

Computer Techniques

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Lecture 1

Information Systems

College of Computer Science & Information Technology

Department of Computer Science



Information Systems

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□ An information system has five parts: **people**, **procedures**, **software**, **hardware**, and **data**.

1. **People**: end **users** like us and information technology **staff**. People are the most important part of any information system. People are included in education, business, medicine, entertainment

2. Procedures: The rules that people follow when using software, hardware, and data.

Procedures are written in manuals by computer programmers and these manuals are provided by software and hardware manufacturers with their products

3. Software: *programs* consisting of step-by-step instructions that tell the computer how to do its work – they process *data* to convert it into *information*.

- ▶ There are two major kinds of software:
system software & application software.

A. System Software

System software enables the application software to interact with the computer hardware. For example: MS Windows with MS Word.

System software is not a single program. Rather, it is a collection of programs.

System software is a collection of programs, including the following:

1. **Operating systems:** are programs that coordinate computer resources, **provide an interface between users and the computer**, and run applications. Smartphones, tablets, and many other mobile devices use embedded operating systems. Desktop computers use standalone operating systems like Windows 10 or Mac OS.
2. **Utilities:** Such as **antivirus program**, to protect computer

B. Application Software (end user software)

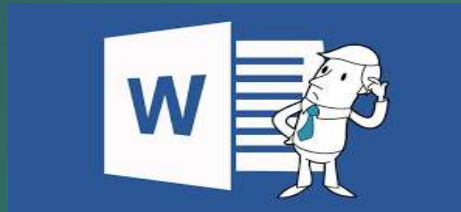
Three types of application software are

I. General-purpose applications (widely used)

Browsers



Word processors



Spreadsheets



Database management systems



Presentation graphics



II. Specialized applications focused on specific. For example, graphics and web authoring programs.

III. Mobile applications

Designed for mobile devices (smartphones and for tablet).

Programs of Social networking, playing games, and downloading music and videos.

4. Hardware

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There are four types of computers

- **Supercomputers:**



- **Mainframe computers:**

- Fill up specially wired, air-conditioned rooms.
- Capable of great processing speeds and data storage.
- Example, insurance companies use mainframes to process information about millions of policyholders.

- **Minicomputer (server):**

- Typically the size of a desk.
- Used by medium-sized companies or departments of large companies for specific purposes.
- A production department may use a minicomputer to monitor manufacturing processes and assembly line operations.

• Personal computers:

- Also known as PCs, are the least powerful.
- The most widely used and fastest-growing type of computer.
- There are five types of personal computers: **desktops, laptops, tablets, smartphones, and wearables.**



Personal Computer Hardware

There are four basic categories of personal computer hardware: **system unit**, **input/ output devices**, **secondary storage**, and **communication**

A. System unit

Holds most of the electronic components that make up the computer, including:

- *Microprocessor* (or processor, Central Processing Unit – CPU): controls and manipulates data to produce information
- *Memory* (Random Access Memory – RAM):
 - holds data and program instructions for processing the data.
 - Memory is sometimes referred to as temporary storage as its contents will be lost if power to computer is switched off.

B. Input/ Output devices

- Input devices translate data and programs that humans can understand into a form that computer can process and include such things as the keyboard and mouse
- Output devices translate processed information from the computer into a form that humans can understand and include such things as the monitor (video display screen) and printers

C. Secondary Storage

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Unlike primary memory, secondary storage holds the contents even when the power is switched off.

Typical storage media includes:

- **Floppy disks**: thin flexible plastic disks used to store and transport smaller files of data.
- **Hard disks**: hard metallic platters with much greater storage capacities used to store programs and very large data files and can also access information much faster than floppy disks.
- **Optical disks**: use laser technology and have greater capacity and two basic types are: Compact Discs (CDs) and Digital Versatile Discs (DVDs) typically used to store and transport multimedia files

D. Communication and the Mobile Internet

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Communication (Connectivity) is the capability of your personal computer to share information with other computers. Such as Internet connection

- **Cloud computing** users can now use the Internet to connect to the cloud and access more powerful computers, software, and storage.
- **Wireless communication** has changed the way we communicate with one another, use of wireless communication devices like tablets, smartphones.
- **The Internet of Things (IoT)** is the continuing development of the Internet that allows electronic devices to send and receive data over the Internet.

5. Data

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- Data is stored in document, worksheet, database, and presentation files.
- Data are the raw, unprocessed facts including text, numbers, images, and sounds. **Four common types of files** include:

- 1.Document files:** created by word processors to save documents like memos, letters.
- 2.Worksheet files:** created by electronic spreadsheets to save analysis of things like budget.
- 3.Database files:** like an employee database file that contains all the worker's names, id numbers, job titles, salary, date of birth.
- 4.Presentation files:** created by presentation graphics programs to save presentation materials like speaker notes, electronic slides.

Assignment 1

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- ▶ What is hard disk and its types?

Computer Techniques

Lecture 2

Application Software



User Interface: is the part of the application that allows user to control and to interact with the program.

