**Operating System : Course Project**

Implementation of Preemptive Scheduling Algorithm

(Rohit Pujari : 75 & Vivek Pundkar : 77)

21.11.2021

# INTRODUCTION

When you turn on your computer, it's nice to think that you're in control. There's the trusty mouse, which you can move anywhere on the screen, summoning up your music library or internet browser at the slightest whim. Although it's easy to feel like a director in front of your desktop or laptop, there's a lot going on inside, and the real person behind the curtain handling the necessary tasks is the operating system.

# WHAT IS OPERATING SYSTEM?

An operating system is a program that acts as an interface between the computer user and computer hardware, and controls the execution of programs.

The operating system (OS) manages all of the software and hardware on the computer. It performs basic tasks such as file, memory and process management, handling input and output, and controlling peripheral devices such as disk drives and printers.

Most of the time, there are several different computer programs running at the same time, and they all need to access your computer’s central processing unit (CPU), memory and storage. The operating system coordinates all of this to make sure each program gets what it needs.

# FUNCTIONS OF OPERATING SYSTEM

* Processor management
* Memory management
* Device management
* Storage management
* Application interface
* User interface
* System security management

# HOW OPERATING SYSTEM WORKS ?

* An operating system works in the middle of software and hardware. When a user gives an instruction or command through a software it passed to the operating system.
* The operating system allocates memory from the RAM and gives that instruction to the CPU for executing it. Multi-tasking is also done in this way.
* Certain programs in a computer are given high, medium and low priorities and the instructions are executed according to these priorities.
* For example, whenever explorer in your Windows operating system crashes you will press 'Alt+Ctrl+Del' for task manager and we use task manager to end the non-responding program. In Windows, task manager is given a high priority and that's why it opens even if explorer is crashed.

# WHAT IS PROCESS ?

* Process is the execution of a program that performs the actions specified in that program.
* Process operations can be easily controlled with the help of PCB(Process Control Block). You can consider it as the brain of the process, which contains all the crucial information related to processing like process id, priority, state, CPU registers, etc.

## PROCESS ARCHITECTURE

* **Stack:** The Stack stores temporary data like function parameters, returns addresses, and local variables.
* **Heap:** Allocates memory, which may be processed during its run time.
* **Data:** It contains the variable.
* **Text:** Text Section includes the current activity, which is represented by the value of the Program Counter.

## 

# WHAT IS PROCESS MANAGEMENT?

Process management involves various tasks like creation, scheduling, termination of processes, and a dead lock. Process is a program that is under execution, which is an important part of modern-day operating systems.

The OS must allocate resources that enable processes to share and exchange information. It also protects the resources of each process from other methods and allows synchronization among processes.

It is the job of OS to manage all the running processes of the system. It handles operations by performing tasks like process scheduling and such as resource allocation.

# PROCESS SCHEDULING

The process scheduling is the activity of the process manager that handles the removal of the running process from the CPU and the selection of another process on the basis of a particular strategy.

Process scheduling is an essential part of a Multiprogramming operating system. Such operating systems allow more than one process to be loaded into the executable memory at a time and the loaded process shares the CPU using time multiplexing.

* Job queue − This queue keeps all the processes in the system.
* Ready queue − This queue keeps a set of all processes residing in main memory, ready and waiting to execute. A new process is always put in this queue.
* Device queues − The processes which are blocked due to unavailability of an I/O device constitute this queue.



The OS can use different policies to manage each queue (FIFO, Round Robin, Priority, etc.). The OS scheduler determines how to move processes between the ready and run queues which can only have one entry per processor core on the system; in the above diagram, it has been merged with the CPU.

# TYPES OF PROCESS SCHEDULING

|  |  |  |  |
| --- | --- | --- | --- |
| **S.N.** | **Long-Term Scheduler** | **Short-Term Scheduler** | **Medium-Term Scheduler** |
| 1 | It is a job scheduler | It is a CPU scheduler | It is a process swapping scheduler. |
| 2 | Speed is lesser than short term scheduler | Speed is fastest among other two | Speed is in between both short and long term scheduler. |
| 3 | It controls the degree of multiprogramming | It provides lesser control over degree of multiprogramming | It reduces the degree of multiprogramming. |
| 4 | It is almost absent or minimal in time sharing system | It is also minimal in time sharing system | It is a part of Time sharing systems. |
| 5 | It selects processes from pool and loads them into memory for execution | It selects those processes which are ready to execute | It can re-introduce the process into memory and execution can be continued. |

# PREEMPTIVE SCHEDULING ALGORITHM

Preemptive scheduling is used when a process switches from running state to ready state or from the waiting state to ready state. The resources (mainly CPU cycles) are allocated to the process for a limited amount of time and then taken away, and the process is again placed back in the ready queue if that process still has CPU burst time remaining. That process stays in the ready queue till it gets its next chance to execute.

**Algorithms based on preemptive scheduling :**

* Round Robin (RR)
* Shortest Remaining Time First (SRTF)
* Priority (preemptive version)