



โครงการเตรียมความพร้อมประเทศไทยในการเข้าสู่ประชาคมอาเซียน
โครงการเพิ่มขีดความสามารถของนักศึกษาและบุคลากรด้านเทคโนโลยีสารสนเทศในระดับสากล
กิจกรรมฝึกอบรมหลักสูตร CompTIA A+

การดูแลและบำรุงรักษาระบบสารสนเทศ

CompTIA A+ **220-802**

RMUTP : CompTIA A+ Pacing Guide (14 - 23 December 2015)

D1	TIME	Topic/Activity	Materials	Instructors
14-Dec-2015	0900-1030	Introduction : Objtives, Outline, Materials	A+ (220-801,220-802) Objectives, Slides, Others	
		Pre-Test	LMS : 20 Questions Test	
	1030-1045	- break -		
	1045-1200	Hardware Fundamentals	Slides (36)	
	1200-1300	- lunch -		
	1300-1430	Peripheral Components	Slides (23)	
	1430-1445	- break -		
1445-1600	Demo : Inside Desktop PC Tutorials	Desktop PC 17+18 Questions (Lecture)		
D2	TIME	Topic/Activity	Materials	Note
15-Dec-2015	0900-1030	Managing System Components	Slides (49)	
	1030-1045	- break -		
	1045-1200	Customized Client Environments Tutorials	Slides (16) 55+16 Questions (Lecture)	
	1200-1300	- lunch -		
	1300-1430	Network Technologies	Slides (67)	
	1430-1445	- break -		
	1445-1600	Network Technologies (cont'd) Tutorials	Slides (67) 64 Questions (Lecture)	
D3	TIME	Topic/Activity	Materials	Note
16-Dec-2015	0900-1030	Installing, Configuring, and Maintaining SOHO Networks Tutorials	Slides (19) 22 Questions (Lecture)	
	1030-1045	- break -		
	1045-1200	Support Laptops Tutorials	Slides (15) 26 Questions (Lecture)	
	1200-1300	- lunch -		
	1300-1430	Support Printers Tutorials	Slides (25) 24 Questions (Lecture)	
	1430-1445	- break -		
	1445-1600	Operational Procedures Tutorials	Slides (35) 36 Questions (Lecture)	

RMUTP : CompTIA A+ Pacing Guide (14 - 23 December 2015)

D4	TIME	Topic/Activity	Materials	Note
17-Dec-2015	0900-1030	A+ Essentials (220-801) Wrap-Up / Q&A	Slides	
	1030-1045	- break -		
	1045-1200	Practical Test : A+ Essentials (220-801)	LMS 74 Questions Test	
	1200-1300	- lunch -		
	1300-1430	Practical Test Review : A+ Essentials (220-801)	LMS 74 Questions Test Results	
	1430-1445	- break -		
	1445-1600	Operating System Fundamentals	Hands On : Installing Windows 7	
D5	TIME	Topic/Activity	Materials	Note
18-Dec-2015	0900-1030	Operating System Fundamentals Tutorials	Slides (52)	
	1030-1045	- break -		
	1045-1200	Operating System Fundamentals (cont'd) Tutorials	Slides (52) 56 Questions (Lecture, Hands On)	
	1200-1300	- lunch -		
	1300-1430	Installing and Configuring Operating Systems Tutorials	Slides (36) 32 Questions (Lecture, Hands On)	
	1430-1445	- break -		
	1445-1600	Security Tutorials	Slides (29) 49 Questions (Lecture, Hands On)	
D6	TIME	Topic/Activity	Materials	Note
19-Dec-2015	0900-1030	Mobile Computing Tutorials	Slides (18) 27 Questions (Lecture, Demo)	
	1030-1045	- break -		
	1045-1200	Troubleshooting Hardware Components Tutorials	Slides (30) 71 Questions (Lecture, Demo)	
	1200-1300	- lunch -		
	1300-1430	Troubleshooting System-Wide Issues Tutorials	Slides (18) 64 Questions (Lecture, Hands On)	
	1430-1445	- break -		
	1445-1600	A+ Practical Application (220-802) Simulation Quiz Demo	3 Questions (Demo)	

RMUTP : CompTIA A+ Pacing Guide (14 - 23 December 2015)

D7	TIME	Topic/Activity	Materials	Note
22-Dec-2015	0900-1030	A+ Practical Application (220-802) Wrap-Up / Q&A	Slides	
	1030-1045	<i>- break -</i>		
	1045-1200	Practical Test : A+ Practical Application (220-802)	LMS 73 Questions Test	
	1200-1300	<i>- lunch -</i>		
	1300-1430	Practical Test Review : A+ Practical Application (220-802)	LMS 73 Questions Test Results	
	1430-1445	<i>- break -</i>		
	1445-1600	CompTIA A+ (220-801,220-802) Wrap-Up / Q&A		
D8	TIME	Topic/Activity	Materials	Note
23-Dec-2015	0900-1030	Practical Test : A+ Essentials (220-801)	LMS 94 Questions	
	1030-1045	<i>- break -</i>		
	1045-1200	Practical Test Review : A+ Essentials (220-801)	LMS Review Test Results	
	1200-1300	<i>- lunch -</i>		
	1300-1430	Practical Test : A+ Practical Application (220-802)	LMS 93 Questions	
	1430-1445	<i>- break -</i>		
	1445-1600	Practical Test Review : A+ Practical Application (220-802)	LMS Review Test Results	



CompTIA A+ Certification Exam Objectives

Exam Number: 220-802

Introduction

In order to receive CompTIA A+ certification a candidate must pass two exams. The first exam is the CompTIA A+ 220-801 Certification Exam. The CompTIA A+ 220-802 Certification Exam is the second exam required in order for CompTIA A+ certification candidates to complete their certification.

The CompTIA A+ 220-802 examination measures necessary competencies for an entry-level IT professional with the equivalent knowledge of at least 12 months of hands-on experience in the lab or field. Successful candidates will have the knowledge required to assemble components based on customer requirements, install, configure and maintain devices, PCs and software for end users, understand the basics of networking and security/forensics, properly and safely diagnose, resolve and document common hardware and software issues while applying troubleshooting skills. Successful candidates will also provide appropriate customer support; understand the basics of virtualization, desktop imaging, and deployment.

CompTIA A+ is ISO 17024 Accredited (Personnel Certification Accreditation) and, as such, undergoes regular reviews and updates to the exam objectives. The following CompTIA A+ 220-802 certification exam objectives result from subject matter expert workshops and industry-wide survey results regarding the skills and knowledge required of an entry-level IT professional. The percentages in this document represent the relative importance of the subject areas (domains) in the associated body of knowledge, and together establish the foundation of an entry-level IT professional.

This examination blueprint includes domain weighting, test objectives, and example content. Example topics and concepts are included to clarify the test objectives and should not be construed as a comprehensive listing of all the content of this examination.

Candidates are encouraged to use this document to guide their studies. The table below lists the domains measured by this examination and the extent to which they are represented. The CompTIA A+ 220-802 certification exam is based on these objectives.

Domain	Percentage of Examination
Operating Systems	33%
Security	22%
Mobile Devices	9%
Troubleshooting	36%
Total	100%

**Note: The lists of examples provided in bulleted format below each objective 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.

CompTIA A+ 220-802 Objectives

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1.0 Operating Systems

1.1 Compare and contrast the features and requirements of various Microsoft Operating Systems.

- Windows XP Home, Windows XP Professional, Windows XP Media Center, Windows XP 64-bit Professional
- Windows Vista Home Basic, Windows Vista Home Premium, Windows Vista Business, Windows Vista Ultimate, Windows Vista Enterprise
- Windows 7 Starter, Windows 7 Home Premium, Windows 7 Professional, Windows 7 Ultimate, Windows 7 Enterprise
- Features:
 - 32-bit vs. 64-bit
 - Aero, gadgets, user account control, bit-locker, shadow copy, system restore, ready boost, sidebar, compatibility mode, XP mode, easy transfer, administrative tools, defender, Windows firewall, security center, event viewer, file structure and paths, category view vs. classic view
- Upgrade paths – differences between in place upgrades, compatibility tools, Windows upgrade OS advisor

1.2 Given a scenario, install, and configure the operating system using the most appropriate method.

- Boot methods
 - USB
 - CD-ROM
 - DVD
 - PXE
- Type of installations
 - Creating image
 - Unattended installation
 - Upgrade
 - Clean install
 - Repair installation
 - Multiboot
 - Remote network installation
 - Image deployment
- Partitioning
 - Dynamic
 - Basic
 - Primary
 - Extended
 - Logical
- File system types/formatting
 - FAT
 - FAT32
 - NTFS
 - CDFS
 - Quick format vs. full format
- Load alternate third party drivers when necessary
- Workgroup vs. Domain setup
- Time/date/region/language settings
- Driver installation, software and windows updates
- Factory recovery partition

CompTIA A+ 220-802 Objectives

1.3 Given a scenario, use appropriate command line tools.

- Networking
 - PING
 - TRACERT
 - NETSTAT
 - IPCONFIG
 - NET
 - NSLOOKUP
 - NBTSTAT
- OS
 - TASKKILL
 - BOOTREC
 - SHUTDOWN
 - TASKLIST
 - MD
 - RD
 - CD
 - DEL
 - FDISK
 - FORMAT
 - COPY
 - XCOPY
 - ROBOCOPY
 - DISKPART
 - SFC
 - CHKDSK
 - [command name] /?
- Recovery console
 - Fixboot
 - Fixmbr

1.4 Given a scenario, use appropriate operating system features and tools.

- Administrative
 - Computer management
 - Device manager
 - Users and groups
 - Local security policy
 - Performance monitor
 - Services
 - System configuration
 - Task scheduler
 - Component services
 - Data sources
 - Print management
 - Windows memory diagnostics
 - Windows firewall
 - Advanced security
- MSCONFIG
 - General
 - Boot
 - Services
 - Startup
 - Tools
- Task Manager

CompTIA A+ 220-802 Objectives

- Applications
- Processes
- Performance
- Networking
- Users
- Disk management
 - Drive status
 - Mounting
 - Extending partitions
 - Splitting partitions
 - Assigning drive letters
 - Adding drives
 - Adding arrays
- Other
 - User State Migration tool (USMT), File and Settings Transfer Wizard, Windows Easy Transfer
- Run line utilities
 - MSCONFIG
 - REGEDIT
 - CMD
 - SERVICES.MSC
 - MMC
 - MSTSC
 - NOTEPAD
 - EXPLORER
 - MSINFO32
 - DXDIAG

1.5 Given a scenario, use Control Panel utilities (the items are organized by “classic view/large icons” in Windows).

- Common to all Microsoft Operating Systems
 - Internet options
 - Connections
 - Security
 - General
 - Privacy
 - Programs
 - Advanced
 - Display/Display Settings
 - Resolution
 - User accounts
 - Folder options
 - View hidden files
 - Hide extensions
 - General options
 - View options
 - System
 - Performance (virtual memory)
 - Remote settings
 - System protection
 - Windows firewall
 - Power options
 - Hibernate
 - Power plans

CompTIA A+ 220-802 Objectives

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- Sleep/suspend
 - Standby
- Unique to Windows XP
 - Add/remove programs
 - Network connections
 - Printers and faxes
 - Automatic updates
 - Network setup wizard
- Unique to Vista
 - Tablet PC settings
 - Pen and input devices
 - Offline files
 - Problem reports and solutions
 - Printers
- Unique to Windows 7
 - HomeGroup
 - Action Center
 - Security Center
 - Remote Applications and Desktop Connections
 - Troubleshooting

1.6 Setup and configure Windows networking on a client/desktop.

- HomeGroup, file/print sharing
- WorkGroup vs. domain setup
- Network shares/mapping drives
- Establish networking connections
 - VPN
 - Dialups
 - Wireless
 - Wired
 - WWAN (Cellular)
- Proxy settings
- Remote desktop
- Home vs. Work vs. Public network settings
- Firewall settings
 - Exceptions
 - Configuration
 - Enabling/disabling Windows firewall
- Configuring an alternative IP address in Windows
 - IP addressing
 - Subnet mask
 - DNS
 - Gateway
- Network card properties
 - Half duplex/full duplex/auto
 - Speed
 - Wake-on-LAN
 - QoS

1.7 Perform preventive maintenance procedures using appropriate tools.

- Best practices
 - Schedules backups
 - Scheduled check disks
 - Scheduled defragmentation

CompTIA A+ 220-802 Objectives

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- Windows updates
- Patch management
- Driver/firmware updates
- Antivirus updates
- Tools
 - Backup
 - System restore
 - Check disk
 - Recovery image
 - Defrag

1.8 Explain the differences among basic OS security settings.

- User and groups
 - Administrator
 - Power user
 - Guest
 - Standard user
- NTFS vs. Share permissions
 - Allow vs. deny
 - Moving vs. copying folders and files
 - File attributes
- Shared files and folders
 - Administrative shares vs. local shares
 - Permission propagation
 - Inheritance
- System files and folders
- User authentication
 - Single sign-on

1.9 Explain the basics of client-side virtualization.

- Purpose of virtual machines
- Resource requirements
- Emulator requirements
- Security requirements
- Network requirements
- Hypervisor

2.0 Security

2.1 Apply and use common prevention methods.

- Physical security
 - Lock doors
 - Tailgating
 - Securing physical documents/passwords/shredding
 - Biometrics
 - Badges
 - Key fobs
 - RFID badge
 - RSA token
 - Privacy filters
 - Retinal
- Digital security
 - Antivirus
 - Firewalls

CompTIA A+ 220-802 Objectives

- Antispyware
- User authentication/strong passwords
- Directory permissions
- User education
- Principle of least privilege
- 2.2 Compare and contrast common security threats.**
- Social engineering
- Malware
- Rootkits
- Phishing
- Shoulder surfing
- Spyware
- Viruses
 - Worms
 - Trojans
- 2.3 Implement security best practices to secure a workstation.**
- Setting strong passwords
- Requiring passwords
- Restricting user permissions
- Changing default user names
- Disabling guest account
- Screensaver required password
- Disable autorun
- 2.4 Given a scenario, use the appropriate data destruction/disposal method.**
- Low level format vs. standard format
- Hard drive sanitation and sanitation methods
 - Overwrite
 - Drive wipe
- Physical destruction
 - Shredder
 - Drill
 - Electromagnetic
 - Degaussing tool
- 2.5 Given a scenario, secure a SOHO wireless network.**
- Change default user-names and passwords
- Changing SSID
- Setting encryption
- Disabling SSID broadcast
- Enable MAC filtering
- Antenna and access point placement
- Radio power levels
- Assign static IP addresses
- 2.6 Given a scenario, secure a SOHO wired network.**
- Change default usernames and passwords
- Enable MAC filtering
- Assign static IP addresses
- Disabling ports
- Physical security

3.0 Mobile Devices

3.1 Explain the basic features of mobile operating systems.

- Android 4.0.x vs. iOS 5.x
 - Open source vs. closed source/vendor specific
 - App source (app store and market)
 - Screen orientation (accelerometer/gyroscope)
 - Screen calibration
 - GPS and geotracking

3.2 Establish basic network connectivity and configure email.

- Wireless / cellular data network (enable/disable)
- Bluetooth
 - Enable Bluetooth
 - Enable pairing
 - Find device for pairing
 - Enter appropriate pin code
 - Test connectivity
- Email configuration
 - Server address
 - POP3
 - IMAP
 - Port and SSL settings
 - Exchange
 - Gmail

3.3 Compare and contrast methods for securing mobile devices.

- Passcode locks
- Remote wipes
- Locator applications
- Remote backup applications
- Failed login attempts restrictions
- Antivirus
- Patching/OS updates

3.4 Compare and contrast hardware differences in regards to tablets and laptops.

- No field serviceable parts
- Typically not upgradeable
- Touch interface
 - Touch flow
 - Multitouch
- Solid state drives

3.5 Execute and configure mobile device synchronization.

- Types of data to synchronize
 - Contacts
 - Programs
 - Email
 - Pictures
 - Music
 - Videos
- Software requirements to install the application on the PC
- Connection types to enable synchronization

4.0 Troubleshooting

4.1 Given a scenario, explain the troubleshooting theory.

- Identify the problem
 - Question the user and identify user changes to computer and perform backups before making changes
- Establish a theory of probable cause (question the obvious)
- Test the theory to determine cause
 - Once theory is confirmed determine next steps to resolve problem
 - If theory is not confirmed re-establish new theory or escalate
- Establish a plan of action to resolve the problem and implement the solution
- Verify full system functionality and if applicable implement preventive measures
- Document findings, actions and outcomes

4.2 Given a scenario, troubleshoot common problems related to motherboards, RAM, CPU and power with appropriate tools.

- Common symptoms
 - Unexpected shutdowns
 - System lockups
 - POST code beeps
 - Blank screen on bootup
 - BIOS time and settings resets
 - Attempts to boot to incorrect device
 - Continuous reboots
 - No power
 - Overheating
 - Loud noise
 - Intermittent device failure
 - Fans spin – no power to other devices
 - Indicator lights
 - Smoke
 - Burning smell
 - BSOD
- Tools
 - Multimeter
 - Power supply tester
 - Loopback plugs
 - POST card

4.3 Given a scenario, troubleshoot hard drives and RAID arrays with appropriate tools.

- Common symptoms
 - Read/write failure
 - Slow performance
 - Loud clicking noise
 - Failure to boot
 - Drive not recognized
 - OS not found
 - RAID not found
 - RAID stops working
 - BSOD
- Tools
 - Screwdriver
 - External enclosures
 - CHKDSK

CompTIA A+ 220-802 Objectives

- FORMAT
- FDISK
- File recovery software

4.4 Given a scenario, troubleshoot common video and display issues.

- Common symptoms
 - VGA mode
 - No image on screen
 - Overheat shutdown
 - Dead pixels
 - Artifacts
 - Color patterns incorrect
 - Dim image
 - Flickering image
 - Distorted image
 - Discoloration (degaussing)
 - BSOD

4.5 Given a scenario, troubleshoot wired and wireless networks with appropriate tools.

- Common symptoms
 - No connectivity
 - APIPA address
 - Limited connectivity
 - Local connectivity
 - Intermittent connectivity
 - IP conflict
 - Slow transfer speeds
 - Low RF signal
- Tools
 - Cable tester
 - Loopback plug
 - Punch down tools
 - Toner probes
 - Wire strippers
 - Crimper
 - PING
 - IPCONFIG
 - TRACERT
 - NETSTAT
 - NBTSTAT
 - NET
 - Wireless locator

4.6 Given a scenario, troubleshoot operating system problems with appropriate tools.

- Common symptoms
 - BSOD
 - Failure to boot
 - Improper shutdown
 - Spontaneous shutdown/restart
 - RAID not detected during installation
 - Device fails to start
 - Missing dll message
 - Services fails to start
 - Compatibility error
 - Slow system performance
 - Boots to safe mode

CompTIA A+ 220-802 Objectives

- File fails to open
- Missing NTLDR
- Missing Boot.ini
- Missing operating system
- Missing Graphical Interface
- Graphical Interface fails to load
- Invalid boot disk
- Tools
 - Fixboot
 - Recovery console
 - Fixmbr
 - Sfc
 - Repair disks
 - Pre-installation environments
 - MSCONFIG
 - DEFRAG
 - REGSRV32
 - REGEDIT
 - Event viewer
 - Safe mode
 - Command prompt
 - Emergency repair disk
 - Automated system recovery

4.7 Given a scenario, troubleshoot common security issues with appropriate tools and best practices.

- Common symptoms
 - Pop-ups
 - Browser redirection
 - Security alerts
 - Slow performance
 - Internet connectivity issues
 - PC locks up
 - Windows updates failures
 - Rogue antivirus
 - Spam
 - Renamed system files
 - Files disappearing
 - File permission changes
 - Hijacked email
 - Access denied
- Tools
 - Anti-virus software
 - Anti-malware software
 - Anti-spyware software
 - Recovery console
 - System restore
 - Pre-installation environments
 - Event viewer
- Best practices for malware removal
 - Identify malware symptoms
 - Quarantine infected system
 - Disable system restore
 - Remediate infected systems

CompTIA A+ 220-802 Objectives

- Update anti-virus software
 - Scan and removal techniques (safe mode, pre-installation environment)
- Schedule scans and updates
- Enable system restore and create restore point
- Educate end user

4.8 Given a scenario, troubleshoot, and repair common laptop issues while adhering to the appropriate procedures.

- Common symptoms
 - No display
 - Dim display
 - Flickering display
 - Sticking keys
 - Intermittent wireless
 - Battery not charging
 - Ghost cursor
 - No power
 - Num lock indicator lights
 - No wireless connectivity
 - No Bluetooth connectivity
 - Cannot display to external monitor
- Disassembling processes for proper re-assembly
 - Document and label cable and screw locations
 - Organize parts
 - Refer to manufacturer documentation
 - Use appropriate hand tools

4.9 Given a scenario, troubleshoot printers with appropriate tools

- Common symptoms
 - Streaks
 - Faded prints
 - Ghost images
 - Toner not fused to the paper
 - Creased paper
 - Paper not feeding
 - Paper jam
 - No connectivity
 - Garbled characters on paper
 - Vertical lines on page
 - Backed up print queue
 - Low memory errors
 - Access denied
 - Printer will not print
 - Color prints in wrong print color
 - Unable to install printer
 - Error codes
- Tools
 - Maintenance kit
 - Toner vacuum
 - Compressed air
 - Printer spooler

CompTIA A+ Acronyms

Introduction

The following is a list of acronyms which appear on the CompTIA A+ exams. 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.

ACRONYM	SPELLED OUT
AC	alternating current
ACL	access control list
ACPI	advanced configuration power interface
ACT	activity
ADSL	asymmetrical digital subscriber line
AGP	accelerated graphics port
AMD	advanced micro devices
APIPA	automatic private internet protocol addressing
APM	advanced power management
ARP	address resolution protocol
ASR	automated system recovery
ATA	advanced technology attachment
ATAPI	advanced technology attachment packet interface
ATM	asynchronous transfer mode
ATX	advanced technology extended
A/V	Audio Video
BIOS	basic input/output system
BNC	Bayonet-Neill-Concelman or British Naval Connector
BTX	balanced technology extended
CAPTCHA	Completely Automated Public Turing Test To Tell Computers and Humans Apart
CCFL	Cold Cathode Fluorescent Lamp
CD	compact disc
CD-ROM	compact disc-read-only memory
CD-RW	compact disc-rewritable
CDFS	compact disc file system
CFS	Central File System, Common File System, Command File System
CMOS	complementary metal-oxide semiconductor
CNR	Communications and Networking Riser
COMx	communication port (x=port number)
CPU	central processing unit
CRIMM	Continuity Rambus Inline Memory Mode
CRT	cathode-ray tube
DAC	discretionary access control

CompTIA A+ 220-802 Objectives

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DB-25	serial communications D-shell connector, 25 pins
DB-9	9 pin D shell connector
DC	direct current
DDOS	distributed denial of service
DDR	double data-rate
DDR RAM	double data-rate random access memory
DDR SDRAM	double data-rate synchronous dynamic random access memory
DFS	distributed file system
DHCP	dynamic host configuration protocol
DIMM	dual inline memory module
DIN	Deutsche Industrie Norm
DIP	dual inline package
DLT	digital linear tape
DLP	digital light processing
DMA	direct memory access
DMZ	demilitarized zone
DNS	domain name service or domain name server
DOS	denial of service
DRAM	dynamic random access memory
DSL	digital subscriber line
DVD	digital video disc or digital versatile disc
DVD-RAM	digital video disc-random access memory
DVD-ROM	digital video disc-read only memory
DVD-R	digital video disc-recordable
DVD-RW	digital video disc-rewritable
DVI	digital visual interface
ECC	error correction code
ECP	extended capabilities port
EEPROM	electrically erasable programmable read-only memory
EFS	encrypting file system
EIDE	enhanced integrated drive electronics
EMI	electromagnetic interference
EMP	electromagnetic pulse
EPROM	erasable programmable read-only memory
EPP	enhanced parallel port
ERD	emergency repair disk
ESD	electrostatic discharge
EVGA	extended video graphics adapter/array
EVDO	evolution data optimized or evolution data only
FAT	file allocation table
FAT12	12-bit file allocation table
FAT16	16-bit file allocation table

CompTIA A+ 220-802 Objectives

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FAT32	32-bit file allocation table
FDD	floppy disk drive
Fn	Function (referring to the function key on a laptop)
FPM	fast page-mode
FRU	field replaceable unit
FSB	Front Side Bus
FTP	file transfer protocol
FQDN	fully qualified domain name
Gb	gigabit
GB	gigabyte
GDI	graphics device interface
GHz	gigahertz
GUI	graphical user interface
GPS	global positioning system
GSM	global system for mobile communications
HAL	hardware abstraction layer
HAV	Hardware Assisted Virtualization
HCL	hardware compatibility list
HDD	hard disk drive
HDMI	high definition media interface
HPFS	high performance file system
HTML	hypertext markup language
HTPC	Home Theater PC
HTTP	hypertext transfer protocol
HTTPS	hypertext transfer protocol over secure sockets layer
I/O	input/output
ICMP	internet control message protocol
ICR	intelligent character recognition
IDE	integrated drive electronics
IDS	Intrusion Detection System
IEEE	Institute of Electrical and Electronics Engineers
IIS	Internet Information Services
IMAP	internet mail access protocol
IP	internet protocol
IPCONFIG	internet protocol configuration
IPP	internet printing protocol
IPSEC	internet protocol security
IR	infrared
IrDA	Infrared Data Association
IRQ	interrupt request
ISA	industry standard architecture
ISDN	integrated services digital network

