CompTIA Server+ Certification

Complete coverage of all CompTIA Server+ certification objectives

Ron Gilster

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Dedicated to

My wife ***Connie***
whose prayers, love and
support have been constant

About the Author

Ron Gilster has written over 50 books on a variety of topics in the areas of IT career certifications, programming, computer technology, and a few in finance, real estate, and business. His commitment to his readers has always been a desire for their success.

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He is a passionate supporter of Open Source, he actively contributes to the Community, writing on the Linux Professional Institute blog and holding tech talks always on FOSS themes, both on technical fields and on professional training.

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I want to express my deepest gratitude to my wife Connie for her unwavering support and encouragement throughout the creation of this book.

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Preface

Although the CompTIA Server+ Certification may not be as well-known as other CompTIA certifications, such as A+, Network+, and Security+, and a few others, it does verify that its holder has the knowledge and understanding of the configurations, operations, and security of network servers and their components. The Server+ certification is intended for IT professionals with two- to four-years of experience working with network servers and computer networks.

CompTIA Server+ is a vendor-neutral certification that is at the same level as vendor-specific certifications, such as the Microsoft MCSA Server Administrator and Cisco Systems'CCNA Data Center. Unlike the Microsoft and Cisco certifications, CompTIA Server+ covers a broader base of server and networking fundamental principles, rather than a specific product line.

The Server+ exam verifies knowledge and understanding in four specific areas: server hardware installation and management, server administration, security and disaster recovery, and troubleshooting.

This book provides informaiton and detail for each of the specific areas identified in the Server+ certification examination's objectives. The material presented is specific to each of the objective items areas to provide the reader with the knowledge and understanding it requires. This book provides in-depth explanations and discussions for all the concepts measured by the exam. It is written at a level that prepares both the well-experienced and the less-experienced IT professionals to prepare for the successul completion of the Server+ certification exam with a qualifying score.

The material presented in each of the chapters is outlined in the following summaries:

Chapter 1: Physical Hardware – This chapter focuses on the server's internal and external components, racking, cabling, and support hardware. The hardware generally discussed is most commonly associated with larger networks and data centers, but the systems found in smaller networks is also addressed. The specific areas covered in this chapter are: racking systems, power cabling, network cabling, server chassis types, and server components.

Chapter 2: Data Storage – This chapter focuses on various technologies used in data storage devices, including hard disk drives, RAID levels and types, capacity planning, hard drive media types, interface types, and shared storage.

Chapter 3: Server Hardware Maintenance – This chapter reviews the administration, management, and preventive maintenance of local and remote server hardware processes and procedures, including out-of-band management, local hardware administration, drive maintenance, hot-swappable hardware, firmware upgrades, and BIOS/UEFI.

Chapter 4: Server Operating Systems – This chapter reviews the administration, management, and preventive maintenance of local and remote server hardware processes and procedures, including minimum hardware requirements, operating system installations, installation types, partition and volume types, and file system types

Chapter 5: Network Infrastructure Services – This chapter reviews the administration, management, and preventive maintenance of local and remote server hardware processes and procedures, including IP configuration, addressing protocols, firewalls, static vs. dynamic routing, and MAC addressing.

Chapter 6: Configure Network Servers – This chapter reviews the administration, management, and preventive maintenance of local and remote server hardware processes and procedures, including server roles and requirements, storage management, server monitoring, data migration and transfer, and administrative interfaces.

Chapter 7: High Availability – This chapter discusses the technologies and methods associated with high availability, fault tolerance, clustering, load balancing, and redundant server network infrastructures.

Chapter 8: Virtualization – This chapter discusses the fundamentals of virtualization and its use in a networking environment, including virtualization, host vs. guest virtualization, resource allocation and provisioning, VM testing, and cloud models.

Chapter 9: Scripting – This chapter looks at how scripts are used in system and network administration. Its specific topics include scripting in server administration, script types, basic scripting constructs, scripting terminology, basic data types, Windows and Linux environmental variables, and script commenting.

Chapter 10: Asset Management – This chapter looks at the process of asset management, including documentation management, document availability, and the policies and procedures of asset management.

Chapter 11: Licensing – This chapter looks at the various types of software versions along with the conditions and rights a software provider grants its users, including software licensing, licensing agreements, licensing models, and version compatibility.

Chapter 12: Data Security – This chapter looks at the methods, processes, and concepts of data security, including encryption, data retention policies, data storage, data protection, and business impacts.

Chapter 13: Physical Security – This chapter looks at the physical security approaches, devices, and environmental controls that an organization can install to protect its systems, including access controls, architectural security reinforcements, authentication factors, and environment controls.

Chapter 14: Access Management – Access management is primarily an information security, IT and data governance process used to grant access to valid users and prohibit invalid users. This chapter covers user accounts, access controls, permissions, auditing, and single sign-on.

Chapter 15: Risk and Mitigation – This chapter discusses the risks to which servers are exposed, how those risks may be mitigated, and the regulatory and legal constraints that must be incorporated into an organization's security program, including security information and event management (SIEM).

Chapter 16: Server Hardening and Decommissioning – This chapter deals with keeping the operating system and applications up-to-date with fixes, updates, patches and the processes required to secure a network server, including hardening, patch management, change management, server decommissioning, media destruction, media retention requirements, and electronics recycling.

Chapter 17: Backup and Restore – This chapter looks at various aspects and practices of a backup and restore policy, including backup and recovery methods, restore methods, and backup validation.

Chapter 18: Disaster Recovery – This chapter discusses the elements and actions that may be a part of a disaster recovery plan, including disaster recovery planning, recovery sites, replication, testing, failovers and failbacks, and testing.

