Operating Systems & Networking

- Teacher Notes

Directions:
Fill in the blanks.

Operating Systems Segment

1. Computers

- Are **machines** able to store, retrieve and process information
- Can be classified by size and power
- Include the following characteristics:
  - respond to specific instructions in a precise manner
  - can perform a **prerecorded** set of instructions
  - able to store and retrieve large amounts of information
  - use operating systems to function effectively

2. Computers

- Break down into the five main following types:
  - personal computer (PC): small, single-user computer; used in homes and businesses; based on a **microprocessor**
    - desktop, laptop
  - work station: **powerful**, single-user computer; more powerful microprocessor than PCs

Microprocessor: the master control circuit of a computer

3. Computers

- Break down into the five main following types:
  - minicomputer: a multi-user computer designed to handle hundreds of users at the same time
  - mainframe: a powerful, multi-user computer; can support hundreds or thousands of users **simultaneously**
  - supercomputer: an extremely fast computer; can perform hundreds of millions of **instructions** every second

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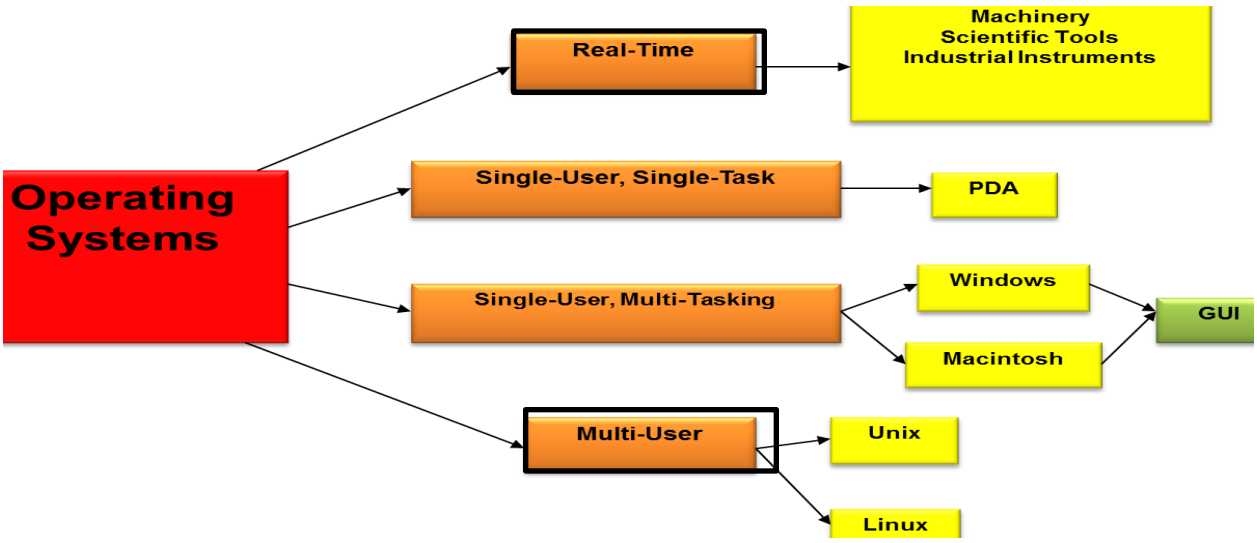
4. Overview



5. Operating Systems

- Are programs acting as **translators** between a computer user and the computer itself
- Control and manage all other programs a computer contains
- Are the master program making everything else run
- Can be considered the **core software** on a computer linking the hardware, software and the computer user

Hardware: the physical and mechanical components of a computer such as: monitor, mouse, chips, keyboard, etc.
Software: programs directing the operation of computers; instructions for a computer

6. Operating Systems

- Performs basic **tasks** to make sure the computer works correctly, most importantly include:
  - process management
  - **memory** management
  - file management
  - hardware management
  - security management

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7. Process Management

- Requires the operating system to complete the following tasks:
  - process creation and **deletion**
  - process suspension and resumption
  - process **synchronization** and communication

8. Memory Management

- Requires the operating system to:
  - keep track of which parts of **memory** are currently being used and who is using them
  - determine which processes to load when memory space becomes available
  - allocate and **de-allocate** memory space when necessary