CompTIA A+ 220-802 Objectives

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ISO	Industry Standards Organization
ISP	internet service provider
JBOD	just a bunch of disks
Kb	kilobit
KB	Kilobyte or knowledge base
LAN	local area network
LBA	logical block addressing
LC	Lucent connector
LCD	liquid crystal display
LDAP	lightweight directory access protocol
LED	light emitting diode
Li-on	lithium-ion
LPD/LPR	line printer daemon / line printer remote
LPT	line printer terminal
LVD	low voltage differential
MAC	media access control / mandatory access control
MAPI	messaging application programming interface
MAU	media access unit, media attachment unit
Mb	megabit
MB	megabyte
MBR	master boot record
MBSA	Microsoft Baseline Security Analyzer
MFD	multi-function device
MHz	megahertz
MicroDIMM	micro dual inline memory module
MIDI	musical instrument digital interface
MIME	multipurpose internet mail extension
MIMO	Multiple Input Multiple Output
MMC	Microsoft management console
MMX	multimedia extensions
MP3	Moving Picture Experts Group Layer 3 Audio
MP4	Moving Picture Experts Group Layer 4
MPEG	Moving Picture Experts Group
MSCONFIG	Microsoft configuration
MSDS	material safety data sheet
MUI	multilingual user interface
NAC	network access control
NAS	network-attached storage
NAT	network address translation
NetBIOS	networked basic input/output system
NetBEUI	networked basic input/output system extended user interface
NFS	network file system

CompTIA A+ 220-802 Objectives

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NIC	network interface card
NiCd	nickel cadmium
NiMH	nickel metal hydride
NLX	new low-profile extended
NNTP	network news transfer protocol
NTFS	new technology file system
NTLDR	new technology loader
NTP	Network Time Protocol
OCR	optical character recognition
OEM	original equipment manufacturer
OLED	Organic Light Emitting Diode
OS	operating system
PAN	personal area network
PATA	parallel advanced technology attachment
PC	personal computer
PCI	peripheral component interconnect
PCIe	peripheral component interconnect express
PCIX	peripheral component interconnect extended
PCL	printer control language
PCMCIA	Personal Computer Memory Card International Association
PDA	personal digital assistant
PGA	pin grid array
PGA2	pin grid array 2
PII	Personally Identifiable Information
PIN	personal identification number
PKI	public key infrastructure
PnP	plug and play
PoE	Power over Ethernet
POP3	post office protocol 3
PoS	Point of Sale
POST	power-on self test
POTS	plain old telephone service
PPP	point-to-point protocol
PPTP	point-to-point tunneling protocol
PRI	primary rate interface
PROM	programmable read-only memory
PS/2	personal system/2 connector
PSTN	public switched telephone network
PSU	power supply unit
PVC	permanent virtual circuit
PXE	preboot execution environment
QoS	quality of service

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RAID	redundant array of independent (or inexpensive) discs
RAM	random access memory
RAS	remote access service
RDRAM	RAMBUS® dynamic random access memory
RDP	Remote Desktop Protocol
RF	radio frequency
RFI	radio frequency interference
RGB	red green blue
RIMM	RAMBUS® inline memory module
RIP	routing information protocol
RIS	remote installation service
RISC	reduced instruction set computer
RJ	registered jack
RJ-11	registered jack function 11
RJ-45	registered jack function 45
RMA	returned materials authorization
ROM	read only memory
RS-232 or RS-232C	recommended standard 232
RTC	real-time clock
SAN	storage area network
SAS	Serial Attached SCSI
SATA	serial advanced technology attachment
SC	subscription channel
SCP	secure copy protection
SCSI	small computer system interface
SCSI ID	small computer system interface identifier
SD card	secure digital card
SDRAM	synchronous dynamic random access memory
SEC	single edge connector
SFC	system file checker
SFF	Small Form Factor
SGRAM	synchronous graphics random access memory
SIMM	single inline memory module
SLI	scalable link interface
S.M.A.R.T.	self-monitoring, analysis, and reporting technology
SMB	server message block or small to midsize business
SMTP	simple mail transfer protocol
SNMP	simple network management protocol
SoDIMM	small outline dual inline memory module
SOHO	small office/home office
SP	service pack
SP1	service pack 1

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SP2	service pack 2
SP3	service pack 3
SP4	service pack 4
SPDIF	Sony-Philips digital interface format
SPGA	staggered pin grid array
SRAM	static random access memory
SSH	secure shell
SSID	service set identifier
SSL	secure sockets layer
ST	straight tip
STP	shielded twisted pair
SVGA	super video graphics array
SXGA	super extended graphics array
TB	terabyte
TCP	transmission control protocol
TCP/IP	transmission control protocol/internet protocol
TDR	time domain reflectometer
TFTP	trivial file transfer protocol
TKIP	Temporal Key Integrity Protocol
TPM	trusted platform module
TSR	Terminate and stay resident
UAC	user account control
UART	universal asynchronous receiver transmitter
UDMA	ultra direct memory access
UDP	user datagram protocol
UNC	universal naming convention
UPS	uninterruptible power supply
URL	uniform resource locator
USB	universal serial bus
USMT	user state migration tool
UTP	unshielded twisted pair
UXGA	ultra extended graphics array
VESA	Video Electronics Standards Association
VFAT	virtual file allocation table
VGA	video graphics array
VM	Virtual Machine
VoIP	voice over internet protocol
VPN	virtual private network
VRAM	video random access memory
WAN	wide area network
WAP	wireless application protocol
WEP	wired equivalent privacy

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WHRD	Windows hardware qualified driver
WIFI	wireless fidelity
WINS	windows internet name service
WLAN	wireless local area network
WOL	Wake on LAN
WPA	wireless protected access
WUXGA	wide ultra extended graphics array
XGA	extended graphics array
ZIF	zero-insertion-force
ZIP	zigzag inline package

A+ Proposed Hardware and Software List

** CompTIA has included this sample list of hardware and software to assist candidates as they prepare for the A+ 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.

Equipment

- iPad tablet
- Android tablet
- Laptop
- Desktop
- Monitors
- SOHO Router/switch
- Access point
- Printer (laser/wireless)
- Power strips
- Surge suppressor
- UPS

Spare parts/hardware

- Motherboards
- RAM
- Hard drives
- Power supplies

CompTIA A+ 220-802 Objectives

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- Video cards
- Sounds cards
- Network cards
- Wireless NICs
- Fans/cooling devices
- CPUs
- Connectors/cables
- Adapters
- Network cables/connectors
- AC adapters
- Optical drives
- Jumpers/screws/stand-offs
- Cases
- Bulk cable
- Maintenance kit

Tools

- Screw drivers
- Multimeter
- Wire cutters
- Punchdown tool
- Crimper
- Power supply tester
- Cable stripper
- POST cards
- Standard technician toolkit
- ESD strap

Software

- Operating system disks (WinXP, Vista, Windows 7)
- Antivirus software
- Virtualization software
- Anti-malware
- Driver software
- Anti-spyware

CompTIA A+ 220-802 Objectives

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Operating System Fundamentals



- **Personal Computer Operating Systems**
- **Windows Control Panel Utilities**
- **Command Line Tools**
- **Windows Security Settings**
- **Windows Operating System Tools**

OV 2 - 1

Microsoft Windows



- **Most popular desktop and server OS**
- **All versions feature:**
 - Graphical user interface
 - Wide application and device support
 - Minimum 32-bit processing
 - Native networking
 - Built-in accessories
- **Often preinstalled**
- **Current three versions found deployed:**
 - Windows 7
 - Windows Vista
 - Windows XP



OV 2 - 2

Microsoft Windows Features

- Aero
- Gadgets
- BitLocker
- Shadow Copy
- System restore
- ReadyBoost
- Sidebar
- Compatibility Mode
- XP Mode
- Defender
- Category view vs. classic view

OV 2 - 3

Microsoft Windows 7 Versions

- Windows 7 Starter
- Windows 7 Home Premium
- Windows 7 Professional
- Windows 7 Enterprise
- Windows 7 Ultimate



OV 2 - 4

Microsoft Windows Vista Versions

- **Windows Vista Home Basic**
- **Windows Vista Home Premium**
- **Windows Vista Business**
- **Windows Vista Enterprise**
- **Windows Vista Ultimate**



OV 2 - 5

Microsoft Windows XP Versions

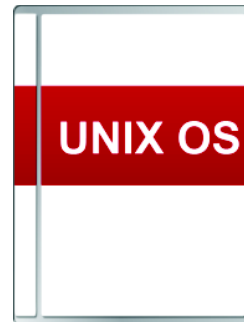
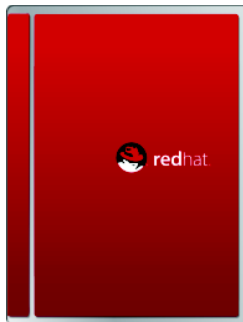
- **Windows XP Professional**
- **Windows XP Home Edition**
- **Windows XP Media Center Edition**
- **Windows XP Professional x64 Edition**



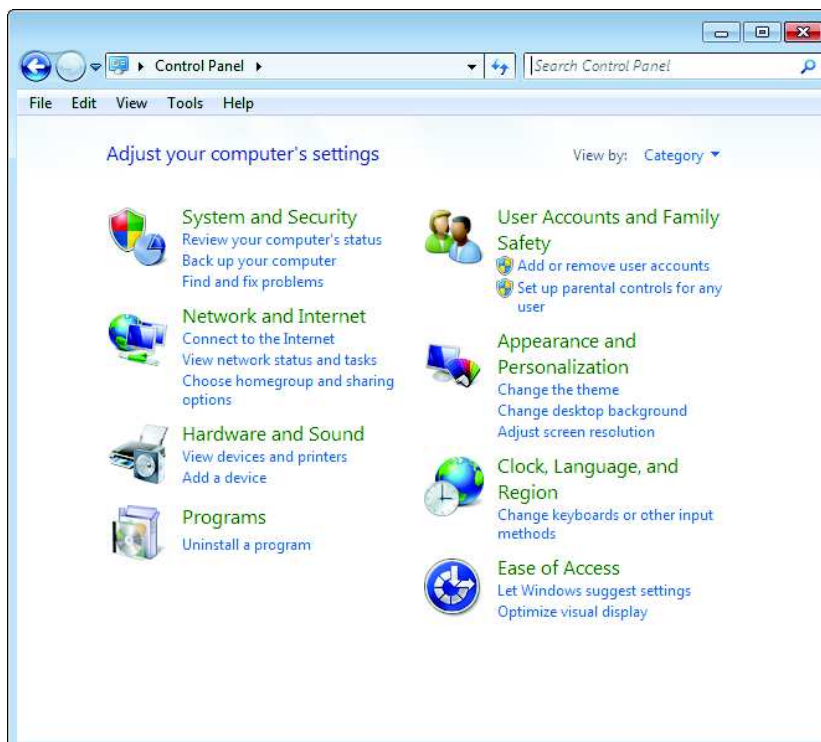
OV 2 - 6

Other Operating Systems

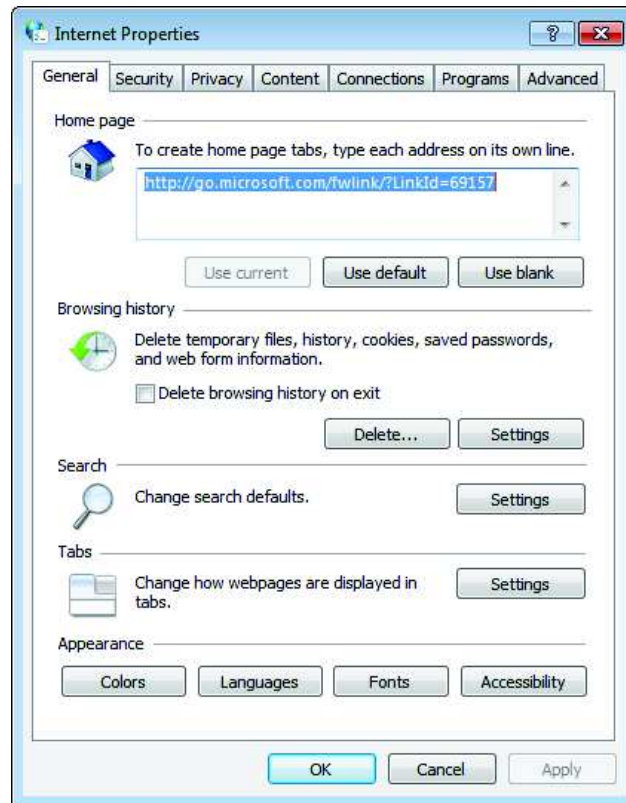
- Apple OS X
- Unix
- Linux



The Control Panel

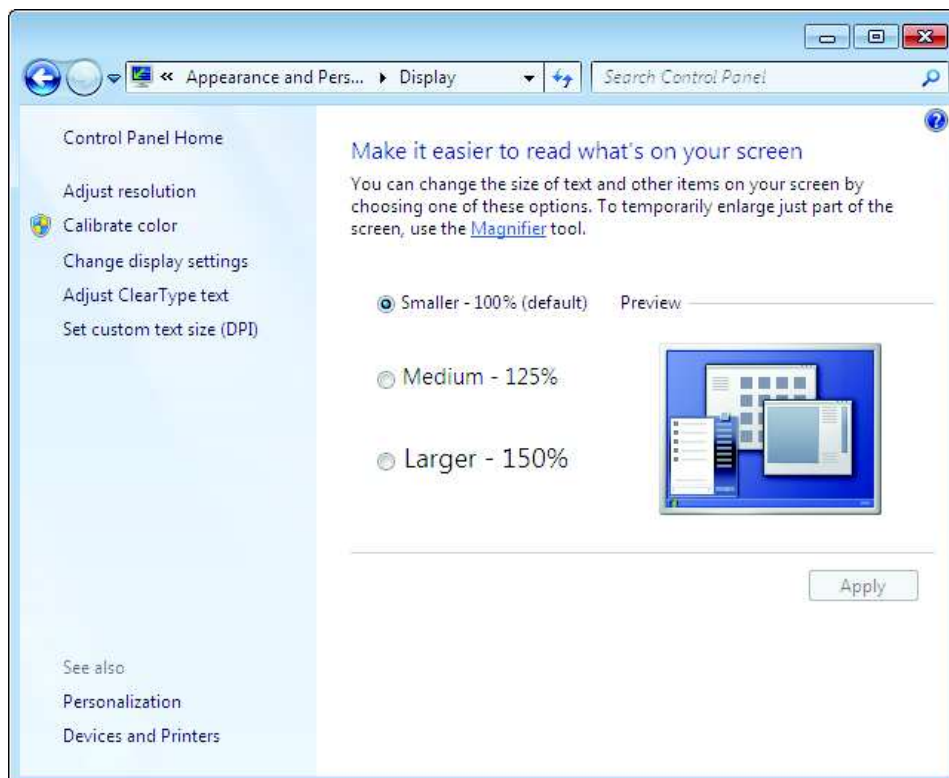


Internet Options

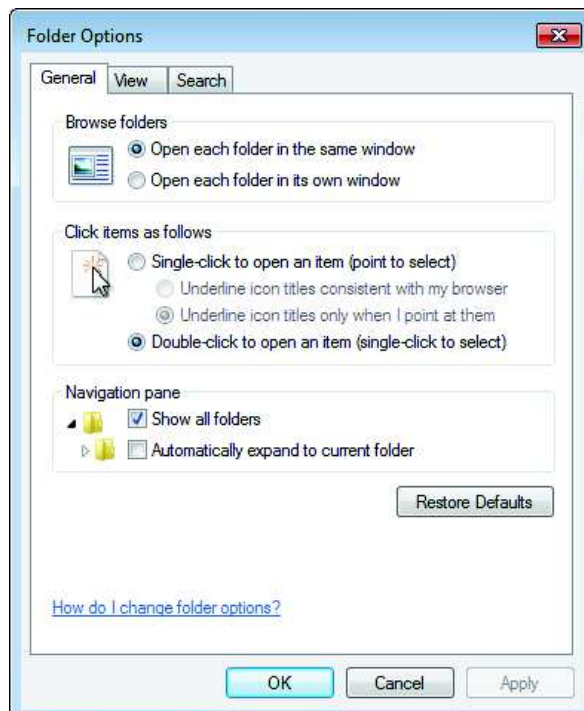
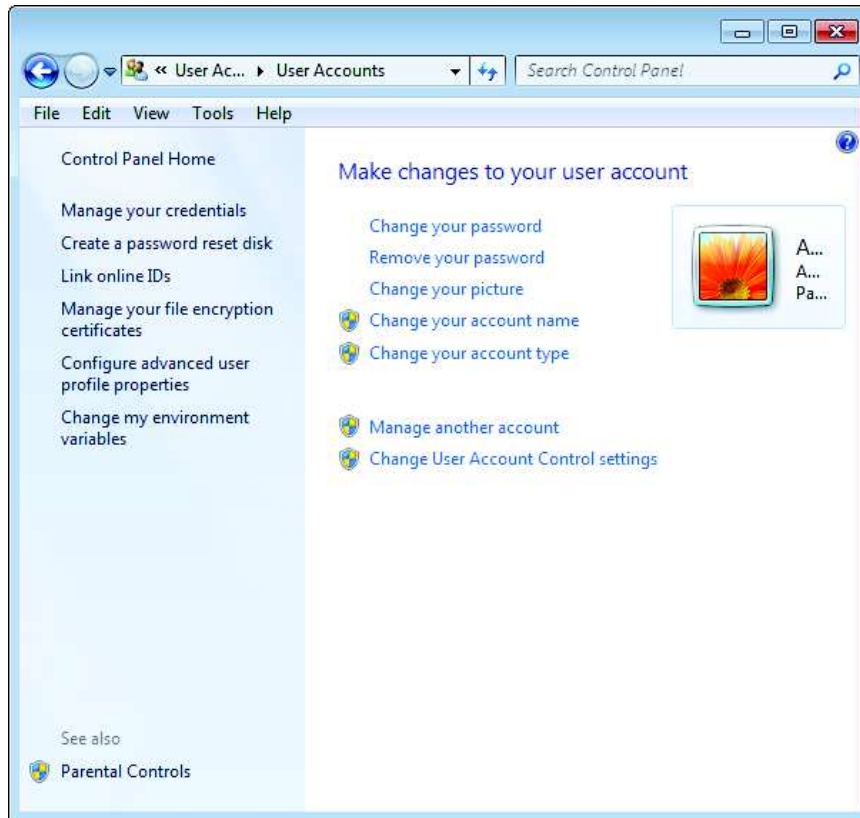


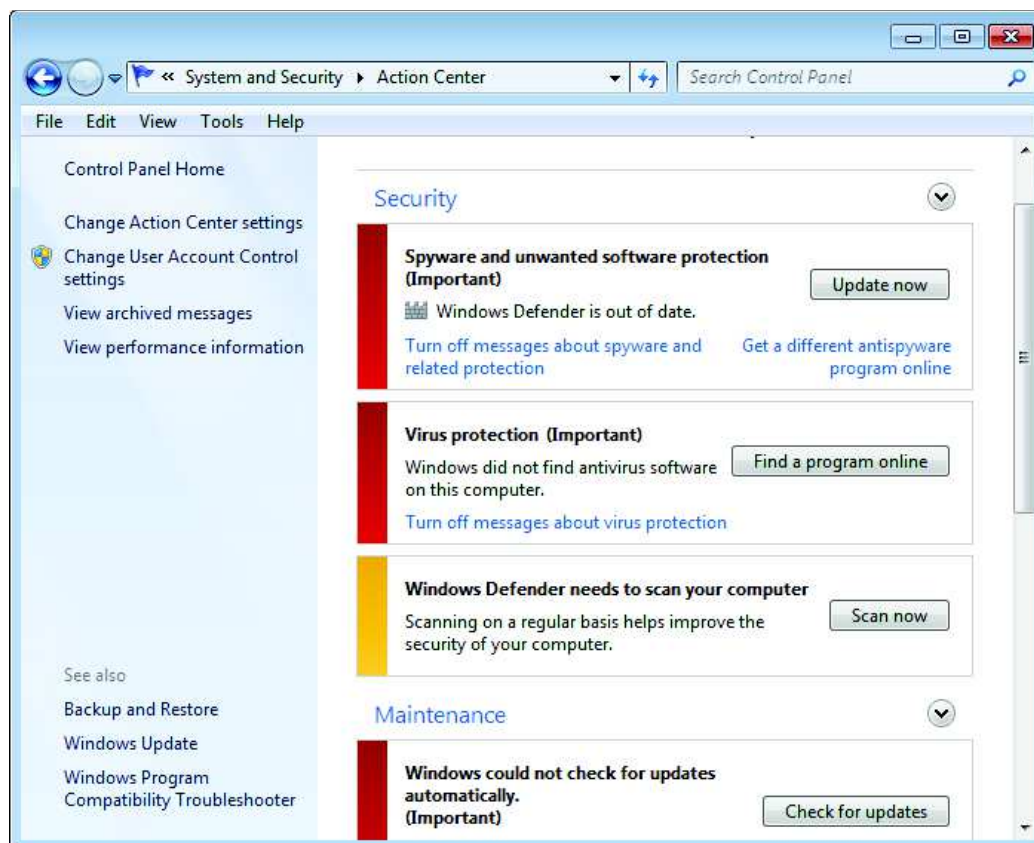
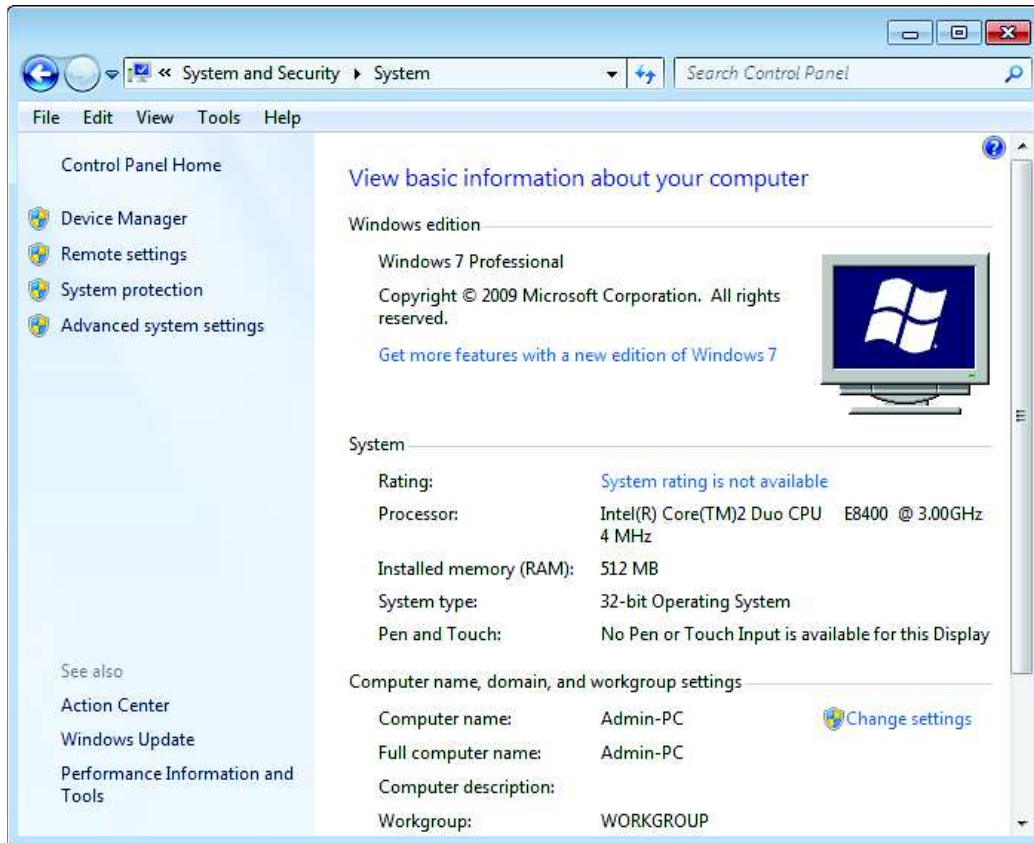
OV 2 - 9

