



# CompTIA Server+ Certification Exam Objectives

**EXAM NUMBER: SKO-004**



# About the Exam

The CompTIA Server+ certification is an international vendor-neutral credential. The CompTIA Server+ exam is a validation of “foundation-level” server skills and knowledge, and is used by organizations and IT professionals around the globe.

This exam will certify that the successful candidate has the knowledge and skills required to:

- **Build, maintain, troubleshoot, secure and support server hardware and software technologies, including virtualization**
- **Identify environmental issues**
- **Understand and comply with disaster recovery and general security procedures**
- **Be familiar with industry terminology and concepts**
- **Understand server roles and their interaction in a dynamic computing environment**

## **EXAM DEVELOPMENT**

CompTIA exams result from subject matter expert workshops and industry-wide survey results regarding the skills and knowledge required of an entry-level IT professional.

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## **PLEASE NOTE**

The lists of examples provided in bulleted format are not exhaustive lists. Other examples of technologies, processes or tasks pertaining to each objective may also be included on the exam although not listed or covered in this objectives document. CompTIA is constantly reviewing the content of our exams and updating test questions to be sure our exams are current and the security of the questions is protected. When necessary, we will publish updated exams based on existing exam objectives. Please know that all related exam preparation materials will still be valid.

## TEST DETAILS

Exam code	SK0-004
Number of questions	100
Length of test	90 minutes
Type of questions	Multiple choice
Recommended experience	CompTIA A+ or 18–24 months of IT experience
Languages	English, Chinese, Japanese
Passing score	750 (on a scale of 100–900)

## EXAM OBJECTIVES (DOMAINS)

The table below lists the domains measured by this examination and the extent to which they are represented:

DOMAIN	PERCENTAGE OF EXAMINATION
1.0 Server Architecture	12%
2.0 Server Administration	24%
3.0 Storage	12%
4.0 Security	13%
5.0 Networking	10%
6.0 Disaster Recovery	9%
7.0 Troubleshooting	20%
<b>Total</b>	<b>100%</b>



# 1.0 Server Architecture

## 1.1 Explain the purpose and function of server form factors.

- **Rack mount**
  - Dimensions
    - 1U, 2U, 4U
  - Cable management arms
  - Rail kits
- **Tower**
- **Blade technology**
  - Blade enclosure
    - Backplane/midplane
    - Power supply sockets
  - Network modules/switches
  - Management modules
  - Blade server

## 1.2 Given a scenario, install, configure and maintain server components.

- **CPU**
  - Multiprocessor vs. multicore
  - Socket type
  - Cache levels: L1, L2, L3
  - Speeds
    - Core
    - Bus
    - Multiplier
  - CPU stepping
  - Architecture
    - x86
    - x64
    - ARM
- **RAM**
  - ECC vs. non-ECC
  - DDR2, DDR3
  - Number of pins
  - Static vs. dynamic
  - Module placement
  - CAS latency
  - Timing
  - Memory pairing
- **Bus types, bus channels and expansion slots**
  - Height differences and bit rate differences
- PCI
- PCIe
- PCI-X
- **NICs**
- **Hard drives**
- **Riser cards**
- **RAID controllers**
- **BIOS/UEFI**
  - CMOS battery
- **Firmware**
- **USB interface/port**
- **Hotswap vs. non-hotswap components**

## 1.3 Compare and contrast power and cooling components.

- **Power**
  - Voltage
    - 110v vs. 220v vs. -48v
    - 208v vs. 440v/460v/480v
  - Wattage
  - Consumption
  - Redundancy
- 1-phase vs. 3-phase power
- Plug types
  - NEMA
  - Edison
  - Twist lock
- **Cooling**
  - Airflow
  - Thermal dissipation
  - Baffles/shrouds
  - Fans
  - Liquid cooling



