PAPER NO. CT 21

PART I

SECTION 2

CERTIFIED

INFORMATION COMMUNICATION TECHNOLOGISTS

(CICT)

OPERATING SYSTEMS-PRACTICAL

STUDY TEXT

GENERAL OBJECTIVE

This paper is intended to equip the candidate with the knowledge, skills and attitude that will enable him/her to manage operating systems in an organization

LEARNING OUTCOMES

A candidate who passes this paper should be able to:

- Install, update and uninstall operating systems
- Manage files and directories using an operating system
- Configure an operating system to handle various tasks
- Handle maintenance and performance issues of an operating system
- Troubleshoot operating systems
- Secure data using an operating system
- Manage user accounts.

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INTRODUCTION TO OPERATING SYSTEMS

DEFINITION OF OPERATING SYSTEM

An operating system is a group of computer programs that coordinates all the activities among computer hardware devices. It is the first program loaded into the computer by a boot program and remains in memory at all times.

HISTORY OF OPERATING SYSTEMS

Historically operating systems have been tightly related to the computer architecture, it is good idea to study the history of operating systems from the architecture of the computers on which they run. Operating systems have evolved through a number of distinct phases or generations which corresponds roughly to the decades.

The First Generation Vacuum Tubes and Plug boards-The 1940's

The earliest electronic digital computers had no operating systems. Machines of the time were so primitive that programs were often entered one bit at time on rows of mechanical switches (plug boards). Programming languages were unknown (not even assembly languages). Operating systems were unheard of .The first ones used mechanical relays but were very slow, with cycle times measured in seconds. Relays were later replaced by vacuum tubes. These machines were enormous, filling up entire rooms with tens of thousands of vacuum tubes, but they were still millions of times slower than even the cheapest personal computers available today.

The usual mode of operation was for the programmer to sign up for a block of time on the signup sheet on the wall, then come down to the machine room, insert his or her plug board into the computer, and spend the next few hours hoping that none of the 20,000 or so vacuum tubes would burn out during the run. Virtually all the problems were straightforward numerical calculations, such as grinding out tables of sines, cosines, and logarithms.

By the early 1950s, the routine had improved somewhat with the introduction of punched cards. It was now possible to write programs on cards and read them in instead of using plug boards; otherwise, the procedure was the same.

The Second Generation Transistors and Batch Systems-The 1950's

The introduction of the transistor in the mid-1950s changed the picture radically. Computers became reliable enough that they could be manufactured and sold to paying customers with the expectation that they would continue to function long enough to get some useful work done. For the first time, there was a clear separation between designers, builders, operators, programmers, and maintenance personnel.

These machines, now called **mainframes**, were locked away in specially air-conditioned computer rooms, with staffs of specially-trained professional operators to run them.
When the computer finished whatever job it was currently running, an operator would go over to the printer and tear off the output and carry it over to the output-room, so that the programmer could collect it later. Then he would take one of the card decks that had been brought from the input room and read it in. If the FORTRAN compiler was needed, the operator would have to get it from a file cabinet and read it in. Much computer time was wasted while operators were walking around the machine room.

Given the high cost of the equipment, it is not surprising that people quickly looked for ways to reduce the wasted time. The solution generally adopted was the **batch system**. The idea behind it was to collect a tray full of jobs in the input room and then read them onto a magnetic tape using a small (relatively) inexpensive computer, such as the IBM 1401, which was very good at reading cards, copying tapes, and printing output, but not at all good at numerical calculations. Other, much more expensive machines, such as the IBM 7094, were used for the real computing.

Third Generation-The 1960's

The systems of the 1960's were also batch processing systems, but they were able to take better advantage of the computer's resources by running several jobs at once. So operating systems designers developed the concept of multiprogramming in which several jobs are in main memory at once; a processor is switched from job to job as needed to keep several jobs advancing while keeping the peripheral devices in use.

For example, on the system with no multiprogramming, when the current job paused to wait for other I/O operation to complete, the CPU simply sat idle until the I/O finished. The solution for this problem that evolved was to partition memory into several pieces, with a different job in each partition. While one job was waiting for I/O to complete, another job could be using the CPU.