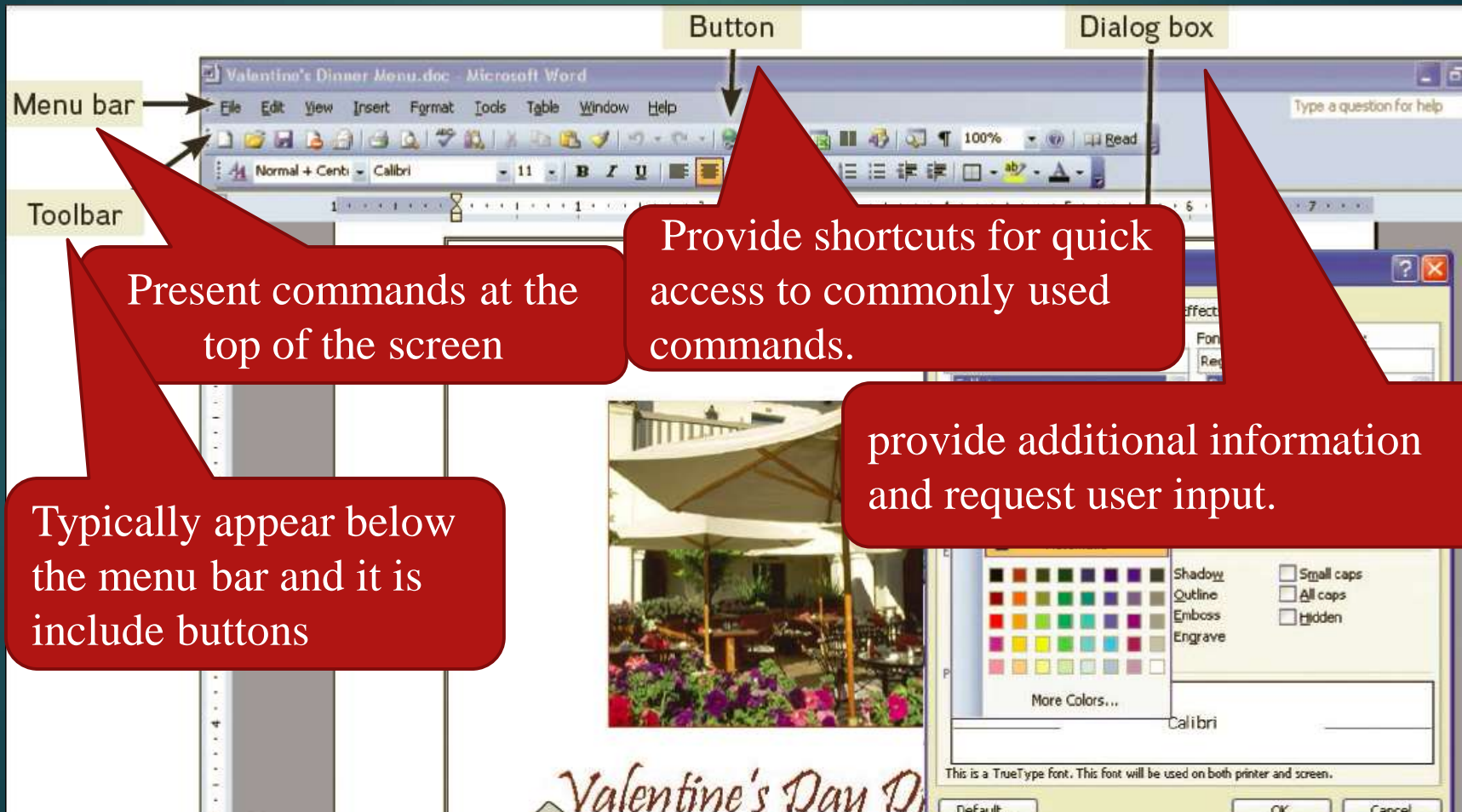
Depending on the application, user can use a mouse, a pointer, a keyboard, or his /her voice to communicate with the application.

Most applications use a mouse and a graphical user interface (GUI) that displays graphical elements called **icons** to represent objects.

Another feature is the use of windows to display information. A **window** is simply a rectangular area that can contain a document, program, or message

Most software programs use a system of **menus**, **toolbars (buttons)**, and **dialog boxes**.

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User Interface


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- ▶ Many applications, and Microsoft applications in particular, use an interface known as the **Ribbon GUI** to make it easier to find and use all the features of an application;
- ▶ GUI uses a system of **ribbons, tabs, and galleries**

Diagram illustrating the Microsoft Word ribbon interface structure:

- Tabs:** FILE, HOME, INSERT, DESIGN, PAGE LAYOUT, REFERENCES, MAILINGS, REVIEW, VIEW, ADD-INS.
- Ribbons:** Groups of commands within a tab (e.g., Clipboard, Font, Paragraph).
- Groups:** Specific command categories within a ribbon.
- Gallery:** A collection of styles or templates (e.g., AaBbCcDd, AaBbCcE, AaBbCcF).

Replace menus and toolbars by organizing commonly used commands into a set of tabs. These tabs display command buttons that using by the user.



The diagram shows a screenshot of the Microsoft Word ribbon interface. The ribbon is divided into tabs: FILE, HOME, INSERT, DESIGN, PAGE LAYOUT, REFERENCES, MAILINGS, REVIEW, VIEW, and ADD-INS. The HOME tab is selected, showing groups like Clipboard, Font, and Paragraph. A red arrow points from the 'Groups' label to the Font group. The document content includes a photo of two elephants and the text 'ADVENTURE TRAVELERS!' and 'Attend an Adventure Travel presentation...'.

Tabs →

Ribbons →

Groups →

Gallery →

Used to divide the ribbon into major activity areas. Each tab is then organized into groups that contain related items, appear only when they are needed and expect the next operation to be performed by user



The screenshot shows the Microsoft Word ribbon with tabs for FILE, HOME, INSERT, DESIGN, PAGE LAYOUT, REFERENCES, MAILINGS, REVIEW, VIEW, and ADD-INS. The HOME tab is active, showing groups for Font (Comic Sans M, 20, bold, italic, underline, color, background color, text color, text effects), Paragraph (bullet point, numbered list, decrease indent, increase indent, line and paragraph spacing, text alignment, text orientation, text wrapping, text direction, text to speech), Styles (Normal, No Spacing, Heading 1, Heading 2, Heading 3), and Editing (Find, Replace, Select). A red arrow points from the 'Groups' label to the Font group. A yellow box labeled 'Gallery' points to the Styles group. Below the ribbon, a flyer design is shown. It features a photograph of two elephants in a body of water. To the right of the photo, the text 'ADVENTURE TRAVELERS!' is written in large, green, bold, sans-serif capital letters. Below the photo and text, there is a paragraph of text: 'Attend an Adventure Travel presentation to learn about some of the earth's greatest unspoiled habitats and find out how you can experience the adventure of a lifetime. This year during four new tours that offer you a unique'.