## 2.0 Server Administration

### 2.1 Install and configure server operating systems.

- **Determine server role/purpose**
- **Update firmware**
- **BIOS/UEFI configuration**
  - Boot order
- **Disk preparation**
  - RAID setup
  - Partitioning
  - Formatting
  - File system type
    - Ext 2, 3, 4
    - NTFS
    - FAT32
- ReiserFS
- UFS
- VMFS
- ZFS
- Swap
- **Configure host name**
- **Local account setup**
- **Connect to network**
- **Join domain/directory**
- **Address security concerns**
  - Patching
  - OS hardening
- Compliance to company procedures/standards
- **Enable services**
- **Install features/roles/applications/drivers**
- **Performance baseline**
  - Server optimization
  - Swap or pagefile optimization
- **Unattended/remote installations**
  - Deploying images and cloning
  - Scripted installs
    - PXE boot
    - TFTP

### 2.2 Compare and contrast server roles and requirements for each.

- **Web server**
- **Application server**
- **Directory server**
- **Database server**
- **File server**
- **Print server**
- **Messaging server**
- **Mail server**
- **Routing and remote access server**
- **Network services server**
  - DHCP
  - DNS/WINS
  - NTP

### 2.3 Given a scenario, use access and control methods to administer a server.

- **Local hardware administration**
  - KVM
  - Serial
  - Virtual administration console
- **Network-based hardware administration**
  - KVM over IP
  - ILO
  - iDRAC
- **Network-based operating system administration**
  - RDP
  - SSH
  - VNC
  - Command line/shell



## 2.4 Given a scenario, perform proper server maintenance techniques.

- **Change management**
- **Patch management**
  - Operating system updates
  - Application updates
  - Security software updates
  - Firmware updates
  - Device drivers updates
  - Compatibility lists
    - Operating systems
    - Hardware
    - Applications
  - Testing and validation
- **Outages and service level agreements**
  - Scheduled downtime
  - Unscheduled downtime
  - Impact analysis
  - Client notification
  - MTTR
- **Performance monitoring**
  - CPU utilization
  - Memory utilization
  - Network utilization
  - Disk utilization
    - Disk IOPS
    - Storage capacity
  - Comparison against performance baseline
  - Processes and services monitoring
  - Log monitoring
- **Hardware maintenance**
  - Check system health indicators
    - LEDs
    - Error codes
    - Beep codes
    - LCD messages
  - Replace failed components
- Fans
- Hard drives
- RAM
- Backplanes
- Batteries
- Preventive maintenance
  - Clearing dust
  - Check proper air flow
  - Proper shut down procedures
- **Fault tolerance and high availability techniques**
  - Clustering
    - Active/active
    - Active/passive
  - Load balancing
    - Round robin
    - Heartbeat

## 2.5 Explain the importance of asset management and documentation.

- **Asset management**
  - Licensing
  - Labeling
  - Warranty
  - Life cycle management
    - Procurement
    - Usage
    - End of life
    - Disposal/recycling
- Inventory
  - Make
  - Model
  - Serial number
  - Asset tag
- **Documentation**
  - Service manuals
  - Network diagrams
  - Architecture diagrams
- Dataflow diagrams
- Recovery documentation
- Baseline documentation
- Change management policies
- Service level agreement
- Server configuration
- **Secure storage of sensitive documentation**

## 2.6 Explain the purpose and operation of virtualization components.

- **Hosts and guests**
- **Management interface for virtual machines**
- **Hypervisor**
  - Type I
  - Type II
  - Hybrid
- **Hardware compatibility list**
  - BIOS/UEFI compatibility and support
  - CPU compatibility support
  - AMD-V/Intel VT
- **Resource allocation between guest and host**
  - CPU
  - Storage
- Memory
- Network connectivity
  - Direct access (bridging) vs. NAT
  - Virtual NICs
  - Virtual switches
- Video



## 3.0 Storage

**3.1** Given a scenario, install and deploy primary storage devices based on given specifications and interfaces.

- **Disk specifications**
  - RPM
  - Dimensions/form factor
  - Capacity
  - Bus width
  - IOPS
- **Interfaces**
  - SAS
  - SATA
  - SCSI
- **Seek time and latency**
  - Hotswap vs. non-hotswap components
- **USB**
  - Fibre channel
- **Hard drive vs. SSD**

