

TCSS 422 A Spring 2025 - BONUS SESSION

# CPU SCHEDULER EXAMPLE PROBLEMS



Draw a scheduling graph for the FIFO CPU scheduler.

Use the scheduling graph to calculate the average turnaround time (ATT), and the average response time (ART) .

| Job | Arrival Time | Job Length |
|-----|--------------|------------|
| A   | T=0          | 400        |
| B   | T=0          | 100        |
| C   | T=0          | 200        |



$$ATT = \frac{400 + 500 + 700}{3} = \frac{1600}{3} = 533.33$$

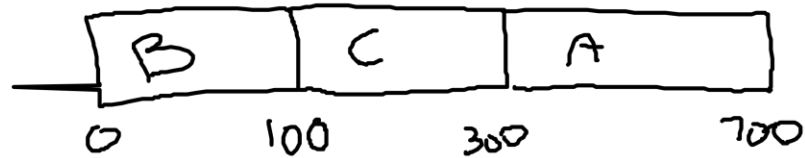
$$ART = \frac{0 + 400 + 500}{3} = \frac{900}{3} = 300$$

Draw a scheduling graph for the SJF CPU scheduler.

Use the scheduling graph to calculate the average turnaround time (ATT), and the average response time (ART).

| Job | Arrival Time | Job Length |
|-----|--------------|------------|
| A   | T=0          | 400        |
| B   | T=0          | 100        |
| C   | T=0          | 200        |

$$ATT = \frac{700 + 100 + 300}{3} = \frac{1100}{3} = 366.\bar{6}$$



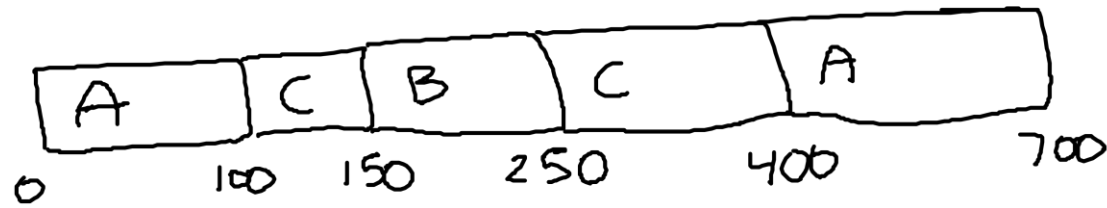
$$ART = \frac{300 + 0 + 100}{3} = \frac{400}{3} = 133.\bar{3}$$

Draw a scheduling graph for the STCF CPU scheduler with preemption  
 Use the scheduling graph to calculate the average turnaround time (ATT), and the average response time (ART).

| Job | Arrival Time | Job Length         |
|-----|--------------|--------------------|
| A   | T=0          | <del>400</del> 300 |
| B   | T=150        | 100                |
| C   | T=100        | <del>200</del> 150 |

$$ATT = \frac{700 + 100 + 300}{3} = \frac{1100}{3} = 366.\bar{6}$$

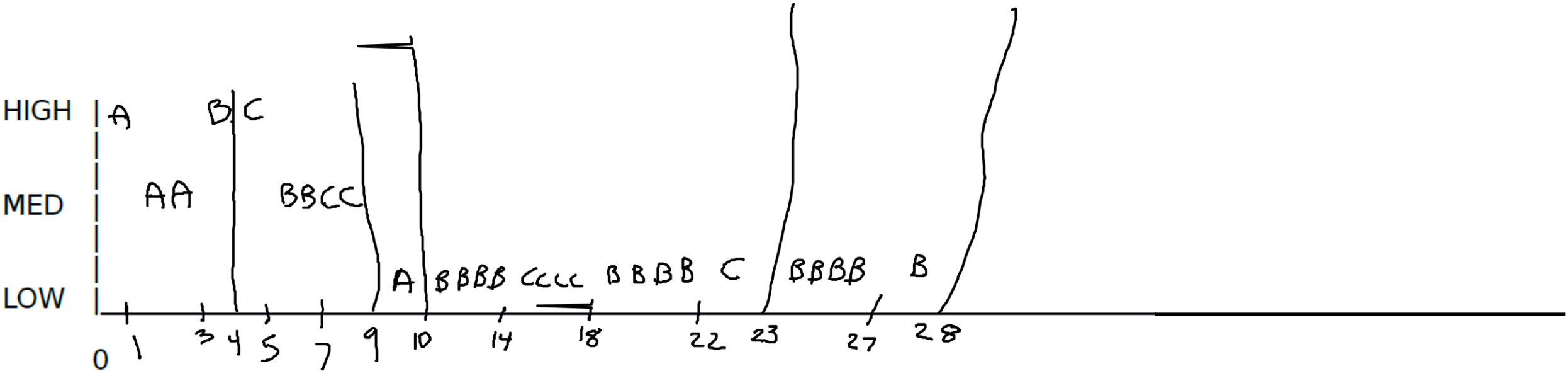
$$ART = \frac{0 + 0 + 0}{3} = 0$$



Jackson deploys a 3-level MLFQ scheduler. The time slice is 1 for high priority jobs, 2 for medium priority, and 4 for low priority. This MLFQ scheduler does NOT priority boost. When a new job arrives the scheduler is not pre-empted, but the new job is added to the end of the work queue.

| Job | Arrival Time | Job Length |
|-----|--------------|------------|
| A   | T=0          | 4          |
| B   | T=2          | 13         |
| C   | T=4          | 5          |

