Lesson 1 - Common Computing Devices	
Internet	a worldwide network of networks based on the TCP/IP protocol
	not owned by a single company or organization.
	high-speed data communications lines between major host computers that route data and messages.
Battery	Power source for a portable computer, typically a rechargeable Lithium-ion (Li-ion) type
	A small coin cell battery is also used in a computer to power CMOS RAM.
Cell phone(mobile telephony)	works through a series of base station transmitters (cells) that connect to the cellular and telephone networks
	an be used for voice and data communications
	2G(GSM; up to about 14 Kbps)
	2.5G(GPRS, HSCSD, and EDGE; up to about 48 Kbps)
	3G(WCDMA; up to about 2 Mbps)
	4G(LTE; up to about 150 Mbps)
	5G(up to 1 Gbps)
Embedded System	A computer system that is designed to perform a specific, dedicated function
	e.g:microcontroller in a medical drip or components in a control system managing a water treatment plant.
Firmware	software instructions stored semi-permanently (embedded) on a hardware device
	e.g. BIOS instructions stored in a ROM chip on the motherboard for instance
Internet of Things-(IoT)	global network of personal devices
	such as: phones, tablets, and fitness trackers, home appliances, home control systems, vehicles, and other items that have been equipped with sensors, software, and network connectivity.
Laptop/Notebook	portable computer offering similar functionality to a desktop computer
	comes with built-in LCD screens and input devices (keyboard and touchpad)
	can be powered from building power (via an AC Adapter) or by a battery
	Peripheral devices can be connected via USB, PCMCIA, or ExpressCard adapters.
Mobile Device	Portable phones and smart phones can be used to interface with workstations using technologies such as Bluetooth or USB.

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Lesson 1 - Common Computing Devices (cont)

	As such, they are increasingly the focus of viruses and other malware
	Portable devices storing valuable information are a considerable security risk when taken offsite.
Mobile Phone	UK English term for a cell phone.
Smartphone	mobile device that provides both phone and SMS text messaging functionality and general purpose computing functionality((web browsing and email plus running software apps))
	typically have screen sizes of between 4 and 5.5 inches.
Tablet	A type of ultra-portable laptop with a touchscreen
	usually based on form factors with either 7" or 10" screens
	A phablet is a smaller device (like a large smartphone).

Lesson 2 - Using a Workstation

Control Panel	The primary management interface for Windows.
Desktop	primary user interface in Windows 7 and earlier is referred to as the desktop
	at the top of the object hierarchy in Windows Explorer
	ontaining the Computer, Documents, Network, and Recycle Bin objects
	also stores shortcuts to programs, files, and system objects.
Notification Area	Part of the taskbar (on the right-hand side)
	displays background applications and status information (such as the date and time, anti-virus software, network connections, and alerts)
	In early versions of Windows this was managed by a systray process and is sometimes still referred to as the system tray.
Shortcut	An item typically placed on the desktop, or in the Start menu, which points to a program or data file.
	When selected, the referenced program or file loads.
Start Menu	The standard interface provided to locate and load applications in Windows 7 and earlier
	the layout and features of the Start menu have changed in each version.
Start Screen	User interface introduced with Windows 8 to replace the Start Menu and manage a Windows device using a touchscreen.
	Windows devices can be set to show the Start Screen or the Desktop at startup.
Taskbar	means of locating running programs and also contains the Start menu and system tray/notification area (as well as an optional Quick Launch toolbar)

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Lesson 2 - Using a Workstation (cont)

It appears (by default) at the bottom of the desktop.

Lesson 3: Using an OS

Kernel	All operating systems have a kernel
	which is a low-level piece of code responsible for controlling the rest of the operating system
	Windows uses a multiprocessor aware, pre-emptive multitasking kernel.
SOHO (Small Office Home Office)	Typically used to refer to network devices designed for small-scale LANs (up to 10 users).
Android	Open source mobile (smartphone and tablet) OS software.
	developed by the **Open Handset Alliance** (primarily sponsored by Google)
Apple	Desktop and portable computer (and latterly smartphone and tablet) manufacturer
	Apple computers are built to use OS X which makes them incompatible with IBM PC/Windows-based software.
Chrome OS	derived from Linux, via an open source OS called **Chromium**
	Chrome OS itself is proprietary
	developed by Google to run on specific laptop (chromebooks) and PC (chromeboxes) hardware.
iOS	Mobile OS developed by Apple for its iPhone and iPad devices
Linux	An open-source operating system supported by a wide range of hardware and software vendors.
Microsoft	world's foremost supplier of operating system and Office productivity software
	dominated the PC market since the development of the first IBM compatible PCs running MS-DOS.
OS X	Operating system designed by Apple for their range of iMac computers, Mac workstations, and MacBook portables
	OS X is based on the BSD version of UNIX
	OS X is well supported by application vendors, especially in the design industry (Adobe/Macromedia).
UNIX Systems	originally developed by the telecommunications company AT&T during the late 1960s and early 1970s
	now a family of more than 20 related operating systems that are produced by various companies
	operating system of choice for many high powered workstation

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Lesson 3: Using an OS (cont)	
	capable of supporting parallel processing and can run on a wide variety of platforms
	offers a multitude of file systems in addition to its native system.
	UNIX servers are the main types of server that form the Internet and are able to use the TCP/IP protocol suite to provide compatibility between networks.
Virtualization Technology	Software allowing a single computer (the host) to run multiple "guest" operating systems (or Virtual Machines [VM])
	The VMs are configured via a hypervisor or VM Monitor (VMM)
	Ms can be connected using virtual networks (vSwitch) or leverage the host's network interface(s)
	It is also possible for the VMs to share data with the host (via shared folders or the clipboard for instance)
	VT is now used as major infrastructure in data centers as well as for testing and training.
VM (Virtual Machine)	Operating systems running in Protected Mode can utilize a separate VM for various 32-bit processes.
	This provides protection so that each program is protected from all other programs
	refers to multiple operating systems installed on a single host PC using virtualization software (a hypervisor), such as Microsoft Hyper-V or VMware.
Windows	Ubiquitous operating system from Microsoft.
	Windows started as version 3.1 for 16-bit computers
	A workgroup version provided rudimentary network facilitie
	Windows NT 4 workstations and servers (introduced in 1993) provided reliable 32-bit operation and secure network facilities, based around domains
	The Windows 9x clients (Windows 95, 98, and Me) had far lower reliability and only support for workgroups, but were still hugely popular as home and business machines
	Windows 2000 workstations (Windows 2000 Professional) married the hardware flexibility and user interface of Windows 9x to the reliability and security of Windows NT, while the server versions saw the introduction of Active Directory for managing network objects