**3.2** Given a scenario, configure RAID using best practices.

- **RAID levels and performance considerations**
  - 0
  - 1
  - 5
  - 6
  - 10
- **Software vs. hardware RAID**
  - Performance considerations
- **Configuration specifications**
  - Capacity
  - Bus types
  - Drive RPM
- **Hotswap support and ramifications**
- **Hot spare vs. cold spare**
- **Array controller**
  - Memory
  - Battery backed cache
  - Redundant controller

**3.3** Summarize hardware and features of various storage technologies.

- **DAS**
- **NAS**
  - iSCSI
  - FCoE
- **SAN**
  - Fibre channel
  - LUN and LUN masking
  - HBAs and fabric switches
- **JBOD**
- **Tape**
  - Drive
  - Libraries
- **Optical drive**
- **Flash, compact flash and USB drive**

**3.4** Given a scenario, calculate appropriate storage capacity and plan for future growth.

- **Base10 vs. Base2 disk size calculation (1000 vs. 1024)**
- **Disk quotas**
- **Compression**
- **Capacity planning considerations**
  - Operating system growth
    - Patches
    - Service packs
    - Log files
- **Temporary directories**
- **Databases**
- **Application servers**
- **File servers**
- **Archival**



## 4.0 Security

### 4.1 Compare and contrast physical security methods and concepts.

- **Multifactor authentication**
  - Something you have
  - Something you know
  - Something you are
- **Security concepts**
  - Mantrap
  - RFID chip
  - ID card
  - Biometric
  - Keypad
  - Access list
  - Security guard
  - Security camera
  - Keys and locks
  - Cabinet
  - Rack mount
  - Server
  - Safe

### 4.2 Given a scenario, apply server hardening techniques.

- **OS hardening**
  - Stopping unneeded services/closing unneeded ports
  - Install only required software
  - Install latest operating system patches
- **Application hardening**
  - Install latest patches
  - Disabling unneeded services/roles/features
- **Endpoint security**
  - HIDS
  - Anti-malware
- **Remediate security issues based on a vulnerability scan**
- **Hardware hardening**
  - Disabling unneeded hardware and physical ports/devices
  - BIOS password
  - Disable WOL (Wake on LAN)
  - Setup boot order
  - Chassis locks/intrusion detection

### 4.3 Explain basic network security systems and protocols.

- **Firewall**
  - Network-based
  - Host-based
- **Port security/802.1x/NAC**
- **Router access list**
- **NIDS**
- **Authentication protocols**
  - LDAP
  - RADIUS
  - TACACS
  - TACACS+
- **PKI**
  - Private key
  - Public key
  - Certificate authority
  - SSL/TLS
- **VPN**
- **IPsec**
- **VLAN**
- **Security zones**
  - DMZ
  - Public and private
  - Intranet and extranet





#### 4.4 Implement logical access control methods based on company policy.

- **ACLs**
    - Users
    - Groups
      - Roles
    - Resources
      - File system
  - Network ACLs
  - Peripheral devices
  - Administrative rights
  - Distribution lists
  - **Permissions**
    - Read
    - Write/modify
    - Execute
    - Delete
    - Full control/superuser
    - File vs. share
- 

#### 4.5 Implement data security methods and secure storage disposal techniques.

- **Storage encryption**
    - File level encryption
    - Disk encryption
    - Tape encryption
  - **Storage media**
    - Soft wipe
      - File deletion
    - Hard wipe
      - Zero out all sectors
  - Physical destruction
  - Remote wipe
- 

