CompTIA PenTest+ Certification Exam Objectives

EXAM NUMBER: PT0-003

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About the Exam

The CompTIA PenTest+ certification exam will certify the successful candidate has the knowledge and skills required to:

- Plan, scope, and perform information gathering as part of a penetration test.
- Perform attacks that are aligned to and fulfill legal and compliance requirements.
- Perform each phase of a penetration test using and modifying appropriate tools and use the appropriate tactics, techniques, and procedures.
- Analyze the results of each phase of a penetration test to develop a written report, effectively communicate findings to stakeholders and provide practical recommendations.

EXAM ACCREDITATION

The CompTIA PenTest+ exam is accredited by ANSI to show compliance with the ISO 17024 standard and, as such, undergoes regular reviews and updates to the exam objectives.

EXAM DEVELOPMENT

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

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TEST DETAILS

Required exam	PT0-003
Number of questions	Maximum of 90
Types of questions	Multiple-choice and performance-based
Length of test	165 minutes
Recommended experience	3–4 years in a penetration tester job role
Passing score	750

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	Engagement Management	13%
2.0	Reconnaissance and Enumeration	21%
3.0	Vulnerability Discovery and Analysis	17%
4.0	Attacks and Exploits	35%
5.0	Post-exploitation and Lateral Movement	14%
Total		**100%**

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1.0 Engagement Management

1.1 Summarize pre-engagement activities.

- Scope definition
  - Regulations, frameworks, and standards
    - Privacy
    - Security
  - Rules of engagement
    - Exclusions
    - Test cases
    - Escalation process
    - Testing window
  - Agreement types
    - Non-disclosure agreement (NDA)
    - Master service agreement (MSA)
    - Statement of work (SoW)
    - Terms of service (ToS)
  - Target selection
    - Classless Inter-Domain Routing (CIDR) ranges
    - Domains
    - Internet Protocol (IP) addresses
    - Uniform Resource Locator (URL)
  - Assessment types
    - Web
    - Network
    - Mobile
    - Cloud
    - Application programming interface (API)
    - Application
    - Wireless
- Shared responsibility model
  - Hosting provider responsibilities
  - Customer responsibilities
  - Penetration tester responsibilities
  - Third-party responsibilities
- Legal and ethical considerations
  - Authorization letters
  - Mandatory reporting requirements
  - Risk to the penetration tester

1.2 Explain collaboration and communication activities.

- Peer review
- Stakeholder alignment
- Root cause analysis
- Escalation path
- Secure distribution
- Articulation of risk, severity, and impact
- Goal reprioritization
- Business impact analysis
- Client acceptance

1.3 Compare and contrast testing frameworks and methodologies.

- Open Source Security Testing Methodology Manual (OSSTMM)
- Council of Registered Ethical Security Testers (CREST)
- Penetration Testing Execution Standard (PTES)
- MITRE ATT&CK
- Open Worldwide Application Security Project (OWASP) Top 10
- OWASP Mobile Application Security Verification Standard (MASVS)
- Purdue model
- Threat modeling frameworks
  - Damage potential, Reproducibility, Exploitability, Affected users, Discoverability (DREAD)
  - Spoofing, Tampering, Repudiation, Information disclosure, Denial of service, Elevation of privilege (STRIDE)
  - Operationally Critical Threat, Asset, and Vulnerability Evaluation (OCTAVE)

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1.4 Explain the components of a penetration test report.

- Format alignment
- Documentation specifications
- Risk scoring
- Definitions
- Report components
  - Executive summary
  - Methodology
  - Detailed findings
  - Attack narrative
  - Recommendations
    - Remediation guidance
- Test limitations and assumptions
- Reporting considerations
  - Legal
  - Ethical
  - Quality control (QC)
  - Artificial intelligence (AI)

1.5 Given a scenario, analyze the findings and recommend the appropriate remediation within a report.

- Technical controls
  - System hardening
  - Sanitize user input/ parameterize queries
  - Multifactor authentication
  - Encryption
  - Process-level remediation
  - Patch management
  - Key rotation
  - Certificate management
  - Secrets management solution
  - Network segmentation
  - Infrastructure security controls
- Administrative controls
  - Role-based access control
  - Secure software development life cycle
  - Minimum password requirements
  - Policies and procedures
- Operational controls
  - Job rotation
  - Time-of-day restrictions
  - Mandatory vacations
  - User training
- Physical controls
  - Access control vestibule
  - Biometric controls
  - Video surveillance

