

**Phase**

**1**

# **Installing Hardware and Software**

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Every common task that is performed by a PC technician is hands-on in some way. Although some of the work you do is performed at the keyboard, many of the tasks you will perform in this phase will be spent underneath a desk in someone's cubicle or at a workbench. These are the usual locations for opening up a computer case and installing or removing equipment. This phase of the book covers the most common installation tasks for hardware, such as RAM, hard drives, and power supplies. In this phase, you'll also learn how to install and uninstall various types of software, including operating systems, applications, and drivers. In general, you'll need at least one PC that you can open up and work with, as well as some common tools. Each task will list the specific requirements you'll need in order to complete the job. This is also true of the software portion of this phase. Now it's time to open the book to the first task, pick up a screwdriver, and get started.



The tasks in this phase map to Domains 1, 2, 3, 4, 7, and 8 for the CompTIA A+ Essentials (220-701) exam objectives and Domains 1, 2, 3, 4, and 8 for the CompTIA IT Practical Application (220-702) exam objectives.

## Task 1.1: Preventing ESD Damage

It is amazingly easy to damage the delicate electrical circuitry inside a computer. As a child, you may have rubbed your feet back and forth on a carpet and then touched another person's hand to give them a static shock. What you probably don't realize is that your body carries some electrical potential all of the time. Most of the time, though, the discharge is insufficient to be perceived by the human nervous system. Unfortunately, it is more than enough to fry some components inside a PC. This type of damage can cause maddening intermittent faults in the computer that can seem to be impossible to diagnose.

Happily, there are precautions you can take to prevent such damage. The most common method (though not recommended as the only method) is to open the PC's access panel and touch the frame of the computer to equalize the electrical potential between you and the computer. This is the "quick and dirty" method of preventing electrostatic discharge (ESD). If you want to do this while working on your own computer, go for it. When you are working with other people's equipment, you'd better stick to safer procedures.



In the first edition of this book, I stuck this task at number 18 in the list, but this is something you really need to know before you stick your hands inside a computer case for the first time. Taking ESD precautions isn't the "sexy" part of PC repair and maintenance, but learning this first will save you one or more migraines as you progress through this book and your career.

## Scenario

You have a PC on your workbench that needs to have its memory upgraded (see Task 1.2). You are about to remove the screws from the PC case's access panel and take off the panel. You have just been briefed by your supervisor on the proper method of preventing ESD damage to the inside of the computer. All of the necessary equipment has been provided, and you begin going through the necessary precautionary procedures.

## Scope of Task

### Duration

This should only take a few minutes.

### Setup

You don't actually have to open the computer for this task; all you'll need to do is set up the ESD precautions.

### Caveat

Although this is a single task, you would be wise to "perform" this task every time you open up a computer case. The few minutes it takes to implement these procedures could save you hours of trying to figure out some problem caused by a stray static shock.

## Procedure

This lesson will show you how to implement proper ESD procedures.

## Equipment Used

You'll need at least an ESD wrist strap, but you can also get an ESD cover for your workbench and a mat to stand on while working on the computer. Always have antistatic bags ready for any components you remove from the computer.



Use your favorite search engine and enter the search string "ESD equipment" to see the different tools available for taking ESD precautions.

## Details

This exercise will show you the steps to take to prevent ESD damage while working on a computer.

### Taking Steps to Prevent ESD Damage

1. Verify that your workbench is covered with an ESD mat before placing a computer on the bench.
2. Make sure there is an ESD mat where you will be standing while working on a computer.
3. Check to make sure whatever component you are installing is stored in an antistatic bag.



Try not to wear synthetic clothing while working on a computer.



Don't use Styrofoam while working on the computer. If you have to have a cup of coffee, use a ceramic cup (although drinking anything around an open computer is asking for trouble). Passing a piece of Styrofoam over electrical components can damage them.

4. Place an antistatic strap around one of your wrists.
5. Clip the other end of the cable attached to the strap to the frame of the computer.



Another activity that can cause ESD damage is vacuuming the interior of the PC case. (Use a can of compressed air instead.) To clean components, use antistatic sprays instead of detergents. Rubbing erasers inside the case also can build up static.



If compressed air seems too messy for you, there are special ESD vacuums available, such as the one at [www.intertronics.co.uk/products/csmdvac.htm](http://www.intertronics.co.uk/products/csmdvac.htm).

## Criteria for Completion

You will have successfully completed this task when you have secured your work area and yourself with ESD equipment. You are now ready to open the computer case.

# Task 1.2: Installing RAM

RAM, or random access memory, is the desktop of the computer. Anytime a PC user wants to open a program to read email, surf the Web, or play a game, that program is loaded into memory from the hard drive and will stay in memory for as long as it's active. How many programs a PC can run at the same time without a noticeable slowdown of performance depends on how much RAM is in the computer. Naturally, the more RAM a computer has, the better.

Installing RAM sticks is an extremely common task for a PC technician. You'll likely spend countless hours on the floor or at a workbench, installing or upgrading RAM. Although choosing the correct type of RAM is vitally important, it is fairly simple to research the computer you are working on to discover exactly which type it takes.

Once you have the correct stick of RAM for the computer, all that's left to do is to power down the PC, open it up, and install the stick. This task will guide you through the steps necessary to find the appropriate type of RAM for a particular computer and physically install it.

## Scenario

One of the users in accounting has recently had installed on her PC new software that is required for a special project she is working on. She is using an older PC and complains that when she tries to open the application, computer performance slows to a crawl. Your supervisor has determined that the user's PC has insufficient RAM to run this piece of software and has assigned you to upgrade the amount of memory in her machine. You will need a computer with access to the Internet to research the type of RAM stick that is correct for the particular PC you'll be working on. You will also need to have a computer in which you can install a RAM stick and the appropriate RAM itself. Make sure you have a screwdriver to remove the side panel of the computer so you can access the interior. You'll need to take the appropriate steps to prevent electrostatic discharge (ESD) damage to the sensitive electrical components inside the PC as well as to the RAM stick you are about to install. See Task 1.1 for details about ESD precautions.

## Scope of Task

### Duration

This task should take about 15–30 minutes.

### Setup

All you'll need for this task is a single computer with at least one empty RAM slot, an appropriate stick of RAM, and a screwdriver that will fit the screws holding the side access panel on the PC.

## Caveat

Depending on the type of computer you are working on, how the PC's access panel is attached will vary, so the instructions in this task may not be quite the same for your PC. The memory slots can be located on different areas of the motherboard on different computers, so you will have to take a moment to locate them. Some RAM slots can be difficult to reach, making your task a bit harder. The occasional scraped knuckle is to be expected when working inside a PC. This example uses a computer running Windows XP Professional. If you are using a different operating system, the steps you use to test and verify that RAM has been added may not be identical to the steps in this task. When selecting the type of RAM, make sure that you use the correct memory frequency as well as the desired amount of RAM. Also, some motherboards care which memory slots you place the first and second sticks of RAM into, so you may have to switch sticks between slots in order to have the computer recognize all of the RAM installed.

## Procedure

In this task, you will learn how to determine which type of memory is correct for a particular PC, open the PC, and install an additional stick of RAM on the motherboard, close the PC, and verify that the additional RAM is detected and being used by the computer. Part of locating the right type of RAM involves visiting the website of a commercial memory vendor. It will not be necessary to purchase RAM from this vendor; you will simply visit this site to find the type of RAM your computer uses.

## Equipment Used

You should need only a single screwdriver to complete this task, although some PCs come with a latch system that lets you open the panel without any tools at all.

## Details

The following sections walk you through determining the computer's manufacturer and model type, using that information to find out what kind of memory is correct for this machine, and installing and testing the additional RAM.

### Determining the Correct Type of Memory for a Particular PC

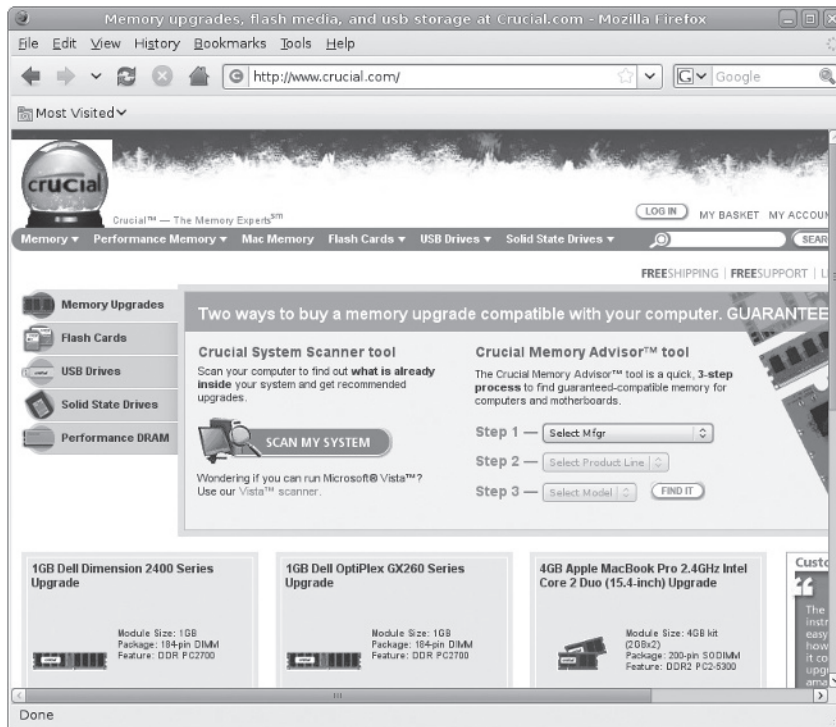
#### DETERMINING THE MAKE AND MODEL OF A PC

1. Look at the front of the computer.
2. Locate the name of the computer manufacturer and the name and number of the model.

#### LOCATING THE CORRECT RAM TYPE FOR A COMPUTER

1. Open a web browser on a computer with an Internet connection.
2. In the URL field, type `www.crucial.com`.

- On the Crucial website, under the Crucial Memory Advisor Tool, click the Select Mfg drop-down arrow.



- Select the name of the maker of the computer.

**Crucial Memory Advisor™ tool**

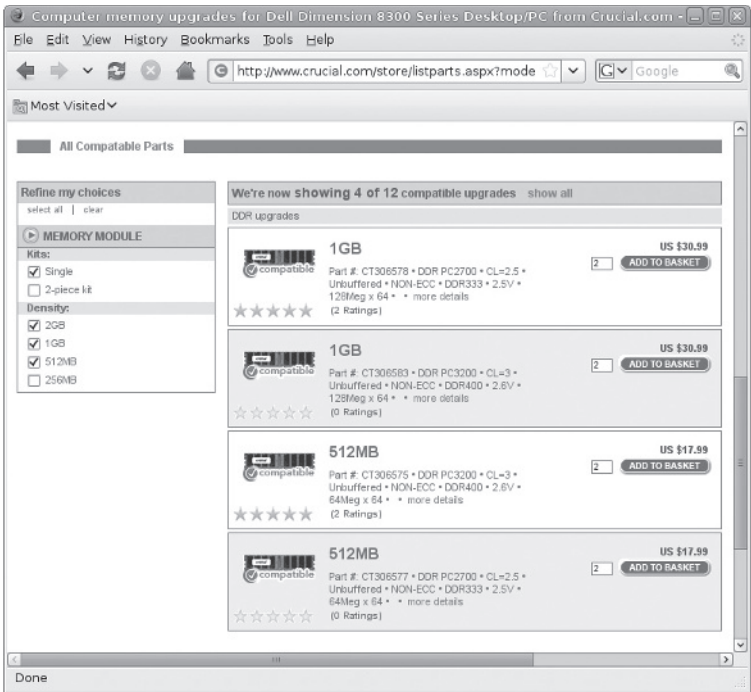
The Crucial Memory Advisor™ tool is a quick, **3-step process** to find guaranteed-compatible memory for computers and motherboards.

Step 1 —

Step 2 —

Step 3 —

- Click the Select Product Line drop-down arrow.
- Select the model name of the computer.
- Click the Select Model drop-down arrow.
- Select the specific model of the computer.
- Click the FIND IT button.
- Locate the specific type and amount of RAM you need.



You can also select the “Max It Out Recommendation” at the top of the results page to maximize the amount of RAM on your computer.

11. Click the picture of the RAM stick or the More Details link in the desired row.
12. Locate the memory-module details and, if necessary, scroll down and locate the product details.



13. Write down the specific details about the stick of RAM you need.
14. Close the web browser.



## Installing a Stick of RAM

### OPENING THE CASE

1. Power down your computer and wait until it is completely off.



Some technicians feel that to be completely safe, the power cord should be unplugged from the computer's power supply as well.

2. Use your screwdriver to remove the screws attaching the access panel to the computer case.
3. Remove the access panel.

### INSTALLING A MEMORY STICK

1. Place the PC on its side or in a position that gives you access to the motherboard.
2. Locate the RAM slots.
3. Remove the RAM stick from its antistatic bag, being careful not to touch the pins.
4. Pull the latches back from the slot.
5. Position the stick of RAM so that the notch on the stick is appropriately aligned with the tab on the slot.
6. Slowly but firmly press down the stick of RAM until both latches on the slot click into position.
7. Replace the access panel.
8. Replace the screws so that the access panel is held firmly to the PC's frame.
9. Return the PC to its original position.

### TESTING THE MEMORY

1. Power on the computer.



If you unplugged the power cord, you will need to plug it back in first.

2. Listen for two beeps as the computer boots.



Beep codes differ depending on the type of BIOS used in your motherboard. To learn more about different types of BIOS and their associated beep codes, visit [www.pchell.com/hardware/beepcodes.shtml](http://www.pchell.com/hardware/beepcodes.shtml) or go to your favorite search engine and search for "beep codes."

3. Look for a message on the monitor indicating that the amount of memory on the computer has changed.
4. Follow any instructions you see on the monitor.
5. Allow the computer to continue to boot and the operating system to load.

**VERIFYING THE MEMORY**

1. On the computer Desktop, click the Start button.
2. Right-click My Computer and select Properties.



If My Computer isn't in your Start menu, it can most likely be found on the Desktop.

3. On the General tab of the System Properties box, locate the amount of RAM in the PC.
4. Click Cancel to close the System Properties box.

**Criteria for Completion**

You have completed this task when you have verified that the amount of RAM has increased to the correct amount. This amount will vary depending on how much RAM the computer originally had and how much you added.

## Task 1.3: Installing a PCI Card

Despite the popularity and ease of use of USB devices and the growing popularity of PCI Express, many hardware features of a PC continue to be supported by PCI, or Peripheral Component Interconnect, cards. Actually, PCI is an industry standard that describes how data are managed on the PCI bus of a computer's motherboard in terms of clock speed and throughput rate. The PCI bus has replaced the older Industry Standard Architecture (ISA) expansion bus in modern computers. PCI cards are added to the main circuit board of a computer to add hardware functionality such as a modem, sound card, or network interface card (NIC).



PCI Express is an up-and-coming standard and is replacing the aging PCI bus (see Task 1.4). You'll find an excellent overview of this technology here: [www.directron.com/expressguide.html](http://www.directron.com/expressguide.html).

Installing or upgrading a PCI card in a computer is a common task for the PC technician; in most cases it is quite easy to do, thanks to Plug and Play (PnP) technology. Older expansion bus cards required the technician to manually configure the I/O and IRQ values for the new card to prevent it from attempting to use resources that were already allocated to another piece of equipment. Today, this configuration is done automatically for the most part (there are exceptions), and all you really need to do is install the card and expect it to work.

## Scenario

Your company has just opened a small branch office nearby that requires several computers to be networked on a local LAN and to have Internet access. One of the computers is an older unit that had a failed NIC card. That card has been removed but a replacement was never installed. You have located an appropriate NIC that you can install in a PCI slot on the PC's motherboard. You must travel to the branch office to install the card. You will need to have a PCI card for this task as well as a screwdriver to remove the screws anchoring the side access panel to the computer's metal frame. Finally, you'll need to take the appropriate steps to prevent ESD damage to the sensitive electrical components inside the PC and the new NIC. See Task 1.1 for details.

## Scope of Task

### Duration

This task should take approximately 30 minutes.

### Setup

All you'll need for this task is a single computer with at least one empty PCI slot, a PCI card, and a screwdriver that will fit the screws holding the side access panel on the PC. PCI-slot covers are also usually attached to the computer by screws. You may need an additional screwdriver if the screw types for the access panel and the PCI slots are different. Although the task scenario specifies a NIC, you can use any PCI card to perform the actual task on your computer. In the NIC scenario, the computer is already configured to accept an IP address dynamically, so a Dynamic Host Configuration Protocol (DHCP) server must be available on the network.

### Caveat

The same caveats that applied to Task 1.2 apply here in terms of how to actually open the computer's access panel and where the PCI slots are located on your particular motherboard. The procedure for installing the new card is identical regardless of the operating system installed on the machine. The process of testing the card subsequently described uses Windows XP as an example.

## Procedure

In this task, you will learn how to install a PCI card into the PCI slot on a computer's motherboard. You will also learn how to determine if the card is functioning correctly once it's installed.

## Equipment Used

You may need one or two screwdrivers, depending on the types of screws holding the access panel and PCI-slot cover to the computer. As mentioned in Task 1.2, some computer access covers use a latch system that doesn't require the use of a screwdriver. Also, some PCI-slot covers are attached by latches that can be opened without a tool.

## Details

The following sections guide you through the process of installing a PCI card on a PC and verifying that the card is functioning correctly.

### Installing a PCI Card

#### OPENING THE CASE

1. Power down your computer and wait until it is completely off. For additional safety, unplug the power cord from the back of the computer.
2. Locate your screwdriver, and remove the screws attaching the access panel to the computer case.
3. Remove the access panel.

#### INSTALLING THE PCI CARD

1. Locate the PCI slots on the motherboard and select the one you will use.
2. Locate the appropriate screwdriver, and remove the screws attaching the PCI-slot cover from the PC's frame.
3. Remove the cover and put it aside.
4. Remove the PCI card from its antistatic container.



All electronic components should be stored in an antistatic container to prevent ESD damage.

5. Orient the card so that the pins line up correctly with the PCI slot.
6. Orient the card so that the NIC's port lines up with the opening in the back of the PC.
7. Gently but firmly press the PCI card into the slot, making sure it is fully engaged.
8. Use the PCI-slot cover screw to secure the PCI card to the PC's frame.
9. Replace the access panel.

10. Replace the screws securing the access panel to the PC's frame.
11. Return the PC to its original location, and replace the PC's power cable.

### TESTING THE PCI CARD

1. Power on the computer.
2. Wait for the PC to boot and load the operating system.
3. Plug the patch cable into the NIC's Ethernet port.



The link light on the NIC should go on if the NIC is active and if the other end of the cord is plugged into an active port on a hub or switch.

4. Click Start ➤ Run.
5. In the Run box, type **cmd** and click OK.
6. When the command emulator opens, type **ipconfig/all** and press Enter.
7. If the output displays the IP address and subnet mask of the PC and other network configuration settings, the PCI NIC is working and the computer successfully received an address dynamically.



The one exception is if the computer cannot connect to the DHCP server. Windows 2000, XP, and Vista are configured by default to use Automatic Private IP Addressing (APIPA) if the computer cannot acquire a dynamic address. If the address is returned in the 169.254.x.x range and the subnet mask is 255.255.0.0, the computer is using APIPA. Consult with your network administrator to find out what subnet mask and IP address range you should expect the computer to acquire. To learn more about APIPA, visit this site: <http://msdn.microsoft.com/en-us/library/aa505918.aspx>.



If the computer hasn't received addressing information, it doesn't necessarily mean that the installation didn't go well. You may have to type **ipconfig/release** and press Enter, then type **ipconfig/renew** and press Enter to acquire an IP address from the DHCP server.

## Criteria for Completion

You have completed the task when the PCI NIC functions correctly, allowing network communications between the PC and the rest of the network. You may have installed a different type of PCI card, such as a video or sound card. If so, the criteria for completion would be the successful testing and operation of those cards based on their purpose.

## Task 1.4: Installing a PCI Express Card

As mentioned in Task 1.3, the PCI is aging and is no longer capable of meeting the current needs for speed and performance, particularly in the arena of graphics cards. AGP (Accelerated Graphics Port) cards are also an aging technology having the same issues. The most common reason for an upgrade to a PCI Express (PCIe) graphics card is to let you run games faster and to add TV/DVI to your computer system.

Fortunately, installing a PCIe graphics card is a relatively simple task, akin to installing a PCI card. The processes are different enough to make creating a separate task worthwhile. To learn more about the PCIe standard, see the URL in the introduction to Task 1.3. Also, Wikipedia provides a good description of the PCIe standards and specifications: [http://en.wikipedia.org/wiki/PCI\\_Express](http://en.wikipedia.org/wiki/PCI_Express).

### Scenario

You have a PC in your workshop with a customer request to install a PCIe graphics card. You have been provided with the necessary card and your only task is to install it and the drivers. The computer's motherboard is current and PCIe-capable. You will need to have available one or more screwdrivers to enable you to remove the PC's access panel and to remove the card-slot cover. After the card has been installed, you will need to use the accompanying CD to install the drivers. Be sure to follow ESD precautions to prevent damage to the PC's electronic components (see Task 1.1).

### Scope of Task

#### Duration

This should take about 30 minutes.

#### Setup

You'll need a computer with at least one empty PCIe slot, a PCIe card, and a screwdriver that will fit the screws holding the side access panel on the PC. You may also need a second screwdriver for any screws attaching the PCIe-slot cover to the PC's frame. If you are unsure whether your motherboard supports the PCIe bus standard, check your motherboard manual.

The card may come with additional features such as a heat sink and cooling fan. The fan may need an external power source. Consult the card's documentation for any additional requirements before proceeding.

You will also need the driver CD for the PCIe graphics card. The driver CD should come with the card. Although the scenario specifies a PCIe graphics card, you can use any PCIe

card you have available to complete this task, but make sure you have the drivers for the card. As always, follow ESD precautions while working inside the PC case.



If you are interested in actually installing a PCIe graphics card suitable for gaming but are unsure how to select the right card, visit [www.build-gaming-computers.com/gaming-video-card.html](http://www.build-gaming-computers.com/gaming-video-card.html) for more information.

## Caveat

A PCIe card, unlike the older PCI or AGP cards, can fit into a slot its own size or larger on the motherboard, but cannot fit into a smaller-sized slot, so verify the size of the card and slot before proceeding. The PCIe bus uses pairs of point-to-point serial links called lanes, rather than a shared parallel bus. Depending on the lane speeds supported by the PCIe card and the motherboard, the number of pins on the card can be different. Make sure that the lane speeds for the card and motherboard are compatible by checking card and motherboard documentation.

## Procedure

This lesson will show you how to install a PCIe graphics card and then install the card's drivers from CD.

## Equipment Used

You'll need one or more screwdrivers to remove the screws from the PC access panel and from the PCIe-slot cover. Some covers however, are attached by tabs or latches that require no special tools. Although you may not consider a CD a tool, you'll need to have the card's driver CD handy.

## Details

The following sections guide you through the process of installing a PCIe graphics card on a PC and installing the card's drivers from a CD.

### Installing a PCIe Graphics Card

#### OPENING THE CASE

1. Power down your computer and wait until it is completely off. For additional safety, unplug the power cord from the back of the computer.
2. Locate your screwdriver and remove the screws attaching the access panel to the computer case.
3. Remove the access panel and position the PC on its side. Apply ESD precautions before proceeding.

**INSTALLING THE PCIE CARD**

1. Locate the PCIe slots on the motherboard and select the one you will use.
2. Locate the appropriate screwdriver and, if necessary, remove the screws from the PC's frame attaching the PCI-slot cover.
3. Remove the cover and put it aside. For some cards, you may need to remove more than one slot cover to accommodate the size of the heat sink and fan on the card.
4. Remove the PCIe card from its antistatic container, holding it by its edges.
5. Orient the card so that the pins are aligned correctly with the slot.
6. Gently but firmly, push the card into the slot until it is securely installed. If present, push the plastic slot latch to the up position to more securely seat the card.
7. Replace the PCIe-slot cover and, if required, secure the cover by replacing and tightening the screws.
8. If your card has a fan, verify that the fan is clear of any cables or other obstructions.
9. If your card's documentation states that it requires an external power connection, locate the necessary four-pin power cable that came with the card. Connect the correct ends of the cable to the motherboard and to the card.
10. Verify that the card is secure in the slot and that all connections are firm.
11. Replace the PC's access panel, securing it with the accompanying screws, upright the PC, and replace the PC's power cable.

**INSTALLING THE PCIE GRAPHICS CARD DRIVERS**

1. Power up the computer.
2. Wait for the computer to completely boot and for the operating system to load, verifying that no error messages occur.
3. Locate the CD containing the drivers for the graphics card.
4. Open the CD/DVD drive, insert the CD, and close the drive.
5. Follow the onscreen instructions for installing the drivers. The instructions will vary depending on the make and model of the graphics card. See Task 1.21 for more information about installing drivers from a disc.
6. When prompted, remove the CD and reboot the computer.
7. After the computer has rebooted and the operating system has loaded, open a web browser and locate the PCIe graphics card manufacturer's website.
8. Locate the current drivers for the card you installed and download and install the most current drivers from the website. The drivers on the CD will almost certainly be out-of-date. See Task 1.22 for more information on installing drivers from the Internet.
9. Reboot the computer again.



