**Information Technology, the Internet, and You Topic 1:**

. **INFORMATION SYSTEMS**

The way to think about a microcomputer is to realize that it is one part of an information system. There are several parts of an information system:

• **People** are an essential part of the system. The purpose of information systems is to make people,or end users like you, more productive.

• **Procedures** are rules or guidelines to follow when using software, hardware, and data. They are typically documented in manuals written by computer professionals.

• **Software** (programs) provides step-by-step instructions to control the computer to convert data into information.

• **Hardware** consists of the physical equipment. It is controlled by software and processes data to create information.

• **Data** consists of unprocessed facts including text,numbers, images, and sound. Information is data that has been processed by the computer.

• **Connectivity** allows computers to connect and share information.

To be computer competent, end users need to understand information technology (IT) , including software, hardware, data, and connectivity

**PEOPLE**

People are the most important part of an information system. This book contains several features to demonstrate how people just like you use computers. These features include the following:

• **Making IT Work for You** presents several interesting and practical applications. Topics include using digital video editing and locating job opportunities.

• **Tips** offer a variety of suggestions on such practical matters as how to improve slow computer performance and how to protect your privacy while on the web.

• **Explorations** direct you to important information and websites that relate to computers and technology.

• **Ethics** boxes pose a variety of different ethical/unethical situations for your consideration.

• **Environment** discusses important and relevant environmental issues. The impact of computers and other technologies is more critical today than ever before.

• **Careers in IT** presents job descriptions, employment demands, educational requirements, salary ranges, and advancement opportunities.

• **Computing Essentials website** integrates the textbook with information on the web, including animations, career information, tips, test review materials, and much more.

**SOFTWARE**

Software, or programs, consists of system and application software.

**1-System Software**

System software enables application software to inter act with computer hardware: -

• **Operating systems** coordinate resources, provide an interface, and run applications..

• **Utilities** perform specific tasks to manage computer resources.

• **Device drivers** are specialized programs to allow input and output devices to communicate with the rest of the computer system.

**2- Application Software** •

Application software includes general-purpose, spe cialized, and mobile applications -

**General purpose** —widely used in nearly all career areas; programs include browsers, word processors, spreadsheets, database management systems, and presentation graphics.

• **Specialized** —focus more on specific disciplines and occupations; programs include graphics and web authoring.

• **Mobile apps** — designed for mobile devices; most popular are for text messaging, Internet browsing, and connecting to social networks

**HARDWARE**

Hardware consists of electronic devices that can fol-low instructions to accept input, process the input,and produce information.

**Types of Computers**

Supercomputer, mainframe, midrange ( server ), and microcomputer are four types of computers. Microcomputers can be desktop, notebook ( laptop com-

puter ), tablet , or handheld ( PDAs and smartphones are the most widely used handheld microcomputers).

**Microcomputer Hardware**

There are four basic categories of hardware devices.

• **System unit** contains electronic circuitry, including the microprocessor and memory. Random-access memory (RAM) holds the program and data currently being processed.

• **Input/output devices** are translators between humans and computers. Input devices include the keyboard and mouse. Output devices include monitors and printers.

• **Secondary storage** holds data and programs. Typical media include hard disks, solid-state storage

( solid-state drives, flash memory cards, and USB drives ), and optical discs ( CD, DVD, and Blu-ray ).

• **Communication** devices allow microcomputers to communicate with other computer.. **Modems** modify audio, video, and other types of data for transmission and processing.

**DATA**

Data is the raw unprocessed facts about something.

**Common file types include**

• **Document files** created by word processors

.. **Worksheet files** created by spreadsheet programs.

• **Database files** created by database management programs.

.. **Presentation** files created by presentation graphics programs.

**CONNECTIVITY**

Connectivity describes the ability of end users to use resources well beyond their desktops.

**The Wireless Revolution**

The wireless revolution is the widespread and increasing use of mobile (wireless) communication devices.

**Internet**

The Internet is the world’s largest computer network.The web provides a multimedia interface to resources available on the Internet.

**Cloud Computing**

Cloud computing uses the Internet and the web to shift many activities from users’ computers to computers on the Internet.

**CAREERS IN IT**

**Webmaster**-Develops and maintains websites and webresources. See page51.

Software engineer Analyzes users’ needs and creates application software. See page 82.

**Computer support specialist**-Provides technical support to customers and other users. See page 112.

**Computer technician-** Repairs and installs computer components and systems. See page 141.

**Technical writer**- Prepares instruction manuals, technical reports, and other scientific or technical documents. See page 174.

**Network administrator**-Creates and maintains computer networks.See page 229

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**The System Unit Topic 2:**

**SYSTEM UNIT**

System unit ( system chassis ) contains electronic components. There are four basic categories of system units: desktop, notebook ( laptop ), tablet, and handheld.

**Desktop**

Desktop system units are located in a separate case; tower unit ( tower computer ) has vertical system unit; system unit is housed with monitor in all-in-one computers.

**Notebook**

Notebook ( laptop ) system units contain secondary storage devices and input devices. Netbooks are a smaller, less powerful, and less expensive type of notebook.

**Tablet**

Tablet system units are located behind the monitor. Tablets are smaller, lighter, and generally less powerful than laptops and use a virtual keyboard.

**Handheld computer**

Smartphones are most popular handheld computer .System unit is located behind the display screen and keypad.

**Components**

Each type of system unit has the same basic components including system board, microprocessor, and memory

**SYSTEM BOARD**

The system board ( mainboard or motherboard ) connects all system components and allows input and output devices to communicate with the system unit.

• **Sockets** provide connection points for chips ( silicon chips, semiconductors, integrated circuits). Chips are mounted on carrier packages.

• **Slots** provide connection points for specialized cards or circuit boards.

• **Bus lines** provide pathways to support communication..

**MICROPROCESSOR**

The microprocessor is a single chip that contains the central processing unit (CPU) or microprocessor. It has two basic components: a control unit and ALU.

**Microprocessor Chips**

A word is the number of bits that can be accessed by the microprocessor at one time. Clock speed represents the number of times the CPU can fetch and process data or instructions in a second. Multicore chips can provide multiple independent CPUs. Parallel processing requires programs that allow multiple processors to work together to run large complex programs.