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2.0 Reconnaissance and Enumeration

2.1 Given a scenario, apply information gathering techniques.

- Active and passive reconnaissance
- Open-source intelligence (OSINT)
  - Social media
  - Job boards
  - Scan code repositories
  - Domain Name System (DNS)
    - DNS lookups
    - Reverse DNS lookups
  - Cached pages
  - Cryptographic flaws
  - Password dumps
- Network reconnaissance
- Protocol scanning
  - Transmission Control Protocol (TCP)/User Datagram Protocol (UDP) scanning
- Certificate transparency logs
- Information disclosure
- Search engine analysis/ enumeration
- Network sniffing
  - Internet of Things (IoT) and operational technology (OT) protocols
- Banner grabbing
- Hypertext Markup Language (HTML) scraping

2.2 Given a scenario, apply enumeration techniques.

- Operating system (OS) fingerprinting
- Service discovery
- Protocol enumeration
- DNS enumeration
- Directory enumeration
- Host discovery
- Share enumeration
- Local user enumeration
- Email account enumeration
- Wireless enumeration
- Permission enumeration
- Secrets enumeration
  - Cloud access keys
  - Passwords
  - API keys
  - Session tokens
- Attack path mapping
- Web application firewall (WAF) enumeration
  - Origin address
- Web crawling
- Manual enumeration
  - Robots.txt
  - Sitemap
  - Platform plugins

2.3 Given a scenario, modify scripts for reconnaissance and enumeration.

- Information gathering
- Data manipulation
- Scripting languages
  - Bash
  - Python
  - PowerShell
- Logic constructs
  - Loops
  - Conditionals
  - Boolean operator
  - String operator
  - Arithmetic operator
- Use of libraries, functions, and classes

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2.4 Given a scenario, use the appropriate tools for reconnaissance and enumeration.

- Wayback Machine
- Maltego
- Recon-ng
- Shodan
- SpiderFoot
- WHOIS
- nslookup/dig
- Censys.io
- Hunter.io
- DNSdumpster
- Amass
- Nmap
  - Nmap Scripting Engine (NSE)
- theHarvester
- WiGLE.net
- InSSIDer
- OSINTframework.com
- Wireshark/tcpdump
- Aircrack-ng

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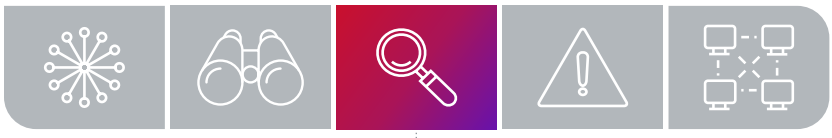

3.0 Vulnerability Discovery and Analysis

3.1 Given a scenario, conduct vulnerability discovery using various techniques.

- **Types of scans**
  - Container scans
    - Sidecar scans
  - Application scans
    - Dynamic application security testing (DAST)
    - Interactive application security testing (IAST)
    - Software composition analysis (SCA)
    - Static application security testing (SAST)
      - Infrastructure as Code (IaC)
      - Source code analysis
    - Mobile scan
  - Network scans
    - TCP/UDP scan
    - Stealth scans
  - Host-based scans
  - Authenticated vs. unauthenticated scans
  - Secrets scanning
  - Wireless
    - Service set identifier (SSID) scanning
    - Channel scanning
    - Signal strength scanning
- **Industrial control systems (ICS) vulnerability assessment**
  - Manual assessment
  - Port mirroring
- **Tools**
  - Nikto
  - Greenbone/Open Vulnerability Assessment Scanner (OpenVAS)
  - TruffleHog
  - BloodHound
  - Tenable Nessus
  - PowerSploit
  - Grype
  - Trivy
  - Kube-hunter

3.2 Given a scenario, analyze output from reconnaissance, scanning, and enumeration phases.

- **Validate scan, reconnaissance, and enumeration results**
  - False positives
  - False negatives
  - True positives
  - Scan completeness
  - Troubleshooting scan configurations
- **Public exploit selection**
- **Use scripting to validate results**

