Step 4  Carefully remove the motherboard from the PC case and place it on your anti-static mat. You should place the motherboard in a large anti-static bag for the best protection.

15 MINUTES

Lab Exercise 9.03: Identifying Motherboard Features
At a glance, one motherboard pretty much looks like any other. Of course, as a PC tech, you know that many differences may exist: Two identical-looking motherboards can have completely different feature sets. Chipsets, bus speed, CPU socket type, and clock speed are just some of the important features that separate one motherboard from another. These differences aren’t always obvious, but you can turn to your motherboard book to identify your motherboard’s features, as described in the following steps.

Learning Objectives
In this lab, you’ll become familiar with different motherboard features.

At the end of this lab, you’ll be able to

- Recognize different motherboard features
- Identify the location of motherboard features

Lab Materials and Setup
The materials you need for this lab are

- A motherboard, such as the one you removed in Lab Exercise 9.02
- The motherboard book or online documentation for that motherboard

Getting Down to Business
In the following steps, you’ll identify the location of key features on your motherboard.

Hint
If you’re using the motherboard you removed in the previous lab, take this opportunity to clean any dust off of it, using canned air, before you begin.

Step 1  Note the location of the make and model information on the motherboards in Figure 9-1. Compare this to your motherboard and locate the manufacturer name and model number.
**Cross-Reference**

For details on chipsets, refer to the "Chipset" section of Chapter 9 of *Mike Meyers' CompTIA A+ Guide to Managing and Troubleshooting PCs.*

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What is the name of your motherboard manufacturer? ____________________________
What is the model number of your motherboard? ________________________________
What CPU socket do you have on your motherboard? ____________________________
What type of chipset do you have on your motherboard? _______________________

Keep this information handy! Having the make and model of your motherboard readily available makes it easy to search the Web for drivers and updated BIOS.

**Step 2** Look for any charts or numbers printed on the surface of the motherboard.

Are there any jumper blocks? _______________________
What are some of the settings that can be configured using jumpers?

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**Step 3** Find the following on your motherboard and note their locations:

- System clock battery ________________
- BIOS __________________
**Step 1**  Here are the physical characteristics of PCI expansion slots:

- About 3 inches long
- Usually white in color (modern motherboards may use bright colors like yellow or green to enhance the visual appeal of the motherboard)
- Offset from the edge of the motherboard by about 1 inch

Figure 9-3 shows PCI slots on a modern motherboard.

Record the following information:

How many PCI slots are on your motherboard? ____________________________

What PCI devices are installed on your system? ____________________________

How many PCI slots are empty? ____________________________

**Step 2**  See if you can locate a 32-bit AGP slot. As the name suggests, the AGP slot is designed to be used with one type of component only—a graphics adapter. Here are the physical characteristics of the AGP slot:

- One slot per motherboard
- A little less than 3 inches long
- Usually brown in color
- Offset from the edge of the motherboard by about 2 inches

Figure 9-4 shows an AGP slot in its natural habitat. While popular on older motherboards, AGP slots have been all but ousted by PCIe, so your motherboard may not have one.
Record the following information:

Is there an AGP video card slot on your motherboard? 

What can you tell about the installed video card without removing it?

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**Step 3** Take a look at your motherboard and see if there are any PCIe slot connectors. PCIe is very interesting, offering a theoretical throughput of 2.5 Gbps per lane and supporting from 1 to 32 lanes. The first devices to take advantage of PCIe were graphics cards using the 16-lane configuration. The physical characteristics of the PCIe expansion slots depend on the number of lanes.

**PCIe x1 slots** have the following characteristics:

- About 1 inch long
- Often brightly colored (blue and white being fairly common)
- Offset from the edge of the motherboard by about 1.25 inches

**PCIe x16 slots** have the following characteristics:

- About 3.5 inches long
- Often brightly colored (blue and white being fairly common)
- Offset from the edge of the motherboard by about 1.25 inches

Figure 9-5 shows PCIe slots on a modern motherboard.
Figure 9-5 A motherboard with both PCIe x1 and PCIe x16 expansion slots

Record the following information:

Are there any PCIe slots on your motherboard? ____________________________

If yes, how many PCIe x1 slots are there? _________________________________

How many PCIe x16 slots are there? _______________________________________

Are there any PCIe cards installed in the system? __________________________

✓ Cross-Reference

For more detail about the PCI, AGP, and PCIe buses, refer to the “Expansion Bus” section in Chapter 9 of Mike Meyers’ CompTIA A+ Guide to Managing and Troubleshooting PCs.