**Specialty Processors**

Specialty processors include graphics coprocessors ,also known as GPU or graphics processing unit (pro-cesses graphic images), and processors in automobiles (monitor fuel efficiency, satellite entertainment,and tracking systems)

**MEMORY**

Memory holds data, instructions, and information.There are three types of memory chips.

**RAM**

RAM ( random-access memory ) chips are called temporary or volatile storage because their contents are lost if power is disrupted :.

• ***Cache memory*** is a high-speed holding area for frequently used data and information.

• *DIMM* ( dual in-line memory module ) is used to expand memory.

• ***Virtual memory*** divides large programs into parts that are read into RAM as needed.

**ROM**

ROM ( read-only memory ) chips are nonvolatile stor-age and control essential system operations.

**Flash Memory**

Flash memory does not lose its contents when power is removed.

**EXPANSION SLOTS AND CARDS**

Most computers allow users to expand their systems by providing expansion slots on their system boards to accept expansion cards.

Examples of expansion cards include graphics cards, sound cards, network interface cards (NIC; network adapter cards), and wireless network cards.

Plug and Play is the ability for a computer to recognize and configure a device without human interaction.

PC cards plug into PCMCIA slots, and Express Card slots accept credit card-sized expansion cards.

**BUS LINES**

***Bus lines***, also known as buses, provide data pathways that connect various system components. Bus width is the number of bits that can travel simultaneously.

***System buses*** connect CPU and memory. Expansion buses connect CPU and slots.

Expansion Buses

**Three principal expansion bus types are**

• **USB** (universal serial bus) can connect from one USB device to another or to a common point (hub) and then onto the system board.

• **FireWire bus** is similar to USB bus but more specialized.

• **PCIe (PCI Express) bus** is widely used; provides a single dedicated path for each connected device.

**PORTS**

Ports are connecting sockets on the outside of the system unit.

***Standard Ports***

Four standard ports are standard ports

• **VGA (Video Graphics Adapter**) and DVI (Digital Video Interface) —provide connections to monitors.

• **USB (universal serial bus)** —widely used to connect keyboards, mice, printers, and storage devices; one port can connect several devices to system unit.

• **FireWire** —provides high-speed connections to specialized FireWire devices such as camcorders and storage devices.

• **Ethernet** —high-speed networking port that has become a standard for many of today’s computers.

***Specialized Ports***

Five specialty ports are eSATA ( external Serial Advanced Technology Attachment ) for high-speed connections to large secondary storage devices, HDMI (High Definition Multimedia Interface) for high-definition digital audio and video, Mini DisplayPort( MiniDP, mDP ) for large monitors, MIDI for digital music, and S/PDIF (Sony/Philips Digital Interface)for high-end audio and home theater systems.

***Cables***

Cables are used to connect external devices to the system unit via ports

**POWER SUPPLY**

Power supply units convert AC to DC and powerdesktops. AC adapters power notebooks and tablets and recharge batteries.

**ELECTRONIC REPRESENTATION**

Human voices create analog (continuous) signals;computers only recognize digital electronic signals.

**Numeric Representation**

Data and instructions can be represented electronically with a two-state or binary system of numbers(0 and 1). Each 0 or 1 is called a bit. A byte consists of 8 bits. Hexadecimal system ( hex ) uses 16 digits to represent binary numbers.

**Character Encoding**

Character encoding standards assign unique sequences of bits to each character. Three standards are ASCII( American Standard Code for Information Interchange ), EBCDIC ( Extended Binary Coded Decimal Interchange Code ), and Unicode.

**CAREERS IN IT**

Computer technicians repair and install computer components and systems. Certification in computer repair or associate degree from professional schools required. Salary range is $31,000 to $46,000

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**Topic 3**

**Input and Output:**

***KEYBOARDS***

Input is any data or instructions that are used by a computer. Input devices are hardware used to trans-late words, sounds, images, and actions that people understand into a form that the system unit can pro-cess. These include keyboards, pointing, scanning,image capturing, and audio-input devices.

Keyboards convert numbers, letters, and special characters that people understand into electrical signals. These signals are sent to, and processed by, the system unit.

**Keyboards**

There are four basic categories of keyboards: tradi -tional, notebook, virtual, and thumb.

• ***Traditional keyboards*** , used on desktop and larger computers. Standard keyboard has 101 keys. Toggle keys turn features on and off. Combination keys perform actions when combinations of keys are held down.

• ***Notebook keyboards*** , used on notebook computers. Smaller than traditional keyboard with fewer keys. Typically does not have numeric keypad or stan-dard location for function and navigation keys.

• ***Virtual keyboard*** , used on tablets and smart phones. Does not have a physical keyboard. Keys displayed on screen and selected by pressing a key’s image.

• ***Thumb keyboard*** , used on smartphones and small portable devices. Very small devices primarily used for texting and connecting to the web.

***POINTING DEVICES***

Pointing devices provide an intuitive interface with the system unit by accepting pointing gestures and converting them into machine-readable input.

**Mice**

A mouse controls a pointer that is displayed on the monitor. The mouse pointer usually appears in the shape of an arrow. Some mice have a wheel button that rotates to scroll through information on the mon-itor. Optical mouse is the most widely used. A cord-less or wireless mouse uses radio waves or infrared light waves. Three devices similar to a mouse are trackballs, touch pads, and pointing sticks.

**Touch Screens**

Touch screens allow users to select actions by touching the screen with a finger or penlike device. Multitouch screens accept multiple-finger commands.

**Game Controllers**

Game controllers provide input to computer games. Widely used controllers include joysticks, dance pads,gamepads, and motion-sensing devices.

**Stylus**

A stylus is a penlike device commonly used with tablets and PDAs. Often, a stylus interacts with thecomputer through handwriting recognition software that translates handwritten notes into a form that the system unit can process

**SCANNING DEVICES**

Scanning devices move across text and images to convert them into a form that the system unit can process.

***Optical Scanners***

An optical scanner (scanner) converts documents into machine-readable form. The three basic types are flatbed, document, and portable.