3.3 Explain physical security concepts.

- **Tailgating**
- **Site surveys**
- **Universal Serial Bus (USB) drops**
- **Badge cloning**
- **Lock picking**

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4.0 Attacks and Exploits

4.1 Given a scenario, analyze output to prioritize and prepare attacks.

- Target prioritization
  - High-value asset identification
  - Descriptors and metrics
    - Common Vulnerability Scoring System (CVSS) base score
    - Common Vulnerabilities and Exposures (CVE)
    - Common Weakness Enumeration (CWE)
    - Exploit Prediction Scoring System (EPSS)
  - End-of-life software/systems
  - Default configurations
  - Running services
  - Vulnerable encryption methods
  - Defensive capabilities
- Capability selection
  - Tool selection
  - Exploit selection and customization
    - Code analysis
  - Documentation
    - Attack path
    - Low-level diagram creation
    - Storyboard
  - Dependencies
  - Consideration of scope limitations
  - Labeling sensitive systems

4.2 Given a scenario, perform network attacks using the appropriate tools.

- Attack types
  - Default credentials
  - On-path attack
  - Certificate services
  - Misconfigured services exploitation
  - Virtual local area network (VLAN) hopping
  - Multihomed hosts
  - Relay attack
  - Share enumeration
  - Packet crafting
- Tools
  - Metasploit
  - Netcat
  - Nmap
    - NSE
  - Impacket
  - CrackMapExec (CME)
  - Wireshark/tcpdump
  - msfvenom
  - Responder
  - Hydra

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4.3 Given a scenario, perform authentication attacks using the appropriate tools.

- **Attack types**
  - Multifactor authentication (MFA) fatigue
  - Pass-the-hash attacks
  - Pass-the-ticket attacks
  - Pass-the-token attacks
  - Kerberos attacks
  - Lightweight Directory Access Protocol (LDAP) injection
  - Dictionary attacks
  - Brute-force attacks
  - Mask attacks
  - Password spraying
  - Credential stuffing
  - OpenID Connect (OIDC) attacks
  - Security Assertion Markup Language (SAML) attacks
- **Tools**
  - CME
  - Responder
  - hashcat
  - John the Ripper
  - Hydra
  - BloodHound
  - Medusa
  - Burp Suite

4.4 Given a scenario, perform host-based attacks using the appropriate tools.

- **Attack types**
  - Privilege escalation
  - Credential dumping
  - Circumventing security tools
  - Misconfigured endpoints
  - Payload obfuscation
  - User-controlled access bypass
  - Shell escape
  - Kiosk escape
  - Library injection
  - Process hollowing and injection
  - Log tampering
  - Unquoted service path injection
- **Tools**
  - Mimikatz
  - Rubeus
  - Certify
  - Seatbelt
  - PowerShell/PowerShell Integrated Scripting Environment (ISE)
  - PsExec
  - Evil-WinRM
  - Living off the land binaries (LOLbins)

4.5 Given a scenario, perform web application attacks using the appropriate tools.

- **Attack types**
  - Brute-force attack
  - Collision attack
  - Directory traversal
  - Server-side request forgery (SSRF)
  - Cross-site request forgery (CSRF)
  - Deserialization attack
  - Injection attacks
    - Structured Query Language (SQL) injection
    - Command injection
    - Cross-site scripting (XSS)
    - Server-side template injection
  - Insecure direct object reference
  - Session hijacking
  - Arbitrary code execution
  - File inclusions
    - Remote file inclusion (RFI)
    - Local file inclusion (LFI)
    - Web shell
  - API abuse
  - JSON Web Token (JWT) manipulation
- **Tools**
  - TruffleHog
  - Burp Suite
  - Zed Attack Proxy (ZAP)
  - Postman
  - sqlmap
  - Gobuster/DirBuster
  - Wfuzz
  - WPScan

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4.6 Given a scenario, perform cloud-based attacks using the appropriate tools.