9. File Management

- Requires the operating system to:
  - create and delete files
  - create and delete **directories**
  - support primitives for manipulating files and directories
  - map files onto **secondary** storage
  - backup files on stable storage media

10. Hardware Management

- Requires the operating system to:
  - monitor the status of each device
  - enforce **policies** to determine which process will get device time and how long for
  - allocate and de-allocate **hardware**

11. Security Management

- Requires the operating system to:
  - distinguish between authorized and **unauthorized** users
  - only allow authorized users to access the files and resources
  - provide a means of **enforcement**
  - specify the controls to be imposed

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12. Operating Systems

- Include the following **four** general types:
  - real-time operating systems (RTOS)
  - single-user, single task operating systems
  - single-user, **multi-tasking** operating systems
  - multi-user operating systems

13. Real-Time Operating Systems

- Are used to control the following:
  - machinery
  - **scientific** tools
  - industrial instruments
- Do not allow the user to have much control over the system
- Are used for real-time applications such as: **thermostats**, mobile phones, spacecrafts, etc.

14. Single-User, Single Task Operating Systems

- Allow users to do only one thing at any given time
- Include Personal Digital Assistants or **PDAs**
  - small, **handheld** computers only allow users to operate one application at a time

15. Single-User, Multi-Tasking Operating Systems

- Are the most **common** type of system found on PCs
- Allow the user to run several computer **applications** at the same time
- Include Windows® (Microsoft®) and Macintosh® (Apple®) platforms

16. Windows®

- Was created by the **Microsoft**® Corporation for use on PCs
- Is a single-user, multi-tasking operating system
- Previously needed to be downloaded after a computer was purchased
- Pre-installed on almost all new personal computers
- Is estimated to run on around **90 percent** of all PCs
- Utilizes a graphical user interface so users do not have to learn difficult demands

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17. Graphical User Interface (GUI)

- Allows users to operate computers without knowing the language used to **communicate** with an operating system
- Makes computers much more **efficient**
- Eases the complications of operating a computer

18. Graphical User Interface (GUI)

- Utilizes the following tools:
  - pointer: a **symbol** (usually an arrow) on a computer screen used to select objects
  - pointing device: an object such as a mouse used for pointing
  - icons: small pictures on a computer screen representing programs and applications
  - desktop: an area on a **display** screen where icons are displayed
  - windows: divide the screen into different areas so several programs can run at the same time
  - menus: allow users to select commands from a list of choices

19. Macintosh® (Mac OS)

- Is an operating system created by **Apple**®
- Is a single-user, multi-tasking operating system
- Also uses **GUI** to help ease the difficulty level for users
- Allows users to run old Macintosh® applications through the system

Application: a computer program performing a specific task

20. Multi-User Operating Systems

- Allow multiple users to **simultaneously** use the programs on a single computer
- Should only allow users who have the necessary knowledge to use the system
- Are complex systems requiring a lot of upkeep and **maintenance**
- Include Unix® and Linux® operating systems

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21. Unix®

- Is a multi-user, multi-tasking operating system
- Designed to be a small, **flexible** system for use by computer programmers
- Not very user-friendly for the average, everyday user
- GUIs have recently been created to help make it easier to use for **average** users

Computer Programmer: a person who designs, writes and installs computer programs and applications

22. Linux®

- Is a variation of the Unix operating system
- Originally created by a student at the University of **Helsinki** named Linus Torvalds
- Is a multi-user, multi-tasking operating system
- Allows source code to be free to the public so it can be re-created by others with necessary **modifications**

Source Code: the tags and instructions developed by the creator explaining how the system was created

Networking Segment

1. Network

- Is a system for communication between two or more computers
- Enables users to share **information** and devices through the system
- Allows users to exchange software, hardware and other data
- Uses a cable or **wireless** connection to run

2. Wireless Connections

- Connect computers without the use of wires and cables
- Uses **electromagnetic** waves to transmit information
- Are also used for telephones not **connected** to the wall
  - example: cordless phones and cellular phones

Electromagnetic Waves: a method of travel for information from computer to computer; consists of light waves, radio waves, etc.

