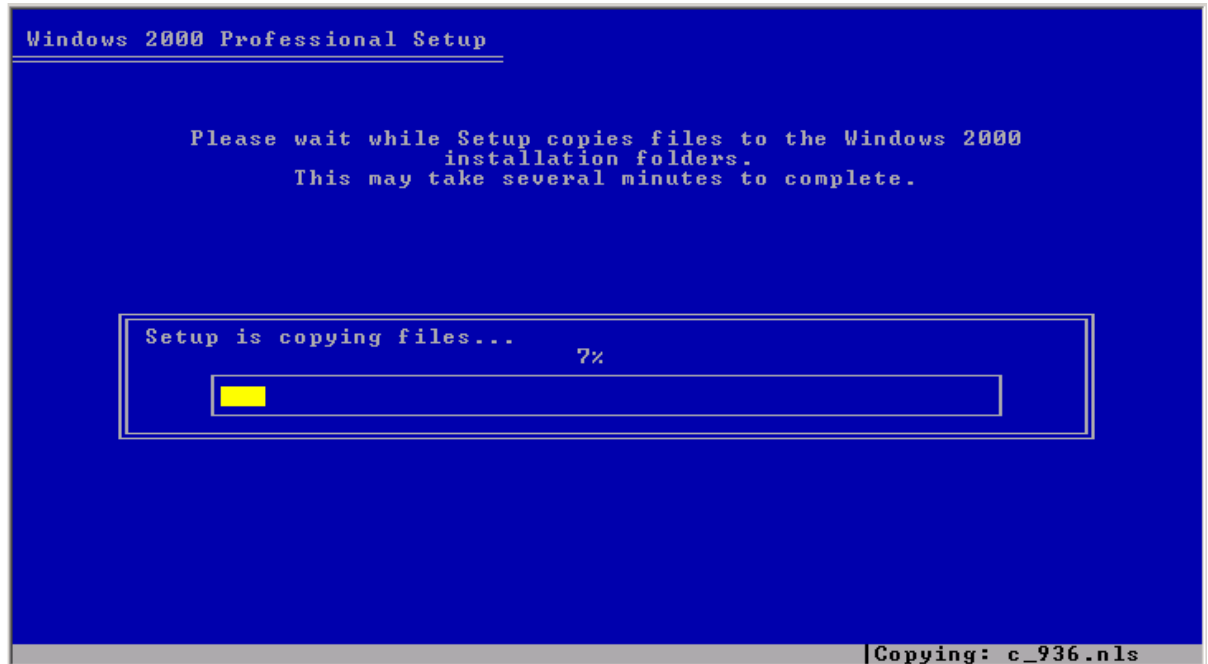The Welcome to Windows screen will display. Press **F8** to agree with the Licensing Agreement.

The next step is to partition and format the drive if needed. This step is not always required. For this lab, create a small partition (2 GB) for installing Windows 2000. This will make the installation a faster process.

Select the option to partition the drive first, and then select the option to format the drive

with NTFS.

Setup will begin formatting the partition.

When partitioning and formatting is complete, the Windows 2000 Professional Setup screen will display and start copying the system files to the hard drive.

The system will restart automatically when the files have been copied. When the system restarts, the message "Press Any Key to Boot from CD" will display again. Do not press any keys at this time.

The Windows 2000 splash screen will then display.

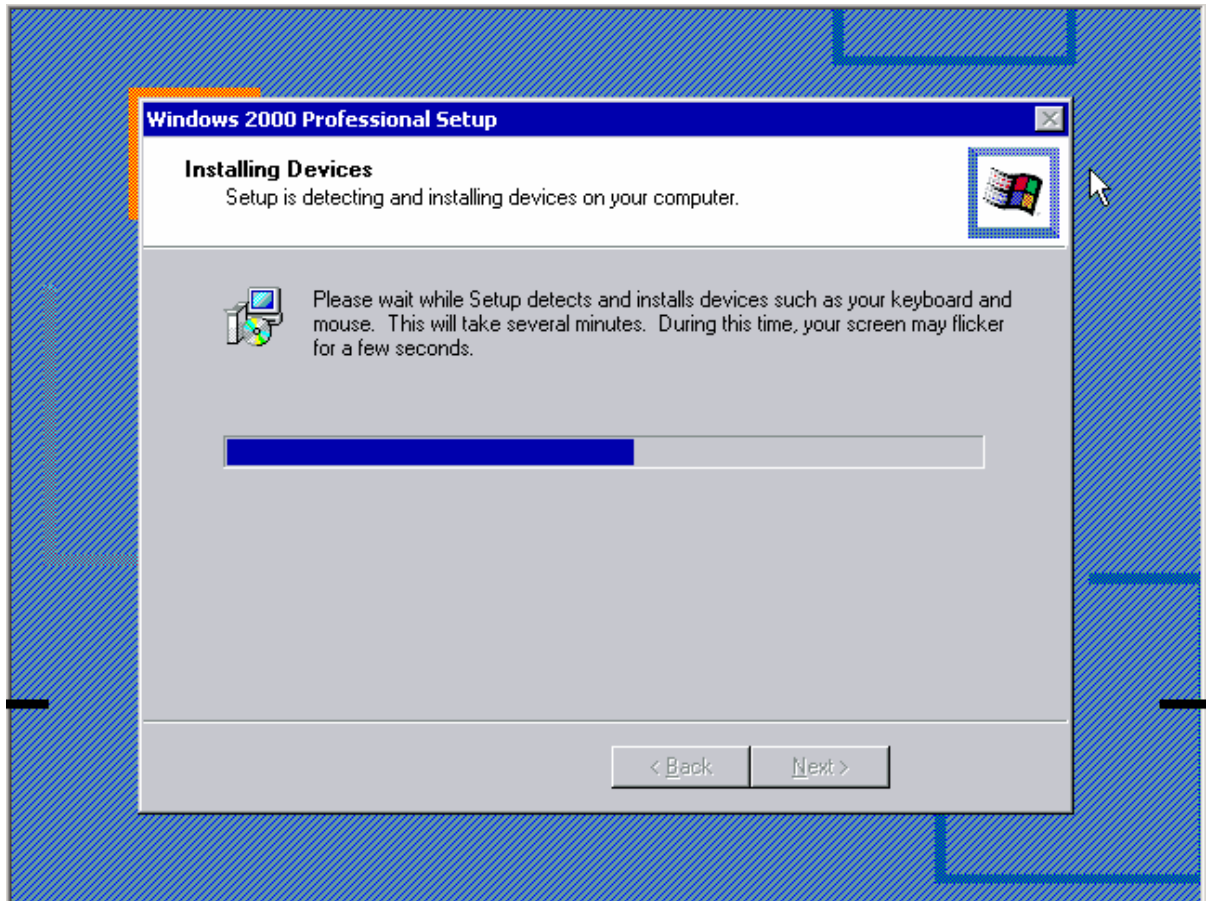The Welcome to Windows 2000 setup screen will display. Click **Next** to proceed to the Installing Devices screen.

Windows 2000 Professional Setup

Installing Devices
Setup is detecting and installing devices on your computer.

Please wait while Setup detects and installs devices such as your keyboard and mouse. This will take several minutes. During this time, your screen may flicker for a few seconds.
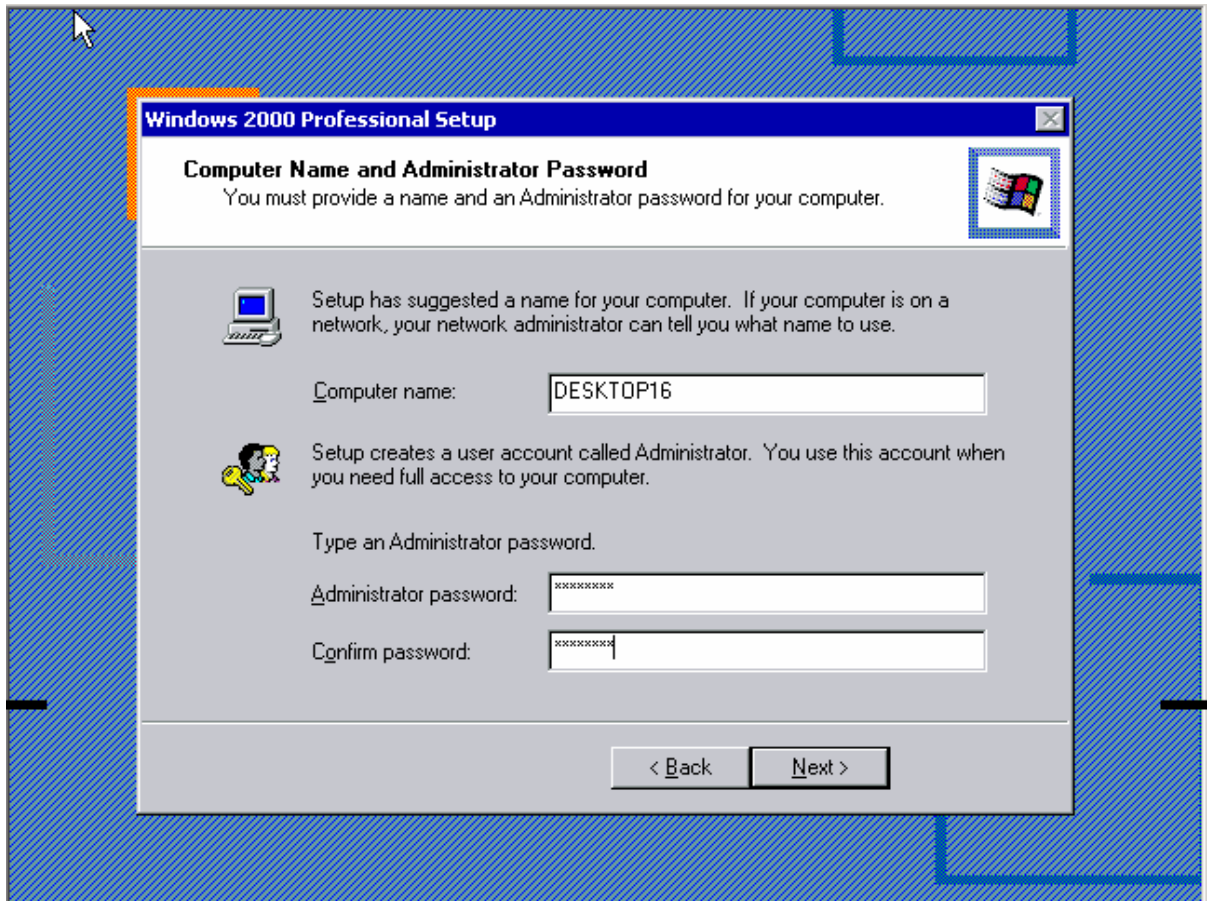
< Back   Next >

When the system is done installing the devices, setup will proceed to the Regional Setting screen.

These settings can be change if required. However, for the purposes of this lab, press **Next**.

On this screen enter the user name and the name of the company. Click **Next**.

Enter the Microsoft product registration key when prompted. Click **Next** to continue.

The "computer name and administrator" password screen displays next. Enter the computer name and the administrator password.

Accept the name suggested by setup, or enter the name assigned to this computer by the network administrator. Enter the word "password" for the password. Click **Next**.

Enter the appropriate date and time settings for the region. Click **Next**.

Setup will now proceed to the Network Settings screen.
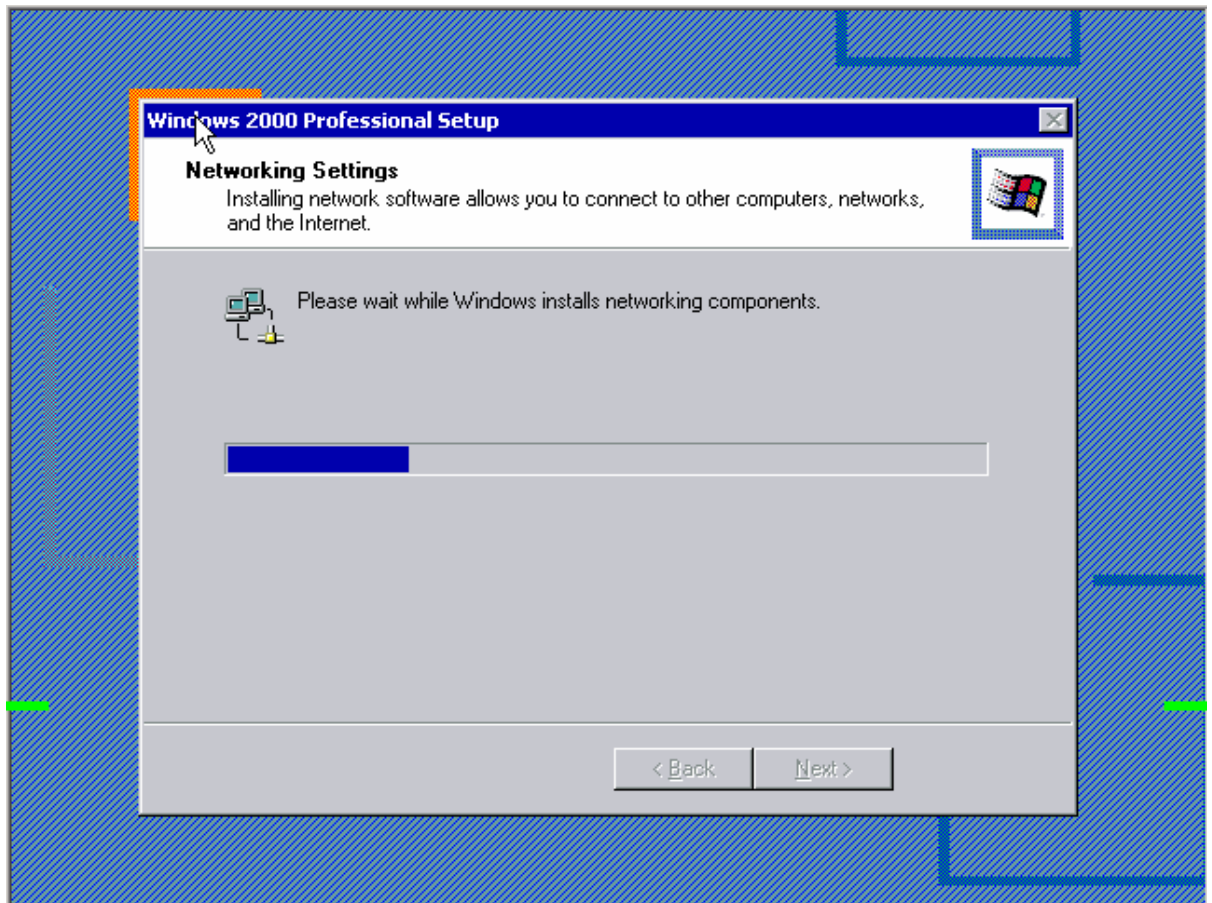
The networking components will be installed during this phase of setup. When complete, click **Next**, to proceed to the next step.
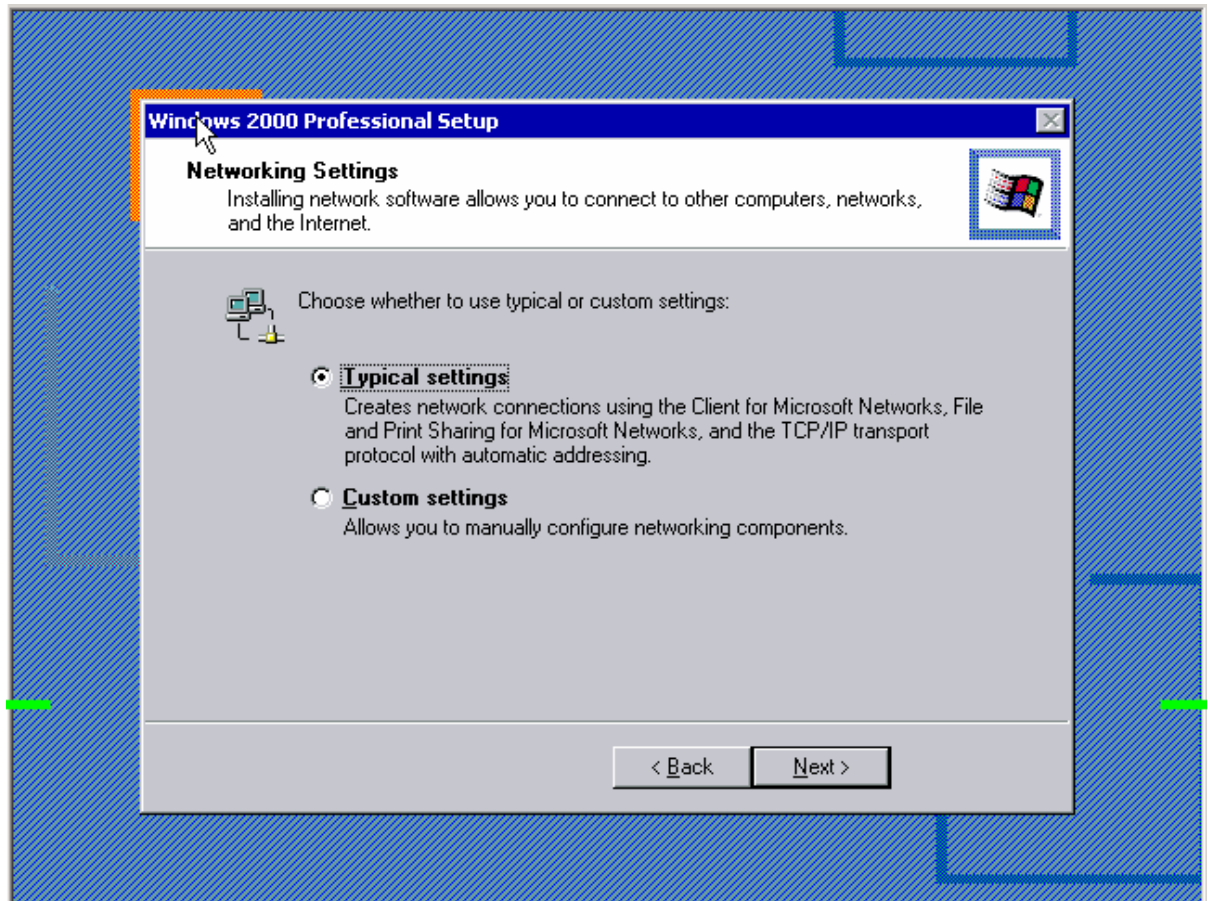
Select the Typical Settings radio button to install the default network settings and then click **Next**. Custom Settings allows other network components to be installed that are not used in this lab.
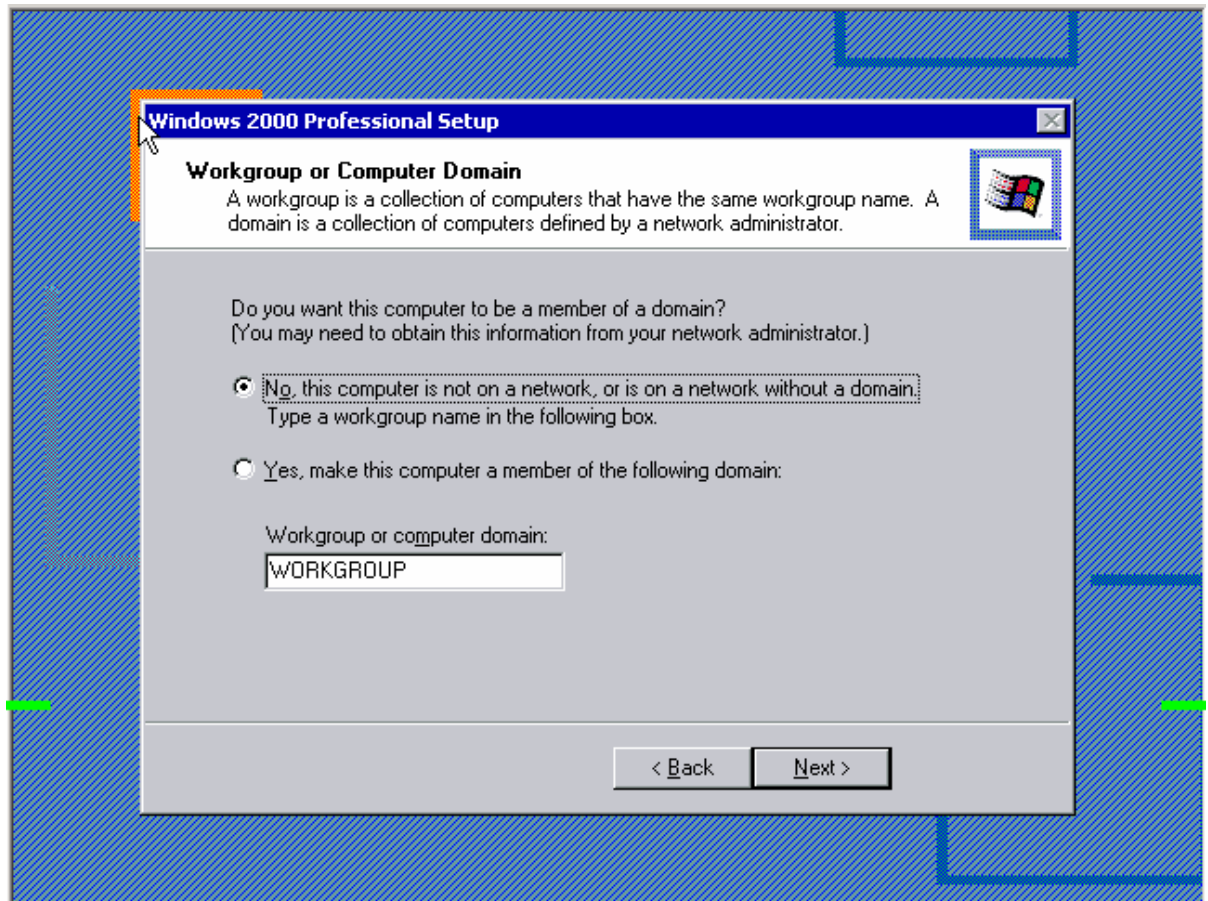
The Workgroup or Computer Domain screen allows the user to join a domain. This is important when the computer is on a network and requires a domain name and password.

For this lab, select the "No, this computer is not on a network, or is on a network without a domain" radio button. Click **Next**.

The Performing Final Tasks screen is next.
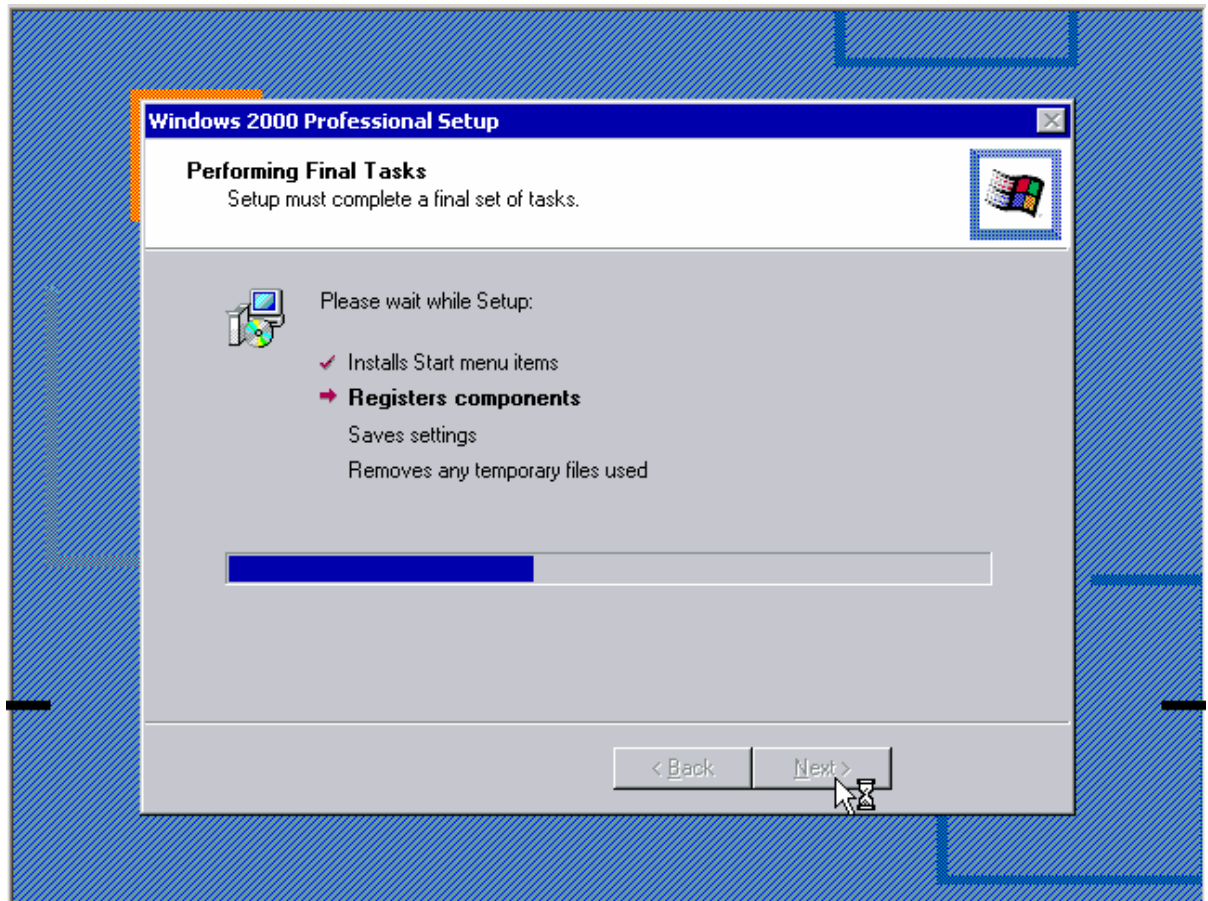
This is the final step of the setup process. This step will take the longest to complete. Once it has finished, click **Next**.