Display

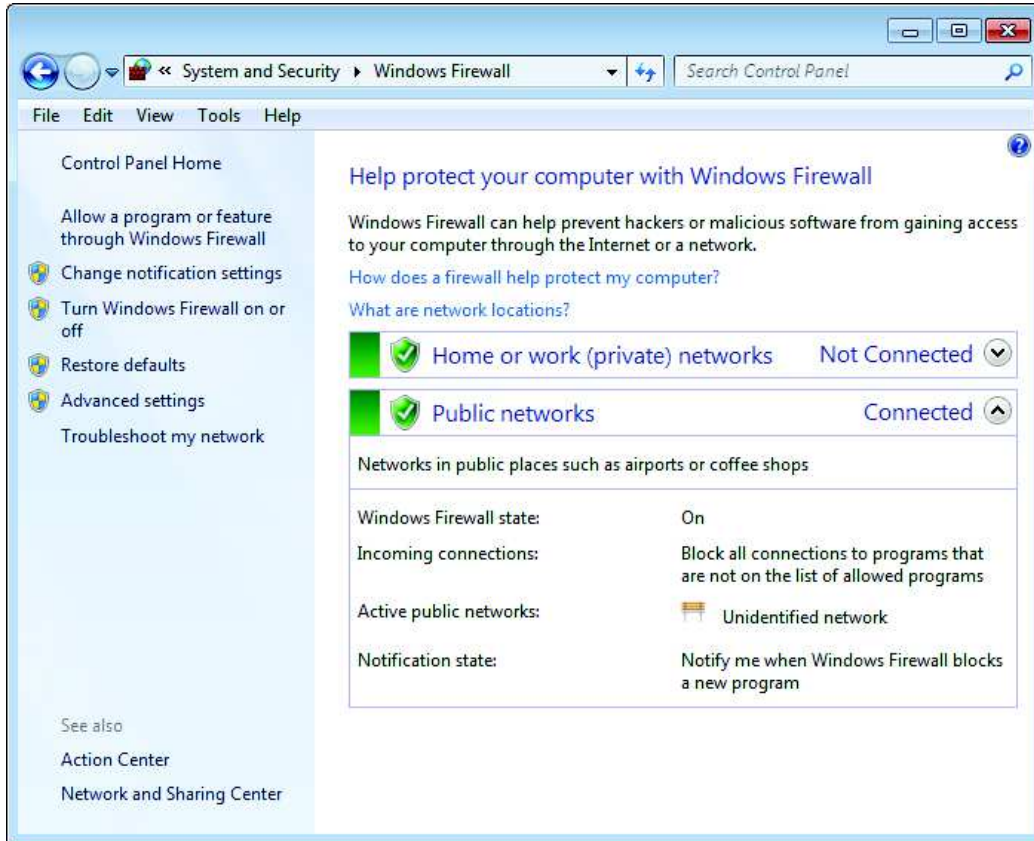


OV 2 - 10

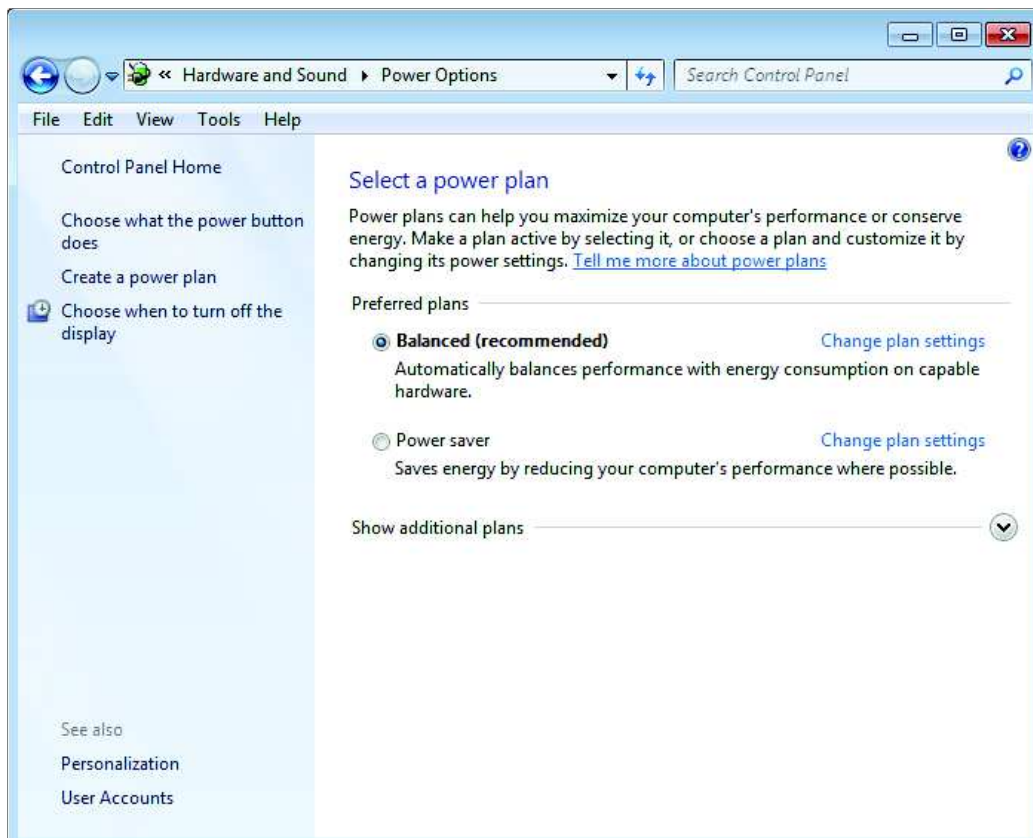




Windows Firewall

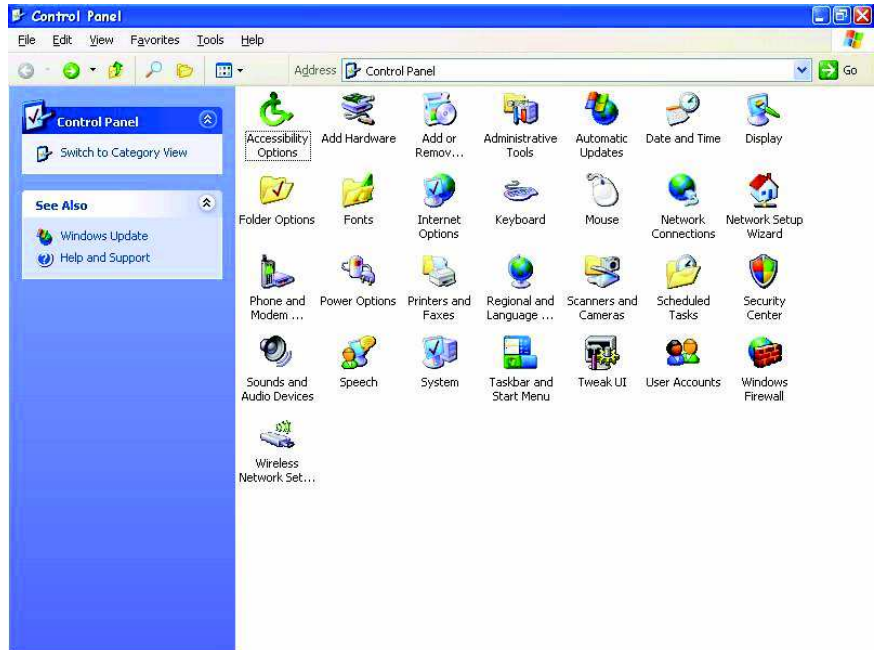


Power Options



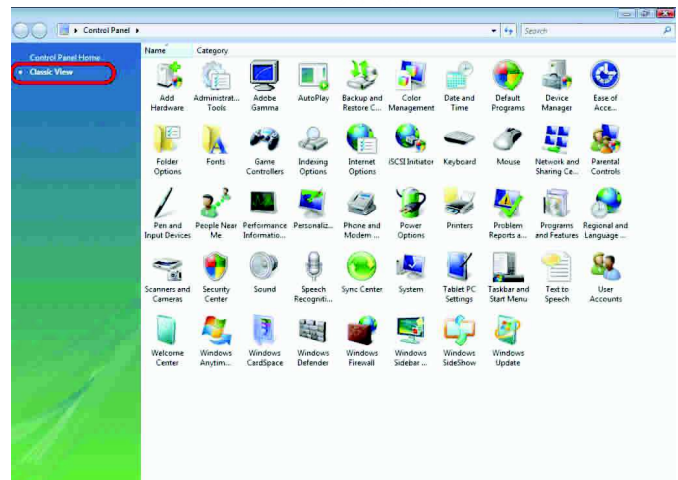
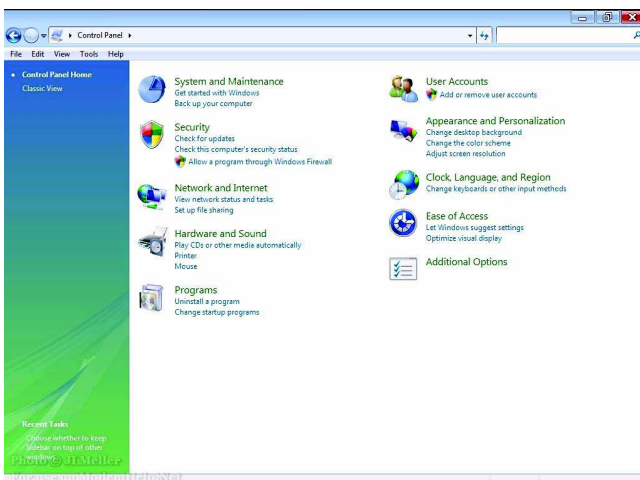
Windows XP Control Panel Utilities

- Add or Remove Programs
- Network Connections
- Printers and Faxes
- Automatic Updates
- Network Setup Wizard



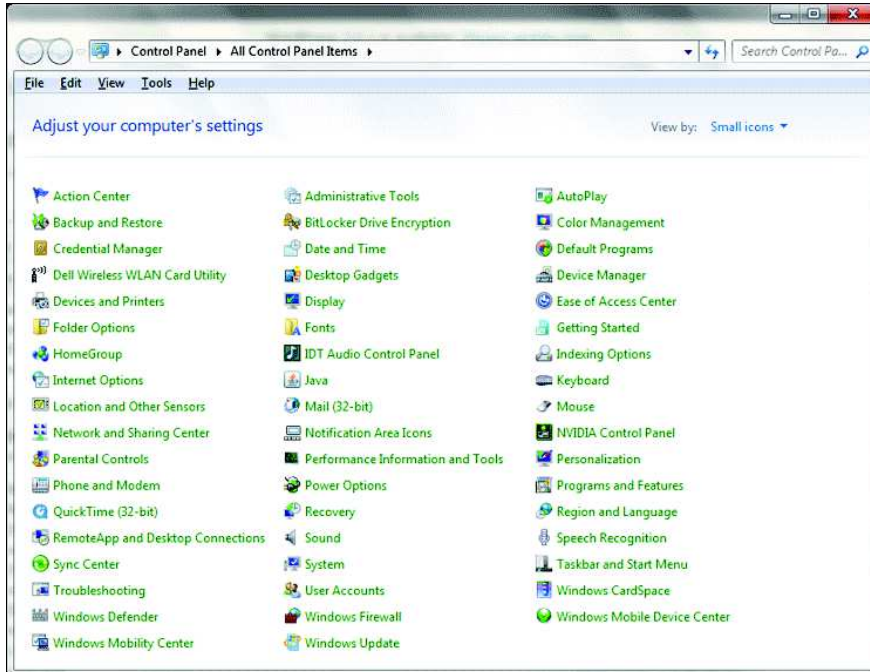
Windows Vista Control Panel Utilities

- Tablet PC Settings
- Pen and Input Devices
- Offline Files
- Problem Reports and Solutions
- Printers



Windows 7 Control Panel Utilities

- HomeGroup
- Action Center
- RemoteApp and Desktop Connections
- Troubleshooting



The Command Prompt

The screenshot shows a Windows Command Prompt window titled "C:\WINDOWS\system32\cmd.exe". The window displays the following text:

```
C:\WINDOWS>cd \  
C:\>dir  
Volume in drive C has no label.  
Volume Serial Number is 1079-2CGB  
  
Directory of C:\  
  
09/12/2006 03:06 PM          0 AUTOEXEC.BAT  
09/12/2006 03:06 PM          0 CONFIG.SYS  
09/22/2006 11:48 AM          <DIR>      data  
09/12/2006 03:17 PM          <DIR>      Documents and Settings  
09/22/2006 11:43 AM          <DIR>      Program Files  
09/22/2006 11:43 AM          <DIR>      WINDOWS  
                2 File(s)          0 bytes  
                4 Dir(s)      833,118,208 bytes free
```

Annotations on the left side of the screenshot:

- Text-Based Commands**: Points to the initial directory listing command and output.
- Text-Input**: Points to the command `C:\>ren data documents`.
- Text-Output**: Points to the updated directory listing output showing the new folder name "documents".

Operating System Command Line Tools



- bootrec
- cd
- chkdsk
- [command name] /?
- copy
- del
- diskpart
- fdisk
- format
- kill
- md
- rd
- robocopy
- sfc
- shutdown
- tlist
- xcopy

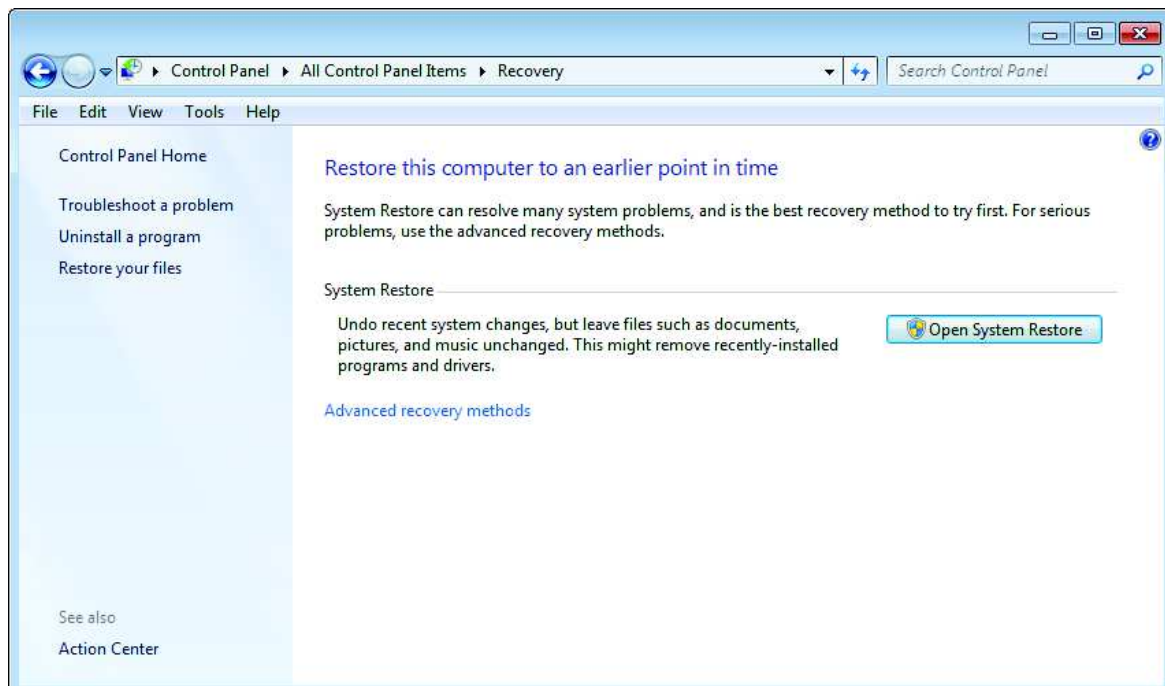
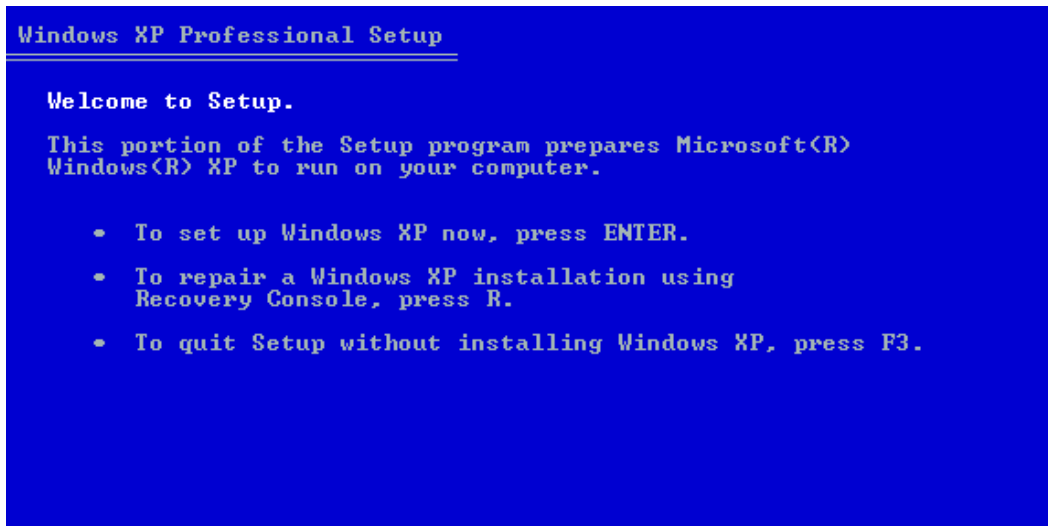
OV 2 - 21

Networking Command Line Tools



- ipconfig
- ping
- nbstat
- net
- netstat
- nslookup
- tracert

OV 2 - 22



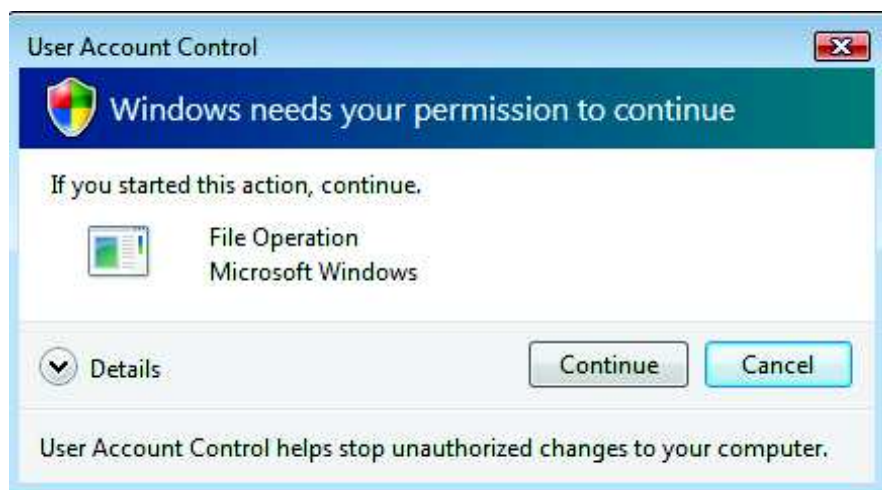
Types of User Accounts

- **Administrator:** Complete administrative access
- **Power User:** More authorization than standard non-privileged users
- **Standard User:** Can use most software on computer
- **Guest:** Limited computer access



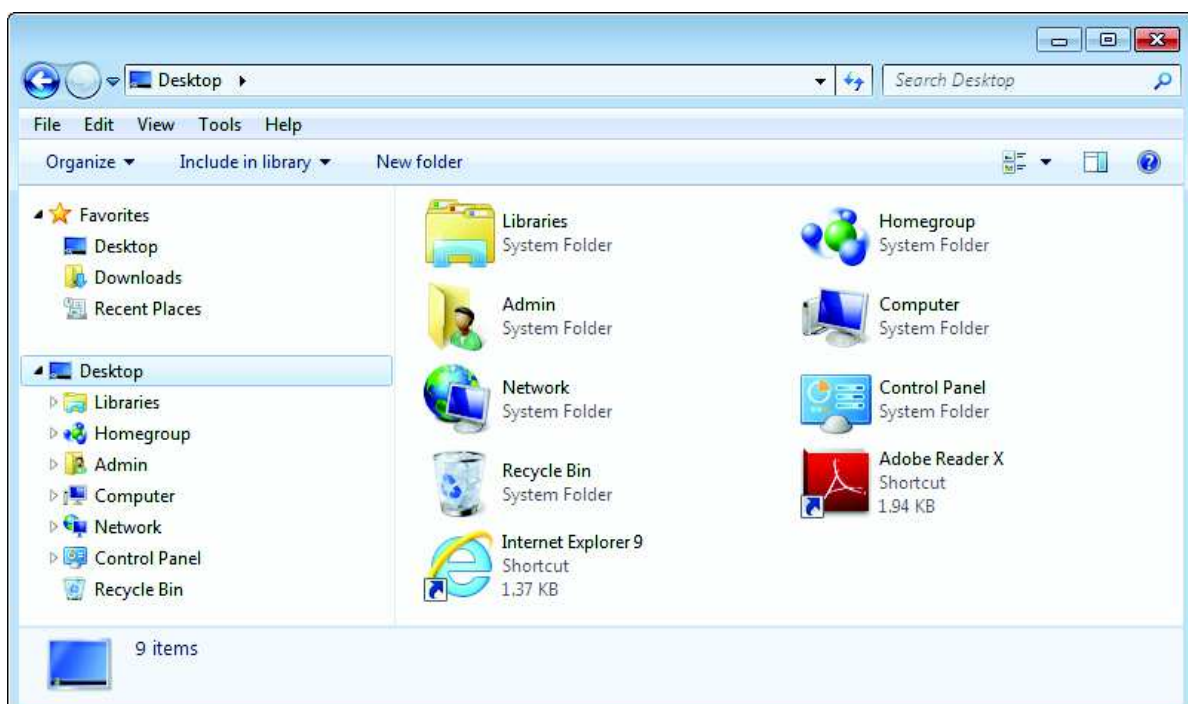
OV 2 - 25

User Account Control

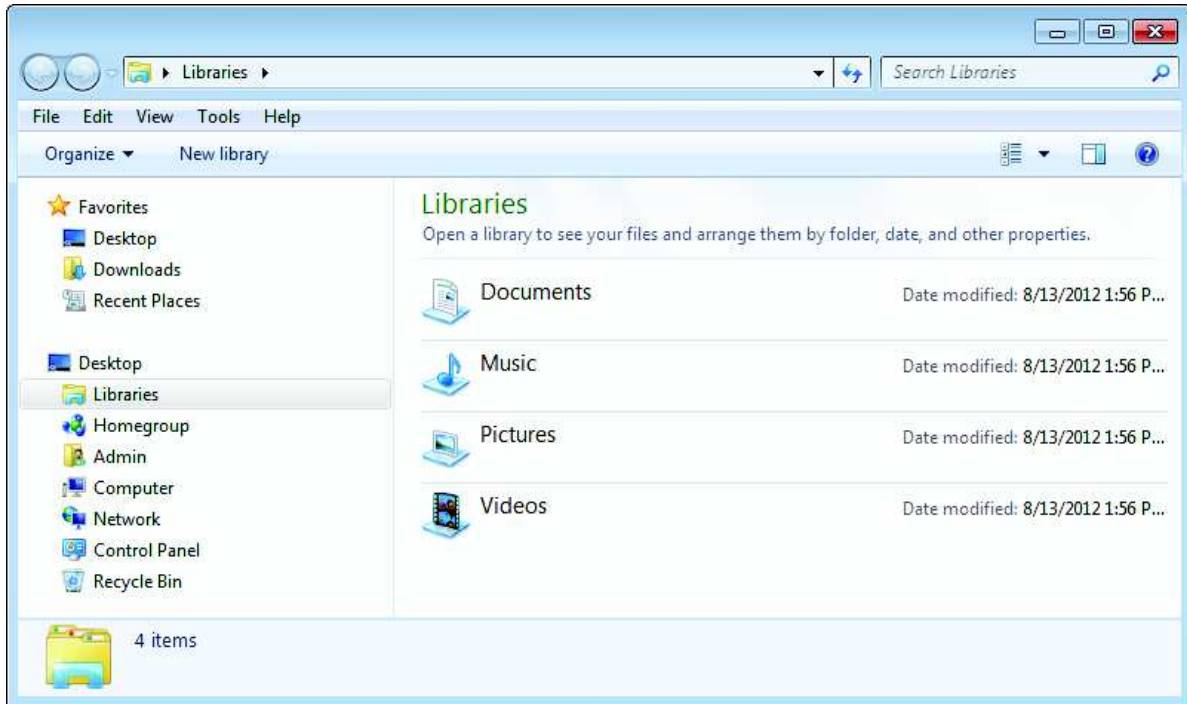


OV 2 - 26

- **Administrators**
- **Power Users**
- **Standard Users**
- **Guests**

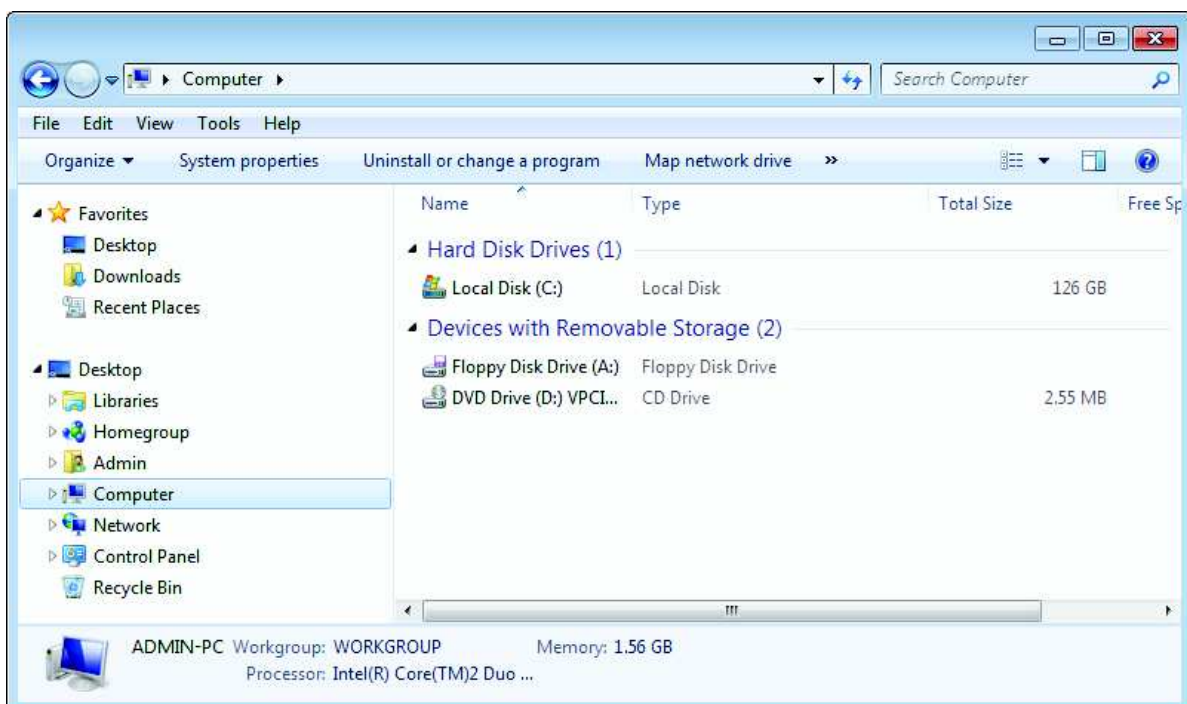


Windows Explorer



OV 2 - 29

Computer/My Computer



OV 2 - 30

File Extensions



- .txt
- .rtf
- .doc
- .bat
- .bin
- .com
- .exe
- .dll
- .hlp, .chm
- .htm, .html
- .inf
- .ini
- .msi
- .sys
- .tif, .jpg, .jpeg, .gif, .bmp, .png
- .xls, .ppt, .mdb