10. When the computer has rebooted and the operating system has loaded, verify the operation of the graphics card by right-clicking the desktop, clicking Properties, clicking Settings, and then configuring the screen resolution to the desired setting.
11. Close all dialog boxes when done.

## Criteria for Completion

You will have successfully completed this task when you have installed the PCIe graphics card and the card's drivers, and have verified that the card and the PC are functioning correctly. If you installed a different type of PCIe card, the criteria for completion are the successful testing and operation of the card based on its purpose.

# Task 1.5: Installing a CPU

All PCs require a central processing unit (CPU) to perform the calculations necessary to process all instructions provided by all of the programs running on the computer. You normally don't have to do this task very frequently because CPUs are pretty robust. The most common situations in which you will install a CPU are when you are building a computer from its component parts, when you are upgrading a PC to a faster CPU, and when (occasionally) the CPU fails and needs to be replaced.

The actual installation process is very simple, but it does require a bit of preparation. You must make absolutely sure that you have the right CPU for the processor slot on the motherboard. You must also verify that the motherboard supports the CPU's bus speed, voltage, multiplier, and other settings. Even if it is physically possible to install the processing unit, if the computer's BIOS doesn't support the CPU's specifications, the computer won't function.

Also, the process of installing a CPU actually consists of two installations—installing the CPU itself and installing the heat-sink fan on top. The temperature a CPU increases with the amount of work it is asked to do. CPUs in boxes used for heavy gaming take quite a beating. If the unit isn't kept within operational temperature limits, it may ignite and melt.

Beyond the actual installation, the BIOS must be specifically set for the CPU's parameters, so the job's not done until the BIOS recognizes the CPU and successfully boots. That said, let's move on and see how to install a processor.

## Scenario

You have been assigned to upgrade the CPU on a computer. The old processor has been removed and all that needs to be done is to install the new one. Your supervisor wants you to install the CPU in the PC and then power it up, configure the BIOS, and confirm that it is operational. The computer is already open and sitting on the workbench. The correct processor, in an antistatic bag, is sitting next to the PC along with everything else you need.



If you didn't know which processors were supported by the motherboard, you could always go to the vendor's site on the Web and find out. This will be covered in Task 2.1, "Identifying a Motherboard." Also, your processor's documentation is a great help in telling you which motherboards support the CPU. Additionally, you can find this information on the CPU manufacturer's website or consult the motherboard manual.



From the following site, you can download a free utility that will tell you the manufacturer of your PC's motherboard. The tool is compatible with Windows XP, but use it with Windows Vista at your own risk: [www.majorgeeks.com/download181.html](http://www.majorgeeks.com/download181.html).

Your boss leaves and you go over to the workbench and start the installation. All you'll need is the CPU, the thermal compound, and the heat-sink fan. As always, take ESD precautions, as described in Task 1.1.

## Scope of Task

### Duration

This task should take about 30 minutes.

### Setup

You'll need either a PC that doesn't have a CPU installed or one from which you can remove and reinstall the unit. If you are using the processor already installed in the computer, the heat-sink fan will be attached. You will need some fresh thermal compound for this task, though. You can buy a tube of the compound at any computer-hardware store. The task is worded as if you are installing the CPU on the motherboard for the first time, so your actual experience may vary a bit.

### Caveat

There is a dizzying number of different CPUs and CPU slots and sockets. This means that there are nearly as many ways to install a CPU as there are different CPU slots or sockets on motherboards. This task will describe installing a CPU into a zero insertion force (ZIF) socket. You can open ZIF sockets by lifting a small lever on one side of the socket and then lock them by closing the lever again. ZIF sockets are very common, so if you are installing a CPU that uses a ZIF socket, this task should be very close, if not identical, to what you will actually be doing in the exercise.

## Procedure

In this task, you will learn how to install a CPU onto a computer's motherboard, configure the BIOS, and verify that the computer is operational.

## Equipment Used

In addition to the CPU itself, you'll need a tube of thermal compound to create a seal between the processor and the heat-sink fan. Although this scenario starts out with the computer case already open, you'll need a screwdriver at the end of the exercise to reattach the access panel. You will also need a piece of plastic wrap or a plastic bag to smooth the thermal compound onto the CPU.

## Details

The following set of instructions will walk you step-by-step through the process of installing a CPU, configuring the BIOS setup, and testing to make sure the computer is operating after the installation.

### Installing a CPU and Heat-Sink Fan

#### INSTALLING THE CPU

1. Locate the processor socket on the motherboard.
2. Lift the lever on the side to open the socket.
3. Carefully remove the CPU from the antistatic bag, holding it by its edges.
4. Turn the CPU until you can see the pins.
5. Verify that none of the pins are bent.



Not all CPUs have pins. The Intel Socket 775 has only holes. The pins are mounted on the motherboard.

6. Locate the single diagonal corner on the CPU.
7. Line up the pins and the diagonal corner with their counterparts on the processor socket.
8. Gently lower the CPU onto the socket, keeping the pins aligned so that they insert into the holes in the socket.
9. Verify that the CPU is correctly aligned and positioned firmly in the socket.
10. Push the lever on the side of the socket back to the locked position.



Some CPUs come with a cooling solution and protective plate that must be installed at this step of the process.

**INSTALLING THE HEAT-SINK FAN**

1. Locate the tube of thermal compound.
2. Open the tube and apply drops of the compound to the top of the CPU.
3. Cover your finger with a clean piece of plastic and rub the compound smoothly onto the CPU.



Depending on the installation kit you are using, you may also be applying paste as described in Step 3.



Do not use your bare finger or a cloth when smoothing the compound, to avoid introducing contaminants.

4. Locate the heat-sink fan.
5. Align the heat-sink fan so that the mounting clamps are lined up with the corresponding mount points on the CPU.
6. Place the aligned heat-sink fan directly on the CPU.
7. Lock the mounting clamps in place.



There is no one standard method of attaching a heat sink to a CPU. Some systems use clamps, whereas others require screws. Refer to the heat sink's documentation for details.



Be especially careful when locking the mounting clamps in place. Applying too much pressure or slipping with a clamp and damaging the motherboard could make all your efforts up to this point useless.

8. Locate the power wire on the heat-sink fan.
9. Locate the three-pin heat-sink fan header on the motherboard.
10. Connect the power wire to the fan header.

**Initially Testing and Configuring the BIOS****INITIALLY TESTING THE INSTALLATION**

1. Leave the access panel off the PC.
2. Place the PC in an upright position.

3. Verify that a monitor, keyboard, and mouse are attached to the PC.
4. Plug the power cord into the PC's power supply.
5. Plug the power cord into an electrical socket or powered surge protector.
6. Power up the computer.
7. Verify that the heat-sink fan is spinning up.
8. Allow the machine to boot while you are looking at the monitor.

### CONFIGURING THE BIOS FOR THE CPU

1. Verify that the BIOS setup screen is displayed on the monitor.



The BIOS setup should appear automatically, but if you are using the same model of processor that was originally installed on the PC, it may not. If it doesn't, you can manually get into the BIOS. Different computers have different ways of entering the BIOS setup, including pressing the F7 key or pressing the Esc key.

2. Select the menu item for the CPU.



Because BIOS setups vary, there is no standard method for locating specific menus and submenus.

3. Locate the settings for CPU multiplier, voltage, and memory timing speeds (there may be other entries as well).
4. Set them to Auto if the option exists for each setting. For those settings without an Auto option, set the values for those matching your CPU. For example, if your CPU's bus speed is 133MHz, you may need to set that value in the BIOS.
5. When you have completed the configuration, navigate to the BIOS main menu.
6. Select the Save and Exit option.
7. The PC should now continue the boot process and load the operating system.
8. Once the system is running, reattach the access panel.
9. Secure the access panel by screwing it to the frame of the PC.

## Criteria for Completion

You have completed the task when the PC has successfully booted, loaded the operating system, and is running normally.

## Task 1.6: Installing a Power Supply

The term *power supply* is a bit misleading. A PC's power-supply unit takes the AC current from an electrical wall socket (actually, from the wall socket and through a surge protector if you're smart) and converts it to DC current that the computer can use. Should the power supply fail, however, the PC and its components are about as useful as a box of rocks.

Installing a power supply is pretty straightforward. However, you do need to make sure that the voltage and wattage match the computer's requirements. Unless you buy a “bare-bones” PC kit, any PC you purchase will have the power supply already installed. You are likely to need to install a power supply only if you're building a computer from scratch. It is more common that you'll replace a power supply that has failed. The original power supply will have the necessary specifications recorded on its case, telling you what you need to know to order a suitable replacement.



If you truly don't know what power supply you need, you can look up the computer's requirements on the manufacturer's website or go to the motherboard maker's site and search there.

Replacing a power supply may seem like a daunting task, but it's one of the easiest jobs you'll face as a PC technician.

### Scenario

You receive a trouble ticket stating that the power supply in the HR manager's computer has failed. You have removed the PC from the manager's office and now have it on your workbench. You looked up the computer make and model on the Web and found out the specifications for the appropriate replacement. You pulled the replacement unit from the supply closet and have it on the bench with the computer. You are ready to open the case, remove the old power supply, and install the new one.

### Scope of Task

#### Duration

This task should take about 15 minutes.

#### Setup

Ideally, you'll need a PC and an appropriate replacement power supply for the computer. If your power supply doesn't need to be replaced and you want to save yourself the cost

of buying a new one, you can just remove the power supply unit from your PC and then reinstall it. You will follow the same steps in either case. As always, take ESD precautions (discussed in Task 1.1) to avoid accidentally damaging electrical components on the motherboard.

## Caveat

You can upgrade a PC to use a more robust power supply, especially if you have installed newer components in the computer that are electricity-hungry. Just make sure that the specifications of the power-supply upgrade match the computer's requirements. Check the motherboard's and power-supply's documentation to determine whether you need additional adapters or other equipment to correctly perform the upgrade. It should also go without saying that you will need to completely unplug the power supply from its power source before beginning this exercise.

## Procedure

In this task, you will learn how to replace a PC's power supply and verify that the new unit is operational.

## Equipment Used

Other than the new power supply, all you'll need is a screwdriver to remove the PC's access panel and the old power supply. To verify that the replacement is successful, you'll need a monitor, keyboard, and mouse attached to the PC when you power it up.

## Details

The following exercise will walk you through the process of removing a failed power supply and replacing it with a new unit.



Before attempting this exercise, make sure you have powered down the computer and unplugged the power cord from the back of the PC!

## Removing and Replacing a Power Supply

### REMOVING THE POWER SUPPLY

1. Locate the screwdriver and remove the screws from the PC's access panel and put them aside.
2. Remove the access panel.
3. Locate the power supply.



It's virtually impossible to not be able to find a computer's power supply. The back of the power supply contains a large fan and the connector for the power cord, and is easily seen on the back of the PC.

4. Make note of how the unit is mounted and how the wires are connected to the motherboard.



Not all power supplies have the same number or type of power connectors. Three is a common number, but your unit may be different. See this site for an example: [www.atxpowersupplies.com/atx-power-supply-powmax-ag-480-watt.htm](http://www.atxpowersupplies.com/atx-power-supply-powmax-ag-480-watt.htm). Note in the example that, depending on the requirements of the replacement unit and your motherboard, you may need additional pin adapters, extensions, or an IDE-to-SATA drive adapter.

5. Disconnect the power supply's wires from the motherboard.
6. Unscrew the power supply from the PC's frame.
7. Lift the old power supply out of the computer.

#### **INSTALLING THE POWER SUPPLY**

1. Locate the replacement power supply.
2. Mount the new unit in the PC frame in the same way the old unit was mounted.
3. Screw the new unit to the computer frame, making sure it is secure.
4. Connect the power supply's wires to the motherboard in the same pattern as the old unit was attached.
5. Make sure the connections are firm.
6. Replace the PC's access panel.
7. Secure the access panel to the PC by replacing the screws.

#### **TESTING THE POWER SUPPLY**

1. Verify that a monitor, keyboard, and mouse are attached to the PC.
2. Plug the power cord into the socket on the back of the power supply.
3. Verify that the power cord is plugged into a surge protector that is receiving AC current.
4. Power up the computer and watch the boot process.

## **Criteria for Completion**

You have successfully completed this task when the PC powers up normally and the operating system loads.



# Task 1.7: Installing an IDE Hard Drive

Periodically, hard drives fail (which is why you always back up your computers and servers...right?). If your data is backed up, it's an inconvenience but not a total disaster. You can simply replace the failed unit with a new comparable drive (while you're at it, you might as well put in a hard drive with more capacity). You might also end up installing a second hard drive in a computer, but that's pretty unusual in a production environment.

There are a few details that you'll need to know to successfully install a hard drive, but it's a fairly routine task. The time-consuming part is reinstalling the operating system and the application software and then restoring the data from your backup tape or external drive.



Installing an operating system is covered in Tasks 1.24 and 1.25, and installing application software is addressed in Tasks 1.27 and 1.28. The actual restoration of data from backups is usually handled by an experienced tech in an IT department, so that task is beyond the scope of this book.

## Scenario

You have been directed to install a hard drive in a new computer. The hard drive already has an operating system and application software installed via ghosting.



It's typical in production environments to configure a hard drive on a master machine and then ghost it to other drives and install those drives in PCs. This saves a lot of time in deploying PCs with identical configurations in the company.

The computer is on your workbench, with the hard drive and IDE ribbon cable sitting next to it.

## Scope of Task

### Duration

This task should take 15 to 30 minutes.

### Setup

For this task, you'll need a hard drive and a PC. If you are not in a position to install a new hard drive, you can remove the hard-disk drive (HDD) from the computer and then replace it. As always, take ESD precautions to avoid damaging electrical components in the computer.

## Caveat

In this exercise, you will be installing an integrated drive electronics (IDE) hard drive. An IDE drive is also referred to as ATA or PATA (Parallel ATA) drive. As of 2009, most PCs ship with SATA drives onboard, all but replacing PATA drives. Installing a serial drive is only slightly different from installing an IDE drive; however there are enough differences to require that the process have a task dedicated to such an installation.



Installing a SATA drive is described in Task 1.8.

## Procedure

In this task, you'll learn how to install an IDE hard drive in a computer.

## Equipment Used

You'll need an IDE hard drive and a parallel ribbon cable to connect the hard drive to the motherboard. Besides a screwdriver, you'll also need a pair of needle-nose pliers or a pair of strong tweezers.

## Details

The following steps will guide you through the process of installing an IDE hard drive into a PC.

### Installing a Hard Drive

#### INSTALLING THE HARD DRIVE IN A PC

1. Verify that the PC is powered down and unplugged.
2. Locate a screwdriver and remove the screws from the PC's access panel.
3. Remove the access panel.
4. Locate the IDE connectors on the PC's motherboard.



A motherboard usually has two IDE connectors. One is used for the primary hard drive, which you are installing now. The other is typically used to attach a CD or DVD drive or can be used for a second hard drive.

5. Locate the power cord for the hard drive; it will be coming out of the power supply.
6. Locate the holes in the hard drive's bay in the computer; this is where you will use screws to attach the hard drive to the bay.
7. Locate the drive jumpers or switches.



Hard drives need to be set to function as a master, slave, or only drive or cable select. This is controlled by a set of either jumpers or switches on the hard drive. They are usually located on the part of the drive containing the ribbon and power connectors. A diagram on the hard drive will show you the position for the jumpers or switches for each role. Your drive is most likely set up to function as the only drive in the PC.

8. Locate the jumper or switch diagram on the drive.
9. If the jumpers or switches are set for the only hard drive or master role, move on.
10. If the jumpers or switches are not configured correctly, move them to the correct position with your needle-nose pliers or your tweezers.



You can use your fingernails if you are fairly dexterous, but the chances of dropping a tiny jumper into the bowels of your PC are high.

11. Connect the ribbon cable to the ribbon connector on the hard drive.
12. Connect the hard drive power cable to the power connector.



Both of these connectors can fit only one way. Be especially careful connecting the ribbon cable to the hard drive and motherboard, because the pins are thin and easily bent.

13. Place the hard drive in its bay but do not attach it.



Putting one or both hands inside a PC case is difficult; often there isn't very much room for you to work. Make sure all your connections are in place before you mount the hard drive to the PC bay.



Some hard drives mount more like floppy or CD drives. Instead of installing them from the inside, you must remove the face plate from the front of the PC and slide the hard drive in from the front. However, if this is the case, you will not be able to connect the cables to the drive until after it is mounted in the front loading bay.

14. Connect the ribbon cable to the IDE connector on the motherboard.
15. Use the screws that came with the hard drive to mount the drive into the bay securely.



You could probably leave the hard drive sitting loosely in the bay and finish the installation. PCs don't move around much once they are installed in an office or cubicle, but there is still a risk that the hard drive will fall out of the bay and damage the motherboard if the PC is subsequently kicked or moved.

16. Replace the access panel.
17. Secure the access panel to the PC by replacing the screws.

#### TESTING THE HARD-DRIVE INSTALLATION

1. Verify that a monitor, keyboard, and mouse are connected to the PC.
2. Make sure the power cord is connected and that the computer is receiving power.
3. Power up the unit and watch the boot process.



Because a ghosted hard drive is used in this scenario, there shouldn't be any issues with hard-drive formatting or loading of software.

## Criteria for Completion

You will have successfully completed the task when the computer boots normally and the operating system loads.

# Task 1.8: Installing a SATA Hard Drive

Now that you've experienced the installation of an IDE drive, it's time to move on to some more recent technology. The most common reason to install a SATA drive is to enjoy the increased performance benefits over IDE. As previously mentioned, the installation process isn't very much different than installing an IDE drive, but there are enough dissimilarities to warrant a separate task in this book.

While Task 1.7 didn't require you to install an operating system, application software, or data onto the IDE drive once it was physically installed, this task is constructed to end at the point where you would normally begin installing an operating system. Tasks 1.24 and 1.25 describe installing Windows XP and Windows Vista respectively, so for additional details, you can skip ahead to those tasks. This task does require that you set the BIOS to recognize the new SATA drive, which isn't always a straightforward process.

## Scenario

Your company is in the process of conducting a long-term upgrade of the PCs in each department from IDE to SATA drives. The operating systems, applications, and data are to

be reinstalled on the new drives once they are physically upgraded in each computer. You have been tasked to install the SATA drive and then reinstall Windows XP on a PC. The PC is sitting on your workbench and you are ready to begin work.

## Scope of Task

### Duration

This task should take about 30 minutes

### Setup

For this task, you'll need a SATA hard drive and a PC, including any peripheral equipment necessary to complete the installation process. If you don't have a new SATA hard drive, assuming your computer already has such a drive installed, you can uninstall the drive and reinstall it in the PC. As always, take ESD precautions to avoid damaging electrical components in the computer.



You can install a SATA drive in a computer that already has an IDE drive installed, as long as your motherboard supports both standards. This lets you enjoy the performance advantages of using SATA for your data-storage partition while continuing to use the IDE drive for the operating system.

### Caveat

Installing a serial drive is only slightly different from installing an IDE drive; however, there are enough differences to require that the process have a task dedicated to such an installation. The major variation is the type of cables and connectors used; however, SATA drives may have no jumpers because SATA supports only one drive per controller. This means that you don't have to set drives as master and slave or cable select.

There is a jumper block next to the SATA interface connector on SATA 150Mbps drives, but it is for factory use only. On the SATA 300Mbps drives, the jumper block next to the SATA connector can be used to force the drive to use 150Mbps mode. You would use this option only if the motherboard came equipped with an older SATA controller that could accommodate only SATA 150Mbps drives.

If your motherboard does not have a SATA host adapter present, you can add an adapter as a PCI card into the PC.



Before proceeding, refer to your motherboard manual to make sure your motherboard supports a SATA drive installation.

## Procedure

In this task, you'll follow the steps required to install a SATA drive in a computer and set the BIOS to recognize the drive.

## Equipment Used

You'll need a SATA hard drive and separate SATA interface cables and power cables or adapters, which are usually sold separately. You will also need an appropriate screwdriver for removing the PC's access panel as well as for attaching the SATA drive to the PC's frame. Although this task does not require you to install Windows XP, if you wish to do so, you'll need an authentic Windows XP installation CD.

## Details

The following steps walk you through the process of installing a SATA drive into a computer and setting the BIOS.

### Installing a SATA Hard Drive

#### INSTALLING THE SATA HARD DRIVE IN A PC

1. Verify that the PC is powered down and unplugged.
2. Locate a screwdriver and remove the screws from the PC's access panel.
3. Remove the access panel.
4. Locate the SATA connector on the PC's motherboard.
5. Locate the SATA drive interface cable.
6. Attach one end of the drive interface cable to the SATA connector on the motherboard and the other end to the cable connector on the drive.



The connectors on the interface cable can be attached only in one way, preventing attaching the cable incorrectly.

7. Locate the drive power cable.
8. Attach one end of the cable to the power supply and the other end to the SATA drive.



The PC's power supply may already have a power cable attached that is SATA-compatible. If the power cable is for IDE, you will need an IDE-to-SATA drive power cable adapter.

9. Place the drive into the drive bay.

10. Locate the mounting screws for the drive and the appropriate screwdriver, and secure the drive to the bay.
11. Locate the mounting screws for the PC's access panel and the appropriate screwdriver, and replace the access panel.
12. Reconnect the power cable to the PC's power supply.

#### CONFIGURING THE BIOS

1. Verify that a monitor, keyboard, and mouse are connected to the PC.
2. Make sure the power cord is connected and that the computer is receiving power.
3. Power up the unit.
4. When the system begins its start-up routine, enter the BIOS setup.



The BIOS setup should appear automatically, but if it doesn't, you can manually get into the BIOS. Different computers have different ways of entering the BIOS setup, including pressing the F7 key or pressing the Esc key.

5. Select the menu item for the SATA drive and set it to Auto.



Because BIOS setups vary, there is no standard method for locating specific menus and submenus.



If you used a PCI SATA host adapter, your BIOS may not recognize the new SATA drive because the PCI card uses its own BIOS. Consult the documentation for the PCI adapter. This issue will not affect the SATA drive's functioning or storage capacity. If you have your drive connected to the SATA adapter on the motherboard and your BIOS does not recognize the drive or identifies it as a SCSI drive, install the drivers for the SATA drive and reboot. Consult the drive's documentation for instructions on how to install the drivers.

6. Verify that your computer is set to look first at your CD drive when booting.
7. Save the settings and exit the BIOS.
8. Locate the Windows XP installation CD and place it in the computer's CD or DVD drive.
9. Reboot the computer.

Continue to Task 1.24 for instructions on how to install Windows XP onto the new SATA drive or Task 1.25 to perform the same task using Windows Vista.

## Criteria for Completion

You will have successfully completed the task when the computer boots normally and it is ready to install an operating system.

## Task 1.9: Installing a SCSI Drive

Installing a SCSI drive can be a challenge. It is definitely not a Plug and Play technology. As you know, SCSI chains need to be terminated at both ends. Either the motherboard of the computer must have an onboard SCSI controller or you need to install an expansion card with a controller before doing anything else.



In Task 1.8, you may have had to install an expansion card with a SATA controller in order to complete the task.

Not all devices on a SCSI chain have to be drives. A wide variety of SCSI devices can be linked, although for the sake of this exercise, we will be dealing with only SCSI drives on the chain.

Improperly terminating a SCSI chain is probably the most common problem with an installation. If either end of the chain isn't properly terminated, electrical signals hitting an "unterminated" point will be reflected back along the cable, interfering with normal electrical signals.

Each SCSI device must have a unique ID number in the chain. On some occasions, a specific device needs a particular ID number. Check the manufacturer's documentation before attempting the installation to avoid any pitfalls. Sometimes you'll run into a SCSI device that has a built-in terminator, meaning that it must be installed at the end of the chain.

Installing a SCSI device is not for the faint of heart, but with proper preparation, it is an accomplishable task.

## Scenario

You are assigned to install a SCSI drive in a small server. The server has four SCSI drives and one of them has failed. The failed drive has already been removed and all you are expected to do is configure, install, and terminate the replacement drive. The high-level formatting and all subsequent tasks will be handled by the supervising technician.

## Scope of Task

### Duration

Due to the level of difficulty in successfully installing a SCSI drive, this task could take from 15 to 30 minutes.



## Setup

The ideal setup would be to use an older server with SCSI drives installed. You can sometimes “rescue” old servers as they are being decommissioned. More than one starving student has retrieved an ancient server from the trash heap. Although installing a SCSI drive is quite similar to installing an IDE or SATA drive, there are enough differences to require that you have “the real thing” on hand. As always, take ESD precautions to avoid damaging electrical components in the computer.