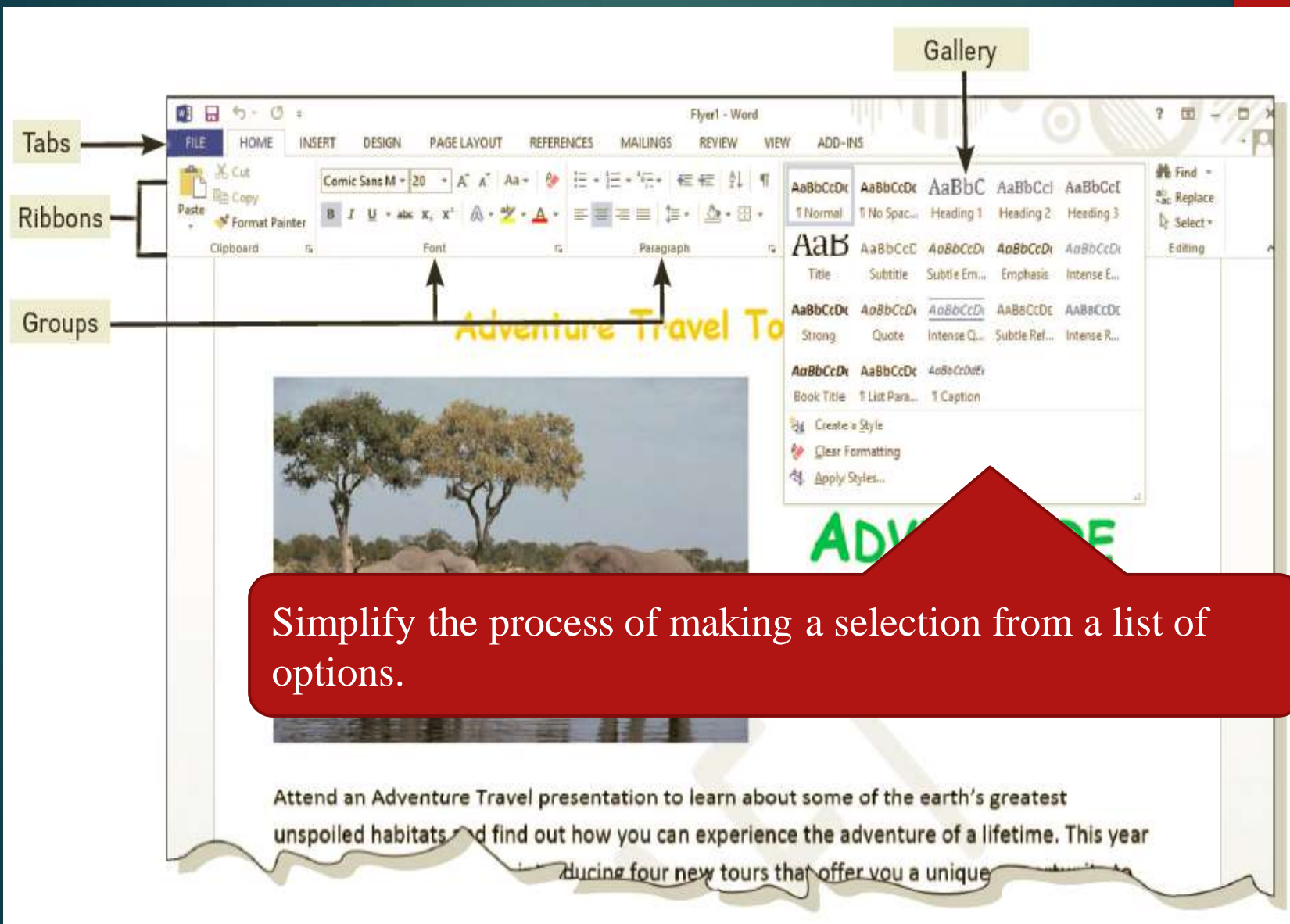
The image shows a screenshot of the Microsoft Word ribbon interface. The ribbon is divided into tabs: FILE, HOME, INSERT, DESIGN, PAGE LAYOUT, REFERENCES, MAILINGS, REVIEW, VIEW, and ADD-INS. The HOME tab is active, showing the Font and Paragraph groups. The Font group includes options for font face (Comic Sans M), size (20), bold (B), italic (I), underline (U), and color. The Paragraph group includes options for bullet points, numbering, and indentation. A red callout box points to the ribbon structure, stating: "Used to divide tabs and contain related items".

Annotations in the image include:

- Tabs**: Points to the ribbon tabs.
- Ribbons**: Points to the ribbon structure.
- Groups**: Points to the Font and Paragraph groups.
- Gallery**: Points to the style gallery on the right.

The document content includes a title "Adventure Travel To", a photograph of a savanna landscape, and the text "ADVENTURE TRAVELERS!".

Attend an Adventure Travel presentation to learn about some of the earth's greatest unspoiled habitats and find out how you can experience the adventure of a lifetime. This year during four new tours that offer you a unique



Features of GUI

- ▶ Spell checker—looks for misspelled words.
- ▶ Alignment— **centers**, **right-aligns**, or **left-aligns** numbers and characters.
- ▶ Fonts and **font sizes**
- ▶ Character effects—different typefaces, such as **bold** or *italics*
- ▶ Edit options— such as **cut**, **copy**, and **paste**.

Application software categories

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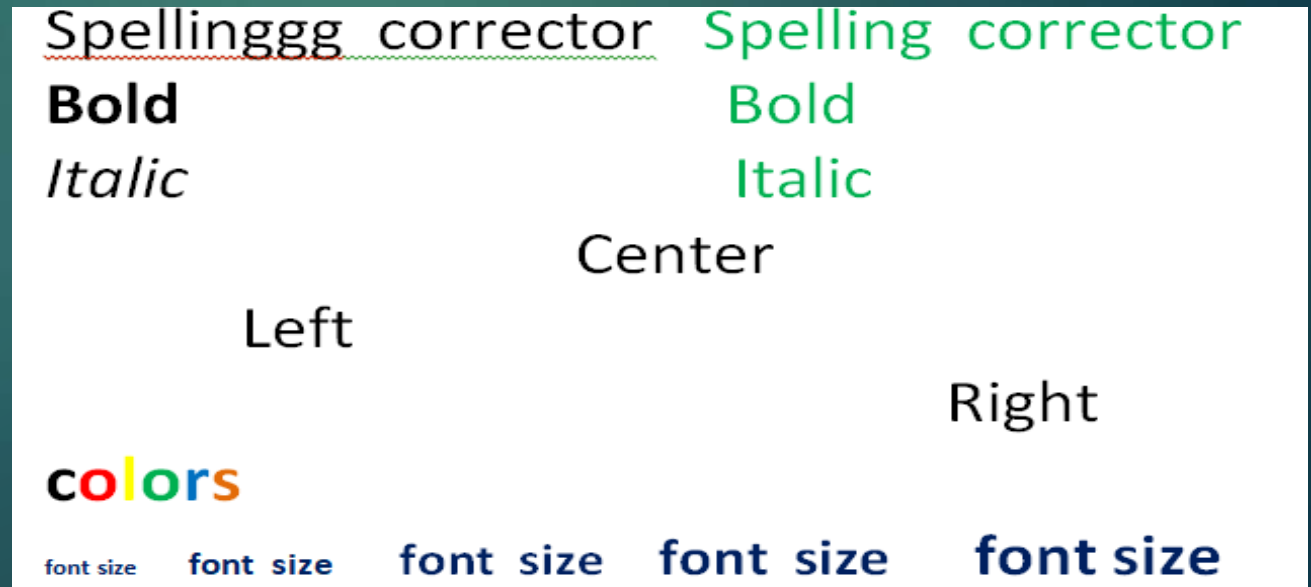
1. General-Purpose Applications. 2. Specialized Applications. 3. Mobile applications.