OV 2 - 31

File Attributes



- **Archive (A)**
- **Hidden (H)**
- **Read-Only (R)**
- **System (S)**
- **Index (I)**

OV 2 - 32

Windows File System Types



- **FAT:** Floppy disks, very small drives
- **FAT32:** Enhanced for larger drives
- **NTFS:** Recommended for Windows-based computers
- **Media file systems:** Such as CDFS



FAT/FAT32



NTFS



Media File Systems

Permissions



NTFS File Permissions

- Read
- Write
- Read & Execute
- Modify
- Full Control



OV 2 - 35

NTFS Folder Permissions

- List Folder Contents
- Read
- Write
- Read & Execute
- Modify
- Full Control



OV 2 - 36



- **Shares include:**
 - Folders
 - Printers
 - Drives
- **Administrative shares**
- **Local shares**



Permission	Description
Read	<ul style="list-style-type: none">• View file and subfolder names, contents, attributes• Run program files• Granted to Everyone by default
Change	<ul style="list-style-type: none">• Perform all Read permission tasks• Add, change, delete files and subfolders
Full Control	<ul style="list-style-type: none">• Perform all Read and Change tasks• Change permissions

NTFS vs. Share Permissions



- **NTFS permissions:** Apply to actions users can take on files and folders on locally or on the network
- **Share permissions:** Apply to folders, subfolders, and files that have been shared with other users and are accessed on the network
- Both NTFS and share permissions can be applied to the same file or folder
- The most restrictive permission will apply

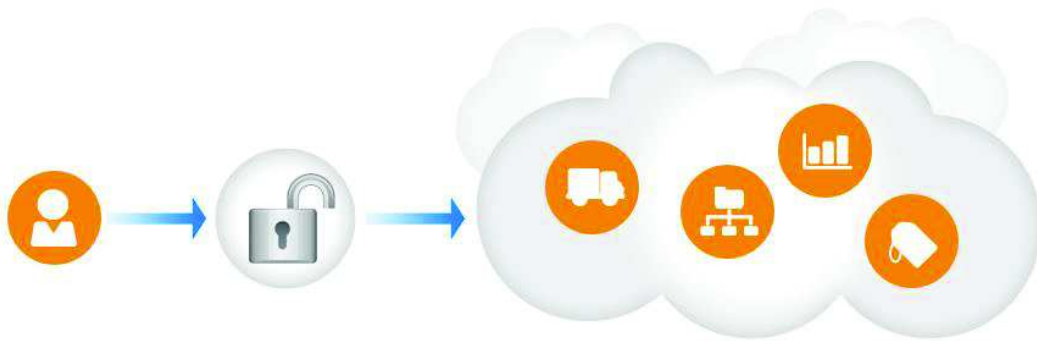
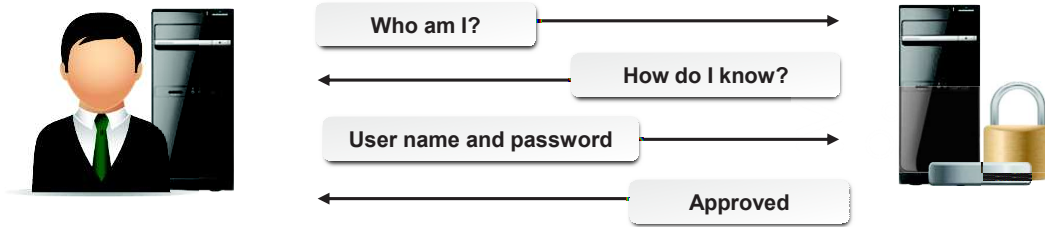
OV 2 - 39

Permissions Considerations



- **Allow vs. Deny**
- **Moving files and folders vs. copying files and folders**
- **File attributes**

OV 2 - 40

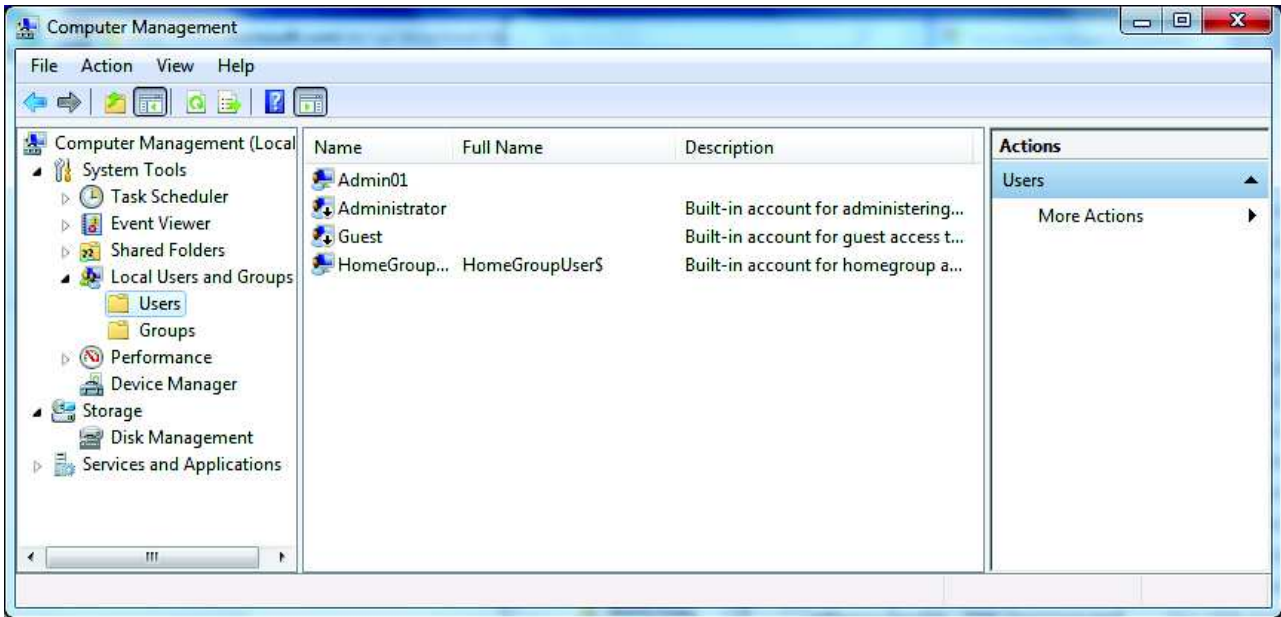


OV 2 - 41

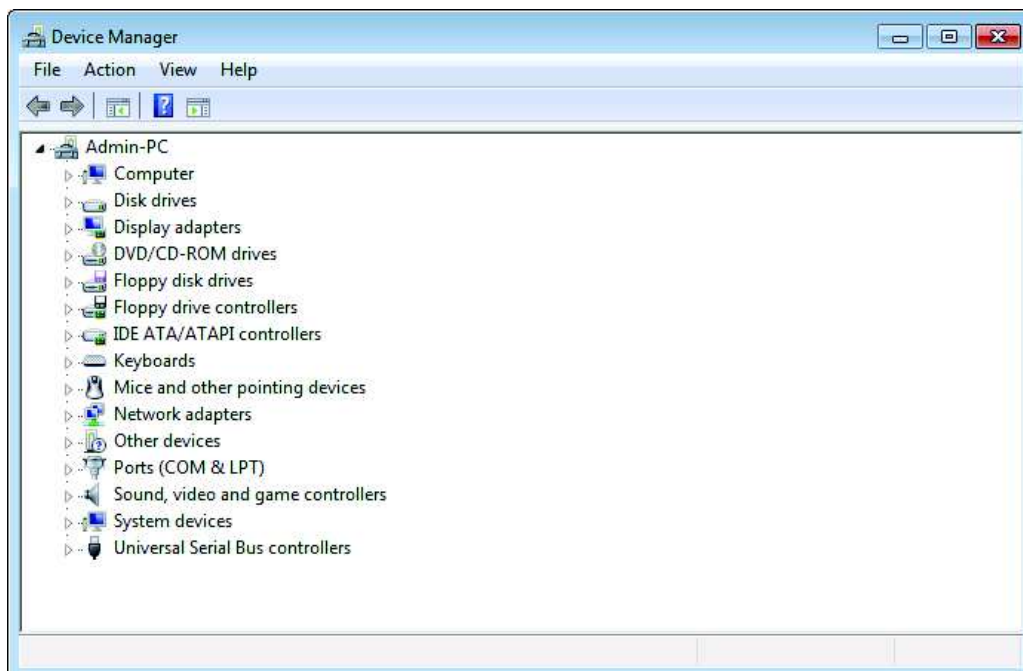
- **Component Services**
- **Computer Management**
- **Data Sources (ODBC)**
- **Event Viewer**
- **iSCSI Initiator**
- **Local Security Policy**
- **Performance Monitor**
- **Print Management**
- **Services**
- **System Configuration**
- **Task Scheduler**
- **Windows Firewall with Advanced Security**
- **Windows Memory Diagnostic**

OV 2 - 42

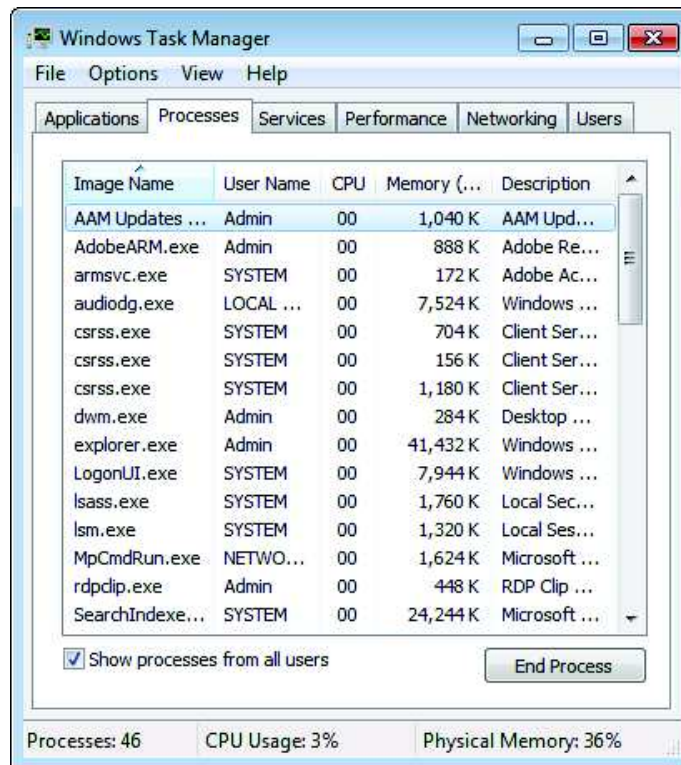
Local Users and Groups



Device Manager

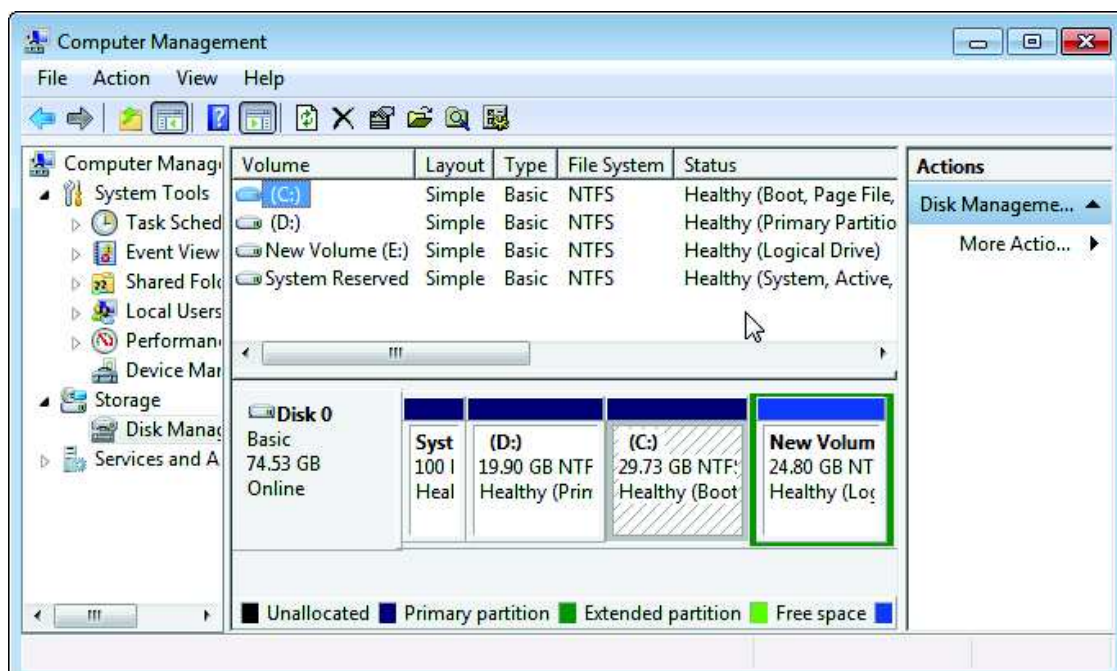


Task Manager



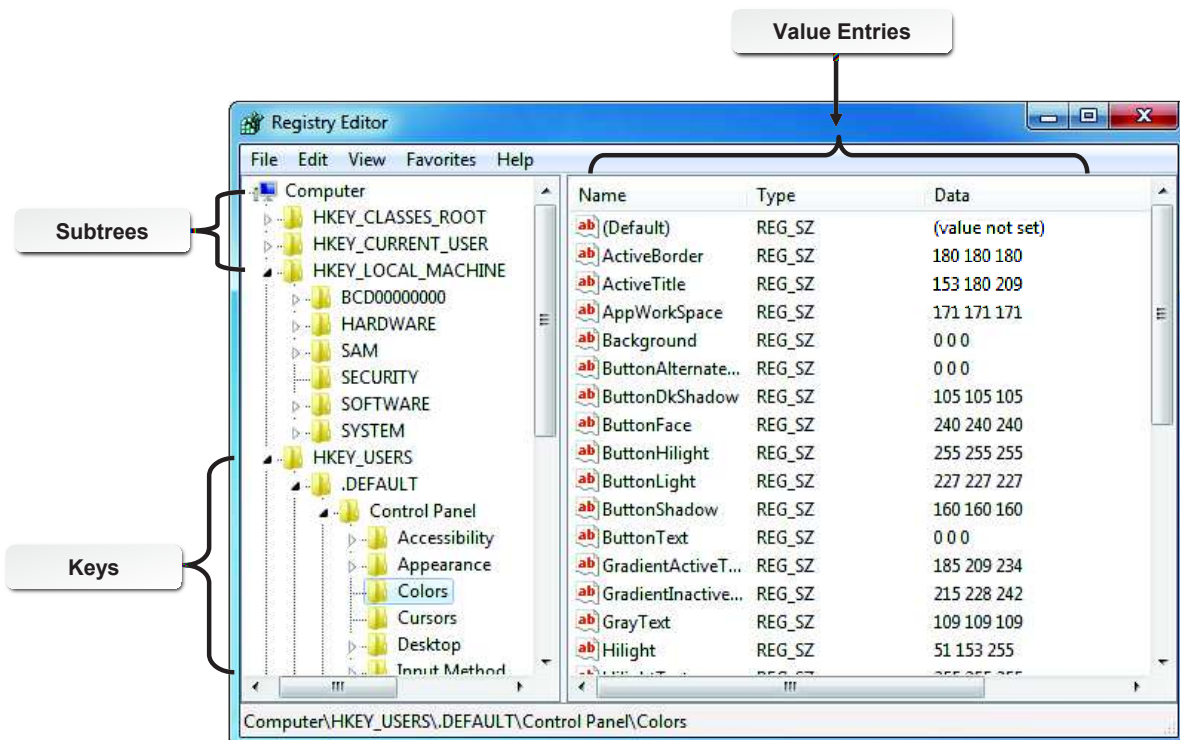
OV 2 - 45

Disk Management



OV 2 - 46

- USMT
- Easy Transfer
- Files and Settings Transfer Wizard



Registry Subtrees



- HKEY_CLASSES_ROOT
- HKEY_CURRENT_USER
- HKEY_LOCAL_MACHINE
- HKEY_USERS
- HKEY_CURRENT_CONFIG

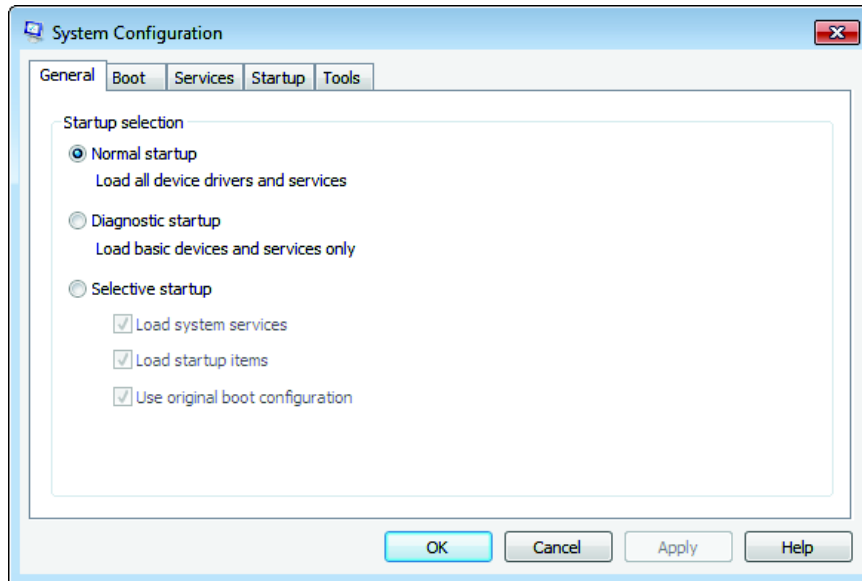
OV 2 - 49

Run Line Utilities



- cmd
- dxdiag
- explorer
- mmc
- *[command].msc*
- msconfig
- msinfo32
- mstsc
- notepad
- regedit
- services.msc

OV 2 - 50



Reflective Questions

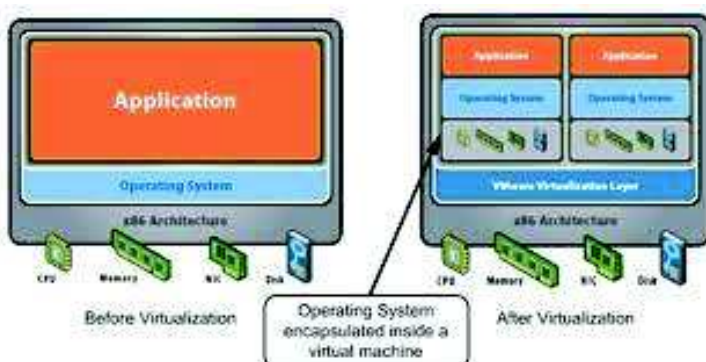
1. What operating systems do you have personal experience with? What operating systems would you like to learn more about, and why?
2. Which of the Windows system components and tools discussed in this lesson were familiar to you? Which ones were new?

- Implement Virtualization
- Install Microsoft Windows
- Windows Upgrades
- Windows Optimization and Preventive Maintenance

What is Virtualization?

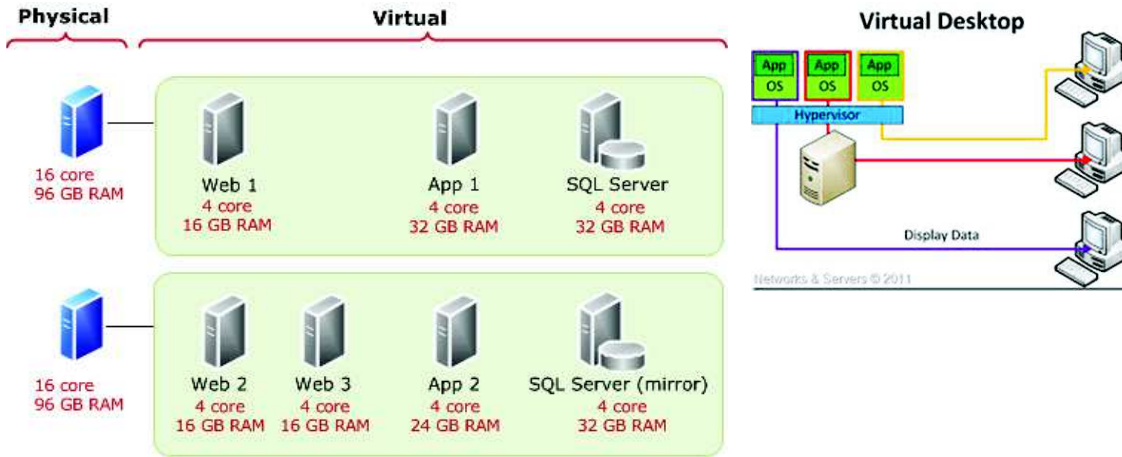
Two main types of virtualization:

- Server-side
- Client-side



Types of Virtualization

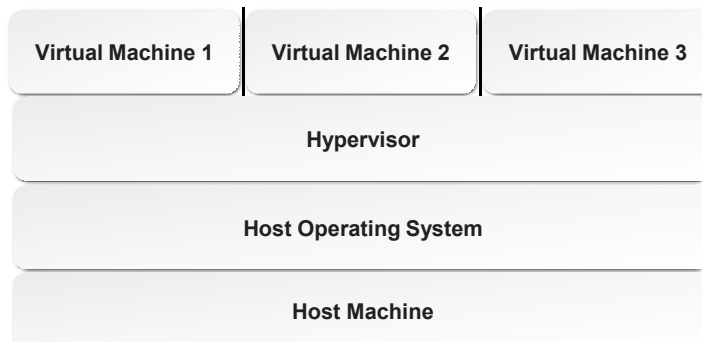
- Server-side virtualization
- Client-side virtualization



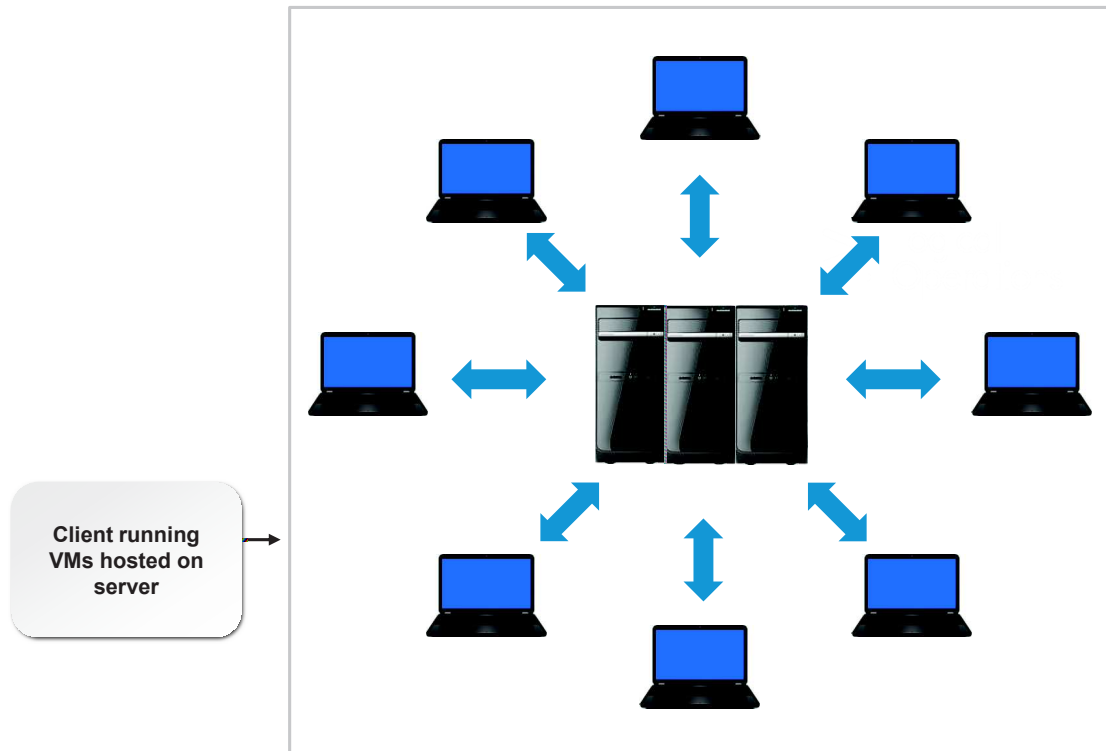
OV 6 - 3

Components of a Virtual Environment

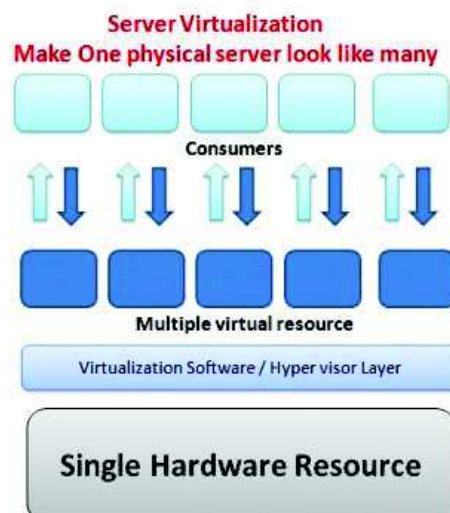
- The host machine
- The hypervisor
- The virtual machines