After you’ve completed your inventory of installed expansion bus devices, put the case cover back on your PC, plug it back in, and turn on the power of the system.

30 MINUTES

Lab Exercise 9.07: Installing Expansion Cards

There are four steps to installing any expansion card device properly:

1. Arm yourself with knowledge of the device before you install it. Is the device certified to run on the Windows OS that you’re running? Is it compatible with your motherboard and other hardware? If you are running Windows 7, a good place to start is the Windows Compatibility Center Web site, found at www.microsoft.com/windows/compatibility/windows-7/en-us/default.aspx.
2. Remove the cover from your PC case and install the device. As always, follow all ESD and safety precautions and handle the card with care.

3. Install device drivers for the component. Windows comes with a large device drivers catalog, so it may try to help you by installing the driver that it thinks the device needs. In most cases, you should visit the card manufacturer's Web site, download the latest drivers for the card and your operating system, and then install the updated drivers. You can also install the card and then use Microsoft/Windows Update, which may find and download a copy of the latest driver from the manufacturer.

4. Verify that the device is functional.

The following exercise is a somewhat abridged version of this procedure; instead of installing a new device, you'll remove and reinstall devices that are already on your system.

Cross-Reference

To review the details of device installation, refer to the "Installing Expansion Cards" section in Chapter 9 of Mike Meyers' CompTIA A+ Guide to Managing and Troubleshooting PCs.

Learning Objectives

In this lab, you'll practice removing and installing internal expansion cards.

At the end of this lab, you'll be able to

- Remove and install expansion cards in a system correctly and safely

Lab Materials and Setup

The materials you need for this lab are

- At least one working Windows computer with expansion cards installed
- A Phillips-head screwdriver
- An anti-static mat and wrist strap
- Anti-static storage bags
- A notepad

Getting Down to Business

In this exercise, you'll physically remove expansion card devices from your PC. You'll then make note of any important information you can find on the device's label: device maker, version, and so on. Finally, you'll reassemble and restart the system. In Lab Exercise 9.08, you'll use Device Manager to make sure everything is working properly.
Lab Analysis Test

1. Jonathan is building a system using an Intel Core i3 processor, and he’s purchased a new motherboard from ASUS. He would like to use an old (but working!) ATX power supply he has laying around to power the system. Why might this not be a good idea?

2. John has a system that runs at 3.2 GHz and uses a 128-MB AGP video card. He uses Windows XP Professional and wants to try its multiple-monitor support feature. Can he add another AGP video card? Why or why not?

3. Dianne is trying to install an ATX motherboard in a new, empty ATX case. She tries to set it down in the bottom of the case, but it won’t fit—the ports on the side are too low to poke out the back of the case, and she can’t make the screws work at all. What has she forgotten?

4. After Erik reassembled his PC and turned it on, he noticed that the green LED and the disk active LED never light up, but everything seems to work okay. What is the problem?

5. You’ve installed an NIC and a PCI FireWire controller card on Susan’s Windows Vista Professional system. The system starts up fine, but when you check Device Manager, you see a yellow triangle with a black exclamation mark beside the NIC icon. What is the problem?
Key Term Quiz

Use the following terms to complete the following sentences. Not all terms will be used.

AGP
ATX
device drivers
expansion card
FlexATX
ITX
microATX
motherboard book
PCI
PCIe
sockets or slots

1. Once a standard graphics expansion slot, ____________ has been replaced in favor of PCIe video cards.

2. To check the technical specifications of a motherboard, consult its ____________.

3. The ____________ bus provides for \( \times 1, \times 2, \times 4, \times 8, \times 16, \) and \( \times 32 \) lanes of bidirectional communication.

4. ____________ are the areas where CPUs are installed on motherboards.

5. One motherboard design, known for its lower power-consumption characteristics and small size, is called ____________.