Introduction

IT Essentials: PC Hardware and Software Companion Guide, Third Edition, is a supplemental book to the Cisco Networking Academy IT Essentials: PC Hardware and Software version 4 course. The course teaches you how to build a computer and troubleshoot problems that occur in everyday use. The course is designed to prepare you to take and pass the CompTIA A+ exams (based on the 2006 objectives). By reading and completing this book, you have the opportunity to review all key concepts that the CompTIA A+ exams cover. If you use this book along with its companion *IT Essentials: PC Hardware and Software Labs and Study Guide*, Third Edition (ISBN 1-58713-198-6), you can reinforce those concepts with hands-on exercises and test that knowledge with review questions and exercises.

The IT Essentials: PC Hardware and Software course is divided into two main units. The first unit, covered in Chapters 1 through 10, goes over the foundational knowledge that aligns with the CompTIA A+ Essentials exam (220-601). The second unit, covered in Chapters 11 through 16, explores more advanced concepts in greater depth to prepare you for the specialized CompTIA A+ technician exams (220-602 for IT Technician, 220-603 for Remote Support Technician, and 220-604 for Bench Technician). You must pass both the A+ Essentials and one of the technician exams to earn the A+ certification.

The course and book also align with the objectives in the first three modules of the EUCIP IT Administrator certification (http://www.eucip.org): Module 1 PC Hardware, Module 2 Operating Systems, and Module 3 Local Area Networks and Network Services.

Who Should Read This Book

This book is intended for students in the Cisco Networking Academy IT Essentials PC Hardware and Software version 4 course. This student typically is pursuing a career in information technology (IT) or wants to have the knowledge of how a computer works, how to assemble a computer, and how to troubleshoot hardware and software issues.

Features of This Book

The features in this book facilitate an understanding of computer systems and troubleshooting system problems. The highlights of each chapter are as follows:

- **Objectives**: Each chapter starts with a list of objectives that should be mastered by the end of the chapter. The objectives provide a reference of the concepts covered in the chapter.

- **Key terms**: Each chapter includes a list of key terms in the chapter. These terms serve as a study aid and are defined in the book's glossary. The key terms reinforce the concepts introduced in the chapter and help you understand the chapter material before you

move on to new concepts. You can find the key terms highlighted in blue throughout the chapter, where they are used in best context.

■ **Explanatory text, lists, figures, and tables**: This book contains figures, procedures, and tables to accompany the thorough text explanations of the objective content and to help explain and visualize theories, concepts, commands, and setup sequences.

■ **Chapter summaries**: At the end of each chapter is a summary of the concepts covered in the chapter. The summary provides a synopsis of the chapter and serves as a study aid.

■ **Lab, Worksheet, Class Discussion, and Remote Technician references**: Throughout each chapter and at the end of each chapter, there are references to the Labs, Worksheets, Class Discussions, and Remote Technician exercises that can be found in the accompanying *IT Essentials: PC Hardware and Software Labs and Study Guide*, Third Edition (ISBN 1-58713-198-6).

■ **Virtual Desktop Activity and Virtual Laptop Activity references**: Throughout each chapter and at the end of each chapter, there are references to the Virtual Desktop activities and Virtual Laptop activities that can be found on the CD that accompanies this book.

■ **"Check Your Understanding" review questions**: Review questions are presented at the end of each chapter to serve as an assessment. In addition, the questions reinforce the concepts introduced in the chapter and help test your understanding before moving on to subsequent chapters.

■ **CD-ROM**: The CD that accompanies this book contains all the Virtual Desktop activities and Virtual Laptop activities referenced throughout the book. The Virtual Desktop and Virtual Laptop are standalone tools designed by Cisco to supplement classroom learning by providing a virtual "hands-on" experience where real equipment is limited. The minimum system requirements to run the Virtual Desktop and Virtual Laptop are 512 MB RAM and the Windows 2000 or XP operating system.