## Caveat

The task includes only the physical installation. Formatting a drive and installing an operating system are separate tasks and not within the scope of this exercise.



Reformatting a hard drive is covered in Task 1.23, and installing an operating system is discussed in Tasks 1.24 and 1.25.

## Procedure

In this task, you will learn how to install and terminate a SCSI drive.

## Equipment Used

You will need a screwdriver or screwdrivers to open the access panel of the server and mount the SCSI drive in its bay. SCSI drives are linked in chains, so the connector and power cables are already inside the server. The drive is to be connected to the end of the chain, so it must be terminated. In this scenario, the terminator is the last connector on the linking cable. You will need a small pair of needle-nose pliers or tweezers to adjust the jumpers or switches on the drive.

## Details

In this exercise, you will learn each step of the process of installing and terminating a SCSI drive in a server.



Remember, only the ends of the chain need to be terminated. If you were installing the drive somewhere in the middle, the termination portion of this task would be unnecessary.

## Installing a SCSI Drive

### SETTING THE JUMPERS OR SWITCHES

1. Locate the jumpers or switches on the SCSI drive.
2. Locate the diagram on the drive describing what each jumper setting means.



This part of the task walks you through an example of the default settings on a particular SCSI drive. The drive you are using may require different settings.

3. Set the SCSI ID to an unused number in the chain.



Narrow SCSI IDs are 0 through 7, with the host adapter usually set to 7. You must select an ID for your drive that is not being used by the adapter or any other devices on the chain. Also, some drives are configured to receive an ID number from the host adapter over the I/O channel.



Some SCSI devices must be set for a particular ID number. Consult the documentation that came with the drive to see if this is true for your device.

4. Set Motor Start to Disable.
5. Set Delay Motor Start to Disable.
6. Set Write Protect to Disable.
7. Set Parity Check to Enable.
8. Set Terminator Power to Other.



The Other setting in step 8 means that another device will provide power to the terminator, even though your drive will be terminated. The host adapter typically provides the terminator power.

## INSTALLING THE SCSI DRIVE INTO A SERVER

1. If necessary, power down the server.
2. Remove the power cord from the server's power supply.
3. Use your screwdriver to remove the screws securing the access panel.
4. Remove the access panel.
5. Locate the vacant drive bay in the server.
6. Locate an unused power cable from the power supply.
7. Locate the vacant connector and terminator on the end of the SCSI cable.
8. Insert the SCSI drive into the bay but do not secure it.
9. Attach the power cable to the power socket on the drive.

10. Attach the SCSI cable connector to the connector socket on the drive.
11. Attach the terminator to the terminator socket on the drive.
12. Locate the screws that are to be used to secure the drive to the bay.
13. Locate the holes for the screws in the bay and drive.



Sometimes the holes for the screws can be at awkward angles or in tight spaces, making this part of the procedure difficult.

14. Secure the drive to the bay with the screws.
15. Replace the access panel.
16. Secure the access panel by replacing the screws.

#### **TESTING THE SCSI-DRIVE INSTALLATION**

1. Verify that a mouse, keyboard, and monitor are attached to the server.
2. Plug the power cord into the power supply socket.
3. Verify that the other end of the power cord is plugged into a power source.
4. Power up the server.
5. Listen as each SCSI drive spins up in sequence and verify that the newly installed drive is spinning up.

### **Criteria for Completion**

You will have successfully completed this task when you can hear the newly installed SCSI drive spinning up in the server.

## **Task 1.10: Installing a CD Drive**

As you can see in Tasks 1.7, 1.8, and 1.9, installing different types of drives in a computer requires a very similar process with just a few important differences. Although installing a SCSI drive involves a few different steps compared to installing IDE and SATA drives, in the end you still use the same tools and connect the drive to the motherboard and the power supply.

Installing a CD drive in a PC involves many of the same steps but does present a difference or two. Most PCs come with some type of optical drive, so you won't often be installing the first CD drive in a PC. It is more likely that you'll either be upgrading the optical drive in a computer or adding a second one. For example, a user could have a basic CD drive in their computer but want a CD burner added.



Most new computers come with a DVD drive installed by default, so when installing or repairing CD drives, you will likely be working with older computers.

In any event, the procedures involved are practically the same. Installing a DVD drive is also similar but there are enough differences of substance to require this to be a separate task.



Task 1.11 will go through the details of installing a DVD drive.

## Scenario

One of the users at a small branch office has purchased an accounting tutorial on a set of audio CDs. He uses an older computer that does not have a CD drive installed. You have been assigned to go over to the branch office and install a compatible drive. You have been provided with a suitable CD drive kit and tools, have traveled to the branch office, and intend to install the drive in the user's computer while he is away at lunch.



Although it's ideal to be able to take the computer back to your office and perform the installation at your workbench, it's faster to work on the computer where it is. You'll find that you spend a great deal of time under people's desks in their office or cubicle.

## Scope of Task

### Duration

This task should take no longer than 30 minutes.

### Setup

The ideal setup would be to have one PC with no CD drive installed and to possess a suitable CD drive to install in the computer. With just a slight bit of tweaking, you could install a second drive in a computer that already has a CD drive installed. As always, take ESD precautions to avoid damaging electrical components in the computer.

### Caveat

You may or may not have to install the drivers for the CD-ROM drive. Windows 2000 Professional, Windows XP, and Windows Vista most likely already have the drivers on board (although Vista has become notorious for having insufficient drivers available). If not, you

can use the drivers on the disc accompanying the drive or download them from the manufacturer's site. Also, you will need to attach the three-wire audio cable to either the sound card or the audio circuitry connector on the motherboard.



I continue to mention Windows 2000 Professional, even though it is an aging operating system, because you will likely encounter it from time to time. Many companies keep using older operating systems to perform “workhorse” tasks based on the principle, “If it ain’t broke, don’t fix it.”

## Procedure

In this task, you will learn how to install a basic CD-ROM drive.

### Equipment Used

You should need only a flat-head and/or Phillips-head screwdriver to open up the access panel and attach the CD drive securely to the drive bay. You will need a pair of needle-nose pliers or tweezers to set the jumpers or switches. You might also need a flat-head screwdriver if you must pry the face off the computer to get at the selected drive-bay cover. To test the installation, you’ll need an audio CD with content on it.

### Details

This exercise will guide you through the specific steps necessary to install a CD-ROM drive in a PC and test the installation.

### Installing a CD Drive

#### OPENING THE COMPUTER AND CONFIGURING THE CD DRIVE

1. Power down the PC.
2. Unplug the power cord from the power supply.



Remember to take ESD precautions before opening the computer case. See Task 1.1 to learn the specific details of preventing ESD damage.

3. Using your screwdriver, remove the screws attaching the access panel to the PC’s frame.
4. Remove the access panel.
5. Locate the desired drive bay.
6. Locate the desired drive-bay cover on the front of the PC.
7. Remove the drive-bay cover.



There are usually two tabs on the drive bay cover that attach inside the computer. You need to reach inside the bay, feel for the tabs, depress them, and push the cover out. Some older PCs will require that you pry off the face of the computer before you can access the drive covers.



Some drive bays come with rails installed. If the drive you are installing does not have corresponding drive rails attached, the rails may come with a kit that has the parts necessary for you to screw the rails into the drive bay. From there, it is just a matter of sliding the drive in on the rails.

8. Remove the CD drive from the antistatic bag.
9. Locate the jumpers or switches on the drive.
10. Locate the jumper diagram on the drive.
11. Locate your needle-nose pliers or tweezers and set the jumpers or switches to the master or only drive position.



Step 11 assumes that your CD drive will be on a separate controller from the computer's hard drive and that it will be either the first or only CD drive in the PC. If you are installing this unit as a second CD drive, you must set the jumpers or switches to the slave position and attach it to the connector at the middle of the ribbon cable rather than the end.



For much older drives, do not connect an IDE and a CD drive to the same disk-drive controller. IDE and CD drives operate at different read and write speeds, and having them on the same ribbon attached to the same controller will reduce data transfer to the level of the slowest drive. This is true only of older drives, however. Drives made since about 2000 use independent device timing, which has eliminated this issue. To read an article on this subject, visit [www.pcguides.com/ref/hdd/if/ide/confTiming-c.html](http://www.pcguides.com/ref/hdd/if/ide/confTiming-c.html).

Also, older 40-pin ribbon cables either do not support cable select as in the previous note or, if they do, they use the middle connector for the master and the end connector for the slave. See this site for more: [www.pcguides.com/ref/hdd/if/ide/confCS-c.html](http://www.pcguides.com/ref/hdd/if/ide/confCS-c.html).

## INSTALLING THE CD DRIVE

1. Slide the CD drive into the drive bay from the front.



The front of the CD drive should fit flush against the face of the computer.

2. Locate the ribbon cable that came with the CD drive.
3. Locate the unoccupied disk-drive connector on the motherboard.



The second disk-drive connector is usually labeled as IDE 2.

4. Locate the red or blue edge on one end of the ribbon cable.



The red or blue edge on the connector indicates the location of pin 1.

5. Locate pin 1 on the motherboard disk-drive connector.
6. Carefully match the holes in the ribbon connector to the pins on IDE 2, including pin 1.
7. Gently and firmly push the connector down, attaching it to the motherboard.
8. Match the other end of the ribbon-cable connector to the pins on the CD drive.
9. Gently and firmly push the connector onto the pins.



In step 9, since you haven't yet attached the CD drive to the drive bay, you will need to hold the drive in place with your other hand.

10. Locate a vacant power cable coming from the power supply.
11. Connect the power cable to the power socket on the back of the CD drive.
12. Locate the audio cable coming from the back of the CD drive.
13. Locate the three-pin audio connector on either the sound card or the motherboard audio connector.
14. Match the pins on the audio cable to the audio connector.
15. Gently and firmly attach the cable to the connector.
16. Attach the CD drive to the drive bay with the screws that came with the drive.
17. Replace the access panel.
18. Replace the screws, securing the access panel to the PC's frame.



If necessary, replace the face on the PC after you've completed step 18.

**INSTALLING DEVICE DRIVERS AND OTHER SOFTWARE FOR THE CD DRIVE**

1. Verify that a standard monitor, keyboard, mouse, and speakers are attached to the PC.
2. Plug the power cable into the PC's power supply.
3. Power up the PC.
4. Locate the driver disc that came with the CD drive.



In the past, the drivers would be on a floppy diskette if the newly installed device was the only CD drive on the PC. Today, it's unlikely that a computer will not have an optical drive installed by the manufacturer at the factory. If you are installing a CD drive on an older computer, you will likely need to download the latest drivers from the drive manufacturer's website. They are unlikely to still be available on a floppy diskette.



When working on a user's computer, you will need to be able to log on to the device without knowing the user's password. Make sure there is a separate user account on company computers that allows you to log in for testing purposes. Otherwise, the user must be present to log in to the computer.

5. When the PC is fully booted, insert the driver disc into the appropriate drive or download the drivers from the manufacturer's website onto the desktop.
6. Locate and start the executable file on the disc or the desktop (e.g., Setup.exe) and follow the onscreen instructions.



The onscreen instructions vary widely depending on the make and model of the CD drive, but they should guide you in how to correctly load the device drivers and other required software.

7. Reboot the PC if necessary.

**TESTING THE CD-DRIVE INSTALLATION**

1. Verify that speakers are attached to the audio connector on the PC.
2. Verify that the speakers are receiving power and turned on. (Make sure the volume is adjusted to a suitable level.)
3. Locate a test CD that has audio content.
4. Open the CD drive.
5. Place the CD in the drive.
6. Close the drive.



7. Click Start ➤ My Computer.
8. Locate the CD drive in the My Computer window.



Usually, the first CD drive in a Windows computer is drive D.

9. Look for a change in the CD-ROM icon indicating the contents of the CD.



If Autoplay is set up, the disc will start to play automatically. Otherwise, a dialog box will open asking which program you want to select to play the disc. If necessary, right-click the CD-ROM icon and select Play.

## Criteria for Completion

You will have successfully completed this task when the CD begins to play and you can hear the content.

# Task 1.11: Installing a DVD Drive

Although, in principle, installing a DVD drive is similar to installing a CD drive (see Task 1.10), there are quite a few more cables and connectors involved. Specifications vary for DVD drives made by different vendors, so it is prudent to completely read the instructions that came with your new DVD unit before beginning the installation.

This task will cover a basic DVD installation; however, the details of installing the DVD you are using may be different. You may have to divert from some of the steps presented here to successfully install your particular drive.

Most PCs come standard with a DVD drive, so it won't be as common for you to install the first DVD drive into a modern computer as it once was. That said, you may likely install the first DVD drive into older PC hardware. A computer that is a few years old will already have a CD drive, so you will be installing the second optical device in the computer. DVD drives are most commonly used to play movies, although they are also used for mobile data storage.

## Scenario

One of your company's managers wants a DVD drive installed in her computer so she can watch video tutorials. She has an older PC with a CD-RW as the only optical drive. You have brought the PC to your workbench and laid out the appropriate tools. Your supervisor has provided you with the DVD-drive installation kit and you are ready to install the drive.

## Scope of Task

### Duration

This task should take between 30 and 45 minutes.

### Setup

Ideally, you will have one PC and one DVD-drive installation kit available for this exercise. You will need to verify that the DVD unit is supported on your PC. You can get this information from the store where you purchased the unit or from the manufacturer's website. The kit should contain all of the cables and other parts necessary for you to install the DVD drive, as well as the driver disc. For this task, it is assumed that the computer already has a CD drive and that the DVD drive will be the second optical drive on board. As always, take ESD precautions to avoid damaging electrical components in the computer.

### Caveat

As previously mentioned, there is no one standard method of installing a DVD drive, so the steps you need to take to install your drive may differ from those in this exercise. Also, because of the different features provided by DVD drives, the installation process is somewhat more complex than for a CD or IDE drive. Another consideration is how compressed video data will be managed. DVDs use MPEG-2 compression, so you'll need a method of decompression. Many high-end graphics cards support hardware decompression, but it is still possible that some computers will need an MPEG expansion card installed.



For this task, there should be an appropriate graphics card or MPEG PCI card already installed and working in the PC. If necessary, consult the steps for installing a PCI card in Task 1.3.

## Procedure

In this exercise, you will learn to install a generic DVD drive in a computer.

### Equipment Used

You may need a flat-head screwdriver, Phillips-head screwdriver, or both to open the access panel and attach the DVD drive securely to the drive bay. You will need a pair of needle-nose pliers or tweezers to set the jumpers or switches. You might also need a flat-head screwdriver if you must pry the face off the computer to get at the selected drive-bay cover. To test the installation, you'll need a DVD disc with content on it. You will also need to have a standard monitor, mouse, keyboard, and pair of speakers available for testing.

## Details

This lesson will walk you through the step-by-step process of installing and testing a DVD drive in a computer.

### Installing a DVD Drive

#### OPENING THE COMPUTER AND CONFIGURING THE DVD DRIVE

1. Verify that the power cord is unplugged from the power supply.
2. Use your screwdriver to remove the screws from the access panel.
3. Remove the access panel.
4. Locate the desired drive bay.
5. Locate the desired drive-bay cover on the front of the PC.
6. Remove the drive-bay cover.
7. Remove the DVD drive from the antistatic bag.
8. Locate the jumpers or switches on the drive.
9. Locate the jumper diagram on the drive.
10. Locate your needle-nose pliers or tweezers.
11. Set the jumpers or switches to the slave position.



Since the PC already has a CD drive installed on the second IDE controller, it is configured as the master drive.

#### INSTALLING THE DVD DRIVE

1. Slide the DVD drive into the drive bay from the front.
2. Locate the ribbon cable that is attaching the CD-ROM drive to the disk-drive controller.
3. Locate the connector at the midpoint of the ribbon cable.
4. Locate the red or blue edge on the midpoint connector of the ribbon cable.
5. Match pin 1 in the connector with pin 1 on the DVD drive.
6. Gently and firmly connect the ribbon to the drive.
7. Locate an unused power cable from the power supply.
8. Attach the cable to the power connector on the drive.
9. Locate the audio cable that came with the DVD drive.
10. Locate the audio connector on the DVD drive.
11. Attach one end of the cable to the drive.
12. Locate the audio-in connectors on the MPEG card.

13. Connect the audio cable from the DVD drive to the first audio-in connector on the card.
14. Locate the audio cable on the CD-ROM drive.
15. Disconnect the cable from the sound card or motherboard.
16. Connect the cable to the second audio-in connector on the MPEG card.
17. Locate the audio-out connector on the MPEG card.
18. Locate the sound card's three-pin connector.
19. Locate an audio cable in the DVD-drive installation kit.
20. Connect one end to the MPEG card's audio-out connector.
21. Connect the other end to the sound card's connector.
22. Locate the monitor's connection to the video card.
23. Locate the monitor connector on the back of the MPEG card.
24. Disconnect the monitor connector from the video card.
25. Connect the monitor connector to the MPEG card.



You will need to have a pair of speakers on hand when you begin testing.

26. Locate the video loopback cable included with the DVD-drive installation kit.
27. Connect one end to the output connector on the video card.
28. Connect the other end of the connector to the MPEG card.
29. Use the screws that came with the drive to attach it securely to the drive bay.
30. Replace the access panel.
31. Replace the screws securing the access panel to the PC frame.

#### **INSTALLING DRIVERS AND SOFTWARE FOR THE DVD-DRIVE**

1. Verify that a standard monitor, keyboard, mouse, and speakers are attached to the PC.
2. Plug the power cable into the PC's power supply.
3. Power up the PC.
4. Locate the driver disc that came with the DVD drive.
5. When the PC is fully booted, insert the driver disc into the appropriate drive.
6. Navigate to the executable file on the disc and launch it. Then, follow the onscreen instructions.



The onscreen instructions vary widely depending on the make and model of the DVD drive, but they should guide you in how to correctly load the device drivers and other required software.

7. Reboot the PC if necessary.

#### TESTING THE DVD-DRIVE INSTALLATION

1. Locate the test DVD disc.
2. Open the DVD drive.
3. Place the disc in the drive.
4. Close the drive.
5. If Autoplay is engaged, the disc will begin playing automatically.



The program used by the DVD drive may prompt you to answer some questions before playing the disc.



You can also use a CD audio disc for testing, since the DVD drive should play standard CDs as well; however, this will not test the video playback.

## Criteria for Completion

You will have successfully completed this task when you can play a DVD in the drive, view the video, and hear the audio output.

# Task 1.12: Installing a Motherboard

A motherboard is also called a system board or mobo, and is the main circuit board of a computer. As a PC technician, you would be installing a motherboard if one were to fail in a PC or if you were building a custom computer from its component parts.

If you are making a PC from scratch, your first step would be to install the power supply in the computer case (see Task 1.6), although it could be installed just prior to physically attaching the motherboard to the PC case. Next, you would install sticks of RAM and the CPU on the motherboard before actually installing the motherboard in the case (see Tasks 1.2 and 1.5, respectively). You might also decide to install the hard drive, optical drives, and other components before the motherboard is secured in the case (as illustrated in Tasks 1.7, 1.8, and 1.11).

Older motherboards required that jumpers and switches be configured, setting the CPU voltage and speed as well as bus speed. On modern motherboards, these settings are configured by the complementary metal oxide semiconductor (CMOS). This makes motherboard installation pretty much a straightforward affair.

## Scenario

One of the engineering staff needs a custom-made computer workstation. Your supervisor has assigned you to assist in making the device by installing the motherboard. You have been provided with all the materials, have opened the new case, and have already installed the power supply, the CPU, and the required RAM. Your next step is to begin the motherboard installation itself.



See Task 1.2 for how to install RAM, Task 1.5 for how to install a CPU, and Task 1.4 for how to install a power supply.



For practical purposes, you can install the power supply, RAM, and CPU as part of the motherboard installation process, rather than doing so beforehand. The steps in this exercise will prompt you as to when they can be installed. Also, check your motherboard's documentation for further suggestions.

## Scope of Task

### Duration

This task should take about 30 to 45 minutes.

### Setup

You'll need an empty PC case with the power supply already installed. You will also need a motherboard with the CPU and RAM sticks installed. Usually new PC cases and motherboards come with the necessary screws, washers, and riser pins you'll need. As always, take ESD precautions to avoid damaging electrical components on the motherboard.

### Caveat

You'll need to consider the form factors of the motherboard and the case so they will match. There is a wide variety of motherboard makes and models, so read the motherboard manual prior to beginning the installation to see if you need to make any other preparations in the installation of your particular motherboard. Do not assume anything regarding the materials that come with your motherboard. Verify the use of all materials prior to beginning work.

For instance, positioning the motherboard in the case is critically important, so before installing anything on the motherboard itself, make sure you practice lining up the holes on the motherboard with the holes on the computer case's metal plate. Also, verify where and how the numerous screw nuts, screws, and washers are to fit before beginning the

installation. Some holes on the motherboard are metallic, which means they are meant to have metal screws directly inserted, and other holes are non-metallic, meaning that you must place one or two washers between the screw and the hole. Consult the motherboard documentation for specific details.

## Procedure

In this exercise, you will learn how to prepare a PC case for a motherboard installation and how to install a motherboard.

## Equipment Used

You will need one or more screwdrivers to fit the different screws used in attaching the motherboard to the case. You will also need a screwdriver and a pair of needle-nose pliers to remove the PCI covers and any other items in the case prior to the installation. Have a marker handy so you can use it to indicate where the riser pins will go.



Some screws used to attach the motherboard to the case are now able to be inserted and tightened by hand, so a screwdriver for that specific task might not be necessary.

## Details

This lesson will guide you through each step in the installation of a motherboard into a PC case.

### Installing a Motherboard

#### PREPARING THE PC CASE

1. Locate a screwdriver and a pair of needle-nose pliers.
2. Locate the PCI covers and any other I/O panels or slots in the case.
3. Use the tools to remove the metal faceplates covering the external drive bays and pop out the tabs covering the portholes in the I/O shield for the motherboard ports.
4. Pull any loose power-supply cables out of the case.



The types of PC case parts and how they are removed are different depending on the make of the case. You will have to look at your particular case carefully to determine how to remove these elements.



PC cases can contain sharp metal corners and edges, so take care not to injure yourself.

5. Locate your marker.
6. Locate the screw holes for the riser pins in the PC case.
7. Use the marker to mark the screw holes in the case that line up with the holes in the motherboard.



Sometimes it's helpful to position the motherboard in the case and use the motherboard holes as a guide to mark the holes in the case.

8. Locate the riser pins.
9. Screw each riser pin into the indicated screw holes.



Riser pins are installed just like ordinary screws, turning in a clockwise direction. Screw each pin in completely so when the board is mounted, it will lie flat.



Riser pins are used to keep the motherboard from having direct contact with the metal PC case.

#### CONNECTING THE FRONT PANEL WIRES

1. Position the motherboard in the case with the holes and riser pins correctly lined up, but do not use the screws to attach the motherboard to the case.



Do not attempt this part of the task without using ESD precautions. See Task 1.1 for details.



To make things easy on yourself, if you haven't done so already, you'll want to install the RAM and CPU before inserting the motherboard into the case, since the relevant slots will be easier to reach right now.

2. Locate the computer case's front panel wires, including the following:
  - HDD LED
  - Power LED
  - Power switch
  - Reset switch
  - Speaker



3. Locate the front panel connectors for each of these wires on the motherboard.
4. Connect each of the front panel wires to their corresponding motherboard connector, matching the positive and negative polarity pins on the wires to the motherboard connectors.



This is usually the point in the process where you would install the PC's power supply into the case if it isn't already present. If you choose to install the hard drive, optical drive, and other units now, you will need to attach the cables from the drives to the motherboard and from the power supply to the drives before proceeding. See Tasks 1.7, 1.8, and 1.11 for details.

### INSTALLING THE MOTHERBOARD

1. Locate the screw holes on the motherboard.
2. Locate the screws and washers to be used in securing the motherboard to the riser pins.



Remember to pay attention to which holes are metallic and non-metallic and use the available washers accordingly.

3. Lift the motherboard and align it so that the screw holes and riser pins are matched. Also, move the motherboard toward the back of the case so that the ports that stick out from the motherboard are matched up with the corresponding holes in the case.
4. Place the motherboard on the riser pins, being careful with the handling of any attached cables, the processor, RAM, and so forth.
5. Locate a screwdriver.
6. Attach the motherboard to the riser pins using the appropriate washers and screws.
7. Locate the motherboard power cable on the power supply.
8. Locate the motherboard's power connector.



Consult the motherboard manual if you have difficulty locating the power connector.

9. Carefully align the cable connector to the motherboard connector.
10. Attach the cable to the motherboard connector.
11. Verify that all cables and other connections have been made and are secure.
12. Prior to closing the case, position the cables inside to make sure that good air flow will be maintained once the computer goes into operation.



You will not apply power to the motherboard until the entire computer is assembled and ready for testing.

## Criteria for Completion

You will have successfully completed this task when the motherboard is attached to the riser pins in the PC case, the front panel wires are connected, and the power supply and other cables are connected to the motherboard. The motherboard will not be tested until all of the components are installed and the completed unit is powered up.