- **Attack types**
  - Metadata service attacks
  - Identity and access management misconfigurations
  - Third-party integrations
  - Resource misconfiguration
    - Network segmentation
    - Network controls
    - Identity and access management (IAM) credentials
    - Exposed storage buckets
    - Public access to services
  - Logging information exposure
  - Image and artifact tampering
  - Supply chain attacks
  - Workload runtime attacks
  - Container escape
  - Trust relationship abuse
- **Tools**
  - Pacu
  - Docker Bench
  - Kube-hunter
  - Prowler
  - ScoutSuite
  - Cloud-native vendor tools

4.7 Given a scenario, perform wireless attacks using the appropriate tools.

- **Attacks**
  - Wardriving
  - Evil twin attack
  - Signal jamming
  - Protocol fuzzing
  - Packet crafting
  - Deauthentication
  - Captive portal
  - Wi-Fi Protected Setup (WPS) personal identification number (PIN) attack
- **Tools**
  - WPAD
  - WiFi-Pumpkin
  - Aircrack-ng
  - WiGLE.net
  - InSSIDer
  - Kismet

4.8 Given a scenario, perform social engineering attacks using the appropriate tools.

- **Attack types**
  - Phishing
  - Vishing
  - Whaling
  - Spearphishing
  - Smishing
  - Dumpster diving
  - Surveillance
  - Shoulder surfing
  - Tailgating
  - Eavesdropping
  - Watering hole
  - Impersonation
  - Credential harvesting
- **Tools**
  - Social Engineering Toolkit (SET)
  - Gophish
  - Evilginx
  - theHarvester
  - Maltego
  - Recon-ng
  - Browser Exploitation Framework (BeEF)

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4.9 Explain common attacks against specialized systems.

- **Attack types**
  - Mobile attacks
    - Information disclosure
    - Jailbreak/rooting
    - Permission abuse
  - AI attacks
    - Prompt injection
    - Model manipulation
  - OT
    - Register manipulation
    - CAN bus attack
    - Modbus attack
    - Plaintext attack
    - Replay attack
  - Near-field communication (NFC)
  - Bluejacking
  - Radio-frequency identification (RFID)
  - Bluetooth spamming
- **Tools**
  - Scapy
  - tcprelay
  - Wireshark/tcpdump
  - MobSF
  - Frida
  - Drozer
  - Android Debug Bridge (ADB)
  - Bluestrike

4.10 Given a scenario, use scripting to automate attacks.

- **PowerShell**
  - PowerSploit
  - PowerView
  - PowerUpSQL
  - AD search
- **Bash**
  - Input/output management
  - Data manipulation
- **Python**
  - Impacket
  - Scapy
- **Breach and attack simulation (BAS)**
  - Caldera
  - Infection Monkey
  - Atomic Red Team

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5.0 Post-exploitation and Lateral Movement

5.1 Given a scenario, perform tasks to establish and maintain persistence.

- Scheduled tasks/cron jobs
- Service creation
- Reverse shell
- Bind shell
- Add new accounts
- Obtain valid account credentials
- Registry keys
- Command and control (C2) frameworks
- Backdoor
  - Web shell
  - Trojan
- Rootkit
- Browser extensions
- Tampering security controls

5.2 Given a scenario, perform tasks to move laterally throughout the environment.

- Pivoting
- Relay creation
- Enumeration
  - Service discovery
  - Network traffic discovery
  - Additional credential capture
  - Credential dumping
  - String searches
- Service discovery
  - Server Message Block (SMB)/fileshares
  - Remote Desktop Protocol (RDP)/ Virtual Network Computing (VNC)
  - Secure Shell (SSH)
  - Cleartext
  - LDAP
  - Remote Procedure Call (RPC)
  - File Transfer Protocol (FTP)
  - Telnet
  - Hypertext Transfer Protocol (HTTP)/Hypertext Transfer Protocol Secure (HTTPS)
    - Web interfaces
  - Line Printer Daemon (LPD)
  - JetDirect
  - RPC/Distributed Component Object Model (DCOM)
  - Process IDs
- Window Management Instrumentation (WMI)
- Window Remote Management (WinRM)
- Tools
  - LOLBins
    - Netstat
    - Net commands
    - cmd.exe
    - explorer.exe
    - ftp.exe
    - mmc.exe
    - rundll32
    - msbuild
    - route
    - strings/findstr.exe
  - Covenant
  - CrackMapExec
  - Impacket
  - Netcat
  - sshuttle
  - Proxychains
  - PowerShell ISE
  - Batch files
  - Metasploit
  - PsExec
  - Mimikatz

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5.3 Summarize concepts related to staging and exfiltration.