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Lesson 3: Using an OS (cont)	
	Windows XP is the mainstream client version (with Home, Professional, Media Center, Tablet PC, and 64-bit editions) while Windows Server 2003/2008/2012/2016 provide the latest generation of servers
	The subsequent client releases of Windows (Vista and Windows 7) feature a substantially different interface (Aero) with 3D features as well as security improvements
	The latest client versions - Windows 8 and Windows 10 - are designed for use with touchscreen devices.
Windows Explorer	The standard interface provided for the management of files and folders under Windows
	This has been renamed File Explorer in Windows 10 and is often just known as "Explorer."

Lesson 4: Managing an OS	
Computer Management Console	provides tools for administering the local computer, including Device Manager, Event Viewer, Disk Management, Services, and Performance Monitor
**	**To access the console, alt-click (My) Computer and select Manage.**
DOS (Disk Operating System)	Single tasking, real-mode operating system developed by Microsoft and widely adopted in the early 1980s
	The last Microsoft release is MS-DOS Version 6.22, in June of 1994.
GUI (Graphical User Interface)	provides an easy to use, intuitive interface for a computer operating system
	Most GUIs require a pointing device, such as a mouse, to operate efficiently.
	One of the world's first GUI-based operating systems was the Apple Mac OS, released in 1984
	Thereafter, Microsoft produced their Windows family of products based around their GUI
	In fact, recognizing that GUI covers a whole range of designs, the Windows interface is better described as a WIMP (Windows, Icons, Menus, Pointing [device]) interface.
Registry	The registry database is the configuration database for Windows
	The registry can be directly edited by experienced support personnel using a variety of tools
	The registry should be backed up before system changes are made.

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Lesson 4: Managing an OS (cont)	
Service	Windows machines run services to provide functions; for example, Plug-and-Play, the print spooler, DHCP client, and so on
	These services can be viewed, configured, and started/stopped via the Services console
	You can also configure which services run at startup using msconfig.
	You can view background services (as well as applications) using the Processes tab in Task Manager.
Task Manager	Program used to provide recovery of stalled applications.
	also allows for control of running tasks, processes, and CPU/memory utilization.
	can be displayed by pressing Ctrl+Shift+Esc, Ctrl+Alt+Del, or alt-clicking the taskbar.
Task Scheduler	enables the user to perform an action (such as running a program or a script) automatically at a pre-set time or in response to some sort of trigger
UAC (User Account Control)	Security system in Windows designed to restrict abuse of accounts with administrator privileges.
	Actions such as installing hardware and software can be performed without changing accounts but the user must authorize the use of administrative rights by clicking a prompt or re-entering user credentials.
Virtual Memory	Virtual memory (also known as swapping or paging) is an area on the hard disk allocated to contain pages of memory
	When the operating system doesn't have sufficient physical memory (RAM) to perform a task (such as load a program) pages of memory are moved to the paging file (also known as a swap file)
	This frees physical RAM to enable the task to be completed
	When the paged RAM is needed again, it is re-read into memory.
	Understanding and configuring virtual memory settings is critical to optimizing the performance of the operating system.

Lesson 5: Troubleshooting and Support	
Knowledge Base	A searchable database of product FAQs (Frequently Asked Questions), advice, and known troubleshooting issues.
	The Microsoft KB is found at http://support.microsoft.com/search.

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Lesson 5: Troubleshooting and Support (cont)	
POST (Power-On Self-Test)	The POST procedure is a hardware checking routine built into the PC firmware.
	This test sequentially monitors the state of the memory chips, the processor, system clock, display, and firmware itself.
	Errors that occur within vital components such as these are signified by beep codes emitted by the internal speaker of the computer
	Further tests are then performed and any errors displayed as on-screen error codes and messages.
	Additional interpreter boards can be purchased that can supply information concerning boot failure.
Troubleshooting	requires a methodical approach
	Having ensured that any data has been backed up, the first step is to gather information (from the user, error messages, diagnostic tools, or inspection).
	The next is to analyze the problem, again consulting documentation, web resources, or manufacturer's help resources if necessary.
	When analyzing a problem, it helps to categorize it (for example, between hardware and software).
	The next step is to choose and apply the most suitable solution
	Having applied a solution, the next step is to test the system and related systems to verify functionality
	The last step is to document the problem, steps taken, and the outcome
	If the problem cannot be solved, it may be necessary to escalate it to another technician or manager.

Lesson 6: Using Data Types and Units	
ASCII	7-bit code page mapping binary values to character glyphs
	Standard ASCII can represent 127 characters, though some values are reserved for non-printing control characters.
Binary	Notational system with 2 values per digit (zero and one)
	Computers process code in binary because the transistors in its CPU and memory components also have two states (off and on).
Bit/Byte	Units of storage. (See: Data Units.)
bps (Bits per Second)	The term "bits per second" is used to describe data transfer speed - the higher the number, the higher the transmission speed.
Boolean	Data type support 1-bit storage, representing FALSE and TRUE

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Lesson 6: Using Data Types and Units (cont)