## Task 1.13: Installing a Video Card

Unless you are building a system from scratch, all PCs come with some sort of video capacity—either an integrated video card or a PCI, PCI Express, or accelerated graphics port (AGP) card. Most video expansion cards today are installed in the motherboard's AGP slot. There is only one AGP slot on a motherboard, so it's pretty easy to find.

The most common reason for you to install a video card is to upgrade the system to display high-level graphics. Gamers especially need high-end video cards; however, web and graphic designers also require high-quality video displays.

The process isn't very different from installing a PCI or PCI Express card (see Tasks 1.3 and 1.4 for details), but there are a few extra steps, especially if you are upgrading a video card.

## Scenario

Your company has just hired a new graphic designer. A suitable PC has been located for the new employee but the video card needs to be upgraded to run the design programs the company uses. The PC is already on your workbench, as are the video card and everything else you need to do the upgrade.

## Scope of Task

### Duration

This task should take about 30 minutes.

## Setup

Ideally, you will have a PC with a video card already installed and another video card available so you can use it to replace the original. The driver disc for the new card should be in the installation kit with the video card. As always, before the installation begins, take ESD precautions so you don't damage electrical components in the PC.

## Caveat

Make sure to completely read any documentation that comes with the new video card prior to doing this exercise. Your card may require specific procedures that are not included in this set of instructions. Also, for this task it is assumed you are using Windows XP.

## Procedure

In this exercise, you will learn how to upgrade a video card in a computer and install the video card's drivers.

## Equipment Used

You should need only a screwdriver(s) to open the access case, remove the old card, and install the new card in the AGP slot.

## Details

This exercise will take you through the motions of uninstalling an old video card and its drivers and installing a new card.

### Uninstalling an Old Video Card

#### UNINSTALLING THE VIDEO-CARD DRIVERS

1. With the system powered up, click Start ➤ Control Panel.



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Control Panel should be set to Classic view to follow along with this task.

2. Double-click Add/Remove Programs.



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The Add/Remove Programs list may take a few moments to populate.

3. Scroll down the list and locate the display drivers for your current video card.
4. Click on the name of the drivers.

5. Click the Change/Remove button.
6. Follow the instructions to remove the video drivers.
7. Close Control Panel.
8. Power down the computer.



If you are using a Windows 9x/Me computer, you must go to the Display Drivers tab on the Video Card Properties box and select Standard Display Adapter and click OK before powering down the PC.

### UNINSTALLING THE OLD VIDEO CARD

1. Unplug the power cable from the power supply.
2. Lay the PC on its side.
3. Locate your screwdriver and remove the screws attaching the access panel to the PC frame.
4. Remove the access panel.
5. Locate the video card.
6. Unscrew the video card from the frame of the computer.
7. Gently pull the old card out of the AGP socket.



You may have to gently rock the card end to end to loosen it. This prevents putting pressure on the card connector or the AGP port. Also, many video cards have a retention mechanism that must be released prior to removing the card. For a description of this, see <http://news.thomasnet.com/fullstory/457886>.

8. Remove the card and put it in an antistatic bag.

### Installing a Video Card

#### INSTALLING THE VIDEO CARD IN THE AGP SLOT

1. Locate the new video card.
2. Remove it from the antistatic bag.
3. Line it up with the AGP slot.
4. Gently but firmly press the card into place.
5. Screw the card onto the PC frame.



If the video card has an onboard fan, make sure that no cables are at risk of interfering with the fan's operation. Also make sure to follow any special instructions that are required for the proper installation and operation of the fan.

6. Replace the access panel.
7. Replace the screws, securing the access panel to the PC frame.
8. Set the PC upright.
9. Plug the power cord into the power supply's socket.
10. Power up the PC.

#### **INSTALLING THE NEW VIDEO CARD DRIVERS**

1. Locate the CD containing the video card drivers.
2. After the PC powers up insert the CD into the optical player, launch the CD, and follow the onscreen instructions to install the drivers.



The onscreen instructions may be slightly different depending on the make and model of card you've installed. You will usually be offered the option of searching for drivers or installing from media. It is usually advisable to download the install the latest drivers from the manufacturer's site, if available.

3. When prompted, remove the driver disc and restart the PC.
4. After the PC reboots, right-click anywhere on the Desktop.
5. Click Properties.
6. Click the Settings tab.
7. In the Screen Resolution box, configure the setting for the desired resolution.
8. In the Color Quality box, use the drop-down list to select the desired color quality in bits.



Before performing this portion of the task, read the monitor and video-card documentation and make sure the hardware and software support the desired settings.

9. Click the Advanced button.
10. Under DPI Setting, use the drop-down list to select the desired refresh rate.

11. In the Compatibility box, click the Apply the New Display Settings Without Restarting radio button.
12. Click OK to close the Advanced dialog box.
13. Click OK to close the Display Settings box.

## Criteria for Completion

You will have successfully completed this task when the card and drivers are installed, you have set the display to the desired settings, and the monitor is correctly displaying the desktop.

# Task 1.14: Installing a Laptop Keyboard

Swapping out a keyboard on a PC is just a matter of unplugging the keyboard's PS/2 or USB connector from the back of the computer and plugging in the new one. On a laptop, the procedure is quite a bit more involved. New PC techs sometimes shy away from working on laptops because it seems so much more difficult to access the various components. Also, depending on the make and model of laptop, the process of performing repair tasks is highly variable.

All this is true; however, sooner or later you'll have to face laptop repair and maintenance as part of your job. With a bit of practice, you'll become more comfortable working on laptops.

Users can be particularly hard on laptop computers. If a user travels a lot with the laptop, it probably gets a great deal of use and sometimes abuse. Keyboards are vulnerable to having all manner of substances dropped or spilled in and on them. Keys can get stuck and even come off. If the keyboard can't be repaired by a good cleaning, it will need to be removed and a suitable replacement installed.

## Scenario

One of the sales associates has just come back from a trip and brings you her laptop. She complains that one of the keys has fallen off and several others are stuck or nonfunctioning. After a careful examination, you explain that the keyboard will need to be replaced. You put in an order to the manufacturer for a replacement keyboard. The sales associate has already uploaded her data to the file server and will be working on her PC at her desk for the next few weeks. She leaves the laptop with you. The keyboard arrives within a few days. You take the laptop and new keyboard to your workbench and prepare to replace the broken keyboard.



It is becoming very common for a laptop to be the only computer a user has access to, even if the user isn't a "road warrior." Often, people need to attend multiple meetings and conferences throughout the work week, and find it necessary to take notes and access virtual meeting rooms via their networked laptops. When working at their desk, the user places the laptop in a docking station, where he or she is able to use a standard keyboard, mouse, and monitor. In this eventuality, you won't have the luxury of waiting days or weeks for the laptop's replacement part to arrive before you repair the device.

## Scope of Task

### Duration

This task should take from 30 to 45 minutes.

### Setup

Ideally, you should have a laptop and replacement laptop keyboard on hand to perform this task. You can also simply remove the keyboard and install it again to perform the same set of actions. Of course, you will absolutely need a laptop of some type to do this exercise. As always, use ESD precautions to avoid damaging electrical components in the laptop.

### Caveat

There seem to be as many types of laptops as there are stars in the sky. This translates into as many different ways of replacing a keyboard on a laptop. In this task, a Dell Inspiron 8200 laptop is used; however, the actual process of doing the same exercise on your laptop could be quite different. Always consult the documentation for your machine or the manufacturer's website for instructions relevant to the laptop you are using.

## Procedure

In this exercise, you will learn how to remove and replace a keyboard on a Dell laptop.

### Equipment Used

You will need a screwdriver to remove a number of screws on the bottom of the keyboard. You will also need a plastic scribe or similar object to pry the keyboard up from the laptop once it's unsecured.

## Details

This task will walk you through the steps of removing a laptop keyboard and installing a new one.

### Replacing a Laptop Keyboard

#### PREPARING TO WORK ON THE LAPTOP KEYBOARD

1. Power down the laptop.
2. Unplug the power cord and external mouse cable, if present.
3. Remove any PC cards, if present.
4. Close the display lid.
5. Remove the battery.



On an Inspiron 8200, the battery is usually located on the front edge of the laptop on the right. To remove it, locate the triangular latch on the bottom of the laptop just under the battery. Depress the latch and pull the battery forward. It should just slide out.



The preceding instructions should be followed when you are planning on repairing or replacing any component in the laptop.

#### REMOVING THE LAPTOP KEYBOARD

1. Turn the laptop over and place it so the front is facing you.
2. Locate three screws labeled with a *K* in a circle.
3. Locate one screw labeled with a *K/M* in a circle.
4. Locate your screwdriver and remove each of these screws.



The screws in a laptop can be quite long and it can be somewhat time-consuming to remove them.

5. Turn the laptop over with the front facing you.
6. Open the display.
7. Locate your plastic scribe.
8. Locate the “blank” key on the keyboard.





The blank key is located just above the right arrow key on the lower-right side of the keyboard on the Inspiron 8200.

9. Place the scribe under the right side of the blank key.
10. Apply pressure from left to right, pushing the keyboard to disengage the tabs on the left side.
11. Gently lift the right side of the keyboard and balance it on its left side on the laptop.
12. Locate the keyboard ribbon cable.
13. Disconnect the cable from the bottom of the keyboard.
14. Lay the keyboard aside.

#### **INSTALLING THE NEW KEYBOARD**

1. Locate the new keyboard.
2. Remove it from the antistatic bag.
3. Rest it on its left side on the laptop.
4. Connect the keyboard ribbon cable to the bottom of the keyboard.



Make sure that the cable does not get crimped when you install the keyboard.

5. Locate the two tabs on the left side of the keyboard.
6. Insert the tabs under the edge of the keyboard housing.
7. Slowly place the keyboard in the housing.
8. Verify that the keyboard is lying flush in the housing.
9. Close the display.
10. Turn the laptop over with the front facing you.
11. Locate the screws removed from the bottom of the laptop.
12. Locate your screwdriver and replace the screws.
13. Turn the laptop over so its bottom is on the workbench and the front is facing you.

#### **TESTING THE KEYBOARD INSTALLATION**

1. Replace the battery.



The battery should just slide back in and click into place.

2. Replace the power cord.
3. Lift the display.
4. Power up the laptop.
5. After the laptop has completely booted, open a blank document.
6. Type in the document, verifying that all the keys function properly.
7. Replace any PC cards and other equipment that were attached to the laptop when you received it.

## Criteria for Completion

You will have successfully completed this task when the keyboard is installed, the laptop is completely reassembled, and you can use the keyboard normally with all of the keys functioning.

# Task 1.15: Installing SO-DIMM in a Laptop

In some ways, installing memory in a laptop is easier than performing the same action in a PC. There seems to be a universal law that says whatever component you need to reach in a PC will be in the most inconvenient and hard-to-reach place. On a laptop, this isn't necessarily so...at least for memory.

The trade-off is that laptop components are smaller and sometimes more delicate (read "easier to break"). SO-DIMM (which stands for small-outline dual inline memory-module) sticks are quite a bit smaller than DRAM (dynamic random access memory), and the clips that hold them into the SO-DIMM sockets are tiny. That's the only real hang-up, though. The actual installation is uncomplicated. You can upgrade a laptop's memory in no time.

## Scenario

You have received a trouble ticket stating that one of the testing engineers needs a memory upgrade for his laptop. You receive the specifics regarding the make and model of the laptop and look up the appropriate SO-DIMM module.



See Task 1.2, "Installing RAM," to learn how to research which type of memory is right for a particular computer.

You order the appropriate module, and when it arrives, you take it and your tools to the user's cubicle. The user is about to take a break, leaving you free to upgrade his laptop's memory.

## Scope of Task

### Duration

This task will take about 10 minutes.

### Setup

You'll need a laptop and an appropriate stick of SO-DIMM to upgrade its memory. In a pinch, you can simply remove an existing memory module in your laptop and replace it to simulate the task. As always, take ESD precautions to keep from damaging any electronic components.

### Caveat

This task is based on upgrading memory in a Dell Inspiron 8200. The exact method of upgrading memory in your laptop may vary. Consult the documentation for your laptop or search the manufacturer's website for specific instructions. The operating system used in this exercise is Windows XP.

## Procedure

This exercise will teach you how to upgrade the memory of a laptop.

### Equipment Used

You should only need a screwdriver to open the memory-module cover on the bottom of the laptop.

### Details

In this task, you will learn the procedures necessary to upgrade the memory in a laptop.

### Installing SO-DIMM in a Laptop

#### PREPARING TO WORK ON THE LAPTOP

1. Power down the laptop.
2. Unplug the power cord and external mouse cable, if present.
3. Remove any PC cards, if present.

4. Close the display lid.
5. Remove the battery.



Find the procedure for removing a battery in the section “Preparing to Work on the Laptop Keyboard” in Task 1.14.

### UPGRADING SO-DIMM IN THE LAPTOP

1. Turn the laptop over with the front facing you.
2. Locate the memory-module cover.



The memory-module cover on an Inspiron 8200 is a small panel located on the left-hand side of the laptop (when it is upside down) and attached by a single screw. Consult the documentation for your laptop to locate the module cover on your device.

3. Locate your screwdriver and remove the screw securing the module cover.
4. Release the two metal tabs holding the cover in place.
5. Lift out the cover.
6. Locate an empty SO-DIMM module slot.



The Inspiron 8200 typically has two slots. The original SO-DIMM module should be in the slot labeled DIMM A.

7. Locate the slot labeled DIMM B.
8. Locate the SO-DIMM module you brought with you.
9. Remove it from the antistatic bag, holding it by its side edges.
10. Align the module to the slot in the correct direction.



The module is made to fit in the slot in only one direction.

11. Slide the module into the slot.



The latches on either side will move aside slightly to allow the module to be placed in the slot.

12. Push the module down into the slot until the two latches on either side click into place.



If the latches don't click and engage, the module may be misaligned. Remove the module and replace it again.

13. Replace the module cover, inserting the side with the metal tabs first.
14. Replace the screw securing the module cover.
15. Place the laptop right side up with the front facing you.
16. Replace the power cord and any other cords and cards you previously removed.
17. Replace the battery.

#### TESTING THE MEMORY

1. Open the display lid.
2. Power on the laptop.
3. Listen for two beeps as the computer boots.
4. Look for a message on the display screen indicating that the amount of memory on the computer has changed.
5. Follow any instructions you see on the screen.
6. Allow the laptop to continue to boot and the operating system to load.

#### VERIFYING THE MEMORY

1. On the computer's Desktop, click the Start button.
2. Right-click My Computer and select Properties.
3. On the General tab of the System Properties box, locate the amount of SO-DIMM in the laptop.
4. Click Cancel to close the System Properties box.



The steps to test and verify the memory upgrade are identical to those found in Task 1.2.

## Criteria for Completion

You will have successfully completed this task when you have verified that the amount of memory has increased to the correct amount. This amount will vary depending on how much memory the computer originally had and how much you added.

## Task 1.16: Installing a Laptop Hard Drive

As you learned in Task 1.7, “Installing an IDE Hard Drive,” hard-disk drives periodically fail for a number of reasons. The same can be said for laptop hard drives; however, the procedure to replace a laptop’s hard drive is quite a bit different and, in many cases, easier than replacing a drive in a PC.

This task is about as common as replacing an IDE drive in a PC. As always, replacing the drive is easy. Recovering the lost data is harder. Make sure you periodically back up any data you can’t live without.

### Scenario

You have received a trouble ticket stating that a marketing associate’s hard drive appears to have locked up. You call the associate and she agrees to bring the laptop to the IT department.

When she arrives, she explains that while she was out of town and using her laptop, she started hearing clicking noises coming from the computer. The noises increased in frequency until they abruptly stopped. At that point, she got a blue screen displaying error messages she couldn’t understand. She turned off the power by pressing and holding the power button down. When she tried to power the device back up, power was applied but the screen remained blank.

You verify that the problem is the hard drive, agree to replace it, reload the operating system and application software, and upload her data from the most recent backup on the file server.

You order a new hard drive, and when it arrives you take it and the laptop to your workbench and begin to work.



This task will cover only the physical replacement of the hard drive. Tasks 1.24 and 1.25 cover installing an operating system, and Tasks 1.27 and 1.28 describe installing Microsoft and non-Microsoft application software.

### Scope of Task

#### Duration

Physically replacing the drive should take about 15 minutes.

#### Setup

The ideal setup is to have a laptop and a compatible spare hard-drive unit to use in this task. If a spare unit is not available, you can remove the existing hard drive and then replace it. As always, use ESD precautions to prevent damaging the electrical components in your laptop.

## Caveat

As with all laptop tasks, there are many different ways to do this exercise, depending on the make and model of your computer. Read the documentation for your laptop, either the hard copy or online at the vendor's site. In this task, a Dell Inspiron 8200 is used.

## Procedure

This exercise will teach you how to replace a hard drive in a laptop.

## Equipment Used

You'll only need a screwdriver to remove the screw securing the hard drive to the laptop.

## Details

This lesson will take you through the steps of removing a hard drive from a laptop and replacing it with a new unit.

### Replacing a Laptop Hard Drive

#### PREPARING TO WORK ON THE LAPTOP

1. Power down the laptop.
2. Unplug the power cord and external mouse cable, if present.
3. Remove any PC cards, if present.
4. Close the display lid.
5. Remove the battery.

#### REMOVING THE LAPTOP HARD DRIVE

1. Locate the hard drive.



The hard drive on an Inspiron 8200 is located on the left side of the laptop (when it's upside down) at about the midsection.

2. Locate the screw securing the hard drive.
3. Locate your screwdriver and remove the hard drive's restraining screw.
4. Grasp the hard drive and slide it out of its bay.
5. Put the unit aside.

#### INSTALLING THE LAPTOP HARD DRIVE

1. Locate the new hard drive.
2. Remove it from the antistatic bag.
3. Orient it correctly at the opening of the bay.

4. Slide the hard drive into the bay until it snaps into place.
5. Replace the restraining screw.
6. Turn the laptop right side up with its front facing you.
7. Plug the power cable back in.
8. Replace the battery.

#### VERIFYING THE INSTALLATION

1. Once the laptop is completely reassembled and connected to a power supply, power it up.
2. When the drive boots, you should receive a message indicating that there is no operating system installed.



The hard drive is now ready to have an OS installed.

## Criteria for Completion

You will have successfully completed this task when your laptop successfully boots. In the task scenario, a complete recovery would require the installation of the operating system, applications, and backed-up data.

## Task 1.17: Installing a Laptop Optical Drive

As you saw in Tasks 1.10 and 1.11, there is quite a bit of difference between installing a CD drive and a DVD drive in a PC. In a laptop, however, the process is exactly the same. Part of what makes it more simple is that laptops support only one optical drive and one hard drive, so there's no need to set jumpers or switches to master and slave position. Also, the units are modular, so there are no cables to deal with.

The drawbacks are size, capacity, and heat. All of the laptop components are literally on top of each other, so dissipating excess heat remains a problem. However, the process of installing a laptop CD or DVD drive is about the same as installing a laptop hard drive (see Task 1.16).

## Scenario

You receive a trouble ticket stating that one of the sales reps is complaining that the DVD player on his laptop is broken. You arrange a time to meet the rep at his cubicle. Once there,



he explains that he was placing a DVD into the open drive two days ago and he slipped and fell forward, cracking the unit. You examine the drive and confirm that it is damaged.

You take the laptop back to the IT department and place it on your workbench. You locate a suitable replacement unit in the stock room and place it next to the laptop. You lay out your tools and begin your work.

## Scope of Task

### Duration

This task should take about 15 minutes.

### Setup

The setup is virtually identical to the one in Task 1.16. If you don't have a spare optical drive, just remove and replace the existing optical drive on your laptop.

### Caveat

As with all laptop tasks, before you begin, check the documentation for your particular laptop and determine if the procedure to perform this exercise differs from the instructions you are reading here. The laptop used in this task is a Dell Inspiron 8200.

## Procedure

This exercise will show you how to replace the optical drive in a laptop.

### Equipment Used

All you should need is a screwdriver to remove the screw holding the optical drive in place. Have a DVD handy for testing purposes.

### Details

This lesson will walk you through the steps of removing an optical drive from a laptop and replacing it with another unit.

### Replacing a Laptop Optical Drive

#### PREPARING TO WORK ON THE LAPTOP

1. Power down the laptop.
2. Unplug the power cord and external mouse cable, if present.
3. Remove any PC cards, if present.
4. Close the display lid.
5. Remove the battery.

**REMOVING THE OPTICAL DRIVE FROM A LAPTOP**

1. Locate the optical drive.



On an Inspiron 8200, the optical drive is located on the right-hand side (when the laptop's upside down) of the computer.

2. Locate the drive's restraining screw.



You should find the screw on the bottom of the laptop, directly below the drive. Verify the location of the screw for your laptop in its documentation.

3. Locate your screwdriver and remove the restraining screw.
4. Locate the tab on the optical drive.
5. Pull the tab, sliding the drive out of the bay.
6. Put the drive aside.

**INSTALLING THE NEW OPTICAL DRIVE IN A LAPTOP**

1. Locate the replacement optical drive.
2. Remove it from the antistatic bag.
3. Correctly orient the drive to the bay.
4. Slide the drive into the bay until it clicks into place.
5. Replace the restraining screw.
6. Turn the laptop to its upright position.

**TESTING THE OPTICAL DRIVE INSTALLATION**

1. Plug the power cable back in.
2. Replace the battery.
3. Lift the display lid.
4. Power on the laptop.
5. After the laptop boots, open the DVD door.
6. Locate your test DVD and place it into the drive.
7. Close the drive door.



You should hear the optical drive spin up as it prepares to play the DVD.

8. If Autoplay is functioning, the DVD's display program will open and the disc will start to play.



In this scenario, the unit that was replaced was identical to the original, so the appropriate drivers and software were already loaded on the laptop.

## Criteria for Completion

You will have successfully completed this task when the new optical unit is installed and it correctly plays the test media.

# Task 1.18: Installing a Docking Station

As I mentioned in Task 1.14, it is becoming increasingly common for a laptop to be the only computer that users are issued in the work environment. This doesn't just include excessively mobile users, but all workers. This allows a user to perform standard computing tasks at their desks and still take a mobile computer with them to meeting rooms and other remote locations.

Of course, no one ever said that a laptop monitor and keyboard were as easy to use as the desktop counterparts. That's where the docking station (otherwise known as a port replicator) comes in. As you are likely aware, the docking station is a hardware interface that allows the user to "plug in" the laptop to a piece of machinery that then allows connections to a desktop mouse, keyboard, and monitor, as well as network, power, and other cables. The worker experience using the docking station is as if they had a PC under their desk rather than a laptop sitting on their desk.

Installing a docking station isn't a very complex task, but in today's enterprise computing environment, it is a job you'll find yourself doing often.

## Scenario

Your company has just hired a new analyst. She has been issued her laptop and has a flat-screen monitor, keyboard, and mouse available to her. You have been informed that her docking station, which was ordered last week, has arrived and is at the analyst's desk, waiting to be installed. You arrange a time at the beginning of the work day to visit her cubicle so you can install and test the docking station. After arriving at the analyst's desk and unpacking the docking station, you're ready to get to work.

## Scope of Task

### Duration

This task should take 30 minutes or less.

## Setup

You'll need a laptop that is docking station–capable. That is, the laptop must have an interface located traditionally on the bottom or back of the laptop that will allow it to attach to the docking-station interface. In the work environment, a standard laptop and corresponding docking station are ordered together, but you may have to do some shopping to gather the correct units if you intend to perform this task. You'll also need a standard monitor, keyboard, and mouse to attach to the docking station. Ideally, you'll have a network cable ready to connect. The power cable will come with the docking-station kit.

## Caveat

As you might have guessed, unless you already own a laptop that is made to be used with a docking station, you won't be able to perform this task, even if you purchase a docking station. Most individual laptop owners don't buy such a setup, so performing this task can be accomplished only if you work for an organization that has such equipment available or if you decide to purchase the hardware yourself. Also, the make and models of the laptop and docking station to be used must be compatible. There are a wide variety of units to choose from, so check the documentation before proceeding.

## Procedure

This scenario will show you the steps to install a docking station, attach a laptop and other devices, and test the laptop performance while docked.

## Equipment Used

You won't need any tools to install the docking station and to connect the laptop and other equipment. All of the connections you'll need to make can be done by hand.

## Details

You will be taken through the steps of setting up a docking station and attaching all the necessary equipment to allow a person to use a laptop as if it were a desktop computer.

### Installing a Docking Station

#### SETTING UP THE DOCKING STATION

1. At the user's desk, verify that the laptop and the docking station are compatible by checking the make and model numbers or other available documentation.
2. Verify that the laptop, monitor, keyboard, and mouse are present as well as a network cable.
3. Open the docking-station packaging if you have not already done so and remove the contents.