- File encryption and compression
- Covert channel
  - Steganography
  - DNS
  - Internet Control Message Protocol (ICMP)
  - HTTPS
- Email
- Cross-account resources
- Cloud storage
- Alternate data streams
- Text storage sites
- Virtual drive mounting

5.4 Explain cleanup and restoration activities.

- Remove persistence mechanisms
- Revert configuration changes
- Remove tester-created credentials
- Remove tools
- Spin down infrastructure
- Preserve artifacts
- Secure data destruction

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CompTIA PenTest+ PT0-003 Acronym List

The following is a list of acronyms that appear on the CompTIA PenTest+ PT0-003 exam. Candidates are encouraged to review the complete list and attain a working knowledge of all listed acronyms as part of a comprehensive exam preparation program.

ACRONYM	DEFINITION
AD	Active Directory
ADB	Android Debug Bridge
AI	Artificial Intelligence
AP	Access Point
API	Application Programming Interface
APT	Advanced Persistent Threat
BAS	Breach and Attack Simulation
BeEF	Browser Exploitation Framework
BGP	Border Gateway Protocol
BIA	Business Intelligence Analytics
C2	Command and Control
CI/CD	Continuous Integration/Continuous Delivery
CIDR	Classless Inter-domain Routing
CGI	Common Gateway Interface
CLI	Command-line Interface
CME	CrackMapExec
CNAME	Canonical Name
COFF	Common Object File Format
CREST	Council of Registered Ethical Security Testers
CSRF	Cross-site Request Forgery
CVE	Common Vulnerabilities and Exposures
CVSS	Common Vulnerability Scoring System
CWE	Common Weakness Enumeration
DAST	Dynamic Application Security Testing
DCOM	Distributed Component Object Model
DDos	Distributed Denial of Service
DMARC	Domain-based Message Authentication, Reporting, and Conformance
DNS	Domain Name System
DoS	Denial of Service
DREAD	Damage potential, Reproducibility, Exploitability, Affected users, Discoverability
DROWN	Decrypting RSA [Rivest-Shamir-Adleman] with Obsolete and Weakened Encryption
EFSRPC	Encrypting File System Remote Protocol
ELF	Executable and Linkable Format
EPSS	Exploit Prediction Scoring System
EXIF	Exchangeable Image File Format
FQDN	Fully Qualified Domain Name
FTP	File Transfer Protocol
GIF	Graphic Interchange Format
HID	Host-based Intrusion Detection
HSTS	HTTP Strict Transport Security
HTML	Hypertext Markup Language
HTTP	Hypertext Transfer Protocol

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ACRONYM	DEFINITION
HTTPS	Hypertext Transfer Protocol Secure
IaC	Infrastructure as Code
IAM	Identity and Access Management
IAST	Interactive Application Security Testing
ICMP	Internet Control Message Protocol
ICS	Industrial Control System
IDOR	Insecure DIrect Object Reference
IdP	Identity Provider
IDS	Intrusion Detection System
IGRP	Interior Gateway Routing Protocol
IoT	Internet of Things
IP	Internet Protocol
IPS	Intrustion Prevention System
ISE	Integrated Scripting Environment
JWT	JSON Web Token
KDC	Key Distribution Center
KRBTGT	Kerberos Ticket Granting Ticket
LDAP	Lightweight Directory Access Protocol
LFI	Local File Inclusion
LLMNR	Link-local Multicast Name Resolution
LOLBins	Living off the Land Binaries
LPD	Line Printer Daemon
LSASS	Local Security Authority Subsystem Service
MAC	Media Access Control
MASVS	Mobile Application Security Verification Standard
MFA	Multifactor Authentication
MIB	Management Information Base
MMS	Multimedia Messaging Service
MSA	Master Services Agreement
MX	Mail Exchange
NDA	Non-disclosure Agreement
NFC	Near-field Communication
NSE	Nmap Scripting Engine
NTLM	New Technology LAN Manager
OCTAVE	Operationally Critical Threat, Asset, and Vulnerability Evaluation
OIDC	OpenID Connect
OpenVAS	Open Vulnerability Assessment Scanner
OS	Operating System
OSINT	Open-source Intelligence
OSSTMM	Open-source Security Testing Methodology Manual
OT	Operational Technology
OWASP	Open Worldwide Application Security Project
PTES	Penetration Testing Execution Standard
PWS	Performance Work Statement
QC	Quality Control
RCE	Remote Code Execution
RDP	Remote Desktop Protocol
RFI	Remote File Inclusion
RFID	Radio Frequency Identification
RIP	Routing Information Protocol
RPC	Remote Procedure Call
SaaS	Software as a Service
SAM	Security Account Manager
SAML	Security Assertion Markup Language

