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Protection And Security Of An Operating System

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Abstract: In this research paper first of all we gave a brief introduction of the operating system, furthers its types is also explained with an example and its component also. In this paper we show that what kind of problem arise, when we protect our operating system, how we can overcome from these problem. In this paper, we show what new requirements arise when introducing security and protection to the operating system into the area of real time operating system as well as distributed and many more operating system.

I. INTRODUCTION

An operating system is software that manages between computer hardware and software resources and provides common services for computer programs. The operating system is very important part of the system software in the computer system. Application programs usually required an operating system to function . Time- sharing operating systems tasks for efficient use of the system and may also include accounting software for cost allocation of processors time.

Examples of popular modern operating systems include android , linux ,Microsoft window, window phones etc.

There are many types of operating systems are present such as:

1 Real time operating system
2 Multi-user
3 Distributed systems
4 Template
5 Embedded

- Real Time Operating System:
  A real time operating system is a multitasking operating system whose aim is to execute real time operating system. Basically in this multi tasks is performed at the same time and in a time sharing operating system specific time is provided to the particular system and it includes accounting software for coast allocation of processor time, mass storage ,printing and other resources.
- Multi-User: In multi-user operating system allows multiple users to access a computer system at the same time . multiuser computer can be classified into two parts time sharing systems and internet servers as it enables multi user to access multiple computer through the sharing of time. Basically in a single user can run the multi program at the single computer.
- Distributed System: In this operating systems, groups of independent computer are manage and make them appear to be a single computer .The development of networked computers that could be linked and communicate with each other give rise to the distributing computing. Basically it is carried out into numbers of machines.
- Template: In an operating system, distributed and cloud computing context ,it refers to creating a single virtual machine image as a guest operating system then saving it as a tool for multiple running virtual machines.
- Embedded: It is designed to be used in embedded computer systems . These are designed to use for a small virtual machines with less autonomy and these are only able to operate on limited numbers of resources . These are very compact and extremely efficient by design.

II. HISTORY

In the past ,computers are build to perform a single tasks like an calculator. Basically basic operating system features were developed in the 19950s , such as resident monitors functions that could run automatically run different programs in succession to speed up processing.

In the 1940s, the earliest electronic digital systems had no operating system . Electronic systems of this time were programmed on rows of mechanical swithes or by jumper wires on plug boards. These were special –purpose system that, for example generated ballistics tables for the military or controlled the printing of payroll checks from data on punched paper cards.

In the early 1950s , a computer could execute only one program at a time . Each user had sole use of the computer for a limited period of time and would arrive at a scheduled time with program and data on punched paper cards and /or punched tape. The program would be loaded into the machine would be set to work until the program completed or crushed . program could be genrally be debugged via a front panel using toggle swithches and panel lights . it is said that ALAN TURING was a master of this. Latest machine comes with a libraries of programs which would be linked to the user's program to assist in operation such as input output and generating a code from human readable symbolic code. This was the genesis of the modern day operating systems.

OS/360 was used on most IBM mainframe computers beginning in 1996 , including computers used by the APOLLO PROGRAM. In the early 1950s, a computer could execute only one program at a time. Each user's had a sole use

of the computer for a limited period of time and would arrive at a scheduled time with program and data on punched paper cards and /or punched tape. The program would be loaded into the machines.

III. COMPONENTS OF OS

The component of an operating system helps in making the different parts of an computer to work together and they all are exist together. All the software were needed to go through the hardware as we know that without hardware , an software couldn't work whether it is as simple as mouse or keyboard or complex as an internet component.

Kernel:

Basically kernel helps in connecting the software application with the hardware application of the computer. Kernel provide a basic level of control over all the computer's hardware devices so that an application program can interact with hardware easily without any problem regarding any software. It also helps in managing the memory of the hardware basically it determine which programs get access to which hardware resources. Kernel also helps in set up or reset the CPU operating states for optimal operations at all times , it also help in organizes the data for long term non volatile resources with file systems on such media as disks , tapes ,flash memory ,etc.