OV 6 - 4



- Emulator to run the VMs
- Security to protect VMs from unauthorized access
- Network components needed to run the VDI



Windows Client Virtualization Solutions



- Windows Virtual PC
- Windows XP Mode
- Microsoft Virtual PC 2007



OV 6 - 7

Windows System Requirements



Operating System	Requirements
Windows 7 Home Premium/Professional/Ultimate	<ul style="list-style-type: none"> • 1 GHz x86 or x64 processor • 1 GB of RAM or 2GB RAM • Hard disk: 40 GB with minimum free space of 20 GB • Support for DirectX 10 graphics
Windows Vista Home Premium/Business/Ultimate	<ul style="list-style-type: none"> • 1 GHz x86 or x64 processor • 1 GB of RAM • Hard disk: 40 GB of free space • Support for DirectX 9 graphics
Windows Vista Home Basic	<ul style="list-style-type: none"> • 1GHz 32-bit (x86) or 64-bit (x64) processor • 512 MB of RAM • 20 GB hard disk: minimum 15 GB free space • Support for DirectX 9 graphics
Windows XP Home Edition or Professional	<ul style="list-style-type: none"> • 233 MHz minimum processor required, 300 MHz or higher required • 64 MB of RAM required, 128 MB recommended • 1.5 GB of space available • Video adapter and monitor with Super VGA 800x600 or higher

OV 6 - 8

Hardware Compatibility

- Check all system requirements and hardware
- Windows 7 Upgrade Advisor
- Windows 7 Compatibility Center
- MAP toolkit



OV 6 - 9

Boot Methods

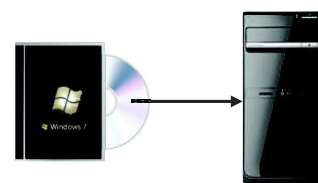
- USB
- CD-ROM/DVD
- PXE



OV 6 - 10



- **Clean install**
- **Unattended installation**
- **Repair installation**
- **Upgrade**
- **Multiboot**
- **Remote network installation**
- **Image deployment**

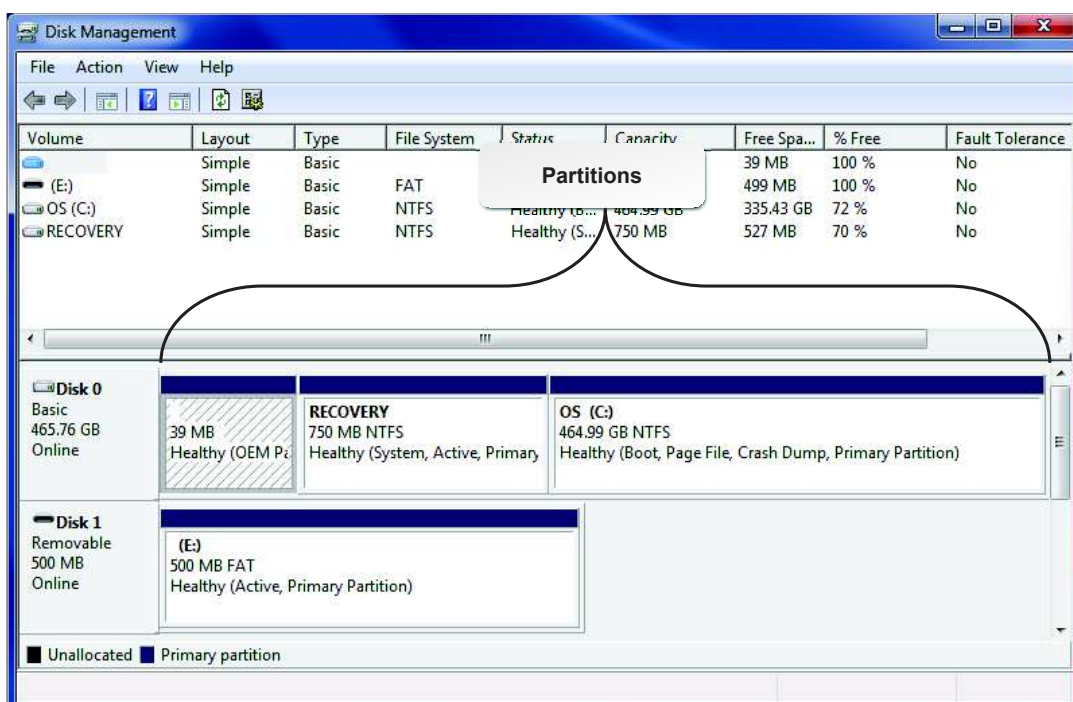


Third Party Drivers

- When hardware has been released after the current OS version, then third party drivers are needed.



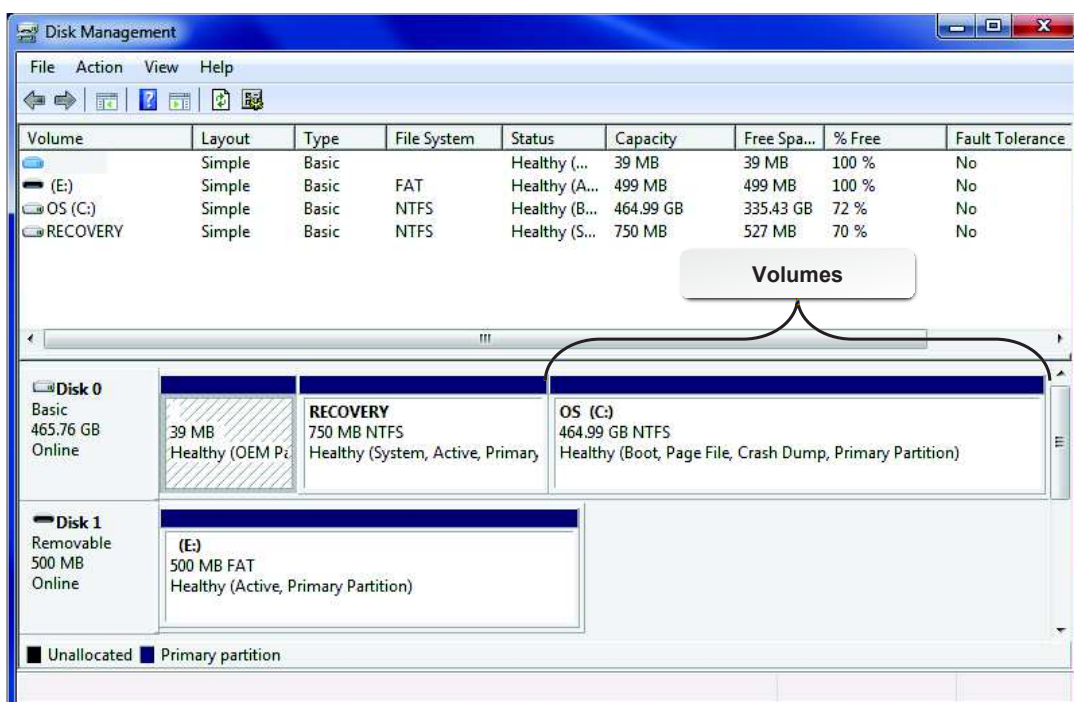
Partitioning



Partitioning Types

- Logical
- Primary
- Extended
- Basic
- Dynamic

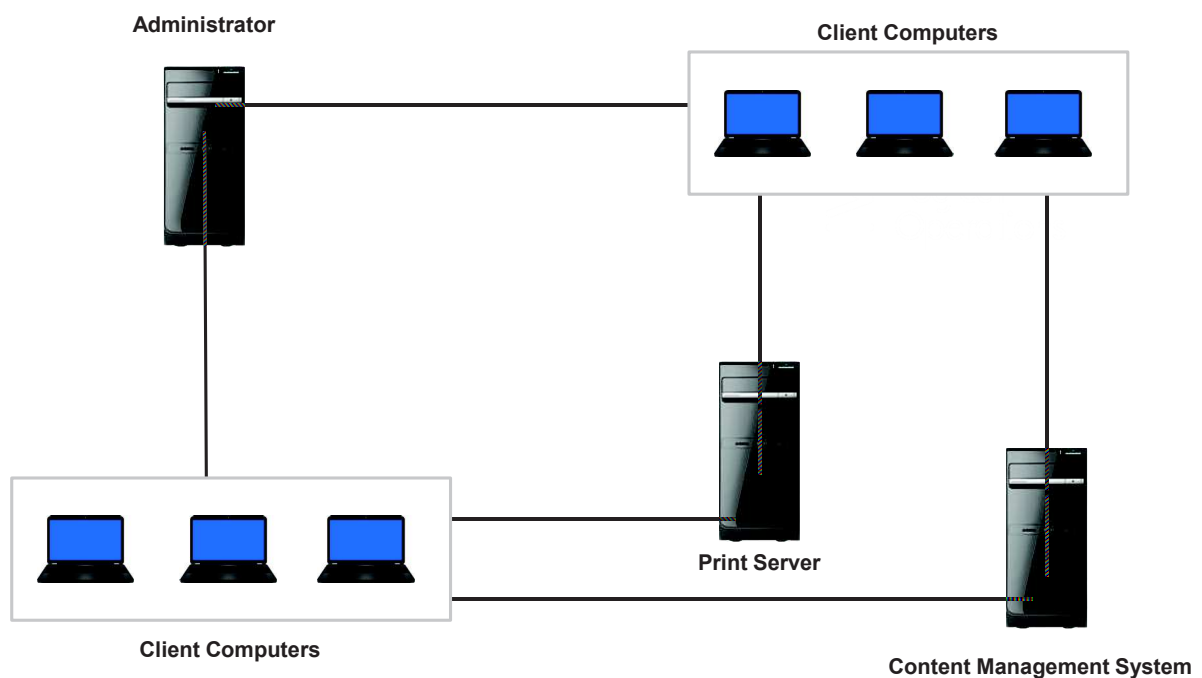
Volumes

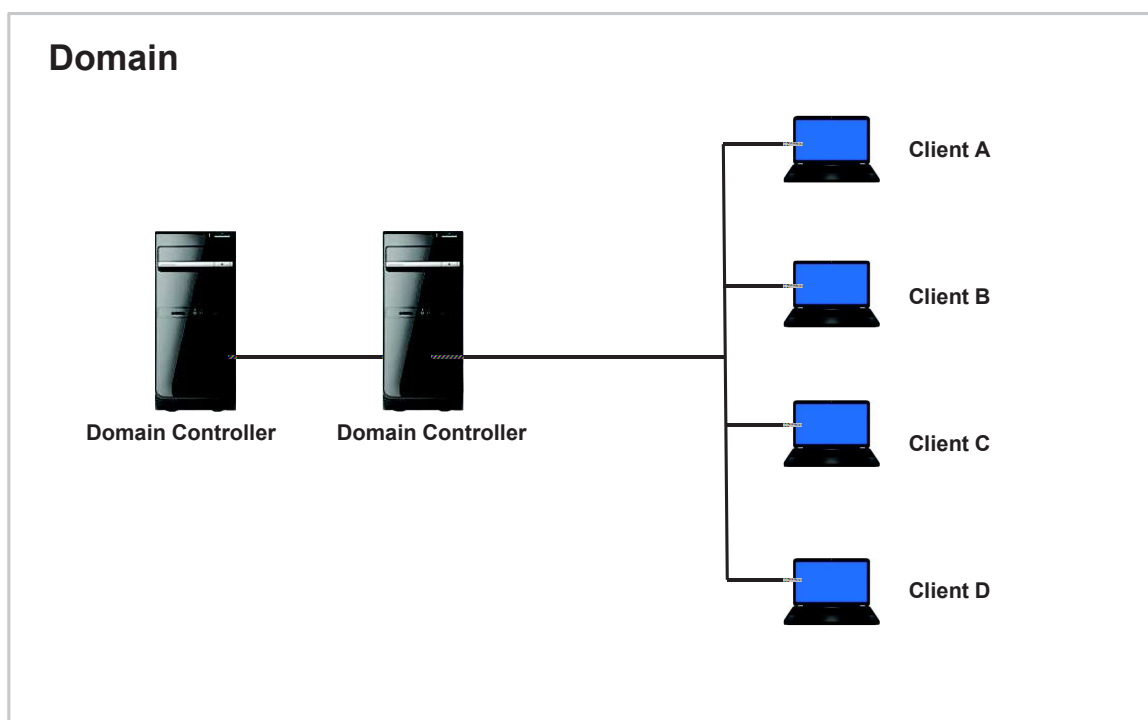
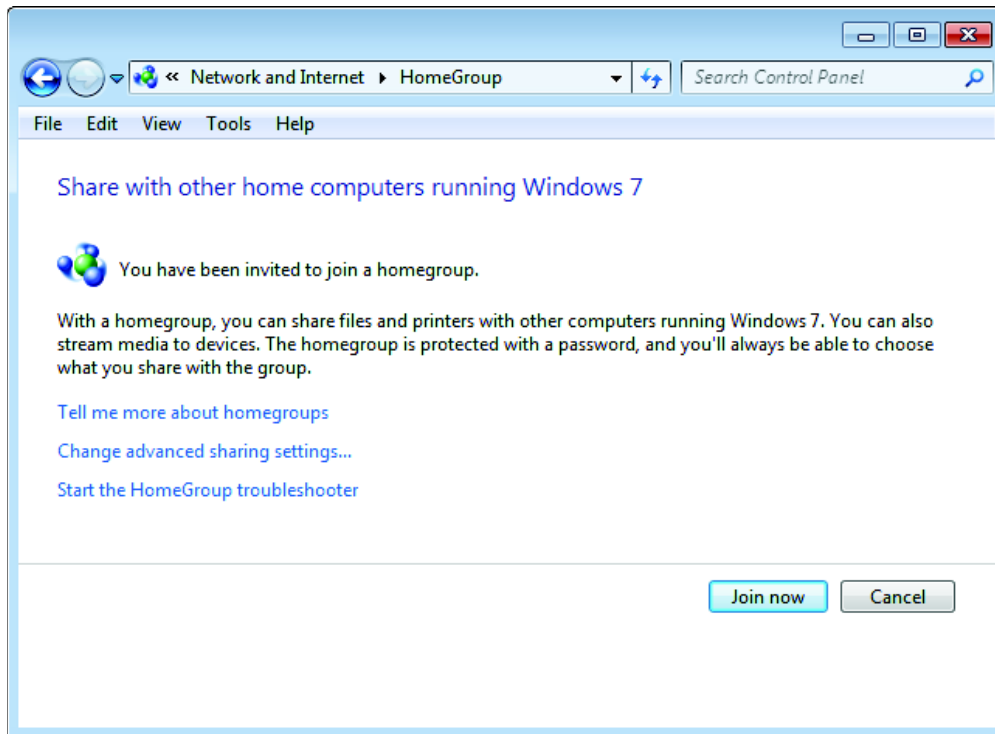


Partitioning and File System Types

- NTFS is recommended for Windows systems.
- FAT is can be used and will be determined by the size of the partition.
- Full format and quick format are available for both file systems.

Workgroups





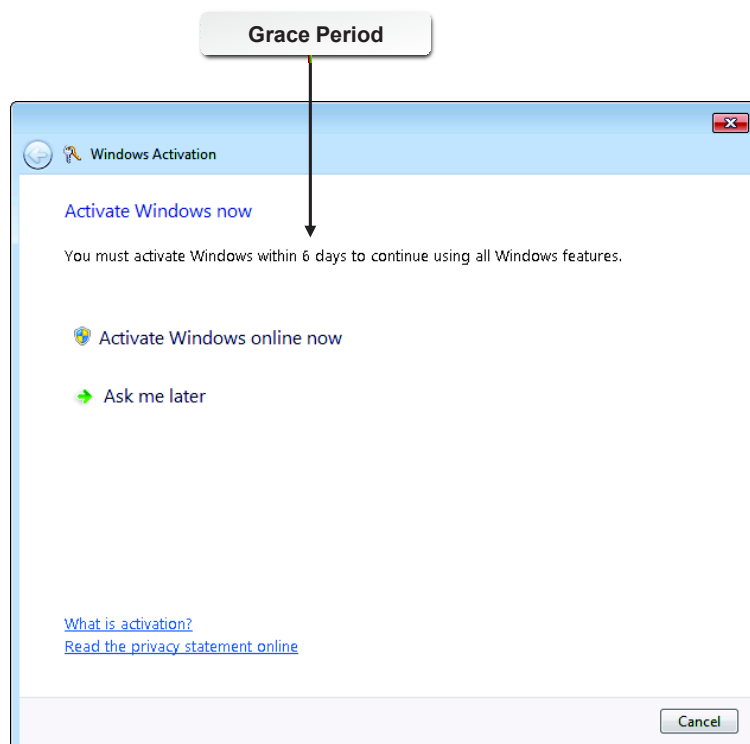
- **Regional and language settings**
- **Computer name**
- **Date and time**
- **Network configuration**
- **Workgroup vs. domain setup**

- **Critical updates, such as service packs and security patches**
- **Optional software updates, such as new tools and functionality**
- **Optional hardware updates, such as new device drivers**

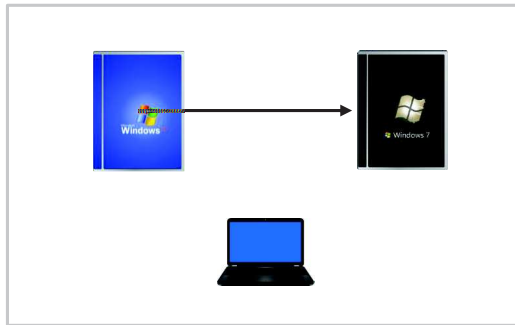


Before using the factory recovery partition:

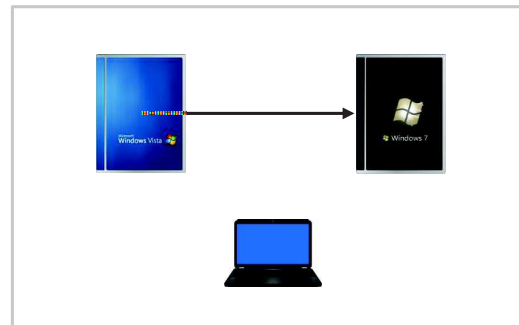
- Review the documentation from computer manufacturer
- Back up any important data to an external storage device



In-Place Upgrades



Clean Install Needed



In-Place Upgrade Supported

Supported Upgrade Paths



Current Operating System	Can Be Upgraded To
Windows XP Home Edition	Windows XP Professional, Windows Vista Home Basic, Home Premium, Business, and Ultimate
Windows XP Professional	Windows Vista Business, and Ultimate, Vista Home, Basic, and premium with a clean installation.
Windows Vista Home	Windows Vista Home, Ultimate and Windows 7 Basic, Premium, Ultimate
Windows Vista	Windows Vista Home to Windows 7 Home Premium, Windows Vista Business to Windows 7 Professional, and Windows Vista Ultimate to Windows 7 Ultimate
Windows 7 Starter	Windows 7 Home Premium, Professional, and Ultimate
Windows 7 Home	Windows 7 Home Basic to Premium, Professional, and Ultimate Windows 7 Home Premium to Windows 7 Professional and Ultimate
Windows 7 Professional	Windows 7 Ultimate.

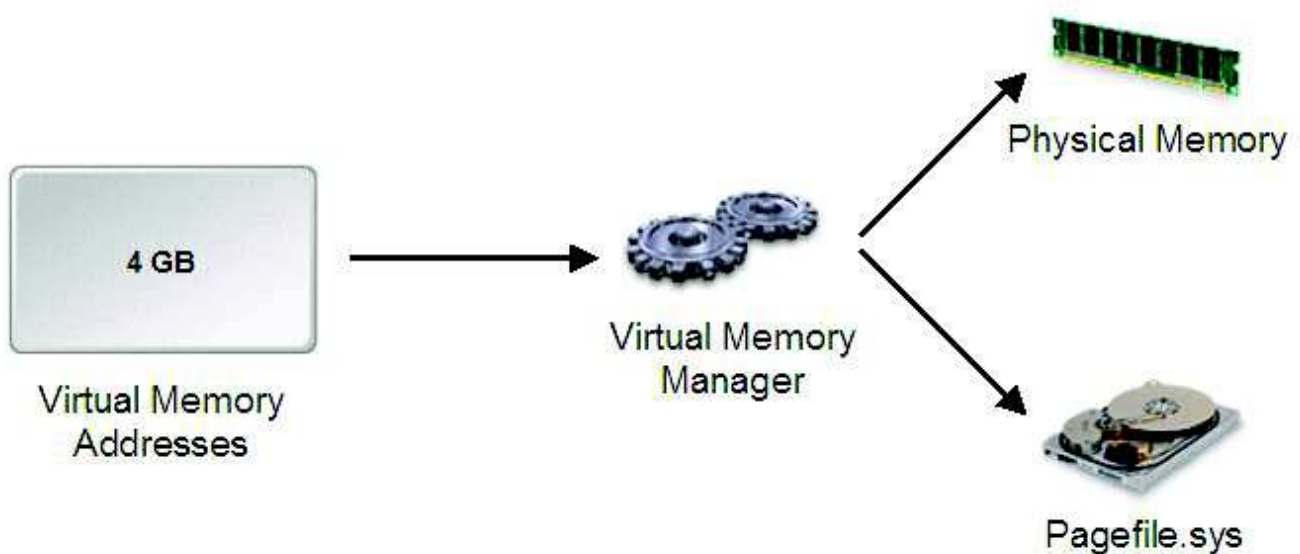
Compatibility Tools

- Ensure that existing hardware is compatible with new OS.
- Ensure that applications will run properly with new OS.
- Use Windows Compatibility Center to check for compatibility.



