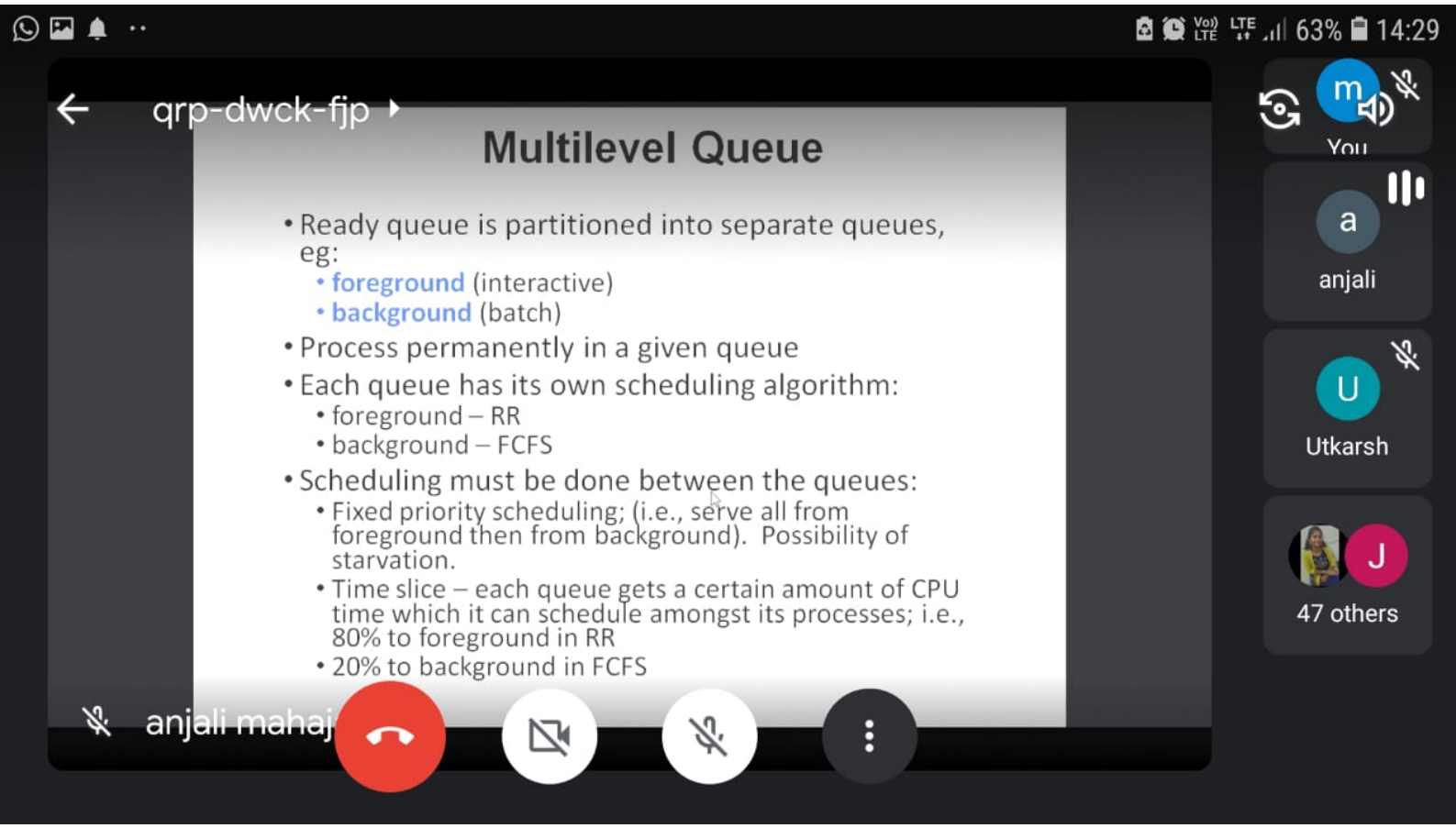