	Boolean logic is a statement that resolves to a true or false condition and underpins the branching and looping features of computer code.
Char	Data type supporting storage of a single character.
Float	Data type supporting storage of floating point numbers (decimal fractions).
Integer	Data type supporting storage of whole numbers.
String	Data type supporting storage of a variable length series of characters.
Data Rate	Data rate is the speed at which data can be sent or received between two or more computer components
	These components may be part of the same computer, or may be connected across a network.
	The type of link that exists, the bus or port to which it is connected and the rate at which the data can be understood and processed are all factors that influence data rate
	The peak (or maximum theoretical) rate needs to be distinguished from actual throughput (or sustained rate)
Data Units	The fundamental unit of data storage is the bit (binary digit) which can represent 1 or 0
	A bit can be measured in multiples using Kilobit (Kb) and Megabit (Mb)
	These units are often used to speak about network data transfer rates
	The computer industry abuses the SI system of decimal measurements where kilo=1,000, mega=1,000,000 and giga=1,000,000,000
	Kilo is given a binary interpretation (a kilobit is 2^10 = 1024 bits)
	Different units are used to describe file sizes and memory capacity. 8 bits form a byte (B). 1024 bytes make a kilobyte (that is 2 ^ 10 bytes); 1024 kilobytes (KB) make a Megabyte (MB); 1024 MB makes 1 Gigabyte (GB); 1024 GB makes 1 Terabyte (TB).
	Other units include the nibble (½byte) and the word (2 bytes).
Hexadecimal	Notational system with 16 values per digit. Values above 9 are represented by the letters A,B,C,D,E,F.
	Hex is a compact way of referring to long byte values, such as MAC and IPv6 addresses.
Transfer Rate	The amount of data that can be transferred over a network connection in a given amount of time, typically measured in bits or bytes per second (or some more suitable multiple thereof).

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Lesson 6: Using Data Types and Units (cont)	
	Transfer rate is also described variously as data rate, bit rate, connection speed, transmission speed, or (sometimes inaccurately) bandwidth or baud
	Transfer rates are often quoted as the peak, maximum, theoretical value; sustained, actual throughput is often considerably less.
Unicode	Extensible system of code pages capable of representing millions of character glyphs, allowing for international alphabets.

Lesson 7: Using Apps	
CAD (Computer-Aided Design)	Computer Aided Design (CAD) software makes technical drawings and schematics easier to produce and revise.
Compatibility Mode	Windows can run a program with settings from previous versions of Windows to try to resolve compatibility problems.
	This is configured from the program's shortcut properties dialog.
DTP (Desktop Publishing)	Desktop Publishing (DTP) is similar to word processing but with more emphasis on the formatting and layout of documents than on editing the text.
IM (Instant Messaging)	Real-time text communications products. IM also supports file exchange and remote desktop.
	Like email, communications are generally unencrypted and unauthenticated.
	can be difficult to block on private networks as most applications can work over HTTP.
Licensing	Terms governing the installation and use of operating system and application software
	A license may cover use on a single computer or by a number of devices or concurrent users at a site.
Open Source	Open source means that the programming code used to design the software is freely available.
PIM (Personal Information Manager)	software provides features for storing and organizing information such as contacts and calendar events and appointments.
Presentation	Presentation software enables users to create sophisticated business presentations that can be displayed as an on-screen slide show or printed onto overhead projector transparencies.
Spreadsheet	A spreadsheet consists of a table containing rows, columns, and cells.

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Lesson 7: Using Apps (cont)	
	When values are entered into the cells, formulas can be applied to them, enabling complex calculations to be carried out.
Word Processing	Word processing means applications that help users to write and edit documents.
	A word processor will come with features enabling the user to edit, format, and review text quickly.
Product Key	A product key is often used to authenticate the use of a software package and may be required to activate the software for use.
Program Files	Windows folder providing the default location for installation of application executables and supporting files
	Ideally, applications should not write user data back to Program Files but use the appropriate user profile folder. In x64 versions of Windows, "Program Files" stores 64-bit applications while 32-bit applications are installed to "Program Files (x86)."
RDP (Remote Desktop Protocol)	Microsoft's protocol for operating remote connections to a Windows machine (Terminal Services), allowing specified users to log onto the Windows computer over the network and work remotely.
	The protocol sends screen data from the remote host to the client and transfer mouse and keyboard input from the client to the remote host.
	It uses TCP port 3389.
System Requirements	Before installing an OS (or a software application), the installer should check that the system meets the minimum hardware requirements
	hese are typically for CPU speed, memory, and hard disk capacity.
	Most software vendors specify minimum and recommended requirements.
	A system that does not meet the minimum requirements will not be able to run the software; one that does not meet the recommended requirements will run the software slowly.
Video Conferencing	Video conferencing or Video Teleconferencing (VTC) software allows users to configure virtual meeting rooms, with options for voice, video, and instant messaging.

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Lesson 7: Using Apps (cont)

VoIP (Voice over IP)	Voice over IP or Internet telephony refers to carrying voice traffic over data networks.
	IP telephony provides integration with the fixed and mobile telephone networks
	A network carrying both voice and data is said to be converged.
	Converged networks introduce a whole new class of devices whose security implications need to be considered.
	There is also a greater vulnerability to DoS (without redundancy the network is a single point of failure for both voice and data traffic) and eavesdropping on voice communications.

Lesson 8: Programming and App Development

Pseudocode	Writing out a program sequence using code blocks but without using the specific syntax of a particular programming language.
Variable	Identifier for a value that can change during program execution.
	Variables are usually declared with a particular data type.
Vector	Identifier for a group of variables of the same type.
	The number of possible elements in a vector **can vary during program execution.**
Array	Identifier for a group of variables of the same type
	The number of possible elements in an array is fixed when the array is declared.
Constant	Identifier for a value that is fixed before program execution and does not change.
Assembly Language	A compiled software program is converted to binary machine code using the instruction set of the CPU platform
	Assembly language is this machine code represented in human-readable text.
Cloud Computing	Any environment where software (Software as a Service and Platform as a Service) or computer/network resources (Infrastructure as a Service and Network as a Service) are provided to an end user who has no knowledge of or responsibility for how the service is provided.
	Cloud services provide elasticity of resources and pay-per-use charging models

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Lesson 8: Programming and App Development (cont)	
	Cloud access arrangements can be public, hosted private, or private (this type of cloud could be onsite or offsite relative to the other business units).
HTML	The language (HyperText Markup Language) used to create web pages.
Java	Programming language used to create web server applications (J2EE) and client-side applications (running in the Java VM).
Markup Language	System of tags used to structure a document. Examples include HyperText Markup Language (HTML) and eXtensible Markup Language (XML).
OOP (Object-Oriented Programming)	Technique for creating robust code by defining classes of "things" in the code.
	The objects have attributes, methods, and properties.
	Code external to the object can only interface with it via its public methods and properties.
Web Application	Software run from a web server.
	Clients can access the application using just a web browser.
XML (eXtensible Markup Language)	A system for structuring documents so that they are human- and machine-readable.
	Information within the document is placed within tags, which describe how information within the document is structured.