How This Book Is Organized

This book is divided into 16 chapters, one appendix, and a glossary of key terms:

■ **Chapter 1, "Introduction to the Personal Computer":** Information technology (IT) is the design, development, implementation, support, and management of computer hardware and software applications. An IT professional is knowledgeable about computer systems and operating systems. This chapter will review IT certifications and the components of a basic personal computer system.

■ **Chapter 2, "Safe Lab Procedures and Tool Use":** This chapter covers basic safety practices for the workplace, hardware and software tools, and the disposal of hazardous materials. Safety guidelines help protect individuals from accidents and injury and

protect equipment from damage. Some of these guidelines are designed to protect the environment from contamination by discarded materials. Stay alert to situations that could result in injury or damage to equipment. Warning signs are designed to alert you to danger. Always watch for these signs and take the appropriate action according to the warning given.

- **Chapter 3, "Computer Assembly—Step by Step":** The first step in the assembly process is gathering the components and completing the computer inventory. Preparing and installing the components are detailed in a step-by-step process. In the final steps, you review the checklist, assemble the case, and boot the system for the first time. Assembling computers is a large part of a technician's job. As a technician, you will need to work in a logical, methodical manner when working with computer components. As with any learned trade, computer assembly skills will improve dramatically with practice.

- **Chapter 4, "Basics of Preventive Maintenance and Troubleshooting":** This chapter introduces preventive maintenance and the troubleshooting process. Preventive maintenance is a regular and systematic inspection, cleaning, and replacement of worn parts, materials, and systems. Preventive maintenance helps to prevent failure of parts, materials, and systems by ensuring that they are in good working order. Troubleshooting is a systematic approach to locating the cause of a fault in a computer system. A good preventive maintenance program helps minimize failures. With fewer failures, there is less troubleshooting to do, thus saving an organization time and money.

- **Chapter 5, "Fundamental Operating Systems":** The operating system (OS) controls almost all functions on a computer. In this chapter, you will learn about the components, functions, and terminology related to the Windows 2000 and Windows XP operating systems.

- **Chapter 6, "Fundamental Laptops and Portable Devices":** Laptops, personal digital assistants (PDA), and smartphones are becoming more popular as their prices decrease and technology continues to progress. As a computer technician, you need to have knowledge of portable devices of all kinds. This chapter focuses on the differences between laptops and desktops and describes the features of PDAs and smartphones.

- **Chapter 7, "Fundamental Printers and Scanners":** This chapter will provide essential information about printers and scanners. You will learn how printers operate, what to consider when purchasing a printer, and how to connect printers to an individual computer or to a network. You must understand the operation of various types of printers and scanners to be able to install and maintain them, as well as troubleshoot any problems that might arise.

- **Chapter 8, "Fundamental Networks":** This chapter will provide an overview of network principles, standards, and purposes. The different types of network topologies, protocols, and logical models, as well as the hardware needed to create a network, will also be discussed in this chapter. Configuration, troubleshooting, and preventive

maintenance will be covered. You will also learn about network software, communication methods, and hardware relationships.

- **Chapter 9, "Fundamental Security":** Technicians need to understand computer and network security. Failure to implement proper security procedures can have an impact on users, computers, and the general public. Private information, company secrets, financial data, computer equipment, and items of national security are placed at risk if proper security procedures are not followed. This chapter will cover why security is important, security threats, security procedures, and how to troubleshoot security issues.

- **Chapter 10, "Communication Skills":** As a computer technician, you will not only fix computers but also interact with people. In fact, troubleshooting is as much about communicating with the customer as it is about knowing how to fix a computer. In this chapter, you will learn to use good communication skills as confidently as you use a screwdriver.

- **Chapter 11, "Advanced Personal Computers":** In your career as a technician, you might have to determine whether a component for a customer's computer should be upgraded or replaced. It is important that you develop advanced skills in installation procedures, troubleshooting techniques, and diagnostic methods for computers. This chapter discusses the importance of component compatibility across hardware and software. It also covers the need for adequate system resources to efficiently run the customer's hardware and software.