Another major feature in third-generation operating system was the technique called spooling (simultaneous peripheral operations on line). In spooling, a high-speed device like a disk interposed between a running program and a low-speed device involved with the program in input/output. Instead of writing directly to a printer, for example, outputs are written to the disk. Programs can run to completion faster, and other programs can be initiated sooner when the printer becomes available, the outputs may be printed.

Another feature present in this generation was time-sharing technique, a variant of multiprogramming technique, in which each user has an on-line (i.e., directly connected) terminal. Because the user is present and interacting with the computer, the computer system must respond quickly to user requests, otherwise user productivity could suffer. Timesharing systems were developed to multi-program large number of simultaneous interactive users.

Fourth Generation

With the development of LSI (Large Scale Integration) circuits, chips, operating system entered in the system entered in the personal computer and the workstation age. Microprocessor technology evolved to the point that it becomes possible to build desktop computers as powerful as the mainframes of the 1970s. Two operating systems have dominated the personal computer scene: MS-DOS, written by Microsoft, Inc. for the IBM PC and other machines using the Intel 8088 CPU and its successors, and UNIX, which is dominant on the large personal computers using the Motorola 6899 CPU family.

FUNCTIONS OF AN OPERATING SYSTEM

The basic functions of an operating system are:

i. Booting the computer
ii. Performs basic computer tasks eg managing the various peripheral devices eg mouse, keyboard
iii. Provides a user interface, e.g. command line, graphical user interface (GUI)
iv. Handles system resources such as computer's memory and sharing of the central processing unit (CPU) time by various applications or peripheral devices
v. Provides file management which refers to the way that the operating system manipulates, stores, retrieves and saves data.

i. Booting the computer

The process of starting or restarting the computer is known as booting. A cold boot is when you turn on a computer that has been turned off completely. A warm boot is the process of using the operating system to restart the computer.

ii. Performs basic computer tasks

The operating system performs basic computer tasks, such as managing the various peripheral devices such as the mouse, keyboard and printers. For example, most operating systems now are plug and play which means a device such as a printer will automatically be detected and configured without any user intervention.

iii. Provides a user interface

A user interacts with software through the user interface. The two main types of user interfaces are: command line and a graphical user interface (GUI). With a command line interface, the user interacts with the operating system by typing commands to perform specific tasks. An example of a command line interface is DOS (disk operating system). With a graphical user interface, the user interacts with the operating system by using a mouse to access windows, icons, and menus. An example of a graphical user interface is Windows Vista or Windows 7.
The operating system is responsible for providing a consistent application program interface (API) which is important as it allows a software developer to write an application on one computer and know that it will run on another computer of the same type even if the amount of memory or amount of storage is different on the two machines.

iv. Handles system resources

The operating system also handles system resources such as the computer's memory and sharing of the central processing unit (CPU) time by various applications or peripheral devices. Programs and input methods are constantly competing for the attention of the CPU and demand memory, storage and input/output bandwidth. The operating system ensures that each application gets the necessary resources it needs in order to maximize the functionality of the overall system.

v. Provides file management

The operating system also handles the organization and tracking of files and directories (folders) saved or retrieved from a computer disk. The file management system allows the user to perform such tasks as creating files and directories, renaming files, coping and moving files, and deleting files. The operating system keeps track of where files are located on the hard drive through the type of file system. The type two main types of file system are File Allocation table (FAT) or New Technology File system (NTFS).

TYPES OF OPERATING SYSTEMS

As computers have progressed and developed, so have the operating systems. Below is a basic list of the types of operating systems and a few examples of operating systems that fall into each of the types. Many computer operating systems will fall into more than one of the below types:

- **GUI** - Short for Graphical User Interface, a GUI operating system contains graphics and icons and is commonly navigated by using a computer mouse. Examples of GUI operating systems are:
  - System 7.x
  - Windows 98
  - Windows CE

TOPIC 8

CONFIGURING HARDWARE SETTINGS

Definition - What does *Hardware Configuration* mean?
Hardware configuration references the details and system resource settings allotted for a specific device. Many computer specialists improve hardware performance by adjusting configurations, which may also include settings for the motherboard and the BIOS, as well as the bus speeds.