Lesson 9: Using Databases	
Database	Most network applications utilize databases.
	Major database server products include Oracle, Microsoft SQL Server, IBM's DB2 and Informix, and Sybase.
	Many databases are operated using Structured Query Language (SQL, pronounced "sequel")
	The freeware MySQL database is a popular choice to provide database functionality on websites
	Database engines are often subject to software exploits, and so should be kept patched
	Database design, programming, and administration is complex and security should be considered as a critical requirement.
Relational Database	Structured database in which information is stored in tables where columns represent typed data fields and rows represent records.
	Tables can have relationships, established by linking a unique primary key field in one table with the same value in a foreign key field in another table.

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Lesson 9: Using Databases (cont)

The overall structure of a particular database and its relations is called a schema.

Lesson 10: System Components

32-bit versus 64-bit	Processing modes referring to the size of each instruction processed by the CPU. 32-bit CPUs replaced earlier 16-bit CPUs and were used through the 1990s to the present day, though most CPUs now work in 64-bit mode.
	The main 64-bit platform is called AMD64 or EM64T (by Intel)
	This platform is supported by 64-bit versions of Windows as well as various Linux distributions
	oftware can be compiled as 32-bit or 64-bit. 64-bit CPUs can run most 32-bit software but a 32-bit CPU cannot execute 64-bit software.
Adapter Card	Circuit board providing additional functionality to the computer system (video, sound, networking, modem, and so on).
	An adapter card fits a slot on the PC's expansion bus and often provides ports through slots cut into the back of the PC case.
	Different cards are designed for different slots (PCI or PCIe).
AMD (Advanced Micro Devices)	CPU manufacturer providing healthy competition for Intel.
	AMD chips such as the K6, Athlon 64, and Opteron have been very popular with computer manufacturers and have often out-performed their Intel equivalents.
ARM (Advanced RISC Machines)	Designer of CPU and chipset architectures widely used in mobile devices.
	RISC stands for Reduced Instruction Set Computing.
	RISC microarchitectures use simple instructions processed very quickly
	This contrasts with Complex (CISC) microarchitectures, which use more powerful instructions but process each one more slowly.
BIOS (Basic Input/Output System)	The BIOS is firmware that contains programs and information relating to the basic operation of PC components such as drives, keyboard, video display, and ports.

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Lesson 10: System Components (cont)	
	It also contains specific routines to allow set-up configuration to be viewed and edited and it contains the self-diagnostic Power-On Self-Test (POST) program used to detect fundamental faults in PC components
	BIOS can also be used to secure components not protected by the OS by specifying a supervisor password (to prevent tampering with BIOS settings) and a user password (to boot the PC).
Bus	Buses are the connections between components on the motherboard and peripheral devices attached to the computer.
	Buses are available in industry standard formats, each with its own advantages and disadvantages
	The standard functions of a bus are to provide data sharing, memory addressing, power supply, and timing.
	Common bus types include PCI, PCI Express, ExpressCard, and USB.
Celeron Processor Series	Budget processor models produced by Intel alongside their Pentium and Core ranges.
Chipset	The chipset provides communications between different components by implementing various controllers (for memory, graphics, I/O, and so on).
	The chipset may also provide "integrated" adapters (video, sound, and networking for instance)
	Historically, "fast" controllers (memory and video) were part of a "northbridge" chipset, placed close to the CPU and system memory.
	Slower buses were part of a "southbridge" chipset
	In modern PC architecture, video and memory controllers are part of the CPU (on-die), the northbridge would mostly handle PCI Express adapters and the southbridge would host SATA, USB, audio and LAN functions, plus PCI/PATA legacy bus support.
Cooling Device	A CPU generates a large amount of heat that must be dissipated to prevent damage to the chip
	Generally, a CPU will be fitted with a heatsink (a metal block with fins) and fan

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Lesson 10: System Components (cont)	
	Thermal compound is used at the contact point between the chip and the heatsink to ensure good heat transfer.
	The PSU also incorporates a fan to expel warm air from the system.
	Modern motherboards have temperature sensors that provide warning of overheating before damage can occur.
	Very high performance or overclocked systems or systems designed for quiet operation may require more sophisticated cooling systems, such as liquid cooling.
	Cooling systems that work without electricity are described as passive; those requiring a power source are classed as active.
Core Processor Series	The latest generation of Intel processors.
	The Core, Core 2, and Core iX CPUs were developed from the Pentium M architecture and have taken on the position of Intel's premium processor for both desktop and mobile platforms, replacing the long-standing Pentium brand.
CPU (Central Processing Unit)	The principal microprocessor in a computer or smartphone responsible for running operating system and applications software.
DDR SDRAM (Double Data Rate SDRAM)	Standard for SDRAM where data is transferred twice per clock cycle (making the maximum data rate [64+64] x the bus speed in bps)
	DDR2/DDR3 SDRAM uses lower voltage chips and higher bus speeds.
DIMM (Dual Inline Memory Module)	Dual in-line memory modules are the standard packaging for system memory.
	There are different pin configurations for different RAM types (SDRAM [168], DDR SDRAM [184], and DDR2/3 SDRAM [240]).
DRAM (Dynamic RAM)	Dynamic RAM is a type of volatile memory that stores data in the form of electronic charges within transistors.
	Due to the effects of leakage and the subsequent loss of electrical charge, DRAM has to be refreshed at regular intervals.