The computer will automatically restart. Ignore the "Press any Key to Boot from CD" message and do not boot from the CD

The Windows 2000 splash screen will display and the Network Identification Wizard will start.
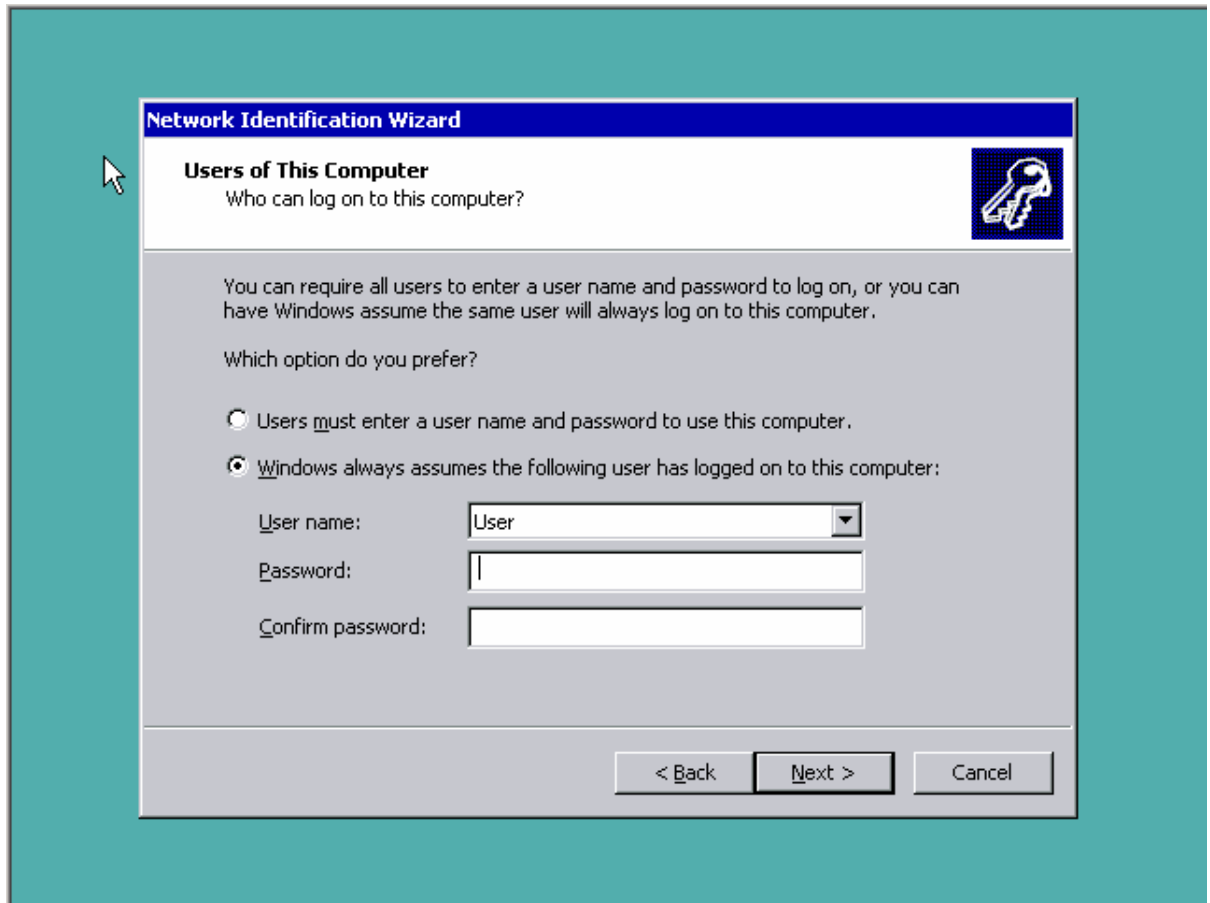
Select the "Users must enter a username and password to use this computer" radio button.

This will require all users to have an account created on the computer before they will be allowed to log on. Click **Next**.

To complete the Network Identification Wizard, click **Finish**.

The log on box will display. Log on with the administrator account and password that was created during setup.

The system will now log on and launch the Windows 2000 desktop.
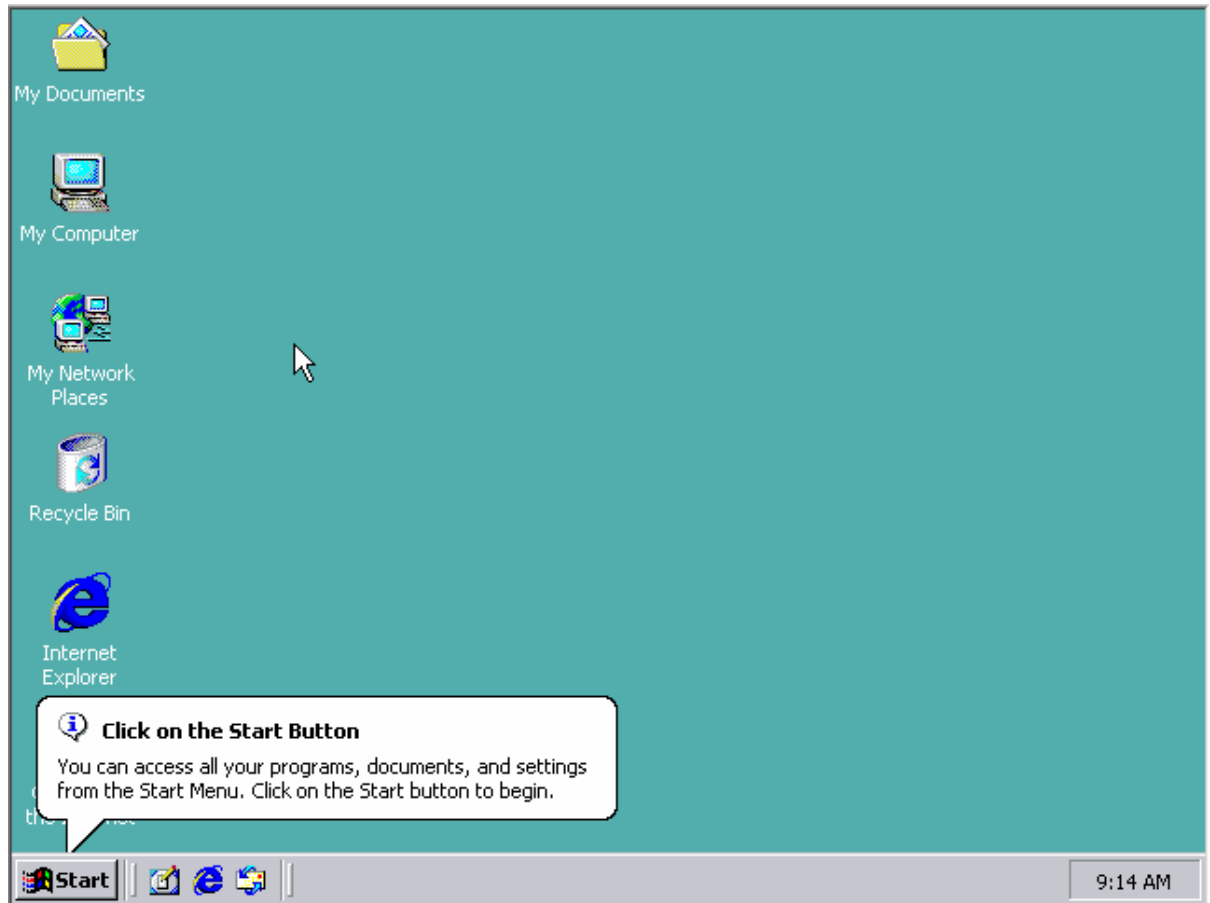
Windows 2000 has now been successfully installed.

Troubleshooting

Before doing the installation, confirm the proper hardware requirements on the system. Also make sure that the operating system is being installed on a blank partition or hard drive that has enough space. If the hardware is compatible and there is sufficient space on the drive or partition there should not be any problems with the installation.

Reflection

Did the Windows installation complete successfully? _____

Lab 7.3.2: Installation Demonstration of Windows XP

Estimated time: 90 Minutes

Objective

In this exercise, the student will learn how to install the Windows XP Professional operating system.

Equipment

The following equipment is required for this exercise:

- A computer with a blank hard disk.

- Windows XP Professional installation CD.

Scenario

The IT department has decided to do an upgrade of all the end-user computers to Windows XP Professional. The operating systems will need to be reinstalled.

Procedures

In this lab, the student will learn how to install the Windows XP Professional operating system.
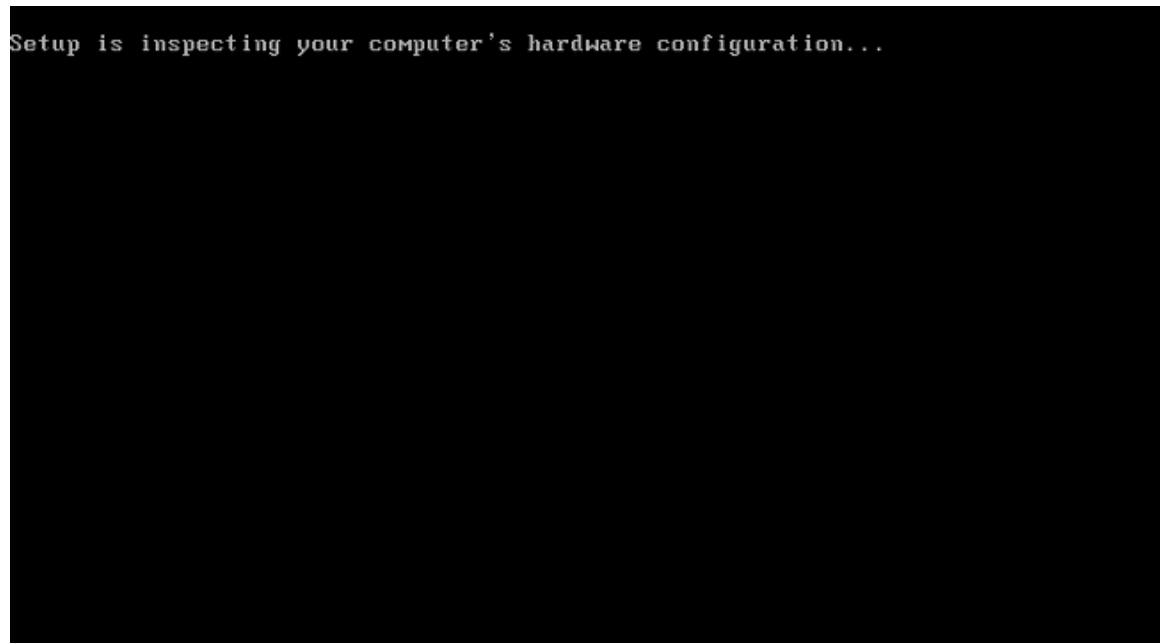
Note: Some system hardware will require that you use a manufacturer supplied recovery disk and procedure for installing the operating system. Refer to manufacturer supplied documentation for specific instructions.

Step 1

Insert the CD into the CD-ROM drive.

Next, configure the system BIOS boot sequence to boot from the CD-ROM first. Keep the CD in the drive and restart the computer.

When the system starts up, watch for the message "Press Any Key to Boot from CD". When the message appears, press any key on the keyboard to boot the system from the CD. The system will now begin inspecting the hardware configuration.

```
Setup is inspecting your computer's hardware configuration...
```

Next, the Windows XP Setup Screen will display and prepare the installation program to load the necessary files.


```
Windows Setup




















   Setup is loading files (Kernel Debugger DLL)...
```

```
Windows Setup
```

```
Setup is loading files (Windows Setup)...
```

```
Windows Setup
```

```
Setup is loading files (IEEE 1394 Bus OHCI Compliant Port Driver)...
```
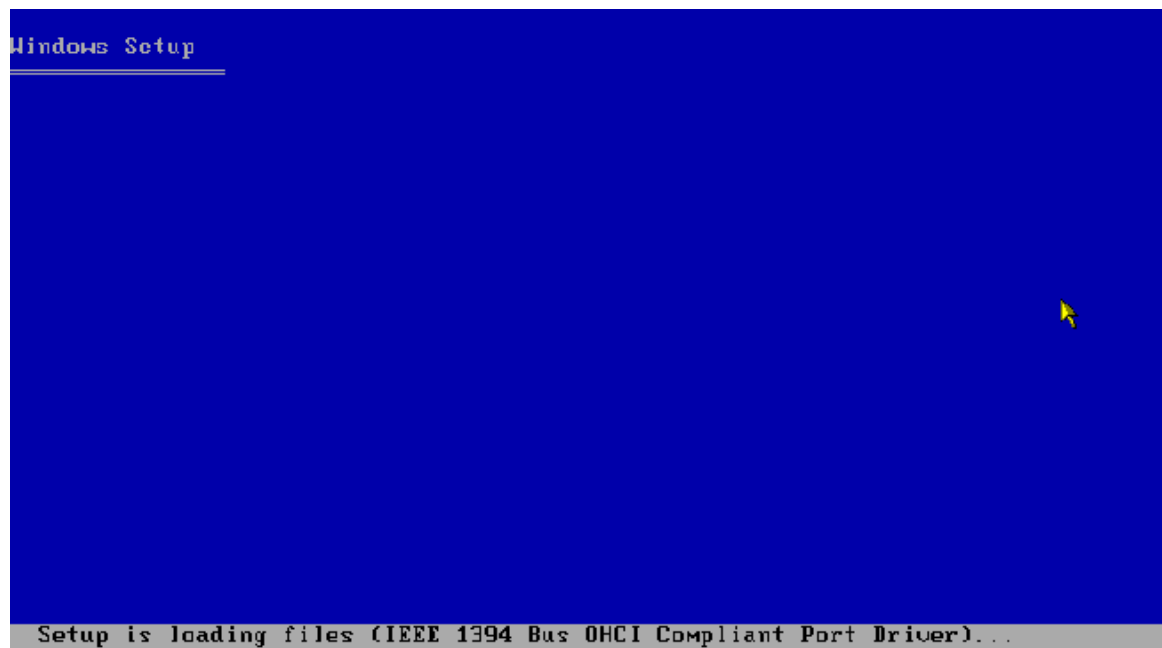
These screens will display for a few minutes while the files are being copied to the hard drive.

The Welcome to Setup screen will display next. Press **Enter** to continue with the installation.

```
Windows XP Professional Setup

  Welcome to Setup.

  This portion of the Setup program prepares Microsoft(R)
  Windows(R) XP to run on your computer.

      •  To set up Windows XP now, press ENTER.

      •  To repair a Windows XP installation using
         Recovery Console, press R.

      •  To quit Setup without installing Windows XP, press F3.

  ENTER=Continue   R=Repair   F3=Quit
```

After the Windows XP Licensing Agreement screen displays, press **F8** to agree with the Licensing Agreement and continue with the installation.

```
Windows XP Licensing Agreement

  Microsoft(r) Windows(r) XP Professional

  END-USER LICENSE AGREEMENT

  IMPORTANT-READ CAREFULLY: This End-User
  License Agreement ("EULA") is a legal agreement between you
  (either an individual or a single legal entity) and the
  manufacturer ("Manufacturer") of the computer system or computer
  system component ("HARDWARE") with which you acquired the
  Microsoft software product(s) identified above ("SOFTWARE").  The
  SOFTWARE includes Microsoft computer software, and may include
  associated media, printed materials, "online," or electronic
  documentation and Internet based services.  Note, however, that
  any software, documentation, or web services that are included in
  the SOFTWARE, or accessible via the SOFTWARE, and are
  accompanied by their own license agreements or terms of use
  are governed by such agreements rather than this EULA.  The terms
  of a printed, paper EULA, which may accompany the SOFTWARE,
  supersede the terms of any on-screen EULA.  This EULA is valid
  and grants the end-user rights ONLY if the SOFTWARE is genuine
  and a genuine Certificate of Authenticity for the SOFTWARE is
  included.  For more information on identifying whether your
  software is genuine, please see
  http://www.microsoft.com/piracy/howtotell.

  By installing, copying, downloading, accessing or otherwise using
  the SOFTWARE, you agree to be bound by the terms of this EULA.

  F8=I agree   ESC=I do not agree   PAGE DOWN=Next Page
```

The next step is to partition and format the hard drive. This step is not always required. If you have a partition already created, use the arrow keys to scroll to that partition. Then press **Enter** to install the operating system on that partition. If a partition does need to be created, create a small partition (4 GB) to install Windows XP. This will make the installation process faster.

To begin the partition setup process, press **C** to create a new partition in the unpartitioned space.

```
Windows XP Professional Setup

  The following list shows the existing partitions and
  unpartitioned space on this computer.

  Use the UP and DOWN ARROW keys to select an item in the list.

      • To set up Windows XP on the selected item, press ENTER.

      • To create a partition in the unpartitioned space, press C.

      • To delete the selected partition, press D.


  4095 MB Disk 0 at Id 0 on bus 0 on atapi [MBR]
        Unpartitioned space                    4095 MB




  ENTER=Install   C=Create Partition   F3=Quit
```

In the space provided, type **4087** to create a 4GB (4087B) partition. Then, press **Enter** to continue with the installation.

```
Windows XP Professional Setup

  You asked Setup to create a new partition on
  4095 MB Disk 0 at Id 0 on bus 0 on atapi [MBR].

      •   To create the new partition, enter a size below and
          press ENTER.

      •   To go back to the previous screen without creating
          the partition, press ESC.

  The minimum size for the new partition is      8 megabytes (MB).
  The maximum size for the new partition is   4087 megabytes (MB).
  Create partition of size (in MB):   4087

 ENTER=Create   ESC=Cancel
```

For the next step, press **Enter** to select the option to install the operating system on the partition that was just created, this should be the **C** drive.

```
Windows XP Professional Setup

  The following list shows the existing partitions and
  unpartitioned space on this computer.

  Use the UP and DOWN ARROW keys to select an item in the list.

      •   To set up Windows XP on the selected item, press ENTER.

      •   To create a partition in the unpartitioned space, press C.

      •   To delete the selected partition, press D.

  ┌─────────────────────────────────────────────────────────┐
  │ 4095 MB Disk 0 at Id 0 on bus 0 on atapi [MBR]           │
  │                                                          │
  │     C:   Partition1 [New (Raw)]           4087 MB (  4086 MB free) │
  │          Unpartitioned space                 8 MB        │
  │                                                          │
  └─────────────────────────────────────────────────────────┘

 ENTER=Install   D=Delete Partition   F3=Quit
```
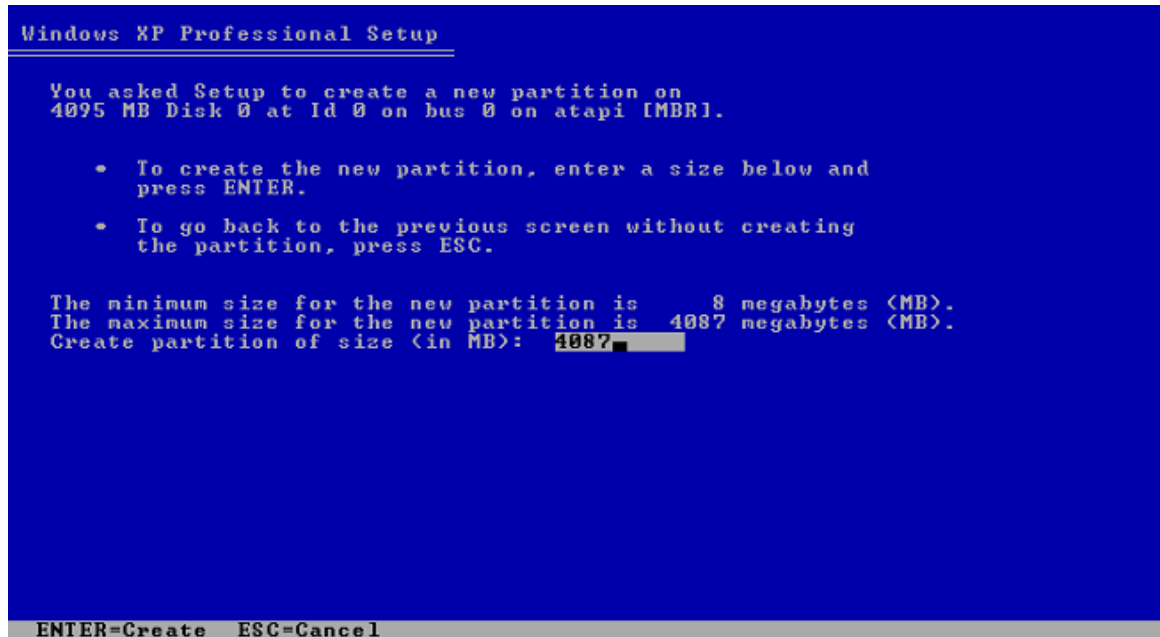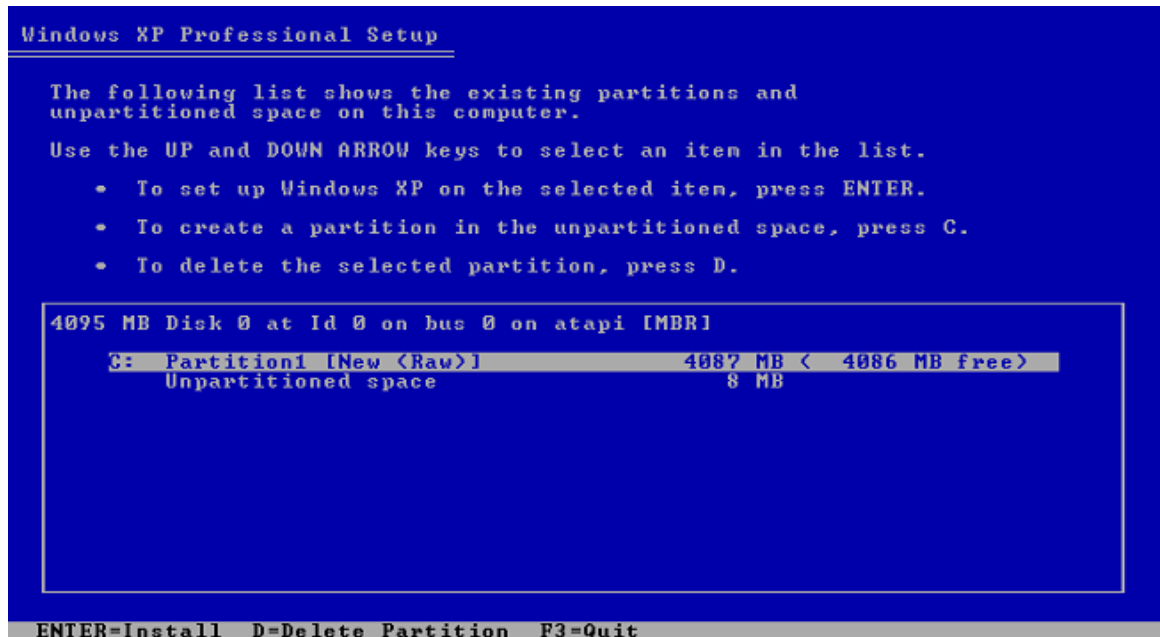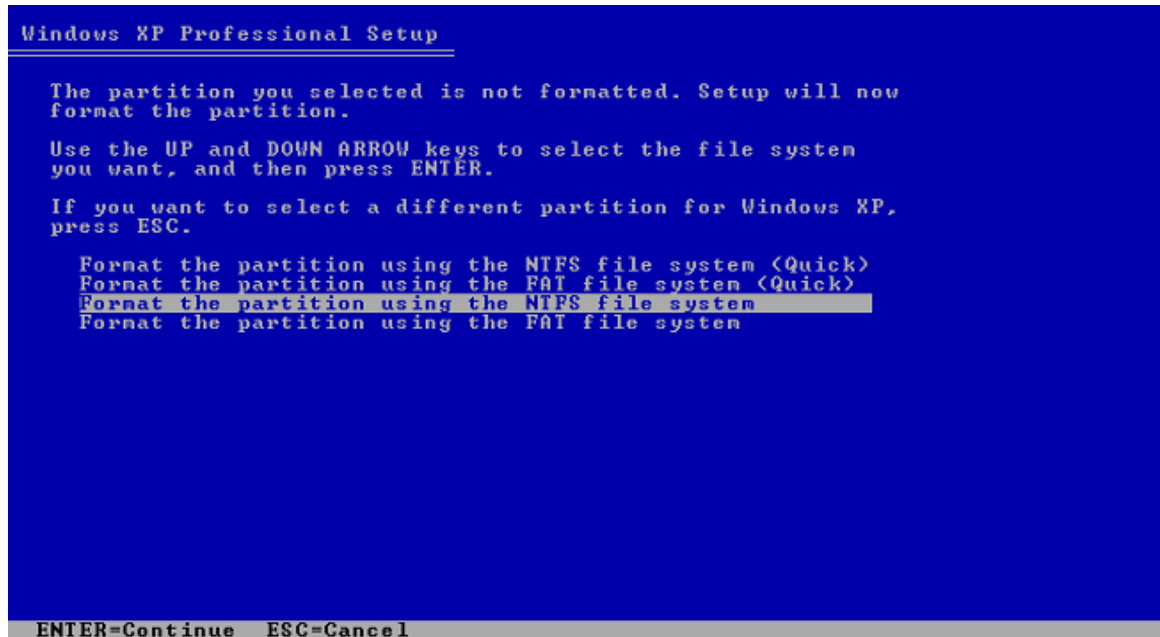
Next, select the option to format the partition using the NTFS file system. **Do not** use the quick method.

```
Windows XP Professional Setup

    The partition you selected is not formatted. Setup will now
    format the partition.

    Use the UP and DOWN ARROW keys to select the file system
    you want, and then press ENTER.

    If you want to select a different partition for Windows XP,
    press ESC.

        Format the partition using the NTFS file system (Quick)
        Format the partition using the FAT file system (Quick)
        Format the partition using the NTFS file system
        Format the partition using the FAT file system

  ENTER=Continue   ESC=Cancel
```