1. General-Purpose Applications

- ▶ Word Processors
- ▶ Spreadsheets
- ▶ Presentation Graphics
- ▶ Database Management Systems

Word Processors

- ▶ It creates text-based documents and it is widely used software tools.
- ▶ It uses to create **memos**, **letters**, and **faxes**, **newsletters**, **manuals**, and **brochures**.
- ▶ **Microsoft Word** is the most widely used word processor.



Spreadsheets

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- ▶ It organize, analyze, and graph numeric data such as budgets and financial reports.
- ▶ It used in Marketing, and Students and teachers record grades. Example: Microsoft Excel, Apple Numbers, Google Sheets, and OpenOffice Calc

to the values in the worksheet. The rows are labeled to identify the various sales and expense items. The columns are labeled to specify the months.

Cells can contain labels, numbers, formulas, and functions. A cell's content is indicated by the row and column labels. For example, cell D16 contains a number for the Payroll expense expected for March.

Formulas Formulas provide a way to perform calculations in the worksheet. In this case, cell C24 contains the formula = C12 (Total Sales for February) - C23 (Total Sales for February) - C23 (Total Sales for February).

	JAN	FEB	MAR	TOTAL	QTD
Expenses					
Expenses	\$ 13,900	\$ 13,600	\$ 14,300	\$ 41,800	\$ 13,700
Drip Coffee	\$ 3,800	\$ 3,000	\$ 3,200	\$ 10,000	\$ 3,000
Food/Beverage	\$ 3,400	\$ 3,800	\$ 3,800	\$ 11,000	
Merchandise	\$ 1,000	\$ 1,300	\$ 1,100	\$ 3,400	
Computer	\$ 400	\$ 400	\$ 400	\$ 1,200	
Total Sales	\$ 14,100	\$ 14,000	\$ 15,700	\$ 43,800	
Revenues					
Cost of Goods	\$ 7,225	\$ 7,400	\$ 7,800	\$ 22,425	
Cost of Merchandise	\$ 700	\$ 770	\$ 770	\$ 2,240	
Payroll	\$ 8,000	\$ 8,000	\$ 8,000	\$ 24,000	\$ 8,000
Internet	\$ 825	\$ 825	\$ 825	\$ 2,475	\$ 825
Building	\$ 2,100	\$ 2,100	\$ 2,100	\$ 6,300	\$ 2,100
Advertising	\$ 600	\$ 600	\$ 600	\$ 1,800	\$ 600
Capital Assets	\$ 1,300	\$ 1,300	\$ 1,300	\$ 3,900	\$ 1,300
Miscellaneous	\$ 1,300	\$ 1,300	\$ 1,300	\$ 3,900	\$ 1,300

Presentation Graphics

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- ▶ Presentation graphics are programs that help to create attractive, visually interesting presentations.
- ▶ Microsoft Power-Point, Apple Keynote, Google Slides, Corel Presentations, OpenOffice Impress, and Prezi.
- ▶ People learn better when information is presented visually.

Database Management Systems

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- ▶ A database management system (DBMS) is a program that sets up or structures a database.
- ▶ It also provides tools to enter, edit, and retrieve data from the database
- ▶ Example of database: recording patient information, or Colleges and universities databases (keep records of students, lecturers , and courses).
- ▶ Database programs: Microsoft Access, Apple FileMaker.

Example of database

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Employee ID	Last Name	First Name	Address	City	State	ZIP Code	Home Phone	Gender	Birth Date	Photo/Resume
12655	Lahti	Jill	5401 E. Thomas Rd.	Landis	CA	92120-3741	(507) 555-4765	F	6/14/1990	🖼️(0)
12920	Larson	Alicia	345 W. Mill Ave.	Maldin	CA	92121-3740	(941) 555-4717	F	6/21/1993	🖼️(0)
13416	Lembi	Damon	4389 S. Rita Ln.	Landis	CA	92120-3741	(941) 555-4747	M	9/12/1982	🖼️(0)
11747	Lettow	Ryan	358 Maple Dr.	Maldin	CA	92121-3740	(507) 555-2805	M	11/15/1991	🖼️(0)
22085	Lindau	Kristina	1947 E. Watson	Landis	CA	92120-3741	(941) 555-4363	F	2/24/1990	🖼️(0)
03406	Lopez	Mina	4290 E. Alameda Dr.	Maldin	CA	92121-3740	(507) 555-4050	F	2/25/1985	🖼️(0)
04731	Marchant	Roberta	564 Palm Avenue	Landis	CA	92120-3741	(507) 555-4990	F	5/18/1990	🖼️(2)
13543	Martinez	Julie	1920 First Ave.	Maldin	CA	92121-3740	(941) 555-1044	F	12/10/1992	🖼️(0)
13635	Martinez	Juan	7115 E. Roosevelt Dr.	Maldin	CA	92121-3740	(507) 555-2935	M	12/10/1992	🖼️(0)
22407	Mazeai				CA	92120-3741	(941) 555-1093	F	9/23/1982	🖼️(0)
03225	Morgan				CA	92121	(507) 555-4567	M	3/5/1984	🖼️(0)
00000	Name				CA	02123-2232	(507) 555-0000	F	1/1/1980	🖼️(0)
00617	Nichols				CA	92120-3741	(507) 555-0001	F	5/19/1972	🖼️(0)
00907	Pennin				CA	02120-3741	(507) 555-3333	M	7/7/1977	🖼️(0)
12194	Polons				CA	92121-3740	(507) 555-1018	M	3/13/1990	🖼️(0)
12247	Rath				CA	92122-1268	(507) 555-4797	F	5/30/1988	🖼️(0)
12594	Reddie				CA	92121	(507) 555-1139	M	11/5/1986	🖼️(0)
12230	Reddie				CA	92120-3741	(507) 555-1191	F	7/14/1988	🖼️(0)
13005	Reilly				CA	92121-3740	(941) 555-4532	F	5/21/1988	🖼️(0)
12612	Richard				CA	92123	(507) 555-4789	F	9/30/1981	🖼️(0)
06000	Robertson	Kirk	832 S. William Ave.	Maldin	CA	92121	(507) 555-3730	M	4/5/1982	🖼️(0)
22297	Rogondino	Patricia	7583 Turquoise	Chesterfield	CA	92122-1268	(941) 555-4539	F	8/30/1980	🖼️(0)
07287	Roman	Anita	2348 S. Bala Dr.	Maldin	CA	92121-3740	(507) 555-4870	F	3/15/1990	🖼️(0)
12918	Rulz	Carlos	10101 First St.	Maldin	CA	92121-3740	(507) 555-0125	M	7/27/1987	🖼️(1)
08391	Rulz	Enrique	35 Palm St.	Chesterfield	CA	92122-1268	(507) 555-0091	M	12/10/1982	🖼️(0)
04321	Sabin	Greg	90 E. Rawhide Ave.	Chesterfield	CA	92122	(507) 555-4455	M	9/30/1987	🖼️(0)
00212	Schiff	Chad	235 N. Cactus Dr.							
22114	Schneider	Paul	1731 Jackson Ave.							
01421	Spehr	Timothy	90 Royal Dr.							
12366	Stacey	David	737 S. College Rd.							
13497	Steele	Jeff	1011 E. Holly Ln.							
12568	Stuefand	Valerie	34 University Dr.							
12583	Sullivan	Marie	78 Omega Drive							
12867										
03890										
22304										