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Lesson 10: System Components (cont)	
	Memory refreshing can be performed when the data bits are accessed regularly, but this periodic access slows down the operation of this memory type.
	Standard DRAM is the lowest common denominator of the DRAM types.
	Modern PCs use a DRAM derivative to store data (currently DDR2/3 SDRAM).
Dual Core	CPU design that puts two chips onto the same package; a cheap means of providing SMP.
FSB (Frontside Bus)	The bus between the CPU and the memory controller (system RAM).
Intel	Intel processors were used in the first IBM PCs and the company's CPUs and chipsets continue to dominate the PC and laptop market.
Liquid Cooling System	Using water piped around the PC and heatsinks for cooling.
	This is more efficient and allows for fewer fans and less noise.
Motherboard	The computer motherboard, also called the system board, provides the basic foundation for all of the computer's hardware including the processor, RAM, BIOS, and expansion cards.
	Several motherboard standards are available each with a different layout and associated advantages.
Multiprocessing	Multiprocessing can be used in systems where two or more processors are used on a single motherboard.
	This can allow operations to be shared thereby increasing performance.
	In order to use multiprocessing arrangements, the PC must have a compatible motherboard, an operating system that is able to use multiple processors, and well-written software that does not intensively use one processor above another.
	Business and professional editions of Windows support a type of multiprocessing called Symmetric Multiprocessing (SMP) with a maximum of 2 CPUs.
PCI (Peripheral Component Interc-onnect) Bus	The PCI bus was introduced in 1995 with the Pentium processor.
	It connects the CPU, memory, and peripherals to a 32-bit working at 33 MHz.

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Lesson 10: System Components (cont)	
	PCI supports bus mastering, IRQ steering, and Plug-and-Play.
	Later versions defined 64-bit operation and 66 MHz clock but were not widely adopted on desktop PCs.
PCI Express (PCIe)	PCI Express (PCIe) is the latest expansion bus standard. PCI Express is serial with point-to-point connections.
	Each device on the bus can create a point-to-point link with the I/O controller or another device.
	The link comprises one or more lanes (x1, x2, x4, x8, x12, x16, or x32)
	Each lane supports a full-duplex transfer rate of 250 MBps (v1.0), 500 MBps (v2.0), or 1 GBps (v3.0)
	The standard is software compatible with PCI, allowing for motherboards with both types of connector.
Pentium Processor Series	Previously Intel's premium CPU brand, now re-positioned as a chip for reliable "always-on, always-available" systems.
RAM (Random Access Memory)	Random Access Memory is the principal storage space for computer data and program instructions.
	RAM is generally described as being volatile in the sense that once power has been removed or the computer has been rebooted, data is lost.
SDRAM (Synchronous DRAM)	Synchronous DRAM is a variant on the DRAM chip designed to run at the speed of the system clock thus accelerating the periodic refresh cycle times.
	SDRAM can run at much higher clock speeds than previous types of DRAM
	Basic SDRAM is now obsolete and has been replaced by DDR/DDR2/3 SDRAM.

Lesson 11: Using Device Interfaces	
IEEE (Institute of Electrical and Electronics Engineers)	The Institute of Electrical and Electronics Engineers was formed as a professional body to oversee the development and registration of electronic standards
	Examples of IEEE standards include the 802 protocols that describe the function and architecture of different network technologies.

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Lesson 11: Using Device Interfaces (cont)	
Bluetooth	Short-range radio-based technology, working at up to 10m (30 feet) at up to 1 Mbps used to connect peripherals (such as mice, keyboards, and printers) and for communication between two devices (such as a laptop and smartphone).
	The advantage of radio-based signals is that devices do not need line-of-sight, though the signals can still be blocked by thick walls and metal and can suffer from interference from other radio sources operating at the same frequency (2.4 GHz)
	Bluetooth Low Energy (BLE) is designed for small battery-powered devices that transmit small amounts of data infrequently
	BLE is not backwards-compatible with "classic" Bluetooth though a device can support both standards simultaneously.
Fax	Transferring an image of a document over a telephone line.
	Faxing is generally accomplished between two fax modems, often incorporated into Multifunction Devices or PC equipment.
Firewire (IEEE 1394 Standard)	Firewire is the brand name for the IEEE standard 1394.
	This serial SCSI bus standard supports high data rates (up to 400 Mbps) and this in turn, makes it attractive for applications requiring intensive data transfer (such as video cameras, satellite receivers, and digital media players).
Fn (Function) Keys	Special command key combos on laptop keyboards for adjusting display output, volume, disabling wireless radio, and so on.
HDMI (High Definition Multimedia Interface)	High-specification digital connector for audio-video equipment.
Hot Swappable	A device that can be added or removed without having to restart the operating system.
I/O (Input/Output) Ports	An input-output port essentially describes a device connection through which data can be sent and received.
Keyboard	The oldest PC input device and still fundamental to operating a computer.
	Desktop keyboards can have PS/2, USB, or wireless (IrDA or Bluetooth) interfaces.

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Lesson 11: Using Device Interfaces (cont)	
	There are many different designs and layouts for different countries. Some keyboards feature special keys.
Mouse	The essential device to implement a WIMP GUI, a mouse simply controls the movement of a cursor that can be used to select objects from the screen.
	All Windows mice feature two click buttons, which are configured to perform different actions.
	Many mice also feature a scroll wheel.
	A mouse can be interfaced using a PS/2, USB, or wireless (IrDA or Bluetooth) port.
Lightning	Proprietary connector and interface for Apple devices.
Plug-and-Play (PnP)	A Plug-and-Play system (comprising a compatible BIOS, operating system, and hardware) is self-configuring.
	When a hardware device is added or removed, the operating system detects the change and automatically installs the appropriate drivers
PS/2 Connector	A port for attaching a keyboard and mouse to a desktop computer, now largely replaced by USB.
RCA Connector	Good quality connector with a distinctive collar or ring used for a variety of Audio/Visual (A/V) functions and equipment.
	The connector is named after its developer (Radio Corporation of America) but the socket is also referred to as a phono plug.
Resolution	A digital image is made up of many thousands of picture elements (pixels).
	Resolution describes the number of dots that an imaging device can use to sample or display the image, measured in pixels per inch (ppi); the higher the resolution, the better the quality.
	On a digital printer, the resolution is the number of toner or ink dots that the print engine can put on paper (measured in dots per inch [dpi]).
	Note that sometimes dpi is used interchangeably with ppi to describe scanner or monitor resolution, but image pixels and printer dots are not equivalent, as multiple print dots are required to represent a single image pixel accurately.