Setup will begin formatting the partition as shown below.

```
Windows XP Professional Setup

                Please wait while Setup formats the partition
    C:  Partition1 [New (Raw)]               4087 MB (  4086 MB free)
            on 4095 MB Disk 0 at Id 0 on bus 0 on atapi [MBR].

            Setup is formatting...
                                    31%
              [                             ]
```
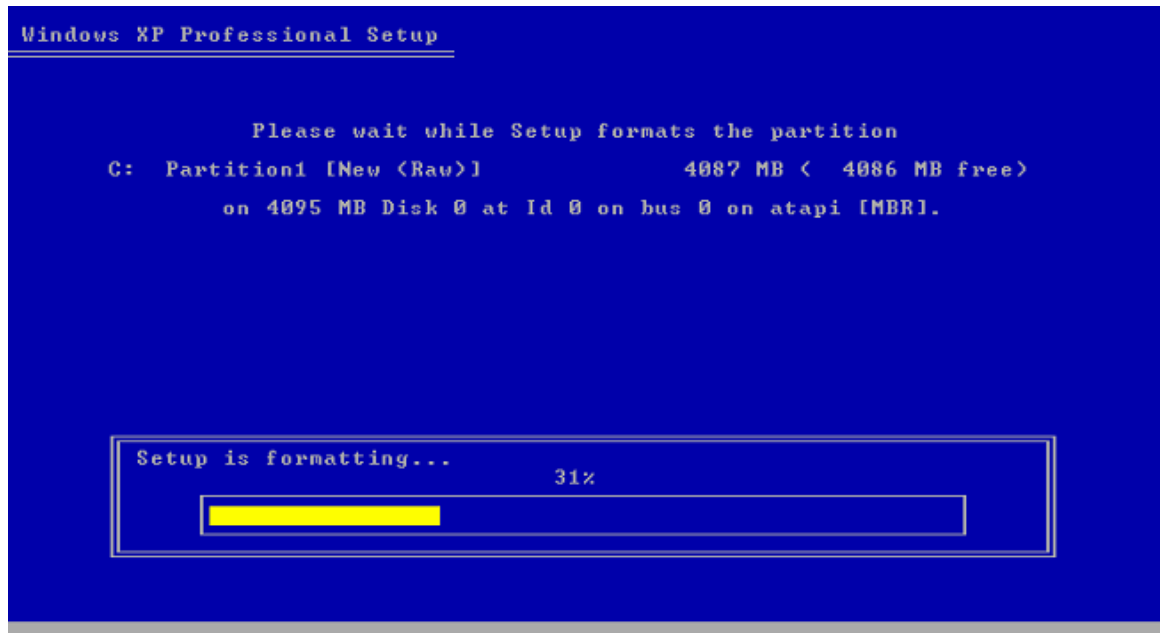
When partitioning and formatting is complete, the Windows XP Professional Setup screen will display and start copying the system files to the hard drive.
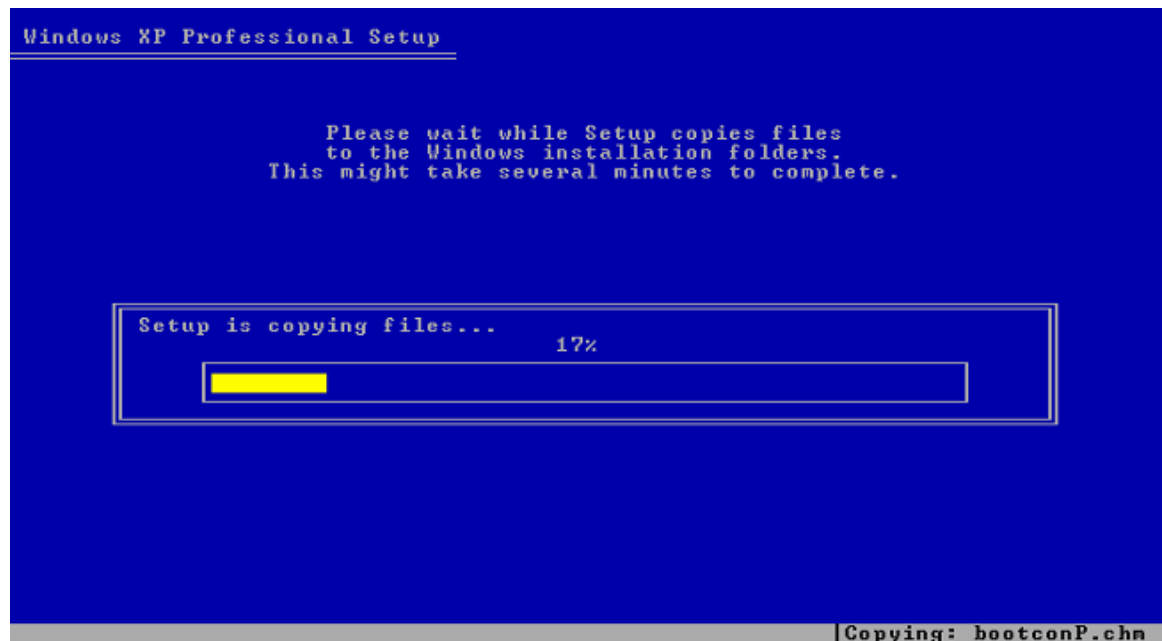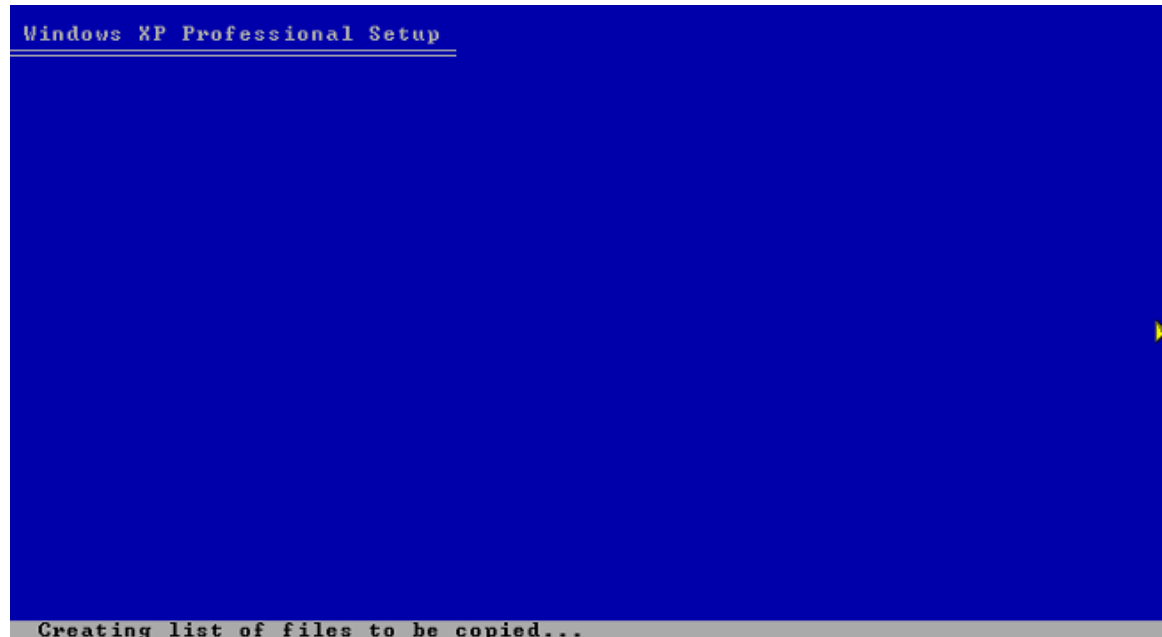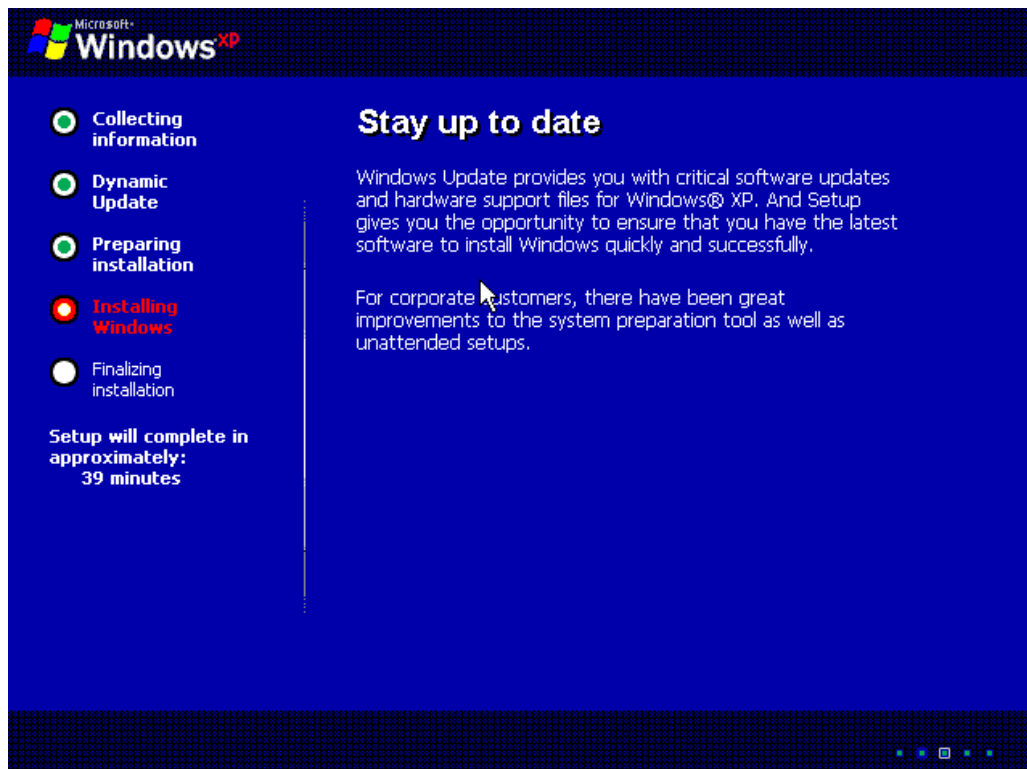

The system will restart automatically when the files have been copied. When the system restarts, the message "Press Any Key to Boot from CD" will display again. **Do not** press any keys at this time.
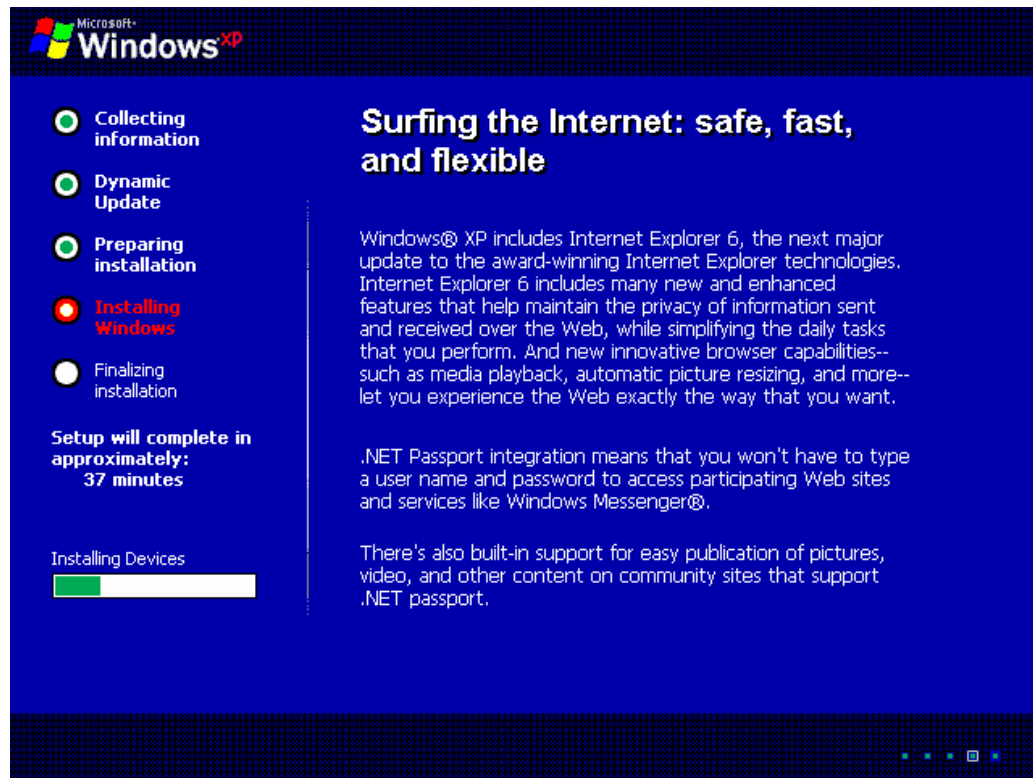
The Windows XP splash screen will then display.
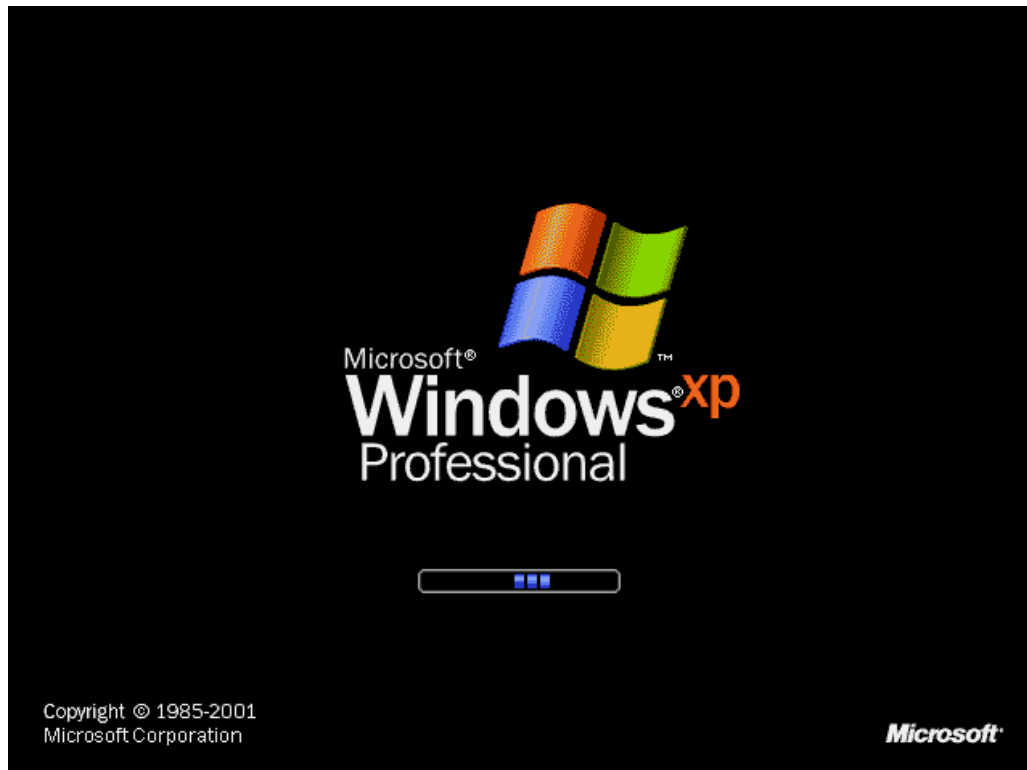
The Windows XP installation screen will display and begin installing the operating system.

The next step of the installation will begin installing the hardware devices. Setup will proceed to this screen.

Once the devices have been initialized and installed, setup will proceed to Regional and Language Options screen. This is where the user can customize the installation based on which country they live in or language they speak.
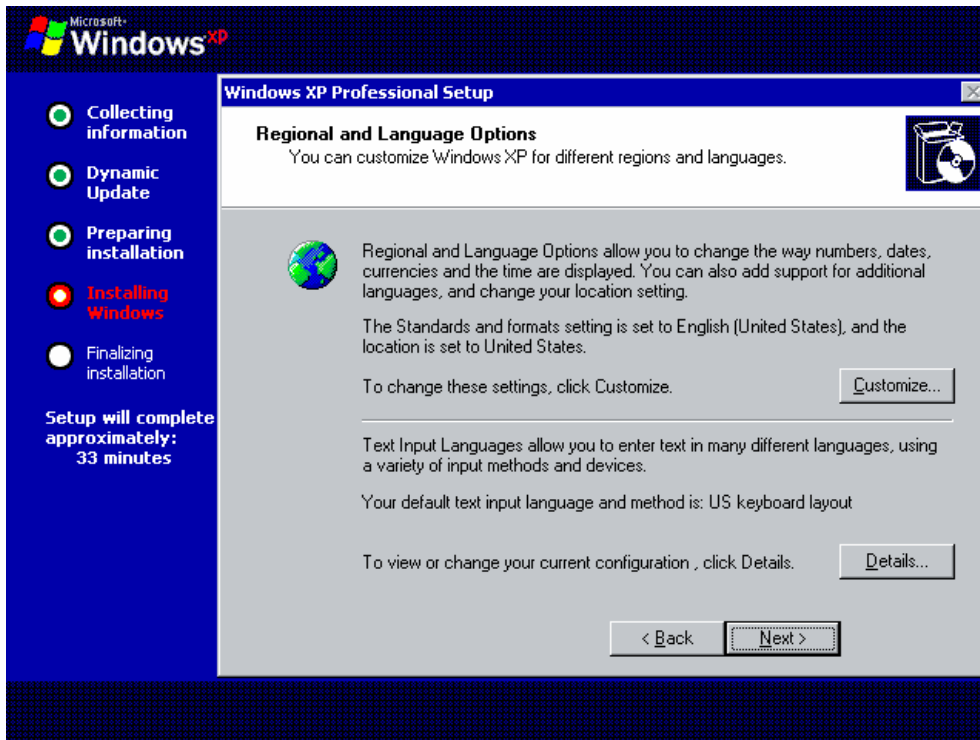
After making the proper selections, press **Enter** and proceed to the Personalization screen.
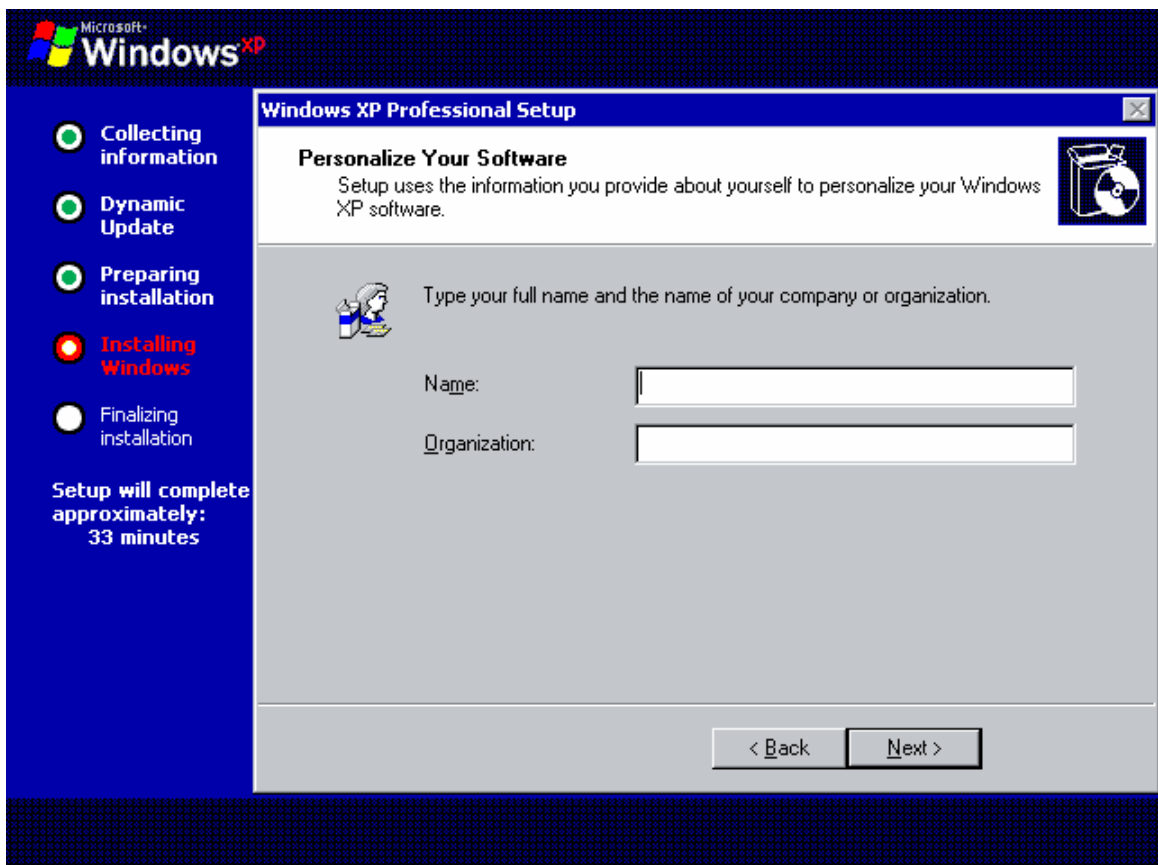
When this screen appears, type in the user name on the first line and the organization in the second line. Check with the instructor when this point is reached. They may have a specified name and organization for you to type in.

Press the **Next** button when finished. The next page to appear will be the Product Key page.

Enter the Windows XP product key that came with the installation CD. Then, press the **Next** button to continue.

The next screen to appear is the Computer Name and Administrator Password page.

Enter the computer name on the top line and the administrator password on the bottom two lines. Click **Next**.

The next page to appear is the Date and Time Settings page.
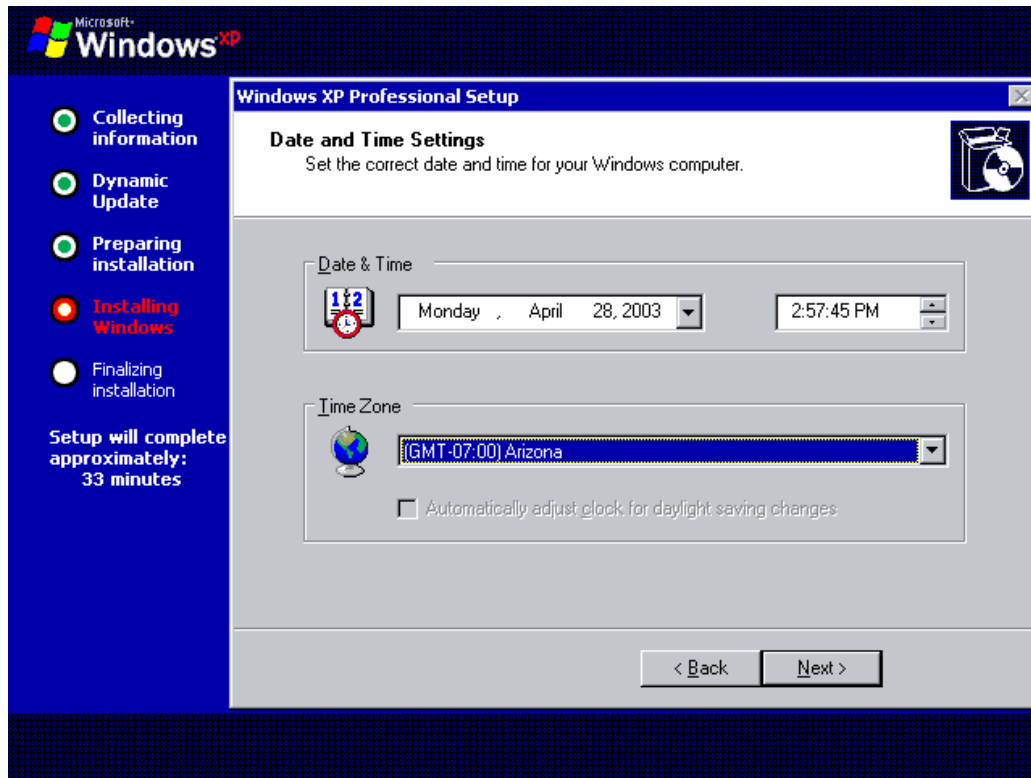
Enter the correct date and time. Then, select the correct time zone.

Click **Next** to continue.

The next screen will automatically install the networking components. The setup process will first install the network.

Next, it will prompt the user to choose the **Typical** or **Custom settings**.
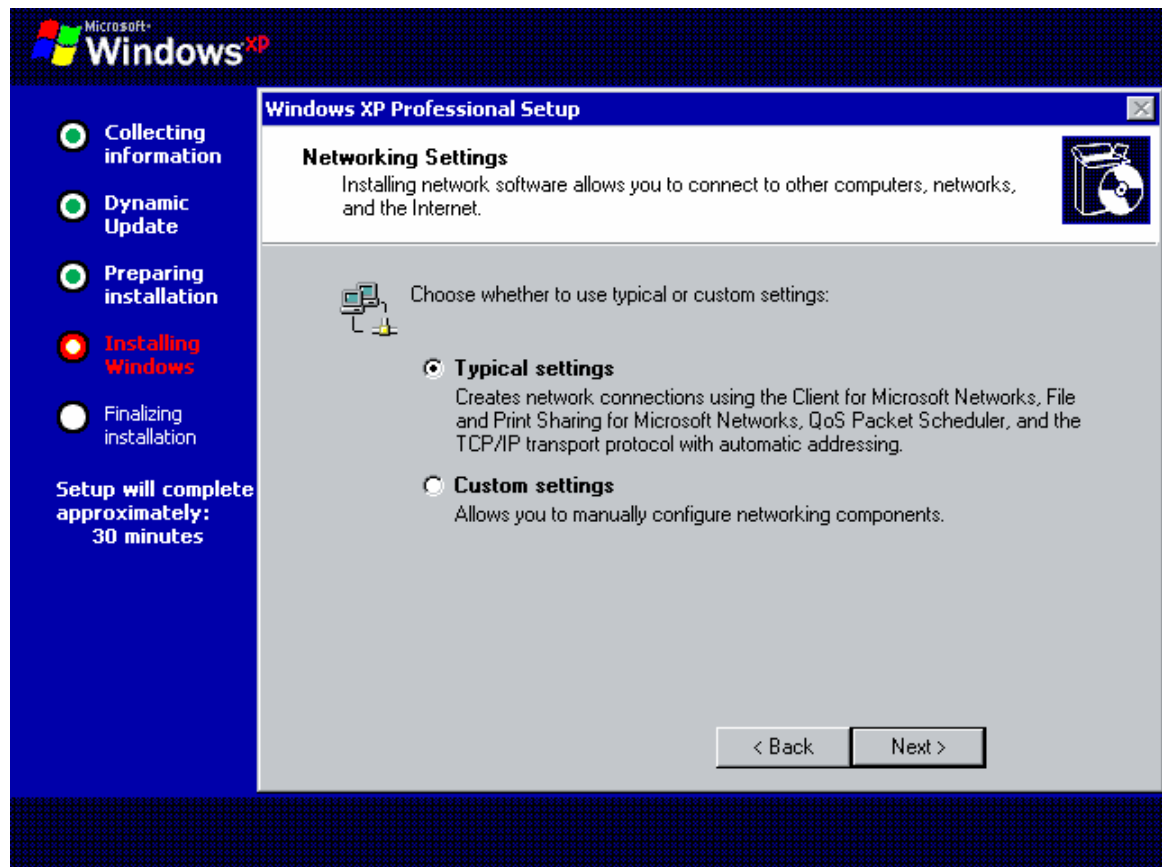
For the purposes of this lab select **Typical settings**. This is the most common selection and automatically configures the network settings. If the **Custom setting** is chosen the user must manually configure the networking components. Click **Next** to continue to the next step.