- **Chapter 12, "Advanced Operating Systems":** The installation, configuration, and optimization of operating systems are examined in greater detail in this chapter. There are various brands of operating systems on the market today, including Microsoft Windows, Apple Mac OS, UNIX, and Linux. A technician must consider the current computer system when selecting an operating system. Each of these operating systems offers many of the same features with a similar interface. However, some functions necessary for specific customer needs might not be available in all of them. You must be able to compare and contrast operating systems to find the best one based on your customer's needs.

- **Chapter 13, "Advanced Laptops and Portable Devices":** With the increase in demand for mobility, the popularity of laptops and portable devices will continue to grow. During the course of your career, you will be expected to know how to configure, repair, and maintain these devices. The knowledge you acquire about desktop computers will help you service laptops and portable devices. However, there are important differences between the two technologies.

- **Chapter 14, "Advanced Printers and Scanners":** This chapter explores the functionality of printers and scanners. You will learn how to maintain, install, and repair these devices in both local and network configurations. The chapter discusses safety hazards, configuration procedures, preventive maintenance, and printer and scanner sharing.

- **Chapter 15, "Advanced Networks":** This chapter focuses on advanced networking topics, including network design, network component upgrades, and e-mail server installations. Basic networking topics such as safety, network components, and preventive maintenance are also discussed.

- **Chapter 16, "Advanced Security":** This chapter reviews the types of attacks that threaten the security of computers and the data contained on them. A technician is responsible for the security of data and computer equipment in an organization. The chapter describes how you can work with customers to ensure that the best possible protection is in place.

- **Appendix, "Answers to Check Your Understanding Questions":** This appendix lists the answers to the Check Your Understanding review questions that are included at the end of each chapter.

- **Glossary:** The glossary provides you with definitions for all the key terms identified in each chapter.

About the A+ Certification

As a CompTIA Authorized Quality Curriculum, IT Essentials: PC Hardware and Software v4.0 will help prepare you for the new CompTIA A+ Essentials and job-skills certification exams. To become A+ certified, you will need to pass two exams to become certified in your chosen career area:

- CompTIA A+ Essentials (220-601)

- Any one of the three job-skills exams:

  - 220-602: IT Technician

  - 220-603: Remote Support Technician

  - 220-604: Depot Technician

After becoming certified, you will be qualified to work as a computer support professional and technician in a variety of work environments and industries.

The CompTIA A+ exam is explained in detail, including a list of the objectives, by visiting the following website:

http://certification.comptia.org/a/

When you are ready to take the exam, you must purchase and schedule your two A+ exams. The necessary information to accomplish this can be found at the following website:

http://certification.comptia.org/resources/registration.aspx

The logo of the CompTIA Authorized Quality Curriculum (CAQC) program and the status of this or other training material as "Authorized" under the CompTIA Authorized Quality Curriculum program signifies that, in CompTIA's opinion, such training material covers the content of CompTIA's related certification exam.

The contents of this training material were created for the CompTIA A+ exam covering CompTIA certification objectives that were current as of 2006.

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How to become CompTIA certified:

This training material can help you prepare for and pass a related CompTIA certification exam or exams. In order to achieve CompTIA certification, you must register for and pass a CompTIA certification exam or exams.

In order to become CompTIA certified, you must:

1. Select a certification exam provider. For more information please visit http://www.comptia.org/certification/general_information/exam_locations.aspx.

2. Register for and schedule a time to take the CompTIA certification exam(s) at a convenient location.

3. Read and sign the Candidate Agreement, which will be presented at the time of the exam(s). The text of the Candidate Agreement can be found at http://www.comptia.org/certification/general_information/candidate_agreement.aspx.

4. Take and pass the CompTIA certification exam(s).

For more information about CompTIA's certifications, such as its industry acceptance, benefits or program news, please visit www.comptia.org/certification

CompTIA is a not-for-profit information technology (IT) trade association. CompTIA's certifications are designed by subject matter experts from across the IT industry. Each CompTIA certification is vendor-neutral, covers multiple technologies and requires demonstration of skills and knowledge widely sought after by the IT industry.

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