#### 4.6 Given a scenario, implement proper environmental controls and techniques.

- **Power concepts and best practices**
  - UPS
    - Runtime vs. capacity
    - Automated graceful shutdown of attached devices
    - Periodic testing of batteries
    - Maximum load
    - Bypass procedures
    - Remote management
  - PDU
    - Connect redundant rack PDUs to separate circuits
- Capacity planning
  - PDU ratings
  - UPS ratings
  - Total potential power draw
- Multiple circuits
  - Connect redundant power supplies to separate PDUs
- **Safety**
  - ESD procedures
  - Fire suppression
  - Proper lifting techniques
  - Rack stability
- Floor load limitations
- Sharp edges and pinch points
- **HVAC**
  - Room and rack temperature and humidity
    - Monitoring and alert notifications
  - Air flow
    - Rack filler/baffle/blanking panels
  - Hot aisle and cold aisle



# 5.0 Networking

## 5.1 Given a scenario, configure servers to use IP addressing and network infrastructure services.

- IPv4 vs. IPv6
- Default gateway
- CIDR notation and subnetting
- Public and private IP addressing
- Static IP assignment vs. DHCP
- DNS
  - FQDN
  - Default domain suffix/search domain
- WINS
- NetBIOS
- NAT/PAT
- MAC addresses
- Network Interface Card configuration
  - NIC teaming
  - Duplexing
  - Full
- Half
- Auto
- Speeds
  - 10/100/1000 Mbps
  - 10 Gbps

## 5.2 Compare and contrast various ports and protocols.

- TCP vs. UDP
- SNMP 161
- SMTP 25
- FTP 20/21
- SFTP 22
- SSH 22
- SCP 22
- NTP 123
- HTTP 80
- HTTPS 443
- TELNET 23
- IMAP 143
- POP3 110
- RDP 3389
- FTPS 989/990
- LDAP 389/3268
- DNS 53
- DHCP 68

## 5.3 Given a scenario, install cables and implement proper cable management procedures.

- Copper
  - Patch cables
  - Crossover
  - Straight through
  - Rollover
  - CAT5
  - CAT5e
  - CAT6
- Fiber
  - Single mode
  - Multimode
- Connectors
  - ST
  - LC
  - SC
  - SFP
  - RJ-45
  - RJ-11
- Cable placement and routing
  - Cable channels
  - Cable management trays
    - Vertical
    - Horizontal
- Labeling
- Bend radius
- Cable ties



## 6.0 Disaster Recovery

### 6.1 Explain the importance of disaster recovery principles.

#### • Site types

- Hot site
- Cold site
- Warm site

#### • Replication methods

- Disk-to-disk
- Server-to-server
- Site-to-site

#### • Continuity of operations

- Disaster recovery plan
- Business continuity plan
- Business impact analysis
  - Who is affected
  - What is affected
  - Severity of impact

### 6.2 Given a scenario, implement appropriate backup techniques.

#### • Methodology

- Full/normal
  - Copy
- Incremental
- Differential
- Snapshot
- Selective
- Bare metal
- Open file
- Data vs. OS restore

#### • Backup media

- Linear access
  - Tape
- Random access
  - Disk
  - Removable media
  - Optical media

#### • Media and restore best practices

- Labeling
- Integrity verification

- Test restorability
- Tape rotation and retention

#### • Media storage location

- Offsite
- Onsite
- Security considerations
- Environmental considerations



## 7.0 Troubleshooting

### 7.1 Explain troubleshooting theory and methodologies.

- **Identify the problem and determine the scope**
  - Question users/stakeholders and identify changes to the server/environment
  - Collect additional documentation/logs
  - If possible, replicate the problem as appropriate
  - If possible, perform backups before making changes
- **Establish a theory of probable cause (question the obvious)**
  - Determine whether there is a common element of symptom causing multiple problems
- **Test the theory to determine cause**
  - Once theory is confirmed, determine next steps to resolve problem
  - If theory is not confirmed, establish new theory or escalate
- **Establish a plan of action to resolve the problem and notify impacted users**
- **Implement the solution or escalate as appropriate**
  - Make one change at a time and test/confirm the change has resolved the problem
  - If the problem is not resolved, reverse the change if appropriate and implement new change
- **Verify full system functionality and if applicable implement preventative measures**
- **Perform a root cause analysis**
- **Document findings, actions and outcomes throughout the process**