The last part of the network configuration in the installation process involves assigning workgroup or domain membership.
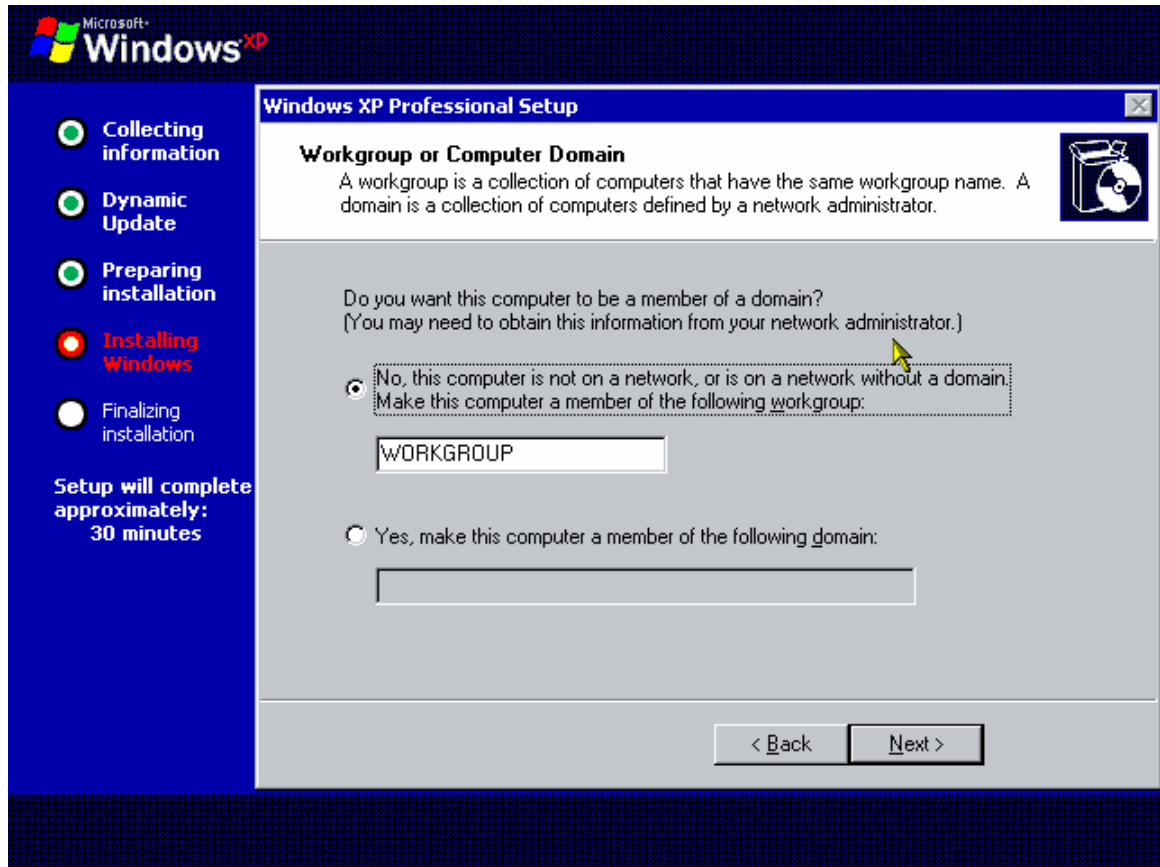
The Workgroup or Computer Domain screen allows the user to join a domain. This is important when the computer is on a network and requires a domain name and password.

Select the "No, this computer is not on a network, or is on a network without a domain" radio button. Then, click the **Next** button.

This completes the user involvement in the setup of the installation process. This is the final step of the setup process. This step will take the longest to complete. Once it has finished, click **Next**.

The next steps are all automated and proceed through Copying files:

Completing the installation process:
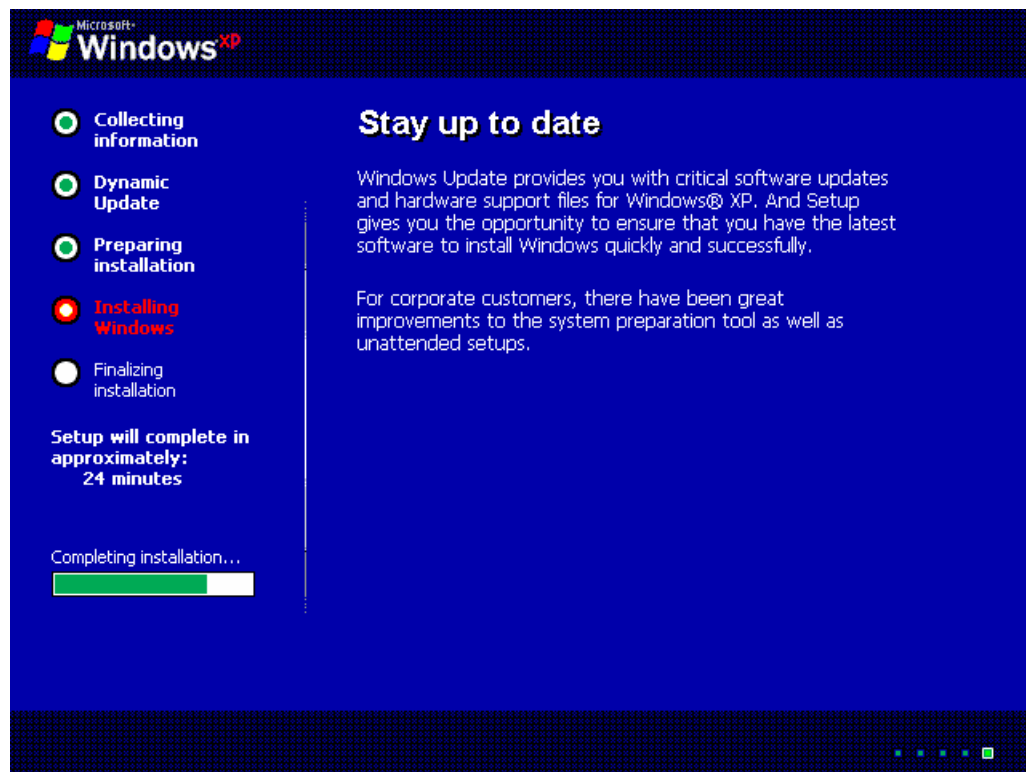
Installing Start Menu items:

Registering Components:

Finalizing the installation and saving the configuration settings:
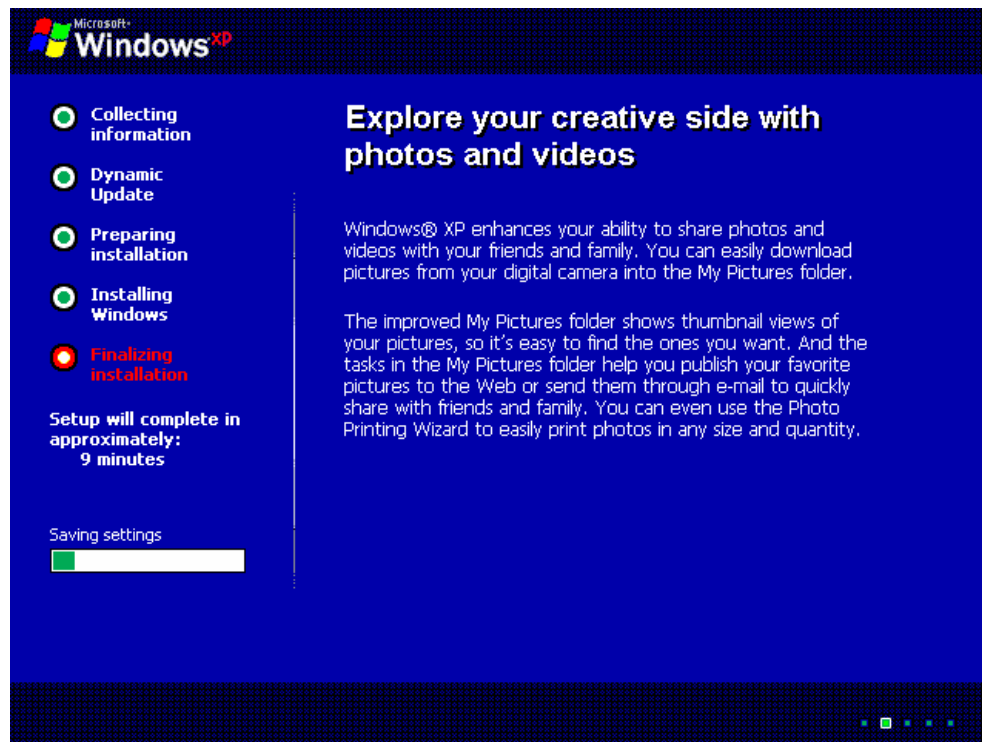
At this point, the computer will automatically restart. Ignore the "Press any Key to Boot from CD" message. Do not boot from the CD again.

The log on box will display. Log on with the administrator account and password that was created during setup.
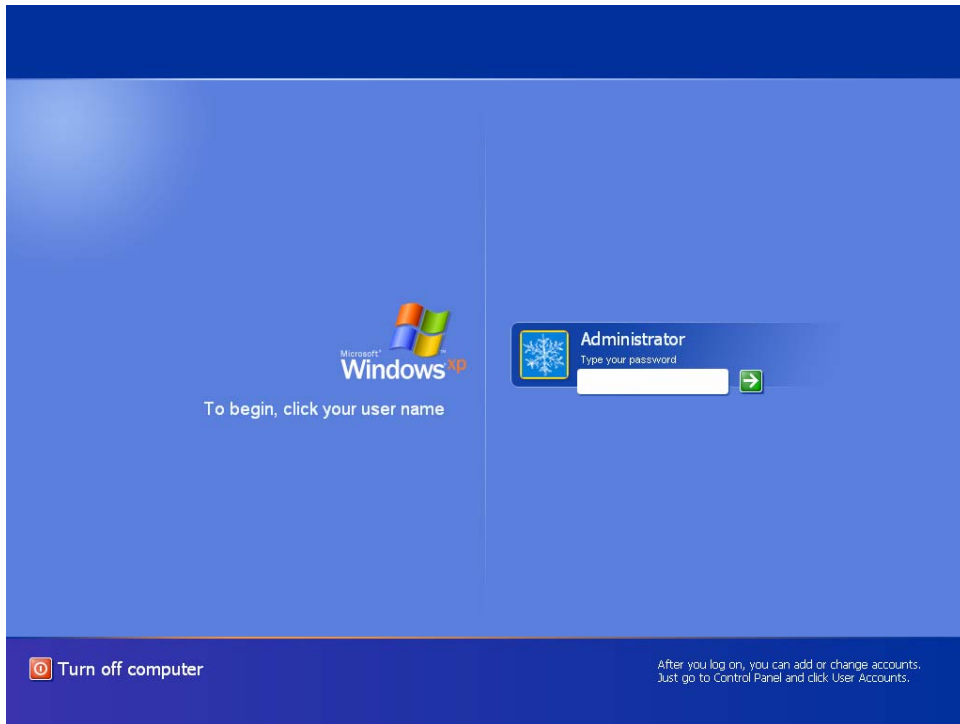
The system will now log on and launch the Windows XP Professional desktop.

Windows XP has now been successfully installed.

Troubleshooting

Before beginning the installation, confirm the proper hardware requirements of the system. Also, make sure that the operating system is being installed on a blank partition or hard drive that has enough space. If the hardware is compatible and there is sufficient space on the drive or partition there should not be any problems with the installation.

Reflection

Did the Windows installation complete successfully? _____

Lab 7.5.2: Using Simple File Sharing to Share Files
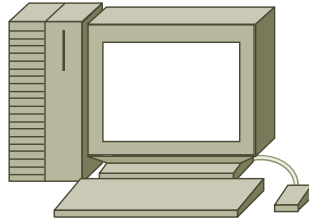
Estimated time: 30 Minutes

Objective

In this lab, the user will use the simple file sharing techniques and tools that are new to Windows XP. This will help a user become familiar with the easy and simplified method for sharing resources in a Windows XP network.

Equipment

The following equipment is required for this exercise:

A computer with Windows XP Professional installed

Scenario

The IT department has purchased some computers with Windows XP Professional as the operating system on the machines. They want you to learn how to share files in the file system so you can help other employees.

Procedures

Sharing files in the Windows XP Professional file system can be done the same way as with Windows 2000, however, Windows XP Professional has added a few extra features for file sharing that can be used to make this process a little easier, faster, and more user friendly. This lab will show how to use these new features.

Step 1

The first step of this lab will show how to turn on the file-sharing feature. File sharing is turned on by default in Windows XP.

1. First, click on **Start** (Start Menu) and then click on **My Documents** to open the window.

2. Next, click on the **Tools** button on the menu list at the top on the screen. Then, scroll down and select **folder options**. This will open the folder options dialog box.

3. Now, click on the **View** tab. This will allow the user to select various advanced folder settings. Scroll through these options and read them to become familiar with some of the options that are available and what they do. At the bottom the user will see the "Use simple file sharing (recommended)" setting.

---

4. The "simple file sharing" radio button should be checked being that this is the default setting. If the user decides at a later date that they did not want to use simple file sharing then they would uncheck this radio box to disable it.

5. Click the **OK** button to close the folder options box.

Step 2

For this step, leave the My Documents window open. Create a new folder called Shared Files within My Documents. This will use simple file sharing to enable a folder to be shared with other users who have local user accounts on that computer.

1. Right-click on an open area of the **My Documents** window and select **New** > **Folder**. The new folder will appear in the My Documents window. Rename it Shared Files.

2. Next, right-click on the **Shared Files** folder and select **Properties**. This will open the properties dialog box for the Shared Files folder. Choose the **Sharing** tab. Read through the entire dialog in both the local sharing and security and Network sharing and security sections to understand the available options.

3. Do not choose the "Make this folder private" radio box because this will disable access to the folder. Instead, drag this folder to the Shared Documents folder in order to share the Shared Files folder.

4. Click **OK** to close the properties box of the Shared Files folder. Now, locate the Shared Documents folder on the left panel of the My Documents folder. To drag the Shared Files folder to this folder, left-click on the **Shared Files** folder and hold it down while dragging it over to the Shared Documents folder.

5. Now, click on the **Shared Documents** link on the left side panel. Once this folder opens, the Shared Files folder will be in there. Other users who have local accounts on this computer will be able to access any files that are put into the Shared Files folders.

6. If it is decided that the folder or files are not to be shared, simply delete them from this folder.

Step 3

For this step leave the My Documents window open. Use the existing Shared Files folder to share.

1. First, right-click on the Shared Files folder and select **Properties**. This will open the properties dialog box for the Shared Files folder. Choose the **Sharing** tab. Read through the entire dialog in both the Local sharing and security and Network sharing and security sections to understand the options.

2. On the Network sharing and security section, click on the link that states that you understand the implications of sharing this on the network. Then, select the "Just enable file sharing" radio box. Sometimes this step will be necessary. If a **Share this folder on the network** dialog box is presented, then select this box and click **Apply**.

3. Next, click on the **OK** button. Now other users who have access to the network workgroup or domain will be able to access files located within this folder.

4. Now, look at the Shared Files folder. There should be a little hand holding the folder. This indicates that the folder is being shared on the network.

Reflection

You have just learned how to use Windows XP simple file sharing tool to share files locally on the computer and across the network. In what ways is this easier or better than the more traditional way of doing it Windows 2000? How may it be worse? What are some of the advantages of using the traditional way of sharing files?

Lab 7.5.3a: Remote Desktop Connection
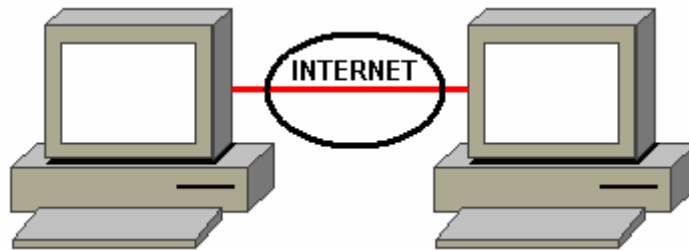
Estimated time: 30 Minutes

Objective

In this lab, Windows XP Remote Desktop Connection will be used in order to establish a remote connection to another computer.

Equipment

The following equipment is required for this exercise:

- Two computer systems with Windows XP Professional installed

Scenario

You are the system administrator for the XYZ Company. You have just upgraded some of the client PCs on the network to Windows XP Professional. You want to set up the client PC for Remote Desktop Administration. This will enable the IT department to provide desktop support remotely.

Procedures

The instructor will have set up two computers using a cross over cable so that they are connected and configured with usable IP addresses and subnet masks. Make sure that the computers can communicate using the `ping` command. Gather the IP configuration data from both PCs. The first part of the lab shows how to set up the remote computer which will be monitored. The second part of the lab shows how to set up the client computer which is the computer which makes the remote connection.

Step 1: Setting Up the Remote Computer

First, enable Remote Desktop on the remote computer. The Remote Desktop Connection software is pre-installed with Windows XP. To run it, click Start, click All Programs, click Accessories, click Communications, and then click Remote Desktop Connection. This software package can also be found on the Windows XP Professional and Windows XP Home Edition product CDs and can be installed on any supported Windows platform. To install from the CD, insert the disc into the target machine's CD-ROM drive, select Perform Additional Tasks, and then click Install Remote Desktop Connection. Next, gather the IP information for both computers and record it for Step 2.

1. Log on with the administrator account or as a user that is a member of the Administrator's group.

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2. Click Start, click Control Panel, and then double-click on the System icon. In the System Properties dialog box, click on the Remote tab.

3. Under the Remote Desktop section, select Allow users to connect remotely to this computer.

   - Note here, that as long as an account has a logon password and that account is logged on they can remotely connect to the computer. The Administrator or any user that is a member of the Administrator or local Remote Desktop Users group can remotely connect to the computer as well.

4. Click on the **Select Remote Users** button to change the person who has permission to remotely connect to the computer.

5. Next, select **Add**. In the empty box, type the username of the account that is used to log into the computer and select **OK**.

6. Now, gather the IP information. To do this, click on the **Start** menu. Then, click on the **Run** button. In the blank space, type cmd and then click on **OK**. This will bring up the DOS prompt. At the prompt, type ipconfig/all. This will display the IP configuration for the computer. Write down the Host Name and IP Address. Keep this information for Step 2.

7. At this point, the remote computer is set up to receive incoming remote connections.

Step 2: Setting up the Client Computer, when the client computer is running Windows XP

It is important to note that a user does not have to be using Windows XP Professional on the client computer in order to remotely connect to the Remote Computer. However, the Remote Computer must be running Windows XP Professional, regardless of what version of Windows the client computer is running. In some cases, such as when the Remote Computer is running Windows 2000 Server or Advanced Server, terminal services can be turned on in order to remotely administer the Server. For purposes in this course, Windows 2000 Professional does not have terminal services and therefore cannot be the remote computer.

1. Open the **Start** menu and select **All Programs** > **Accessories** > **Communications** > **Remote Desktop Connection**.

2. In the space, type in the IP address of the Remote Computer that you recorded in Step 1. Then click the **Options** tab.

3. In the user name space, type the username of the account, which has administrative access to the remote computer.

4. Next, click on **Connect**. At this point, the client computer will attempt to make a connection. When a connection is made, a logon screen will appear. The username should be there. Type in the password, and then click the **OK** button.

Step 3: Setting Up the Client Computer, when the client computer is running Windows

2000

1. If the client computer is using a different operating system other than Windows XP Professional, it still can be used to remotely connect to a Windows XP system. To do this, install the files from the Windows XP Professional installation CD.

2. Insert the CD into the CD-ROM drive. When the XP menu appears, select **Perform Additional Tasks**, and then select **Set Up Remote Desktop Connection**.

---

3. The necessary files will be copied to the harddrive and the setup process will be complete.

4. To make the remote connection, simply follow the steps in Step 2 of this lab.

Troubleshooting

For the computers to be able to connect to each other, they must be able to establish contact and be able to communicate and find each other on the network prior to running the Remote Desktop Connection. This can be done by gathering and recording the IP configurations for both computers by typing **ipconfig/all** at the command prompt. Use the `ping` command to establish that the computers will be able to connect when using the Remote Desktop Connection.

Reflection

Use the Remote Desktop Connection utility to connect to your work computer from home or visa versa. This requires a more advanced knowledge of computer networking because it involves establishing a Virtual Private Connection (VPN) through the Internet and you must configure the routers and firewalls on both ends to open the proper port numbers to allow a Remote Desktop Connection to be established. Windows XP also provides a means of making a Remote Desktop Connection to your PC through the Internet over the web connection.

1. What are some advantages of using the Remote Desktop Connection?

_____

2. What are some disadvantages or security concerns when using the Remote Desktop Connection?

_____

Lab 7.5.3b: Internet Connection Firewall
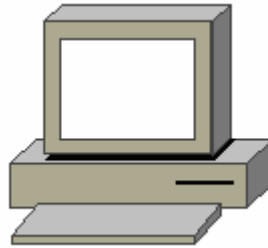
Estimated time: 30 Minutes

Objective

In this lab, you will learn how to use the integrated firewall that is now included with the latest releases of Microsoft's operating systems including Windows XP. You will select the proper settings, which allows a user or administrator to secure the integrity of the operating system from intruders.

Equipment

The following equipment is required for this exercise:

- A computer system running Windows XP

Scenario

The IT department has purchased some new computers with Windows XP installed on them. These new computers are going to be used by people in the finance and accounting departments of the company. It is important that these computers be as secure as possible and that all of the data be protected from intruders. Although proper firewalls, filters, and access-lists have been placed on the corporate network incoming gateways, these computers need to be secure from internal threats and intruders who may reside within the network boundaries. The IT department manager has instructed you to implement Windows XP's integrated firewall on these computers in order to block them from intruders.

Procedures

Before beginning this lab you also need to be logged in as the administrator or a member of the administrators group. It is also important to understand that the management tasks we will be covering in this lab apply to other computers that are part of the network and these settings affect only the individual computer which these settings are configured on.

Step 1

The first step in configuring the Windows XP integrated firewall is to locate and open the Network Connections settings located in the Control Panel.

1. Open the Control Panel using the Start menu. Left-click on the **Start** button located in the lower left side of the screen. Then click on the **Control Panel** button to open the control panel.

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2. Locate the Network Connection icon in the control panel. Once you have located it, double-click on it to open the dialog box.

3. At this point you should see a Local Area Connection icon. Left-click on this icon once to reveal the list of network tasks on the left side of the network connection screen.

Step 2

In Step 2 we will learn about these various settings and how to open the Internet Connection Firewall settings dialog box.

1. First, left-click once the **View** status of this connection.

2. On the General tab you can see the various status settings related to the network connection such as status, duration, and speed. You can also disable the network connection by clicking the Disable button, however do not so this in this lab.

3. Next, click on the **Support** tab. This will show you useful information about the network connection such as the address type, IP address, subnet mask, and default gateway. Using this information and the information from the previous step will help in determining what sort of firewall settings to select, which will be done in the next section of this lab.

Step 3

In this step we will configure the proper Internet Connection Firewall settings for this computer.

1. First, click back on the **General** tab and then click the **Properties** button. This will bring up the local area connection properties dialog box where various configurations and settings can be made on the network connection.

2. Next, click on the **Advanced** tab in the **Local Area Connection Properties** dialog box. At this point you should see the Internet Connection Firewall settings. The first thing you may want to do is to click on the Learn more about Internet Connection Firewall link.

3. After reading though the material, close that page and return to the **Local Area Connection Properties** dialog box. Click the check box, next to the **Protect my computer and network by limiting or preventing access to this computer from the Internet** settings.

4. This will make a **Settings** button appear in the bottom right-hand corner of the **Local Area Connection Properties** dialog box. Click on this **Settings** button to bring up the ICF advanced settings screen.

5. There are three tabs on this screen. First, we will configure the **Services** tab.

6. Click on the **Services** tab. Select all the boxes that you see. As you select each one, a popup box will appear which will allow you to select the name or IP address of the computer which is hosting these services on the network. If this were an actual production environment instead of a lab, you would need to put the correct computer/hostname of the computer that is hosting these services on the network. Also note the internal and external port number on these popup windows. These are the actual ports numbers that will be closed when you click these boxes. By clicking all these boxes you are essentially closing most of the well-known or popular ports that intruders can use to access the computer. If this computer were acting as a gateway to which other computers used to gain Internet access, closing these ports would also disable the access to the other computers that use this computer as a gateway.

7. Next, click on the **Security Logging** tab. This tab will allow you to log events such as attempts or connections made to the computer.

8. Click on both the **Log dropped packets** and **Log successful connections** boxes to enable security logging.

9. Next click on the **ICMP** tab. ICMP is commonly used to for error checking and testing connectivity of remote computers. Sometimes intruders or hackers use ICMP to access or do damage to remote computers. Using this tab, it is possible to disable ICMP events or connections from being received and interpreted by this computer.

10. Select all the boxes in the ICMP tab window. Notice as you select them a description of what these various ICMP tasks do appears on the bottom of the ICMP tab window. Read these as you select down through them to become more familiar which what each one does.

11. Once you have selected all of these, click the **OK** button to save these settings and close the **Advance Settings** box. Then click **OK** on the **Local Area Connection Properties** dialog box to save the settings and close that box. Also click on the **Close** button on the **Local Area Connection Status** dialog box to close it. Close the **Network Connection** window that was opened in the control panel.