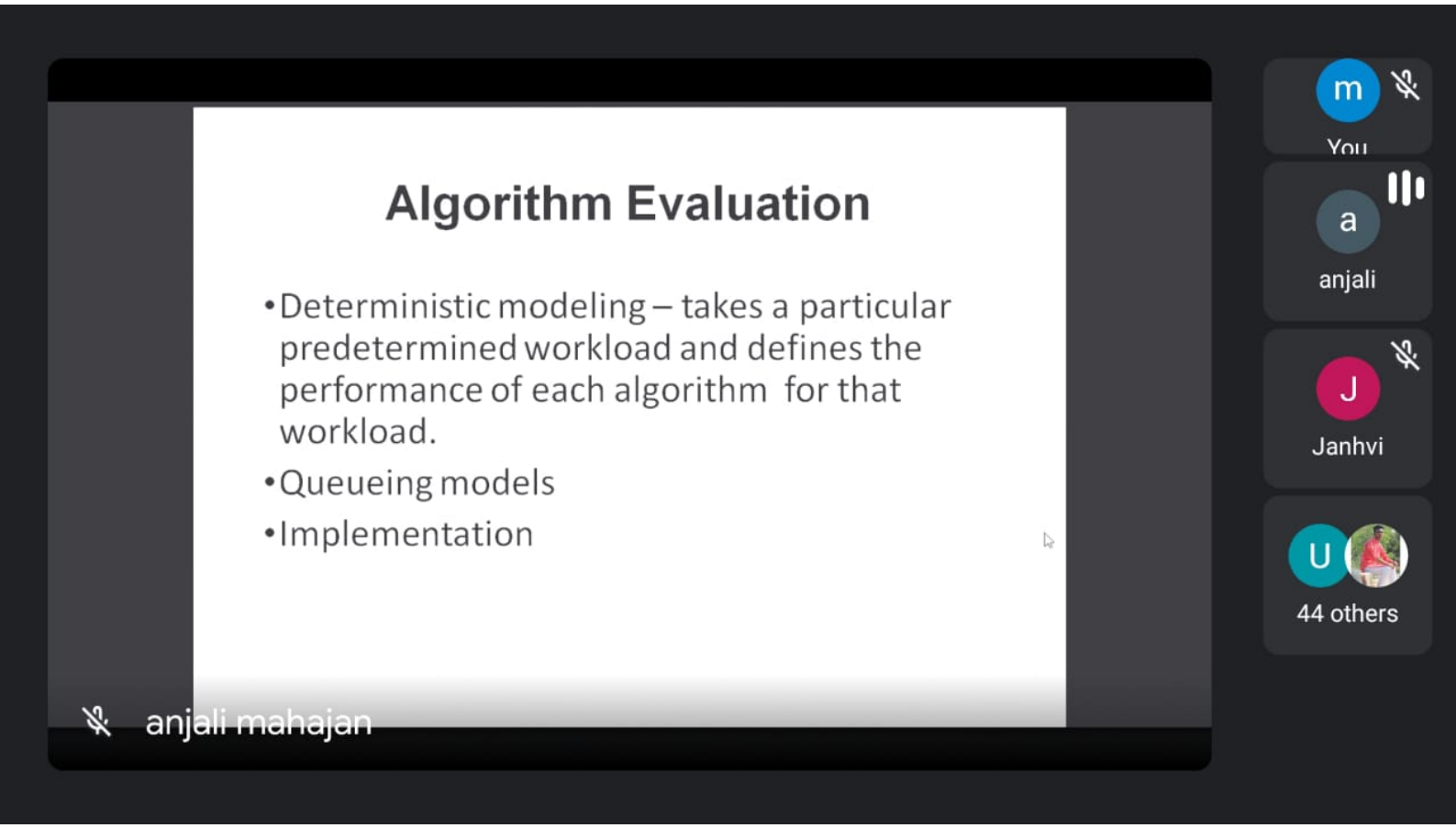
Example of RR with Time Quantum = 4