4. Verify that the correct docking station and all necessary peripherals, such as a power cable, are present.
5. Position the docking station in a location that the user has requested and verify that the location will be within reach of power and network outlets and cables.
6. Locate the power connector on the docking station.
7. Locate the power cable and power supply for the docking station.
8. Plug in one end of the power cable to a power outlet or power strip and plug in the other end to the docking station.



Most business desks in cubicles have openings in various areas on the desk surface to allow cabling to pass from the top of the desk to underneath the desk. You will most likely be feeding cables through such an opening as you progress through this exercise.

9. Press the power button on the docking station to verify that it is receiving power, and then press the power button again to turn off the unit.



Most docking stations have a power light so you can see power is reaching the unit, even when a laptop or other equipment is not attached.

#### **ATTACHING PERIPHERALS TO THE DOCKING STATION**

1. Locate the connectors for the peripherals on the docking station, such as the monitor, keyboard, and so on.
2. Position the monitor where the user has requested, verifying it is within reasonable distance from the docking station.
3. Connect the monitor I/O cable to the monitor port on the docking station.
4. Locate the monitor's power cable and connect one end to a power outlet or power strip, and the other end to the monitor.
5. Press the monitor's power button to verify that it is receiving power and then turn it off.
6. Locate the keyboard and place it in front of the monitor or where the user has requested.
7. Connect the keyboard cable to the corresponding port on the docking station.
8. Locate the mouse and place it where the user has requested.
9. Connect the mouse cable to the corresponding port on the docking station.
10. Locate the Ethernet cable and verify it is connected to an available LAN port.



It is typical for business environments to have all cubicles and other work spaces wired for LAN connections, so finding a network connection and cable available should be no problem.

11. Connect the other end of the cable to the corresponding port on the docking station.
12. If any other equipment needs to be attached, such as a local printer, locate and connect the equipment using the proper cables and ports.

#### **ATTACHING THE LAPTOP AND TESTING THE DOCKING STATION**

1. Consult the docking station and laptop documentation to verify the proper method of attaching the laptop to the docking station.



There are a wide variety of procedures, so make sure you are familiar with how your equipment connects before proceeding.

2. Attach the laptop to the docking station.
3. Press the power button on the monitor.
4. Press the power button on the docking station to power up both the docking station and the laptop.
5. Watch the monitor to verify that you can see the boot or splash screen as the operating system loads.
6. Either have the user log on to the laptop or log on using a test account for the computer.



This effectively tests the keyboard connection.

7. After the operating system has finished loading, test the functioning of the mouse, keyboard, network connection, and so forth to verify that the computer can be used normally while attached to the docking station.
8. Power down the computer and disconnect the laptop, then power it up without being connected to the docking station to verify that it operates correctly.
9. Power down the laptop, reconnect it to the docking station, then power up the docking station to verify that the user can interact with the laptop normally while using the docking station.



Don't assume that just because the connection initially works, the laptop and docking station will work correctly with repeated connections and disconnections. Disconnect and reconnect the laptop at least once to make sure it works in both modes.

## Criteria for Completion

You will have successfully completed this task when you can connect, disconnect, and reconnect the laptop to the docking station and be able to use the computer normally, both disconnected and connected to the docking station.

# Task 1.19: Installing a KVM Switch

The idea of a keyboard-video-mouse (KVM) switch is that it allows you to use a single keyboard, monitor, and mouse on two or more computers or servers. KVMs are traditionally used to attach several servers so you can switch the use of your keyboard, monitor, and mouse between them. After all, this equipment takes up a lot of space, and space is usually at a premium in a server room. Chances are you don't need to see the display of more than one of your servers at any given time.



With the current popularity of running numerous virtual machines on a single piece of hardware, KVMs are used less, but you will no doubt still be required to install and maintain such equipment.

If you have two computers connected through a KVM device, you can switch to unit A and work on the first server and then switch to unit B and access the second server. Although junior PC techs don't do a large amount of work with server maintenance (the more typical role is in desktop support), occasionally you'll be asked to install a KVM switch and verify that it works.

## Scenario

A second server has just been installed at one of your company's branch offices. Both servers have been configured but are currently shut down. You've been assigned to install a KVM switch so that a single keyboard, monitor, and mouse setup in the server room can be used to work with both servers.

The senior tech provides you with a KVM installation kit and explains the setup. You take the kit and your tools and drive to the branch office. You introduce yourself to the supervisor on duty and she takes you to their small server room. You set the KVM unit and toolkit on the table next to the monitor, mouse, and keyboard and start the job.

## Scope of Task

### Duration

This task should take about 20 minutes.

## Setup

You will need to have two PCs, one KVM unit, and one monitor, keyboard, and mouse. Have both PCs powered down before starting this exercise. You will also need the appropriate cabling to connect both computers to the KVM device. Those cables should come with the KVM switch. ESD procedures are not necessary because you won't be coming in direct contact with delicate electrical components.

## Caveat

There are a number of different makes and models of KVM switches on the market, so the procedure for installing yours may differ slightly.

## Procedure

This lesson will teach you how to connect two computers to a single KVM switch and, using a single monitor, keyboard, and mouse, be able to switch back and forth between the two computers.

## Equipment Used

No tools are needed to complete this task besides what is described in the “Scope of Task” section. The only thing you might need is a set of plastic ties for cable management.

## Details

You will be guided through the steps necessary to connect two computers to a KVM switch; attach a single monitor, keyboard, and mouse to the switch; and use the switch to toggle back and forth between the two computers.

### Installing a Two-Port KVM Switch

#### CONNECTING THE PERIPHERALS TO THE KVM SWITCH

1. Place the switch in its permanent location in proximity to the servers, monitor, keyboard, and mouse.
2. Verify that both servers have power cords plugged into their power supplies.
3. Verify that both servers are powered down.
4. Locate the output ports for the monitor, keyboard, and mouse on the back of the KVM switch.
5. Attach the monitor connector to the video output port on the switch.
6. Attach the keyboard connector (PS/2 or USB) to the keyboard output port on the switch.
7. Attach the mouse connector (PS/2 or USB) to the mouse output port on the switch.



**CONNECTING COMPUTERS TO THE KVM SWITCH**

1. Locate the input ports for the monitor, keyboard, and mouse connections for position A.
2. Locate the input ports for the monitor, keyboard, and mouse connections for position B.
3. Locate the two sets of KVM cables to be used to connect the KVM switch to the two servers.
4. Attach the monitor, keyboard, and mouse connectors on one end of the first cable to the input ports for the monitor, keyboard, and mouse connectors for position A on the switch.
5. Locate the monitor, keyboard, and mouse connectors on the first server.
6. Locate the loose end of the cable you just attached to the switch.
7. Attach the monitor, keyboard, and mouse connectors on the cable to the appropriate ports on the first server.



Connecting individual cables from the switch to server A and then from the switch to server B will help avoid confusion as to which cable goes with which server.

8. Attach the monitor, keyboard, and mouse connectors on the second cable to the appropriate input ports for position B on the KVM switch.
9. Locate the loose end of the second cable.
10. Attach the monitor, keyboard, and mouse connectors on the cable to the appropriate ports on the back of the second server.
11. Locate the power cord for the KVM switch.
12. Plug it into the power socket of the switch.
13. Locate a vacant plug on the power strip or UPS unit.
14. Plug the other end of the KVM power cord into the power device.
15. Locate your plastic ties in your toolkit.
16. Organize the different sets of cables and contain each bundle with a set of ties.



Although you don't need to practice good cable management for the sake of this exercise, in the real world you are expected to be not only technically proficient, but also tidy. Nobody wants to deal with a nest of snakes... or cables.

**TESTING THE KVM INSTALLATION**

1. Power up the KVM device.
2. Power up the first server.

3. Power up the second server.
4. When all devices are fully powered and booted, press the A button.



You should see the desktop of the first server with the login dialog box.



It is assumed that you have login credentials for these servers.

5. Log in to server A.
6. Set the background color or some other obvious visual indicator to a nondefault configuration.
7. Press the B button to switch to the other server.
8. Log in to server B.
9. Repeat switching back and forth between A and B to test the installation.
10. Practice using the keyboard and mouse on both servers A and B to test them.
11. When done, log off both servers.

## Criteria for Completion

You will have successfully completed this task when you are able to freely switch back and forth between both computers and use the monitor, keyboard, and mouse normally on both machines.

## Task 1.20: Installing a Complete Workstation from the Box

When you think of working as a PC technician, especially from the hardware point of view, you probably imagine either repairing or replacing bits and pieces of an overall computer. However, there is something called a workstation rollout that you will occasionally participate in. This is when a company is opening a new department or expanding a department and needs to have 80 new workstations up and running in two days. You can also have a rollout when PC hardware and the OS are being upgraded in an existing office.

What you can face as a tech is 80 boxes sitting beside 80 desks in different offices and cubicles waiting for you (and the rest of your team) to unbox them, assemble the different

parts, hook them up to the network and power, and boot them. If you are operating on a much smaller scale, you could be solely responsible for the rollout.

Then the fun begins because they all have to be set up to a specific set of configurations, which means either you'll be carrying around a CD to load that information on the computer, or the computer's hard drive is ghosted and you'll need to go through a setup wizard. It's not all a drag, though. If you have to work long hours on a large rollout over the weekend, the team lead usually springs for pizza.

## Scenario

One of your company's branch offices is still using Windows 2000 Professional on its PCs. You have been assigned to perform a complete hardware and operating-system upgrade for the office's six PCs. You will need to physically replace the computers and configure the new PCs to connect to a local server and run proprietary software. You will also be responsible for boxing up the old equipment and using the provided labels to prepare them for shipping back to the corporate office.

You've been provided with instructions that will walk you through the procedure of performing the hardware and OS rollout. You have been assigned to start on a Friday morning so you'll be working around the employees at the branch office. You have arrived at the branch office and introduced yourself to the manager. She has shown you where all the boxes containing the new machines are placed as well as the tape and packing labels you'll need later. You go to the first workstation, lay out your instructions, and begin to follow them.

## Scope of Task

### Duration

Realistically, rolling out six desktops and testing them should take four to five hours, depending on how much configuration is needed and how smoothly the job goes. Performing this task with a single computer should take about an hour.

### Setup

The setup for this exercise can only be approximated in a home or small lab environment. The best you could do would be to have access to a completely boxed computer that needs to be unboxed, have all of the physical cabling connected, have a connection to the network, and be set up to communicate with the other computers in the network.

### Caveat

This is a very common task for a PC tech at a company that is budgeted to slowly upgrade its PC hardware and operating-system platforms. However, it is a difficult task to replicate in terms of practicing because the PCs involved in a rollout have already been configured to run through a setup routine when booted. Your job is to follow instructions, call the IT

department if something doesn't go as planned, and clean up after yourself. Part of your job in this case is to empty the garbage, or at least take the empty boxes to the nearest dumpster.

Even if you aren't in a position to follow every step of this task, just going through it will provide you with an inside glimpse into one of the ordinary activities done by technicians. Although it is typical for your instructions to include all six PCs, this task will cover only the first one; it is assumed that the setup for the other five is identical.

For the purpose of this exercise, assume the new operating system being rolled out is Windows XP Professional.

## Procedure

This lesson will show you how to perform a small hardware and OS rollout.

## Equipment Used

You won't be opening up any of the PC cases, so you won't need much in the way of tools. In a scenario such as this, you will need a box cutter to open the boxes, tape to seal them once you put the old units inside and ready them for shipping, and probably some plastic ties to tidy up the cabling.

## Details

This exercise will take you through the whole process of a hardware and OS rollout, including unboxing the new computer, physically setting up the computer, running the configuration wizard, and verifying that the PC can communicate with the network, including the server.

## Preparing to Roll Out the First Computer

### INVENTORYING THE NEW EQUIPMENT

1. Locate your box cutter.
2. Carefully cut the tape on the top of the box.
3. Open the box.
4. Remove the invoice from inside the box.
5. Read the invoice, taking note of what you should find in the box.
6. Remove all of the equipment from the box, including the new PC.
7. Compare the equipment to the invoice, making sure they match.
8. Write on the invoice that everything listed was delivered.



You will be expected to keep track of all of the paperwork and transport it to the main IT department when the work is done.

**DECOMMISSIONING THE FIRST WINDOWS 2000 PROFESSIONAL WORKSTATION**

1. Locate the first computer you are going to replace.
2. Ask the user to log off the computer.
3. After the user logs off, sit at the workstation and perform a graceful power down.



As part of your introduction to the workers at the office, you are usually instructed to tell them what to expect and that you will try to disrupt their work as little as possible. They have typically received this information before your arrival, but you need to be polite and remember that you are a guest in their office.

4. Get under the desk and access the old unit.
5. Unplug the keyboard, mouse, and monitor connectors.
6. Unplug the Ethernet connector and the power cord.
7. Lift the old PC out from under the desk.



PCs can be situated either on or under the user's desk, depending on the size of the unit and the user's personal preferences.

8. Place the old PC in the box the newer unit arrived in.
9. Replace the packing material (such as Styrofoam) to protect the older unit.
10. Seal the box securely with packing tape.
11. Attach the preaddressed shipping label to the box.
12. Set the box in a preselected area in the office, out of the way of the users.

**Rolling Out the First Computer****PHYSICALLY INSTALLING THE FIRST COMPUTER**

1. Locate the first new PC.
2. Place it under the user's desk in the same position the old PC occupied.
3. Locate the power cord used by the old PC.



In this scenario, you'll be using all of the old cables and peripherals for the rollout. Only the PC will be new.

4. Plug the cord into the new computer's power supply. The power supply is inside the PC. A connection for it is located on the back of the computer. See Task 1.6 for the definition of a computer's power supply.
5. Locate the Ethernet cable you removed from the old PC.
6. Plug the Ethernet cable into the new computer's NIC port.
7. Locate the keyboard, mouse, and monitor connectors from the old PC.
8. Connect them to the appropriate ports on the new PC.

#### PERFORMING THE INITIAL CONFIGURATION

1. Sitting at the keyboard, power up the PC and let it boot.



Usually once the operating system loads, a proprietary login screen appears. Your instructions will include login credentials. The credentials used in the subsequent steps, including the IP address of the local server, are bogus and just used as examples.

2. Type the username **tech01** in the Username field.
3. Type the password **csicsic** in the Password field.
4. Click Start.
5. Click Run.
6. In the Run box, type **cmd** and press Enter.
7. At the command prompt, type **ipconfig/all**.
8. Verify that the PC has received a dynamic IP address from the DHCP server at the branch.



It seems prudent to mention again that Windows XP and Vista are configured by default to use Automatic Private IP Addressing (APIPA) in the event that the computer cannot acquire a dynamic address. If the address is returned in the 169.254.x.x range and the subnet mask is 255.255.0.0, the computer is using APIPA. Consult with your network administrator to find out what subnet mask and IP address range you would expect the computer to acquire.

9. Type **ping 192.168.0.1** at the prompt and verify that there is a connection to the server.
10. Type **ping www.google.com** at the prompt and verify that there is a connection to the Internet.
11. Close the command-line interface (CLI).



At this point, you usually run through a routine to configure the new PC for the office. The following is an example. This part of the process can be highly variable.

### **CONFIGURING THE NEW PC FOR ITS ENVIRONMENT**

1. Double-click the CSIC icon on the Desktop.
2. In the Available Servers list, click on server CSIC-1701 to select it.
3. Click OK.
4. When the Configuration Status box appears, watch the green progress indicator until it moves completely across the box and flashes green.
5. Click Done.
6. Log out of the workstation.
7. Repeat the entire process for the other five computers.

### **Completing the Rollout**

1. Verify that you have completed the rollout for all six new machines.
2. Verify that you have boxed and sealed all six of the old workstations in their boxes.
3. Verify that you have correctly labeled all six boxes for shipping and moved them to an out-of-the-way area.



On the next business day, the office will arrange for its selected shipping company to come, take the boxes, and transport them to their destination.

4. Clean up any excess packing material or other waste that was created during the roll-out and dispose of it in a nearby dumpster.
5. Verify that all six users can log in to the network and perform their jobs.
6. Complete and sign all documentation and have the manager countersign.
7. Call the IT department and advise them that the job is completed and you'll be bringing in the paperwork.

## **Criteria for Completion**

In the scenario, you will have successfully completed the task when all six new workstations are fully operational and networked. If you have been simulating the exercise by assembling and networking a PC, you will have successfully completed the task when you have attached all peripherals to the PC, connected it physically to the rest of the network, powered up the machine, and are able to perform typical tasks and have network connectivity.

## Task 1.21: Installing Drivers from a Disc

Long gone are the days when a computer could contain by default all of the hardware drivers necessary to work and play well with every device and component on the market. Chances are, if you install a piece of hardware or a peripheral, you'll also have to install the drivers.

Most of the time, this isn't much of a chore, especially if you are installing a new device and have the driver disk that came with the hardware. Windows makes it pretty easy, but you do have to go through a few steps. Get used to them. As a PC tech, you'll be installing or updating drivers almost all the time.

### Scenario

A user has turned in a trouble ticket stating that he is having difficulty playing audio tutorials on his PC. You've investigated and determined that the problem is his sound card. You install a replacement PCI sound card (see Task 1.3) and now you need to install the drivers. You have the driver disc that came with the sound card and are ready to do the installation.



The sound-card scenario is only an example. You'll end up installing drivers for a wide variety of components.

### Scope of Task

#### Duration

This task should take about 10 minutes.

#### Setup

Ideally, you will have just installed a new device or component and have the driver disc for the new piece of hardware handy.

#### Caveat

In this lesson, you'll be using Windows to do the installation, but often the vendor's driver disc has its own interface and installation procedure. In the vast majority of cases, you just need to follow the onscreen instructions and the drivers will be successfully installed.

### Procedure

This lesson will teach you how to install device drivers from a CD.



## Equipment Used

The only thing you'll need after the device is installed is the driver disc.

## Details

This task will walk you through the steps of using Windows to install a device driver from a CD.

### Installing Device Drivers from a Disc

#### GETTING READY TO INSTALL DRIVERS FROM THE DISC



For this task, you should have already installed the sound card and powered up the Windows XP computer.



Some devices require that you install the drivers before you power up the new equipment. Consult the device's documentation before continuing.

1. Locate the driver disc.
2. Locate the driver installation instructions.
3. Verify that the correct procedure is to use Windows to install the drivers.



You may fail to correctly install the device drivers if you don't follow the recommended method of installing them from the driver disc.

#### INSTALLING FROM THE DEVICE DRIVER DISC USING WINDOWS

1. Sitting at the keyboard, click Start.
2. Right-click My Computer.
3. Click Properties.
4. Click the Hardware tab.
5. Click the Device Manager button.
6. Locate the new device in the Device Manager list.



A yellow exclamation point may appear next to the device, indicating that it is not functional at this time.

7. Expand the Sound Card notation in the list.
8. Right-click the name of the sound card.
9. Click Properties.
10. Click the Update Drivers button.
11. In the Hardware Update Wizard, click the Install from a List or Specific Location (Advanced) radio button.
12. Click Next.
13. Insert the driver disc in the PC's CD or DVD drive.
14. Click the Search for the Best Driver in These Locations radio button.
15. Verify that the Search Removable Media (Floppy, CD-ROM) box is checked.
16. Click Next.
17. When the search of the disk locates the driver, select it and click OK.



A dialog box may appear indicating that the driver isn't digitally signed. This is not a serious situation; it only means that Microsoft has not specifically tested the driver with Windows XP. Click the Continue Anyway button.

18. After the driver installs, click Finish.
19. If prompted, click the Restart button to reboot the PC.
20. Remove the driver disc.

## Criteria for Completion

You will have successfully completed this task when the computer reboots and you can use the new device normally.

## Task 1.22: Installing Drivers from the Internet

Probably the most difficult task in installing drivers from the Internet is finding them. Although it makes sense to go to the manufacturer's site first, depending on how the company's site is set up, it may not be easy to locate the right drivers. Also, if you are looking for drivers for a legacy device, the vendor may have gone out of business. Task 2.6 will focus on how to find drivers online. For this task, it is assumed that you've located the right driver page to find the needed driver, download it, and install it.

## Scenario

You are installing an HP All-in-One device as a local printer/fax/scanner on a user's computer. You don't have the driver disc that originally came with the device but can find the drivers online. The computer has an Internet connection and you can go to HP's site and find the drivers page for the product.

## Scope of Task

### Duration

This task should take about 15 minutes.

### Setup

You'll need a computer with an Internet connection and, ideally, a device that's connected to the PC and needs updated drivers. You can also download the drivers for just about any device but not install them.

### Caveat

If you wanted to update the drivers of a device already installed on your computer, you could just use the Device Manager to search for drivers online. (Task 1.21 used the Device Manager to install drivers from a CD.) This task focuses on a situation in which you are installing a new device and must locate and download drivers from the Internet. In this example, you are downloading an HP device driver, but this task is applicable for any manufacturer or device.

## Procedure

This task will show you how to download and install device drivers from an Internet site.

### Equipment Used

You only need a computer with an Internet connection to complete this task.

### Details

This task will show you the steps necessary to download and install device drivers from a manufacturer's site.

### Downloading and Installing Device Drivers

#### SELECTING AND DOWNLOADING DRIVERS

1. With the [www.hp.com](http://www.hp.com) site open in your browser, select Support and Drivers.
2. On the Support page, select the Download Drivers and Software radio button.

3. In the For Product field, enter the name and model number of the device, such as officejet 6110.
4. Click the Go button.



Your product make and model may have several submodel numbers, and you may have to enter or select the one that most closely matches your device.

5. On the Product Search Results page, select the model number that most closely matches the device you are installing.
6. Click the name of your operating system.
7. Find the specific driver you need and click the link.
8. Review the information on this page to make sure it is the correct driver.
9. Click the Download Only button.
10. Browse to the folder on your hard drive where you want to place the driver.



When downloading drivers or any file from the Internet, prepare a folder in your directory system ahead of time so you can find the file later. For example, you could create a folder named Drivers off your C drive and download all your drivers to one folder. This makes it easy to find them later.

11. Click OK to download the driver to the selected folder.



The amount of time it takes for the drivers to download depends on your connection speed and the size of the software package.

### INSTALLING DEVICE DRIVERS

1. Browse to the folder where you downloaded the driver package.
2. Double-click the driver package.
3. In the installation wizard, accept the default location for the installation.
4. Click Next to extract the drivers.



This part of the task may take a few minutes. After the drivers are extracted, the process is largely automatic, with the installation software checking your system, preparing for the installation, conducting the installation, and configuring the product.

5. After the installation is complete, restart the computer.



Depending on the device involved, you may have to complete the configuration wizard before being able to use the device.

## Criteria for Completion

You will have successfully completed the task when the drivers are installed, the device is configured, and you are able to use the device normally.

# Task 1.23: Reformatting a Hard Drive

Reformatting a hard drive is no fun. It usually means that there is something seriously wrong with the computer that cannot be repaired in any other way. Reformatting means erasing everything on the hard drive and then reinstalling the OS, drivers, application software, and data. If possible, back up all of the data on the drive before reformatting.



Reformatting a hard drive will erase everything on it and all of your data will be lost.

Sometimes a computer will become so overrun with malware that it becomes impossible to recover it through normal means. The solution of last resort is to wipe the drive and reinstall everything. The Windows XP Recovery Console provides an ideal tool for doing this.



There are a number of other methods you should use to attempt to recover a compromised computer before reformatting the hard drive. Proceed with all of those methods prior to resorting to this option.

## Scenario

You receive a trouble ticket from a user that his Windows XP laptop seems to go out of control when powered up and connected to the network. You investigate and determine that the laptop has been severely overrun by malware during a business trip taken by the user. Antivirus and antimalware removal solutions have been unsuccessful. Other methods such as System Restore and Last Known Good Configuration have also proved unsuccessful. Your supervisor advises you to reformat the hard drive of the laptop. Fortunately, most of the data on the laptop can be recovered from the last backup, prior to the computer being compromised.

You take the laptop to your workbench and locate the Windows XP installation disc that you'll need for the reformatting. You know that the file system on the XP machine is NTFS.

## Scope of Task

### Duration

This task should take about 20 minutes

### Setup

You'll need to have a computer running Windows XP that must be able to boot from a CD drive. You'll also need to have the recovery disc. Most important, the computer must not contain data and software that you will need.

### Caveat

Be very sure you have any data you want backed up before proceeding with this task. Once you're done, any data on the drive will be gone forever. If your computer doesn't check the optical drive before the hard drive when it starts booting, you'll have to change the boot order in the BIOS. Once this process is done, make sure you have all of the application installation discs if you want to reinstall the operating system and all the apps.



To reinstall the operating system and all the apps, see Task 1.24, "Installing Windows XP Professional as a Fresh Install," Task 1.27, "Installing Microsoft Applications," and Task 1.28, "Installing Non-Microsoft Applications."

## Procedure

This task will show you how to reformat a hard drive using the Recovery Console in Windows XP.

### Equipment Used

You won't need any tools for this task, just the Windows XP computer itself and the recovery or installation CD.



Depending on where you bought your computer, you were given either the full installation disc with the computer when you received it or a recovery disc that contains all the XP repair tools but not the operating-system installer. If at all possible, when you buy a computer, make sure the full installation disc comes with it.



