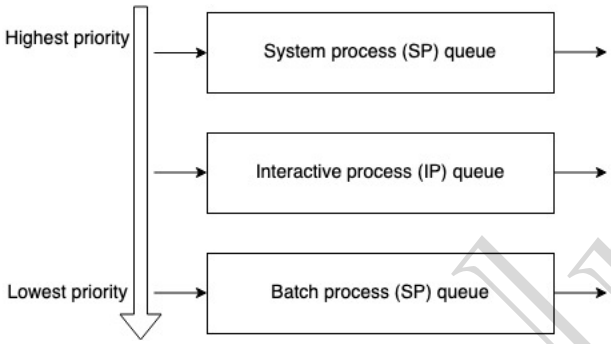
# LEC-14: MLQ | MLFQ

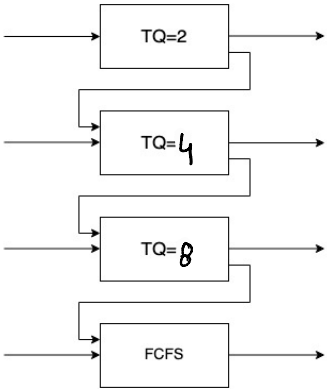
1. Multi-level queue scheduling (**MLQ**)
    a. Ready queue is divided into multiple queues depending upon priority.
    b. A process is permanently assigned to one of the queues (inflexible) based on some property of process, memory, size, process priority or process type.
    c. Each queue has its own scheduling algorithm. E.g., SP -> RR, IP -> RR & BP -> FCFS.

queue ko 3 mei divide:-




    d. System process: Created by OS (Highest priority)
    Interactive process (Foreground process): Needs user input (I/O).
    Batch process (Background process): Runs silently, no user input required.
    e. Scheduling among different sub-queues is implemented as **fixed priority preemptive** scheduling. E.g., foreground queue has absolute priority over background queue.
    f. If an interactive process comes & batch process is currently executing. Then, batch process will be preempted.
    g. Problem: Only after completion of all the processes from the top-level ready queue, the further level ready queues will be scheduled.
    This came starvation for lower priority process.
    h. Convoy effect is present.

2. Multi-level feedback queue scheduling (**MLFQ**)
    a. Multiple sub-queues are present.
    b. Allows the process to move between queues. The idea is to separate processes according to the characteristics of their BT. If a process uses too much CPU time, it will be moved to lower priority queue. This scheme leaves I/O bound and interactive processes in the higher-priority queue.
    In addition, a process that waits too much in a lower-priority queue may be moved to a higher priority queue. This form of ageing prevents starvation.
    c. Less starvation then MLQ.
    d. It is flexible.
    e. Can be configured to match a specific system design requirement.
    Sample MLFQ design:




**3. Comparison:**

| | FCFS | SJF | PSJF | Priority | P-Priority | RR | MLQ | MLFQ |
|---|---|---|---|---|---|---|---|---|
| Design | Simple | Complex | Complex | Complex | Complex | Simple | Complex | Complex |
| Preemption | No | No | Yes | No | Yes | Yes | Yes | Yes |
| Convoy effect | Yes | Yes | No | Yes | Yes | No | Yes | Yes |
| Overhead | No | No | Yes | No | Yes | Yes | Yes | Yes |