Record

Each record contains information about one employee. A record often includes a combination of numeric, text, and object data types.

Form

Like printed paper forms, electronic forms should be designed to be easy to read and use. This form makes it easy to enter and view all employees' data, including their photographs.

Employee Records

Employee ID

08391

Last Name

Rulz

First Name

Enrique

Address

35 Palm St.

City

Chesterfield

State

CA

ZIP Code

92122-1268

Home Phone

(507) 555-0091

Gender

M

Photo/Resume



2. Specialized Applications

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- ▶ Graphics
- ▶ Video Game Design Software
- ▶ Web Authoring Programs

- **Desktop publishing programs:** Program that allows user to mix text and graphics to create professional quality documents such as calendars, brochures, and newspapers. Example : Microsoft Publisher.
- **Image editors;** for editing or modifying digital photographs. Example: Adobe Photoshop.
- **Illustration programs:** to create and edit vector images. created by connecting lines and curves. Example: Adobe illustrator.
- **Video editors:** to edit videos to enhance quality. User can add special effects, music, and titles. Example: Windows Live Movie Maker.

Video Game Design Software

Organize user thoughts and guide user through the game design process including character development and environmental design.

Web Authoring Programs

Corporations use the web to reach new customers and to encourage their products. Individuals create online diaries or commentaries, called **blogs**.

3. Mobile applications

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Mobile Apps : Programs for smartphones and tablets.
Example: Music, Video , Social networking programs,
Shopping and games .

Software suite

Software suite is a collection of separate application programs bundled together. Four types of suites are **office suites**, **cloud suites**, **specialized suites**, and **utility suites**.

- ▶ **Office suites**: contain general-purpose programs that are used in a business situation. EX: **Microsoft Office**
- ▶ **Cloud suites** : documents stored at a server on the Internet and are available anywhere you can access the Internet.
Google Docs
- ▶ **Specialized suites**: include graphics suites like **CorelDRAW**.
- ▶ **Utility suites**: include programs designed to make computing easier and safer. Ex: **Norton Antivirus**

Assignment 2

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- ▶ Search about Google docs and discuss its advantages.

Computer Techniques

Lecture 3

System Software



System Software

System software works with end users, application software, and computer hardware to handle the majority of technical details.

System software is **not a single program**. It is a collection or a system of programs that handle hundreds of technical details with little or no user intervention.

System software consists of four types of programs:

3

- Operating systems.
- Utilities
- Device drivers
- Language translators

Operating Systems

An operating system: is a collection of programs that handle many of the technical details related to using a computer.

An operating system is the most important type of computer program. Without a functioning operating system, the computer would be useless.

Operating Systems Functions

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Operating systems functions can be classified into three groups:

- Managing resources
- Providing user interface
- Running applications:

Operating Systems Features

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- ▶ **Booting:** starting or restarting a computer.
- ▶ **Desktop:** that provides access to computer resources.
- ▶ **Icons:** graphic representations for a program, type of file, or function.
- ▶ **Pointer:** controlled by a mouse, trackpad, or touch screen.
- ▶ **Windows:** rectangular areas for displaying information and running programs.
- ▶ **Menus:** provide a list of options or commands that can be selected.

Operating Systems Features (Cont..)

7

- ▶ **Tabs:** divide menus into major activity areas such as format and page layout.
- ▶ **Dialog boxes:** typically provide information or request input.
- ▶ **Help:** provides online assistance for operating system functions and procedures.
- ▶ **Gesture control:** ability to control operations with finger movements, such as swiping, sliding, and pinching.

Operating Systems Categories

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There are **three** basic operating system categories:

- **Embedded operating systems:** (real-time operating systems) are entirely stored within a device.
- **Stand-alone operating systems:** (desktop operating systems) control a single desktop or laptop computer.
- ▶ **Network operating systems** (NOS) are used to control and coordinate computers that are networked or linked together.. Example Linux, Windows *Server*, and *UNIX*

Mobile operating systems

- ▶ Mobile operating systems are a type of embedded operating system used in smartphones, tablets ..etc.
- ▶ These mobile operating systems are less complicated and more specialized for wireless communication. For example best known are **Android** which developed by Android company, **iOS** developed by Apple and **Windows Phone** introduced by Microsoft.

Desktop Operating Systems

1

- ▶ **Windows:** Microsoft's Windows is the most widely used personal computer operating system.
- ▶ **UNIX:** The UNIX designed to run on minicomputers in network environments with many different versions. Now, it is widely used by servers on the web, mainframe computers, and personal computers. There are many different versions such as **Linux**.

Desktop Operating Systems

1

(Cont..) Designed to run only with Apple computers, Mac OS is not as widely used as the Windows operating system. The two most recent versions are:

OS X Mavericks: introduced several improvements, including better power management and combination with cloud computing.

OS X Yosemite: It has user interface similar to the iOS interface. use with Apple's cloud storage service, iCloud, and Apple mobile devices.