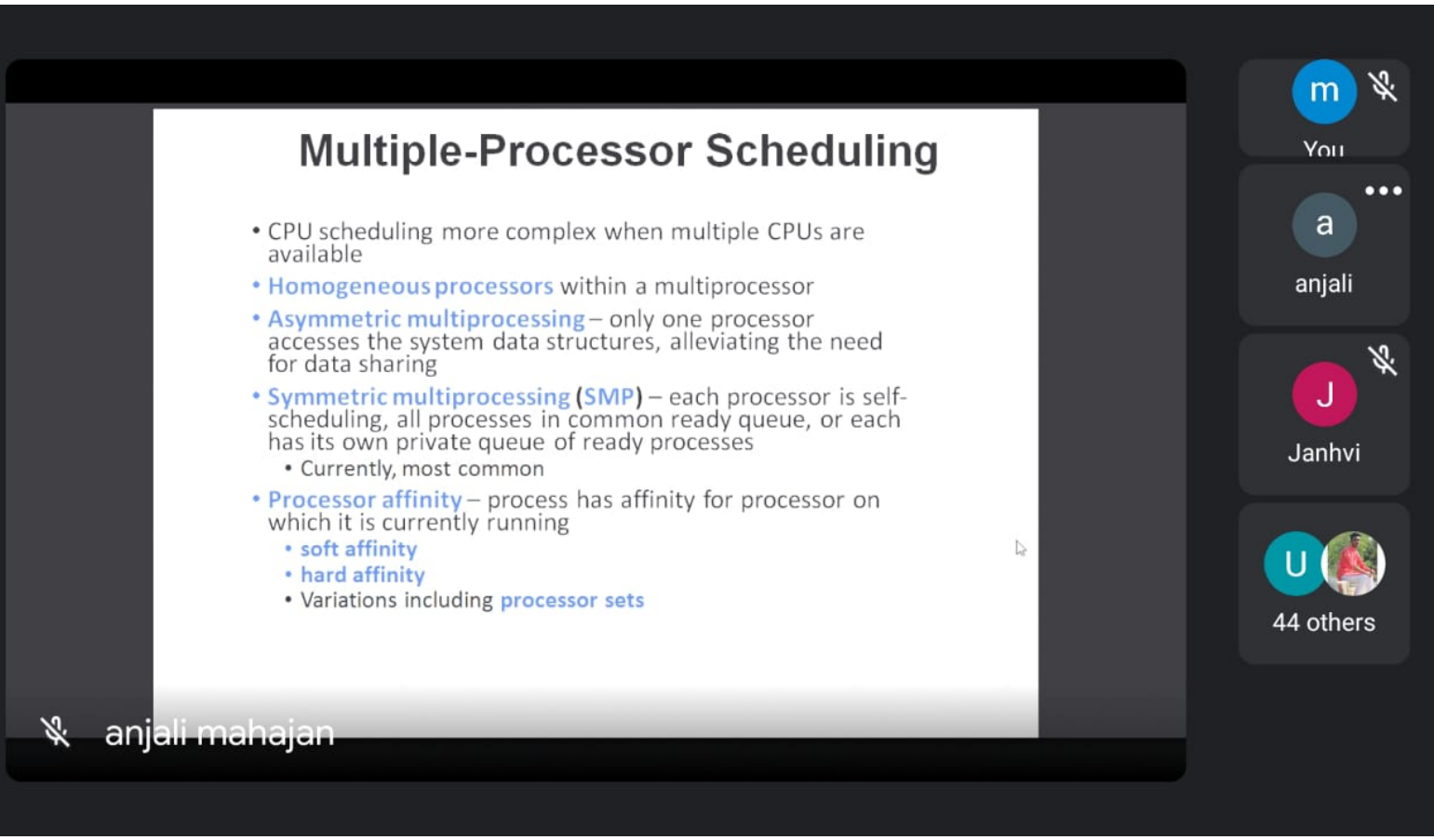
Process	Burst Time
P_1	24
P_2	3
P_3	3

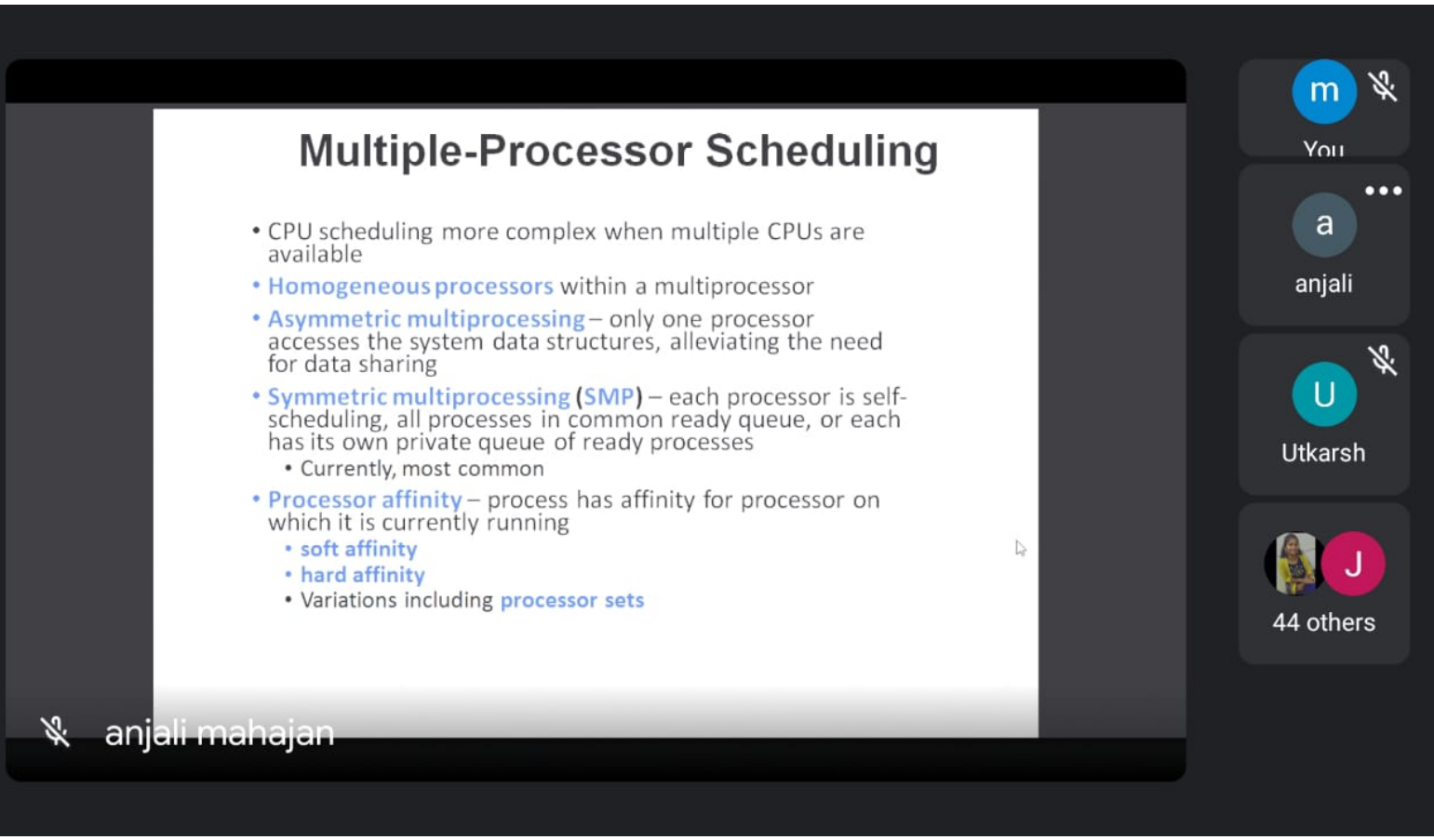
- The Gantt chart is:

- Typically, higher average turnaround than SJF, but better ***response***
- q should be large compared to context switch time
- q usually 10ms to 100ms, context switch < 10 usec


63% 14:29
qrp-dwck-fjp
Multilevel Queue
• Ready queue is partitioned into separate queues, eg:
• foreground (interactive)
• background (batch)
• Process permanently in a given queue
• Each queue has its own scheduling algorithm:
• foreground – RR
• background – FCFS
• Scheduling must be done between the queues:
• Fixed priority scheduling; (i.e., serve all from foreground then from background). Possibility of starvation.
• Time slice – each queue gets a certain amount of CPU time which it can schedule amongst its processes; i.e., 80% to foreground in RR
• 20% to background in FCFS
anjali mahaj
You
anjali
Utkarsh
47 others