***Card Readers***

Card readers interpret encoded information located on a variety of cards. The most common is the magnetic card reader that reads information from a thin magnetic strip on the back of a card.

***Bar Code Readers***

Bar code readers or scanners (either handheld wand readers or platform scanners) read bar codes on products. The bar code system Universal Product

Code (UPC) is widely used in supermarkets.

***RFID Readers***

RFID readers read RFID (radio-frequency identifi-cation) tags . These tags are widely used for tracking lost pets, production, and inventory and for recording prices and product descriptions.

***Character and Mark Recognition Devices***

Character and mark recognition devices are scanners that are able to recognize special characters and marks. Three types are magnetic-ink character recognition (MICR), optical-character recognition (OCR), and optical-mark recognition (OMR).

**IMAGE CAPTURING DEVICES**

Image capturing devices create or capture original images. These devices include digital cameras and webcams.

***Digital Cameras***

Digital cameras are similar to traditional cameras except that images are recorded digitally on a disk or in the camera’s memory. Most digital cameras record video too.

***Webcams***

Webcams are specialized digital video cameras that capture images and send them to a computer for broadcast over the Internet. Webcams are built into many smartphones and tablets, while others are to the computer monitor.

**AUDIO-INPUT DEVICES**

Audio-input devices convert sounds into a form that can be processed by the system unit. By far the most widely used audio-input device is the microphone.

***Voice Recognition Systems***

Voice recognition systems use a microphone, a sound card, and special software. These systems allow users to operate computers and other devices as well as create documents by using voice commands. Spe-cialized portable voice recorders are widely used by doctors, lawyers, and others to record dictation. Some systems are able to translate dictation from one language to another, such as from English to Japanese

**MONITORS**

Output is processed data or information. Output devices are any hardware used to provide or to create output.

Monitors (display screens) are the most used out-put device. Output is often referred to as soft copy. Monitors vary in size, shape, and cost. Almost all, however, have some basic distinguishing features.

**Features**

The most important characteristic of a monitor is its clarity, which relates to the quality and sharpness of images. It is a function of several monitor features, including resolution (matrix of pixels or picture elements), dot pitch, contrast ratio, size, and aspect ratio.

**Flat Panel**

Flat-panel monitors are the most widely used moni-tor; most are LCD (liquid crystal display). Most common type is TFT-LC (thin-film transistor liquid

crystal). AMOLED (active-matrix organic light-emit-ting diode) is a newer flat panel technology.

**E-book Readers**

E-books (electronic books) are traditional printed books in electronic format. E-book readers (e-readers)are mobile devices to store and display e-books and other electronic media. They use e-ink technology.Tablets can display e-books and have a larger display area but are heavier, more expensive, and more dif-ficult to read in bright light.

**Other Monitors**

Other types of monitors include digital (interac-tive) whiteboards to project output; high-definition television (HDTV) to display clear detailed images;and older monitors using cathode-ray tubes (CRTs).

**PRINTERS**

Printers translate information processed by the system unit and present the information on paper. Printer output is often called hard copy.

**Features**

Most printers have the same basic features, including resolution measured in dpi (dots per inch), color capa-bility (most common black ink selection is grayscale), speed (measured in the number of pages printed per minute), memory, and duplex (both sides of paper) printing.

**Inkjet**

Inkjet printers spray ink at high speed onto the sur-face of paper. Most widely used type of printer, reli-able, quiet, and inexpensive. The most costly aspect of inkjet printers is replacing the ink cartridges.

**Laser**

Laser printers use technology similar to photocopying machine involving laser light beam to produce high-quality images. There are two categories: personal (less expensive, used by single user) and shared (supports color, more expensive, and supports group of users).

**Other Printers**

There are several other types of printers. These printers include cloud printers, thermal printers, and plotters.

• ***Cloud printers*** provide printing services to others on the Internet. GoogleCloud Print is a service that supports cloud printing.

• ***Thermal printers*** use heat elements to produce images on heat-sensitive paper.

• ***Plotters*** are special-purpose printers for produc-ing a wide range of specialized output including output from graphics tablets and other graphical input devices

**AUDIO AND VIDEO DEVICES**

Audio-output devices translate audio information from the computer into sounds that people can understand.The most widely used are speakers and headsets.

**Portable Media Players**

Portable media players (digital media players) are electronic devices for storing and playing digital media. Mobile digital television (mobile DTV) tech-nology allows direct broadcast to digital media players as well as smartphones and other computers.

**COMBINATION INPUT AND OUTPUT DEVICES**

Many devices combine input and output capabilities.

**Multifunctional Devices**

Multifunctional devices (MFD) typically combine the capabilities of a scanner, printer, fax, and copy machine.

**Internet Telephones**

Internet telephones send and receive voice commu-nication over the computer networks using voice over IP (VoIP, telephony, Internet telephony, IP telephony). Skype is a widely used VoIP service.

**Robots**

Artificial intelligence (AI) attempts to mimic human senses, thought processes, and actions. Robotics, an area of AI, uses robots (computer-controlled machines that mimic the motor activities of living things). Four of robots: perception system , industrial , mobile , and household .

**Virtual Reality Headgear and Gloves**

Virtual reality (VR) creates 3-D simulated immer-sive experiences. Virtual reality hardware includes headgear and gloves. Applications include training environments, such as in aviation, surgery, spaceship repair, or nuclear disaster cleanup.

**ERGONOMICS**

Ergonomics is the study of human factors related to things people use. Concerned with fitting the task to the user rather than forcing the user to contort to do the task, it involves devising ways that input and out-put devices can be used and designed to increase ease of use and decrease health risks.

**Recommendations**

Some recommendations to avoid physical discomfort are

• **Eyestrain** and headache. To make the computer easier on the eyes, take a 15-minute break every hour or two; keep everything you’re focusing on at about the same distance; and clean the screen periodically.

• **Back and neck pain.** To help avoid back and neck problems, use adjustable equipment; chairs should adjust for height, angle, and back support; monitors

should be at eye level or slightly below. Use a foot-rest, if necessary, to reduce leg fatigue.