12. You have now successfully configured the Internet Connection Firewall in Windows XP.

Troubleshooting

Sometimes when these settings are configured they actually tighten or shut off too much access and sometimes actually prohibit the user from doing their job or accessing network resources that they otherwise need. In this case it may be necessary to "tweak" these ICF settings to that the user has the proper access they require. For this reason, careful attention should and must be taken whenever configuring any type of firewall or security settings.

Reflection

1. What other security tasks would you have to be responsible for implementing in order help protect a computer besides using the Internet Connection Firewall?

   _____

Lab 7.5.5: Using the Windows XP Start Menu and Windows Explorer
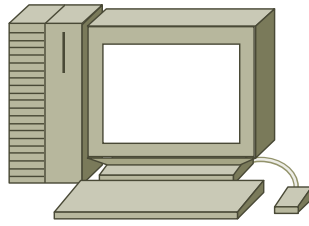
Estimated time: 30 Minutes

Objective

To explore the basic features of the Windows XP Start menu and Windows Explorer Navigation tools.

Equipment

The following equipment is required for this exercise:

- A computer system with Windows XP Professional installed

Scenario

The IT department of XYZ Company has installed a computer with Windows XP Professional. The company has asked you to run a few tasks to explore the features of the new Start menu to ensure that it is running properly. They also want you to learn to navigate the file system so that you can help other employees.

Procedures

Before beginning this lab, make sure that the Windows XP Professional machine is powered on and you can log in. There are many new features that are included in Windows XP Professional. Some features such as the Start menu and Control Panel have undergone some drastic changes. These changes might make it difficult to use the first time using the Graphical User Interface (GUI). Navigating the Windows XP Professional file system will be done almost the same as with Windows 2000, however, Windows XP Professional has added a few extra features that will help in navigating the file system easier and faster. This lab will show how to use the new features of Windows XP to navigate the file system.

Part 1: Using the Windows XP Start menu

Step 1

Once the system boots, the Windows XP Welcome Screen will appear. Click on the proper username, and then log in with the password.

When finished entering the password, press **Enter**. If the password is typed correctly, the system will authenticate the user and grant them access.

Step 2

After the system authenticates the user, the desktop environment appears.

Notice that the Windows XP Professional desktop environment is different from Windows 2000. By default, the My Computer, My Documents, My Network Places, and Internet Explorer icons do not appear on the desktop. The user can enable these icons to appear on the desktop if they wish. This will be done later in the lab.

Step 3: Using the new Windows XP Start menu

Using the new XP Start menu can be a little confusing when using it for the first time. However, once a user becomes familiar with the new Start menu they will see the changes that Microsoft made will help them navigate through the Graphical User Interface (GUI) easier. The following tasks will help a user to become familiar with the new Start menu.

1. To get an idea of what the new Start menu looks like, click on the Start menu icon located in the bottom left corner of the screen. Notice that the icons that are missing from the desktop are now located in the Start menu. The user will also see that the Start menu is now divided into two parts. The left side shows a list of the programs that are used frequently. The right side shows what is in My Computer and My Network Places. It also contains the Control Panel, Printers and Faxes, and the search and run function icons.

2. Click on a few of the programs and open up a few windows to simulate a typical environment that a user would have when working on the computer.

---

3. Now, access My Computer by using the Start menu. Click the **Start** icon, and then click on the **My Computer** icon. Instead of having to close all the windows and then clicking on the icon on the desktop, it has been placed in the Start menu so that a user can have access to it much quicker.

4. Now, examine some of the various options that are available to customize the Windows XP Start menu. First, right-click on the **Start** menu icon in the lower left bottom of the screen and select **Properties**.

5. Next, click on the **Taskbar** tab. There will be several options to choose from in order to change how the Start menu and Taskbar work. Click on some of the radio boxes to select or deselect certain options until the Start menu is the way you like it. When finished, click the **Start** menu tab.

6. Notice that Windows XP provides the option of using the Classic Start menu that came with previous releases of Microsoft Windows operating systems. Now, click the **Customize** button. This button provides a new interface to manipulate the Start menu. First, change the setting to use Small Icons rather than the large ones. Second, deselect the Internet and E-mail radio buttons located on the bottom of the dialog box. They will no longer appear in the Start menu. Remember, the user can always go back and select these boxes if they would like them to be quickly available in the Start menu.

7. Next, look at the Programs section of this screen the user will see that it is possible to change how many programs that are available for quick selection on the Start menu. Change the amount to 11, and then click **OK**. The first box should disappear. Click the **Apply** button and then the **OK** button. You should see the new changes on the Start menu.

8. Keep in mind that the more a user uses Windows XP; they will learn that the majority of the Graphical User Interface (GUI) operations performed will involve the Start menu as the starting place. Users will quickly learn that there is really no need to have any icons on the desktop. For those who like the icons shown on the desktop, Step 4 of this lab shows how to add the icons to the desktop.

Step 4: Enabling the My Computer, My Documents, My Network Places, and Internet

Explorer icons

1. Locate the mouse pointer on the desktop and right-click the mouse. Scroll down and click on the **Properties** button. This will display the system Display Properties dialog box.

2. Next, select the **Desktop** tab. This will bring you to the menu that will allow a user to change the desktop feature.

3. Now, click on the **Customize Desktop** button located in the bottom left corner of the properties box. This will bring up a dialog box that will allow a user to make further adjustments to the desktop. From this point a user can select which icons they want to display on the desktop. They may also change what the icon looks like or run the desktop cleanup tool. The **Web** tab allows web pages to be displayed on the desktop. A user may also lock the desktop items to prevent moving or resizing of web items on the desktop.

Part 2: Using the Windows XP Windows Explorer navigation tool

Step 1

The first feature that a user will want to become familiar with is how to navigate to any window without having to close windows or even using Windows Explorer.

1. Click on the **Start** menu and then click on **My Computer**. Notice how the icons are arranged differently?

_____

2. First, click on the **Tools** menu on the top of the screen and select **Folder** options. After the Folder Options box opens select the **View** tab. Then, scroll down until you come to the Show Control Panel in My Computer box and make sure it is checked. If it is not selected, select it because it is not checked by default. Next, click the **Apply** button. This will allow the user to have the control panel icon in the My Computer window.

Step 2

1. For this step, leave the My Computer window open. Look down the left side of the screen to see the Other Places menu. This shows the other directories that a user can navigate to from this window without having to close the current window.

2. First, click on the **My Documents** icon in the Other Places menu. It will take a user to the My Documents window. Do the same thing to navigate back to the My Computer window or change to a different window from here as well.

3. Double-click on the **C:** drive and open a folder. Use the Other Places menu to navigate to different folders and back again, all from one window.

4. Open the Control Panel from the Start menu. This done by clicking on the **Start** menu icon, and then, click on the **Control Panel** icon. By default, the icons are grouped together by categories.

5. Now, choose an item from the Control Panel list such as Performance and Maintenance. The user will have the option of selecting one of the tasks from the list or they can select one of the icons below to compete a specific task.

Reflection

In what circumstances might this way of navigating the file system be easier?

_____

Lab 8.2.3: Upgrading the Video Accelerator

Estimated time: 30 Minutes

Objective

Upon completion of this lab, the student will be able to install a video card with advanced capabilities such as 3D, more memory, or AGP (Advanced Graphics Port). Also, the student will remove the old video drivers and install new ones.

Equipment

The following equipment is required for this exercise:

- ESD wrist strap

- The lab computer with Windows 98 installed

- Standard Phillips-head screwdriver that is not magnetic

- AGP Video card and driver installation software

- Motherboard manual

Scenario

A computer has limited video capabilities built onto the motherboard or has a very basic video card installed. An advanced graphics board must be installed to use 3D graphics, or to use a larger desktop, or to use programs that require more video memory.

Procedures

This lab involves working with delicate components inside the computer case that are very sensitive to static electricity. Once the computer cover has been removed, touch an unpainted metal part of the chassis. Before touching ANYTHING else inside the case, be sure the ESD wrist strap is on. If the motherboard has video capabilities built in, be sure to consult the motherboard manual for instructions on disabling this feature in the BIOS. Jumpers on the motherboard may need to be manipulated before proceeding.

Step 1

Before installing a new adapter, it is typically necessary to change the current video card drivers to basic Windows drivers. To accomplish this, go to **Start** > **Settings** > **Control Panel**. Double click **System**, click the **Device Manager** tab and locate the video adapter. Click the **+** next to the item to show the name of the device. Next, double-click the device to show its properties and click the **Driver** tab and **Update Driver**. When prompted, click **Display a list of all the drivers in a specific location, so you can select the driver you want**, click **Show all hardware** locate **[Standard Display Adapters]**, and install **[Standard VGA 640x480]**. Close any open windows and shut down the computer by clicking **Start**, then click **Shut Down**, then select the **Shut Down** option and click **OK**.

Next, unplug the computer from the wall outlet to make sure it will not be turned on by accident. Finally, unplug the monitor cable from the computer.

Step 2

Open the computer case and lay it on its side and locate the expansion slots.

Step 3

Remove the screw holding the expansion card access cover in place. Remove the cover and set it aside.

Step 4

Remove the existing video card from the expansion slot and place it either in an antistatic bag or on an antistatic mat. Next, remove the replacement card from its antistatic bag. Hold the card by the edges, being careful not to touch any of the components on the card.

Step 5

With one hand, grasp the top of the card by the metal end that will be attached to the chassis by a screw and use the other hand for the top corner of the circuit board. Next, place the card edge connector into the PCI or AGP expansion slot, depending on the type of video card that you have. Be sure to line up the metal guide on the bottom of the card with the small opening where the expansion card access cover was removed.

Step 6

Using a back and forth rocking motion and a little bit of pressure, the card should seat into the socket fairly easily. Do not use too much force to insert the card edge connector. If the card will not seat correctly, remove it and make sure to align everything correctly. Then try again. When the card is properly seated, the metal tab will line up perfectly with the screw hole. In addition, notice that the card is evenly seated in the expansion slot.

Step 7

Either secure the tab with the screws from the access cover or with the screws provided with the card. Remove the ESD strap from the computer and fit the case back together.

Step 8

Once the computer is back together, plug the monitor cable into the new graphics card. Next, plug the computer back into the power outlet and make sure all connecting cables are secure.

Step 9

Turn on the computer and follow the onscreen instructions. The Windows 9x operating system should find New Plug & Play Hardware and try to install the device drivers for it. When prompted, insert the disk that came with the video card to complete the software installation. Click **Yes** when prompted to reboot the computer for changes to take effect. For video cards that come with a manual, follow the installation instructions of the manufacturer.

Step 10

Once the computer has rebooted, the video card should be ready for use. Test the card by changing the resolution of the monitor or run a 3D application.

Troubleshooting

If the resolution cannot be changed to the expected range, or a 3D application will not run, check the device manager to make sure there is no conflict with the new adapter. Reinstall the standard VGA driver, reboot, and reinstall the new drivers for the video card.

Reflection

What was the most challenging part of this exercise? Why?

_____

_____

_____

_____

Lab 8.3.4: Sound Card Installation

Estimated time: 30 Minutes

Objective

Upon completion of this lab, the student will be able to install a sound card in a computer, attach the speakers and microphone, and install the proper drivers.

Equipment

The following equipment is required for this exercise:

- ESD wrist strap

- Your lab computer with Windows 98 installed

- Standard Phillips-head screwdriver that is not magnetic

- Sound card and driver installation software

- Speakers

- Microphone

- Motherboard manual

Scenario

The computer either has sound capabilities built onto the motherboard or has no sound ability at all. The student would like to add a sound card to enjoy the full capabilities of the computer's multimedia files.

Procedures

This lab involves working with delicate components inside the computer case that are very sensitive to static electricity. Once the computer cover has been removed, touch an unpainted metal part of the chassis. Before touching anything else inside the case, be sure you are using your ESD wrist strap. If the motherboard has sound capabilities built in, be sure to consult the motherboard manual for instructions on disabling this feature in the BIOS (or a jumper on the motherboard) before proceeding.

Step 1

Shut down the computer by clicking **Start** > **Shut Down**, then select **Shut Down** and click **OK**. Next, unplug the computer from the wall outlet to make sure it will not be turned on by accident. Also, unplug any speakers or microphone from the motherboard if it is equipped with on-board sound.

Step 2

Open the computer case and lay it on its side, locating the expansion slots. The sound card can now be installed.

Step 3

Locate an empty expansion slot, and using a screwdriver, remove the screw holding the expansion card access cover in place. Remove the cover and set it aside.

Step 4

The next step is to remove the sound card from the antistatic bag. Hold the card by the edges, being careful not to touch any of the components on the card.

Step 5

Grasp the top of the card by the metal end that will be attached to the chassis with one hand and the top corner of the circuit board with the other hand. Next, place the card edge connector into the expansion slot chosen. Be sure to line up the metal guide on the bottom of the card with the small opening where the expansion card access cover was removed.

Step 6

Using a back and forth rocking motion and a little bit of pressure, the card should seat into the socket fairly easily. Do not use too much force to insert the card edge connector. If the card will not seat correctly, remove it and make sure to align everything correctly. Then try again. When the card is properly seated, the metal tab will line up with the screw hole. In addition, notice that the card is evenly seated in the expansion slot.

Step 7

Secure the tab with the screw used to remove the access cover. If the CD audio cable has not been installed yet, attach it at this time.

Step 8

Remove the ESD strap from the computer and fit the case back together.

Once the computer is back together, plug the speakers into the sound card in the port labeled "speakers" or labeled with a small picture of a speaker. Next plug the microphone into the port labeled "mic" or labeled with a small picture of a microphone. Now plug the computer back into the wall socket and make sure all connecting cables are secure.

Step 9

Turn on the computer. The Windows 9x operating system should find New Plug & Play Hardware and try to install the device drivers for it. When prompted, insert the disk that came with the sound card to complete the software installation. The sound card should now be ready to use.

Step 10

To test the sound card, click **Start** > **Control Panel**. Once the control panel appears, double-click the **Sounds** icon. Click on any sound that has a small speaker icon next to it and click the small "play" button next to the preview speaker. If sound is audible, the card was installed correctly. If the sound was not heard, double-click the **System** icon in the control panel and click the **Device Manager** tab.

Search for the sound card in the hardware list. Make sure the sound card is listed and does not have any conflicts.

Troubleshooting

Double check all connections to the sound card making sure the plugs are inserted all the way. If the speakers are powered externally, make sure they are plugged into the wall and turned on. Double-click the speaker icon on the right-hand side of the task bar to bring up the operating system's volume controls. Make sure the controls are turned up and that none of them is muted. If there is a problem in the device manager, remove the sound card from the list and restart the computer. This will force Windows to re-install the sound card into the list and re-install the drivers. Also, if the speakers are not self-powered, a jumper on the sound card may need to be set to the amplified position.

Reflection

What was the most challenging part of this exercise? Why?

_____

_____

_____

_____

Lab 9.1.2: Basic Disk to Dynamic Disk Conversion

Estimated time: 20 Minutes

Objective

Upon completion of this lab, the student will be able to convert a hard drive from a basic disk to a dynamic disk.

Equipment

The student will need the following items in order to complete this lab:

- A PC with Windows 2000 Professional installed

Scenario

RAID 0 is being set up on the newly purchased home server. Windows 2000 Professional is being run as the operating system. There is a 20 GIG hard drive and another one is being purchased to set up RAID 0.

Procedures

In this lab, the student will convert the hard drive from a basic disk to dynamic disk this will enable configuration of RAID 0 striping on the PC.

Step 1

Right-click on **My Computer** and click **Manage**.

What window opens up when **Manage** is clicked?

_____

Step 2

In the left windowpane click **Storage**. In the right windowpane double click the **Disk Management** (**local**) snap in.

How many disks does the computer have? _____

How many partitions and what are they named? _____

What other devices appear in the window? _____

Step 3

Right-click on the local disk (Disk 0) and click **Upgrade to Dynamic Disk**. In the window Upgrade to Dynamic Disk, put a check in the box next to Disk 0, if there is not already one and click **OK**.

Step 4

In the window Disk to Upgrade verify that it is Disk 0 and where it says "Will Upgrade"

---

there is a **Yes** underneath it.

Step 5

In the same window click **Details** in the lower left corner. What does it say?

_____

Are any volumes contained on Disk 0?

_____

Step 6

Click **OK** to return to the Disk to Upgrade window. Now click **Upgrade**. A warning window will appear asking if the user is sure, click **Yes**. Now the last warning window will appear read it and click **Yes** also.

Step 7

A window will appear saying a reboot will take place to finish, click **OK**.

Step 8

Once the computer reboots it will say "Windows 2000 has finished installing new devices. The user must restart their computer before the new settings will take effect." Click **Yes**.

Step 9

Right-click **My Computer** and click **Manage**. Click **Storage** and then **Disk Management (local)**.

Did it convert to dynamic disk? _____

Troubleshooting

Click **Action** in the upper left corner and click **Restore Basic Disk Configuration**. A warning will appear click **Yes**.

Can someone convert back to Basic Disk without losing any information? Why?

_____

_____

Reflection

Can someone convert back to Basic Disk without losing any information? Why?

_____

_____

_____

Lab 10.3.1: NIC Installation

Estimated time: 30 Minutes

Objective

In this exercise, the student will install a Network Interface Card into a PC. The student will also configure that NIC to use an IP address.

Equipment

The following equipment is required for this exercise:

- PC with Windows 98 or earlier

- Network Interface Card with appropriate drivers

- Anti-static wrist strap

- Tool kit

- Windows 98 installation CD-ROM or cab files

Scenario

The boss has decided to install a network using the existing company PCs. The necessary hardware must be installed on each computer in order for them to be networked.

Procedures

A PC technician is responsible for upgrading and maintaining PCs for the company. As part of this job, a technician often upgrades existing PCs with new hardware to fit the company's changing needs. In order to allow a PC to be networked, one of the first things a technician must do is install a Network Interface Card (NIC). A NIC allows a PC to access the networking media (cabling, wireless) and communicate with other PCs.

Step 1

In order to properly install a NIC, it is important to note several items. First, to prevent the NIC from being damaged by electro-static discharge (ESD), it is important to ensure that the technician is properly grounded. Wear an ESD wrist-strap that is fastened to the metal frame of the PC whenever handling computer components. Also, when handling the NIC, only hold it by the edges, and do not touch the gold metal contacts along the bottom of the card.

Examine the NIC. Who manufactured the card?

_____

Can a model number be identified? If so, what is it?

_____

Can the speed(s) that the NIC operates at be determined? If so, what speed?

_____

Looking at the end of the card, what type of media connects to it?

_____

What slot type does the NIC fit into?

_____

Step 2

Now that the NIC has been examined, it is time to proceed with the installation. Make sure that the PC is shut down and unplugged.

Remove the cover from the PC. Choose a slot on the motherboard to install the NIC. A small metal cover may need to remove from the back of the expansion slot in order for the NIC to install properly. The NIC will only install one way. Make sure it is lined up properly. Remember that it is possible to damage the NIC or the motherboard if too much force is used when pushing the NIC into place.

After the card is installed, secure the card with a screw and ensure that the card does not dislodge when plugging a patch cord in. When finished with the card, replace the cover and plug the machine back in.

Step 3

Now that the hardware is installed, it is time to install the software. This step will require the correct driver for the NIC. A driver is a piece of software that allows an operating system to access a piece of hardware, such as the NIC. Depending on the age of the NIC, Windows may already have a driver for the NIC. If not, go to the NIC manufacturer's website and download it. Use the information found in Step 1 to ensure the right driver is being used.

Boot the PC.

Did Windows find new hardware? If no, refer to the troubleshooting section for suggestions. _____

Once Windows finds new hardware it will bring up the "Add New Hardware Wizard" screen. Click on **Next**. Windows will now ask to search for the best driver, or have Windows display a list of drivers that it includes. Go ahead and choose "Search for the best driver for your device" and click **Next**. Now specify where the driver is located. If it on CD then click **CD-ROM drive**, or if it is on a floppy disk then click on **Floppy disk drives**. If the exact location is known click on **Specify a location** and type in the path to the driver, or click on **Browse** and highlight the folder the driver resides in. Once a selection has been made, click on **Next**. Windows will now show the name of the device and where the driver is located. Click **Next** and Windows will then install the driver and will display when it has finished installing the software. Then click on **Finish**, and Windows will prompt to reboot. Select **OK** to continue.

Note: Windows may require the Windows 98 installation CD-ROM to complete the

installation.

Once the driver has been installed, verify that the NIC was properly installed. To do this, use the following directions:

Right-click over the **My Computer** icon on the desktop.

Click on **Properties**.

Click on the **Device Manager** tab.

Click on the **+** sign next to Network Adapters.

Is the name of the adapter listed here? _____

Is anything else listed here? If so, what?

_____

Now that the NIC is installed it is time to setup TCP/IP. To do this, complete the following steps:

Right-click on **Network Neighborhood**.

Click on **Properties**.

Where "The following network components are installed" is displayed, scroll down to TCP/IP. If TCP/IP is not listed it will need to be installed by following the directions below. Otherwise, skip to Step 6.

Click on the **Add** tab.

Click on **Protocol** and **Add**.

Click on **Microsoft** and then scroll down and highlight TCP/IP.

Click **OK**.

There may be a prompt for the location of Windows setup files. If you are unsure of their location, ask the instructor for directions.

Once TCP/IP has been installed, return to the Network Neighborhood properties and configure the IP address.

Double-click on the TCP/IP listing that also has the NIC listed next to it.

Make sure that the IP address screen is displayed, and then click on **Specify an IP address**.

Enter an IP address and subnet mask that will work within the network. Ask the instructor for directions as to which addresses will be used.

Once the IP address and subnet mask have been entered, click on **OK**.

Click on **OK** on the Network screen, and when Windows prompts to restart, clicks on **Yes**.

Troubleshooting

Sometimes Windows will not detect a new hardware device. If that happens the device will have to be installed manually. To do this, complete the following steps:

Click on **Start** > **Settings** > **Control Panel**

Double-click on **Add New Hardware**.

Click **Next** to begin installing software for the device.

Click **Next** to let Windows search for new hardware.

If Windows still does not detect the new device, it will ask to search for a non plug-and-play device. Either choose to let Windows search, or choose the hardware from a list.

Select "No, I want to select it from a list".

Click **Next**.

Select **Network adapters**.

Click **Next**.

Select **Have Disk** and specify the location of the driver.

If a problem still exists, shut the computer off and make sure that the NIC is physically installed correctly.

A common mistake made by many technicians is accidentally installing the wrong device driver. If this happens, the device will usually not work. The easiest solution is to do the following:

Right-click on **My Computer**.

Click on **Properties**.

Click on **Device Manager**

Click on the **+** sign next to network adapters and highlight the NIC.

Click on **Properties**.

Click on the **Driver** tab at the top of the screen.

Click on **Update Driver**.

Follow the prompts in order to install the correct driver.

Reflection

As a group, research and list as many NIC card manufacturers and their websites as possible.

_____

_____

_____

_____

As a group, research and discuss how a subnet mask is used within a network.

_____

_____

_____

_____

Lab 10.3.3: Configuring the NIC to Work with a DHCP Server

Estimated time: 10 Minutes

Objective

Upon completion of this lab, the student will be able to configure a Network Interface Card (NIC) to utilize Dynamic Host Configuration Protocol (DHCP).

Equipment

The following equipment is required for this exercise:

- Network created from the previous sections in this chapter with Windows 98 or earlier and TCP/IP enabled.

- A DHCP server accessible on the network

Scenario

The company wants to expand the number of users they currently have. The company will be changing to a dynamic addressing scheme, and will need to begin making the necessary changes to the host computers.

Procedures

There is a choice between two types of address management within a network. The types are static or dynamic.

Static addressing requires an administrator to physically enter a unique IP address into each host on the network. The larger the network becomes the more difficult it may be to keep track of assigned addresses. This is especially true if hosts are changing to new subnets periodically.

DHCP is used to automatically assign IP addresses to hosts within the network. A DHCP server is configured to automatically assign an address from a range of addresses known as a scope. The hosts will request an IP address from the DHCP server, which will then assign a unique address. This enables PCs to move around within a network and have their addresses changed automatically as needed. It also allows the administrator to manage thousands of addresses in the network.

Step 1

View the Network Neighborhood properties as described:

Right-click on **Network Neighborhood**. Click on **Properties**.

Is TCP/IP listed as an installed component? If so, what is the name and model number of the NIC it is bound to?

_____

_____

Is TCP/IP listed with any other items? If so, list those items.

_____

_____

Step 2

View the settings of TCP/IP as described.

Highlight TCP/IP (make sure it is the one listed with the NIC).

Click on **Properties**.

Is an IP address currently assigned? If so, write down the address along with the subnet mask.

_____

_____

Step 3

Follow the instructions to change the address from being static to dynamically assigned.

Click on the radio button labeled "Obtain an IP address automatically".

Did anything change on the TCP/IP screen? If so, what?

_____

_____

Step 4

Follow these instructions to save the new configuration.

Click **OK** on the TCP/IP properties page.

Click **OK** on the Network Properties page.

Click on **Yes** when prompted to restart the computer.

If asked to insert a Windows disk in order to install files, ask the instructor for further directions.

Step 5

After rebooting the machine, follow these instructions to verify the new IP address:

> **Note:** Check the lights on back of the card. These lights will blink when there is network activity taking place. Blinking lights on the NIC is an indication that the computer is successfully establishing network connection.

Click on **Start** > **Run**.

Type the command **winipcfg** and click **OK**.

Click on the arrow next to NIC adapter.

Highlight the NIC and Click on the tab that says **More Info**.

What is the new IP address and subnet mask?

_____

_____

What is the IP address of the DHCP server?

_____

_____

What date was the lease for the address obtained and when does it expire?

_____

_____

Troubleshooting

When configuring DHCP on a client computer, the computer might display an error stating that the server is unavailable. Should this happen, the easiest solution is to finish rebooting the machine and then follow these instructions:

Click on **Start**.

Click on **Run**.

Type the command "winipcfg" and click **OK**.

Click on the arrow and choose an adapter.

Click on the **Release**, which clears an address.

Click **Renew**, which requests a new address.

The machine should now be able to join the network after rebooting.

Reflection

As a group, try to think of situations where static addressing would be preferred over DHCP.

Determine any other commands that would show the IP address under Windows 98 or Windows NT when using DHCP.