VIEWING HARDWARE PROFILE PROPERTIES

To view the properties for a hardware profile, in the Available Hardware Profiles list, select a profile, and then click Properties. This displays the Properties dialog box for the profile.

If Windows XP Professional identifies your computer as a portable unit, the This Is a Portable Computer check box is selected. If Windows XP Professional determines that your portable computer is docked, it automatically selects that option.

CREATING A HARDWARE PROFILE

You must be logged on as an administrator or a member of the Administrators group in order to complete this procedure. If your computer is connected to a network, network policy settings may also prevent you from completing this procedure.

1. Open System in Control Panel.
2. On the **Hardware** tab, click **Hardware Profiles**.
3. Under **Available hardware profiles**, click **Profile 1 (Current)**, and then click **Copy**.
4. Type a name for the new hardware profile, and then click **OK**.
5. You can customize your new profile by enabling or disabling devices for that profile in Device Manager For more information about Device Manager, click **Related Topics**.

Note

- To open System, click **Start**, click **Control Panel**, click **Performance and Maintenance**, and then click **System**.
- The profile named Profile 1 (Current) provides a model for you to create new hardware profiles. It will not appear in the list of available hardware profiles shown during startup.

TO ENABLE OR DISABLE A SERVICE FOR A HARDWARE PROFILE

1. Open Services
2. Right-click the service that you want to enable or disable, and then click **Properties**.
3. On the **Log On** tab, click the hardware profile that you want to configure.
4. Click **Enable** or **Disable**, and then click **OK**.

Important

- Changing the default service settings might prevent key services from running correctly. It is especially important to use caution when changing the Startup Type and Log On As settings of services that are configured to start automatically.

PLUG AND PLAY HARDWARE

In computing, a plug and play device or computer bus, is one with a specification that facilitates the discovery of a hardware component in a system without the need for physical device configuration or user intervention in resolving resource conflicts.

Plug and play devices can be due to boot-time assignment of device resources and to hot-plug systems such as USB and IEEE 1394 (FireWire).

ADD/REMOVE HARDWARE

Windows 2000 Professional automatically installs and configures most Plug and Play–compliant devices. For devices that are not automatically configured, the Add/Remove Hardware wizard, shown in Figure 19.2, installs and configures legacy and Plug and Play devices that require installation information, such as the driver location.