Program Execution:

As we know the operating system provides an interface between an application program and the computer hardware ,so that an application program can interact with the hardware only by obeying rules and procedures programmed into the operating system. Basically in this execution of program will take place so the program run by the user . Execution of the program involves the creation of the process by the operating system.

Interrupts:

Interrupts are main part of the operating systems, as they provide an efficient way for the operating system to interact with and react to its environment. It is a programming which is directly supported by most modern CPUS. Through interrupts a computer automatically saving local registers contexts and running specific code in responce to events . Even basics computer supports hardware interrupts , and allow the programmer to specify code which may be run when that event will take place.

Modes:

The computer which have a modern CPUs will support multiple modes of operation. CPUs with this capability at least have 2 modes :

- Protected Mode
- Supervisor Mode

The supervisor mode is used by the operating system's kernels for low level tasks that need unrestricted access to the hardware. For example how memory is written and erased and communication with the devices such as graphics card. Protected mode is contrast to the supervisor mode that is it used for everything else. Applications operate within protected mode and this can only use hardware by communicating with the kernel which control everything in the supervisor mode.

As we know when firstly our computer start up then it is automatically running in the supervisor mode. The few programs to run on the computer , being the BIOS or EFI, Boot loader , and the operating system have unlimited access to the hardware and this is required because initialization a protected environment can only be done outside of the one. When operating system of the computer passes the control to the another program then it can be placed in the protected mode.

Memory Management:

Among all the others things , a multiprogramming operating system kernel must be responsible to the memory management of the computer. Basically in this all the memory is managed which is currently used by the computer or PC. Basically in this the program does not interface with the memory which is already in use by the another program. Since program time share , each program must have independent access to the memory.

Virtual Memory:

The use of virtual memory addressing mean that the kernel can choose what memory each program can use at a given interval of time or period . when the kernel detect the fault of the page memory then it memory is allocated for the limited time period. In the modern day operating system , the memory which is less used by the programmer will be temporary placed in the disk or other media to make that space available for use by the others program.

Multitasking:

MULTITASKING refers to the running of multiple independent computer programs on the same computer ; giving appearance that it is performing the tasks at the same time. Basically in this multiple tasks are performed at the same time so that a user can perform more then one task at the same time without any problem. An early model in which allocation of time is done to the program is term as cooperative multitasking. Basically in this a particular time

period is set for the particular program after that the execution will stop and move to the another program.

Security:

To know about the security of the system first of all you have to know that how many numbers of technology is working on your computer properly. A modern operating system provides access to the numbers of the resources which are available for the software which is running on your computer or through the hardware such as the network via the kernel. The operating system must able to distinguished between the requests which should be allowed to the computer or which should not be allowed to the computers that is operating system must be able to distinguish between the privileged and non privileged, system commonly have a form of requester identity , such as a user name. To establish identity there may have a authentication. Basically in this , first a fall the user should have to enter the identity after that the user will enter .

In addition to the allow/disallow model of security , a system with a high level of security will also offer auditing option. These would allow tracking of request for access to resources. External security involves a requests from outside the computer such as login from an external source or an external network .the request made from the external device is firstly passed through device drives to the operating system's kernel, where they can passed onto applicati ons or carried out directly. Basically external security is long term because it contains sensitive data that is both commercial and military nature. The United States Government Department OF Defence creates Perspective on the State of Information Technology that sets basic requirements for assessing the effectiveness of security. This is because of vital importance of the operating system.

Protection:

Protection is a mechanisms that prevents accidental or international misuse of the system. Basically in this section we will try to provide the protection to the operating system. In this it includes three major aspects that is:

- Authentication
- Authorization
- Access enforcement

Authentication:

It identify responsible party (principle) behind each action. It is typically done with the password . basically in this a secret piece of information used to establish identity of a user. It should not be stored in a readable form that is one way transformation.

Passwords should be long and unique so that it will not predict or remember by the user.

Authorization:

Basically in this it have a principle to determine and perform which operation on which objects. Logically , authorization information represented as an access matrix

Access Enforcement :

Some part of the system must be responsible for enforcing access controls and protecting authentication and authorization.