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Lesson 11: Using Device Interfaces (cont)	
RFID (Radio Frequency IDentification)	A chip allowing data to be read wirelessly.
	RFID tags are used in barcodes and smart cards.
RJ (Registered Jack) Connector	Connector used for twisted pair cabling. 4-pair network cabling uses the larger RJ-45 connector.
	Modem/telephone 2=pair cabling uses the RJ-11 connector.
Stylus	A digitizer usually also employs a stylus as a pointing device (rather than using a finger), often as a drawing tool.
Thunderbolt	The Thunderbolt (TB) interface was developed by Intel and is primarily used on Apple workstations and laptops.
	Thunderbolt can be used as a display interface (like DisplayPort) and as a general peripheral interface (like USB 3).
Touchpad	Input device used on most laptops to replace the mouse.
	The touchpad allows the user to control the cursor by moving a finger over the pad's surface.
	There are usually buttons too but the pad may also recognize "tap" events and have scroll areas.
USB (Universal Serial Bus)	USB permits the connection of up to 127 different peripherals. A larger Type A connector attaches to a port on the host; Type B and Mini- or Micro- Type B connectors are used for devices.
	USB 1.1 supports 12 Mbps while USB 2.0 supports 480 Mbps and is backward compatible with 1.1 devices (which run at the slower speed).
	USB devices are hot swappable.
	A device can draw up to 2.5W power.
	USB 3.0 defines a 4.8 Gbps SuperSpeed rate and can deliver 4.5W power.
VGA (Video Graphics Array) Connector	A 15-pin HD connector has been used to connect the graphics adapter to a monitor since 1987.
	The use of digital flat-panel displays rather than CRTs means that as an analog connector, it is fast becoming obsolete.
Video Card	Provides the interface between the graphics components of the computer and the display device.
	A number of connectors may be provided for the display, including VGA, DVI, and HDMI.
	Graphics adapters receive information from the microprocessor and store this data in video RAM.

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Lesson 11: Using Device Interfaces (cont)

	An adapter may support both analog and digital outputs or analog/digital only (as most LCDs use digital inputs the use of analog outputs is declining).
	Most adapters come with their own processor (Graphics Processing Unit [GPU]) and onboard memory.
Video Standards	Video standards define the resolution and color depth for a graphics adapter and computer display.
	Early standards defined monochrome, low resolution displays.
	The VGA standard defined a standard graphics mode of 640x480 in 16 colors.
	Super VGA (SVGA) standard defines an extensible series of graphics modes, the default being 800x600 in True Color (24-bit).
	There are also various XGA standards defining resolutions greater than 1024x768 (SXGA, UXGA), some of which are widescreen formats (WSXGA+, WUXGA).

Lesson 12: Using Peripheral Devices

Audio Card	Adapter card providing sound playback and recording functionality.
Audio Port	A number of different audio ports exist on modern computer motherboards or on specialist sound cards.
	Commonly audio ports may be marked as: audio out, audio in, speaker out, microphone input/mic, and headphones.
CRT (Cathode Ray Tube) Monitor	A CRT receives an analog signal from the graphics adapter and forms a color image on the screen by illuminating red, green, and blue dots (triads), The screen size is the diagonal distance across the face of the CRT, though part of this area may be obscured by the case, making the viewable area considerably less than the quoted screen size.
	CRTs are no longer mass-manufactured and modern systems use LCD panels.
Device Driver	A small piece of code that is loaded during the boot sequence of an operating system.

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Lesson 12: Using Peripheral Devices (cont)	
	This code, usually provided by the hardware vendor, provides access to a device, or hardware, from the OS kernel.
	Under Windows, a signing system is in place for drivers to ensure that they do not make the OS unstable.
Device Manager	Primary interface for configuring and managing hardware devices in Windows.
	Device Manager enables the administrator to disable and remove devices, view hardware properties and system resources, and update device drivers.
Digital Camera (Digicam)	A version of a 35mm film camera where the film is replaced by light-sensitive diodes (an array of CCDs [Charge Coupled Devices]) and electronic storage media (typically a flash memory card).
	The sensitivity of the array determines the maximum resolution of the image, typically 5 megapixels (2560x1920) or better.
	A digital camera can be connected to a computer via a USB or Firewire port.
DisplayPort	Digital A/V interface developed by VESA.
	DisplayPort supports some cross-compatibility with DVI and HDMI devices.
DVI (Digital Video Interface)	Video adapter designed to replace the VGA port used by CRT monitors.
	The DVI interface supports digital only or digital and analog signaling.
Flatbed Scanner	A type of scanner where the object is placed on a glass faceplate and the scan head moved underneath it.
Fuser	Assembly that fixes toner to media.
	This is typically a combination of a heat and pressure roller, though non-contact flash fusing using xenon lamps is found on some high-end printers.
Ink Dispersion Printer	Better known as inkjets, this is a type of printer where colored ink is sprayed onto the paper using microscopic nozzles in the print head.