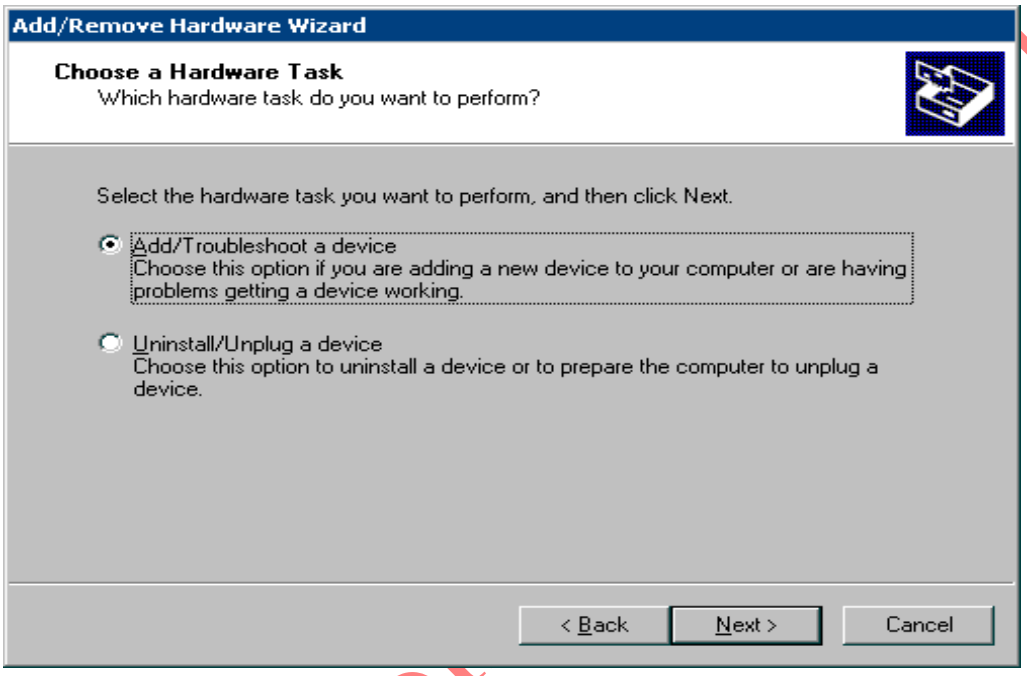

Figure 19.2 Add/Remove Hardware Wizard

The Add/Remove Hardware wizard provides an easy way to install and configure non–Plug and Play devices that have not been automatically recognized by Windows 2000 Professional.

To use the Add/Remove Hardware wizard to install hardware:

1. In the Control Panel, double-click the **Add/Remove Hardware** icon, and then click **Next** .
2. Click **Add/Troubleshoot a device**, and then click **Next**.
3. The wizard now searches for new Plug and Play hardware.

If the wizard does not find a new device, it displays a list of the existing devices and gives you the option to troubleshoot any of them. You can select a device from the list to launch the Hardware Troubleshooter.

TROUBLESHOOTING HARDWARE PROBLEMS

When your computer is acting peculiarly, turn off the computer. Click on the Start button, select the Shut Down option, and then choose Shut Down. Leave the PC off for 1 to 2 minutes. Turn the PC back on again.

An Unresponsive PC

- First check the cable. Unplug it from the computer and the outlet. Re-plug in both sides and try booting it again.
- Check the wall outlet. Plug something else into the outlet and see if it works.
- Turn the system off and wait 30 seconds and then try again.
- Reach behind the machine and see if you feel air blowing out of the power supply. If you do, then you know the machine is getting some power.
- Look at the keyboard for the indicator lights being lit up as the machine boots.
- Sometimes the monitor has something to do with the system acting up. Unplug the power cord from the monitor and the wall and re-plug it. Unplug the cable from the computer to the monitor and re-plug it into the monitor. Try rebooting.
- Listen to identify a beeping series if there is one to report it to the technical help.
- Turn in all comments to the Help Desk.

Monitor Troubleshooting

Symptom:
The monitor screen is black

Diagnosis
Check to see if the computer turned on.

- Is the computer turned on? There is a light on the CPU. If the computer is on, it **will be lit.**

Check to see if the monitor getting power.

- If no lights appear on the front of the monitor at all, it is not getting any power from the power source. Check to see if ALL plugs are secure.

- Power cord from the computer to the power strip.
- Power strip to the wall socket.

Check to see if the Power Strip turned on.

- There is a light on the strip. If the strip is on, the indicator light will be on.

Check to see if the monitor getting a signal from the computer.

- There is a light on the monitor. If the monitor is on, it will be lit. If it is turned on, check the contrast and brightness buttons to see if they have been tampered with.
- A green light on the front of the monitor would indicate that it is getting a signal from the computer.
- An orange light would indicate there is not signal from the computer. Make sure the computer is on and you see lights on the front of it. Check the cable that runs from the monitor to the computer to see if it has worked loose.

Check to see if the brightness has been turned entirely down.

- Make sure you check the brightness and contrast buttons or settings on the monitor.

Check to see if the computer in Power Save or Sleep mode.

- Move the mouse or press any key on the keyboard to see if the computer will "wake-up."

Check to see if all peripherals plugged in.

- Verify that all cables and cords leading in to and out of your computer to insure they are all in tight and not disconnected.

Secure the following to the computer:

- Monitor
- Mouse
- Keyboard
- Printer
- Network cable to computer and wall (Blue)