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3. Networks

- Break down into the following main types:
  - Local Area Network
  - Wide Area Network
  - **Metropolitan** Area Network
  - Controlled Area Network
  - **Personal** Area Network

4. Local Area Networks (LAN)

- Are local, privately owned networks
- Have a high speed and low error rate
- Are able to be measured in meters because of their small **geographical** size
- Typically means the computers in the **network** are within the same building or office

Error Rate: The number of times an area network does not function properly compared to the total number of times the network is accessed

5. Wide Area Networks (WAN)

- Are networks providing **connections** between computers in multiple locations
- Cover a significantly larger area than **LANs**
- Can be used to connect different office locations of a large company
- Consist of several LANs linked together to create a larger network

6. Metropolitan Area Networks(MAN)

- Cover an area the size of an average to large city
- Are high-speed networks designed to link together **metropolitan** size areas, campuses or school districts
- Fall **between** the size of LANs and WANs
- Cover about 80 kilometers worth of distance

7. Controller Area Networks (CAN)

- Are used for real-time control operations
  - temperature, time, etc.
- Was originally developed for use in **vehicles**
- Has excellent error protection to prevent problems
- Sends shorter **messages** than other networks

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8. Personal Area Networks (PAN)

- Usually cover the small area around a user's **workspace**
- Allow users to transfer files and gain access to printers and other nearby hardware
- Cover a range of up to **ten meters** in distance
- Used to connect devices a single person uses with their computer

9. Internet

- Is a worldwide, publicly accessed network
- Allows interconnected computer networks to **transmit** data back and forth
- Enables contact between companies, individuals, academic institutions, etc.
- Consists of approximately 60,000 independent networks and 350 million active users
- Is **doubling** in size each year

10. Network Messaging

- Allows users to send **messages** from one computer to another through the Internet
- Is a quick, easy and efficient way to send and retrieve data
- Utilizes programs such as
  - instant messaging programs
  - online **chat rooms**
  - e-mail

11. Servers

- Allow multiple users to access the same equipment such as fax machines, printers or common **files** stored in one central place
- Are used so several people can access the Internet and other computer programs simultaneously
- Can be used interchangeably with the names **client-servers** or network servers
- Store an abundant amount of information
- Manage the resources of a network of computers

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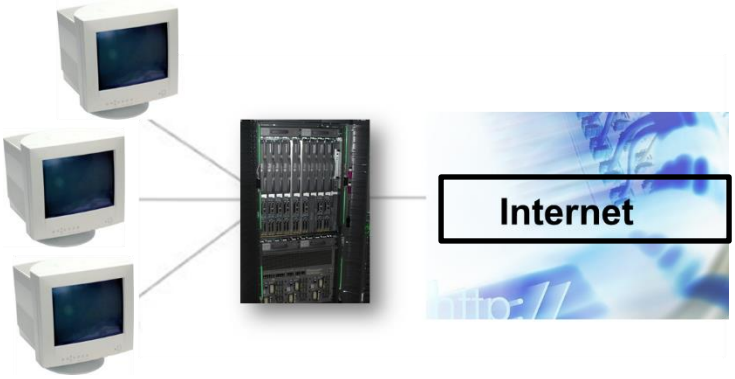
12. Servers



13. Server Size

- Depends on the size of a home or **business** in which it will run
- Increases in size as the speed also increases and vice versa
- Increases and decreases along with the number of users
- Can be as small as a **keyboard** or as large as a whole room

14. Firewalls

- Serve as a security device between a computer and Internet sites or between multiple **computer** networks
- Inspect network traffic passing between computer networks
- Shield networks from unauthorized visits
- Can also restrict unwanted **data** from flowing outside of a network

15. Transmission Control Protocol/Internet Protocol (TCP/IP)

- Serves as a unique identification for a computer on a network
- Helps **distinguish** individual computers
- Is a 32 bit code made up of four subsets of numbers
- Determines where **information** needs to be delivered
- Serves the same purpose as a street address
  - example: (172.16.122.204)

16. Network Hardware

- Includes:
  - network router
  - network **interface** card
  - network switches
  - network **bridge**