A network or PC technician may be required to manage a company's addressing scheme. Static addressing requires a great deal of management on the technician's part. The technician will have to keep track of what addresses are available and which ones are in use. Depending on the size of your network, this could become very complicated and time consuming. DHCP allows the creation of a range of addresses, and allows a server to determine which address a host receives. Should a host be moved to a new network, DHCP will assign a new address without the administrator's intervention.

Lab 10.7.2: Troubleshooting a NIC Using the Ping Command

Estimated time: 15 Minutes

Objective

Upon completion of this lab, the student will be able to use the `ping` command to test connectivity and troubleshoot problems based on `ping` command results.

Equipment

The following equipment is required for this exercise:

- Several Windows 98 or earlier PCs with networking installed and configured

- One hub or switch

- One PC with Internet access

Scenario

A PC technician often receives calls from users with complaints about the network. One morning a user calls and complains that they are unable to reach anything on the network. Because the user is in an office in another building, it is decided to try troubleshooting the problem remotely before visiting their office.

Procedures

When working with computers that have networking installed, technicians will be asked to troubleshoot a variety of problems. Depending on the size of the company, this can become quite challenging. If the users are spread out across multiple floors, buildings, or even cities, it can become extremely time consuming to visit every office for every problem. Luckily, there are utilities that allow a technician to begin troubleshooting a problem without leaving the office.

There are a wide variety of troubleshooting tools available to a technician. Many of these tools can be expensive to purchase. However, there are a few utilities that are free and come with almost every operating system. One of the most commonly used utilities is the Packet Internet Groper (Ping) command. The `ping` command is used to test connectivity between two hosts (PCs). When a device is pinged, a signal is being sent to the device, which will then reply back. If the ping is successful, then the connection between the two devices is good. If the ping fails, then there is a problem between the devices.

Step 1

Open a command prompt as described below.

Click on **Start** > **Run**

Type the word "command" and click **OK**

Type the command `ping a.b.c.d` (where a.b.c.d is the IP address of the NIC.)

Was a reply received? _____

How many times did the NIC reply back? _____

How many bytes were used? _____

How much time did it take to receive a reply? _____

What was the maximum Time To Live (TTL)? _____

Step 2

The NIC in a workstation may be pinged by using its IP address, or something called the loopback address. The address 127.0.0.1 is reserved as the loopback address and is not used on the Internet. Instead, the loopback is an address that pings the NIC installed in the workstation you are currently using.

Type the command **ping 127.0.0.1**.

Did you receive a reply back? _____

Are the values for bytes, time, and TTL the same as last time? If not, what has changed?

_____

Step 3

If the technician can successfully ping the PC address, and the loopback, then the NIC and TCP/IP have been successfully installed. Now it is time to test whether or not the other hosts within the network can be reached.

Type **ping A.B.C.D** (This time A.B.C.D is the address of another workstation within the network.)

Was a reply received a reply back? If not, what was the error message?

_____

_____

Are the values the same for bytes, time, and TTL, as they were in Step 1? If not, what has changed?

_____

_____

Step 4

If the technician is able to successfully ping another workstation that means there is a good connection between the two machines. However, there are times when using the **ping** command will result in a problem.

Type the command **ping A.B.C.D.** (A.B.C.D is an IP address for a workstation outside of the network.)

What message was received?

_____

_____

What might this message mean?

_____

_____

Now using a PC with an Internet connection, open a DOS prompt and type **ping 1.1.1.1**

What message was received this time?

_____

_____

What might this message mean?

_____

_____

Troubleshooting

If there is trouble pinging the IP address of the workstation, or if the technician is unable to ping the loopback address, then the TCP/IP settings need to be checked. If the TCP/IP was not set properly, then the ping function will not work. Check to make sure that the protocol is correctly installed and bound to the NIC.

If there is trouble pinging other hosts within the network, then check the cable and make sure that it is correctly plugged into the hub or switch. Check the IP address and the subnet mask to make sure they have been entered correctly.

Reflection

Once a PC is installed on a network, much of a technician's time will be spent troubleshooting network problems. It is important that a technician try to save as much time as possible. Ping is a great utility to begin troubleshooting a problem. Ping will help a technician determine whether the network problem is related to a bad cable, an incorrect TCP/IP setting, or a problem with a remote device. Make sure to be comfortable using the Ping command and its responses.

Lab 11.3.7: Adding an Inkjet Printer to a Computer

Estimated time: 30 Minutes

Objective

In this lab, the student will connect a printer to a PC, install the correct printer driver, and verify communication between computer and printer by printing a test page.

Equipment

The following equipment is required for this exercise:

- A computer with Windows 98 installed

- Inkjet printer with ink cartridges installed

- Communication cable (USB or parallel)

- Printer driver(s)

Scenario

A PC technician is responsible for the installation of printers throughout an organization. The goal is to properly install and configure an inkjet printer with the proper drivers.

Procedures

A printer is one of the essential components of a computer system. Whether it is a laser printer for high quality text printouts or an inkjet printer for publishing digital camera photographs, it is important to know how to install a printer.

Step 1

Connect the communication cable to the printer.

What type of cable will be used to connect the printer to the PC (USB or parallel)?

_____

Which end of the cable was connected to the printer (USB-A, USB-B, DB-25, or Centronics)?

_____

Step 2

Connect the communication cable to the computer.

Which end of the cable was connected to the computer (USB-A, USB-B, DB-25, or Centronics)?

_____

Step 3

Power on the printer and make sure it is functioning properly. Turn the computer power on and login to Windows.

Step 4

After initial logon, Windows should detect the printer. If the computer does not find the printer, start the Add Printer wizard by going to **Start** > **Settings** > **Printers**. Double-click the **Add Printer** icon.

If Windows finishes loading the Desktop and does not detect new hardware, what might be the cause?

_____

_____

Step 5

Begin the Found New Hardware wizard by clicking **Next** at the bottom of the window. This wizard will lead the technician through the entire printer installation process.

The next screen in the wizard asks whether the printer is a local or network printer. Select local and click **Next**.

This will open a window with a list of printer manufacturers and devices. If the drivers for the printer are in possession, click the **Have Disk** button and browse for the location of the drivers.

What type of media contains the printer driver?

_____

_____

Why are printer drivers rarely located on a floppy disk?

_____

_____

Step 6

Windows searches the selected medium for appropriate printer drivers. Driver files found will show up in the Driver File Search Results screen. From this screen, select the proper driver for the printer and choose **Next**.

Why do manufacturers usually include multiple printer drivers on a single CD-ROM?

_____

_____

Windows is now installing the printer driver files. An installation progress message might be displayed during this phase.

What are common device driver file extensions?

_____

_____

Step 7

The next window will prompt for the port that the printer is connected to. If a parallel cable was used, select LPT1.

What ports are listed other than LPT?

_____

_____

Step 8

The Add Printer wizard will now prompt for the printer name. Use either the default name suggested by the system or another name to help identify the printer. The name may identify the type of printer, the printer location, or anything else that helps to identify the printer on the local system.

Choose whether or not to make this printer the default printer. If more than one printer is in used, the default printer should be the one used most often.

What name was given to the printer?

_____

_____

Step 9

The final step is to print a test page. Click **Yes** to print a test page and then click **Finish**. Depending on the printer being installed, a printer initialization program may run. These programs are used to set the print orientation, check to see the type of ink cartridge(s) that are installed, and so on.

Step 10

Click **Finish** or **Close** if the wizard has not already closed. When the test page finishes printing, a dialog box will appear asking if the test page printed properly. If it did, click **Yes**. If the results are not readable, click **No** and follow the printer troubleshooter to help solve the problem.

Step 11

Check to be sure the printer is installed on the computer. From the Windows Desktop, choose **Start** > **Settings** > **Printers**. This will open the Printers folder.

Is an icon for the printer just installed visible? If not, see the troubleshooting section of this lab.

_____

_____

Which printer is set as the Default Printer? How can this be checked?

_____

_____

Step 12

Double-click on the printer icon. This will open up the print queue.

Are any print jobs listed in the print queue? Why not?

_____

_____

Step 13

Right-click on the printer icon and choose **Properties**. The printer properties dialog box will open.

What "tabs" are available?

_____

List two user-selectable options from a tab:

_____

Step 14

Click on the **General** tab. The Print Test Page is near the bottom of the page. Click the **Print Test Page** button.

After clicking the Print Test Page button, what question did Windows ask? How was it answered?

_____

Step 15

The inkjet printer has been successful installed on the Windows computer. If not able to print a test page, see the troubleshooting section of this lab.

Troubleshooting

If Windows begins the Found New Hardware wizard, but is unable to locate a suitable device driver, check the printer driver media. Also, a newer, updated printer driver may need to be downloaded from the manufacturer web site.

If able to install the printer but unable to print a test page using either method in the lab, check the communication cable. The cable may be in sufficient condition to allow the computer to know it is connected to a printer, but may not be good enough to pass printer data.

The technician may also need to configure the BIOS for the printer to function correctly. Some computers will require the parallel port to be set to EPP. To accomplish this, the BIOS will need to be configured.

Reflection

What is an advantage of a laser printer over an inkjet printer?

_____

_____

_____

Lab 11.4.4: Setting Up Print Sharing Capabilities

Estimated time: 20 Minutes

Objective

Upon completion of this lab, the student will be able to verify communication between the server and the client, setup the print server, configure the client, and test the client's print capability.

Equipment

The following equipment is required for this exercise:

- A functional network with at least two computers running Windows.

- A printer installed on one Windows computer.

Scenario

The sales department in a small company currently has a single printer connected to one computer. Since the other sales reps need access to a printer, the manager has asked the PC technician to make the printer available to the entire sales department.

Procedures

The strength of a computer network is the ability to share resources. An example of a resource is a printer. Windows allows users to connect and install a printer on one computer (the print server) and share it with the other computers (clients) on the network. This lab will detail the steps followed to set up print-sharing using Windows.

Step 1

On the computer with the printer attached (the server), click **Start** and **Run**. In the Run dialog box, type `Command` and press **Enter**. This will open a Command Line session window.

Step 2

Type `IPCONFIG` if running Windows 2000. Type `WINIPCFG` if running Windows 98. This command will present information about the IP address of the computer.

What is the IP address of the server?

_____

Step 3

On the client computer, click **Start** > **Run**, type `Command` and press **Enter**. At the command line prompt ping the server IP address (example: ping 192.168.10.1).

What is the purpose of using the `ping` command?

_____

Were the ping attempts successful? If not, ensure that both computers are properly configured and connected to the network.

_____

Step 4

It is important to know the network identification information for the server. To see this information, right-click on **My Computer**, choose **Properties**, and select the **Network Identification** tab.

What is the Full Computer Name of the server?

_____

What is the Workgroup of the server?

_____

Step 5

In order for several computers to use the same printer, print-sharing software needs to be installed on the server. To do this, return to the Desktop, right-click on **Network Neighborhood**, choose **Properties**, and then click the **File and Print Sharing** button. Make sure there is a check next to the "I want to be able to allow others to print from my printer(s)" option. Once that is checked, click the **OK** button. Then click **OK** on the network properties window. The computer will prompt the user to restart the machine. Click **Yes**.

Step 6

Now that the print sharing software is installed, it is time to configure the particular printer for print sharing. From the Desktop, click **Start** > **Settings** > **Printer**s to open the Printers folder.

Is the printer available in the folder? _____

Step 7

Right-click on the icon of the printer to be shared with the client computer. Choose **Properties**, and select the **Sharing** tab.

Step 8

The sharing options are used to make the printer available to clients and give the printer a unique name on the network. Choose **Shared as** and then type in a unique name for the printer.

Why must the name for the printer be unique to the network?

_____

What name was the printer given?

_____

Step 9

When finished with the sharing options, click **OK**.

After clicking **OK** and returning to the Printers folder, what has changed regarding the look of the printer icon and what does this change signify?

_____

Step 10

The technician is now ready to begin installing the printer on the client. On the client computer, click **Start** > **Settings** > **Printers** to open the Printers folder.

Step 11

Double-click the **Add Printer** icon to begin the Add Printer Wizard. This wizard will walk the technician through the process of selecting the shared printer.

Step 12

Click **Next** to get to the printer type screen. On this screen choose **Network Printer** and click **Next**. This will lead to the wizard that allows the technician to browse the network for the printer, or to enter the path to the printer.

Step 13

On this screen, type in the path to the printer and choose **Next**. The path is formatted like this: \\server_name\printer_name where the server_name is the Full Computer Name of the server and printer_name is the name given to the printer.

What is the path to the printer?

_____

After clicking the **Next** button and returning to the Printers folder, is there an icon for the printer?

_____

Step 14

The printer has been installed on the client computer. Now, test the communication between the client and the printer.

What are two methods for printing a test page from the client computer?

_____

Troubleshooting

If the computer that a printer is connected to is turned off or is removed from the network, the resources that are being shared from that computer will no longer be available. Many times it is necessary to have a dedicated print server so that anyone can print to a computer at anytime.

There are various ways of setting up a print server. Some network-capable printers have print servers built into them. Other print servers available are very small and can be easily hidden between the printer and a desk or wall.

Reflection

Why would a company install a network printer instead of purchasing a printer for every end user?

_____

_____

_____

Lab 11.5.4: Managing Files in a Printer Queue

Estimated time: 20 Minutes

Objective

Upon completion of this lab, the student will be able to:

- Open up the printer queue

- Add jobs to the printer queue

- Delete a job from the printer queue

- Rearrange jobs in the printer queue

- Purge all jobs held in the printer queue

Equipment

The following equipment is required for this exercise:

- A computer with Windows 98 installed

- An installed printer

Scenario

If a document does not immediately print, many computer users will click the print button again. They keep clicking the print button until the document prints. This can lead to massive amounts of wasted resources.

Procedures

In this lab, the student will learn how to manipulate print jobs held in a printer queue. After placing jobs in the queue, this lab will cover how to delete single jobs, prioritize jobs, and purge the entire printer queue. These skills become necessary when a print job is sent to the queue, but is not the correct document that needs to be printed.

Step 1

Each installed printer uses a queue to hold print jobs. This is an area of memory and hard drive that is used to feed information to the printer. Click **Start** > **Settings** > **Printers**, to open the Printers folder. Double-click on the printer being used in this lab. This will open up the queue.

Which printer will be used for this lab?

_____

What jobs are currently in the printer queue?

_____

Step 2

In the printer queue menu bar, click **File** and choose **Pause Printing**. This will cause the printer queue to hold all print jobs without sending any information to the printer. Minimize the printer queue window.

Step 3

To add jobs to the printer queue, create some documents to print. Click **Start** > **Programs** > **Accessories** and choose **Notepad**.

Step 4

Using Notepad, type in "Document 1" and save it to the Desktop as "low.txt".

Step 5

Add this document to the printer queue by choosing **File** > **Print**. Open the printer queue window (it is minimized and available on the Taskbar).

Is the print job listed in the printer queue?

_____

Who is the owner of the print job?

_____

What is the progress of the print job?

_____

How long will this job stay in the queue?

_____

Step 6

Use Notepad to create and print two more documents. Type in "Document 2", save it to the Desktop as "medium.txt", and print the document. Type in "Document 3", save it to the Desktop as "high.txt", and print the document.

How many jobs are now being held in the printer queue?

_____

Step 7

Sometimes it is necessary to cancel print jobs while they are being held in the printer queue. In the printer queue window, right-click on **medium.txt**.

What options are available in the context-sensitive wmenu?

_____

Step 8

Choose **Cancel Printing**.

How many jobs are now being held in the printer queue?

_____

Step 9

By default, the printer queue handles jobs using first in, first out (FIFO). Sometimes it is necessary to give priority to certain print jobs. In the printer queue window, drag low to an area below high and release it.

What is the order of the print jobs held in the printer queue?

_____

When the printer is set to resume printing, which print job will the printer queue release first?

_____

Step 10

To delete all jobs held in the printer queue, either delete each single job or choose to purge the entire queue. To purge the printer queue, open the printer queue window, choose **Printer** from the menu bar, and click **Purge Print Documents**.

How many jobs are now being held in the printer queue?

_____

Step 11

Choose the **Printer** menu and click **Pause Printing** to release the printer from its paused state. Close the printer queue window and delete the low, medium, and high documents from the Desktop.

Troubleshooting

If unable to place jobs in the printer queue using Notepad, check to ensure that the printer queue being viewed is the queue for the current default printer. Notepad is a simple application and will only print to the default printer.

Reflection

As a network administrator, how would being able to control the print queue help with the conservation of resources?

_____

_____

Lab 12.1.2: Using a Digital Multimeter

Estimated Time: 30 Minutes

Objective

> This lab will concentrate on the ability of students to identify and record power supply specifications and connecter types. It will also, focus on the use of a multimeter to safely test and record voltage readings.

Equipment

> The following equipment is required for this exercise:

> - Personal computer (no peripherals will be needed)

> - PC hand tool kit

> - Multimeter

Scenario

> The student is an On-Call Help Desk Engineer for a small computer sales store. A client, who purchased a computer from the XYZ company, as well as an extended warranty, is having problems with their PC. Based on their description of the behavior of the PC, the power supply is suspected.

Procedures

> For this lab, students will need to compile power supply information as well as test procedures. Observe various types of power supply form factors and characteristics. If at any time a student is unsure of the procedure, ask the instructor.

> **Note:** This lab deals with electrical power supplies. Proper care should be taken whenever working with a power supply. Also, students should not wear a grounding strap when testing the power supply.

Step 1

> Remove the cover of the computer and properly store the screws.

> Review the precautions and directions on the side of the air can. Use the air sparingly to blow the dust out of the power supply and off of all visible surfaces inside the case. Once all surfaces are clean, reattach the case cover.

Step 2

Record the following power supply information (found on the power supply label).

Manufacturer	
Model Number	
Operating Range	
Current at 115 V	
Current at 230 V	
Wattage Rating	

Step 3

Sketch the power supply and identify the 4 main external components of a power supply by labeling them on your drawing.

Step 4

Name the specific type of Motherboard connector that the power supply is using.

Step 5

How many large drive connectors are available on your power supply?

Step 6

How many small drive connectors are available on your power supply?

Step 7

Identify the large drive connector leads, and then measure their voltage values (ask the instructor, if there are any questions related to how to proceed with voltage measurements).

Lead Color	Expected Voltage	Actual Voltage
1.		
2.		
3.		
4.		

Step 8

Identify the small drive connector leads, and then measure their voltage values (ask the instructor, if there are any questions related to how to proceed with voltage measurements).

Lead Color	Expected Voltage	Actual Voltage
1.		
2.		
3.		
4.		

Step 9

Reflection: Why is it important for a technician to know the different colors and their values?

Step 10

With the multimeter, measure the voltage on each colored wire of the motherboard connectors. Most motherboard connectors will have either two connectors or one long connector.

Use the Table below to record the lead color and their measured voltage

Note: Do not measure the black leads because they are ground.

Note the meter lead polarity: Red is positive (+) and Black is negative (-).

1. Lead Color	Voltage Reading
2. Lead Color	Voltage Reading
3. Lead Color	Voltage Reading
4. Lead Color	Voltage Reading
5. Lead Color	Voltage Reading
6. Lead Color	Voltage Reading
7. Lead Color	Voltage Reading
8. Lead Color	Voltage Reading
9. Lead Color	Voltage Reading
10. Lead Color	Voltage Reading
11. Lead Color	Voltage Reading
12. Lead Color	Voltage Reading
13. Lead Color	Voltage Reading
14. Lead Color	Voltage Reading
15. Lead Color	Voltage Reading
16. Lead Color	Voltage Reading
17. Lead Color	Voltage Reading
18. Lead Color	Voltage Reading
19. Lead Color	Voltage Reading
20. Lead Color	Voltage Reading

Step 11

Check the continuity from the ground of the power cord socket to the metal base of the computer.

Step 12

Check the continuity of all three conductors of a power cord from the plug end to the female end.

1. Neutral   _____

2. Hot   _____

3. Ground   _____

Step 13

Reflection Question: Why measure voltage when troubleshooting a Power Supply?

Troubleshooting

One way to determine if a power supply is not functioning properly is to compare the test results from what the connector should be reading. A malfunctioning power supply should not be opened. Replace the component with a new one of the same power capacity.

Reflection

What was learned from this lab that was not known before?

_____

How can the knowledge from this lab help in the future?

_____

_____

_____

Lab 12.3.5: Cleaning Computer Components

Estimated Time: 25 Minutes

Objective

Upon completion of this lab, the student will know the proper procedure to clean computer components.

Equipment

The following items are needed in order to complete this lab:

- A computer with a keyboard, mouse, and monitor

- Mild detergent (a little soap, a lot of water)

- Cleaning rag

- Container for the detergent (bucket or spray bottle)

- Can of compressed air

- Tool kit

- Keyboard cap puller (optional)

Scenario

As a PC repair technician, the student has been sent to fix a computer that has stopped working. A good practice to follow when repairing PCs is to clean the computer before leaving it.

Procedures

When cleaning electrical components, it is critical to unplug the device before working with it. If there is power running to a computer system and a damp cloth is run over it, the results could be deadly.

Step 1

The first thing that should be cleaned is the inside of the computer case. To begin, unplug the power cord if it is not already unplugged. Next, remove the case cover either by removing the appropriate screws or latch. When the case is open, it is a good idea to keep the case standing vertical or even angled so that when the dust is blown out, it does not settle back inside.

Review the precautions and directions on the side of the air can. Use the air sparingly to blow the dust out of the power supply and off of all visible surfaces inside the case. Once all surfaces are clean, reattach the case cover.

Has the inside of the case been thoroughly cleaned? _____

Step 2

When cleaning the monitor, the first and most important step is to turn off the unit and unplug it from the wall. Once unplugged, it is safe to clean the surfaces with a cloth that is dampened with a mild detergent. If the cloth leaves streaks on the screen, there is too much liquid. A damp or moist cloth has only enough cleaner to help remove dust and clean the surface. Using a dry cloth, wipe down the screen and sides to remove any residual cleaning fluid.

When all sides of the monitor have been cleaned, it is a good idea to let it sit and dry for at least a half hour, just in case something may have dripped inside.

Has the monitor been thoroughly cleaned? _____

Step 3

The keyboard is the component that has the most physical contact with the user. The two areas of the keyboard that should be cleaned are the surface of the keys and the area below the keys.

The fastest way to remove dust and other loose objects from below the keys is to blow it out with a can of air. Start at one side of the keyboard and work toward the other side until the dust buildup is removed.

Step 4

If a liquid such as soda was spilled on the keyboard, the keys will need to be removed in order to clean it out. Using a keyboard cap puller, remove the keys in the area where the spill occurred and use a cloth to clean up the mess. When thoroughly cleaned, the keys can be replaced by positioning them in the correct spot then pressing them down.

Has the keyboard been thoroughly cleaned? _____

Step 5

The mouse is one of the most frequently cleaned components on a computer. An optical mouse requires less cleaning than a mechanical mouse.

To clean a mechanical mouse, remove the locking ring on the bottom. The proper direction to turn the ring should be indicated by an arrow. Once removed, turn the mouse over and catch the ring and ball.

Observe the two posts that are inside the mouse, which are the x-axis and the y-axis. If there is a buildup of dirt on either one of these, use a Q-Tip and some alcohol to remove the dirt.

Step 6

Once the dirt is removed from the posts, inspect the ball to make sure it is clean. If it needs to be cleaned, use a mild cleanser and a clean lint-free rag to clean off the dirt. Once the ball is clean and dry, put the ball back into the mouse and return the ring to the locked position.

Has the mouse been thoroughly cleaned? _____

Troubleshooting

If dust builds up in a power supply, it could cause the system to malfunction or shut down. If the fans stop and the system overheated, internal components can be damaged as well. Preventive maintenance can prolong the life of not only the power supply, but also the entire system.

Reflection

How often should a computer system be entirely cleaned?

_____

Why should computer systems be cleaned?

_____

_____

_____

Lab 12.4.1: Using the Scandisk and Defrag Utilities

Estimated Time: 30 Minutes

Objective

Upon completion of this lab, the student will be able to scan a hard drive, defragment the drive to check for errors, and defragment files using the Scandisk and Defrag utilities.

Equipment

The following equipment is required for this exercise:

- A computer with Windows 98 or 2000 Professional installed

Scenario

As a system administrator, the manager expects routine maintenance to be performed on all computer systems as necessary. Run the Scandisk and Defrag utilities on the appropriate machines to keep them running smoothly.

Procedures

If a computer is used on a regular basis and system maintenance is not performed, system stability will decrease. As files are created, used, and deleted, the media they are stored on may become fragmented. Also, if a file is not properly closed it may leave corrupted pieces of data behind. To resolve these problems, the two utilities Scandisk and Defrag are included with the Windows operating system.

Step 1

The first utility to run is Scandisk. This utility will ensure that any problem files will be fixed before the Defrag utility organizes the drive. To start the Scandisk utility, open My Computer and right-click on the drive to be checked and choose Properties. Select the **Tools** tab and then click the **Check Now** button. This will start the Scandisk utility (referred to as Error-checking in Windows 2000).

What types of tests are available in the Scandisk program?

_____

Which test type is the default? _____

Step 2

To begin the scanning, click the **Start** button. When it is finished, click the **Close** button. If there are errors, see the troubleshooting section of this lab.

Step 3

Once Scandisk has completed successfully, the Defrag utility can be run to reorganize the files on the disk. To start the Defrag utility, open My Computer and right-click on the drive to be defragged and choose Properties. Select the **Tools** tab and then click the **Defragment Now** button. This will start the Defrag utility.

Note: Make sure that the screensaver and any other programs that automatically start are temporarily disabled or they can interrupt the defragmenting process.

Troubleshooting

If Scandisk reports a cross-linked file or fragments of a file, it may ask how it should resolve the problem. There is an option to convert recovered data to a text file. However, this will clutter the drive with many text files of garbled information. Select the option to discard the information and continue.

Reflection

List any other utilities that come with Windows that can help in the preventative maintenance of a system:

_____

Lab 13.1.7: The Steps of the Troubleshooting Cycle

Estimated Time: 25 minutes

Objective

Upon completion of this lab, the student will be able to describe the importance of, and identify the steps involved in, the troubleshooting cycle.

Equipment

This is a written lab. No equipment is necessary.

Scenario

The student has just started a new job, as a computer technician, with a small consulting group. The company has approximately 50 employees with varying levels of computer expertise. As a computer technician, the student's primary responsibility is to provide desktop support to these employees.