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Lesson 12: Using Peripheral Devices (cont)

	There are two main types of ink dispersion system: thermal shock (heating the ink to form a bubble that bursts through the nozzles) and piezoelectric (using a tiny element that changes shape to act as a pump).
Laser Printer	A type of printer that develops an image on a drum using electrical charges to attract special toner then applying it to paper.
	The toner is then fixed to the paper using a high-heat and pressure roller (fuser).
	The process can be used with black toner only or four color toner cartridges (Cyan, Magenta, Yellow, and Black) to create full-color prints.
	Monochrome laser printers are the "workhorses" of office printing solutions.
LCD (Liquid Crystal Display) Panel	A display technology where the image is made up of liquid crystal cells controlled using electrical charges.
	Modern active matrix displays produce high quality images.
	LCD panels are used on portable computers and (as prices have fallen) are popular with desktop systems too, as they take up much less desk space than CRTs.
	The main problem with LCDs is that they are not good at displaying an image at any resolution other than the native resolution of the display.
Multimedia	Multimedia refers to PC components that can playback and record sound and video (or to sound and video files).
	There are numerous sound and video file formats, including legacy Windows-specific formats such as WAV (for audio) or AVI (for video and audio).
	The preferred file format for Windows Media Player is ASF (Advanced Systems Format), which is usually compressed (WMA or WMV)
	Other file formats include those used for Apple's QuickTime player (MOV and QT), Apple's iTunes format (AIFF), and RealNetworks player (RA or RAM).
	The most popular standards-based format is MPEG.
Network Adapter (NIC [Network Interface Card])	The network adapter allows a physical connection between the host and the transmission media

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Lesson 12: Using Peripheral Devices (cont)	
	A NIC can address other cards and can recognize data that is destined for it, using a unique address known as the Media Access Control (MAC) address
	The card also performs error checking. Network cards are designed for specific types of networks and do not work on different network products.
	Different adapters may also support different connection speeds and connector types.
NFC (Nearfield Communications)	Standard for peer-to-peer (2-way) radio communications over very short (around 4") distances, facilitating contactless payment and similar technologies.
	NFC is based on RFID.
OCR (Optical Character Recognition)	Software that can identify the shapes of characters and digits to convert them from printed images to electronic data files that can be modified in a word processing program.
	Intelligent Character Recognition (ICR) is an advanced type of OCR, focusing on handwritten text.
Printer	"Printer" is often used to mean "print device" but also refers to a term used to describe the software components of a printing solution.
	The printer is the object that Windows sends output to.
	It consists of a spool directory, a printer driver, and configuration information.
Projector	Large format display technology.
	Projectors can use CRT or LCD mechanisms but the market-leading technology is generally considered to be DLP.
Scanner	A type of photocopier that can convert the image of a physical object into an electronic data file.
	The two main components of a scanner are the lamp, which illuminates the object, and the recording device, an array of CCDs (Charge Coupled Devices).
	There are flatbed and sheet-fed versions, with sheet-fed versions typically being incorporated with a printer and fax machine into a multifunction device.

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Lesson 12: Using Peripheral Devices (cont)

	Scanners can output images directly to a printer or to a suitable file format (such as JPEG, PNG, or TIFF).
	Scanners can also interface with applications software using one of several interfaces (TWAIN, WIA, SANE, or ISIS).
Test Page	When a printer is installed or reconfigured, the installer should print a test page to verify functionality.
TFT (Thin Film Transistor) Active Matrix Display	The TFT display provides the best resolution of all of the currently available flat-panel Liquid Crystal Display (LCD) designs, although they are also the most expensive.
	TFT displays offer very high image clarity, contrast ratios of between 150:1 to 200:1, fast refresh rates, and wide viewing angles.
Toner	Specially formulated compound to impart dye to paper through an electrographic process (used by laser printers and photocopiers).
	The key properties of toner are the colorant (dye), ability to fuse (wax or plastic), and ability to hold a charge
	There are three main types of toner, distinguished by the mechanism of applying the toner to the developer roller: dual component (where the toner is mixed with a separate magnetic developer), mono-component (where the toner itself is magnetic), and non-magnetic mono-component (where the toner is transferred using static properties).
Touchscreen	Back of Flashcard 24 of 27 A display screen that is responsive to touch input
TWAIN	Standard "driver" model for interfacing scanner hardware with applications software.
Webcam	A webcam can be used to record video
	There are many types, from devices built into laptops to standalone units.
	While early devices were only capable of low resolutions, most webcams are now HD-capable.
WIA (Windows Image Acquisition)	Driver model and API (Application Programming Interface) for interfacing scanner hardware with applications software on Windows PCs.

Lesson 13: Using Storage Devices

ATA	Parallel ATA (Advanced Technology Attachment) was the main disk interface for PCs

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Lesson 13: Using Storage Devices (cont)	
	The interface was very commonly called IDE [Integrated Drive Electronics] or Enhanced IDE (EIDE)
	Each PATA adapter supports two devices, commonly called master and slave
	A drive is connected to the bus by a 40-pin ribbon cable.
	The PATA interface has been replaced by SATA.
Blu-ray	Latest generation of optical drive technology, with disc capacity of 25 GB per layer.
	Transfer rates are measured in multiples of 36 MBps.
CD-ROM (Compact Disc - Read Only Memory)	CD-ROM disc is an optical storage technology.
	The discs can normally hold 700 MB of data or 80 minutes of audio data
	Recordable and re-writable CDs (and DVDs) are a popular backup solution for home users.
	They are also useful for archiving material.
	Unlike magnetic media, the data on the disc cannot be changed (assuming that the disc is closed to prevent further rewriting in the case of RW media).
	This makes them useful for preserving tamper-proof records.
DVD (Digital Video/Versatile Disk)	DVD discs offer higher capacities (4.7 GB per layer) than the preceding CD-ROM format.
	As with CDs, recordable and re-writable forms of DVD exist, though there are numerous competing formats (notably ±R and ±RW and DVD-RAM).
Flash Memory	Flash RAM is similar to a ROM chip in that it retains information even when power is removed, but it adds flexibility in that it can be reprogrammed with new contents quickly.
	Flash memory has found a popular role in USB thumb drives and memory cards.
	These tiny cards can provide removable, megabyte or gigabyte storage for devices such as digital cameras.
	Other evolving uses of flash memory are in Solid State Drives (SSD), designed to replicate the function of hard drives, and hybrid drives (standard hard drives with a multi-gigabyte flash memory cache).