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17. Network Router

- Is a hardware device connected to multiple **channels** for different networks through an interface
- Is a type of device which acts as the central point to direct **traffic** on the Internet
  - it not only selects the best path to route a message, but also translates information form one network to another

18. Network Interface Card

- Is a device which provides the **physical** connection between the network and the computer workstation
- Is a major factor in determining the speed and performance of a network
- Can be internal or external
  - most network **cards** are internal and included in the purchase of the computers

19. Network Switch

- Is a device providing a central connection point for cable from the **workstations**
- Electrically amplifies the signal as it moves from one device to another
- Can immediately **reduce** network traffic in most networks

20. Network Bridge

- Is a device dividing traffic on a local area network
- Separates the LAN into several different **segments**
- Is also responsible for filtering data by determining the data **destination** or discarding unnecessary data

21. Network Troubleshooting

- Involves:
  - verifying the network adapter is properly installed and detected by the computer with no conflicts
    - open the **Device Manager** and verify there are no errors
    - if conflicts exist, try letting the operating system re-detect and install the network card
    - if the operating system re-detects the card but does not find the drivers, **download** the latest network card driver

22. Network Troubleshooting

- Involves:
  - verifying connection
    - when working on a wired network, make sure the network cable is properly connected and verify the LEDs next to the network jack are properly **illuminated**
    - when working on a wireless network, look for the computer's **Wi-Fi button** and make sure it is on; make sure the correct Wi-Fi hotspot is used

23. Network Troubleshooting

- Involves:
  - verifying the network card is capable of **pinging** itself
    - use the ping command and see whether replies from the network card is received
    - if an error is received, or the **transmission** fails, then the network card is not physically installed correctly or it is defective

24. Network Troubleshooting

- Involves:
  - making sure the computer can connect to the router correctly
    - determine the router's address by looking at the **Gateway** address
    - if no reply is received from the **router**, either the router is not set up properly, or the connection between the router and the computer is not correct

25. Network Troubleshooting

- Involves:
  - making sure the Internet service provider is working properly
    - wait for a few minutes to make sure it is not a **temporary** outage
    - unplug the power cables to the router and modem and leave them disconnected for **15 seconds**, and then see if your router is pinged
    - contact the Internet service provider to make sure there is no problem on their end

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Information Systems

1. Information Systems

- Are often referred to as **Management** Information Systems (MIS)
- Refer to the entire process from *gathering* to *using* information to be utilized in an **organization**
- Provide information which can then be used in various areas of the organization

2. Information

- Is used at various levels within an organization
  - management & operations
    - decision making, business **strategy**, goals
  - accounting & finance
    - bookkeeping, financial statements
  - sales & **marketing**
    - customer/consumer demographics
  - human resources

3. Business Planning

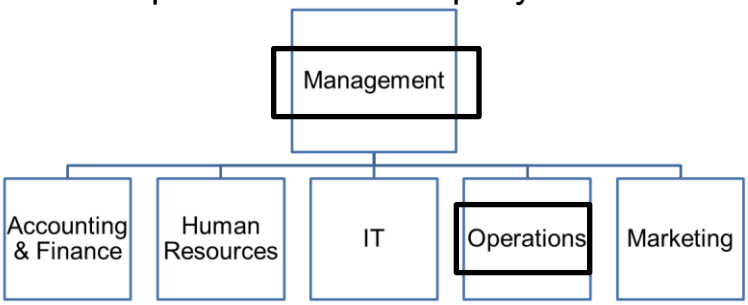
- Will inherently consist of gathering, processing and **storing** information
- After the **business** planning stage information will be more actively USED

4. Information System Issues

- Include having to perform the following:
  - increasing security on computers
  - decreasing **expenses**/costs
  - decreasing complexity of **systems**

5. Equipment & Supplies

- Are used in each department of a company



- Also will vary depending upon company industry type and/or size

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6. Equipment & Supplies

- Are **contingent** on the purpose of the business
- Will include both **hardware** and software

7. Equipment & Supplies

- Hardware examples include:
  - computers/monitors
  - printers
  - copiers
  - **scanners**
  - telephones/mobile phones
  - wireless **communication** devices
  - external storage devices