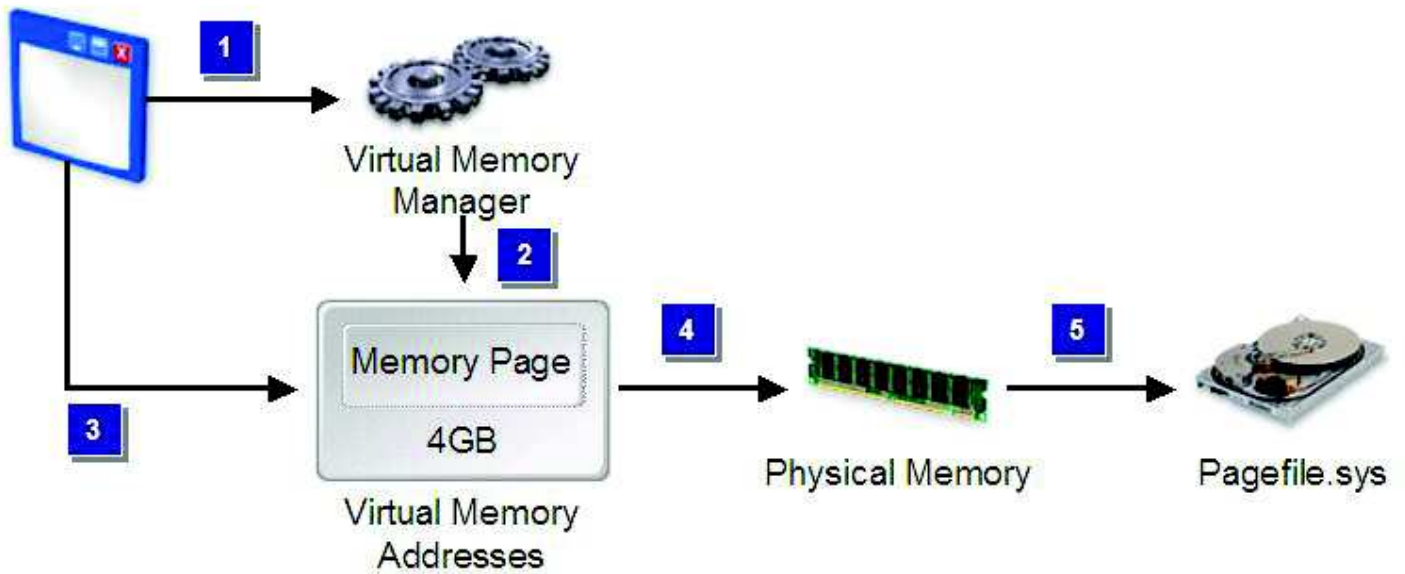
OV 6 - 27

Virtual Memory

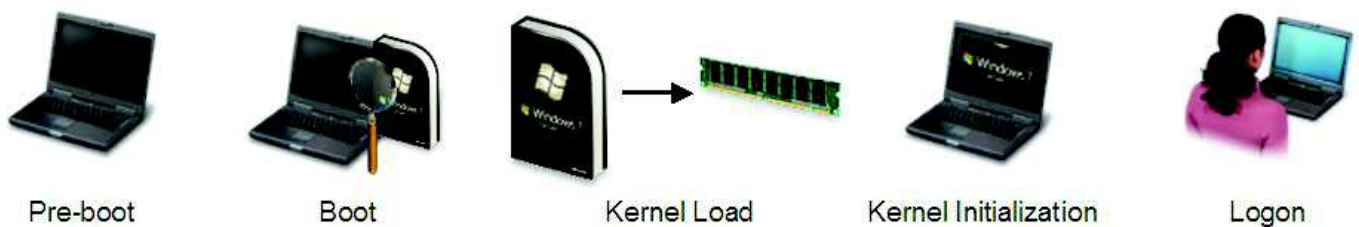


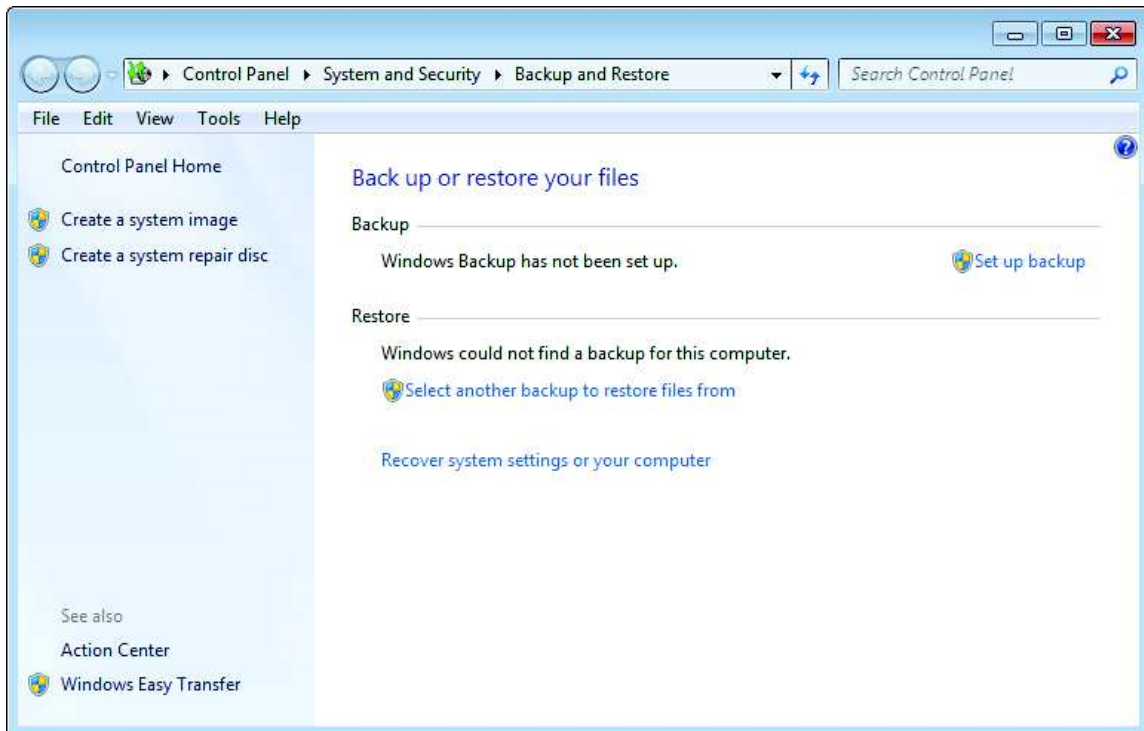
OV 6 - 28

The Virtual Memory Process



The Windows Boot Process





OV 6 - 31

- **Backup Utility (Windows XP)**
- **Backup and Restore (Windows Vista and Windows 7)**
- **Check Disk**
- **Disk Cleanup**
- **Disk Defragmenter**
- **Recovery Image**
- **System Restore**

OV 6 - 32

Scheduling Tasks



- **Scheduled backup**
- **Scheduled Check disk**
- **Scheduled disk defragmentation**

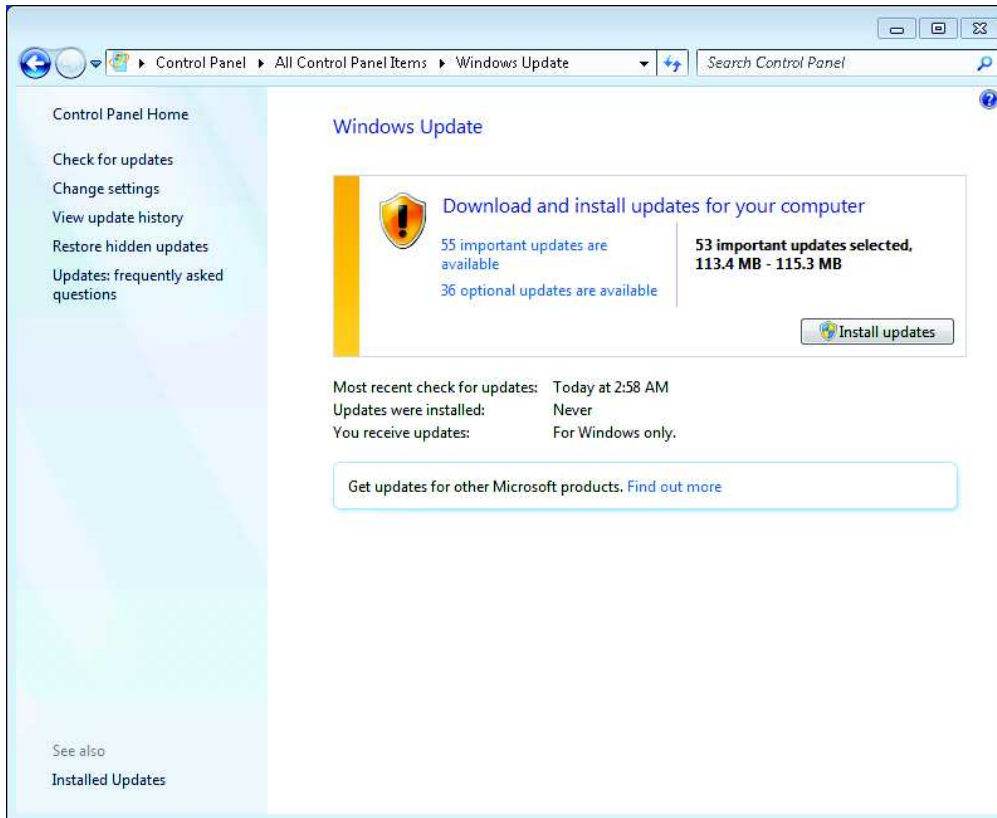
OV 6 - 33

Patch Management



- **A patch management program may include:**
- **An individual who subscribes and reviews patched and newsletters**
- **Regular review and triage of updates**
- **Offline patch test environment**
- **Administrative push of both immediate and weekly patches**
- **Periodic evaluation of non-critical updates**

OV 6 - 34



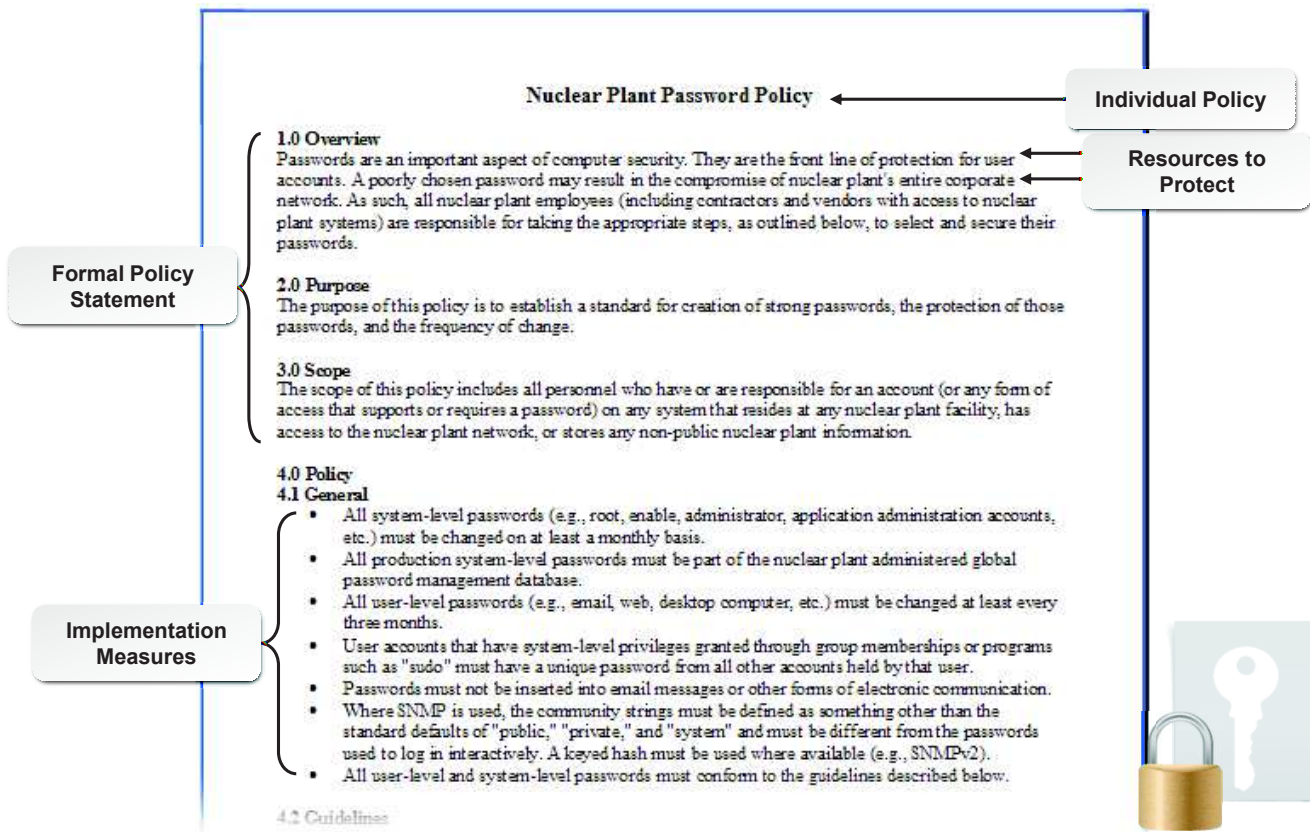
OV 6 - 35

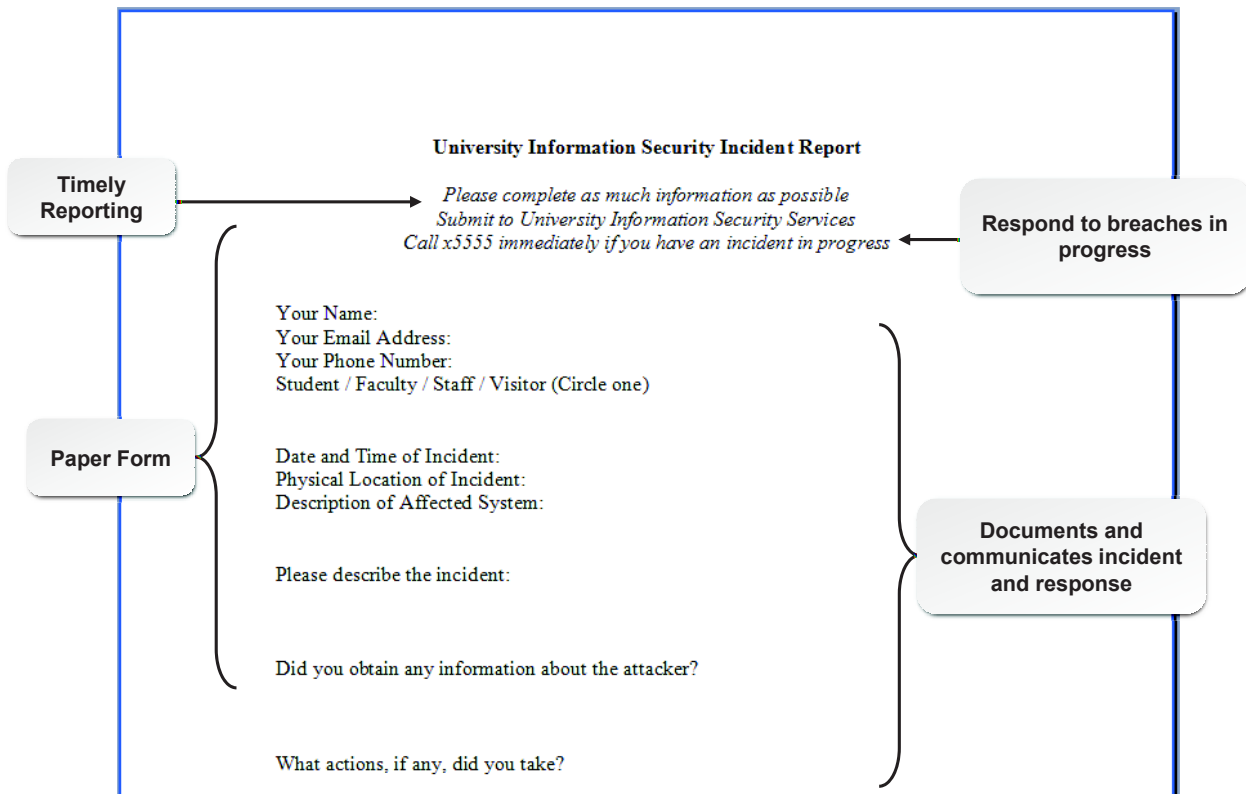
Reflective Questions

1. Do you have experience installing operating systems? Do you feel you will be able to perform installations more efficiently as a result of the information presented in this lesson?
2. How often do you expect to be able to perform in-place upgrades instead of clean installs at your workplace?

OV 6 - 36

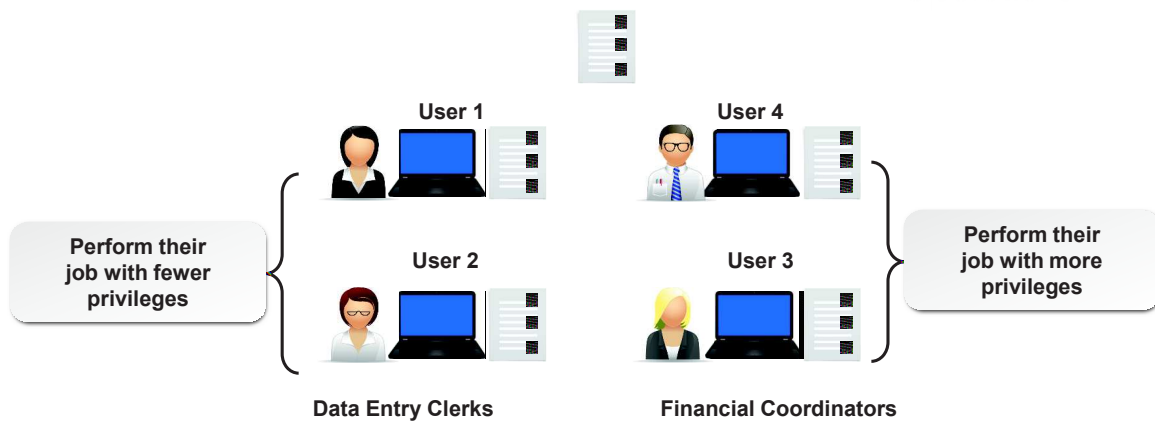
- Security Fundamentals
- Security Threats and Vulnerabilities
- Security Protection Measures
- Workstation Security



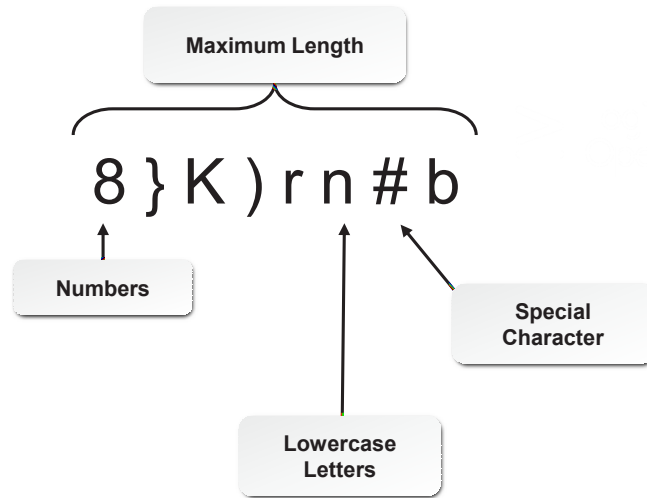


User and software has only minimal level of access to:

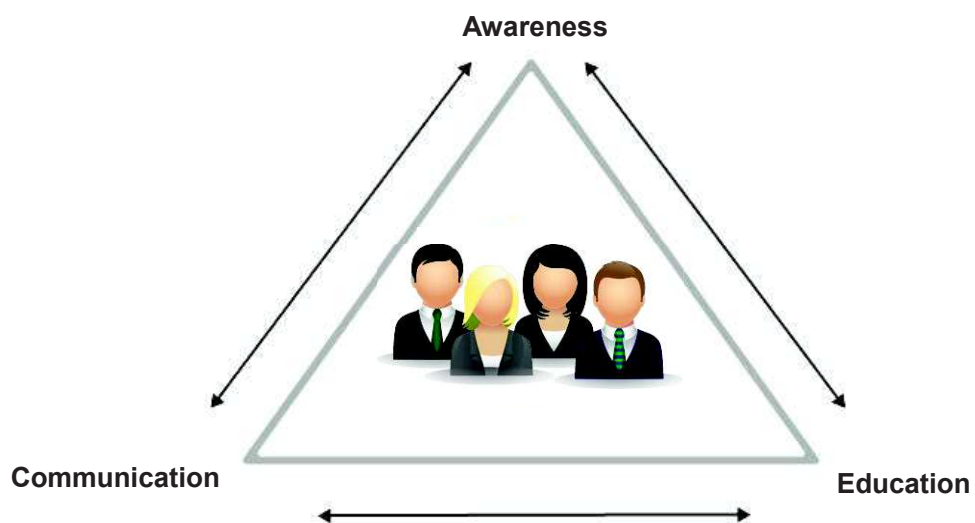
- Facilities
- Computing hardware
- Software
- Information



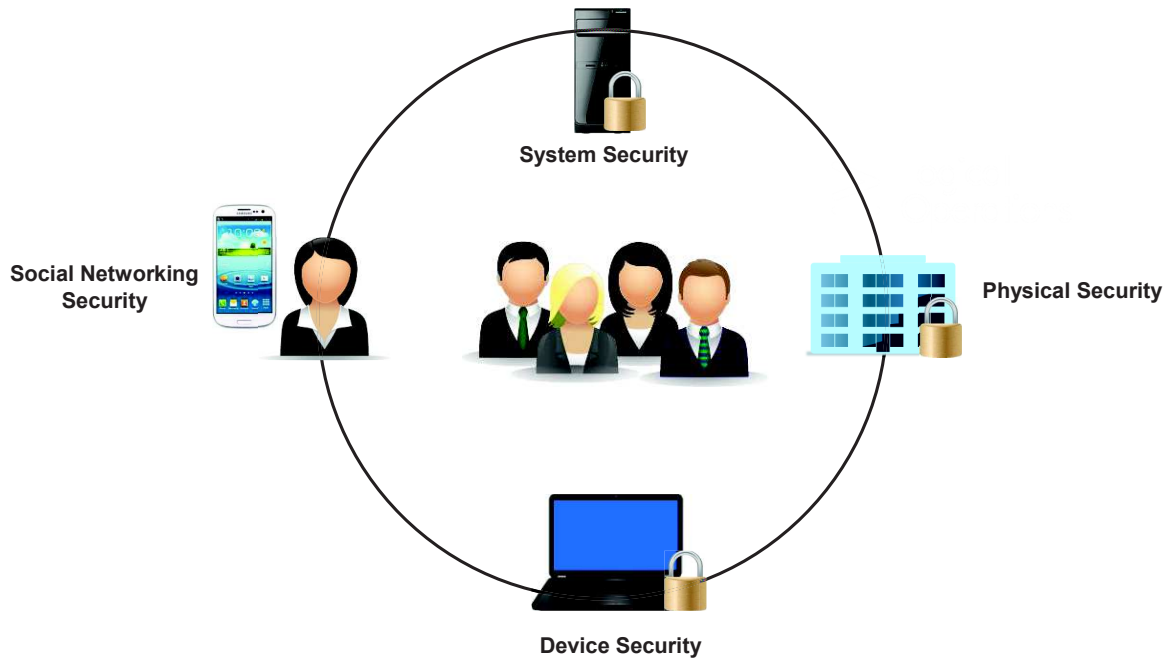
Strong Passwords



User Education



Common User Security Practices

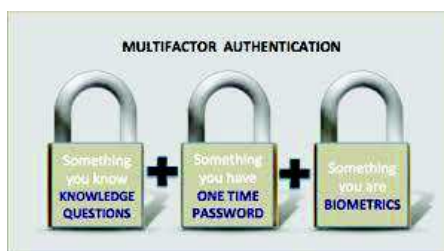


OV 13 - 7

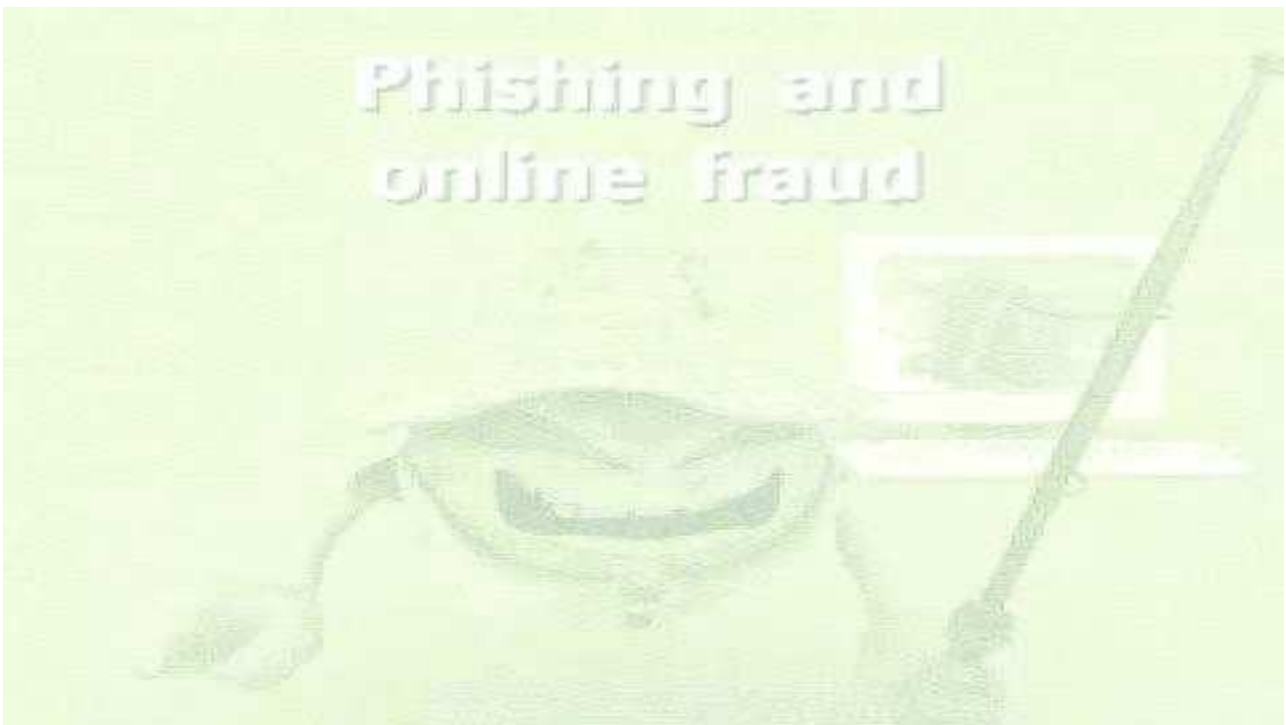
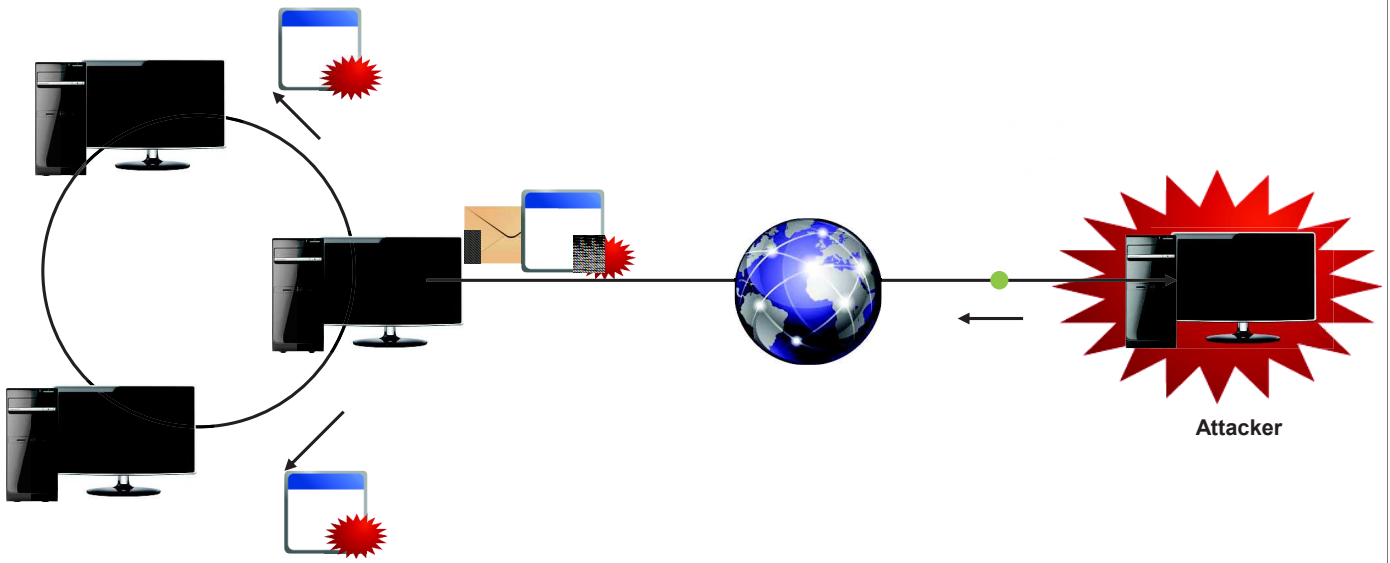
Authentication Methods