Utilities

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Utilities: are specialized programs designed to make computing easier. There are hundreds of different utility programs. The most important are:

- ▶ **Troubleshooting** or **diagnostic** programs that recognize and correct problems, ideally before they become serious.
- ▶ **Antivirus programs** that protect the computer system against viruses. For example: **Norton AntiVirus** and **Webroot SecureAnywhere AntiVirus**.
- ▶ **Backup programs** that make copies of files to be used in case the originals are lost or damaged. Windows 10 comes with a free backup program, the File History tool, and Mac OS X has a backup feature named Time Machine.
- ▶ **File compression programs** that reduce the size of files so they require less storage space and can be sent more efficiently over the Internet.

Windows Utilities

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3

- ▶ **File History:** is a utility program included with Windows 10 that makes a copy of all files that are in the libraries, contacts, and favorites and on the desktop.
- ▶ **Disk Cleanup:** is a troubleshooting utility that identifies and remove unnecessary files. This frees up disk space and improves system performance.
- ▶ **Optimize Drives:** is a utility program that locates and remove unnecessary fragments and rearranges files and unused disk space to optimize operations.

Utility Suites

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Utility suites combine several utility programs into one package. Utility suite is cheaper than buying each program separately. The best known utility suites are **BitDefender**, **Kaspersky**, and **Norton** which is most widely used Utility Suites it includes:

Norton Utilities: a collection of trouble shooting utilities that can find and fix problems.

Norton Antivirus: a collection of antivirus programs that protects computers from many different viruses.

Norton Cleansweep: a collection of programs that safely removes programs and files that are no longer needed, archive, move and backs up the hard drive, and protects existing files when installing new software.

Device Drivers

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Device Drivers: are specialized programs that allow communications between the device

such as mouse or keyboard to work with the rest of the computer system.

Each time the computer is booted, the OS loads all device drivers into memory.

If a new device is added to computer system, user need to add the device driver to the computer before the device can be used.

Microsoft Windows has wizards that can help in process, such as the Windows Add Printer Wizard. Windows Update can help user to make sure user have all the latest versions of device drivers.

Language Translators

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Language translators convert programming instructions written by programmers into machine language that computers can understand and process. Computers can understand only a language of 0's and 1's called machine language.

Assignment

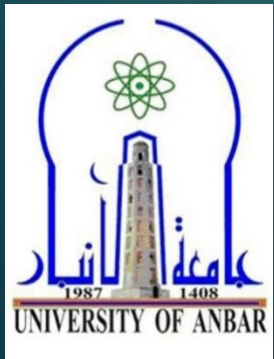
1
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Compare mobile operating systems, including iOS, Android, and Windows Phone.

Computer Techniques

Lecture 5

Input and Output



Input

2

- Input is any data or instructions that are used by a computer. They can come directly from the user in the form of text, numbers, pictures, voice.
- Input devices are hardware used to translate words, sounds, images, and signals that people understand into a form that computer can process. There are many input devices include keyboards, mice, pointing, scanning, image capturing, and audio-input devices.

Keyboards

3

Keyboards the most common ways to input data which convert numbers, letters, and special characters into electrical signals. There are four basic categories of keyboards: traditional, laptop, virtual, and thumb.

► Traditional keyboards full-size keyboards are widely used on desktops and larger computers. The standard keyboard has 101 keys. Traditional keyboards provide function keys, navigation keys, and a numeric keypad. Toggle keys turn features on and off. Combination keys perform actions when combinations of keys are held down.

Keyboards (cont...)

- ▶ Laptop keyboards are smaller than traditional keyboard with fewer keys. Typically does not have numeric keypad or standard location for function and navigation keys.
- ▶ Virtual keyboards used on mobile devices and tablets. Does not have a physical keyboard. Keys displayed on the screen and selected by pressing a key's image.
- ▶ Thumb keyboards used on smartphones and other small mobile devices. Designed primarily for communicating via texting and connecting to the web.

Pointing Devices

- ▶ Pointing devices provide an interface with the system unit by accepting physical movements or signs and converting them into machine-readable input. There are many pointing devices, including the mouse, touch screen, stylus, and game controller.
- ▶ 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 monitor. The many basic types of mouse designs like optical mouse and wireless mouse.

Pointing Devices (cont..)

6

- ▶ Optical mouse is the most widely used. It emits and senses light to detect mouse movement. The detected movements are communicated to the system unit through a cable.
 - ▶ Wireless mouse (cordless) uses radio waves or infrared light waves to communicate with the system unit.
- Touchpad like a mouse used to control the pointer by moving and tapping user finger on the surface of a pad. It is used with laptops and some types of mobile devices.

Pointing Devices (cont..)

- ▶ Touch screens allow users to select actions by touching the screen with a finger or penlike device.
- ▶ Stylus device used with tablets and mobile devices. It uses pressure to draw images on a screen. A stylus interacts with the computer through handwriting recognition software.

Pointing Devices (cont..)

Game Controllers provide input to computer games. The controllers widely used are: joysticks, gaming mice, gamepads, and motion-sensing devices.

- ▶ Joysticks control game actions by users changing the pressure, speed, and direction of a control stick.
- ▶ Gaming mice a game controller that provides greater precision, faster response, and programming buttons.
- ▶ Gamepads are designed to be held by two hands and provide inputs including motion, turning, stopping, and firing.
- ▶ Motion-sensing devices control games by user movements. Like Microsoft's Kinect motion-sensing device accepts user movements and spoken commands to control games on the Xbox 360.

Scanning Devices

Scanning devices convert scanned text and images into a form that the system unit can process. There are five types of scanning devices: card readers, bar code readers, optical scanners, RFID readers, and character and mark recognition devices.

- ▶ Card readers read encoded information on the credit card, debit card, access (parking or building) card, and other cards. When the card is swiped through the magnetic card reader, the information is read which stored on a thin magnetic strip on the back of the card.
- ▶ Bar Code Readers (either handheld wand readers or platform scanners) read bar codes on products.

Scanning Devices (cont...)

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- ▶ Optical Scanners (scanner) converts documents into machine-readable form. These devices do not recognize individual letters or images. They recognize light, dark, and colored areas that make up individual letters or images. Scanned documents are saved in files that can be further processed, displayed, printed, or stored for later use. The four basic types are flatbed, document scanner, portable, and 3D.

Scanning Devices (cont...)

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- ▶ Flatbed scanner an input device similar to a copying machine. The image scanned by placed on a glass surface, and the scanner records the image.
- ▶ Document scanner is similar to a flatbed scanner except that it can quickly scan multipage documents. It automatically feeds one page of a document at a time through a scanning surface.
- ▶ Portable scanner is a handheld device that slides across the image, making direct contact.
- ▶ 3D scanners use lasers, cameras, or robotic arms to record the shape of an object. 3D scanners cannot recognize light, dark, and colored areas.