### 7.2 Given a scenario, effectively troubleshoot hardware problems, selecting the appropriate tools and methods.

- **Common problems**
  - Failed POST
  - Overheating
  - Memory failure
  - Onboard component failure
  - Processor failure
  - Incorrect boot sequence
  - Expansion card failure
  - Operating system not found
  - Drive failure
  - Power supply failure
  - I/O failure
- **Causes of common problems**
  - Third-party components or incompatible components
  - Incompatible or incorrect BIOS
  - Cooling failure
  - Mismatched components
  - Backplane failure
- **Environmental issues**
  - Dust
  - Humidity
  - Temperature
  - Power surge/failure
- **Hardware tools**
  - Power supply tester (multimeter)
  - Hardware diagnostics
  - Compressed air
  - ESD equipment



### 7.3 Given a scenario, effectively troubleshoot software problems, selecting the appropriate tools and methods.

#### • Common problems

- User unable to log on
- User cannot access resources
- Memory leak
- BSOD/stop
- OS boot failure
- Driver issues
- Runaway process
- Cannot mount drive
- Cannot write to system log
- Slow OS performance

- Patch update failure

- Service failure
- Hangs no shut down
- Users cannot print

#### • Cause of common problems

- User Account Control (UAC/SUDO)
- Corrupted files
- Lack of hard drive space
- Lack of system resources
- Virtual memory (misconfigured, corrupt)
- Fragmentation

- Print server drivers/services

- Print spooler

#### • Software tools

- System logs
- Monitoring tools (resource monitor, performance monitor)
- Defragmentation tools
- Disk property tools (usage, free space, volume or drive mapping)

### 7.4 Given a scenario, effectively diagnose network problems, selecting the appropriate tools and methods.

#### • Common problems

- Internet connectivity failure
- Email failure
- Resource unavailable
- DHCP server misconfigured
- Non-functional or unreachable
- Destination host unreachable
- Unknown host
- Default gateway misconfigured
- Failure of service provider
- Cannot reach by host name/FQDN

#### • Causes of common problems

- Improper IP configuration
- VLAN configuration
- Port security
- Improper subnetting
- Component failure
- Incorrect OS route tables
- Bad cables
- Firewall (misconfiguration, hardware failure, software failure)
- Misconfigured NIC, routing/switch issues
- DNS and/or DHCP failure
- Misconfigured hosts file
- IPv4 vs. IPv6 misconfigurations

#### • Networking tools

- ping
- tracert/traceroute
- ipconfig/ifconfig
- nslookup
- net use/mount
- route
- nbtstat
- netstat



## 7.5 Given a scenario, effectively troubleshoot storage problems, selecting the appropriate tools and methods.

### • Common problems

- Slow file access
- OS not found
- Data not available
- Unsuccessful backup
- Error lights
- Unable to mount the device
- Drive not available
- Cannot access logical drive
- Data corruption
- Slow I/O performance
- Restore failure
- Cache failure
- Multiple drive failure

### • Causes of common problems

- Media failure
- Drive failure
- Controller failure
- HBA failure
- Loose connectors
- Cable problems
- Misconfiguration
- Improper termination
- Corrupt boot sector
- Corrupt file system table
- Array rebuild
- Improper disk partition
- Bad sectors
- Cache battery failure

- Cache turned off
- Insufficient space
- Improper RAID configuration
- Mismatched drives
- Backplane failure

### • Storage tools

- Partitioning tools
- Disk management
- RAID array management
- Array management
- System logs
- Net use/mount command
- Monitoring tools

## 7.6 Given a scenario, effectively diagnose security issues, selecting the appropriate tools and methods.

### • Common problems

- File integrity issue
- Privilege escalation
- Applications will not load
- Cannot access network file/shares
- Unable to open files
- Excessive access
- Excessive memory utilization

### • Causes of common problems

- Open ports
- Active services
- Inactive services
- Intrusion detection configurations
- Anti-malware configurations
- Local/group policies
- Firewall rules
- Misconfigured permissions
- Virus infection
- Rogue processes/services

### • Security tools

- Port scanners
- Sniffers
- Cipher
- Checksums
- Telnet client
- Anti-malware

# CompTIA Server+ Acronyms

The following is a list of acronyms that appear on the CompTIA Server+ exam. Candidates are encouraged to review the complete list and attain a working knowledge of all listed acronyms as a part of a comprehensive exam preparation program.

