4.1 Scheduling types - Scheduling Objectives, CPU and 1,0 burst cycles, Pre-emptive, Non- Pre-emptive Scheduling, Scheduling criteria.

4.1 Scheduling Types

Scheduling Objectives, CPU and I/O Burst Cycles, Pre-emptive vs. Non-Pre-emptive Scheduling, and Scheduling Criteria

1. Scheduling Objectives

- **Objective**: Ensure efficient CPU utilization and process management.
- **Goals**:
  - Maximize CPU utilization.
  - Minimize process waiting time.
  - Maximize throughput (number of processes completed in a given time).
  - Minimize turnaround time (time from process submission to completion).

2. CPU and I/O Burst Cycles

- **CPU Burst**: Time a process spends executing instructions on the CPU.
- **I/O Burst**: Time a process spends waiting for I/O operations to complete.
- **Pattern**: Processes often alternate between CPU and I/O bursts, which affects scheduling decisions.

3. Scheduling Types

- **Pre-emptive Scheduling**: Allows a process to be interrupted and moved to the ready state by the scheduler if a higher-priority process arrives.
  - **Example**: Round-Robin Scheduling.
- **Non-Pre-emptive Scheduling**: Once a process starts execution, it runs to completion or until it performs an I/O operation.
  - **Example**: First-Come-First-Served (FCFS) Scheduling.

4. Scheduling Criteria

- **CPU Utilization**: Keeping the CPU busy as much as possible.
- **Throughput**: Number of processes completed per time unit.
- **Turnaround Time**: Total time taken from process submission to completion.
- **Waiting Time**: Time a process spends waiting in the ready queue.
- **Response Time**: Time from process submission to the first response.

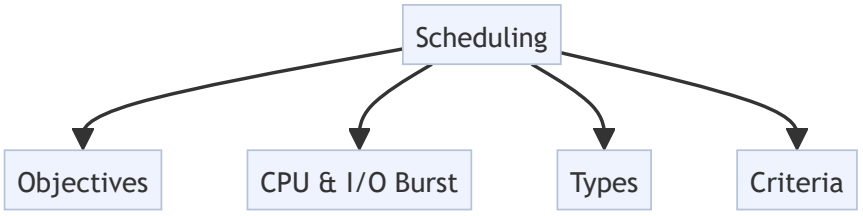
Summary Table

Aspect	Description
Scheduling Objectives	Efficient CPU utilization, minimize waiting time, maximize throughput, minimize turnaround time.
CPU Burst	Time spent executing instructions on the CPU.

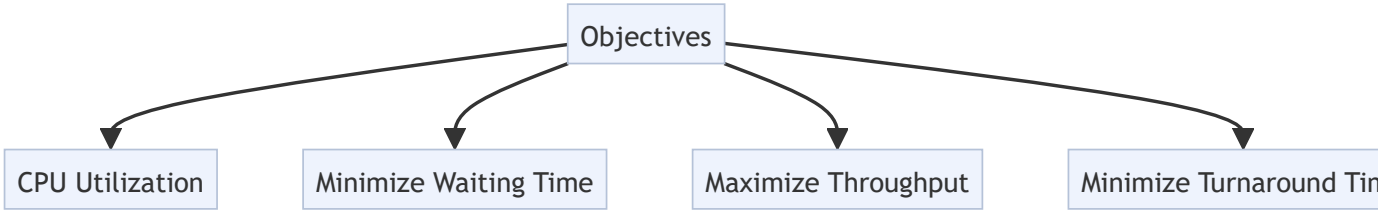
Aspect	Description
I/O Burst	Time spent waiting for I/O operations to complete.
Pre-emptive Scheduling	Allows interruption of processes (e.g., Round-Robin).
Non-Pre-emptive Scheduling	Processes run to completion or I/O (e.g., FCFS).
CPU Utilization	Keeping the CPU busy.
Throughput	Number of processes completed per time unit.
Turnaround Time	Time from submission to completion.
Waiting Time	Time spent waiting in the queue.
Response Time	Time from submission to the first response.

Diagram

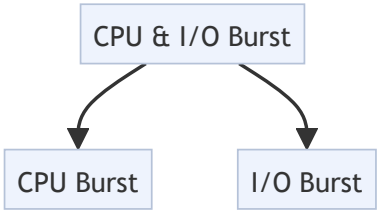
1. Scheduling Overview



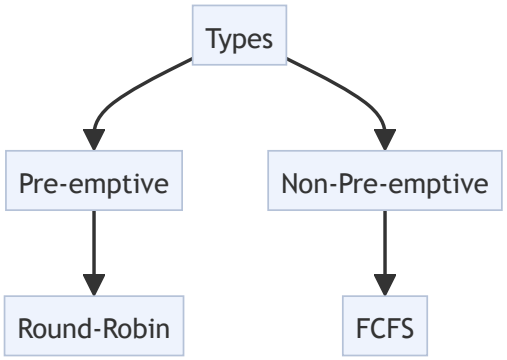
2. Scheduling Objectives



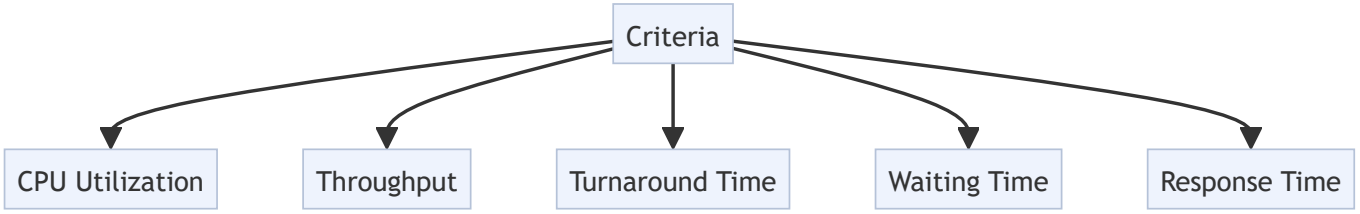
3. CPU & I/O Burst



4. Scheduling Types



5. Scheduling Criteria



Explanation

- **Scheduling Objectives**: Goals to optimize system performance.
- **CPU and I/O Burst Cycles**: The alternating periods of CPU and I/O activity affect scheduling strategies.
- **Scheduling Types**: Distinguish between pre-emptive and non-pre-emptive methods.
- **Scheduling Criteria**: Metrics used to evaluate scheduling algorithms.