Computer manufacturers such as HP now create a separate directory on the hard drive that contains all of the recovery-disc tools. The user is required to create the disc themselves. I highly recommend that you do so as soon as you buy the computer. If you don't, and subsequently suffer a severe hardware or software failure, you'll most likely be without a method of recovery.

## Details

This task will show you all of the information regarding changing the boot order of a computer and using Windows XP Recovery Console to reformat the hard drive.

### Changing the Boot Order of a Computer

#### GETTING INTO THE BIOS AND CHANGING THE BOOT ORDER

1. Verify that the laptop is connected to a power source.
2. Open the CD or DVD drive.
3. Insert the recovery disc.
4. Boot the computer.
5. As the boot sequence begins, scan the bottom of the screen for the key or key combination that will let you enter the setup.



The key or key combination depends on the computer manufacturer and the type of BIOS the computer uses. Some of the more common are F1, F2, Del, Esc, or Ctrl+Alt+Del.

6. When the setup screen appears, look for an area or list referencing the boot order.



Exactly how the setup screen is configured varies widely. This task takes you through a basic procedure, but how your BIOS is set up may differ.

7. Follow the onscreen notes to enter the boot order menu.
8. View the listing of the boot order.
9. If necessary, change the boot order to make the CD or DVD drive the first in the list.
10. Press the key that will save your changes and restart the computer.

### Reformatting a Hard Disk

#### USING WINDOWS XP RECOVERY CONSOLE TO REFORMAT THE HARD DISK

1. As the computer boots from the CD, look for the Welcome to Windows Setup screen.
2. Press either the F10 function key or the R (for repair) key.

3. When the Recovery Console opens, select the Windows installation from the list.



Windows will most likely be at the top of the list and be called C:\WINDOWS.

4. Press Enter.
5. At the login screen, use your administrator name and password to log in.



On home Windows systems, the primary user is usually the administrator. In a work setting, admin usernames and passwords are set by the IT-department staff. Your supervisor will have provided you with this information.

6. Press Enter.
7. In the command-line emulator, type **map** at the prompt.



Typing **map** will provide a list of drive letters with the associated file system, size, and device name of each drive.

8. Press Enter.
9. Type **format C: /fs:ntfs**.



Step 9 assumes that the drive you want to reformat is the primary or C drive. If the drive you are reformatting uses a different drive letter, use that one instead.

10. Press Enter.
11. Type **y** and then press Enter.
12. After the reformatting process finishes, type **exit**.
13. Press Enter to restart the computer.

## Criteria for Completion

You will have successfully completed the task when the computer reboots and the hard drive has been reformatted with the operating system, application software, and data deleted.



# Task 1.24: Installing Windows XP Professional as a Fresh Install

As you saw in Task 1.23, there are times when even good PCs go bad and there's nothing left to do but reformat the hard drive. Of course, this is only part of the rehabilitative therapy for your ailing computer. To fix the original problem, you had to throw out the good software with the bad. Although you have guaranteed that all viruses and other malware have been removed from the hard drive, you also deleted the operating system, application software, and all your data.

Hopefully you backed up your data and located software installation discs. You're going to need them if you ever want to use your computer for more than a paperweight. Assuming you took all of the appropriate steps to find your software discs; you'll soon be tapping away at the keyboard and clicking the mouse once again.

## Scenario

You have just completed reformatting the hard drive of a laptop that had been corrupted with various forms of malware (see Task 1.23). You have located a Windows XP Professional installation disk and are ready to reinstall the operating system. You will be performing a fresh install, so it will be as if you were installing Windows XP on a brand-new hard drive.



You can use a Windows XP Home edition install disk for this task because the installation process is virtually identical.

## Scope of Task

### Duration

This task should take about 30 to 45 minutes, depending on the capacity of your computer's CPU and memory.

### Setup

You'll need a computer with a newly reformatted hard drive. You will also need a genuine Windows XP Professional installation disc and the accompanying product key.

## Caveat

This task will take you only as far as the installation of the operating system. Tasks 1.27 and 1.28 will continue the recovery process by teaching you how to install Microsoft and non-Microsoft application software. You can complete this task only by reinstalling Windows XP on a reformatted drive.

## Procedure

This task will instruct you on how to reinstall Windows XP on the reformatted hard drive of a computer.

## Equipment Used

You will need only a computer with a reformatted hard drive and a valid Windows XP installation disc with the accompanying product key.



Do not use pirated software for this or any other task you perform in this book!

## Details

This lesson will walk you step-by-step through the procedure of performing a fresh install of Windows XP on a reformatted hard drive.

### Reinstalling Windows XP

#### REINSTALLING WINDOWS XP ON A REFORMATTED COMPUTER

1. Verify that your computer is hooked up to a power supply.
2. Locate the Windows XP install disc.
3. Insert the disc into the CD or DVD drive of the computer.
4. Reboot the computer.



In Task 1.23, you made sure that the computer would look to the optical drive first to boot. Watch carefully for the message “Press any key to boot from CD.” It will appear for only a few seconds, so quickly press any key on the keyboard to initiate a boot from the CD.



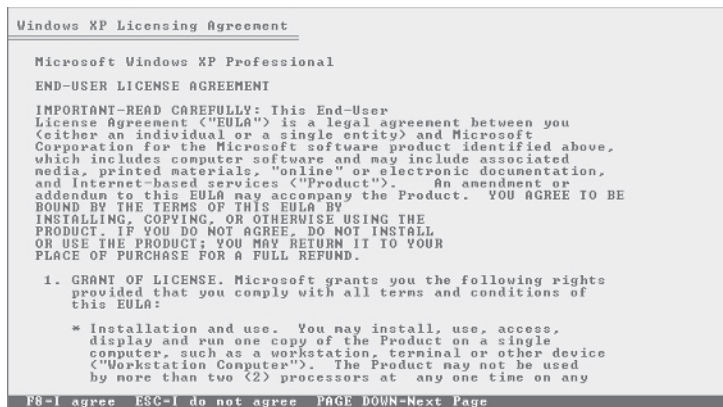
You may be asked to activate the product (operating system) at this time or at some point in the installation process. Skip this part of the setup since you will need an Internet connection to complete product activation.

5. When the Welcome to Microsoft Windows XP window appears, click the arrow in the green box next to Install Windows XP.



You can also press Enter at this step.

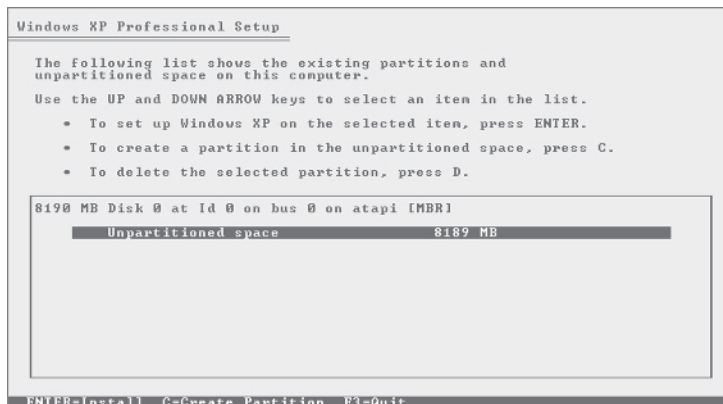
6. The initial Windows Setup window appears. At this point, Setup will format the partition.
7. When the Welcome to Setup window appears, press Enter.
8. When the End-User License Agreement appears, press F8 to agree.



9. When the partition window appears, verify that the desired partition is selected and the press Enter to install Windows XP on that partition.



You can also create a new partition by pressing C. To toggle through a list of partitions in the partition window, use the up and down arrow keys.



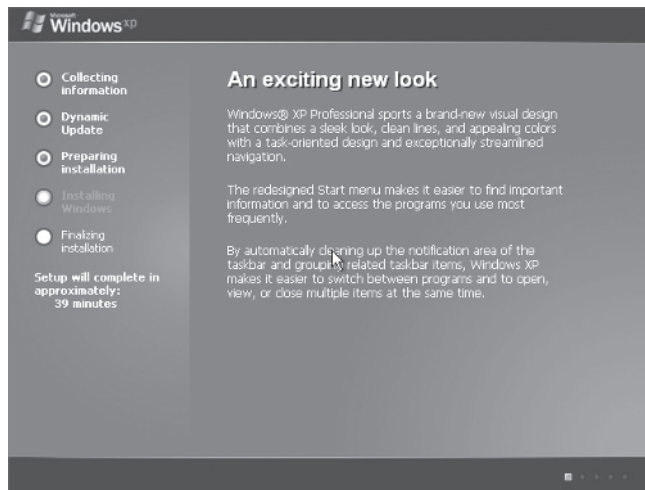
10. When the file-system window appears, use the up and down arrow keys to select Format the Partition Using the NTFS File System, and then press Enter.
11. Setup will format the partition and then copy files to the Windows installation folders. When it finishes copying files, Windows will reboot.



After Windows reboots, the GUI installation screen appears, informing you of the current stage of the installation and about how long it will take. Notice the flashing green lights at the lower-right side of the screen. The moving lights indicate that the installation is proceeding.



If those lights stop moving or are moving extremely slowly, it probably indicates a problem with the install. The most common cause is a smudge or dirt on the disc. You will need to stop the installation, remove the disc, and examine it for smudges or damage. If possible, clean the disc and make another attempt to do the installation.



12. When the Regional and Language Options box appears, click Next.



If you live someplace besides the United States, you will want to click the Customize and Details buttons to adjust the Regional and Language Options settings so they are appropriate to your location. After these settings are adjusted, you can click Next to proceed.

13. When the Personalize Your Software box appears, enter your name or the name of the end user in the Name field. You can optionally enter a company name in the Organization field.
14. Click Next.
15. When the Your Product Key box appears, enter the 25-character product key that came with the installation disc.



You can usually find the product key on a label attached to the disc case.

16. After you've entered the key, click Next.
17. When the Computer Name and Administrator Password box appears, type the host-name of the computer in the Computer Name field.
18. Type the password for the local computer administrator account in the Administrator Password field and repeat this step in the Confirm Password field.



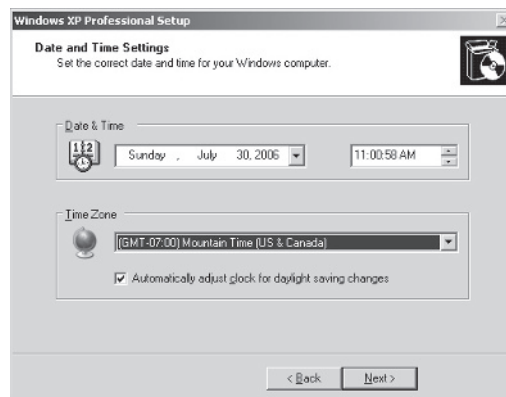
This is the password for the administrator account on the local machine, not the domain administrator password.

19. Click Next.
20. When the Date and Time Settings box appears, adjust the Date, Time, and Time Zone settings using the drop-down lists and arrow keys.



Usually, the Date and Time are correct and you will only have to adjust the Time Zone setting.

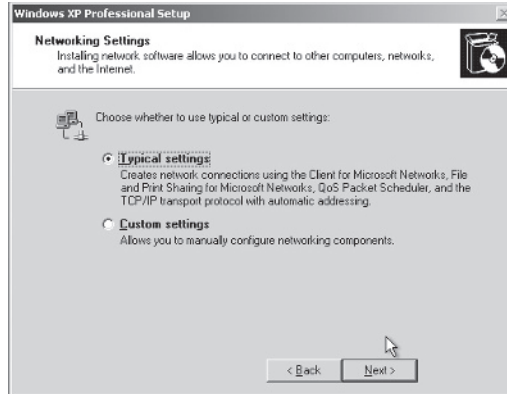
21. If desired, verify that the Automatically Adjust Clock for Daylight Saving Changes check box is checked, and click Next.





After you click Next in the Date and Time Settings window, you will be returned to the GUI installation window. Allow the installation process to continue until your input is required.

22. When the Networking Settings box appears, select Typical Settings and click Next.

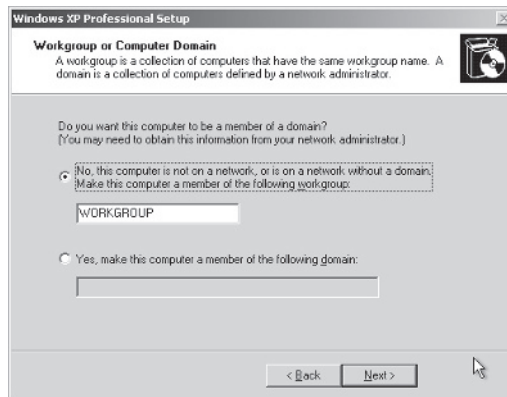


23. When the Workgroup or Computer Domain box appears, select the No, This Computer Is Not on a Network radio button and accept the default workgroup name of WORKGROUP.

24. Click Next.



If you are installing Windows XP Home edition, the default name of the workgroup is MSHOME.





You will join this computer to the domain after the installation is complete. See Task 3.10 for details.



After you click Next in the Workgroup or Computer Domain window, you will be returned to the GUI installation window. The installation will proceed to its conclusion after about 30 minutes and the computer will reboot at that time.

25. When the computer reboots and the Display Settings box appears asking to adjust the screen resolution, click OK.
26. When the screen resolution is adjusted, if you can read the message in the Monitor Settings box, click OK.



After you click OK in the Monitor Settings box, Windows XP will load.

### CONFIGURING A NEWLY INSTALLED WINDOWS XP PROFESSIONAL COMPUTER

1. When the Welcome to Microsoft Windows screen appears, click Next.



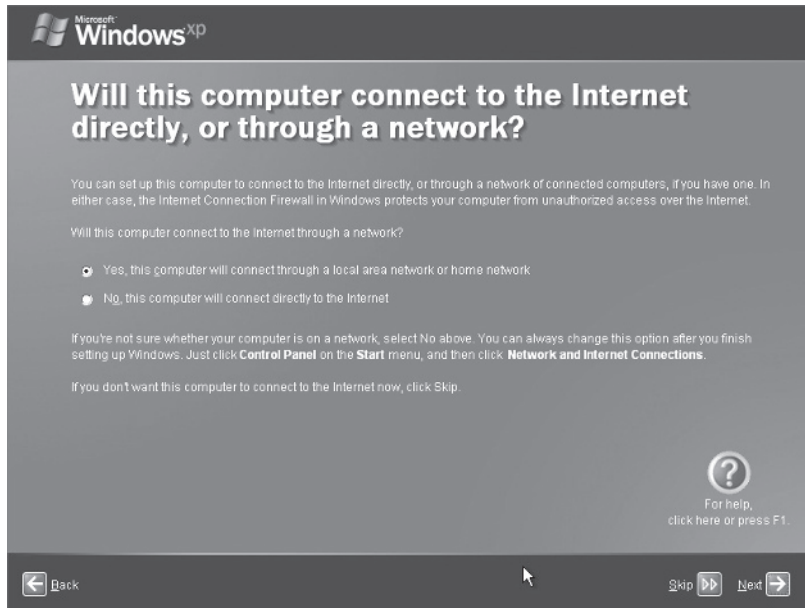
If you have speakers attached to the computer, turn them on and turn up the volume. If the sound card and speakers are operating correctly, you will hear a test "song."



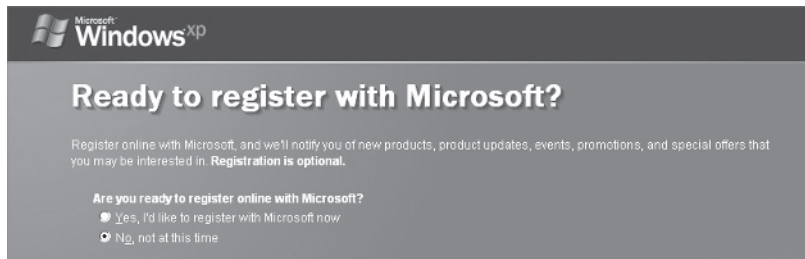
- When the Internet Connection screen appears, select the Yes, This Computer Will Connect Through a Local Area Network or Home Network radio button and click Next.



You also have the option to skip the screen in step 2 by clicking Skip.



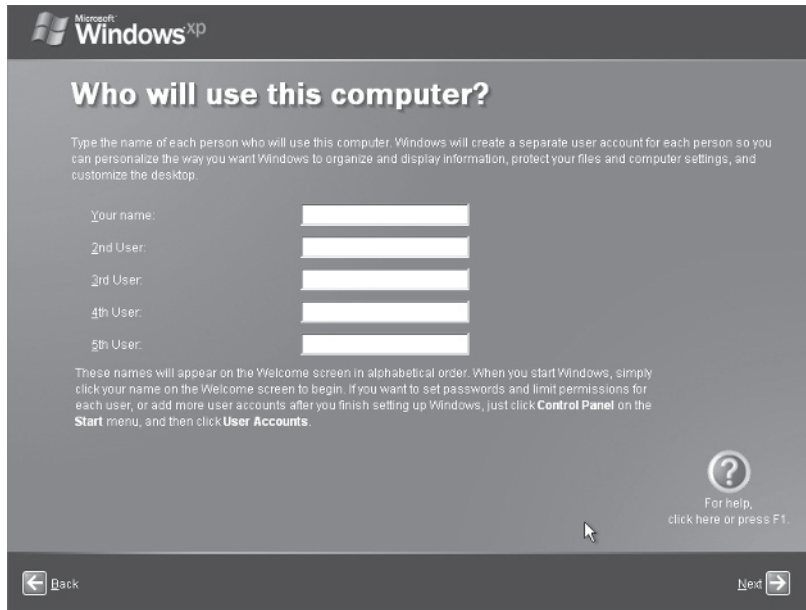
- When the Ready to Register with Microsoft? screen appears, select the No, Not at This Time radio button and click Next.



- When the Who Will Use This Computer? screen appears, type the name of the primary user in the Your Name field.
- If other users need to have their own local computer accounts on this PC, use the additional fields to enter their names.



6. Click Next.



7. When the Thank You! screen appears, indicating that Windows XP Professional has been successfully configured, click Finish.



Windows will reboot and the operating system will complete loading. The Desktop will then appear and you will be ready to start using Windows XP Professional. You can remove the installation CD at this time.

## Criteria for Completion

You will have successfully installed and configured Windows XP on a computer when the operating system loads and you can use the computer normally.



Under normal circumstances, your next steps are to activate the onboard firewall, configure the network connection, connect to the Internet, and go to the Windows Update site. You will need to install all the service packs and security patches before you resume any other activity on the computer.

## Task 1.25: Installing Windows Vista as a Fresh Install

This exercise will build on Task 1.23, just as Task 1.24, “Installing Windows XP Professional as a Fresh Install,” did. In this case, you will be performing a fresh install, but using Windows Vista instead of XP. While many people continue to have concerns about Vista, and are considering postponing upgrading from Windows XP until Microsoft Windows 7 is formally released in 2010, Vista has taken hold in the home and workplace and, as a technician, you’ll be expected to perform this sort of job.

### Scenario

You have just completed reformatting the hard drive of a laptop that had been corrupted with various forms of malware (see Task 1.23). In this scenario, the laptop previously ran Windows Vista and you have been tasked with installing Vista on the notebook device. You have located a Windows Vista DVD and are ready to reinstall the operating system. You will be performing a fresh install, so it will be as if you were installing Windows Vista on a brand-new hard drive.

### Scope of Task

#### Duration

This task should take about 30 to 45 minutes, depending on the capacity of your computer’s CPU and memory.



To check on the system requirements of the computer you want to use to install Windows Vista, including CPU and memory, visit <http://support.microsoft.com/kb/918884>.

### Setup

You’ll need a computer with a newly reformatted hard drive. You will also need a genuine Windows Vista installation DVD and the accompanying product key. The laptop or other computer used for this exercise must be set to boot from the DVD drive.

## Caveat

This task will take you only as far as the installation of the operating system. Tasks 1.27 and 1.28 will continue the recovery process by teaching you how to install Microsoft and non-Microsoft application software. You can complete this task only by reinstalling Windows Vista on a reformatted drive.

You are most likely aware of the plethora of varieties of Vista available. For the sake of this exercise, the Windows Vista installation will not favor any particular edition of Vista. Since the laptop we are using for this example previously ran Vista adequately, this exercise will not include the steps for checking system requirements or hardware and software compatibility.

## Procedure

This task will instruct you on how to reinstall Windows Vista on the reformatted hard drive of a computer using the Windows Vista installation DVD.

## Equipment Used

You will need only a computer with a reformatted hard drive and a valid Windows Vista installation DVD with the accompanying product key.



Do not use pirated software for this or any other task you perform in this book!

## Details

This lesson will walk you step-by-step through the procedure of performing a fresh install of Windows Vista on a reformatted hard drive.

### Reinstalling Windows Vista

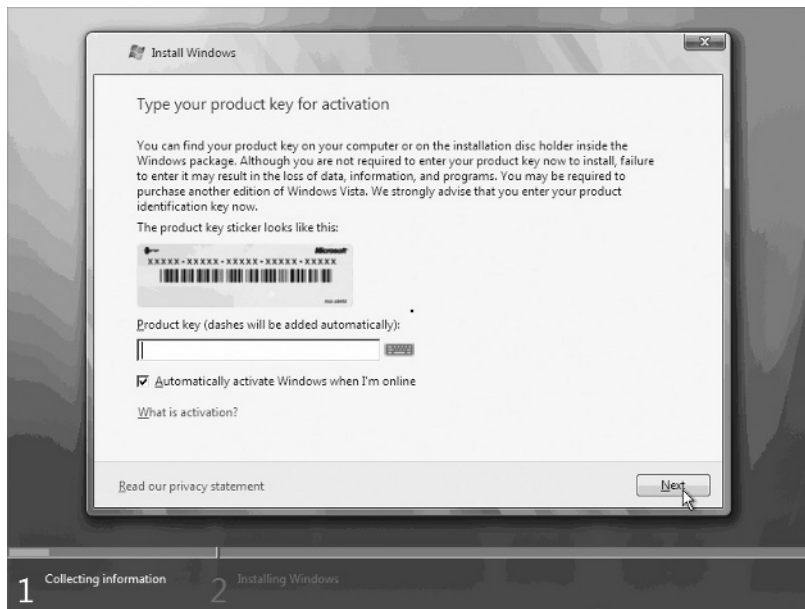
#### REINSTALLING WINDOWS VISTA ON A REFORMATTED COMPUTER

1. Verify that your computer is hooked up to a power supply.
2. Locate the Windows Vista install DVD.
3. Insert the disc into the DVD drive of the computer.
4. Reboot the computer.

5. When the GUI setup launches, make whatever regional settings changes you desire and then click Next.



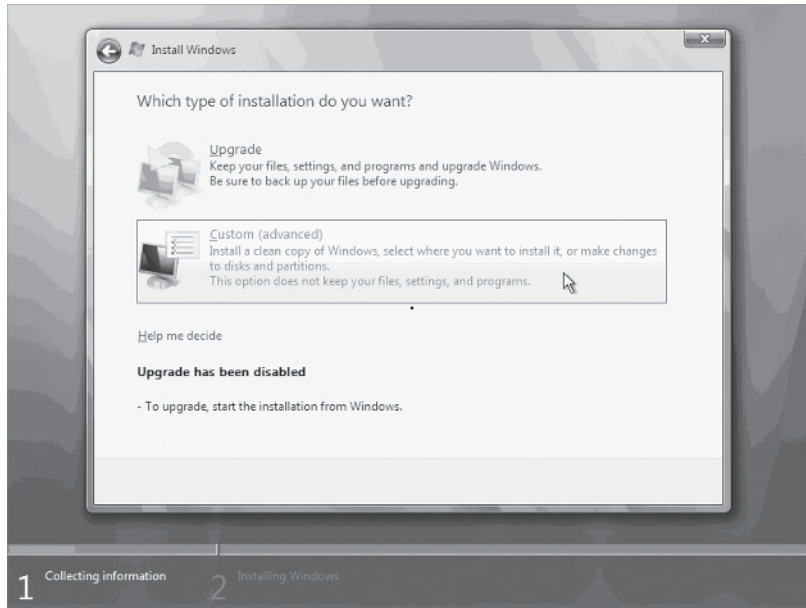
6. When the next screen appears, click Install Now.
7. When the Type Your Product Key for Activation screen appears, enter the product key in the available field and click Next.