- User name and password
- Biometrics
- Tokens
- Multifactor
- Mutual

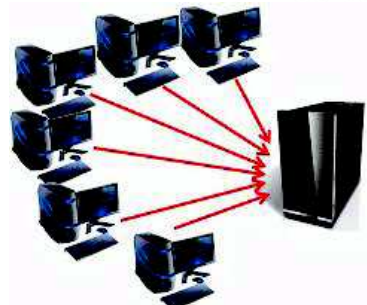
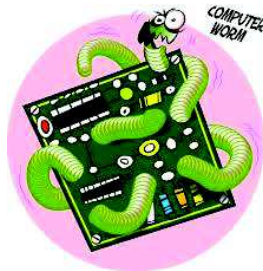


OV 13 - 8

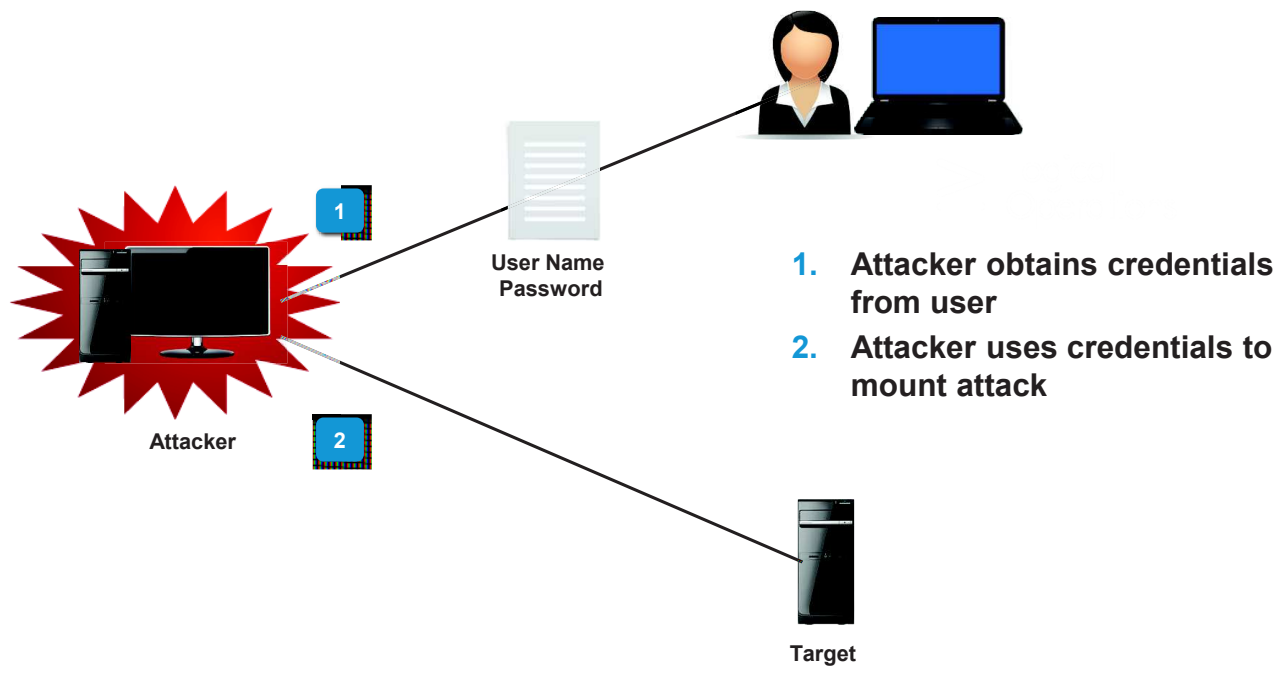


Types of Malware

- Viruses
- Worms
- Trojan horses
- Logic bombs
- Spyware
- Adware
- Rootkits
- Spam

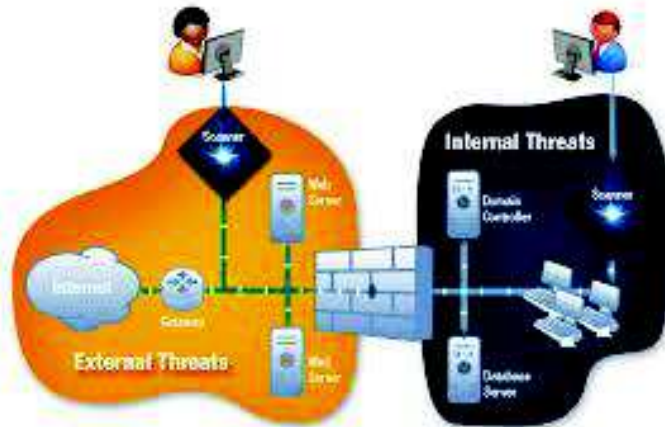


Social Engineering



Physical Security Threats and Vulnerabilities

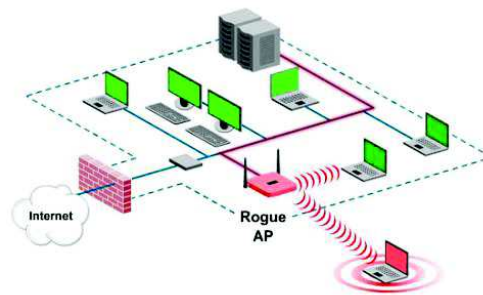
- Internal
- External
- Natural
- Man-made



OV 13 - 13

Common Wireless Security Threats

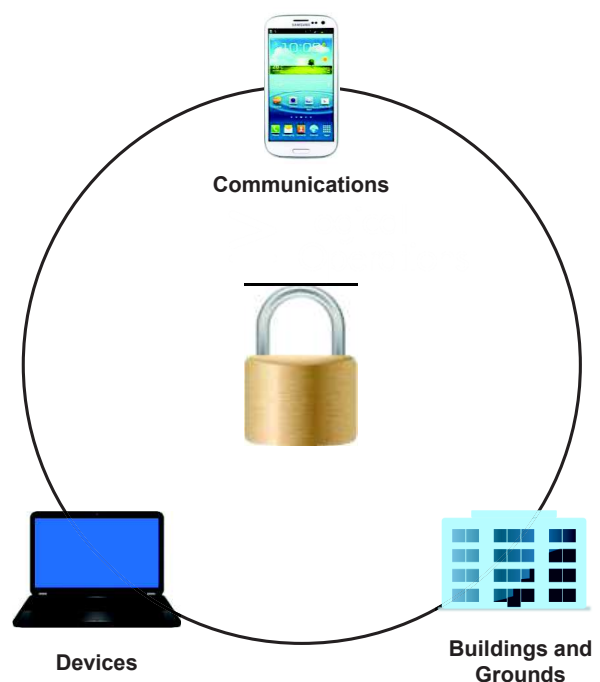
- Rogue access point
- Evil twins
- Interference
- Bluejacking
- Bluesnarfing
- War driving and war chalking
- IV attack
- Packet sniffing



OV 13 - 14

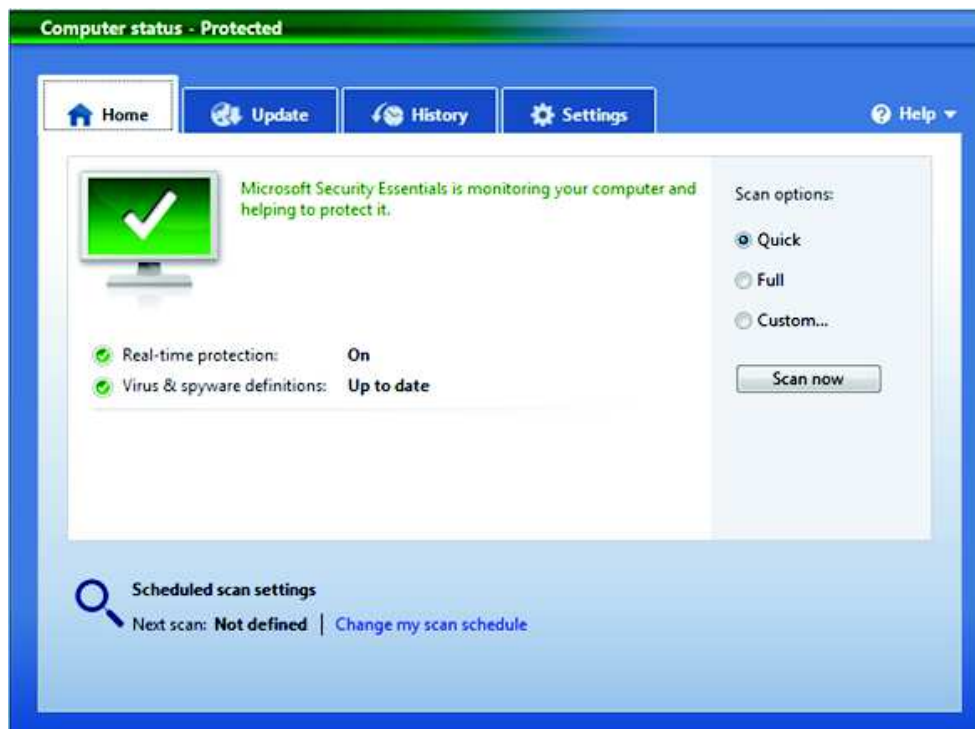
- The implementation and practice of various control mechanisms that are intended to restrict physical access to facilities.
- Assuring the reliability of certain critical infrastructure elements such as electrical power, data networks, and fire suppression systems.
- Events that can threaten physical security include:
 - Facility intrusions
 - Electrical grid failures
 - Fire
 - Personnel illnesses
 - Data network interruptions

- Logging and visitor access
- Identification systems
- Video surveillance
- Security guards
- Physical barriers
- Alarms



Digital security controls include:

- Antivirus
- Firewalls
- Antispyware
- User authentication and strong passwords
- Directory permissions

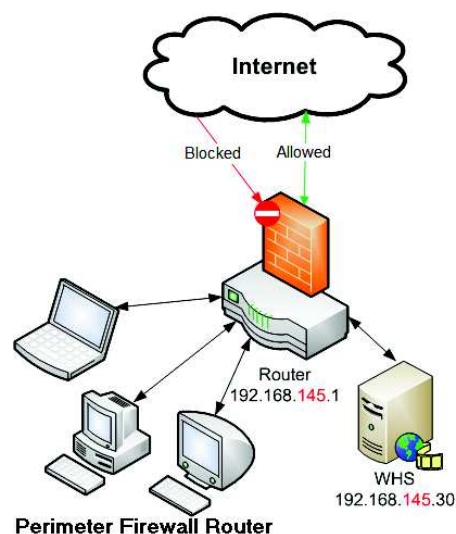
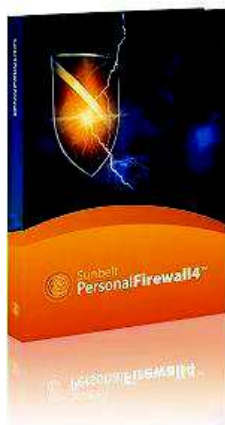




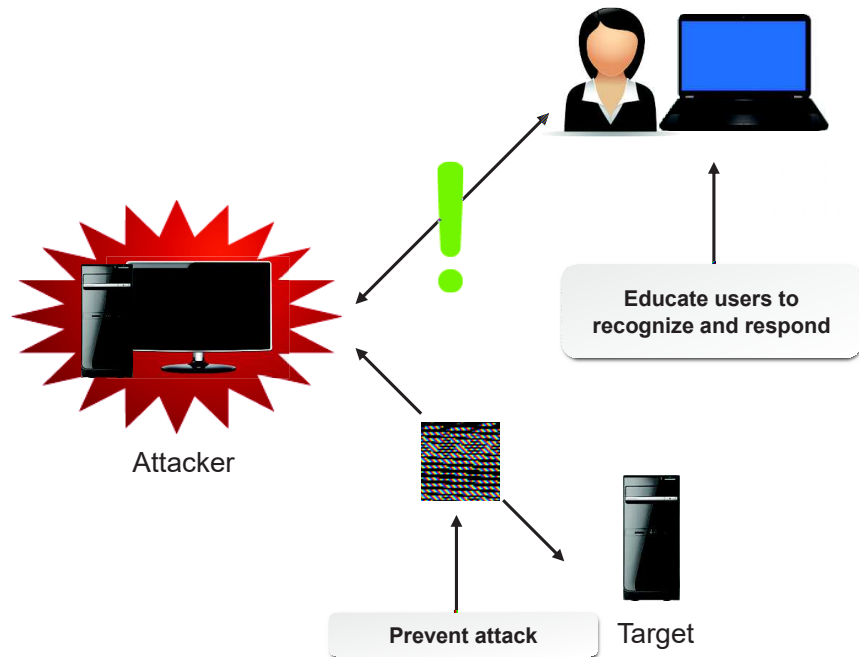
OV 13 - 19

Common types include:

- Host or personal firewalls
- Network-based firewalls



OV 13 - 20



OV 13 - 21

Hard Drive Sanitation

- Degaussing
- Overwriting
- Physical destruction
- Recycling



OV 13 - 22

Formatting Hard Drives for Disposal

- Formatting options:
- Low-level formatting
- Standard formatting



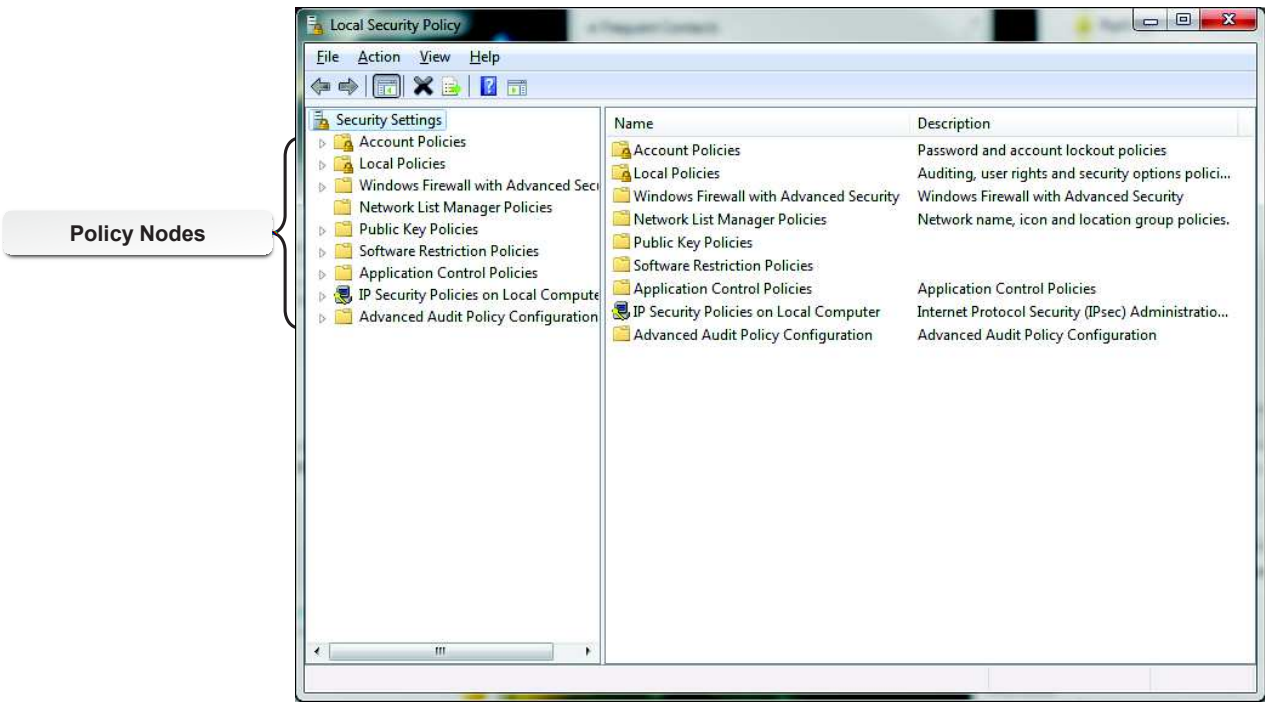
OV 13 - 23

Physical Destruction Methods for Computer Media

- Shredding
- Drilling
- Degaussing
- Electromagnetic waves



OV 13 - 24



Software-based firewall included with:

- Windows 7
- Windows Vista
- Windows XP with service pack 2
- Windows Server 2003 with Service Pack 1 or later
- Windows Server 2008

Software Firewall Configuration Settings



- **Global security level**
- **Program filters**
- **Security log**
- **Unsolicited traffic blocking and filtering**
- **Port forwarding and triggering**

OV 13 - 27

Workstation Security Best Practices



- **Manage user authentication**
- **Install updates and patches**
- **Manage user accounts**
- **Educate users**
- **Apply workstation security measures**

OV 13 - 28

- 1. What security concepts have you come across in your experience?**
- 2. What physical security controls have you had experience with? What controls do you think are the most common?**

- Mobile Device Technologies
- Configure Mobile Devices



OV 11 - 1

What is Mobile Technology?

- PDAs
- Smartphones
- Tablet PCs
- Carputers



OV 11 - 2

Mobile Operating Systems

- Apple iOS
- Android
- Blackberry OS
- HP webOS



Smartphones

- iPhone
- Android Smartphones
- Blackberry Smartphone
- Windows Smartphone



Tablet PCs

- **Larger than mobile phones, but smaller than a laptop.**
- **Operating systems include:**
 - Apple iPad on iOS
 - Android OS used on a number of devices
 - Windows 7 Home OS on some tablets
 - Microsoft's Surface runs on Windows RT OS
 - Blackberry's Playbook runs on Blackberry OS



For a complete list of Tablet PCs and operating systems visit www.tabletpccomparison.net.

OV 11 - 5

Tablets vs. Laptops

- **Repairs**
- **Upgrades**
- **Touch interface**
- **Storage**
- **OS**



OV 11 - 6

Tablets vs. Laptops



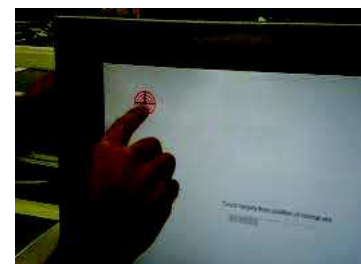
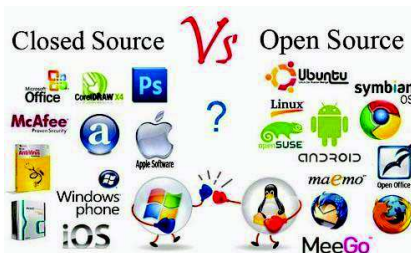
Characteristic	Laptops	Tablets
Repairs	The hardware components of a laptop can be fixed and replaced when issues arise. This is still fairly common with newer laptops as well.	There are no field-serviceable parts in a tablet. When something breaks, in most cases, the entire tablet needs to be replaced.
Upgrades	The hard drive and central processing unit (CPU) can be upgraded, if needed, to meet OS requirements or to add more functionality to the laptop.	Tablets are not typically upgradeable, unless it is software-related. The storage components cannot be upgraded
Touch interface	Most laptops do not come with a touch interface component. You can purchase specific laptops that have the feature, but it is not common.	All tablets come with touch interface technology. The touch technology allows the user to interact with the tablet. It is also the primary input method used for tablets. Tablets utilize a touch interface that allows interaction between the user and the OS.
Storage	Most laptops will have a mobile version of a traditional mechanical hard drive that has a higher storage capacity than solid state drives (SSDs).	Tablets can only run the mobile OS that the device was manufactured to run. The actual mobile OS will depend on the specific tablet due to the CPU architecture versus the ARM architecture.
OS	Laptops can run a number of different operating systems including versions from Microsoft, Linux, and UNIX.	Tablets can only run the mobile OS that the device was manufactured to run. The actual mobile OS will depend on the specific tablet due to the CPU architecture versus the ARM architecture.

11 - 7

Mobile Device Features



- Open/closed source
- App source
- Screen orientation
- GPS and geotracking
- Screen calibration
- Voice recognition



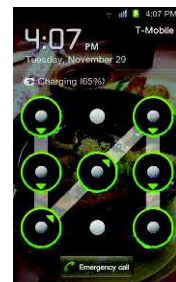
OV 11 - 8

- Assume the same threats apply to mobile devices as desktop and laptop devices.
- Be aware of viruses and spam transmitted over the network and through email.



Mobile Device Security Techniques

- Enable screen lock and passcode settings
- Configure device encryption
- Require remote wipes
- Enable location services and applications
- Enable remote backup
- Install antivirus software
- Install updates and patches



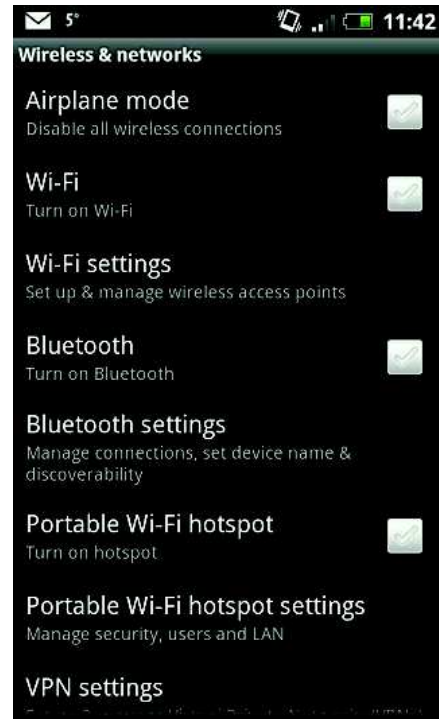
Network Configuration Settings



iPhone Network Configuration

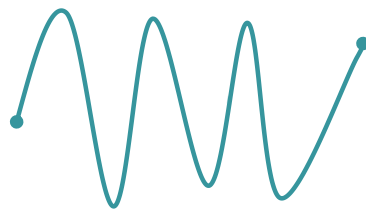


Android Network Configuration



OV 11 - 11

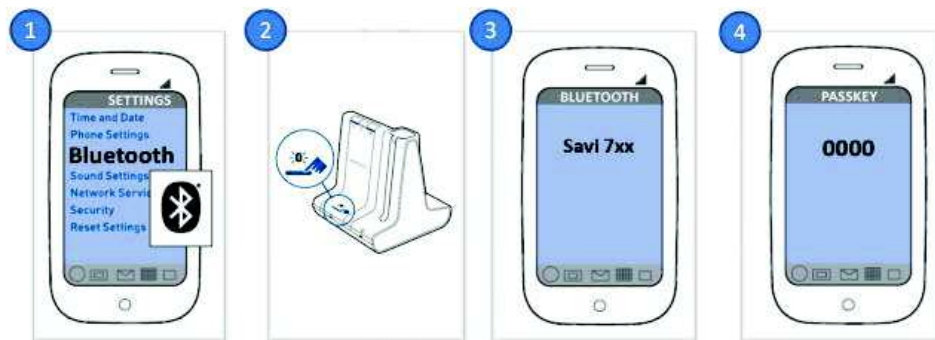
Bluetooth Configuration Methods



OV 11 - 12

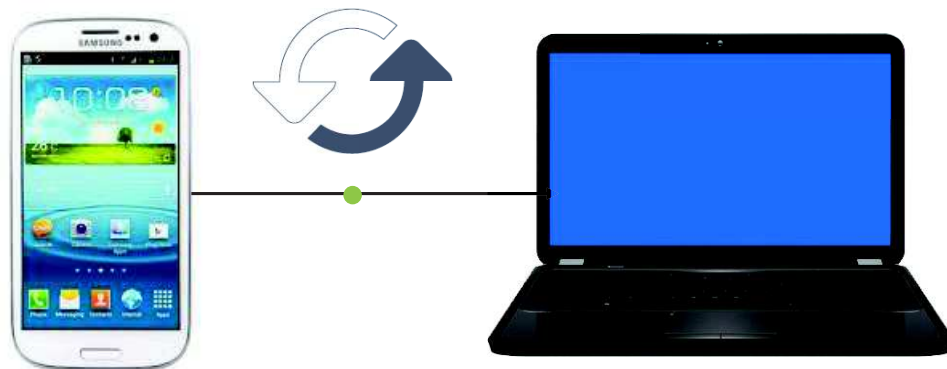
The Bluetooth Pairing Process

1. Enable Bluetooth
2. Enable pairing
3. Find the device for pairing
4. Determine if a pin code is needed
5. Enter the pin code
6. Verify the connection
7. Test the connection



OV 11 - 13

Data Synchronization



OV 11 - 14

Synchronization Requirements

- You may need a specific system account
- You might require an email account
- If using Exchange, control may be given to the Admin
- Organizations may have specific requirements
- Certain devices might require additional software



OV 11 - 15

Email Configuration Methods

Email can be configured to synch with many different system including:

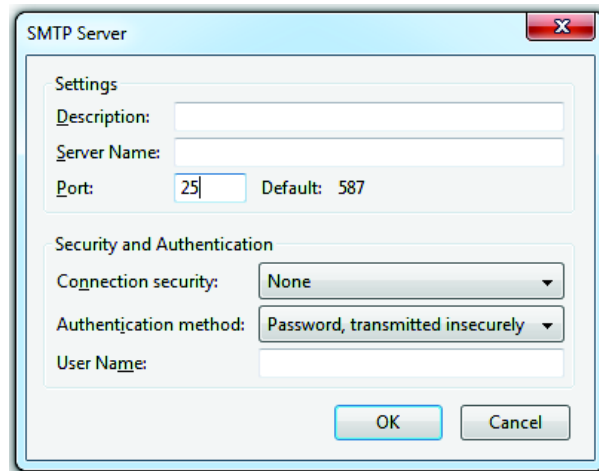
- Yahoo! Mail
- Microsoft Exchange
- Windows Live
- Gmail
- Hotmail



OV 11 - 16

Email Server and Configuration Settings

- Protocol
- Security
- Ports



OV 11 - 17

Reflective Questions

1. In your professional experience, have you supported mobile devices? If not then, what kind of experience do you have with them?
2. What type of technical support do you think will be expected of an A+ technician as mobile devices become even more prominent within the workplace?