• **Repetitive strain injury**. Repetitive strain injury (RSI) is caused by fast,repetitive work and can generate neck, wrist, hand, and arm pain. One particular type of RSI, carpal tunnel syndrome,found among heavy computer users, consists of damage to nerves and tendons in the hands. Ergonomically correct keyboards help prevent injury. Take frequent, short rest breaks and gently massage hands.

**CAREERS IN IT**

Technical writers prepare instruction manuals, tech-nical reports, and other documents. An associate or a college degree in communication, journalism, or English and a specialization in, or familiarity with, a technical field are required. Salary range is $41,000 to $78,000

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**System Software Topic 4:**

**SYSTEM SOFTWARE**

System software works with end users, application programs, and computer hardware to handle many details relating to computer operations.

Not a single program but a collection or system of programs, these programs handle hundreds of tech-nical details with little or no user intervention.

Four kinds of systems programs are operating systems, utilities, device drivers, and language translators.

• **Operating systems** coordinate resources, provide an interface between users and the computer, and run programs.

• **Utilities** perform specific tasks related to managing computer resources.

• **Device drivers** allow particular input or output devices to communicate with the rest of the computer system.

• **Language translators** convert programming instructions written by programmers into a language that computers can understand and process.

**OPERATING SYSTEMS**

Operating systems (software environments, software platforms) handle technical details.

**Functions**

Functions include managing resources, providing a user interface (most operating systems use a graphical user interface, or GUI), and running applications. Multitasking allows switching between different applications stored in memory; current programs run in foreground; other programs run in background.

**Features**

Booting starts ( cold ) or restarts ( warm ) a computer system. The desktop provides access to computer resources. Common features include icons, pointers, windows, menus, tabs, dialog boxes, Help, and gesture control. Data and programs are stored in a system of files and folders.

**Categories**

Three categories of operating systems are

• ***Embedded*** —used with handheld computers; operating system stored within device.

• **Network (NOS)** —controls and coordinates networked computers; located on the network server.

• **Stand-alone (desktop)** —controls a single computer;located on the hard disk.

Operating systems are often called software environ-ments or software platforms.

**MOBILE OPERATING SYSTEMS**

Mobile operating systems (mobile OS) are embedded in every smartphone and tablet. These systems are less complicated and more specialized for wireless communication than desktop operating systems.

Some of the best known are BlackBerry, iOS (iPhone OS), Android, Windows Phone, and WebOS.

• **Android** was originally developed by Android Inc. and later purchased by Google. It is a widely used mobile OS.

• **BlackBerry** OS (RIM OS) originated in Canada. It was designed as the platform for BlackBerry hand-held computers.

• **iOS (iPhone OS**) was developed by Apple to sup-port iPhone, iPod Touch, and iPad.

• **WebOS** was developed by Palm, Inc., and later purchased by HP. It has evolved into the operating system for many of HP ’s mobile devices.

• **Windows** Phone 8 was introduced in 2012 by Microsoft to support a variety of mobile devices,including smartphones. It can run many power-ful programs designed for laptop and desktop computers.

**DESKTOP OPERATING SYSTEMS**

**Windows**

Windows, the most widely used operating system, is designed to run with many different microprocessors. The two recent versions are Windows 7 and Windows 8. Windows 8 offers an interface very similar to the Windows Phone interface; supports desktops, note-books, and tablets; uses a start screen and tiles; and provides support for gestures, cloud integration,and apps. Windows RT, a version of Windows 8, is designed to run with ARM tablets.

**Mac OS**

Mac OS, an innovative, powerful, easy-to-use oper-ating system, runs on Macintosh computers. The two most recent versions are Lion and Mountain Lion. Mountain Lion’s interface is very similar to the interfaces on Apple’s smartphone and tablets. It  is designed for Apple’s desktops and laptops. Lion’s functionality similar to Windows 8 but generally considered easier to use.

**DESKTOP OPERATING SYSTEMS**

**UNIX and Linux**

UNIX was originally designed to run on minicomputers in network environments. Now, it is widely used by servers on the web, mainframe computers, and very powerful microcomputers. There are many different versions of UNIX. One version, Linux, a popular and powerful alternative to the Windows operating system, is open source software. Google’s Chrome OS is based on Linux and designed for netbooks and other mobile devices. Chrome OS focuses on Internet con-nectivity and cloud computing.

**Virtualization**

Virtualization allows a single physical computer to support multiple operating systems. Using a special program ( virtualization software ) allows the single physical computer to operate as two or more sepa-rate and independent computers known as virtual machines. Host operating systems run on the physical machine. Guest operating systems operate on virtual machines. Microsoft’s Hyper-V creates and runs vir-tual machines.

**UTILITIES**

Utilities make computing easier. The most essential are troubleshooting (diagnostic), antivirus, backup, and file compression.

**Windows Utilities**

Windows operating systems are accompanied by sev-eral utility programs, including Backup and Restore, Disk Cleanup, and Disk Defragmenter (eliminates

unnecessary fragments; tracks are concentric rings; sectors are wedge-shaped).

**Utility Suites**

Utility suites combine several programs into one package. Computer viruses are dangerous programs.

**DEVICE DRIVERS**

Device drivers (drivers) allow communication between hardware devices. Add a Device Wizard gives step-by-step guidance to install printer drivers. Windows Update automates the process of updating device drivers.

**CAREERS IN IT**

Computer support specialists provide technical support to customers and other users. Degrees in computer science or information systems are preferred plus good analytical and communication skills. Salary range is $31,000 to $58,000

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**Topic 5: windows**

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**Topic 6: Application software**

**APPLICATION SOFTWARE**

The three categories of application software are general purpose, specialized, and mobile.

**User Interface**

You control and interact with a program using a user interface. A graphical user interface (GUI) uses icons selected by a mouse-controlled pointer. A window contains a document, program, or message. **Software programs with a traditional GUI have:**

• **Menus** —present commands listed on the menu bar.

• **Toolbars** —contain buttons for quick access to commonly used commands.

• **Dialog box** —provides additional information or requests user input.

**Software programs with a Ribbon GUI have:**

• **Ribbons** —replace menus and toolbars.