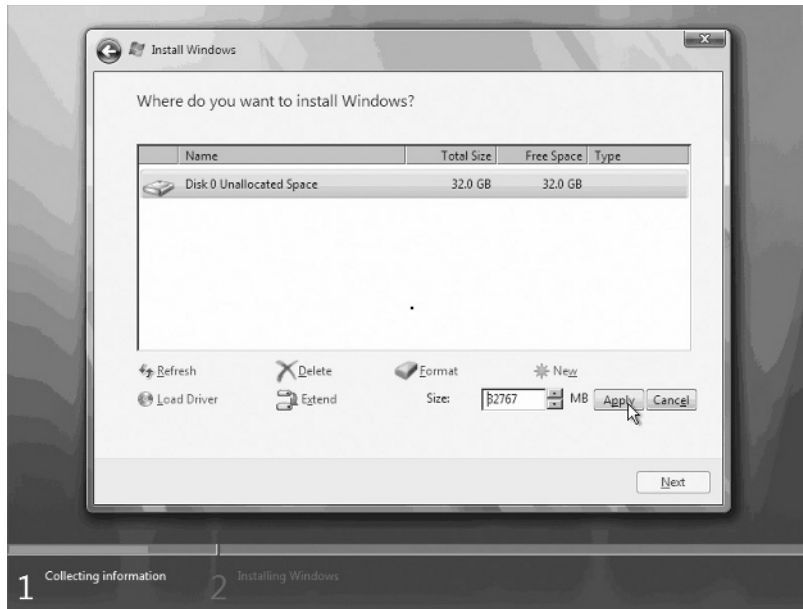
The Automatically Activate Windows When I'm Online check box is selected by default.

8. On the license agreement screen, select the I Accept the License Terms check box and then click Next.
9. On the Which Type of Installation Do You Want? screen, select Custom (Advanced).

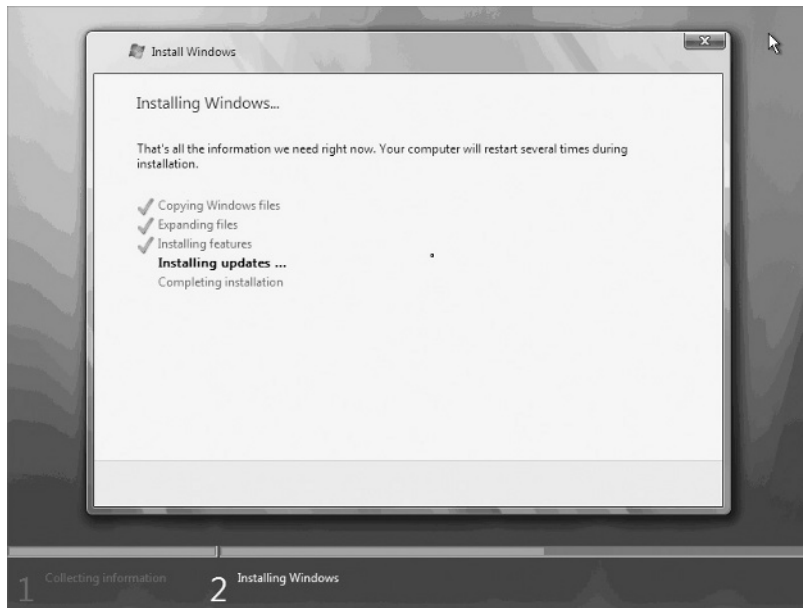


The Upgrade button is disabled because this is a fresh install. This button would only be active if you were installing Vista on a computer that had an operating system present.

10. On the Where Do You Want to Install Windows? screen, select the partition where you want Vista installed, click Apply, and then click Next. In this case, there should be only one partition available: Disk 0.



11. The Installing Windows process will launch, which will take some time to complete, as Windows is performing tasks such as copying files, installing features, and installing updates from the Internet.



12. After the Windows Vista updates are downloaded and installed from the Internet, Vista will automatically reboot the computer.
13. When rebooted, Vista will continue to perform necessary tasks. This may take some time.
14. When the necessary tasks are complete, Vista will reboot the computer again.

#### SETTING UP WINDOWS VISTA

1. After the computer reboots, the Set Up Windows screen launches. When you are prompted, enter the username and password for the first user on the computer, and then click Next.



You will either need the laptop user's name and password, or you can enter the administrative credentials here and have the user enter their logon information at a later time.

2. On the next screen, enter the hostname for the computer, select the desktop background, and then click Next.
3. On the Help protect Windows automatically screen, select the desired setting that fits your company's security requirements.



If you are performing this task on a computer in a home or small lab setting, the best option is to select Use Recommended Settings.

4. On the Review Your Time and Date Settings screen, confirm that the time zone, date, and time settings match your location and then click Next.
5. When the Thank You screen appears, click Start.
6. The computer will display a series of promotional screens while Windows Vista performs the final configuration tasks.

### Criteria for Completion

You will have successfully completed this task when the Welcome screen appears showing the Vista version information and the Get Started with Windows screen.

## Task 1.26: Uninstalling Software

Sometimes it's necessary to uninstall software on a computer. Usually you do this when a program is no longer used by the company because it has become obsolete or the firm has decided to go with another vendor for that type of software. Although there is quite a variety of programs out there, Windows uses the same process to uninstall a program and all its components. It's really a piece of cake.

## Scenario

The payroll department has decided to discontinue the use of its current accounting software and has purchased similar software from a different vendor. You have been assigned to go to the payroll office and uninstall the relevant program from the computers there. It is just past regular business hours, so none of the users will be present. You are free to log on to each PC using your administrator credentials and remove the programs.

## Scope of Task

### Duration

This task will take 10 to 15 minutes.

### Setup

You will need one computer with a program you can uninstall. It can be any sort of software.

### Caveat

This is a fairly benign task, so there shouldn't be any particular issues.

## Procedure

This task will teach you how to remove a program from a Windows XP computer.

### Equipment Used

You will only need a computer and a program on that computer you are willing to remove.

### Details

This task will show you the process of removing a program from a Windows XP computer.

### Uninstalling a Program



For this task, it is assumed that you are at a computer that is powered up and you are logged on with an account that has administrator privileges.

1. Click Start ➤ Control Panel.





If your Control Panel is currently in Category view, switch it to Classic view.

2. Double-click the Add or Remove Programs icon.
3. When the list populates, click the name of the program you want to remove.
4. Click the Change/Remove button.
5. When the dialog box opens asking if you are sure you want to remove the program, click Yes.



You may be asked to remove multiple components. In this event, click Delete All.

## Criteria for Completion

You will have successfully completed the task when you return to the Add or Remove Programs list and the program you selected is no longer present.

# Task 1.27: Installing Microsoft Applications

Although most computers you will purchase come with all the necessary application software already installed, you may occasionally have to install some piece of Microsoft application software. Like installing a Microsoft operating system, the process is heavily scripted and doesn't leave much to chance. In the vast majority of cases, you'll need the product key to install the software and you'll need to activate it within 30 days of the installation.

IT departments tend to keep their software discs, including the product keys, under lock and key, and they will be keeping track of the number of licenses they have available. Before doing an install, always verify the number of licenses your company has for the software. Installing a Microsoft application is as simple as popping the install DVD in the optical drive and following the instructions.

## Scenario

You have just finished installing Windows XP on a laptop that had to have its hard drive reformatted (see Tasks 1.23 and 1.24). You have configured a network connection and

restored all of the service packs and security updates. Your next step is to install all of the Microsoft application software. You will start by installing Microsoft Office 2003 Professional.



Microsoft Office 2003 is used as an example for this task, but if you're installing Office 2007 or any other Microsoft application software, the process should be quite similar.

You have located the DVD and product key and are ready to begin.

## Scope of Task

### Duration

Depending on the software package, this task will take about 15 to 20 minutes.

### Setup

You'll need access to a computer and an installation DVD containing a Microsoft application.

### Caveat

As you must be aware, Microsoft products are not inexpensive, so you may not want to go out and buy a Microsoft Office suite. In a pinch, you can uninstall and reinstall a Microsoft application on your computer. Make sure you have the appropriate install discs available before you begin. Also, if you have installed a Microsoft product on one computer and you attempt to install and activate the product on a second computer, this may violate the licensing agreement.

## Procedure

This task will show you how to install a piece of Microsoft application software.

### Equipment Used

All you'll need is a computer and a Microsoft application installation CD or DVD.

### Details

This lesson will guide you through the process of installing a Microsoft application.

#### Installing a Microsoft Application

1. Verify that the computer is powered up.

2. Log on as Administrator.
3. Locate the Microsoft Office 2003 installation disk.
4. Insert the CD into the computer's optical drive.



The disk should autoplay; if it doesn't, you'll need to open My Computer, right-click the CD or DVD icon, and click Open. Look for a launch or startup file and double-click to execute it. The installation program should launch.

5. When the Product Key screen appears, input the product key that accompanied your installation disc and click Next.



The product key is usually found on a label attached to the disc case.

6. When the user-information dialog box opens, type the name of the user and the organization in the appropriate fields and then click Next.
7. When the licensing-agreement dialog opens, check the I Accept the Terms in the Licensing Agreement check box, and then click Next.
8. In the Type of Installation area, verify that the default location (path) is present.



The path for Microsoft Office will look like this: C:\Program Files\Microsoft Office\.

9. Click Complete Install.
10. Click Next.
11. In the Summary box, click the Install button.



The installation process will begin when you click the Install button in the Summary box.

12. When the Setup Completed box appears, select the Check the Web for Updates and Additional Downloads check box.
13. Click Finish.

14. Internet Explorer will launch; when the Windows Update page displays, click the Check for Updates button and then download and install all Microsoft Office updates.



For this task, you should have already established a network connection and downloaded and installed all service packs and security patches for Windows XP or Windows Vista.

15. When prompted, reboot the computer.
16. When the computer reboots, log on as Administrator and verify that Microsoft Office 2003 Professional was installed.

## Criteria for Completion

You will have successfully completed this task when you can verify that the Microsoft Office suite has been installed on the computer.

# Task 1.28: Installing Non-Microsoft Applications

It is said that man does not live by bread alone, and neither does he (or she) work with just Microsoft applications. Beyond using a wide variety of well-known commercial software packages, organizations also can use proprietary software and packages that are written just for certain types of businesses or business functions. You will find that one of your common tasks is installing both Microsoft and other vendor software.

This task uses a specific piece of software for demonstration purposes, so the exact installation procedure may be different from what you experience. That being said, most software installs use some sort of “wizard-like” framework, so it’s usually a matter of following the instructions and clicking Next.

## Scenario

You have reinstalled Windows XP and all the Microsoft applications on a recently reformatting laptop (see Tasks 1.23, 1.24, and 1.27 for details). Now you need to restore the non-Microsoft applications. You have the different installation discs available and are ready to begin.

## Scope of Task

### Duration

This task should take about 15 to 20 minutes.

### Setup

You will need a computer and access to the installation disc of a non-Microsoft application. Alternatively, you can download software from the Internet and install it on your computer.



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You can find and download plenty of freeware at [www.freewarehome.com/](http://www.freewarehome.com/); however, I can't guarantee the results, so make your selections wisely.

### Caveat

If you are going to download and install freeware, make sure you are using a trusted source. There are plenty of dodgy websites that advertise free software just to get you to download and install some vicious variety of malware that hangs onto your PC worse than a third-degree burn.

## Procedure

This lesson will show you how to install non-Microsoft applications.

### Equipment Used

All you'll need is a computer and a software-installation disc. Alternately, you'll need an Internet connection so you can download and install freeware from the Internet.

### Details

This task will walk you through the procedure for installing a non-Microsoft application.



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For the sake of this task, a freeware program called HTML Tidy will be installed. The exact steps you use to install your software may differ.

### Installing a Non-Microsoft Application

1. Verify that the computer is powered up.
2. Verify that you are logged on with an account that has administrator privileges.
3. Locate the application's installation disc.
4. Insert the disk into the optical drive.



The disc should autoplay; if it doesn't, see Task 1.27 for details regarding launching the installation program manually.

5. When the install wizard launches, click Next.
6. Use the default location (path) to install the program.



The path for the default location will look something like C:\Program Files\HTML Tidy\.

7. Click Next.
8. If the program offers you the option of putting an icon on the Desktop, accept it.
9. Click Next.
10. Review your selections in the Ready to Install dialog box to make sure they are correct.
11. Click Install.
12. When the program installs, click Finish.
13. If necessary, reboot the computer.

### Criteria for Completion

You will have successfully completed this task when the computer reboots (assuming this was required) and you click Start ➤ All Programs and see the new program displayed in the list.

## Task 1.29: Upgrading Windows 2000 to Windows XP

Usually, most companies maintain an upgrade schedule for their equipment based on their budget and the usability of devices and utilities. Although Windows 2000 is getting a little long in the tooth, there's still plenty of life in the OS. However, many companies believe the

time has come for their Windows 2000 computers to be upgraded to Windows XP. Task 1.30 will demonstrate how to upgrade a Windows XP computer to Windows Vista.



The probability that you'll be required to perform this particular job is rapidly declining; however, there are still sufficient computers in the business world that run Windows 2000 Professional for a variety of reasons. With many companies reluctant to roll out Windows Vista, an upgrade from Windows 2000 to the still-reliable Windows XP remains a likely technician task.

Operating-system upgrades can be managed in two ways:

1. Both the hardware and operating systems can be upgraded at the same time.
2. The operating system on an existing piece of hardware can be upgraded via installation or upgrade disc.

This task presents the latter solution. (See Task 1.20 for an example of the former solution.) Assuming the hardware is robust enough to run XP reasonably well, your CIO could save quite a chunk of change by not having to pop for 50 or 100 new PCs as well as the software licenses.

## Scenario

You've been assigned to upgrade the four PCs in your company's shipping department from Windows 2000 to Windows XP. You have come in on the weekend so that you'll have free access to the computers and won't have to interrupt the users. You have been provided with the necessary installation disc and product key to accomplish your task.

## Scope of Task

### Duration

This task should take about an hour.

### Setup

You'll need a computer running Windows 2000 Professional and a Windows XP Professional installation or upgrade disc.

### Caveat

On most occasions, the upgrade from 2000 to XP is fairly routine, but always plan for the unexpected. Make sure you've backed up your data in case the upgrade goes wrong. There is no viable upgrade path from Windows 2000 to Windows XP Home Edition. You must upgrade to Windows XP Professional.

## Procedure

You will learn how to upgrade a computer's operating system from Windows 2000 Professional to Windows XP.

## Equipment Used

You will need only a computer running Windows 2000, and a Windows XP upgrade disc.

## Details

This task will conduct you through the procedure of upgrading a Windows 2000 Pro computer to a Windows XP computer.

### Upgrading a Windows 2000 Computer to Windows XP

#### PREPARING THE COMPUTER FOR UPGRADE

1. Defragment the hard drive of the computer before beginning the upgrade.



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Task 2.14 will cover how to defragment a hard drive.

2. Close any applications that may be running, especially the antivirus program.
3. Make sure you have the original Windows 2000 installation disc as a precaution in the event that the upgrade fails.
4. Locate the Windows XP upgrade disc.
5. Insert the disc in the computer's optical drive.
6. When the Welcome to Windows XP Upgrade screen appears, choose Check System Compatibility.

#### RUNNING THE WINDOWS XP UPGRADE ADVISOR

1. When the Windows XP Upgrade Advisor Welcome screen appears, click Next.
2. When the program asks if you want to download the latest files, click Yes.



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Step 2 is optional but advisable.

3. When the informational screen appears telling you that most computers will support Windows XP, click Next.
4. When the upgrade-advisor screen appears, click Next.





The upgrade-advisor screen will list any issues that might affect the upgrade in Blocking and Compatibility. A blocking issue would be a condition that would prevent Windows XP from being run on the computer (which is exceedingly rare). A compatibility issue is when some piece of hardware or software on the computer may not run with Windows XP. Usually, these sorts of issues are resolved by driver updates.



Most of what happens after step 4 is automatic. The option to download the latest files you selected in step 2 will now cause these files to download. Next, the Upgrade Advisor examines the system and generates a report listing any issues that will affect the upgrade. There are bound to be at least some issues. Take note of them because you will be required to take steps to resolve these issues once Windows XP is installed.

5. After the Upgrade Advisor report appears, click Finish.



In this example, there won't be any significant issues affecting the upgrade. When the Advisor finishes, leave the Windows CD in the computer.

#### UPGRADING TO WINDOWS XP

1. When the Welcome to Windows XP screen appears, select Install Windows XP.
2. When the Choose an Installation Type screen appears, select the Upgrade option.
3. Click Next.
4. When the License Agreement page appears, press F8 to agree to the terms of the license.
5. When the Product Key page appears, enter the key that came with the Windows XP disc.
6. When prompted, choose to update the computer over the Internet from the Windows Update site.



For this task, it is assumed that the computer has an Internet connection.

7. Click Next.



The Update Advisor may show you a report again on software and hardware compatibility issues. You should already have made notes from this report in the section “Running the Windows XP Upgrade Advisor” earlier in this task. Verify that the report is the same.



After the necessary files are downloaded and installed, the computer will automatically reboot.



If you see a message saying to press “any key” to boot from the CD, do not do so. To complete the installation, you must boot from the hard drive.



The next part of the process is the actual installation of Windows XP. This is pretty automated, so there won’t be a lot for you to do until the installation is complete.

### POSTINSTALLATION TASKS

1. Once the installation is complete, open Internet Explorer.
2. Select Tools ➤ Windows Upgrade.



Windows Update will check your computer for any needed security updates, hotfixes, and drivers.

3. When prompted, select Express Upgrade.
4. Select all the update options offered.



Windows Update will download and install the necessary software.

5. When prompted, reboot the computer.
6. After the computer has rebooted, defrag the hard drive again.



During the Windows Upgrade process, the data on the drive becomes significantly fragmented, slowing performance.

7. Verify that the computer seems to be operating normally.



Your supervisor usually will give you a list of tasks to perform to test the computer. This includes playing a music CD to test sound, doing a test print, connecting to mapped drives, and any other activity the user will need to perform as a normal part of their work.

8. Reactivate the antivirus program and any other security measures you turned off during the upgrade.
9. Log off the computer.

## Criteria for Completion

You will have successfully completed this task when the computer displays as a Windows XP computer and you are able to perform tasks on the PC normally.

# Task 1.30: Upgrading from Windows XP to Windows Vista

Task 1.29 demonstrated the process of upgrading a Windows 2000 Professional computer to Windows XP Professional. While this skill may still be useful from time to time, you are more likely going to find yourself upgrading a Windows XP Home or Professional computer to Windows Vista. Since Vista is known to be rather demanding in its need for resources, an essential task is to determine if the computer running Windows XP is capable of supporting Vista.

As with all upgrades, you should back up any data on the computer beforehand, in case the upgrade results in data loss. Also have handy all of the installation discs for your application software.



You will need to access both the Hardware Compatibility List (HCL) for Vista and Vista's hardware requirements. The HCL resource can be found at [www.microsoft.com/whdc/hcl/default.mspx](http://www.microsoft.com/whdc/hcl/default.mspx) and the requirements list can be found at [www.microsoft.com/windows/windows-vista/get/system-requirements.aspx](http://www.microsoft.com/windows/windows-vista/get/system-requirements.aspx).

## Scenario

You've received a request to upgrade the finance manager's PC from Windows XP to Windows Vista as part of a project to upgrade the managerial-staff computers over the next month. You have come in on the weekend so that you'll have free access to the computer, and you have the required administrator logon information for the PC.

You have been provided with the necessary installation disc and product key to accomplish your task. You have also previously consulted the HCL and system requirements for Vista, compared that information to the subject computer, and determined that it will support the Vista upgrade. You have defragmented the hard drive as a necessary preparation step.

You have logged on to the Windows XP computer, visited the Windows update site, and updated all of the hardware drivers and other software to the most current versions for XP. You have the Vista upgrade DVD and product key and are ready to proceed.

## Scope of Task

### Duration

This task should take about an hour to an hour and a half depending on the speed of the PC's CPU, the amount of RAM present, and how much hardware and software Vista must detect during the upgrade.

### Setup

You'll need a computer running Windows XP Home or Professional and a Windows Vista installation or upgrade disc. This exercise does not specify a particular edition of Windows Vista for the upgrade.

### Caveat

Before performing the upgrade, it is essential that you go to the Windows Update site and download and install the most current hardware drivers for the computer. The operating-system upgrade may fail if you do not perform this task, even though you are directed to update drivers and other software during the upgrade process.

You can decide to remove any devices and peripherals that are not absolutely necessary for the running of the computer, including sound cards, printers, scanners, and the like, to improve the success of the upgrade.

To play it safe, you can also uninstall all unnecessary software applications and particularly programs that you seldom or never use. You should also (temporarily) uninstall your antivirus software but immediately reinstall it after the upgrade is complete. Make sure the antivirus software you use is Vista-compatible. If not, you will need to purchase a software package that will work with Vista.



You can run the compatibility check after you insert the upgrade DVD by clicking Check Compatibility Online on the Windows Vista upgrade splash screen before clicking Install Now.

## Procedure

You will learn how to upgrade a computer's operating system from Windows XP to Windows Vista.

## Equipment Used

You will need only a computer running Windows XP Home or Professional and a Windows Vista upgrade DVD.

## Details

This task will take you through the steps of upgrading a Windows XP computer to Windows Vista.

### Upgrading a Windows XP Computer to Windows Vista

1. Open the optical drive on the computer, insert the Windows Vista DVD, and close the drive.
2. If Autorun does not begin the process, open My Computer, select the DVD drive, browse to the root folder, and double-click `setup.exe`.
3. When the Windows Vista Setup screen appears, click Install Now.
4. On the subsequent screen, click Next.
5. Click Go Online to Get the Latest Updates (Recommended) to download and install the latest updates for the Windows XP computers. If updates are found and installed, the computer will automatically reboot before continuing with the upgrade procedure.



Although you already completed this task before beginning the upgrade, it is recommended, though optional, that you take this step to verify that all required updates have been installed. If you have uninstalled the computer's antivirus software, it is vital that you connect to only the authentic Windows upgrade site. You do not want to introduce malicious software during the upgrade.

6. Enter the Windows Vista product key in the available fields and then click Next.
7. Click I Accept the License Terms (required to use Windows), and then click Next.
8. On the Which Type of Installation Do You Want? screen, click Upgrade (Recommended) to start the upgrade process.

9. The Vista upgrade will perform necessary tasks, including copying windows files, gathering files, detecting hardware, installing drivers, and so on. This may take some time.
10. When the necessary tasks are complete, Vista will reboot the computer.

### SETTING UP WINDOWS VISTA

1. After the computer reboots, the Set Up Windows screen launches. When you are prompted, enter the username and password for the first user on the computer; then click Next.



You will either need the computer user's name and password, or you can enter your administrative credentials here and have the user enter their logon information at a later time.

2. On the next screen, enter the hostname for the computer, select the desktop background, and then click Next.
3. On the Help Protect Windows Automatically screen, select the desired setting that fits your company's security requirements.



If you are performing this task on a computer in a home or small lab setting, the best option is to select Use Recommended Settings. Otherwise, use the option required by your company's IT security policy.

4. On the Review Your Time and Date Settings screen, confirm that the time zone, date, and time settings match your location and then click Next.
5. If you are prompted to install Windows Vista updates, you can either choose to do so now, or select Ask Me Later to install updates after the upgrade is complete and you have reinstalled the PC's antivirus software.
6. If prompted for the computer's current location, select Home if you are working at home or in a small lab, or Work if you are performing the upgrade in a business environment.
7. The computer will reboot again.
8. After the computer reboots and Windows Vista is finished loading, a list of compatibility issues (if any exist) will be displayed for anything that has loaded on startup that Windows Vista is unable to run.
9. Reinstall a Vista-compatible antivirus program and update the virus definitions.
10. Now it is safe (or as safe as possible) to update any drivers and other software required by Vista to run the hardware and software that Vista detected.

## Criteria for Completion

You will have successfully completed this task when Windows Vista loads as the computer's software and any hardware and software issues have been resolved.



For the sake of completing this exercise, it is not necessary to have 100 percent of all potential compatibility issues resolved, since it may take some time to track down every single issue. This is especially true if you have uninstalled your application software, and intend to reinstall it at this point. See Tasks 1.27 and 1.28 for more information.

## Task 1.31: Using Restore Points in Windows XP

Windows XP comes with a handy little tool called System Restore. Sometimes making a change on a computer, such as downloading a program or updating a device driver, will cause some unforeseen damage. System Restore automatically creates restore points every time a major change is made to the computer. If something goes wrong with a change, you can literally turn back the clock and restore the computer's configuration settings to a previous point in time. You can also manually create a restore point if necessary. System Restore can solve a multitude of problems by taking the computer to a point when it was functioning well, and at the same time preserving all of your documents, emails, and any other settings and data.



Windows Vista has the same utility and you could probably use this exercise with a Vista computer, but the task was written specifically for Windows XP.

## Scenario

You receive a trouble ticket stating that a user is unable to open Windows Explorer and Internet Explorer on her Windows XP computer. After an investigation, your supervisor determines that a number of system files have been corrupted within the past few days. You are instructed to use System Restore to take the computer's configuration back to a restore point created a week ago. You are at the user's computer in her cubicle and ready to perform the task.

## Scope of Task

### Duration

The task should take about 10 minutes.

## Setup

All you'll need is a computer running Windows XP.