<b>ACRONYM</b>	<b>SPELLED OUT</b>	<b>ACRONYM</b>	<b>SPELLED OUT</b>
*nix	Unix/Linux/Solaris/OS X/BSD	FCoE	Fibre Channel over Ethernet
ACL	Access Control List	FQDN	Fully Qualified Domain Name
AD	Active Directory	FRU	Field Replaceable Unit
AIT	Advanced Intelligent Tape	FTP	File Transfer Protocol
AMD-V	AMD Virtualization	FTPS	File Transfer Protocol over SSL
ARM	Advanced RISC Machines	GFS	Grandfather Father Son
BBWC	Battery-Backed Write Cache	GPU	Graphics Processing Unit
BIOS	Basic Input/Output System	GUI	Graphical User Interface
BSOD	Blue Screen Of Death	HBA	Host Bus Adapter
CAS	Column Address Strobe	HCL	Hardware Compatibility List
CAT5	Category 5	HID	Human Interface Device
CAT5e	Category 5 enhanced	HIDS	Host Intrusion Detection System
CAT6	Category 6	HIPS	Host Intrusion Prevention System
CIDR	Classless Inter-Domain Routing	HTTP	Hyper Text Transport Protocol
CLI	Command Line Interpreter	HTTPS	Hyper Text Transport Protocol Secure
CMOS	Complementary Metal Oxide Semiconductor	HVAC	Heating, Ventilation and Air Conditioning
CPU	Central Processing Unit	iDRAC	integrated Dell Remote Access Control
CRU	Customer Replaceable Unit	IIS	Internet Information Services
CUPS	Common Unix Printing System	ILO	Integrated Lights Out
DAS	Direct Attached Storage	IMAP4	Internet Mail Access Protocol 4
DC	Domain Controller	Intel VT	Intel Virtualization Technology
DDoS	Distributed Denial of Service	IOPS	Input/output Operations Per Second
DDR	Double Data Rate	IP	Internet Protocol
DDR2	Double Data Rate2	IPMI	Intelligent Platform Management Interface
DDR3	Double Data Rate3	IPsec	Internet Protocol Security
DHCP	Dynamic Host Configuration Protocol	IPv6	Internet Protocol Version 6
DLT	Digital Linear Tape	iSCSI	Internet Small Computer System Interface
DMA	Direct Memory Access	JBOD	Just a Bunch Of Disks
DMZ	Demilitarized Zone	KVM	Keyboard-Video-Mouse
DNS	Domain Name Service	LAN	Local Area Network
DSRM	Directory Services Restore Mode	LC	Local Connector
DTX	Discontinuous Transmission	LCD	Liquid Crystal Display
ECC	Error Correcting Code	LDAP	Lightweight Directory Access Protocol
ESD	Electrostatic Discharge	LED	Light Emitting Diode
FAT	File Allocation Table	LKGC	Last Known Good Configuration