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Lesson 13: Using Storage Devices (cont)	
HDD (Hard Disk Drive)	High capacity units typically providing persistent mass storage for a PC (saving data when the computer is turned off).
	Data is stored using platters with a magnetic coating that are spun under disk heads that can read and write to locations on each platter (sectors)
	A HDD installed within a PC is referred to as the fixed disks.
	HDDs are often used with enclosures as portable storage or as Network Attached Storage (NAS).
Recordable CD Drives	CD/DVD writers are now mainstream devices, used for data transfer and archiving.
	Recordable CDs are available in two general forms: those that can be written to once and read many times (CD-R) and those that can be written to and erased (CD-RW).
	CD writers use a laser to disrupt the medium of the disk - either by heating a dye, by altering the magnetic properties of the metal disk, or by changing disc structure through phase-change techniques.
	Media varies in terms of longevity and maximum supported recording speed. DVD also has R and RW formats, both of which feature competing + and - standards.
	DVD recorders can also perform CD-R/RW recording.
	An additional consideration is whether drives and media support dual-layer and/or double-sided recording.
	Blu-ray has recordable (BD-R) and rewritable (BD-RE) formats and supports dual-layer but not double-sided recording.
Removable Media	In order to share files and programs, computers can either be connected to each other (across a direct link or via a network) or must be able store and retrieve files from an interim storage medium.
	The most common types of removable media are floppy disks and optical discs.

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Lesson 13: Using Storage Devices (cont)	
	However the term "removable media" also covers tape drives, high capacity disks, and removable hard drives.
SATA (Serial ATA)	Standard IDE/ATA uses parallel data transmission.
	Serial ATA allows for faster transfer rates and longer, more compact cabling (it features a 7-pin data connector).
	There are three SATA standards specifying bandwidths of 1.5 Gbps, 3 Gbps, and 6 Gbps respectively.
	SATA drives also use a new 15-pin power connector, though adapters for the old style 4-pin Molex connectors are available.
	External drives are also supported via the eSATA interface.
SD (Secure Digital) Card	One of the first types of flash memory card.
Thumb Drive	A flash memory card with USB adapter.
WORM (Write Once, Read Many) Drive	A WORM drive is able to write data to a recordable CD disc only once, although the data can be read many times.

Lesson 14: Using File Systems	
8.3 Filenames	The DOS file naming standard - an eight-character ASCII name followed by a three-character file extension (which identifies the file type).
	Windows supports long file names but can also generate a short file name, based on DOS 8.3 naming rules.
	This provides backwards compatibility for older applications.
Partition	A discrete area of storage defined on a hard disk using either the Master Boot Record (MBR) scheme or the GUID Partition Table (GPT) scheme.
	Each partition can be formatted with a different file system, and a partition can be marked as active (made bootable).
Boot Partition	In Microsoft terminology, the partition that contains the operating system (that is, the \WINDOWS folder) is referred to as the boot partition.
	This is typically a different partition to the system partition (the partition containing the boot files).

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Lesson 14: Using File Systems (cont)	
Compression Software	To send or store a file it often needs to be compressed in some way, to reduce the amount of space it takes up on the storage media or the bandwidth required to send it over a network.
	There are a number of compression utilities and formats.
Directory	A file system object used to organize files. Directories can be created on any drive (the directory for the drive itself is called the root) and within other directories (subdirectory).
	Different file systems put limits on the number of files or directories that can be created on the root or the number of subdirectory levels
	In Windows, directories are usually referred to as folders.
FAT (File Allocation Table)	When a disk is formatted using the FAT or FAT32 file system a File Allocation Table (FAT) is written in a particular track or sector.
	The FAT contains information relating to the position of file data chunks on the disk; data is not always written to one area of the disk but may be spread over several tracks.
	The original 16-bit version (FAT16, but often simply called FAT) was replaced by a 32-bit version that is almost universally supported by different operating systems and devices.
	A 64-bit version (exFAT) was introduced with Windows 7 and is also supported by XP SP3 and Vista SP1 and some versions of Linux and OS X.
File	Data used by a computer is stored by saving it as a file on a disk. Files store either plain text data or binary data.
	Binary data must only be modified in a suitable application or the file will be corrupted.
	A file is created by specifying a name. Naming rules depend on the version of Windows and the file system
	Files usually have a three character extension (the last 3 characters in the file named preceded by a period).
	The file extension is used to associate the file with a particular software application.

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Lesson 14: Using File Systems (cont)

	Files have primary attributes (Read-Only, System, Hidden, and Archive) and other properties (date created or modified for instance).
	Files stored on an NTFS partition can have extended attributes (access control, compression, and encryption).
File System	When data is stored on a disk, it is located on that medium in a particular, standardized format.
	This allows the drive and the computer to be able to extract the information from the disk using similar functions and thus data can be accessed in a predictable manner.
	Examples of file systems include FAT16, FAT32, and NTFS (all used for hard disks) and CDFS (ISO 9660) and UDF (Universal Disk Format), used for optical media such as CD, DVD, and Blu-ray.
Libraries	Virtual folder feature introduced in Windows 7 as a wrapper for multiple folder locations (which can be local or network) that store files that are part of the same logical "collection."
	The system is installed with default libraries for documents, pictures, and music and the user can add locations to these or create new libraries.
Long File Names	A 255 character Unicode name that can contain spaces and multiple periods.
MPEG	Moving Pictures Expert Group is an ISO standards committee for audio and video compression and playback
	There have been numerous MPEG standards over the years
	From MPEG-1, the mp3 audio compression format remains very popular.
	MPEG-2 is widely used for file and broadcast delivery.
	MPEG-4 (or MP4) extends the MPEG-2 specification, notably providing support for Digital Rights Management (DRM), which enables playback to be tied to particular hardware devices.
NTFS (New Technology Filing System)	The NT File System supports a 64-bit address space and is able to provide extra features such as file-by-file compression and RAID support as well as advanced file attribute management tools, encryption, and disk quotas.

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Lesson 14: Using File Systems (cont)

PDF (Portable Document Format)	Adobe's Portable Document Format (PDF) is a file format for distributing documents
	PDF was envisioned as a "final" format for the distribution of a published document.
Permissions	To access files and folders on a volume, the administrator of the computer will need to grant file permissions to the user (or a group to which the user belongs).
	File permissions are supported by NTFS-based Windows systems.
Recycle Bin	When files are deleted from a local hard disk, they are stored in the recycle bin.
	They can be recovered from here if so desired.
UDF (Universal Disk Format)	File system used for optical media, replacing CDFS (ISO 9660).

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