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ACRONYM	DEFINITION
SAST	Static Application Security Testing
SCA	Software Composition Analysis
SCADA	Supervisory Control and Data Acquisition
SDK	Software Development Kit
SDLC	Software Development Life Cycle
SDR	Software-defined Radio
SET	Social Engineering Toolkit
SIEM	Security Information and Event Management
SMB	Server Message Block
SMS	Short Message Service
SNMP	Simple Network Management Protocol
SOA	Start of Authority
SOC	Security Operations Center
SoW	Statement of Work
SPN	Service Principal Name
SQL	Structured Query Language
SQLi	Structured Query Language Injection
SSH	Secure Shell
SSID	Service Set Identifier
SSL	Secure Socket Layer
SSO	Single Sign-on
SSRF	Server-side Request Forgery
STRIDE	Spoofing, Tampering, Repudiation, Information Disclosure, Denial of Service, Elevation of Privilege
TCP	Transmission Control Protocol
TGS	Ticket Granting Service
TLS	Transport Layer Security
ToS	Terms of Service
TTP	Techniques, Tactics, Procedures
UDP	User Datagram Protocol
URL	Uniform Resource Locator
USB	Universal Serial Bus
VLAN	Virtual Local Area Network
VNC	Virtual Network Computing
VPN	Virtual Private Network
WAF	Web Application Firewall
WinRM	Windows Remote Management
WLAN	Wireless Local Area Network
WMI	Windows Management Instrumentation
WPAD	Web Proxy Auto Discovery
WPS	Wi-Fi Protected Setup
XSS	Cross-site Scripting
ZAP	Zed Attack Proxy

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CompTIA PenTest+ Proposed Hardware and Software List

CompTIA has included this sample list of hardware and software to assist candidates as they prepare for the PenTest+ exam. This list may also be helpful for training companies who wish to create a lab component to their training offering. The bulleted lists below each topic are a sample list and not exhaustive.

HARDWARE

- Computers
- Wireless access points
- Servers
- Switches
- Cabling
- Firewalls
- Router
- Host-based intrusion detection (HID)/ door access controls
- Wireless adapters capable of packet injection
- Directional antenna
- Mobile device
- IoT equipment (cameras, micro-computer, smart TV, etc.)
- Bluetooth adapter
- Multifunction printers (wired/wireless enabled)
- NFC/RFID cloning equipment
- Lock pick kit (where applicable)
- Biometric device
- Programmable logic controller
  - Software-defined radio (SDR) kit
- USB flash drives

SOFTWARE

- Access to cloud environment
  - Command-line interface (CLI) access
  - Management console access
  - Instances of cloud services
- OS licensing
- Open-source OS
- Penetration testing frameworks
- Virtual machine software
- Scanning tools
  - Vulnerability scanning tools
  - SAST
  - DAST
- Credential testing tools
  - Spraying tools
  - Password crackers
- Application security tools
- Debuggers
- Wireless testing tools
- Web proxy tools
- Social engineering tools
- Remote access tools
- Network tools
  - Protocol analyzers
  - Sniffing tools
- Mobility testing tools
- Open-source or publicly available security information and event management (SIEM)/ intrusion detection system (IDS)/intrusion prevention system (IPS)/endpoint security tools
- C2 tools

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