• **Tabs** —divide ribbons into groups. Contextual tabs automatically appear when needed.

• **Galleries** —graphically display alternatives before they are selected.

**Common Features**

Common features include spell checkers, alignment, fonts and font sizes, tables, and reports.

**GENERAL-PURPOSE APPLICATIONS**

General-purpose applications include word processors, spreadsheets, database management systems, and presentation graphics.

**Word Processors**

Word processors create text-based documents. Individuals and organizations use word processors to create memos, letters, and faxes. Organizations also

create newsletters, manuals, and brochures to provide information to their customers. Microsoft Word is the most widely used word processor. Others include Corel WordPerfect, Apple Pages, OpenOffice Writer, and Google Docs.

**Spreadsheets**

Spreadsheets organize, analyze, and graph numeric data such as budgets and financial reports. They are widely used by nearly every profession. Microsoft Excel is the most widely used spreadsheet program.

Others include Apple Numbers and OpenOffice Calc.

**GENERAL-PURPOSE APPLICATIONS**

**Database Management Systems**

A database is a collection of related data. A database management system (DBMS) or database manager is a program that structures a database. It provides tools to enter, edit, and retrieve data from the database. Organizations use databases for many purposes including maintaining employee records.Two widely used database management systems designed for microcom-puters are Microsoft Access and OpenOffice Base.

**Presentation Graphics**

Presentation graphics are programs that combine a variety of visual objects to create attractive, visually interesting presentations. They are excellent tools to communicate a message and to persuade people. People in a variety of settings and situations use presentation graphics programs to make their presentations more interesting and professional. Three of the most widely used presentation graphics programs are Microsoft PowerPoint, OpenOffice Impress, and Apple Keynote.

**SPECIALIZED APPLICATIONS**

Specialized applications are widely used within specific professions. They include graphics programs and web authoring programs.

**Graphics Programs**

Graphics programs are used by graphic arts professionals.

• Desktop publishing programs (page layout programs) mix text and graphics to create professional-quality publications.

• **Image editors (photo editors)** edit digital photo-graphs consisting of thousands of dots or pixels that form bitmap or raster images.

• **Illustration programs (drawing programs)**  create and edit vector images. Vector images (vector illustrations) use geometric shapes.

• **Image galleries** are libraries of electronic images. Two basic types are stock photographs and clip art.

**Web Authoring Programs**

Web authoring is the process of creating a website. Individuals create online diaries called blogs. Many sites have animations (moving graphics) and Flash movies (interactive animation). Website design is represented by a graphical site map.

Web authoring programs (web page editors, HTML editors) create sophisticated commercial websites. Some are WYSIWYG (what you see iswhat you get) editors.

**MOBILE APPS**

Mobile apps (mobile applications, apps) are add-on programs for a variety of mobile devices. Traditional applications include address books, to-do lists, alarms, and message lists. Recently mobile capabilities have exploded.

**Apps**

One of the fastest-growing apps is QR code readers. These readers allow mobile devices to use their digital cameras to scan QR codes. QR codes (quick response codes) are graphics that automatically link mobile devices to content, including games, text, videos, and websites.

**App Stores**

An app store is typically a website that provides access to specific mobile apps that can be downloaded either for a nominal fee or free of charge. Two of the best-known stores are Apple’s App Store and Google Play

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| **Focus** | **Site** | **App** |
| www.appstore.com | iOS devices | Apple App Store |
| play.google.com | Android devices | Google Play |
| appworld.blackberry.com | BlackBerry products | BlackBerry App World |
| windowsphone.com/marketplace | Windows phones | Windows Phone Marketplace |

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**SOFTWARE SUITES**

A software suite is a collection of individual application packages sold together.

• **Office suites (office software suites or productivity suites )** contain professional-grade application programs.

• **Cloud suites (online office suites)** are stored on servers and available through the Internet.

• **Specialized suites** focus on specific applications such as graphics.

• **Utility suites** include a variety of programs designed to make computing easier and safer.

**CAREERS IN IT**

Software engineers analyze users’ needs and create application software. Bachelor’s or advanced specialized associate’s degree in computer science or information systems and extensive knowledge of computers and technology are required. Salary range is $53,000 to $97,000..

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**Topic 7 : Microsoft word**

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**Topic 8 : MS PowerPoint**

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**Topic 9 : MS Excel**

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**Topic 10 : The Internet, the Web, and Electronic Commerce**

**INTERNET AND WEB**

**Internet**

Launched in 1969 with ARPANET, the Internet consists of the actual physical network.

**Web**

Introduced in 1991 at CERN, the web provides a multimedia interface to Internet resources. Three generations: Web 1.0 ( existing information), Web 2.0 ( content creation and social interaction), Web 3.0 ( computer-generated information).

**Common Uses**

The most common uses of the Internet and the web include

• *Communication*— the most popular Internet activity.

• *Shopping*— one of the fastest- growing Internet activities.

• *Searching*— access libraries and local, national, and international news.

• *Education*— e- learning or taking online courses.

• *Entertainment*— music, movies, magazines, and computer games.

**ACCESS**

Once connected to the Internet, your computer seemingly becomes an extension of a giant computer that branches all over the world.

**Providers**

Internet service providers are connected to the Inter-net, providing a path for individuals to access the Internet. Connection technologies include DSL, cable, and wireless modems.

**Browsers**

Browsers access the web allowing you to surf or explore. Some related terms are

• *URLs*— locations or addresses to web resources; two parts are protocol and domain name; top- level domain ( TLD) or web suffix identifies type of organization.

• *HTML* — commands to display web pages; hyper-links ( links) are connections. Technologies providing interactive, animated web-sites include cascading style sheets, or CSS ( to control the appearance of web pages); JavaScript ( to trigger interactive features); AJAX ( to create quick response interactive websites; and applets ( to present animation, display graphics, provide interactive games, and more). Mobile browsers run on portable devices.

To be a competent end user, you need to be aware of resources available on the Internet and web, to be able to access these resources, to effectively communicate electronically, to efficiently locate information, to understand electronic commerce, and to use web utilities.