This portion of the system hase the total power so it should be as simple and as small as possible.

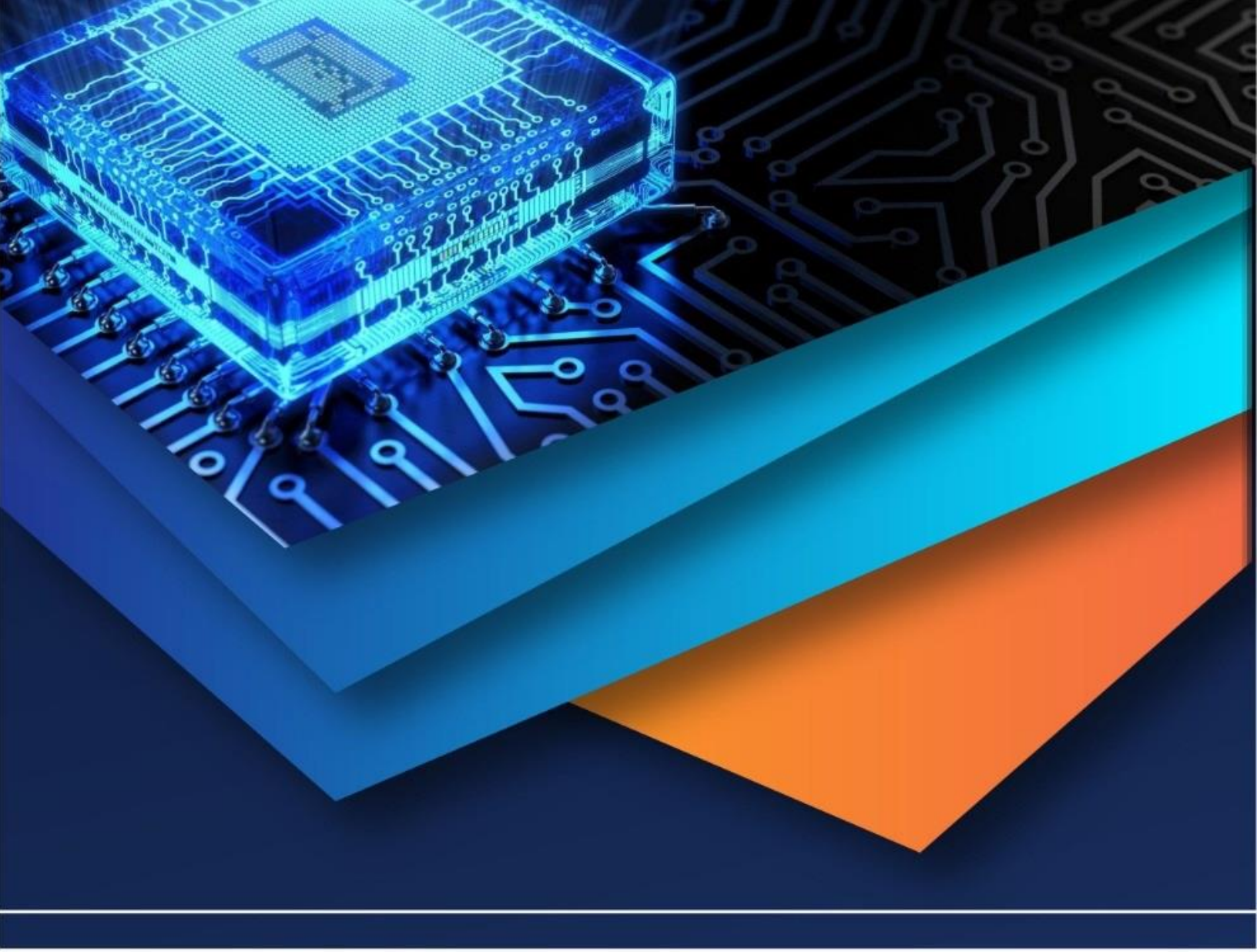
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