<b>ACRONYM</b>	<b>SPELLED OUT</b>	<b>ACRONYM</b>	<b>SPELLED OUT</b>
LOM	Lights Out Management	SC	Standard Connector
LTO	Linear Tape-Open	SCP	Secure Copy Protocol
LUN	Logical Unit Number	SCSI	Small Computer System Interface
MIB	Management Information Base	SDRAM	Synchronous Dynamic Random-Access Memory
MMC	Microsoft Management Console	SFP	Small Form-factor Pluggable
MTTR	Mean Time To Recover	SFTP	Secure File Transfer Protocol
NAC	Network Access Control	SLA	Service Level Agreement
NAS	Network Attached Storage	SMP	Symmetric Multiprocessing
NAT	Network Address Translation	SMTP	Simple Mail Transport Protocol
NEMA	National Electronic Manufacturers Association	SNMP	Simple Network Management Protocol
NetBIOS	Network Basic Input Output System	SQL	Structured Query Language
NIC	Network Interface Card	SSD	Solid State Drive
NIDS	Network Intrusion Detection System	SSH	Secure Shell
NLB	Network Load Balancing	SSL	Secure Sockets Layer
NOS	Network Operating System	ST	Straight Tip
NTFS	New Technology File System	TACACS	Terminal Access Controller Access Control System
NTP	Network Time Protocol	TCP/IP	Transmission Control Protocol/Internet Protocol
NX	No Execute	TDR	Time Domain Reflectometer
OEM	Original Equipment Manufacturer	TFTP	Trivial File Transfer Protocol
OS	Operating System	TLS	Transport Layer Security
OSPF	Open Shortest Path First	UAC	User Account Control
OTDR	Optical Time Domain Reflectometer	UDP	User Datagram Protocol
PAT	Port Address Translation	UEFI	Unified Extensible Firmware Interface
PBX	Private Branch Exchange	UFS	Unix File System
PCI	Peripheral Component Interconnect	UID	Unit Identification
PCIe	Peripheral Component Interconnect express	UPS	Uninterruptible Power Supply
PCI-X	Peripheral Component Interconnect Extended	USB	Universal Serial Bus
PDU	Power Distribution Unit	VLAN	Virtual Local Area Network
PKI	Public Key Infrastructure	VM	Virtual Machine
POP3	Post Office Protocol (Version 3)	VMFS	VMware File System
POST	Power On Self-Test	VNC	Virtual Network Computing
PXE	Preboot Execution Environment	VoIP	Voice over IP
RADIUS	Remote Authentication Dial-in User Service	VPN	Virtual Private Network
RAID	Redundant Array of Inexpensive/ Integrated Disks/Drives	VRM	Voltage Regulator Module
RAM	Random-Access Memory	VSS	Volume Shadow Service
RAS	Remote Access Server	VT	Virtualization Technology
RDP	Remote Desktop Protocol	WBEM	Web-based Enterprise Management
RFID	Radio Frequency Indemnification	WDS	Windows Deployment Services
RIS	Remote Installation Service	WINS	Windows Internet Naming Service
RISC	Reduced Instruction Set Computer	WMI	Windows Management Instrumentation
RJ-45	Registered Jack 45	WOL	Wake-on-LAN
RPM	Rotations Per Minute	WORM	Write-Once, Read-Many
SAN	Storage Area Network	WSUS	Windows Software Update Services
SAS	Serial Attached SCSI	XD	Execute Disable
SATA	Serial ATA	ZFS	Zettabyte File System



# Server+ Proposed Hardware and Software List

CompTIA has included this sample list of hardware and software to assist candidates as they prepare for the Server+ exam. The bulleted lists below each topic are a sample list and not exhaustive.

## **EQUIPMENT**

- Server
- Multiple NICs
- Remote management interface
- RAID controller
- SAS or SATA drives
- Industry standard rack enclosure
- Laptop or desktop
- Switch
- Ethernet cables
- Fiber cables
- Smart UPS
- PDU
- LCD screens
- KVM
- Serial cables
- Thermostat
- Cooling devices

## **SPARE PARTS/HARDWARE**

- Hard drive
- RAM
- Power supplies
- Cables
- Power cords
- Cable/zip wraps

## **TOOLS**

- Digital multimeter
- Screw driver
- Wrench
- Hammer
- Flash light
- Vacuum
- Canned air
- Cable testers

## **SOFTWARE**

- Virtualization software
- Various server operating systems (Windows/Linux)
- Host-based security suite
- Vulnerability assessment software
- PuTTY
- Packet analyzer
- NMAP