**COMMUNICATION**

**E- mail**

E- mail ( electronic mail) is the transmission of electronic messages. There are two basic types of e- mail accounts:

• ***Client- based*** e- mail accounts use e- mail clients installed on your computer.

• ***Web- based*** e- mail accounts use webmail clients located on the e- mail provider’s computer. This is known as webmail.

A typical e- mail has three basic elements: header ( including address, subject, and perhaps attachment ), message, and signature.

Spam is unwanted and unsolicited e- mail that may include a computer virus or destructive programs often attached to unsolicited e- mail. Spam blockers, also known as spam filters, are programs that identify and eliminate spam.

**Messaging**

While e- mail is the most widely used, two other messaging systems are

• *Text messaging*— sending short electronic messages between mobile devices.

• *Instant messaging ( IM*)— supports live communication between friends.

**Social Networking**

Social networks connect individuals to one another. Many sites support a variety of different activites. Three of the best known are Facebook ( provides access to Facebook Profiles, Facebook Pages, and Facebook groups ), Google 1 ( provides access to Circles, Hang-outs, and Sparks ), and LinkedIn.

**Blogs, Webcasts, and Wikis**

Other sites that help individuals communicate across the web are blogs, microblogs, webcasts, podcasts, and wikis.

• *Blogs ( web logs)* and microblogs are online journals that support chronological postings. Unlike blogs that often contain detailed postings, microblogs publish short, concise sentences. Twitter is the most popular microblogging site.

• *Webcasts* and podcasts deliver audio, video, and other media content over the Internet. Unlike podcasts, webcasts use streaming technology.

• *A wiki* is a website designed to allow visitors to use their browsers to add, edit, or delete the site’s content. Wikis are often used to support collab-orative writing in which there is a community of interested contributors. Wikipedia is one of the most popular wikis

**SEARCH TOOLS**

Search services maintain huge databases relating to website content. Spiders are programs that update these databases.

**Search Engines**

Search engines are specialized programs to help locate information. To use, enter a keyword or phrase and a list of hits or links to references is displayed.

**Specialized Search Engines**

Specialized search engines focus on subject- specific websites.

**Content Evaluation**

To evaluate the accuracy of information found on the web, consider the following:

• *Authority*. It the author an expert? Is the site official or does it present one individual’s or organization’s opinion.

• *Accuracy*. Has the information been critically reviewed? Does the site provide a method to report inaccurate information?

• *Objectivity*. Is the information factual or does the author have a bias? Does the author appear to have a personal agenda to convince or form a reader’s opinion?

• *Currency*. Is the information up to date? Does the site specify when information is updated? Are the site’s links operational?

**ELECTRONIC COMMERCE**

Electronic commerce, or e- commerce, is the buying and selling of goods over the Internet. Three basic types of e- commerce are business- to- consumer, consumer-to- consumer, and business- to- business.

• *Business- to- consumer ( B2C)* commerce involves sales from business to the general public. It is the fastest- growing type. Three of the most widely used applications are online banking, financial trading, and shopping.

• *Consumer- to- consumer ( C2C)* commerce involves sales between individuals, often as the electronic version of classified ads or an auction. Web auctions are similar to traditional auctions except buyers and sellers rarely, if ever, meet face to face.

• *Business- to- business ( B2B)* commerce involves sales from one business to another, typically a manufacturer- supplier relationship.

**Security**

The two greatest challenges for e- commerce are the development of

• Safe, secure payment methods. Two types are credit cards and digital cash ( third party sells digital cash to buyers and redeems for sellers).

• Convenient ways to provide required information such as mailing addresses and credit card information.

**CLOUD COMPUTING**

Cloud computing uses the Internet and the web to shift many computer activities from the user’s com-puter to other computers on the Internet.

**Components**

There are three basic components to cloud computing:

• Clients are corporations and end users who want access to data, programs, and storage.

• The Internet provides the connection between the clients and providers. Two critical factors are the speed and reliability of the user’s access and the Internet’s capability to provide safe and reliable access.

• Service providers are organizations with computers connected to the Internet that are willing to provide access to software, data, and storage.

**WEB UTILITIES**

Web utilities are specialized utility programs that make using the Internet and the web easier and safer.

**Plug- ins**

Plug- ins are automatically loaded and operate as part of a browser. Many websites require specific plug- ins to fully experience their content. Some plug- ins are included in many of today’s browsers; others must be installed.

**Filters**

Filters are used by parents and organizations to block certain sites and to monitor use of the Internet and the web.

**File Transfer Utilities**

File transfer utilities copy files to ( downloading ) and from ( uploading ) your computer. Three types are

• *File transfer protocol ( FTP*) and secure file transfer protocol ( SFTP) allow you to efficiently copy files across the Internet.

• *Web- based* file transfer services make use of a web browser to upload and download files.

• *BitTorrent distributes file* transfers across many different computers.

**Internet Security Suite**

An Internet security suite is a collection of utility pro-grams designed to protect your privacy and security on the Internet.

**CAREERS IN IT**

Webmasters develop and maintain websites and web resources. Bachelor’s or associate’s degree in com-puter science or information systems and knowledge of common programming languages and web devel-opment software are required. Salary range is $ 56,000 to $ 80,000

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[**Topic 11- Communications and Networks**](http://lms.seu.edu.sa/webapps/blackboard/execute/displayLearningUnit?course_id=_3337_1&content_id=_146054_1)

**COMMUNICATIONS**

Communications is the process of sharing data, programs, and information between two or more computers. Applications include e- mail, texting, Internet telephones, and electronic commerce.

**Connectivity**

Connectivity is a concept related to using computer networks to link people and resources. You can link or connect to large computers and the Internet, providing access to extensive information resources.

**The Wireless Revolution**

Mobile devices like smartphones and tablets have brought dramatic changes in connectivity and communications. These wireless devices are becoming widely used for computer communication.

**Communication Systems**

Communication systems transmit data from one location to another. Four basic elements are

• Sending and receiving devices

• Communication channel ( transmission medium)

• Connection ( communication) devices

• Data transmission specifications

**COMMUNICATION CHANNELS**

Communication channels carry data from one computer to another.