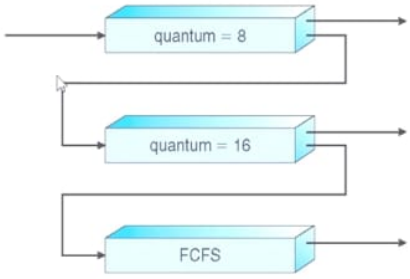

Algorithm Evaluation
•Deterministic modeling – takes a particular predetermined workload and defines the performance of each algorithm for that workload.
•Queueing models
•Implementation
anjali mahajan
m
You
a
anjali
J
Janhvi
U
44 others


Multiple-Processor Scheduling
• CPU scheduling more complex when multiple CPUs are available
• Homogeneous processors within a multiprocessor
• Asymmetric multiprocessing – only one processor accesses the system data structures, alleviating the need for data sharing
• Symmetric multiprocessing (SMP) – each processor is self-scheduling, all processes in common ready queue, or each has its own private queue of ready processes
• Currently, most common
• Processor affinity – process has affinity for processor on which it is currently running
• soft affinity
• hard affinity
• Variations including processor sets
anjali mahajan
m
You
a
anjali
J
Janhvi
U
44 others


Multiple-Processor Scheduling
• CPU scheduling more complex when multiple CPUs are available
• Homogeneous processors within a multiprocessor
• Asymmetric multiprocessing – only one processor accesses the system data structures, alleviating the need for data sharing
• Symmetric multiprocessing (SMP) – each processor is self-scheduling, all processes in common ready queue, or each has its own private queue of ready processes
• Currently, most common
• Processor affinity – process has affinity for processor on which it is currently running
• soft affinity
• hard affinity
• Variations including processor sets
anjali mahajan
m
You
a
anjali
U
Utkarsh
J
44 others

Example of Multilevel Feedback Queue

- Three queues:
  - Q_0 – RR with time quantum 8 milliseconds
  - Q_1 – RR time quantum 16 milliseconds
  - Q_2 – FCFS
- Scheduling
  - A new job enters queue Q_0 which is served FCFS
    - When it gains CPU, job receives 8 milliseconds
    - If it does not finish in 8 milliseconds, job is moved to queue Q_1
  - At Q_1 job is again served FCFS and receives 16 additional milliseconds
    - If it still does not complete, it is preempted and moved to queue



anjali mahajan

m
You

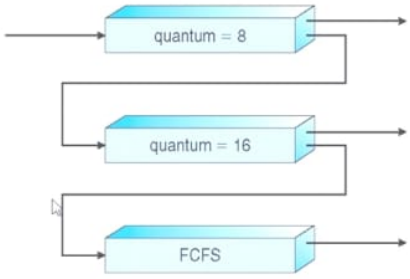
a
anjali

U
Utkarsh

J
44 others

Example of Multilevel Feedback Queue

- Three queues:
  - Q_0 – RR with time quantum 8 milliseconds
  - Q_1 – RR time quantum 16 milliseconds
  - Q_2 – FCFS
- Scheduling
  - A new job enters queue Q_0 which is served FCFS
    - When it gains CPU, job receives 8 milliseconds
    - If it does not finish in 8 milliseconds, job is moved to queue Q_1
  - At Q_1 job is again served FCFS and receives 16 additional milliseconds
    - If it still does not complete, it is preempted and moved to queue



anjali mahajan

m
You

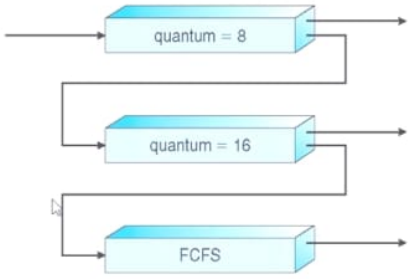
a
anjali

U
Utkarsh

J
44 others

Example of Multilevel Feedback Queue

- Three queues:
  - Q_0 – RR with time quantum 8 milliseconds
  - Q_1 – RR time quantum 16 milliseconds
  - Q_2 – FCFS
- Scheduling
  - A new job enters queue Q_0 which is served FCFS
    - When it gains CPU, job receives 8 milliseconds
    - If it does not finish in 8 milliseconds, job is moved to queue Q_1
  - At Q_1 job is again served FCFS and receives 16 additional milliseconds
    - If it still does not complete, it is