8. Equipment & Supplies

- Software examples include:
  - security software
  - **operating** system
  - product specific software such as for photo or video editing
  - accounting and **bookkeeping** software
  - business documents software

9. Maintenance & Updates

- Software
  - security updates are top priority and should be carried out frequently
  - other software may have free **updates** available online or updates for a fee
  - some types of software will have to be **repurchased** in order to update

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10. Maintenance & Updates

- Hardware
  - printers (ink)
  - **copiers**/scanners
  - phones/phone lines
  - wireless devices
- Should include regularly **maintained** parts, firmware or software updates to keep devices working properly

11. Maintenance Schedule

- Keep detailed records to maintain warranties
- Example: printer
  - date of **purchase**
  - make and model
  - number of pages printed
  - previous **service** calls
  - contact information of service provider

12. Information System Tools

- Include:
  - transaction processing system (TPS) – record and document all of a business's recurring and routine **transactions**
  - operating information system (OIS) – plan and schedule production and **assembly** functions
  - decision support system (DSS) – make use of computing tools, mathematical and scientific modes of its analysis

13. Information System Security

- Involves protecting a business or organization's data assets
- Professionals test, **implement** and maintain software and hardware used to protect information
- Managers might coordinate system-wide **initiatives** to increase security

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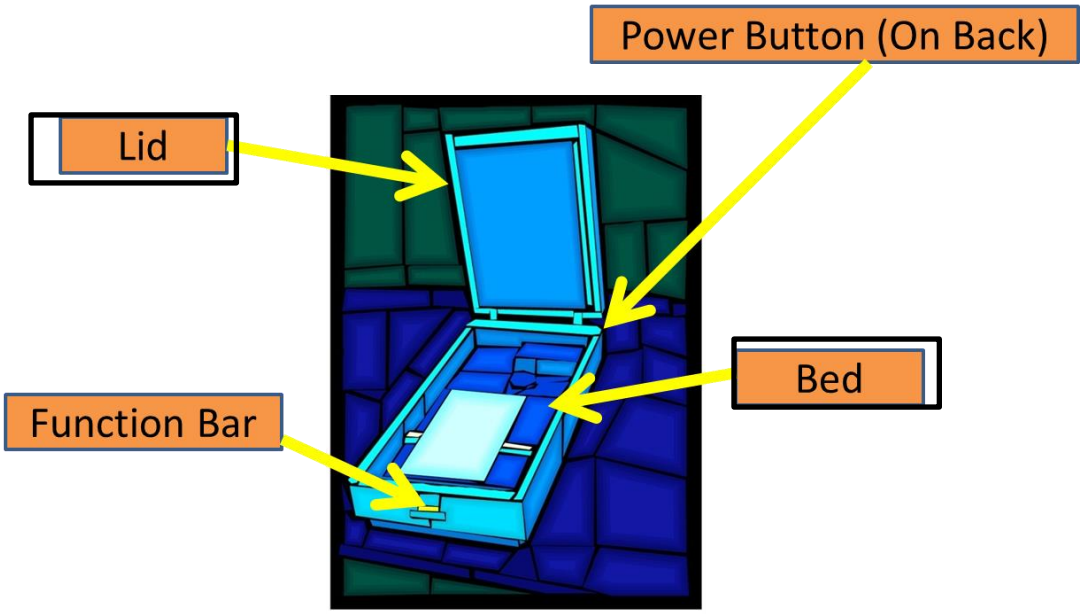
14. Scanners

- Are external devices used to transfer data to a computer in an image form
- Have **rapidly** advanced over the past ten years
- Consist of two types:
  - flatbed which scans paper documents, books, and photographs
  - **sheetfed** which can only scan flat pieces of paper

15. Parts of a Scanner



16. Steps of Operating a Scanner

- Include the following:
  - turning the scanner on
  - raising the scanner lid
  - placing the image to be **scanned** face down on the bed, aligning properly, and then closing the lid
  - selecting the proper program on your computer, and selecting the 'Scan' or '**Acquire'** function to begin the scan
  - select the location where you want to save your scan