**Physical Connections**

Physical connections use a solid medium to connect sending and receiving devices. Connections include twisted pair ( telephone lines and Ethernet cables), coaxial cable, and fiber- optic cable.

**Wireless Connections**

Wireless connections do not use a solid substance to connect devices. Most use radio waves.

• *Bluetooth*— transmits data over short distances; widely used for wireless headsets, printers, and handheld devices.

• *Wi- Fi ( wireless fidelity)*— uses high- frequency radio signals; most home and business wireless networks use Wi- Fi.

• *Microwave*— line- of- sight communication; used to send data between buildings; longer distances require microwave stations.

• *WiMax ( Worldwide Interoperability for Microwave Access)*— extends the range of Wi- Fi networks using microwave connections.

• *LTE ( Long Term Evolution)* — currently has similar performance to WiMax; promises to provide greater speed and quality transmissions in the near future.

• *Satellite* — uses microwave relay stations in the sky; GPS ( global positioning system) tracks geographic locations.

• *Infrared* — uses light waves over a short distance; line- of- sight communication.

To be a competent end user you need to understand the concepts of connectivity, the wireless revolution, and communication systems. Additionally, you need to know the essential parts of communication technology, including channels, connection devices, data transmission, networks, network architectures, and network types.

**CONNECTION DEVICES**

Many communication systems use standard tele-phone lines and analog signals. Computers use digital signals.

**Modems**

Modems modulate and demodulate. Transfer rate is measured in megabits per second. Four types are tele-phone, DSL, cable, and wireless ( wireless wide area network, WWAN).

**Connection Service**

T1, T3 ( DS3), and OC ( optical carrier) lines provide support for very high speed, all- digital transmission for large corporations. More affordable technologies include dial- up, DSL ( digital subscriber line), ADSL ( widely used), cable, satellite , and cellular services. 4G ( fourth- generation mobile telecommunications) promises 10 times faster speeds than 3G.

**DATA TRANSMISSION**

Bandwidth measures a communication channel’s width or capacity. Four bandwidths are voiceband ( low bandwidth), medium band, broadband ( high-capacity transmissions), and baseband. Protocols are rules for exchanging data. Widely used Internet pro-tocols include http, https, and TCP/ IP. IP addresses ( Internet protocol addresses) are unique numeric Internet addresses. DNS ( domain name server) con-verts text- based addresses to and from numeric IP addresses. Packets are small parts of messages

**NETWORKS**

Computer networks connect two or more computers. Some specialized network terms include

• ***Node*** — any device connected to a network.

• ***Client*** — node requesting resources.

• ***Server*** — node providing resources.

• ***Directory server*** — specialized node that manages resources.

• ***Host*** — any computer system that can be accessed over a network.

• ***Router*** — a node that forwards data packets from one network to another network.

• ***Switch*** — node that coordinates direct flow of data between other nodes. Hub is an older device that directed flow to all nodes.

• ***NIC ( network interface card)*** — LAN adapter card for connecting to a network.

• ***NOS ( network operating system)*** — controls and coordinates network operations.

• ***Network administrator*** — network specialist responsible for network operations.

**NETWORK TYPES**

Networks can be citywide or even international, using both wired and wireless connections.

• *Local area networks ( LANs*) connect nearby devices. Network gateways connect networks to one another. Ethernet is a LAN standard. These LANs are called Ethernet LANs*.*

*• Home networks* are LANs used in homes.

• Hotspots provide Internet access typically using Wi- Fi technology.

• *Wireless LANs ( WLANs)* use a wireless access point ( base station) as a hub.

• *Personal area networks ( PANs*) are wireless net-works for PDAs, cell phones, and other small gadgets.

• *Metropolitan area networks ( MANs)* link office buildings within a city, spanning up to 100 miles.

• *Wide area networks or WANs* are the largest type. They span states and countries or form worldwide networks. The Internet is the largest wide area net-work in the world.

**NETWORK ARCHITECTURE**

Network architecture describes how networks are arranged and resources are shared.

**Topologies**

A network’s topology describes the physical arrangement of a network.

• *Bus network*— each device is connected to a common cable called a bus or backbone.

• *Ring network*— each device is connected to two other devices, forming a ring.

• *Star network* — each device is connected directly to a central network switch; most common type today.

• *Tree ( hierarchical) network* — a central node is connected to subordinate nodes forming a treelike structure.

• *Mesh network* — newest; each node has two or more connecting nodes.

**Strategies**

Every network has a strategy, or way of sharing information and resources. Common network strategies include client/ server and peer- to- peer.

• *Client/ server ( hierarchical) network* — central computers coordinate and supply services to other nodes; based on specialization of nodes; widely used on the Internet; able to handle very large net-works efficiently; powerful network management software available.

• *Peer- to- peer network* — nodes have equal authority and act as both clients and servers; widely used to share games, movies, and music over the Internet; easy to set up and use; lacks security controls.

**ORGANIZATIONAL NETWORKS**

**Internet Technologies**

Internet technologies support effective communication using intranets and extranets.

• *Intranet* — private network within an organization; uses browsers, websites, and web pages. Typical applications include electronic telephone directories, e- mail addresses, employee benefit information, internal job openings, and much more.

• *Extranet* — like intranet except connects more than one organization; typically allows suppliers and others limited access to their networks.

**Network Security**

Three technologies commonly used to ensure net-work security are firewalls, intrusion detection systems, and virtual private networks.

• *Firewall* — controls access; all communications pass through proxy server.

• *Intrusion detection systems ( IDS)* — work with firewalls; use sophisticated statistical techniques to recognize and disable network attacks.

• *Virtual private network ( VPN)* — creates secure private connection between remote user and organization’s internal network.

**CAREERS IN IT**

Network administrators manage a company’s LAN and WAN networks. Bachelor’s or specialized advanced associate’s degree in computer science, computer technology, or information systems and practical networking experience required. Salary range is $ 46,000 to $ 84,000.

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**Topic 12 - Privacy, Security and Ethics**

**PRIVACY**

Privacy concerns the collection and use of data about individuals. There are three primary privacy issues: accuracy ( who is responsible to ensure data is correct), property ( who owns data and rights to software), access ( who controls access to data).

