

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

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Lecture-13 By Vivek Dubey

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COMPUTER SCIENCE AND ENGINEERING

CS403PC

COMPUTER SCIENCE AND ENGINEERING (ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)

CS403PC

BHARAT INSTITUTE OF ENGINEERING AND TECHNOLOGY

Scheme of Operating System

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S. No.	Course Code	Course Title	L	T	P	Credits
3	CS403PC	Operating Systems	3	0	0	3
6	CS406PC	Operating Systems Lab	0	0	3	1.5

UNIT-2:

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- **Process and CPU Scheduling –**
 - Process concepts and scheduling, Operations on Processes, Cooperating Processes, Threads, and Interposes Communication, **Scheduling Criteria**, Scheduling Algorithms, Multiple-Processor Scheduling.
- **System call interface for process management-**
 - fork, exit, wait, waitpid, exec

What is the need of process scheduling in OS?

1

- A typical process involves both I/O time and CPU time.
- In a uniprogramming system like MS-DOS, time spent waiting for I/O is wasted and CPU is free during this time.
- In multiprogramming systems, one process can use CPU while another is waiting for I/O.
- This is possible only with process scheduling.
- An operating system uses process scheduling to ensure that processes execute efficiently and have reduced wait times.
- The goal of process scheduling policies is to –
 - use CPU resources wisely,
 - increase throughput,
 - reduce wait time,
 - increase response and
 - turnaround times.

Scheduling Criteria

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2

- Normally, many objectives must be considered in the design of a scheduling algorithm.
- In particular, a scheduler should consider fairness, efficiency, response time, turnaround time, throughput, etc.
- These goals mostly depends on the system one is using batch system/ interactive system/ real-time system, etc.

- The following goals are desirable in any of the systems:

- Fairness
- Policy Enforcement
- Efficiency

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3

- Important criteria of CPU Scheduling include the following:

- CPU Utilization
- Throughput
- Turn around Time
- Waiting Time
- Response Time

- **Fairness –**

- Fairness is important under all circumstances.
- A scheduler must ensure that each process gets its fair share of the CPU and no process should ever suffer from indefinite postponement.

- **Policy Enforcement –**

- The scheduler has to ensure that system's policy is enforced.
- For example, if the local policy is safety then the safety control processes must be enforced by all means.

- **Efficiency-**

- Scheduler has to ensure that the system in particular the CPU is kept busy always whenever possible.
- If such efficiency is achieved, more work is extracted within short time.

Criteria of CPU Scheduling

5

- **CPU utilization –**

- Keeping the CPU as busy as possible.
- CPU utilization in a real system ranges from 40% to 90% for a lightly loaded system to a heavily loaded system respectively.

- **Throughput –**

- It is a unit for measure of work done by the CPU.
- The number of processes that are completed per unit time is called throughput.
- It may vary depending on the length of the process.
- For long processes, throughput may be one process per hour.
- For short transactions, throughput may be even many processes per second.

Contd.. *Criteria of CPU Scheduling*

6

- **Turnaround time –**

- *The time taken to execute a particular process is the turnaround time.*
- *The time interval is from the time of submission of a process to the time of completion.*

- **Turnaround time includes the following:**

- ✓ Time spent waiting to get into memory.
- ✓ Waiting time in the ready queue.
- ✓ Executing time on the CPU.
- ✓ Performing I/O related operations.

Contd.. Criteria of CPU Scheduling

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- **Waiting time –**

- Waiting time is the sum of the periods spent waiting in the ready queue.
- It is only the amount of time that a process spends waiting in the ready queue.

- **Response time –**

- Response time is a measure of the time from the submission of a request to the first response is has produced.
- In general, it is the time taken to start responding and not the time it takes to output the response.