OV 11 - 18

Troubleshooting Hardware Components

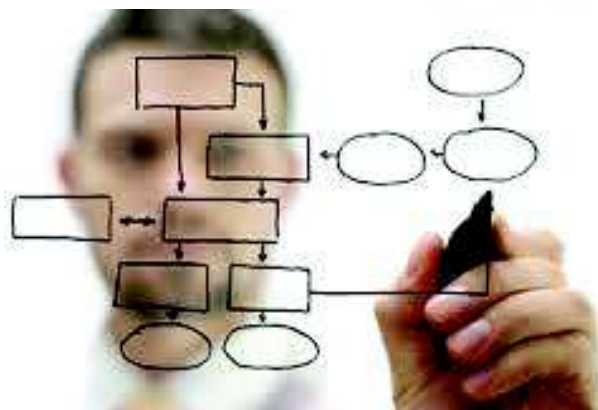
- Troubleshooting Theory
- Troubleshoot Video and Display Devices
- Troubleshoot Hard Drives and RAID Arrays
- Troubleshoot System Components
- Troubleshoot Laptops
- Troubleshoot Printers



OV 14 - 1

Troubleshooting Theory

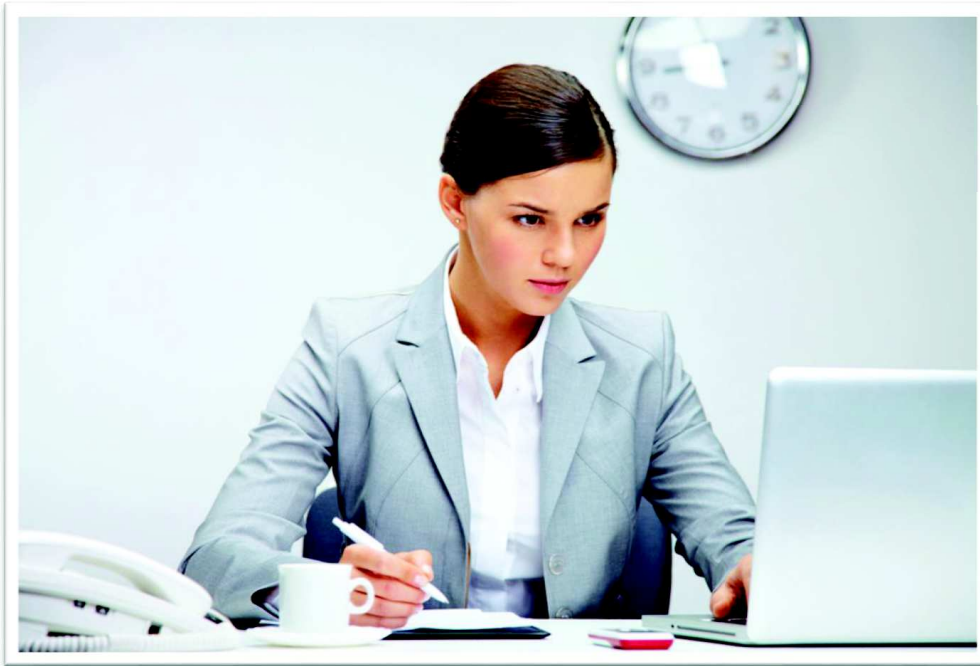
- Identify the problem
- Establish a theory
- Test the theory
- Establish a plan
- Verify
- Document



OV 14 - 2

Troubleshooting Models

- Provide you with a systematic way to tackle an issue or problem.
- Helps you break down the issue and identify causes and solutions.



OV 14 - 3

Troubleshooting Template Forms

- A general section
- A description of conditions and specifics
- The problem identified while troubleshooting
- Whether or not the problem can be reproduced
- The possible cause or causes
- Solutions or corrections made
- The results of implementing the solutions
- All testing results
- Any external resources used

New Activity: Approval - User

Name: Verify Problem Solution

Stage: Open

Condition:

Users: S(assignment_group.manager)

approval_column: approval

approval_history: approval_history

Groups:

Wait for: Anyone to approve

When anyone rejects: Reject the approval

Advanced:

Due date based on: A user specified duration

Duration: Days 00 Hours 00:00:00

Schedule based on: (no schedule)

Time zone based on: (no time zone)

OV 14 - 4

Common Video and Display Issues

- Dark screen
- Dim image or no image in screen
- Flickering or distortion
- Display turns itself off
- Application problems
- Defective pixels
- Color issues
- Physical damage
- Video card issues



OV 14 - 5

Drive and Array Troubleshooting Tools

- Screwdriver
- External enclosures
- CHKDSK
- FORMAT
- FDISK
- File recovery software



OV 14 - 6

Common Hard Drive Symptoms

- Failure to boot
- POST errors
- Drive is not recognized
- Drive read/write failure
- Computer will not boot
- Grinding noises
- Loud clicking noises
- Possible data corruption
- Slow performance
- External drive issues
- Removable drive issues
- OD not found
- BSOD



OV 14 - 7

Common RAID Array Issues

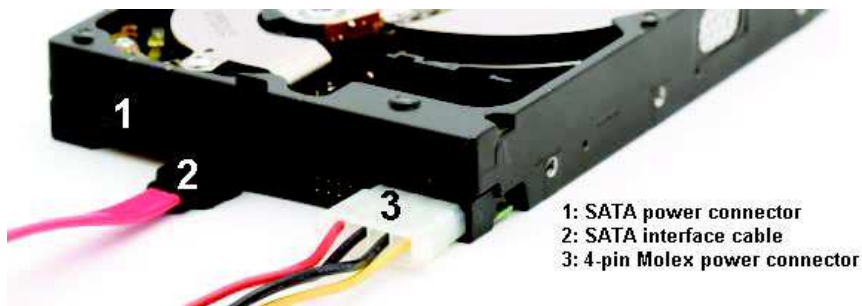
- **RAID not found when computer boots up.**
 - RAID may not be configured within the BIOS.
 - Motherboard does not recognize RAID.
- **RAID stops working suddenly.**
 - Settings have changes within the BIOS
 - Motherboard may not support RAID



OV 14 - 8

SATA Troubleshooting Tips

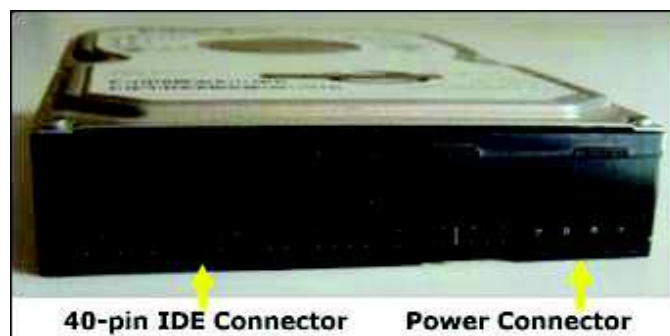
- Check vendor specifications for the OS and software used
- Ensure that you are using the latest SATA controller version.
- Restart the setup process and reinstall the driver.
- Ensure that the SATA controller drives are loading during OS installation.
- Verify that speed limitation settings are correct and use jumper settings if needed.



OV 14 - 9

PATA Troubleshooting Tips

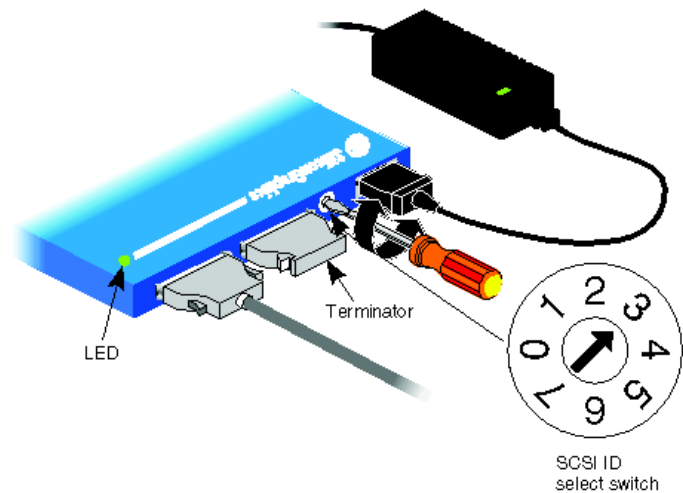
- Adjust the settings when using a single drive.
- Apply the correct settings if using two drives.
- Verify the settings are changes when removing a drive.
- Use caution when moving a drive to another system and verify the settings and configuration will work.



OV 14 - 10

SCSI Troubleshooting Tips

- Verify that all SCSI devices have unique ID numbers and are properly terminated.
- When resetting a system, verify that SCSI controllers renew all connections.
- Handle SCSI cables carefully.
- Enable the SCSI BIOS using jumper settings or software configurations
- Carefully make any necessary connections to disks.



OV 14 - 11

Common System Troubleshooting Tools

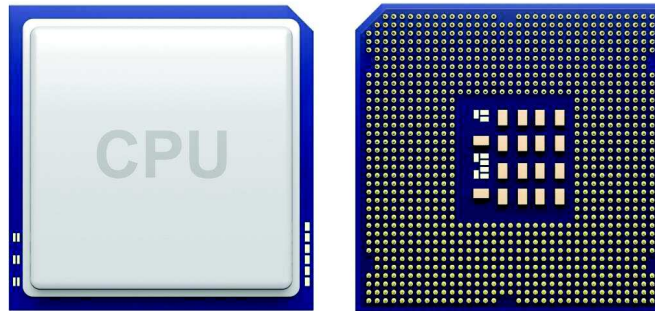
- Power supply tester
- Multimeter
- Loopback plug
- POST card



OV 14 - 12

Common CPU Issues

- Overheating and failure
- Slot and socket compatibility
- Cooling system issues
- Excess power consumption



OV 14 - 13

Common Cooling System Issues

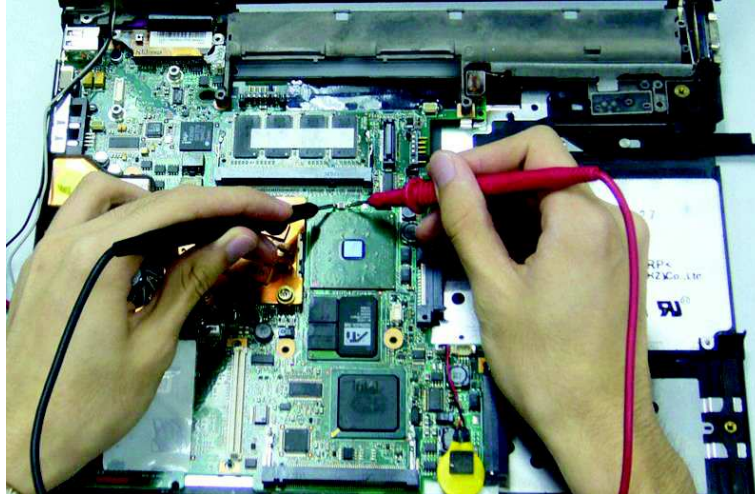
- Dust buildup
- Poor airflow
- Poor heat transfer



OV 14 - 14

Common Motherboard Issues

- **Difficult to recognize and diagnose.**
- **Typical issues include:**
 - Computer will not boot
 - Computer displays erratic behavior
 - Intermittent device failure



OV 14 - 15

Repair vs. Replace

- **Very few components on the board are individually repairable**
- **Most times when a motherboard fails, you will replace it**



OV 14 - 16

Common RAM Issues

- Computer crashes, system lockups, and unexpected shutdowns
- Memory errors appear on screen
- Blank screen on bootup
- Computer does not boot and POST beep codes sound
- Some or all newly installed RAM is not recognized



Computer Memory Problems

OV 14 - 17

Common External Power Source Problems

- Line noise
- Power sag
- Power under-voltage or brownout
- Frequency variation
- Overvoltage
- Power Failure



OV 14 - 18

Common Power Supply Problems

- Fans will not work
- No power
- Fans spin but no power to other devices.
- Computer will not start or reboots after startup
- An odor or burning smell is coming from the power supply
- Smoke coming from the computer
- Loud noise is coming from the power supply



OV 14 - 19

Power Supply Troubleshooting Considerations

- Verify how much power each system component requires.
- Verify that the usage does not exceed the power supply capacity.
- When replacing, consider the connection type and number of connectors.
- Verify that the output voltages are within the range of what is expected.



OV 14 - 20

Maintenance and Handling Techniques

- Verify the cooling system is clean of dust and that the laptop is properly ventilated.
- Follow the best practices and guidelines for proper batter maintenance.
- Use proper transportation and handling guidelines with the laptop



OV 14 - 21

Operating Environment Best Practices

- Avoid high temperatures
- Avoid rapid changes in temperature
- Avoid high humidity
- Avoid low humidity
- Be aware of RF interference and use precautions.



OV 14 - 22

General Laptop Issues

- Display issues
- Battery issues
- Device temperature
- Battery power issues
- No power when connected to AC
- Ghost cursor issues



OV 14 - 23

Common Laptop Keypad Issues

- Nonstandard key placement
- Function keys
- Numeric keys
- Sticking keys



OV 14 - 24

Common Wireless Connectivity Issues

- Intermittent wireless connectivity
- No Bluetooth connectivity
- No wireless connectivity



OV 14 - 25

Laptop Disassembly Best Practices

- Document and label all cable and screw locations as you go.
- Organize the parts as you remove them from the laptop.
- Refer to the manufacturer's documentation to help with locating components.
- Use the appropriate hand tools, such as a small screw driver to remove the screws.



OV 14 - 26

Common Printer Symptoms

- **Jobs in queue do not print**
- **Print function not as expected**
- **Print quality issues**
- **Access issues**
- **Garbled output**
- **Jobs do not appear in queue**
- **Sporadic problems due to environment**



/ 14 - 29

Reflective Questions

- 1. In your current job role, have you had to troubleshoot computer hardware problems? If so, what did you do and how did you resolve the issue?**
- 2. What hardware components do you expect to have to troubleshoot most often at your workplace?**

Troubleshooting System-Wide Issues



- Troubleshoot Operating Systems
- Troubleshoot Wired and Wireless Networks
- Troubleshoot Common Security Issues



OV 15 - 1

Operating System Troubleshooting Tools



- Recovery Console
- WinRE
- Bootrec.exe
- System File Checker (sfc)
- Repair Disks
- Pre-installation environments
- MSCONFIG
- DEFRAG
- REGEDIT
- Event Viewer
- Safe Mode
- Command Prompt
- Remote Desktop
- Emergency repair disk
- ASR

OV 15 - 2

BSOD

System Shutdown

Summary

A problem has been detected and windows has been shut down to prevent damage to your computer.

If this is the first time you've seen this Stop error screen, restart your computer. If this screen appears again, follow these steps:

Check to make sure any new hardware or software is properly installed. If this is a new installation, ask your hardware or software manufacturer for any windows updates you might need.

If problems continue, disable or remove any newly installed hardware or software. Disable BIOS memory options such as caching or shadowing. If you need to use Safe Mode to remove or disable components, restart your computer, press F8 to select Advanced Startup Options, and then select Safe Mode.

Technical information:

*** STOP: 0x000000E2 (0x00000000,0x00000000,0x00000000,0x00000000)

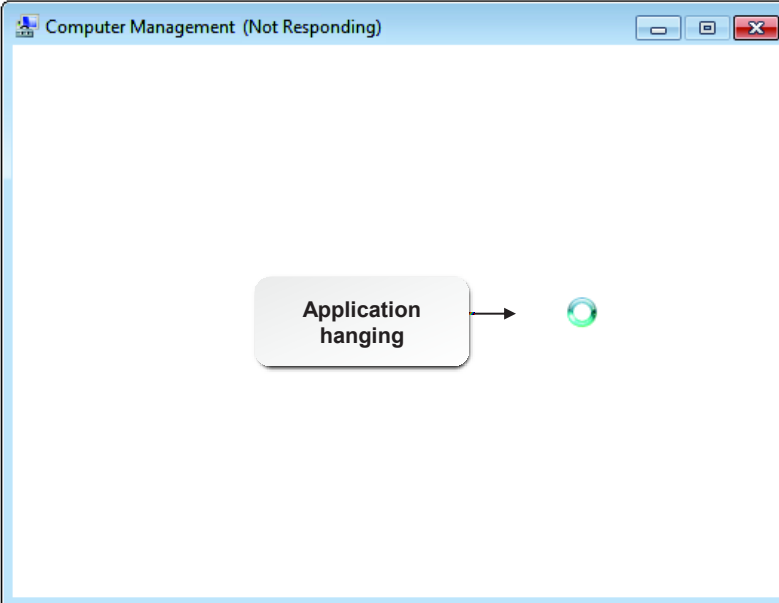
Memory Data

beginning dump of physical memory
dumping physical memory to disk: 21

All Blue Background

System Lockup Errors

Not responding message



Application hanging

Input/Output Device Issues

- **Missing or loose mouse or keyboard connection**
- **Blocked signals for wireless devices**
- **Missing or incorrect driver for specialty device**
- **Misconfigured monitor settings**



OV 15 - 5

Application Errors

- **Cannot install application**
- **Installed application will not start or load**
- **The application cannot be found**
- **GPF is causing issues**
- **Illegal operations is attempted and forces application shutdown**
- **An invalid working directory issues.**



OV 15 - 6

Boot Issues

- POST errors
- Invalid boot disk
- Failure to boot
- Missing OS
- Missing NTLDR
- Missing dll message
- System files fail to open or are missing
- Device or service failed during startup
- Boots to Safe Mode
- Device or program in registry not found



OV 15 - 7

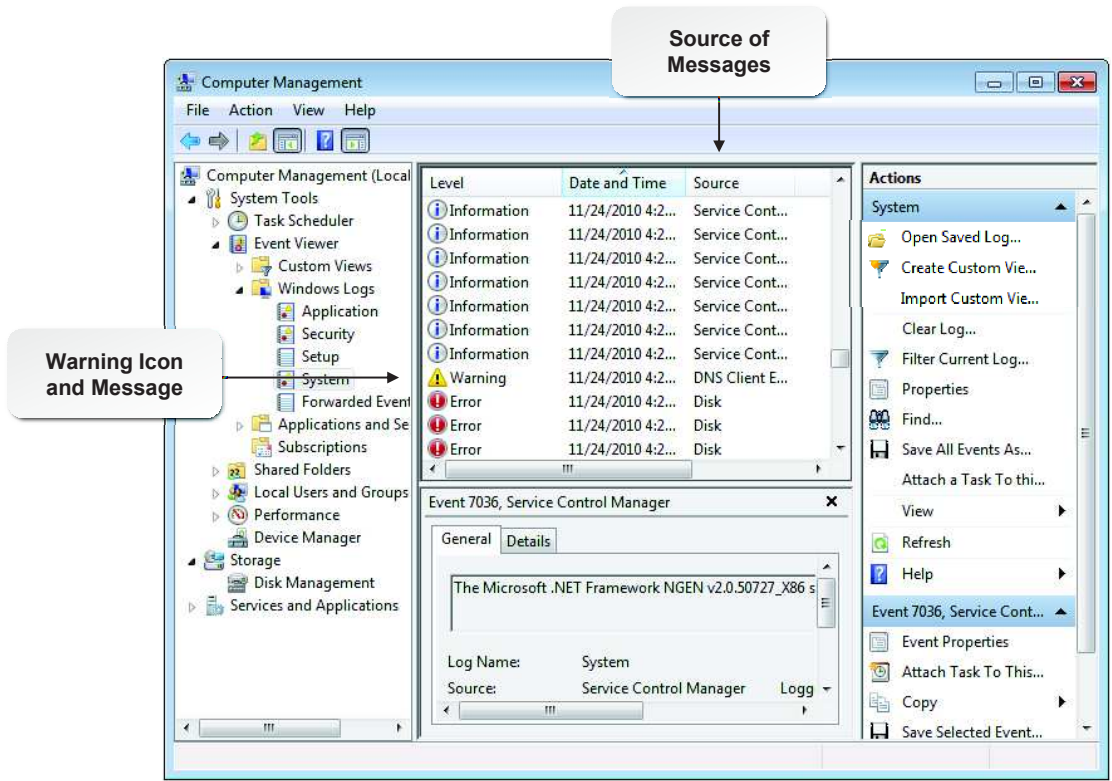
Common Operating System Symptoms

- General issues
- Memory issues
- Low system performance and disk issues
- CPU issues
- Shutdown issues
- RAID not detected



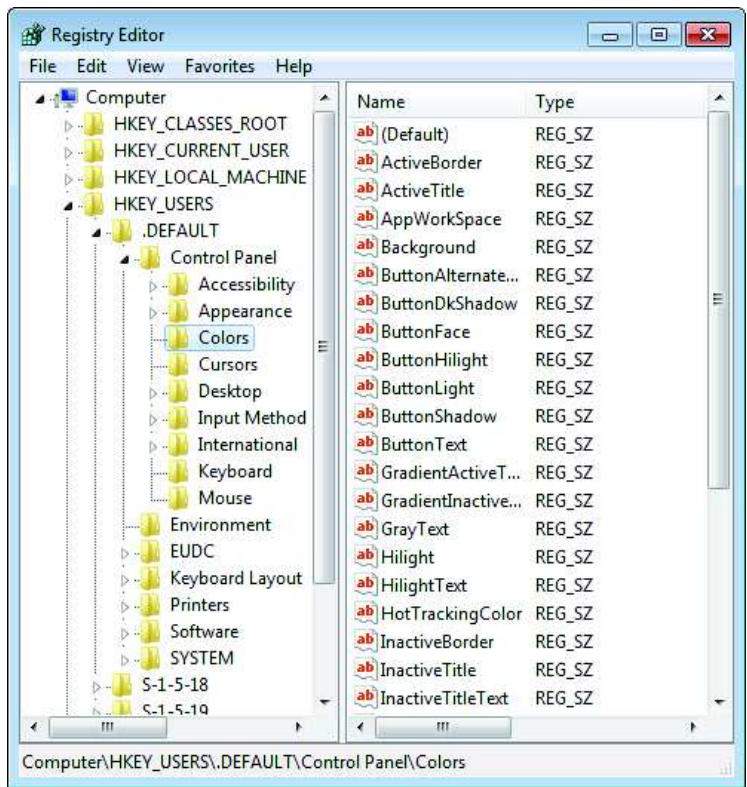
OV 15 - 8

Error and Warning Messages in Event Viewer



Registry Error Messages

- Stop errors or other errors
- Registry access, value entries, or files
- Maintain registry backups
- Find errors in KnowledgeBase



Common Network Issues

- No connectivity or connection lost
- Slow transfer speeds
- Local connectivity but no Internet connection
- Limited connectivity
- IP conflict
- Intermittent connectivity
- Low RF signals
- APIPA address issues



OV 15 - 11

Network Troubleshooting Utilities

Common utilities include:

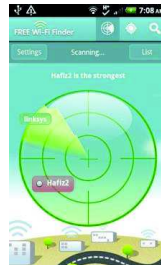
- IPCONFIG
- PING
- NSLOOKUP
- TRACERT
- NETSTAT
- NBSTAT
- NET



OV 15 - 12

Network Troubleshooting Tools

- Cable tester
- Loopback plug
- Punch down tools
- Toner probes
- Wire strippers
- Crimper
- Wireless locator



Common Security Issues

- Pop-ups
- Browser redirections
- Security alerts
- Internet connectivity issues
- PC locks up
- Windows update failures
- Rogue antivirus
- Email issues
- Access denied
- Malicious software
- File system issues
- Data access issues
- Backup security



Malware Removal Process

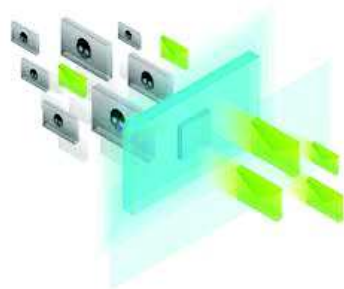
- Identify malware symptoms
- Disable system restore
- Remediate infected systems
- Quarantine infected systems
- Enable system restore and create restore point
- Enable end users



OV 15 - 15

Malware Removal Best Practices

- Always use trusted installation sources and websites.
- Always use email attachment protection.
- Research malware types



OV 15 - 16

Security Troubleshooting Tools

- Anti-malware software
- Antivirus software
- Anti-spyware software
- Pop-up blockers
- Spam blockers
- Recovery Console
- System Restore
- Event Viewer
- Pre-installation environments



OV 15 - 17

Reflective Questions

1. What system wide area do you think you will provide the most support to users?
2. Have you ever had to recover a severely compromised computer system? If so, then describe your experience.

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