**Large Databases**

Large organizations are constantly compiling information about us. Reverse directories list telephone numbers followed by subscriber names. Information resellers ( information brokers) collect and sell personal data. Electronic profiles are compiled from databases to provide highly detailed and personalized descriptions of individuals. Identity theft is the illegal assumption of someone’s identity for the purposes of economic gain. Mistaken identity occurs when an electronic profile of one per-son is switched with another. The Freedom of Information Act entitles individuals access to governmental records relating to them.

**Private Networks**

Many organizations monitor employee e- mail and computer files using special software called employee-monitoring software.

**The Internet and the Web**

Many people believe that, while using the web, little can be done to invade their privacy. This is called the illusion of anonymity**.**

**PRIVACY**

Information stored by browsers includes history files ( record sites visited) and temporary Internet files or browser cache ( contain website content and display instructions). Cookies store and track information. Privacy mode ( InPrivate Browsing; Private Browsing) ensures that your browsing activity is not recorded. Spyware secretly records and reports Internet activities. Computer monitoring software ( or key-stroke loggers ) are particularly dangerous. Antispyware ( spy removal programs) detects and removes various privacy threats.

**Online Identity**

Many people post personal information and some-times intimate details of their lives without considering the consequences. This creates an online identity. With the archiving and search features of the web, this identity is indefinitely available to anyone who cares to look for it.

**Major Laws on Privacy**

The Gramm- Leach- Bliley Act protects personal financial information; the Health Insurance Portability and Accountability Act ( HIPAA) protects medical records; and the Family Educational Rights and Privacy Act ( FERPA) restricts disclosure of educational records.

To be a competent end user, you need to be aware of the potential impact of technology on people. You need to be sensitive to and knowledgeable about personal privacy, organizational security, and ethics.

**SECURITY**

Computer security focuses on protecting information, hardware, and software from unauthorized use as well as preventing damage from intrusions, sabotage, and natural disasters. Someone who gains unauthorized access to computers that contain information about us is commonly known as a computer hacker. Not all hackers are intent on malicious actions and not all are criminals.

**Cybercrime**

Cybercrime ( computer crime) is an illegal action involving special knowledge of computer technology.

• Malicious programs ( malware) include viruses ( the Computer Fraud and Abuse Act makes spreading a virus a federal offense), worms, and Trojan horses. Zombies are remotely controlled infected computers used for malicious purposes. A collection of zombie computers is known as a botnet, or robot network.

• Denial of service ( DoS) attack is an attempt to shut down or stop a computer system or network. It floods a computer or network with requests for information and data.

• Scams are designed to trick individuals into spending their time and money with little or no return. Common Internet scams include identity theft, chain letters, auction fraud, vacation prizes, and advance fee loans. These are frequently coupled with phishing websites or e- mails.

• Social networking risks include posting work- related criticisms and disclosure of personal information.

• Cyberbullying is the use of the Internet, cell phones, or other devices to send or post content intended to hurt or embarrass another person.

• Rogue Wi- Fi hotspots imitate legitimate hotspots to capture personal information.

• Theft takes many forms including stealing hard-ware, software, data, and computer time.

• Data manipulation involves changing data or leaving prank messages. The Computer Fraud and Abuse Act helps protect against data manipulation.

**Measures to Protect Computer Security**

There are numerous ways in which computer systems and data can be compromised and many ways to protect computer security. These measures include

• Access can be restricted through biometric scanning devices and passwords ( secret words or phrases; dictionary attacks use thousands of words to attempt to gain access).

• Encrypting is coding information to make it unreadable except to those who have the encryption key. Virtual private networks ( VPNs) encrypt connections between company networks and remote users. WPA2 ( Wi- Fi Protected Access) is the most widely used wireless network encryption for home wireless networks.

• Anticipating disasters involves physical security, data security, and disaster recovery plans.

• Preventing data loss involves protecting data by screening job applicants, guarding passwords, and auditing and backing up data.

**ETHICS**

What do you suppose controls how computers can be used? You probably think first of laws. Of course, that is right, but technology is moving so fast that it is very difficult for our legal system to keep up. The essential element that controls how computers are used today is ethics. Ethics are standards of moral conduct. Computer ethics are guidelines for the morally acceptable use of computers in our society. We are all entitled to ethical treatment. This includes the right to keep personal information, such as credit ratings and medical histories, from getting into unauthorized hands.

**Copyright and Digital Rights Management**

Copyright is a legal concept that gives content creators the right to control use and distribution of their work. Materials that can be copyrighted include paintings, books, music, films, and even video games.

Software piracy is the unauthorized copying and distribution of software. The software industry loses over $ 30 billion annually to software piracy. Two related topics are the Digital Millennium Copyright Act and digital rights management.

• Digital Millennium Copyright Act establishes the right of a program owner to make a backup copy of any program and disallows the creation of copies to be sold or given away. It is also illegal to download copyright- protected music and videos from the Internet.

• Digital rights management ( DRM) is a collection of technologies designed to prevent copyright violations. Typically, DRM is used to ( 1) control the number of devices that can access a given file and ( 2) limit the kinds of devices that can access a file.

**ETHICS**

Today, many legal sources for digital media exist, including

• Television programs that can be watched online, often for free, on television- network- sponsored sites.

• Sites like Pandora that allow listeners to enjoy music at no cost.

• Online stores that legally sell music and video content. A pioneer in this area is Apple’s iTunes Music Store.

**Plagiarism**

Plagiarism is the illegal and unethical representation of some other person’s work and ideas as your own without giving credit to the original source. Examples of plagiarism include cutting and pasting web content into a report or paper. Recognizing and catching plagiarists is relatively easy. For example, services such as Turnitin are dedi-cated to preventing Internet plagiarism. This service examines a paper’s content and compares it to a wide range of known public electronic documents includ-ing web page content. Exact duplication or paraphras-ing is readily identified.

**CAREERS IN IT IT**

security analysts are responsible for maintaining the security of a company’s network, systems, and data. Employers look for candidates with a bachelor’s or advanced specialized associate’s degree in infor-mation systems or computer science and network experie