## Caveat

System Restore is a useful and benign program and there should be no issues in restoring the computer to a particular restore point. If you restore a computer to a previous point and the problem is still not corrected, you can run System Restore again and take the computer further back in time.



Restore Points aren't the ultimate cure-all for Windows XP and Vista computer problems. I encountered a situation where I was unable to restore a computer to any previous restore point. The computer had become infected with a virus that had been written to, among other things, disable the ability to use restore points. My only option in that case was to use the recovery disc that came with the computer (which, fortunately, worked).

## Procedure

In this task, you will learn how to use the Windows XP System Restore utility to undo a harmful change to a computer.

## Equipment Used

You will need no equipment for this task.

## Details

This task will take you through the process of restoring a Windows XP computer's settings to a previous point in time.

### Using the Restore Point System on Windows XP

#### VERIFYING THAT THERE IS SUFFICIENT SPACE FOR RESTORE POINT STORAGE



By default, System Restore allocates a maximum of 12 percent of hard-drive space to store restore points. After this space becomes full, the system overwrites the stored data from the oldest restore points to the newest.

1. Click Start ➤ Control Panel.





In this example, Control Panel is in Classic view.

2. Double-click the System applet.
3. Click the System Restore tab on the System Properties box.
4. Confirm the Disk Space to Use bar is set at 12%.
5. Click OK.



System Restore might be turned off on your computer. Verify that the Turn Off System Restore check box is unchecked.

6. Close Control Panel.

#### **SETTING A WINDOWS XP COMPUTER TO A RESTORE POINT**

1. Click Start ➤ All Programs ➤ Accessories ➤ System Tools ➤ System Restore.
2. When the Welcome to System Restore box opens, click Restore My Computer to an Earlier Time.
3. Click Next.
4. In the Select a Restore Point box, click on the day on the calendar where you want the computer restored.



You may have to click on the left-pointing arrow at the top of the calendar to go to the previous month.

5. Select the specific restore point you want to use, and then click Next.
6. On the Confirm Restore Point Selection page, verify that the correct restore point has been selected.
7. Click Next.



The computer will automatically reboot.

8. Log on to the computer after it reboots.
9. On the Restoration Complete page, click OK.
10. Test the computer to see if it is functioning normally and perform the tasks the user said she was not able to do.

## Criteria for Completion

You will have successfully completed this task when the Restoration Complete message displays and you can use the computer normally.

# Task 1.32: Shutting Down Programs

Every so often, a program in Windows will hang and refuse to close. Worse, it might be a program that has a memory leak, sucking up more and more of your available RAM and giving nothing back. When an average user wants to close Microsoft Word or Internet Explorer, they click the little red box with the white X inside in the upper-right corner of the document or window. The vast majority of the time this works quite well, but when it doesn't, an end user could wind up both frustrated and unproductive. There is actually a very simple way to shut down a stubborn program.

## Scenario

You are walking past the accounting department when one of the users motions you over to her desk. She has been working extensively in Microsoft Excel for most of the morning but complains that the application has now locked up on her. She asks if you'd mind helping fix the problem. You take a look at the Excel header bar and see the message "Not Responding." You realize this could be a pretty easy fix, and since you have a few minutes, you agree to help her.



In a larger business with an in-house IT department, requesting help for a computer problem requires the end user to call the help desk and file a trouble ticket before a tech is assigned to respond. Smaller businesses are less formal, but if you drop whatever you're doing all the time to help out just because you're handy, you'll never get any of your assigned work finished. Word to the wise.

## Scope of Task

### Duration

This task should take less than 5 minutes.

## Setup

All you'll need is a Windows XP computer running some application. The easiest way to set up the task is to start a program you'll recognize as it's listed in the Processes tab in Task Manager. You'll easily be able to recognize the program and shut it down.



Sometimes, the offending process is not a normal application like Excel. You may have a rogue process running that was planted there by a virus or other malware. If you don't recognize some of the listings on the Processes tab, you can do an Internet search for the names of the processes to see what results you get. Alternately, you can go to a site such as [www.neuber.com/taskmanager/process/](http://www.neuber.com/taskmanager/process/) and search there for the definitions of Windows processes.



Even when you have no application software running (look in Task Manager's Applications tab), the Processes tab will still show numerous programs running. The vast majority of those processes are necessary to provide various services. Occasionally, one is an indication of a problem.

## Caveat

Every once in a while, closing a program in this manner causes unusual results in the computer. You'll receive a warning dialog box when you attempt to close the program later on in the task. However, it is considered a safe method of shutting down stalled processes.

## Procedure

In this task, you'll learn how to shut down stalled processes, including background processes in Windows XP.



This method also works on Windows 2000 and Windows Vista computers and is similar but not the same on Windows 98.

## Equipment Used

You won't need any equipment to complete this task.

## Details

This task will take you through the steps of shutting down a running process in Windows XP.

## Shutting Down a Process in Windows XP

1. While sitting in front of the keyboard, press Ctrl+Alt+Del.
2. When the Windows Task Manager opens, click the Processes tab.
3. In the Image Name column, locate EXCEL .EXE.



For the purpose of this task, you can choose to stop another program by selecting its name.

4. Select EXCEL .EXE by clicking on it.
5. Click the End Process button in the lower-right corner of the Task Manager box.



You'll receive a Task Manager warning stating that "terminating a process can cause undesired results" and explaining what some of those results could be. The message asks if you still want to terminate the process.

6. When the Task Manager Warning box appears, click Yes.



You'll be tempted to use the Applications tab in Task Manager to kill Excel, but keep in mind that only application software is listed there. Many other running processes in Windows won't appear in this display, so it's better to use the Processes tab in the vast majority of cases.

## Criteria for Completion

You will have successfully completed this task when the selected process disappears from the list in the Processes window. In this example, Excel should close immediately.



Sometimes applications hang for unknown reasons and the next time you go to use them, they work fine. This task is an example of that situation. Keep in mind that there are other circumstances where this symptom could indicate a larger problem that's not so easily solved.

# Task 1.33: Tweaking Windows XP

Tweaking or hacking a computer is a method or series of methods designed to improve hardware and software performance beyond their default settings.



The title of this task could have just as easily been “Hacking Windows XP,” but the word *hacking* is sometimes taken the wrong way.

There is no one procedure for tweaking a computer, so this task will actually be a series of “mini-tasks” written to show you different ways to improve the performance of a Windows XP computer. The list is by no means exhaustive; entire books can be (and have been) written on hacking operating systems and software.



Of course, there is a large list of Windows Vista hacks that exists as well, but this exercise will address Windows XP tweaks specifically.

## Scenario

You’ve received a trouble ticket from a user stating that his computer is running slowly but not complaining of a specific set of symptoms. After looking into the matter, your supervisor suggests that you perform a “tune-up” on the user’s computer, optimizing various settings for faster and more efficient performance.

## Scope of Task

### Duration

This task could take anywhere from 15 minutes to an hour depending on the extent of the “tweaking.”

### Setup

All you’ll need to do for this task is to sit at a Windows XP computer and follow the task instructions. You’ll need to use Windows XP Professional to complete this task successfully.

### Caveat

The results of this task on your computer may vary from the “ideal,” depending on a number of factors such as the age of the computer and how well it has been maintained.

The tasks presented in this exercise are meant to be used on a computer that runs a large amount of resource-intensive applications on a regular basis or one that is at least somewhat underpowered. If you are running PCs that are no more than a few years old and are being used “normally,” you shouldn’t run into this situation too often.

## Procedure

You’ll learn a number of techniques that will result in improved performance of your Windows XP computer.

## Equipment Used

No special equipment will be needed.

## Details

This task will show you the specific activities to go through that will result in a general improvement of computer performance.

## Free System Resources

### CUSTOMIZING HOW VISUAL EFFECTS ARE DISPLAYED

1. Click Start.
2. Right-click My Computer.
3. Click Properties.
4. When the System Properties box opens, click the Advanced tab.
5. Under Performance, click the Settings button.
6. Click the Visual Effects tab if it doesn’t display by default.
7. Click the Customize radio button.



Most of the boxes in the display window will be checked.

8. Uncheck the checked boxes.
9. Click OK.



You may notice a change in how objects display visually as a result of shutting down all of these effects. You’ll most likely have to re-enable some of them until you get your system displaying as you desire.

### DISABLING A HARD DRIVE'S INDEXING SERVICE

1. Click Start ➤ My Computer.
2. Right-click the hard drive of your choice and click Properties.
3. Verify that the General tab is selected in the Local Disk properties box.
4. Uncheck the Allow Indexing Service to Index This Disk for Fast File Searching check box.



The disk-indexing service uses an executable named `Cidaemon.exe` to create and update the indexing catalog on the disk drive. Although this does make searching for files and folders faster, the process also consumes a great deal of CPU processing and page file space. (See “Customizing Virtual Memory” later in this task to learn more about page files.)

5. In the box that pops up, check Apply Change to *(drive letter):\* Subfolders and Files.
6. Click OK.
7. Close the My Computer box.
8. Reboot the computer.

### CUSTOMIZING THE START MENU

1. Right-click Start.
2. Click Properties.
3. Click the Classic Start Menu radio button.
4. Click the Customize button.
5. In the Advanced Start menu options window, scroll up and down checking or unchecking the features you want to appear in the menu.
6. Click the Add button.
7. Click OK.



The Start menu will change to an older version that takes up less space on the Desktop and uses fewer resources to open and display.

### DISABLING WALLPAPER

1. Right-click any empty area on the Desktop.
2. Click Properties.
3. Select the Desktop tab.
4. Scroll to the top of the Background window.

5. Click None.
6. Click OK.



This saves some memory and will make your boot time a bit faster. Of course, the desktop will be completely impersonal.



In large enterprise settings using Active Directory domains, end-user desktops and a variety of other services and features are configured automatically on all user computers by Active Directory Group Policy objects (GPOs).

### CUSTOMIZING VIRTUAL MEMORY



Virtual memory uses hard-drive space to supplement the RAM in a computer. When a PC has insufficient RAM, some open services and data requiring memory are temporarily switched to a page file on the hard drive. This frees up memory; however, excessive “paging” (switching of data and services back and forth between RAM and the hard drive) results in performance slowdowns.



This exercise requires that you have more than one partition on the computer’s hard drive.

1. Click Start.
2. Right-click My Computer.
3. Click Properties.
4. In the System Properties box, click the Advanced tab.
5. In the Performance box, click Settings.
6. In the Performance Options box, click the Advanced tab.
7. Click the Programs radio buttons under both Processor Scheduling and Memory Usage.
8. Under Virtual Memory, click the Change button.
9. Select a drive partition other than C:\.
10. Set the initial size and the maximum size of the page file to 1½ times the amount of RAM in your computer.
11. Click Set.
12. Click OK.





You can achieve the best performance by placing virtual memory on a separate physical drive, if available. According to Microsoft, to optimize your virtual memory space, divide virtual memory space among as many different physical hard drives as possible. For more details, see <http://support.microsoft.com/kb/308417>. You can also create a second page file on a partition using FAT32 rather than NTFS, but this is used only when a separate, very small partition is created for the sole purpose of “hosing” the paging file.

### DISABLING SYSTEM SOUNDS

1. Click Start ➤ Control Panel.
2. Double-click Sounds and Audio Devices.
3. On the Volume tab, uncheck the Place Volume Icon in the Taskbar check box.
4. Click the Sounds tab.
5. On the Sounds tab, click the Save As button.
6. Save your current sound scheme under a name such as Normal.
7. Click the Sound Scheme drop-down list.
8. Select No Sounds.
9. Click OK.

## Criteria for Completion

You will have successfully completed this set of tasks when you’ve customized all of the settings as described. Performance on the computer should be improved; however, your mileage may vary.

There are literally hundreds of tweaks you can perform on XP to improve system performance and stability. The ones presented in this set of tasks are only a sample of the more common methods.

## Task 1.34: Installing a Local Printer

In most business settings, users print to one or more network printers. This allows printer resources to be shared among a large number of users, avoiding the need to rely on one user sharing their printer with the rest of the workgroup. A print server performs the queuing and is always (hopefully) available to the network.

There are occasions when one or more users will require a local printer to be attached to their PC. Some businesses still use old dot-matrix printers to print multicopy No Carbon

Required (NCR) documents such as invoices. Department heads may want to print confidential documents in their offices rather than risk sensitive material being printed on a network printer shared by the rest of the staff. You will occasionally find it necessary to install a local printer on a computer.

## Scenario

You receive the assignment of installing a local printer on a new sales executive's PC. You are provided with the new printer and installation kit on a cart, and you take the equipment to the appropriate office and get ready to install it.

## Duration

This task should take about 15 to 20 minutes at most.

## Setup

You'll need a PC, a printer, the USB cable, and the driver disc that came with the printer. If you already have a printer installed, you can uninstall the printer drivers and disconnect the printer from your computer. Then follow the instructions in this task to reinstall the printer. In most cases, you probably don't even need to have the driver disc since XP contains an extensive list of drivers for common print devices. Of course, having the disc doesn't hurt, just in case.

## Caveat

Installing a printer on Windows XP should be a snap. Just make sure you have the right driver disc in the event that Windows doesn't have the drivers on board (a remote possibility). Also, some printers require that you use their installation software to do the setup rather than using the Add Printer Wizard. Read the instructions that come with your printer completely before beginning this exercise.



It is unlikely that you'll use a printer cable for this task, since current printers come almost exclusively with USB cables, but if you are performing this task with an older setup, using a printer cable won't appreciably change the installation process.

## Procedure

This task will take you through the process of installing a local printer on a PC.

## Equipment Used

The only piece of equipment you might need is a small screwdriver if you are using an older setup requiring a standard printer cable. Even then, some of the connectors are screwed

in while others can be tightened by hand. If you are unpacking a brand-new printer from a box, you may need a box cutter to cut through the tape and any other restraints used to secure the printer for shipping.

## Details

This exercise shows you the steps necessary to connect a local printer to a PC and verify that it's working.

### Installing a Local Printer

#### CONNECTING THE PRINTER

1. Power up the computer.
2. Log on as the local administrator.
3. Unpack the printer.
4. Place the printer at a desired location near the computer.
5. Verify that all packing equipment and tape have been removed from the printer.
6. Locate the USB cable used to attach the printer to the PC, as well as the printer's power cable.
7. Locate the installation kit, which should include a driver disc, installation manual, and any other equipment or materials that came with the printer.
8. Read the installation manual completely before proceeding.
9. Attach the power cable to the printer and plug the other end into a power socket or surge protector.
10. Attach one end of the USB cable to the printer's USB port and attach the other end to the PC's USB port.



The connectors at each end of the USB cable will be different. The connector for the printer will be more of a square while the connector for the computer will look like a thin rectangle.

11. Following the instructions that came with the printer, open the printer and find the printer head(s).
12. Locate the printer cartridge(s) that came with the printer.



If cartridges did not come with the printer, your supervisor should provide you with the appropriate cartridges for this device.

13. Install the cartridge(s) in the printer following the instruction guide.



There's no one method of installing printer cartridges, so we won't go into detail on this part of the task.

14. Close the printer.
15. Power up the printer.



The printer should go through a self-check routine and perform the alignment of the printer head(s) at this point, or it may perform some parts of this process after it is fully installed. There can be a special process associated with printer alignment, depending on the make and model of printer you are installing. Check the printer's documentation for details.

## INSTALLING THE PRINTER

1. Click Start ➤ Printers and Faxes.



You can also click Start ➤ Settings ➤ Control Panel ➤ Printers and Faxes if the Printers and Faxes option isn't available in the Start menu.



If Windows autodetects the printer as a new USB device or the Add Hardware Wizard launches, close the wizard and proceed with the instructions in this task.

2. In the upper-left corner of the Printers and Faxes page, click Add a Printer.
3. When the Add Printer Wizard launches, click Next.
4. On the Local or Network Printer page, click the Local Printer Attached to This Computer radio button and check the Automatically Detect and Install My Plug and Play Printer check box.
5. Click Next.
6. Under Select a Printer Port, use the drop-down list to select USB.



If you are using an older standard printer cable, select LPT1: [Recommended Printer Port].

7. Click Next.
8. On the Install Printer Software page, in the Manufacturer window, scroll down and select the manufacturer of the printer (HP, Brother, etc.).

9. In the Printers window, scroll down and select the specific model of printer you have.



In the vast majority of cases, your computer manufacturer and model will be included in these lists.

10. Click Next.
11. On the Name Your Printer page, give a name to the printer.



Use a name that clearly identifies the printer.

12. Click Next.
13. On the Printer Sharing page, verify that the Do Not Share This Printer radio button is selected.
14. Click Next.
15. On the Location and Comment page, you can add the location of the printer and a brief description. This step is completely optional, especially for an unshared local printer.
16. Click Next.

#### TESTING THE PRINTER

1. When the Print a Test Page window appears, click Yes.



A box will appear asking if the test page printed properly. The page should print after a few seconds.

2. When the test page prints, click OK.



If the test page doesn't print or if it doesn't print properly, instead of clicking OK in step 2, click Troubleshoot. The Help and Support Center page will open and you can work your way through a wizard process to diagnose the problem. You can also consult the Troubleshooting section of the printer's documentation for information about the error.

3. Click Next.
4. When the Completing the Add Printer Wizard page appears, click Finish.
5. Once the wizard closes, open the application or applications the user will normally print from.



The user will probably print from Word and Excel, but find out in advance which applications will be used to print. Occasionally the test page will print fine but a particular application will refuse to share and play well with the printer.

6. Systematically open each application, create a small document, and then print it.
7. When you have successfully printed from each application, close it.
8. When the test is completed, verify that all application software is closed.
9. Log off the PC.
10. Make sure that the user has plenty of printer paper and extra print cartridges.

## Criteria for Completion

You will have successfully completed this task when you have printed a test page from the Add Printer Wizard and from each application you will be printing from.

# Task 1.35: Installing Printer Drivers

You may think this task is a subset of Task 1.34. Although the steps are similar, the situation is different. Besides, there's more than one way to install printer drivers.

Occasionally drivers (or any kind of software) will become corrupted or newer drivers will become available. Sometimes the print device begins to act strangely and the solution is to update or reinstall the drivers. In any event, there are various reasons why you will be asked to perform this task.

## Scenario

One of the marketing executive's local printers has started printing "garbage." Your supervisor believes the printer drivers have been corrupted and provides you with the driver disc appropriate for the user's device. You have been assigned to reinstall the printer drivers and correct the problem.

## Duration

This task should take about 10 minutes.

## Setup

You will need a driver disc for your local print device.

## Caveat

You can also attempt to install drivers from Windows Update if they are available or from the printer manufacturer's website.

## Procedure

You will learn the steps necessary to install printer drivers on a computer.

## Equipment Used

You will need no special equipment to complete this task besides the driver disc.

## Details

This task will walk you through the procedure of installing new printer drivers on a computer from a disc.

### Installing Printer Drivers

#### INSTALLING PRINTER DRIVERS USING THE ADD A PRINTER DRIVER WIZARD

1. Click Start ➤ Printers and Faxes.



You can also click Start ➤ Settings ➤ Control Panel ➤ Printers and Faxes if the Printers and Faxes option is unavailable in the Start menu.

2. Right-click the desired printer.
3. Click Properties.
4. Click the Advanced tab.
5. Click the New Driver button.
6. Click Next.



After you click the New Driver button and click Next, the Welcome to the Add a Printer Driver Wizard page will launch.

7. In the Printer Driver Selection page, in the Manufacturer window, scroll down and select the manufacturer of your printer.
8. In the Printers window, scroll down and select the specific model of your printer.
9. Click the Have Disk button.
10. Insert the driver disc in the computer's optical drive.
11. In the Install from Disk box, use the drop-down list to select the drive letter of the optical drive.



Instead of using the drop-down list to select a drive letter, you can click the Browse button and use Windows Explorer to browse to the correct drive.

12. Click OK.
13. Click Next.
14. When the Completing the Add Printer Driver Wizard page appears, click Finish.



The drivers should install at this point of the process.

### TESTING THE PRINTER DRIVER INSTALLATION

1. In the Printers and Faxes box, right-click the printer.
2. Click Properties.
3. On the General tab, click Print Test Page.



After you click Print Test Page, a box will appear asking if the test page printed properly. The page should print after a few seconds.

4. When the test page prints, click OK.



If the test page doesn't print or if it doesn't print properly, instead of clicking OK in step 4, click Troubleshoot. The Help and Support Center page will open and you can work your way through a wizard process to diagnose the problem. You can also consult either the printed documentation for the printer or the printer's documentation on the manufacturer's website.

5. Click OK to close the Printer Properties box.
6. Open the applications the user will use to print.
7. Create a test document in each application and print it.
8. When done, close all applications.

## Criteria for Completion

You will have successfully completed this task when you have installed the drivers and the printer operates normally.



# Task 1.36: Installing a Bluetooth Device in Windows Vista

As you likely know, Bluetooth is a wireless protocol used to connect devices over a very short distance to construct personal wireless networks, or PANs. A Bluetooth device can be almost anything, from a keyboard or mouse to a PDA. Bluetooth uses the same frequencies as Wi-Fi devices but at higher power levels. This renders Bluetooth incompatible with Wi-Fi, since the Bluetooth signals will literally “overpower” the Wi-Fi radio transmissions.

As a support technician, you won’t need to know a great amount of detail about the specifications associated with Bluetooth, but you will need to know how to install a Bluetooth device on a PC. This task will show you the basics.

## Scenario

The chief operations officer at your company wants a Bluetooth keyboard installed for his Windows Vista computer. He has just left for lunch and expects the keyboard to be up and running when he gets back.

Your supervisor has already installed the necessary Bluetooth technology onto the computer, so all you have to do is physically install the device and set it up. You have already unplugged and laid aside the old USB keyboard. You have been provided with the Bluetooth keyboard and adapter. You have been shown how to turn on the Bluetooth device and make it discoverable.

## Duration

This task should take about 10 minutes.

## Setup

You will need a Bluetooth device and adapter. It would be ideal if your computer has Bluetooth technology installed, but it’s not absolutely necessary, because you can also install the device directly from the device’s control panel. You can use any Bluetooth device, but the steps for the installation may differ somewhat from this exercise. Also, although it is common to use a passkey with Bluetooth devices, since this is just a keyboard, a passkey won’t be necessary for this task.



A passkey, or passcode, is a number used to associate a Bluetooth device with a computer. Passkeys are used to provide security so that your device cannot be accessed using another computer. Low-security devices such as keyboards and mice typically don’t use passkeys.

## Caveat

If you use Wi-Fi at or near the PC you plan to use for this exercise, you will need to turn off your wireless network so that this task will succeed. The process of activating the Bluetooth device and making it discoverable will vary depending on the device, so consult the device's documentation for details. You will also need to refer to the device's documentation if you will be installing it from the device's control panel, rather than using Windows Vista.



Recent developments with Bluetooth have addressed the 802.11b and 802.11g conflict, particularly with Bluetooth 1.2 (2003), with the use of adaptive frequency hopping spread (AFH) spectrum signaling. See the following for more information: [http://bluetooth.com/Bluetooth/Press/SIG/Bluetooth\\_SIG\\_Adopts\\_Version\\_12\\_of\\_Wireless\\_Technology\\_Specification.htm](http://bluetooth.com/Bluetooth/Press/SIG/Bluetooth_SIG_Adopts_Version_12_of_Wireless_Technology_Specification.htm).



Making a wireless or Bluetooth device “discoverable” is the process of configuring the device to transmit so it can be detected by a receiving unit, such as an access point in the case of Wi-Fi, or the computer in the case of installing the Bluetooth keyboard. It may mean that you will temporarily need to disable the Windows onboard firewall and other security measures.

## Procedure

You will learn the steps needed to install a Bluetooth keyboard on a Windows Vista computer.

## Equipment Used

You will need the Bluetooth device and a Bluetooth adapter, unless the computer has a built-in adapter. The adapter plugs into any USB port, so installation is straightforward.

## Details

This exercise will show you how to install a Bluetooth device.

### Installing a Bluetooth Device

#### SETTING UP THE BLUETOOTH DEVICE

1. Make sure you are logged on to the computer with an account that has administrator privileges.
2. Locate the Bluetooth adapter and remove it from its packaging.
3. Insert the adapter in an available USB port on the computer.
4. Locate the Bluetooth keyboard and remove it from its packaging.

5. Verify that the keyboard has a power source and turn it on.
6. Place or hold the keyboard in the proximity of the computer.
7. Verify that the keyboard is discoverable (consult the keyboard's documentation for the specific steps needed).

#### **SETTING UP BLUETOOTH IN WINDOWS VISTA**

1. Click the Windows Vista Start button.
2. Click Control Panel.
3. Click Hardware and Sound, and then click Bluetooth Devices.
4. Click Add.



#### **NOTE**

Follow the instructions in the screens that follow. The instructions may vary depending on the device being installed.

5. After the installation process is completed, attempt to use the keyboard normally, such as opening up Notepad and typing some characters. Make sure all of the keys work as expected.

## **Criteria for Completion**

You will have successfully completed this exercise when the Bluetooth device is installed and behaving as expected.