The student has recently gone through job orientation and has received training on the procedures for responding to computer problems. The training included an introduction to the hardware and software in use, common errors, common symptoms, and using the troubleshooting cycle to effectively solve problems.

The end user is complaining that their computer has stopped responding. It is the student's responsibility to troubleshoot and resolve this problem.

Procedures

The troubleshooting steps can be very useful in solving computer problems. Sometimes a problem will require common sense and the solution is straightforward. Other times, the solution will require a broad level of technical knowledge. In this lab, the student will follow the troubleshooting cycle as an example of solving computer problems. The lab will begin with step one, which is identifying the problem from the end user.

Step 1

After arriving on scene, begin the troubleshooting cycle by defining the problem. Start by identifying the general symptoms and then determine the possible causes for the existing problem.

For future references, the student has brought along a notebook to document the findings.

Upon arrival, what environmental factors can be assessed? How is an assessment of the environment beneficial?

_____

_____

Step 2

The next step is to gather pertinent information from the end user. Initially, ask general

questions with the goal of obtaining a broad idea about the computer problem. Questions should gain focus as information is obtained from the end user.

What questions could be asked to obtain a broad idea about the problem?

_____

_____

After questioning, it is learned that the computer is not producing any sound. Everything else appears to be functioning correctly.

The student can now assume the problem is related to the multimedia (sound) capabilities of the computer. What questions could be asked or actions taken to better define the problem?

_____

_____

During questioning, it is determined that the end user has been having problems ever since a recent sound card upgrade. The student attempts to reproduce the error by playing an audio file. The audio file does not produce any sound. The student inspects the audio player and it appears to function correctly. Then, the student visually inspects the speaker cables and verifies that the speakers are turned on. The student sees no apparent problems with the connected devices and the speakers are turned on.

Gathering information is by far the most important step of the troubleshooting cycle.

Step 3

Given the above scenario, what are the most likely causes of the malfunctioning soundcard?

_____

_____

The user has stated that he is having problems producing sound from his machine and there has been a recent upgrade performed on his soundcard. From this information, the student can infer the problem is related to the recent upgrade of the sound card.

It has also been verified that both the audio player and speakers are functioning properly. The student has also verified the speakers are connected correctly. Since verifying the speakers and audio player are working, the student concludes it is unlikely they are causing the problem. The student continues the troubleshooting cycle by creating solutions for the apparently bad sound card installation.

Step 4

Effectively developing a solution involves gathering correct information, knowledge of the computer components, and the ability to recognize symptoms.

The problem has been isolated to a bad installation of the sound card.

Give an example of a solution that might solve this user's problem:

_____

_____

The solution should focus around the different aspects of the sound card installation. Based on experience, the student is aware that most sound card problems result from a bad or outdated driver, improperly installed sound card, or system resource conflicts.

For example, one solution might be verifying the proper installation of the sound card in the PCI slot. If the problem still exists, check for system resource conflicts. Finally, update or reinstall the driver.

Step 5

The first aspect of the solution involves simply checking the installation of the soundcard.

What precautions need to be taken before working inside the computer case?

_____

_____

The student verifies the soundcard has been properly inserted and has good connections. It appears to be properly inserted. Experience has taught the student to check for obvious solutions first. If the problem still exists, move onto the second aspect of the solution, which is to check if there are any system resource conflicts.

The user is running Windows 98 and the student checks resource conflicts in the Device Manager.

In the Device Manager for Windows 98, what will indicate a system resource conflict?

_____

_____

The student does not notice any problems and moves on to updating or installing the device driver for the sound card. In order to get the latest device driver for the sound card, the student visits the website for the sound card manufacturer. The student conducts a search for the sound card driver and locates a new driver. This driver is different from the one the user installed because it includes a Windows 98 patch that resolves known compatibility issues. The student installs the new driver and then reboots the machine.

Step 6

The fifth step is determining if the problem has been solved. If the problem appears to be solved, than the troubleshooting process has been successfully completed. If the problem is not fixed, then the student will be required to return to previous steps and continue the troubleshooting process. Sometimes, it might be necessary to undo changes made to the system and revert to the old configuration. In either case, be certain to properly document the results. Documenting the results will help work productivity in the future.

After bootup, play an audio file and hear sound out of the speakers. The problem has been resolved and the troubleshooting cycle has come to an end.

Troubleshooting

What are the steps in the troubleshooting cycle?

Step 1 - _____

Step 2 - _____

Step 3 - _____

Step 4 - _____

Step 5 - _____

Step 6 - _____

Reflection

It has been stated that troubleshooting is cyclical. What does this mean?

_____

_____

Why are the steps in the troubleshooting cycle useful for solving computer problems?

_____

_____

What is the most important step in the troubleshooting cycle, and why is it so important?

_____

_____

If the problem exists after the solution has been implemented what steps should be taken?

_____

_____

Lab 13.2.2: Identifying POST Errors

Estimated Time: 20 Minutes

Objective

Upon completion of this lab, the student will be able to identify common POST errors. The ability to identify POST errors is essential for troubleshooting computers.

Equipment

In order to complete this lab, the student will need:

- An operating computer

- A mouse

- A keyboard

Scenario

The student is working as a technician for a small medical billing office. The office has just bought new computers. The newly purchased computers are all the same make and model. The students are to familiarize themselves with the computer and document the POST error for the major components.

Procedures

To become familiar with POST errors, remove several key components from the computer system and then listen for the audible POST errors. POST errors are a series of beeps that indicate a failure during startup. If a POST error is heard, the student will then document the findings.

Note: POST errors are dependent on the BIOS. POST errors are not the same universally.

Step 1

First, remove the keyboard connector from the back of the computer case and reboot the system. Listen for any abnormal beeps during startup.

Was any POST error heard?

_____

If a POST error was heard, what was the pattern of the beep?

_____

Note: If one beep is heard during startup this indicates normal operation.

Step 2

Plug the keyboard connector back into the back of the computer case. Next, unplug the computer and remove the computer case to expose the internal components. Identify the RAM on the motherboard and remove the RAM stick(s). Reboot the machine and listen for POST errors.

Was any POST error heard?

_____

If a POST error was heard, what was the pattern of the beep?

_____

Step 3

Reinstall the RAM and reboot the machine. One beep should be heard, which indicates normal operation during the boot process. If any POST errors are heard, verify the RAM was properly replaced and try again.

Step 4

After the machine boots normally, turn the power off and unplug the computer. Identify and disconnect the floppy drive. Remove the connectors for both the ribbon cable and the power supply that connect to the floppy drive. Reboot the machine and listen for POST errors.

Was any POST error was heard?

_____

If a POST error was heard, what was the pattern of the beep?

_____

Step 5

Unplug the computer and reattach the floppy drive connectors and reboot the machine. One beep, which indicates normal operation, during the boot process, should be heard. If any POST errors are heard, verify the floppy drive has been properly connected and try again.

Step 6

After the machine boots normally, turn the power off and unplug the computer. Identify and remove the video card from the motherboard. Reboot the machine and listen for POST errors.

Was any POST error heard?

_____

If a POST error was heard, what was the pattern of the beep?

_____

Step 7

Unplug the computer, replace the video card, and reboot the machine. One beep should be heard, which indicates normal operation during the boot process. If one beep is heard, replace the computer case. If a POST error is heard, verify the video card was properly replaced and try again.

Troubleshooting

Computer technicians need to be familiar with POST errors and their implications. Technicians need to be aware of any unusual sounds during the boot process because it could be an indication of a failure during initial diagnostic tests. In many cases, these unusual sounds are the first sign that a failure has occurred.

Reflection

When will POST errors occur?

_____

What sound is made during a normal boot process?

_____

Are POST errors dependant on the BIOS installed?

_____

Lab 14.7.4: Booting into Safe Mode

Estimated Time: 25 Minutes

Objective

Upon completion of this lab, the student will be able to boot the PC utilizing the advanced troubleshooting options of Windows 2000.

Equipment

The following equipment is required for this exercise:

- An operational computer that is running Windows 2000.

Scenario

The student is the system administrator for the XYZ Company, and upon arriving at work in the morning there is a call from an end user stating that a "system boot failure" error message is being displayed.

Procedures

Booting the computer into Safe Mode, bypasses the normal startup sequence of Windows. Part of this process involves timing. When the black and white Starting Windows bar is on the screen, press the **F8** key before the system begins loading Windows.

Step 1

Power-on the computer.

Step 2

When the computer is running through the boot process, a series of different startup screens are displayed. In order to get into Safe Mode in Windows 2000, press **F8** while the black and white Starting Windows bar appears at the bottom of the screen. The Starting Windows bar will display after the BIOS has been loaded.

What is the name of the menu that displays?

_____

What are the options that are available on this menu?

_____

_____

_____

_____

_____

Step 3

Next, select the **Safe Mode** option by using the arrow keys up or down and press **Enter**. Windows will load to the Safe Mode environment. Read the window carefully and press **OK**.

Step 4

Windows loads into the Safe Mode desktop environment. However, since Windows only loads basic drivers in Safe Mode, the graphics will be in VGA mode.

Does the desktop appear to be in VGA mode? _____

How are the video settings checked?

_____

_____

Step 5

Access the Device Manager to check the loaded drivers. To access the Device Manager, click on **Start** > **Settings** > **Control Panel** > **System** > **Hardware** > **Device Manager**. The Device Manager will open displaying the hardware components.

Step 6

After the Device Manager is open, check to see if any devices are conflicting. Conflicting devices will have a yellow exclamation point next to them.

Are there any conflicting devices? _____

Step 7

Verify that no network drivers have been installed. To verify the network drivers, click on the "plus (**+**)" sign next to Network Adapters. A list of devices should display. Right-click on a device, select Properties, and a Device Properties window will appear.

What does the Device Properties window display for Device Status?

_____

_____

Troubleshooting

Booting a PC into Safe Mode is often used by computer technicians when they are troubleshooting a problem. Safe Mode helps technicians identify and diagnose problems. If the problem is not present in Safe Mode, then it is probably related to settings or drivers.

Safe Mode loads only generic drivers during the loading of the OS. It will load basic drivers for the mouse, video display, mass storage, keyboard, and the default services. Booting a PC into Safe Mode does not load network devices or connections by default.

However, the PC can be booted using the "Safe Mode with Networking" to establish a network connection.

Reflection

What key is pushed to enter into Safe Mode in Windows 2000?

_____

What is the main difference between Safe Mode and normal operation?

_____

Why might Safe Mode be an effective troubleshooting tool?

_____

Lab 14.7.5: Using the Windows 2000 Recovery Console

Estimated time: 30 Minutes

Objective

In this lab, the student will learn how to use and implement the Windows 2000 Recovery Console.

Equipment

The following equipment is required for this exercise:

- A computer system running Windows 2000

Scenario

The student is the system administrator for the XYZ Company, and upon arriving at work in the morning there is a call from an end user stating that a "system boot failure" error message is being displayed. To fix the problem, run the Windows 2000 Recovery Console to repair any boot file that may be damaged.

Procedures

In the first step of this lab, the system boot failure will need to be created. In the second step of the lab, the Recovery Console will be used to repair the system boot failure that was created in the first step. In the third part of the lab, the Recovery Console will be installed and some of the Recovery Console commands will be utilized.

Step 1

First, turn off/disable system protection. Double-click **My Computer**, then select **Tools**> **Folder Options**.

In the Folders Options display box, click on the **View** tab.

With the View tab selected, change the defaults for viewing hidden and system files. To do this, click the **Show hidden files and folders** radio button. Also, uncheck **Hide protected operating system files (Recommended)**.

Next, rename the Ntldr file to Oldntldr. To do this, click on **Start >Search >for Files and Folders**. In the Search for files and folders named: field type `ntldr`.

When the file shows up on the right screen, right-click on the file and select **Rename**. Rename it to Oldntldr.

Restart the computer. An error message should be received when the computer is restarted.

Step 2

Make sure that the Windows 2000 installation CD is in the CD-ROM drive and then restart the computer. Change the BIOS settings to boot from the CD-ROM.

When the Setup Notification message appears, Setup will now display the Welcome To

---

Setup screen.

Press **R** to repair a Windows 2000 installation using the recovery console. The Windows 2000 Repair Options screen displays.

Press **C** to start the Recovery Console. Next, type 1 and then press **Enter**. At the prompt, enter the administrator's password and then press **Enter**.

A `C:\Winnt` command prompt appears. Type `cd ..` then press **Enter**. This will change to the root folder (C:\).

Type `copy Oldntldr Ntldr` at the command prompt and press **Enter**.

Type `exit` and press **Enter**. The computer will reboot and should start normally.

Step 3

Log on to the system with the Administrator account.

Insert the Windows 2000 Professional CD into the CD-ROM drive. Close the Windows 2000 window when it displays.

Go to **Start** > **Run** and in the box type `D:\i386\winnt32 /cmdcons` and then click **OK**. The Windows 2000 Setup message box will display. Note that the CD-ROM drive letter might vary depending on the system configuration.

Click **Yes** to install the Windows 2000 Recovery Console. Windows 2000 Setup installs the Windows 2000 Recovery Console to the hard disk.

Click **OK** to close Setup dialog box.

Step 4

Restart the computer and select "Microsoft Windows 2000 Recovery Console" from the boot loader menu.

The Windows 2000 Recovery Console will start up and prompt for the Windows 2000 installation to log on to. There should only be one choice to choose from at this point. Enter the administrator password when prompted and then press **Enter**.

Type `help` and press **Enter** to see the list of available commands. Find the `Listsvc` command and use it to view all of the available services.

Type `Listsvc` at the command prompt (at the end of the list) and press **Enter** to view a list of available services. Press **Esc** to stop.

Type `disable /?` and then press **Enter**. This command disables any Windows system service or driver.

Type `disable alerter` and then press **Enter**.

The Alerter Service will now be disabled. Note the lines of text advising that the "Alerter service" has been changed. Type `exit` and then press **Enter** to restart the computer. Boot into Windows 2000.

Now that the Alerter Service has been disabled, it will need to be restarted.

Log on to the system with the Administrator account.

Navigate to the Computer Management window. There are two ways to access the Computer Management window:

Go to **Start** > **Programs** > **Administrative Tools** >**Computer Management**.

OR

Go to **Start** > **Settings > Control Panel** > **Administrative Tools** >**Computer Management**.

Next, expand "Services And Applications" by clicking the plus (**+**) sign and then click **Services**.

Double-click **Alerter**, change the "Startup Type" option to "Automatic", and then click **OK**.

Right-click **Alerter**, and then click **Start**. Close the Computer Management window.

Troubleshooting

The recovery console is a very useful tool when troubleshooting problems. If the system stops responding or will not boot properly, it is a good place to go while troubleshooting the issue.

Reflection

Give an example of a problem that could be solved using the recovery console:

_____

_____

_____

_____

Lab 14.10.3: Windows Registry Backup and Recovery

Estimated time: 20 Minutes

Objective

In this lab, the student will learn how to back up and perform a recovery of the registry. These files are also referred to as the System State files.

Equipment

The following equipment is required for this exercise:

- A computer system running Windows 2000

Scenario

As the system administrator for the XYZ Company, a new software package is to be deployed onto a manager's system. This software has not been tested, however it is known that it will make changes to the registry. The first step is making a backup of the system state files in case the software corrupts the system.

Procedures

The first step is to use the Windows Back Up Wizard to select the files that are to be backed up and then to perform the back up. Second, modify the registry. It is possible that the system will not work after these changes to the registry are made. Lastly, use the backup to restore the system state and registry files.

Step 1

Log on to the Server with the Administrator account

When the systems boots up, Click **Start**, and then click **Run**.

In the Run dialog box, type `ntbackup` and then click **OK**. The Backup dialog box should appear.

Take a minute to read the three descriptions under the Welcome tab, and then click the **Backup Wizard** button. The Backup Wizard should start.

Click **Next**, to display the What To Back Up screen. Select the type of backup to be performed.

Click the **Only back up the System State data** button, and then click **Next**. At this point, the Where to Store the Backup screen will display. Select a place to save the file when prompted. This should be a pre-designated folder for backup files.

The Completing The Backup Wizard screen should display. This screen shows the details of the backup that will be performed. At this point, additional changes can be made. Click the **Advanced** button.

When the Type Of Backup screen appears, make sure that Normal is selected and that the Backup Migrated Remote Storage Data box is not checked.

Click **Next**. The How To Backup screen should display. Verify the backed up data after performing the backup.

Select the Verify Data After Backup check box, and then click **Next**.

The Media Options page will display. Specify whether to append this backup job to existing media or overwrite existing backup data on the destination media at the prompt. Click the **Replace The Data On The Media With This Backup** button.

Click **Next**. Now the Backup Label screen displays. Supply a label for the backup job and for the backup media. Windows will supply a backup label and media label by using the current date and time by default.

In the Backup Label text box, type **System State set created on xxx** (where xxx is today's date and time). Do not change anything in the Media Label text box. Click **Next**.

When the When To Back Up screen displays, choose whether to run the backup job now or schedule this backup job. For this lab, select the **Now** radio button. Click **Next**.

When the Completing The Backup Wizard screen displays, click Finish to start the backup job.

Windows Backup will display the Selection Information dialog box, indicating the estimated amount of data for the backup and the time to complete it.

The Windows Backup displays the Backup Progress dialog box, which shows the status of the backup operation, statistics on estimated and actual amount of data being processed, the time that has elapsed, and the estimated time that remains for the backup to complete.

When the backup is complete, click the **Report** button. A backup report will be displayed. The backup report contains key details about the backup operation, such as the time it started and how many files were backed up. When finished, close Notepad.

Close the Backup Progress dialog box and the Backup dialog box as well.

Step 2

Go to **Start** > **Run**. Type in `Regedt32` in the box. The Registry Editor window should open.

Expand the HKEY_LOCAL _MACHINE Registry Key.

Right-click the **Hardware Folder** and select **Edit**, then **Delete**.

Close the Registry Editor Box. The system is officially broken. In reality, only a virus would be able to damage the registry like this. The point is that changes to the system can result in changes to the registry. With the backup, the system can be restored.

Step 3

Locate the Backup file that was saved in Step 1 of this lab.

Double-click on that file. The Backup Utility Wizard displays.

Click on the **Restore Wizard** button. The Welcome to the Restore Wizard screen displays. Click **Next**.

The What to Restore wizard screen will displays. Expand the File. Find the backup file that was created with the proper date and time and expand that as well. Click on the **System State** check box. Click **Next**.

On the Completing the Restore Wizard screen click on **Advanced**.

On the Where to Restore screen, make sure that original location is selected. Click **Next**. If the Restoring System State will always overwrite files unless restored to a different location screen displays. Click **OK**.

Click on the Replace existing files if they are older than the backup files radio button. Click **Next**.

Verify that all three radio buttons are selected, then click **Next**, then click **Finish**.

The restore will begin by coping the files back to the system showing the progress results.

When the restore wizard completes, the report can be viewed by clicking the **Report** button. Then click **Close**.

When prompted to restart the system, click **Yes**. The system will restart.

Troubleshooting

Always back up the registry when installing new software. If something is changed or removed in the registry that affects the system, using the backup to fix it can save hours of troubleshooting.

Reflection

How can backing up the system state files save time?

_____

_____

_____

_____

Worksheets

Worksheet 1.3.8: Windows Navigation and Settings

1. It is extremely important not to power off the computer while the operating system is still running using the _____ _____.

2. The main display screen in Windows is known as the _____.

3. The _____ contains the start button, quick launch buttons, and the clock.

4. The _____ menu allows you to access virtually every program and function on the PC.

5. To adjust the date and time, double-click on the _____ on the right side of the_____ .

6. Most applications have three tiny icons in the upper right corner of the screen that are used to _____ the screen, _____ the screen, or _____ the application.

7. To adjust the screen display, first_____ all windows that are open. Right-click on an empty space on the _____ and choose properties.

8. To access the volume control, click on the _____ icon on the right side of the _____.

9. To move a desktop icon to another position on the desktop, click on it and then _____ it to the desired location.

10. Once highlighted, you can rename icons, like folders, by clicking on the _____ and then typing in a new one.

11. To create a new folder, _____ the desktop and then select **New** > **Folder**.

12. The _____ bar displays the name of the document and application.

13. The _____ bar contains menus for manipulating the document, such as creating new documents, copying text, inserting images, and so on.

14. The _____ bar shows useful information, such as page number, whether the file is being saved, how to access the Help feature, and so on.

15. The _____ bars appear when the document is too large for it to fit on the screen and are used for moving the image or text through the window.

Worksheet 1.5.9: Number Systems Exercises

1. Define the following:

    Decimal: _____

    Binary: _____

    Hexadecimal: _____

2. Explain how binary and hexadecimal numbers are used with computers.

    _____

    _____

    _____

    _____

    _____

    _____

    _____

3. Without using a calculator, convert the binary numbers into decimal numbers.

    A. 01111011 _____   B. 00000111 _____

    C. 11110000 _____   D. 10101010 _____

    E. 01010101 _____   F. 10010011 _____

    G. 00111001 _____   H. 11111111 _____

    I. 11010101 _____   J. 10000000 _____

4. Convert the decimal numbers into binary numbers.

    A. 23 _____   B. 131 _____

    C. 3 _____   D. 234 _____

    E. 79 _____   F. 199 _____

5. Convert the decimal numbers into hexadecimal numbers.

A. 16 _____   B. 131 _____

C. 3 _____   D. 234 _____

E. 65 _____   F. 255 _____

6. Convert the hexadecimal numbers into decimal numbers.

A. 27 _____   B. AA _____

C. 3 _____   D. F1 _____

E. 241 _____   F. 255 _____

Worksheet 1.6.6: Lab Safety Checklist

Fill in the blanks in the following lines:

1. The workspace for an IT technician should be large enough to accommodate the:

    a. _____

    b. _____

    c. _____

    d. _____

    Near the workbench, power outlets should be available to accommodate the system unit power and the power needs of other electrical devices.

2. The workspace should maintain a humidity level of _____ percent to reduce the likelihood of ESD.

3. The workbench should be a _____ surface. Additionally, it should have a flat cleanable surface.

4. The workspace should be distant from areas of heavy _____ equipment or concentrations of _____.

5. The workspace should be free of _____. _____ can contaminate the workspace, causing premature damage to computer components. The work area should have a filtered air system to reduce _____ and contaminants.

6. Lighting should be adequate to see small details. Two different illumination forms are preferred, such as an adjustable _____ with a shade and _____ lighting.

7. Extreme variations of _____ can affect a computer's components. _____ should be maintained consistent with the components' specifications.

8. Properly _____ AC electrical current is essential. Power outlets should be tested with an outlet tester for proper grounding.

Worksheet 2.3.2: PC Power Supply

1. The most basic function of the PC power supply is to convert _____ current to _____ current.

2. What is the purpose of the cover panels?

   _____

   _____

3. Drives, like CD-ROMs and DVD-ROMs, are inserted into bays or racks that are typically _____inches wide.

4. What are some factors to consider when purchasing a computer case?

   a. _____

   b. _____

   c. _____

   d. _____

   e. _____

   f. _____

   g. _____

5. In Europe, the standard outlet delivers _____Volts AC, while in North America the standard wall outlet delivers _____Volts AC.

6. What rating do computer power supplies have?

   _____

   _____

7. What are the two most common power supply types?

   a. _____

   b. _____

8. What is the importance of the power supply fan?

   _____

   _____

Worksheet 2.3.8: BIOS/ROM

0. The BIOS serves as the interface between the _____ and the

    _____.

0. The detailed instructions needed for system start-up are stored in

    _____ .

0. What does BIOS stand for?

    _____

0. What does ROM stand for?

    _____

0. What special characteristic do EPROM, EEPROM, and Flash ROM have?

    _____

    _____

0. What differentiates RAM from ROM?

    _____

    _____

    _____

Worksheet 2.3.9: Expansion Slots

0. What are expansion slots?

   _____

0. Expansion bus is also referred to as a (an)? _____ or

   _____.

0. An expansion bus is used to add _____ to existing systems.

0. List five different types of expansion slots:

   a. _____

   b. _____

   c. _____

   d. _____

   e. _____

0. Define the term "Plug and Play".

   _____

   _____

0. Name three common types of expansion cards:

   a. _____

   b. _____

   c. _____

0. Name the three bus types:

   a. _____

   b. _____

   c. _____

0. An ISA bus was developed with both _____ bit and _____ bit bus speeds.

0. Which bus type supports bi-directional communication?

   _____

0. What does PCI stand for? _____

Worksheet 2.4.2: RAM and RAM Sockets

1. Memory chips in a computer system are referred to as _____.

2. RAM is the industry standard abbreviation for _____ .

3. Define volatile as it applies to RAM:

   _____

   _____

   _____

4. Name the two basic types of RAM: _____, _____

5. Which type of RAM needs to be re-energized constantly in order to retain its contents? _____

6. Define RAM parity: _____

   _____

7. _____ refers to the process by which the computer rewrites data to RAM.

8. Describe the physical difference between a SIMM and DIMM chip:

   _____

   _____

9. Define memory caching:

   _____

   _____

Worksheet 2.5.2: Video Cards

1. A video card converts a _____ signal into a
    _____ signal.

2. Video cards are also known as _____ or _____.

3. The video card receives its data from the _____ and sends it to the
    _____.

4. _____ provides video during boot up until the necessary video
    drivers can take over.