Image Capturing Devices

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

▶ Digital cameras record images digitally and store them on a memory card or in the camera's memory. Most digital cameras record video too. Such as cameras in tablets and smartphones.

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

Audio-Input Devices

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3

Audio-input devices convert sounds into a form that can be processed by the system unit. The most widely used audio-input device is the microphone. Audio input can take many forms, including the human voice and music

► **Voice recognition** allow users to operate computers and other devices as well as to create documents using voice commands. Apple phones come with **Siri**, Windows phones come with **Cortana**, and Google phones come with **Google Now**.

Output

Output

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- ▶ Output is processed data or information. Output typically takes the form of text, graphics, photos, audio, and/or video.
- ▶ Output devices are any hardware used to provide or to create output. They translate information that has been processed by the system unit into a form that humans can understand. The most widely used are monitors, printers, and audio-output devices.

Monitors

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- Monitors (display screens) are the most-used output device.
- The most important feature of a monitor is its clarity. Clarity refers to the quality and sharpness of the displayed images. It is a function of several monitor features, including resolution (**matrix of pixels**), dot pitch, contrast ratio, size, and aspect ratio.

Monitors types:

- Flat-Panel Monitors LCD, LED, OLED
- Curved Monitors better viewing angles
- E-book Readers handheld, book-sized device that displays text and graphics. Using content downloaded from the web or special cartridges, these devices are used to read newspapers, magazines, and books.

Monitors (cont...)

- ▶ Digital or interactive whiteboards are connected to a computer or projector. They are widely used in classrooms and company boardrooms.
- ▶ Ultra-high-definition television (UHDTV) provides a much clearer and more detailed wide-screen picture than regular HDTV.
- ▶ Digital projectors project the images from a traditional monitor onto a screen or wall. The projected images can be difficult to see in bright rooms.

Printers

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8

Translate information processed by the system unit and present the information on paper. Printer output is called hard copy. Printers have five features, including resolution, color capability, speed, memory, and duplex printing.

- ▶ Resolution measured in dpi (dots per inch).
- ▶ Color capability: users have the option to print with just black ink or with color.
- ▶ Speed is measured in the number of pages printed per minute. Printers can print 15 to 19 pages per minute for single-color output and 13 to 15 pages per minute for color output.
- ▶ Memory within a printer is used to store printing instructions and documents waiting to be printed.
- ▶ Duplex printing allows automatic printing on both sides of a sheet of paper.

Printers Types

1

- ▶ Inkjet printers spray ink at high speed onto the surface of paper. They are widely used type of printer, dependable, quiet, and inexpensive.
- ▶ Laser printers uses technology similar to photocopying machine. More expensive than inkjet printers, faster and used in high-quality output. There are two categories personal and shared.
- ▶ 3D printers create objects by adding layers of material onto one another.
- ▶ Cloud printers are printers connected to the Internet that provide printing services on the Internet.
- ▶ Thermal printers use heat elements to produce images on heat-sensitive paper.
- ▶ Plotters use data from graphical devices. Used by graphic artists, engineers, and architects

Audio-Output Devices

2
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- ▶ Audio-Output devices translate audio information from the computer into sounds that people can understand. The most widely used audio-output devices are (speakers and headphones).
- ▶ These devices connect to a sound card within the system unit. This connection can be by cable or wireless (Bluetooth).

Combination Input and Output Devices

2

1

Many devices combine input and output capabilities. It is done to save space or for specialized applications. Common combination devices include:

- ▶ Headsets combine the functionality of microphones and headphones; integral part of serious video game systems.
- ▶ Multifunctional devices (MFD): combine scanner, printer, fax, and copy machine.
- ▶ Telephones are input and output devices for receiving and sending voice communication. For example Voice over IP (VoIP).
- ▶ Drones take input from a controller and send output video and sound to user.
- ▶ Robots use cameras, microphones, and other sensors as inputs; outputs can be taking a photo and other.
- ▶ Virtual reality headgear and gloves is becoming a standard for high-end video games and for 3D movies.

Concept check

2
2

- ▶ What is input? What are input devices?
- ▶ List and compare the four categories of keyboards.
- ▶ What are toggle keys? What are combination keys?
 - ▶ Describe keyboard entry including types and features of keyboards.
- ▶ What is a pointing device? Describe four pointing devices.
- ▶ What is an optical mouse and Wireless mouse ?
- ▶ Describe four game controllers. What is a stylus?
- ▶ Describe scanning devices . Describe types of scanning devices.
- ▶ Describe three common character and mark recognition devices.
- ▶ Recognize image capturing and audio-input devices.
- ▶ Identify different monitor features and types including flat panels and e-books.
 - ▶ Define printing features and types including inkjet and cloud printers.

- ▶ Define combination input and output devices including multifunctional devices, telephones, drones, robots, and VR headgear and gloves.
- ▶ How are image capturing devices different from an optical scanner?
- ▶ Describe two image capturing devices.
- ▶ What are voice recognition systems? Siri? Cortana? Google Now?
- ▶ Define monitor features: clarity, resolution, dot pitch, contrast ratios, size, and aspect ratio.
- ▶ Describe flat-panel, curved, LCD, LED, and OLED monitors.
- ▶ What are e-book readers, digital whiteboards, UHDTVs, and digital projectors?
- ▶ Discuss these printer features.
- ▶ Compare inkjet, laser, and 3D printers.
- ▶ Discuss cloud, thermal, and plotter printers.
- ▶ What are the two most widely used audio-output devices?
- ▶ What are headsets? Multifunctional devices? Telephony?
- ▶ What are drones? Robots? Virtual reality? Headgear? Gloves?

Assignment

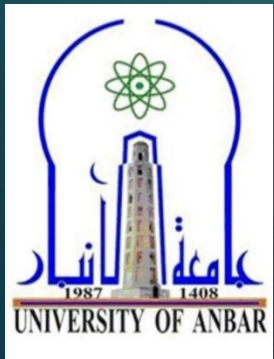
2
4

Search about Voice over IP (VoIP). Write a short report the advantages and disadvantages of VoIP.

Computer Techniques

Lecture 6

Secondary Storage



Storage

2

Storage an main feature of every computer is the ability to save, or store information.

➤ RAM (Random Access Memory) is called **primary storage** since the data and program must be in RAM Before it processed or run in CPU.