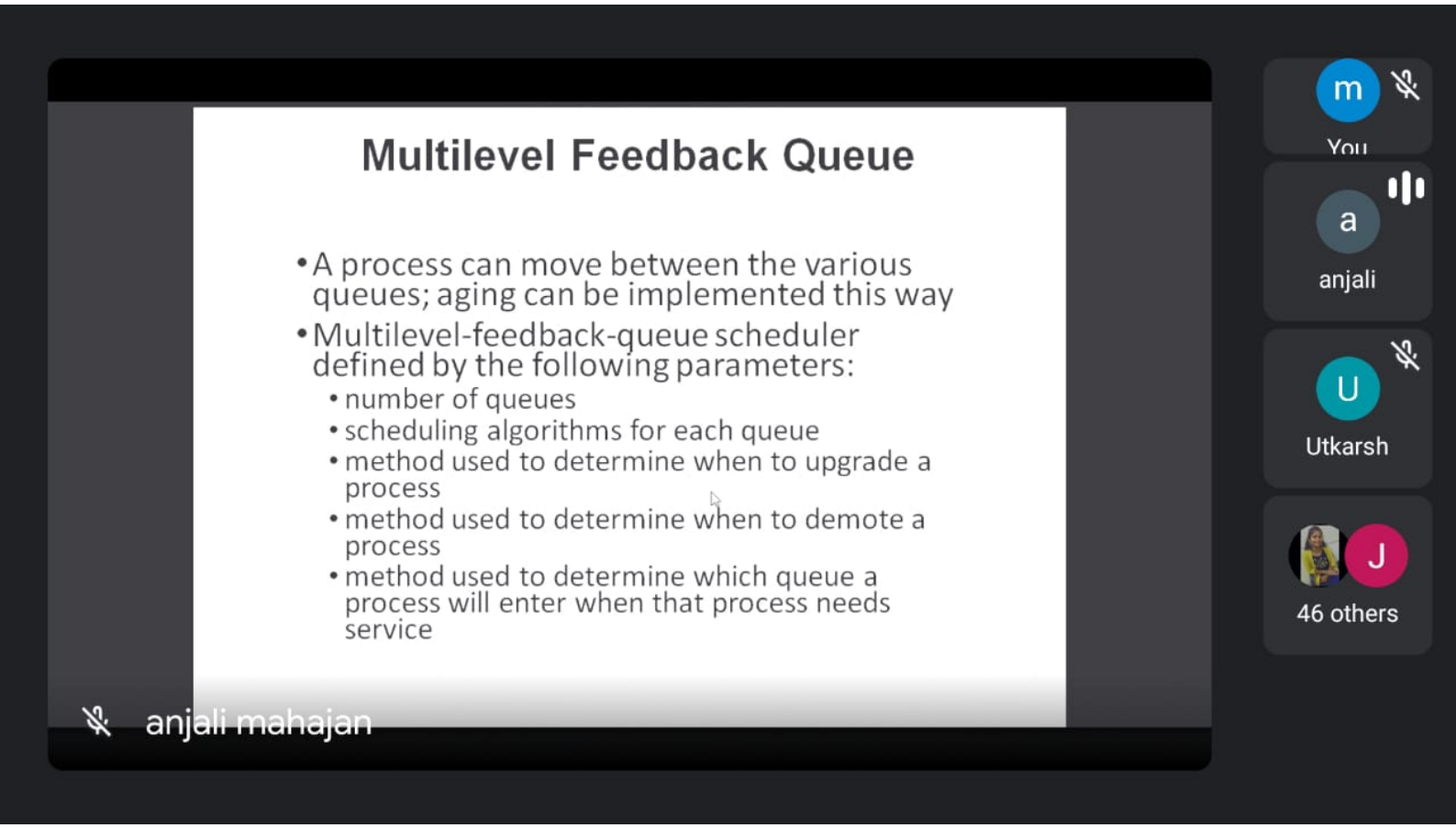
Mohan Arekar left

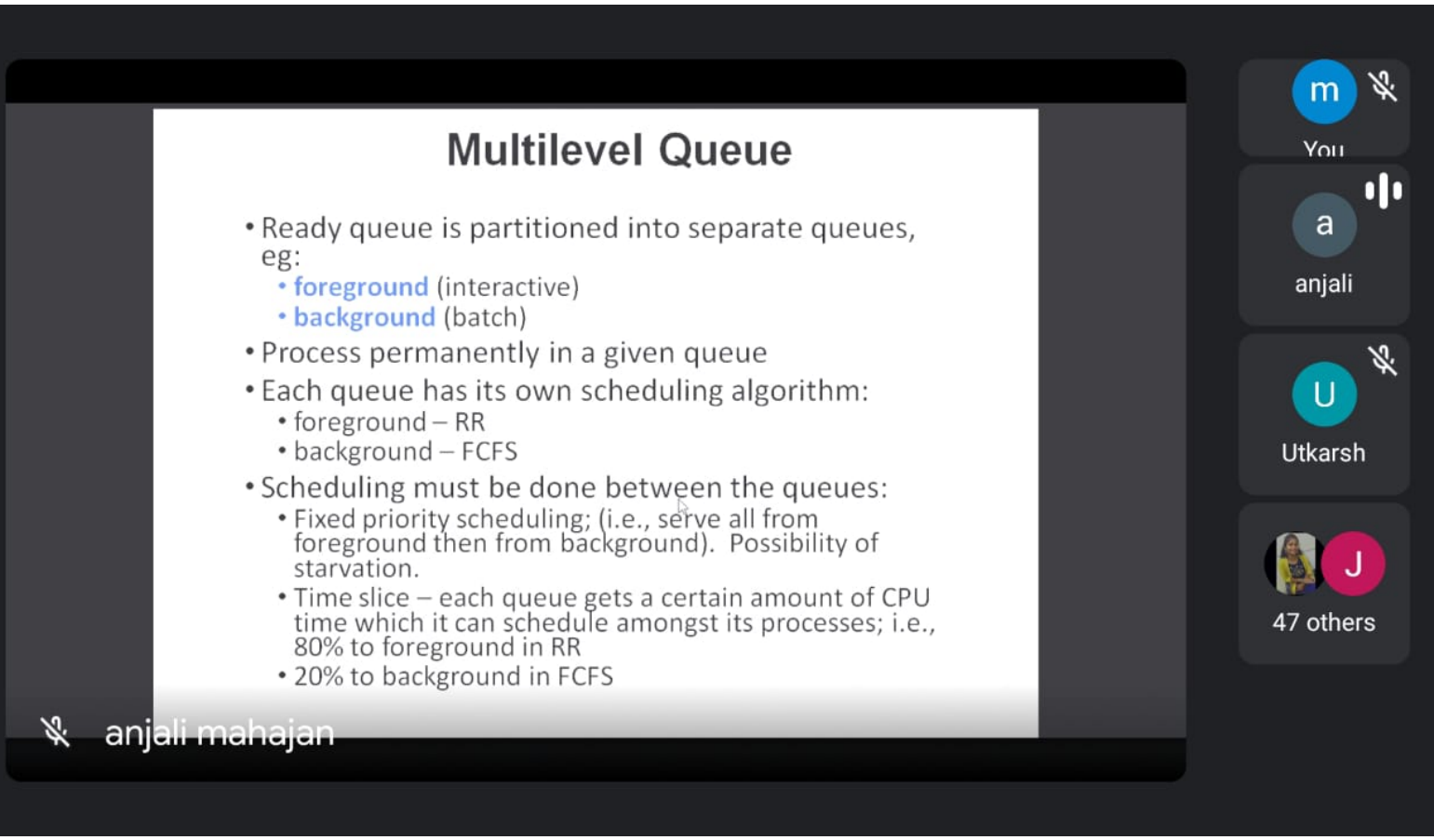
m
You

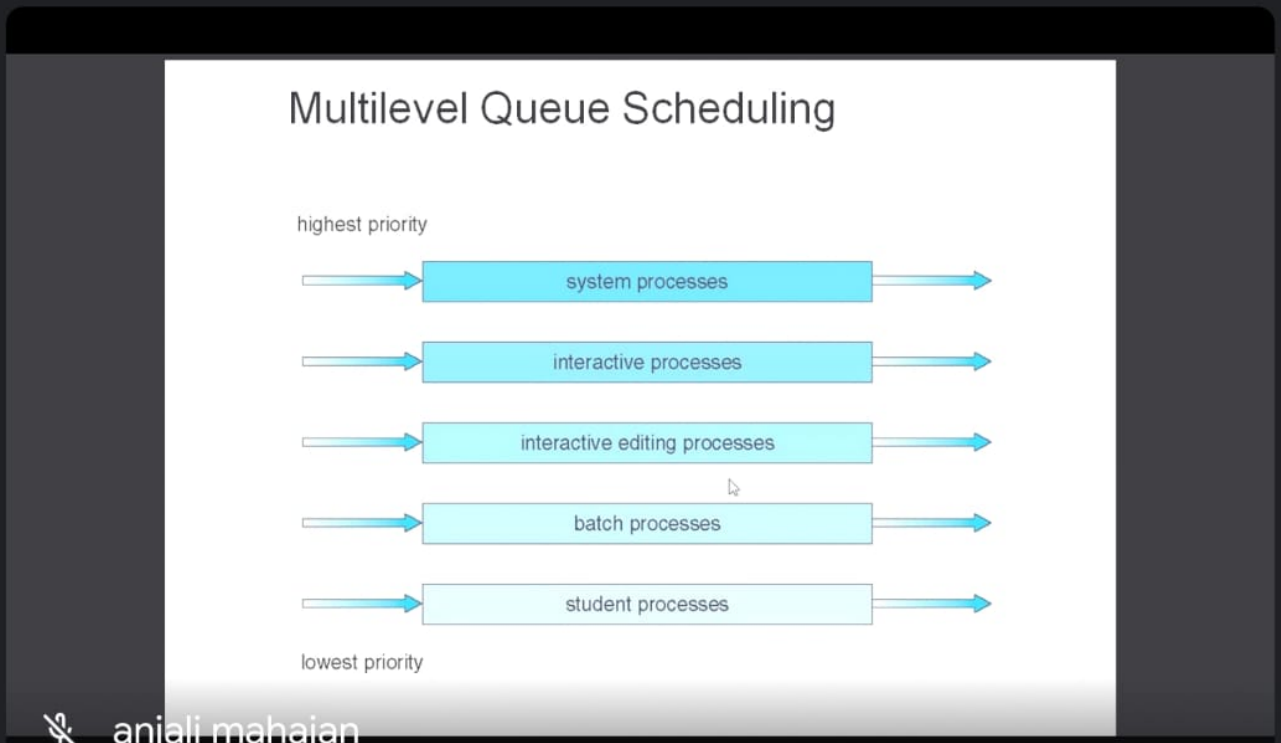
a
anjali

U
Utkarsh

J
46 others


Multilevel Feedback Queue
• A process can move between the various queues; aging can be implemented this way
• Multilevel-feedback-queue scheduler defined by the following parameters:
• number of queues
• scheduling algorithms for each queue
• method used to determine when to upgrade a process
• method used to determine when to demote a process
• method used to determine which queue a process will enter when that process needs service
anjali mahajan
m
You
a
anjali
U
Utkarsh
J
46 others


Multilevel Queue
• Ready queue is partitioned into separate queues, eg:
• foreground (interactive)
• background (batch)
• Process permanently in a given queue
• Each queue has its own scheduling algorithm:
• foreground – RR
• background – FCFS
• Scheduling must be done between the queues:
• Fixed priority scheduling; (i.e., serve all from foreground then from background). Possibility of starvation.
• Time slice – each queue gets a certain amount of CPU time which it can schedule amongst its processes; i.e., 80% to foreground in RR
• 20% to background in FCFS
anjali mahajan
m
You
a
anjali
U
Utkarsh
J
47 others



anjali mahajan

m
You

a
anjali

U
Utkarsh

J
47 others