5. The abbreviation "CRT" stands for _____.

6. List the three colors mixed together within the CRT to produce all other colors:

    a. _____

    b. _____

    c. _____

7. How closely the pixels are grouped, which translates to how sharp the picture
    appears, is referred to as _____.

8. VGA and SVGA video adapters use a standard _____-pin connector to
    connect to the monitor.

9. The term "pixel" stands for

    _____

10. The term "VGA" stands for

    _____

Worksheet 2.7.1: Floppy Drive

1. Explain what a floppy drive is used for in a computer:

    _____

    _____

2. Define the following parts of a floppy disk drive:

    a. Read/Write Head-

        _____

        _____

    b. Logic Board-

        _____

        _____

    c. Stepper Motor-

        _____

        _____

    d. Case-

        _____

        _____

    e. Hub-

        _____

        _____

    f. Lever-

        _____

        _____

1. List the different parts of a floppy disk:

    a._____

    b._____

    c._____

    d._____

2. What type of cable is used to connect the floppy drive to the motherboard?

_____

3. How many floppy drives can a computer support on a ribbon cable? _____

4. What type of power supply connector is used to supply power to the floppy drive?

_____

Worksheet 2.7.2: Hard Drive Identification

1. Explain what a hard drive is used for in a computer

   _____

2. Define the following parts of a Hard Drive:

   a. Cover mounting screw holes-

   _____

   _____

   b. Spindle-

   _____

   _____

   c. Read/Write heads-

   _____

   _____

   d. Platter-

   _____

   _____

   e. Actuator-

   _____

   _____

   f. Actuator Arm -

   _____

   _____

   g. Base Casting-

   _____

   _____

   h. Disk Platters-

   _____

   _____

1. In revolutions per minute (rpm), how fast do hard drives spin?

   _____

2. Flux is the _____ _____ _____ in the media.

3. What is RLL?

   _____

   _____

Worksheet 2.7.3: CD-ROM Identification

0. Explain how a CD-ROM is used:

_____

_____

0. List and define the following components of a CD-ROM:

. Spindle-

_____

_____

. Tray Motor-

_____

_____

. Laser Lens-

_____

_____

. Spindle Motor-

_____

_____

. Tracking Drive-

_____

_____

. Laser Pickup Assembly-

_____

_____

0. List three common CD-ROM speeds found in computers and identify their transfer rate.

a. _____

b. _____

c. _____

0. What type of power connection is used on a CD-ROM drive? _____

0. What is the audio out cable on a CD-ROM connected to in the computer?

_____

0. How much information can be stored on a CD-ROM? _____

0. Which type of interface controllers used by CD-ROM is capable of faster transfer rates – IDE or SCSI? _____

Worksheet 3.3.4: Power Supplies

1. Depending on the type of case and motherboard selected, the power supply must adhere to the same _____ _____ requirements in order to fit inside the case and correctly power the motherboard and other devices.

2. Some fans can change direction to allow air to be blown directly on the _____ and to regulate the quality of the air entering the case.

3. The two basic types of power supplies are _____ and _____

4. Match each component with the voltage from the power supply unit that it uses.

    1. _____ Motherboard   a. –5V

    2. _____ Disk Drives   b. +3.3V

    3. _____ Serial Port Circuits   c.   0V

    4. _____ ISA bus cards   d. +12V

    5. _____ Most newer CPUs   e. +5V

    6. _____ Ground   f. –12V

5. An AT power supply produces how many different levels of DC voltage?

    _____

    An ATX power supply produces how many different levels of DC voltage?

    _____

6. Match each voltage with the correct color wire.

    1. _____ Yellow   a. 0V

    2. _____ Red   b. –5V

    3. _____ Blue   c. +3.3V

    4. _____ White   d. +12V

    5. _____ Black   e. +5V

    6. _____ Orange   f. –12V

7. Never attempt to repair a defective power supply. _____ inside a power supply box store electricity and will discharge through the body if touched.

8. The ATX motherboard is a _____-pin keyed connector.

9. The AT motherboard has two _____-pin connectors.

10. The ATX motherboard directs air _____ of the computer case.

11. The AT motherboard directs air _____of the computer case.

Worksheet 3.9.1: What is BIOS?

1. The acronym BIOS stands for _____

2. The BIOS code is typically embedded in a _____ chip on the motherboard.

3. _____ BIOS allows the upgrade of the BIOS software from a disk provided by the manufacturer without replacing the chip.

4. Configuration of the BIOS on a computer is called the _____ or _____.

5. Without the correct code and_____ _____, the system will either not boot properly or work inconsistently with frequent errors.

6. The acronym POST stands for _____

7. Any problems during the POST are indicated by the BIOS displaying

   _____

8. BIOS initially runs basic device test programs and then seeks to _____ these devices.

9. Circle all that are correct:

   0. BIOS contains the software required to test hardware at boot up.

   0. BIOS contains the software required to execute windows applications and access user files.

   0. BIOS contains the software required to support the transfer of data between hardware components.

   0. BIOS contains the software required to support hard drive and floppy drive data storage.

   0. BIOS contains the software required to start up the operating system.

10. BIOS is saved in the chip on the motherboard (even when the power is turned off) by a _____.

Worksheet 4.1.3: Operating System Fundamentals

Answer the following true or false questions:

1. _____ Two or more users running programs and sharing peripheral devices, such as a printer, at the same time is known as multitasking.

2. _____ Multitasking is a computer's capability to run multiple applications at the same time.

3. _____ When a computer has two or more CPUs (Central Processing Unit) that programs share, it is known as multiprocessing.

4. _____ Multithreading is not the capability for a program to be broken into smaller parts that can be loaded as needed by the operating system.

5. _____ Multithreading allows individual programs to be multitasked.

6. _____ UNIX has been around since the 1960s.

7. _____ Computers that are not capable of handling concurrent users and multiple jobs are often called "network servers" or simply "servers".

8. _____ The file management system is what the OS uses to organize and manage files.

Worksheet 4.2.3: DOS Commands

Match each command with the function it performs.

1. _____DIR
   a. Copies a file

2. _____CD
   b. Displays memory properties

3. _____MD
   c. Displays the status of a disk

4. _____RD
   d. Changes the attributes of a file

5. _____DEL
   e. Copies one floppy disk to another

6. _____REN
   f. Formats a disk

7. _____SET
   g. Displays the contents of a directory

8. _____MEM
   h. Sets the system time

9. _____COPY
   i. Prints a text document

10. _____TYPE
    j. Opens a file for editing

11. _____FDISK
    k. Removes a directory

12. _____TIME
    l. Deletes a file

13. _____DATE
    m. Creates a new directory

14. _____CHKDSK
    n. Renames a file

15. _____DISKCOPY
    o. Displays the contents of the environment variables

16. _____EDIT
    p. Changes to a specified directory

17. _____FORMAT
    q. Program used to format and partition fixed disks

18. _____PRINT
    r. Displays the contents of a text file

19. _____ATTRIB
    s. Sets the system date

Worksheet 4.2.7: DOS

True or False:

1. _____ DOS is an acronym for Data Operating Service.

2. _____ All generations of Windows to date support DOS commands.

3. _____ DOS is user friendly.

4. _____ DOS can only run a single program at a time.

5. _____ DOS can run very large programs.

6. _____ DOS is an essential tool used extensively for troubleshooting.

7. _____ DOS files on a disk are stored in what are known as "folders".

8. _____ DOS records the location of every directory and file on a disk in a table called the "FAT".

9. _____ DOS files are referred to by filenames comprising up to 8 characters and an extension.

10. _____ DOS filenames and their extensions are separated by a dash (-).

11. _____ DOS has a main directory on the disk known as the "tree directory".

12. _____ The root of the C drive is represented by "C:\".

13. _____ The directory name and filename are separated by a slash (/).

Worksheet 5.1.10: Windows Files and Folders

1. A _____ and a _____ are equivalent terms for the same concept. They are places to store files.

2. The _____ directory is the master folder that contains all the other folders.

3. Names of early Windows 3.1 and DOS filenames are limited to _____ letters plus a _____ letter extension, but Windows 98 and later allow extended filenames of up to _____ characters.

4. Drive letters use the 26 letters of the alphabet followed by a colon. _____ and _____ are reserved for floppy drives, while _____ is for the hard drive.

5. By _____-clicking on an item on the desktop or in Explorer, options will appear such as Copy, Move, or Create Shortcuts.

6. _____ give immediate clues as to the creation or last modified date of a file or folder, type of item, and size of the file.

7. To highlight several files at one time, hold down the _____ key and click on those files you want to select.

8. To unselect a file within a group of selected files, hold the _____ key and then click on the highlighted file you want to de-select.

9. To select all files, select _____ from the menu on the toolbar, and click Select All.

10. _____-click on a file to open it.

11. To copy a file or folder onto a floppy disk, _____-click on the file and click_____ _____, then click 3 ½ Floppy.

12. Until you _____ the Recycle Bin, the files are still in the folder on the hard drive.

13. Files can be _____ from the Recycle Bin to the original folder that stored the file.

14. _____-clicking on the Recycle Bin brings up a menu, which allows easy emptying.

Worksheet 5.2.2: Managing Printers

1. To add a new printer, you will need to click on the **Start** button, go to **Settings**, choose **Printers**, and then select_____.

2. The six steps to adding the local printer using the Add Printer Wizard in Windows 98 are:

    Step 1   Select _____ printer.

    Step 2   Locate the _____ on the manufacturer and model list.

    Step 3   Select the printer _____.

    Step 4   _____ the new printer, especially if there are many printers being used.

    Step 5   If you wish, you can set this printer to be the _____ printer, if it is the one most commonly used printer.

    Step 6   Print a _____ page.

3. You can access the print manager by clicking on the _____ icon on the right side of the taskbar.

4. You can access the print manager by going to the _____ folder under Settings on the Start menu, then _____-click on the printer you are using.

5. Sometimes you will encounter a printer _____. Then a pop-up _____ appears to let you know what it is.

Worksheet 5.4.2: Preparing the Hard Drive

Match each vocabulary word with its correct definition.

1. _____ Primary Partition

    . This is the collective name for all tracks having the same number in a hard disk drive when several disks are stacked and rotate on a common spindle.

2. _____ Extended Partition

    . The area on each logical DOS disk where the information to boot the operating system is recorded.

3. _____ Active Partition

    . A special file that is created and located in the disk's sector 0 where DOS stores information about the disk's directory structure.

4. _____ Logical Drive

    . The first partition on a DOS disk (usually contains an operating system).

5. _____ FDISK

    . A 512 byte "chunk" of space on a DOS disk.

6. _____ Boot Sector

    . The partition DOS refers to at boot up.

7. _____ Partition Table

    . The process that creates a blank File Allocation Table and root directory structure on a DOS disk.

8. _____ Track

    . A physical separation of information within an extended partition.

9. _____ Sector

    . The process that marks off the disk into sectors and cylinders, and defines their placement on the disk.

10. _____ Cluster

    . The partitioning program for MS-DOS.

11. _____ Cylinder

    . The partition that is normally assigned all the available space left on a DOS drive.

12. _____ FAT

    . Concentric circles on the disk surface created by formatting a hard drive.

13. _____ Low-level Format

    . Two or more sectors on a single track.

14. _____ High-level Format

    a. A record of the starting point of each logical drive, active partition, and master boot record.

Worksheet 5.6.6: Troubleshooting Windows Installation

1. Isolate the problem as either _____or _____ related.

2. If, after installing the OS and not receiving a successful boot, first attempt to restart the machine using the _____ button.

3. To learn more about setup errors, refer to the_____.TXT file that comes with the Windows installation disks or CD.

4. The computer's System Properties gives _____ categories of information, each represented by a tab.

5. The _____ _____ in Windows provides a graphical interface representation of the devices configured in the system.

6. A device _____ is software specially designed to enable the computer to use the hardware or devices installed within the system.

7. What is a Windows startup disk?

    _____

    _____

8. To create a Windows 98 startup disk, double-click on_____ from the control panel window.

9. In addition to the critical operating system files copied to the Windows 98 startup disk during creation, what three important disk utilities for troubleshooting are added?

    _____ Scandisk.exe   _____ Msd.exe   _____ Mem.exe

    _____ Win.com   _____ Autoexec.bat   _____ Format.exe

    _____ Win.ini   _____ System.ini   _____ Fdisk.exe

    _____ Config.sys   _____ Bootlog.txt   _____ Setup.txt

10. When the "Save Uninstall Information" option is selected during Windows 98 setup, setup creates the _____ .dat and _____ .ini files that contain the uninstall information.

Worksheet 8.1.6: Multimedia Devices

Match each device with its appropriate description:

_____Video Card

A. Transforms digital information into analog signals and applies them to an audio preamplifier.

_____Microphone

B. Takes pictures and movies that can be broadcast on the Internet or sent to someone through email.

_____Speakers

C. An interface used by a computer to communicate with a musical instrument.

_____Web Cam

D. A device used to read and write data to compact disks.

_____DVD

E. A device used to input and record sounds to a computer.

_____Video Capture Card

F. An integrated circuit card in a computer or, in some cases, a monitor that provides digital-to-analog conversion.

_____Sound Card

G. Changes analog signals into sound waves.

_____MIDI

H. An optical recording media used for storing enormous amounts of data.

_____CD-RW Drive

I. A device used to record from video sources outside the computer.

Worksheet 8.2.5: Video Accelerators

1. RAMDAC is an acronym for:

    _____

    _____

2. The RAMDAC converts _____ signals into _____
    signals.

3. The video card receives data from the _____ and sends it to the

    _____.

4. CRT is an acronym for

    _____

5. A CRT uses _____, _____, and _____
    to produce all other colors.

6. VGA is an acronym for:

    _____

7. AGP is an acronym for:

    _____

8. The AGP interface is a variation of the _____ bus design that has been
    modified to handle the larger data throughput associated with three-dimensional

    _____

9. What is refresh rate?

    _____

    _____

    _____

Worksheet 8.3.3: Sound Cards

1. The RAMDAC receives the processed _____ information and converts it to an _____ signal

2. Two computer peripheral devices that send a signal to the sound card are the _____ and the _____ .

3. The quality of the sound card depends on the number of _____ used to hold each sound sample, or the sample size.

4. Sound cards generally have sampling rates from about _____ to _____ samples per second.

5. Two of the methods used to convert digitally stored sound into realistic analog sound are _____ _____ synthesis and

    _____ synthesis.

Worksheet 8.4.7: CD and DVD Terminology

1. CD-ROM is an acronym for _____ _____ _____ _____ _____.

2. DVD is an acronym for _____. _____ _____.

3. With a CD-R, data is written _____ on a light-sensitive material by a powerful, highly focused _____ _____.

4. Single-speed drives transfer data at a rate of _____ kb per second.

5. A CD-RW drive labeled 48x24x16 _____data at 48x, _____ data at 24x and _____data at 16x.

6. A typical DVD has a capacity that ranges from _____ GB to _____ GB.

7. Match each recording format with its media.

   1. _____ Yellow Book   a. Interactive CD

   2. _____ Red Book   b. Enhanced CDs

   3. _____ Orange Book   c. Digital Computer Data

   4. _____ Green Book   d. Digital Music CD

   5. _____ Blue Book   e. Magneto Optical, Write Once, and
                                    Re-writable drives

Worksheet 9.1.4: RAID

1. What is hardware based RAID?

   _____

   _____

2. What is software based RAID?

   _____

   _____

3. Below each of the pictures that follow, indicate if it is: RAID 0, RAID 1 mirroring, RAID 1 Duplexing, RAID 5, RAID 1/0.

   _____

Disk 1, 2, and 3 are RAID 0

Disk 1	Disk 2	Disk 3
Block 1	Block 2	Block 3
Block 4	Block 5	Block 6

Disk Controller

Disk 4	Disk 5	Disk 6
Block 1	Block 2	Block 3
Block 4	Block 5	Block 6

RAID 1 mirror stripe set 1, 2, and 3 is mirrored on stripe set 4, 5, and 6

Disk 4, 5, and 6 are RAID 0

Disk 1	Disk 2	Disk 3
Block 1	Block 2	Block 3
Block 4	Block 5	Block 6

Disk Controller

Drive 1   Drive 2

Block 1	Block 2
Block 3	Block 4
Block 5	Block 6

Block 1	Block 2
Block 3	Block 4
Block 5	Block 6

Disk Controller

_____

Worksheet 9.4.3: Adding Processors

1. How do you check the motherboard to see if it can support a faster clock speed?

    _____

2. To add another processor to a multiprocessor-capable network server, the new processor must meet what criteria?

    _____

    _____

    _____

    _____

3. The seven steps for adding additional processors:

    Step 1 _____

    Step 2 _____

    Step 3 _____

    Step 4 _____

    Step 5 _____

    Step 6 _____

    Step 7 _____

4. On a Windows NT and Windows 2000 Server the _____ has to be updated before multiple processors are added.

5. What number from the processor label can you use to look up Intel web sites to identify the processor currently in your network server? _____

6. When upgrading a single processor to a faster single processor, may the BIOS need to be upgraded? True / False _____

7. What two ways is the processor identification utility available?

    _____

    _____

8. Can Novell support multiple processors? _____

9. What are the steps taken to enable multiple processors in Novell?

_____

_____

10. What must be done in Linux to be able to support multiple processors?
_____

11. What command will show you the current processor information?
_____

Worksheet 10.2.5: Types of Networks

1. What is the definition of a network?

    _____

    _____

    _____

2. What is the definition of a computer network?

    _____

    _____

    _____

3. Provide a brief definition for each of the terms:

    LAN: _____

    _____

    _____

    WAN: _____

    _____

    _____

    Circuit-switched network: _____

    _____

    _____

    Packet-switched network: _____

    _____

    _____

    Client/Server Network: _____

    _____

    _____

Peer to Peer: _____

_____

_____

Hybrid network: _____

_____

_____

4. On a LAN, what are the rules for coordinating the use of the medium called?

_____

_____

_____

5. Define CSU/DSU:

_____

_____

_____

6. A data channel, over which data can be sent, can operate in one of three ways, name them:

_____

_____

Worksheet 10.4.2: Network Topology

1. What is the difference between physical topology and logical topology:

    _____

    _____

    _____

2. Describe the following topology:

    Bus: _____

    _____

    _____

    Star: _____

    _____

    _____

    Extended Star: _____

    _____

    _____

    Ring: _____

    _____

    _____

    Mesh: _____

    _____

    _____

    Hybrid: _____

    _____

    _____

    _____

3. What is the definition of networking media?

_____

_____

_____

4. What does the term "architecture" refer to?

_____

_____

_____

5. In a Token Ring implementation, what is the purpose of the "monitor of the ring"?

_____

_____

_____

Worksheet 10.6.5: OSI Model, TCP/IP, Protocols

1. What does OSI stand for?

   _____

   _____

   _____

2. How does the OSI model work and include an example:

   _____

   _____

   _____

3. Explain the purpose of each of the seven layers of the OSI model:

   Application: _____

   _____

   _____

   Presentation: _____

   _____

   _____

   Session: _____

   _____

   _____

   Transport: _____

   _____

   _____

   Network: _____

   _____

   _____

   Data Link: _____

_____

_____

Physical: _____

_____

_____

4. What is a protocol?

_____

_____

_____

5. For what purpose was the original TCP/IP designed?

_____

_____

_____

6. How does TCP/IP differ from the OSI Model?

_____

_____

_____

7. Explain application protocols:

_____

_____

_____

8. Explain transport protocols:

_____

_____

_____

9. Explain network protocols:

_____

_____

Worksheet 10.8.7: Connecting to the Internet

1. Explain the difference between synchronous and asynchronous:

    _____

    _____

    _____

2. What is the definition of a modem?

    _____

    _____

    _____

3. List the four main types of modems:

    _____

    _____

    _____

4. There are three activities that occur during the local command and online state of a modem. List them:

    _____

    _____

    _____

5. What are AT commands?

    _____

    _____

    _____

6. What does ISP stand for and what role does an ISP play in the Internet?

    _____

    _____

    _____

7. What does vBNS stand for and what role does the vBNS play in the Internet?

    _____

    _____

    _____

8. Explain the major differences between DSL and cable modems:

    _____

    _____

    _____

Worksheet 11.6.1: Paper Jams

True or False

1. _____ Fragments of paper that are torn in the printing process often must be removed from the paper path.

2. _____ Failing parts that drive paper movement may cause paper to crumple or z-fold in the process of moving through the path.

3. _____ Paper clumping is when one page sticks to another because the toner was not fused to the paper correctly.

4. _____ A paper jam cannot occur when the wrong type of paper is used because the printer will not accept it through the registration rollers.

5. _____ Most of the problems in laser printers that require service are rooted in the paper dust that is accumulated in the paper path.

6. _____ Because there are static charges present in the laser printing process, dust will not accumulate outside the paper path.

7. _____ If there is toner residue on the printer, use a wet towel to clean the affected area.

8. _____ Stepper motors are usually trouble free.

9. _____ Poor solder connections on stepper motors have been known to cause intermittent operations.

10. _____ Very few paper jams are caused by improper paper type or weight.

Worksheet 12.1.4: Environmental Considerations

1. Explain why batteries need special disposal guidelines.

    _____

    _____

    _____

2. Explain why monitors need special disposal guidelines.

    _____

    _____

    _____

3. Explain why chemical solvents and aerosol cans need special disposal guidelines.

    _____

    _____

    _____

4. Inkjet printer cartridges and laser printer toner cartridges can be _____
    and _____.

5. MSDS is an acronym for?

    _____

6. What is the MSDS used for?

    _____

    _____

    _____

7. MSDS contains information on:

    . _____

    . _____

    . _____

    . _____

Worksheet 12.2.1: Electrostatic Discharge (ESD)

1. ESD is an acronym for _____ _____ .

2. Most computer chips run on less than _____ volts of electricity.

3. Always use _____ _____ to temporarily store computer parts and components until they are ready to be reinstalled.

4. Devices such as grounding _____ _____ form a connection between a person and to the earth, which gives a place for the static to go before it attacks a sensitive computer component.

5. When the humidity is _____ the potential for ESD increases dramatically.

6. If the temperature is cool or if there is carpeting on the floor, there is a _____ _____ potential for static electricity.

7. When working on a computer, one of the first things a person should do when the case has been opened is to _____ themselves to the case by touching an exposed unpainted metal part of the computer case.

8. A good working area should have a climate control system that maintains the relative humidity between _____ % and _____ %.

9. When working on high voltage equipment, such as a power supply or a CRT monitor, a _____ _____ should NOT be used.

Worksheet 12.3.5: Preventive Maintenance for Components

1. The majority of preventive maintenance is _____ .

2. A problem with dust is its capability to be _____ charged.

3. If the wrong types of cleaners are used, damage from _____ could occur over time.

4. _____ _____ can be a very useful tool to quickly and easily clean out a dusty computer.

5. To fully protect your files from virus infection, the virus _____ list must be up to date.

6. If you are going to work on a laser printer that has been in use, let it _____ for a while before coming in contact with the internal components.

7. Define the following terms:

    .   blackout –

    _____

    _____

    .   brownout –

    _____

    _____

    .   electrical noise –

    _____

    _____

    .   spike –

    _____

    _____

    .   surge –

    _____

    _____

. surge suppressor –

_____

_____

. standby power supply –

_____

_____

. uninterruptible power supply –

_____

_____

Worksheet 13.1.2: Troubleshooting Basics

1. Troubleshooting is a process of diagnosing a _____ and finding and implementing the correct _____ , which results in restoring the system to its original operational state.

2. The Troubleshooting Cycle

    . _____ the problem

    . Gather _____

    . _____ a solution

    . _____ a solution

    . Is the problem solved?

        • Yes – Document your observations and results

        • No – undo changes and _____ steps a-d

    . _____

3. Why is using the structured approach provided by the troubleshooting cycle beneficial in solving computer related problems?

    _____

    _____

    _____

Worksheet 13.3.2: Troubleshooting Printers

True or False:

1. _____ Problems with dot-matrix printers related to the print quality are some of the most difficult to identify.

2. _____ Because dot-matrix printers are relatively simple devices, there are only a few problems that usually arise.

3. _____ With dot-matrix printers, a common cause of a paper jam is a piece of paper that has torn off and lodged in the paper path.

4. _____ Stepper motors are not sensitive to stray voltages.

5. _____ In a dot-matrix printer, lines of print will be unevenly spaced if the main motor is damaged.

6. _____ Print quality is the most common problem associated with ink jet printers.

7. _____ Black lines present in every line of text on a printed page are caused by a plugged hole in at least one of the small, pinhole ink nozzles in the print cartridge.

8. _____ Failure of the high-voltage power supply (HVPS) is not the cause of a laser printer printing blank pages.

9. _____ If there is toner inside the toner cartridge you will be able to hear it when it is shaken.

10. _____ The corona wire (or roller) is an inexpensive part and can be easily replaced.

11. _____ Because the drum is grounded, it has no charge and nothing with a charge (like toner) will stick to it.

12. _____ Toner spilled inside the printer or by a crack or chip in the EP drum may cause repetitive marks.

13. _____ Foreign matter caught on the transfer corona wire causes vertical white lines running down the printed page.

14. _____ Image smudging is caused by a fuser problem.

Worksheet 13.3.4: Troubleshooting Hardware

1. What is a Field Replaceable Unit (FRU)?

   _____

   _____

   _____

2. What is POST used for?

   _____

   _____

   _____

3. Describe what Beep Codes indicate:

   _____

   _____

   _____

4. Explain one main reason for a CPU failure:

   _____

   _____

   _____

5. What is the first place you should check when troubleshooting memory?

   _____

   _____

   _____

6. How can you tell if you have a motherboard problem?

   _____

   _____

   _____

7. List two types of video problems:

_____

_____

_____

8. The first three steps when diagnosing any disk drive problems are:

a. Check the _____ cable.

b. Check the _____ cable.

c. Check the device _____.

9. Most sound card problems are _____ conflicts.

Worksheet 14.4.5: Troubleshooting Software

Match each term with its description

_____   1. Clean Boot   a. A file that has a list of DOS statements that are executed
                                 when the computer is first started

_____   2. Patch   b. An error that occurs when two programs that are running at
                                 the same time try to use the same area in memory

_____   3. Boot Disk   c. Software that is still in the initial phase of testing within the
                                 software production house

_____   4. CONFIG.SYS   d. A diagnostic state of Windows that allows you to fix
                                 problems that prevents you from starting Windows normally

_____   5. AUTOEXEC.BAT   e. Software used to "quick-fix" a bug in a program

_____   6. REM   f. Memory and hard drive space used by Windows

_____   7. Safe Mode   g. A disk containing a rudimentary operating system used to
                                 start a computer

_____   8. Registry   h. A way of starting a computer with a minimal set of drivers
                                 and programs

_____   9. Device Manager i. The second release of a program intended for the public to
                                 test

_____   10. Resources   j. A file that contains statements for loading memory drivers
                                 and that tells the operating system where key DOS files are
                                 located

_____   11. GPF   k. A command used to make remarks in DOS startup files

_____   12. Beta Release   l. Files that contain information about user settings and
                                 configuration information for applications

_____   13. Alpha Release   m. A part of Windows that provides you with a visual
                                 presentation of physical devices that are used in your
                                 system