➤ Secondary storage provides permanent storage. Using secondary storage devices such as a hard-disk drive, data and programs can be hold after the computer has been shut off. The important features of secondary storage are:

Media, Capacity, Storage devices, and Access speed measures

Hard Disks

3

Hard disks save files by change magnetic charges of the disk's surface. Hard disks use solid metallic platters that are stacked one on top of another.

Read/Write heads ride a 0.000001 (one 1 millionth) inch cushion of air above the disk.

A head crash occurs if the R/W head scratches the surface of the disk, but these don't occur as frequently as they did on early storage systems.

There are two types of hard disks: internal and external.

Internal Hard Disk

- Also known as a fixed disk
- Located inside the system unit or chassis.
- Typically mapped as the “C:” drive.
- Advantages are speed and capacity: a 100 GB HD can hold as much as 70,000 traditional 1.44 MB floppies = $(100 * 2^{30}) / 1,440,000$.
- Access speeds are measured in milliseconds (ms) e.g. 10 ms.
- Disk rotation speeds are measured in RPM (rotations per minute) e.g. 5,400 RPM.
- You should perform routine maintenance on your hard drive using programs such as Microsoft’s Disk utility programs.

External Hard Disk

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External hard disks are removable and connected to a USB or Thunderbolt port on the system unit and are easily removed.

External hard disks useful to protect or secure sensitive information, backing up the contents of the internal hard disk, and providing additional hard-disk capacity.

Three ways to improve the performance of hard disks are disk caching, redundant arrays of inexpensive disks, and file compression/ decompression.

Performance Enhancements

6

Disk Caching frequently used data is read into memory chips, which improves the transfer rate to the CPU by up to 30%.

Redundant arrays of inexpensive disks (RAID): improves performance by expanding external storage, improving access speed, and providing backup. While it costs more to have a RAID system, it improves storage reliability. RAID systems are typically used for network servers.

File compression and file decompression: increase the amount of storage available on the disks by removing repeating patterns of data. Popular programs for compressing files include WinZip and PKZip. The smaller size comes at a price, since it takes a little longer to uncompress the data.

Optical Disks

7

➤ Optical disks can hold close to 17 GB of data – enough to store over several million typewritten pages or a medium sized library on a single disk.

➤ Optical disks use reflected light rather than magnetized spots.

The most widely used optical discs are **CD, DVD, and Blu-ray discs.**

1. CD (Compact Disc)

- One of the most widely used optical formats
- Typically store 650 MB to 1 GB (1,000 MB) on one side of a CD
- Rotational speed determines how fast data can be transferred to the CPU
- 24X (24 speed) CD can transfer data at 3.6 MB per second.
- 48X (48 speed) CD can transfer data at 7.2 MB per second.

This disc has three basic formats: **read only**, **write once**, and **rewritable**.

A. Read Only - CD-ROM

- Compact Disc – Read Only Memory is similar to a commercial music CD
- RO means it can not be written over by the user
- Typically used to deliver large databases, references, or software applications.

B. Write once - CD-R

- Compact Disc – Recordable: write once, read many
- CD burners typically use these to archive data or record music

C. Rewriteable - CD-RW

- Compact Disc – ReWritable: write many, read many
- Used to create and edit multimedia presentations

2.DVD (Digital Versatile/Video Disc)

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A newer format that is replacing CD optical disks

- DVDs can store 4.7 GB to 17 GB on a single disk

This disc has three basic formats: **read only**, **write once**, and **rewritable**.

A. Read only - DVD-ROM

- Written at manufacturing plant, read many
- Typically used for video distribution

B. Write once - DVD-R DVD+R

- Write once, read many
- Tend to cost more than CD writable disks
- Used for archiving data and writing video files

C. Rewriteable - DVD-RW DVD+RW DVD-RAM

- Write many, read many
- Still working on setting a standard format

3. Blu-ray discs (BDs)

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- The newest form of optical storage designed to store high definition video, which uses the HD 720 and HD 1080 resolutions.
- Used a blue laser light rather than the current red light, capacities may be close to 50 GB per disk.

Other Types of Secondary Storage 1

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Solid-state storage

- These devices have no moving parts, so they are fast and reliable
- Tends to have less capacity, and costs more per byte
- Flash memory cards are used in notebook computers and digital cameras
- Key chain hard drives (key chain flash memory devices)
typically connect through a USB port, and can store up to 1 GB for easy, portable storage

2. Internet Hard Drives

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- Special web sites that provide users with storage.
- Called i-drives or online storage.
- Advantage is it's always available as long as you have an Internet connection.
- Disadvantage is speed is often slower, and there is some hesitation about storing sensitive data on these sites.

3.Magnetic Tape

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- Tapes only provide sequential access, where disk systems provide either sequential or direct access.
- Advantage with tape is virtually unlimited storage (just add another tape), it's reliable, and it's inexpensive per MB stored.
- Disadvantage is it's somewhat slow, and limited to sequential access.
- Often used to back up disk storage, especially for networked systems.
- Mainframe systems used magnetic tape reels.
- Newer tape systems use tape cartridges or magnetic tape streamers for backing up data.

Cloud Storage

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- Cloud storage, also known as **online storage**. An Internet based space for storing data and files.
- Cloud computing: Data stored at a server on the Internet and available anywhere the Internet can be accessed
- The Internet acts as a “cloud” of servers that supply applications to clients as a service.
- Servers provide cloud storage, like Google Drive Docs.

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Advantage of cloud storage:

- **Maintenance:** The cloud service will take care of disk defragmentation, backups, encryption, and security.
- **Hardware upgrades:** The cloud service will never run out of disk space and can replace failed hard disks without interruption to the user.
- **File sharing and collaboration:** Users can share documents, spreadsheets, and files with others from anywhere with an Internet connection.

Disadvantage of cloud storage:

- **Access speed:** The data transfer rate is dependent upon the speed of your Internet connection, which most likely is not as fast as a user's internal network.
- **File security:** Users are dependent upon the cloud service's security procedures, which may not be as effective as your own

Concept check

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- ▶ Discuss four important characteristics of secondary storage.
- ▶ What are the two types of hard disks? Briefly describe each.
- ▶ What is density? What are tracks, sectors, cylinders, and head crashes?
- ▶ List and describe three ways to improve the performance of hard disks.
- ▶ What is solid-state storage? How is it different from hard-disk drives?
- ▶ What are solid-state drives? What are they used for?
- ▶ What are flash memory cards? What are USB drives? What are they used for?
- ▶ What is cloud computing?
- ▶ What is cloud storage?
- ▶ What are some of the advantages and disadvantages of cloud storage?