Chapter 19: Troubleshooting Methods – This chapter reviews the methods recommended for use when troubleshooting a failure or fault in any general hardware, software, network, storage device, and security policies or devices. This chapter covers the standard troubleshooting steps and the documentation of findings, actions, and outcomes.

Chapter 20: Hardware Issues – This chapter looks at the problems that can occur on server hardware, including memory issues, causes of common problems, and tools and techniques.

Chapter 21: Storage Issues – This chapter looks at data storage devices, their issues and causes, and the processes used to detect them, including common storage device problems, and the causes of common storage problems.

Chapter 22: Operating System and Software Issues – This chapter reviews common software problems, their causes, and some of the tools and utilities used to troubleshoot them.

Chapter 23: Software Tools and Techniques – This chapter looks at the tools and techniques available to resolve and fix problems and issues associated with a network server.

Chapter 24: Network Connectivity Issues – This chapter identifies the common problems, issues and their causes that occur on a computer network.

Chapter 25: Network Tools and Techniques – This chapter identifies the network operating system utilities and tools that are commonly a part of the troubleshooting process.

Chapter 26: Troubleshooting Security Issues – This chapter discusses the common data security concerns associated with network servers and the security tools used to diagnose and remedy any issues found.

Appendix A: CompTIA Server+ Certification Exam: Practice Test 1

Appendix B: CompTIA Server+ Certification Exam: Practice Test 2

Appendix C: CompTIA Server+® Acronyms

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Appendix E: Answers to Practice Test 1

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Part - 1

Server Hardware Installation and Management

Regardless of its purpose or role in a network, a server has two primary components: hardware and software. In this part, you review the system and data storage hardware, their installation, function, and maintenance.

Part 1 includes the following chapters:

- Chapter 1: Physical Hardware
- Chapter 2: Storage Devices
- Chapter 3: Server Hardware Maintenance

Chapter 1
Physical Hardware

Introduction

When we think about a network server, we lump the hardware and software into one system. For the most part, this is not entirely wrong, but technically, a server is a software and its support services. We commonly refer to the physical hardware as a server, even though it could have multiple server software running on it. In this chapter and the whole book, the term server is used interchangeably to indicate both. Keep in mind that there is some difference between server hardware and server software. So, it is okay to see a server as the combination of the hardware and the software in the context of the service it provides to a network. Regardless, without its hardware or its software, there would be no server.

This chapter focuses on the server's internal and external components, racking, cabling, and support hardware. The hardware discussed in this chapter (and most of this book), is generally associated with larger networks and data centers. However, all servers, even the **small offices or home offices** (**SOHO**), require the same support systems, in one form or another. With that understanding, let us look at the various types of hardware and support systems that provide for the operations of a server.

Structure

The chapter covers the following topics:

- Racking systems
- Power cabling
- Network cabling
- Server chassis types
- Server components

Objective

By the end of this chapter, you will be able to identify and describe the sub-objectives of the following Server+ examination objective: *Given a scenario, install physical hardware*.

Racking systems

The hardware on which server software runs can be a standalone computer or a computer system specifically designed for that purpose. The computers/servers in large networks are commonly contained in specially designed computer rooms, data centers, or server farms. In these environments, the server hardware is typically mounted on open racks or in cabinets. *Figure 1.1* shows examples of an open rack and a rackmount cabinet like those commonly found in data centers:

***Figure 1.1**: Server hardware is commonly mounted on an open rack (left) or a server cabinet (right) in large data centers* [1]

1. Images courtesy of Datarack Co.

Rack dimensions

The dimensions of a mountable rack device have a standard width and height sizing. The majority of rackmount devices have a width of 19-inches, but their heights can vary with the type and purpose of each device. Racking systems, like those shown in *Figure 1.1*, have either two or four vertical rails. Server hardware and other devices are attached to the rails using a rail kit. A rail kit is typically specific to the device with horizontally mounted rails on which the device sits, and fasteners to secure the device to the vertical rails. A two-rail rack has no depth limitations, but a four-rail rack is typically either 24 or 48-inches in-depth and is designed to enclose devices.

Rackmount systems are designed to accommodate varying device heights. The height of a device is measured using the rack unit or "U." One U, or "1U," is standardized at 1.75 inches. *Figure 1.2* illustrates the size of 1U. Most racks or cabinet systems are 42U in height. Rack-mountable server hardware is 2U or 3.5-inches tall. Theoretically, twenty-one 2U devices could be mounted in a 42U rack:

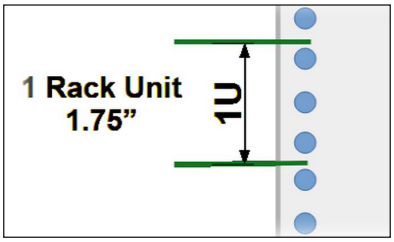

***Figure 1.2**: One rack unit (1U) is 1.75 inches in height*

Rack layout

Racking systems are designed to hold all standard rack-mountable devices, including server hardware, **uninterruptible power supplies** (**UPS**), **power distribution units** (**PDUs**), cable management devices, **keyboard-video-mouse** (**KVM**) switches, patch panels, and more. However, the placement of certain devices can affect the effectiveness of the cooling system and its airflow.

Before inserting devices into a rack, you should plan where each device should be in relationship to the other devices. If there are multiple racks, consider the power and cooling systems of the facility. Heavier devices, such as a UPS, should be placed at the bottom of the rack, and the lightest devices should tend toward the top. Devices common to a rack installation, such as patch panels, routers, switches, firewalls, etc., are typically placed in the upper part of the rack. This is for the ease of installation, access, and cable management.