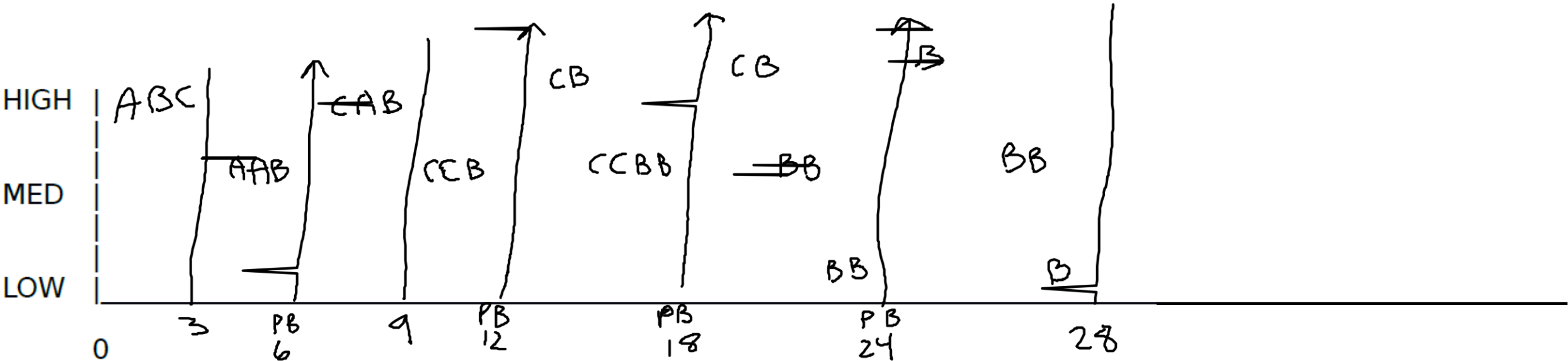
(11 points) Show a scheduling graph for the MLFQ scheduler for the jobs above. Draw vertical lines for key events and be sure to label the X-axis times as in the example. Please draw clearly. An unreadable graph will loose points.



Jackson deploys a 3-level MLFQ scheduler. The time slice is 1 for high priority jobs, 2 for medium priority, and 4 for low priority. This MLFQ scheduler performs a Priority Boost every 6 timer units. When the priority boost fires, the current job is preempted, and the next scheduled job is run in round-robin order.

| Job | Arrival Time | Job Length                         |
|-----|--------------|------------------------------------|
| A   | T=0          | <del>7</del> 7                     |
| B   | T=0          | 18 <del>14</del> 12 <del>9</del> 4 |
| C   | T=0          | <del>8</del> 7 <del>4</del> 1 0    |

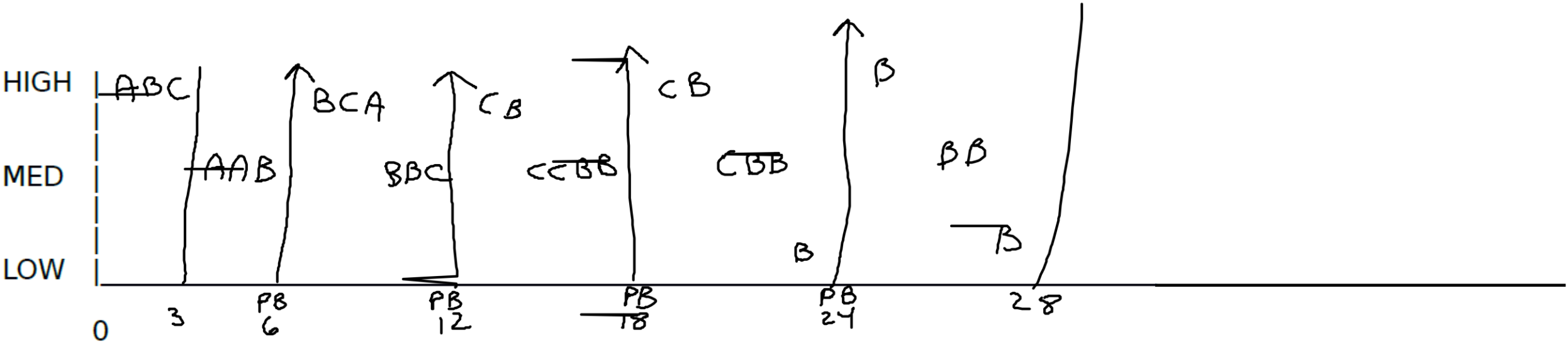
(11 points) Show a scheduling graph for the MLFQ scheduler for the jobs above. Draw vertical lines for key events and be sure to label the X-axis times as in the example. Please draw clearly. An unreadable graph will loose points.



Jackson deploys a 3-level MLFQ scheduler. The time slice is 1 for high priority jobs, 2 for medium priority, and 4 for low priority. This MLFQ scheduler performs a Priority Boost every 6 timer units. When the priority boost fires, the current job is preempted, but is rescheduled to run next in the top-level queue.

| Job | Arrival Time | Job Length                      |
|-----|--------------|---------------------------------|
| A   | T=0          | <del>4</del> 0                  |
| B   | T=0          | 16 <del>17</del> <del>8</del> 4 |
| C   | T=0          | <del>8</del> 5 <del>2</del> 0   |

(11 points) Show a scheduling graph for the MLFQ scheduler for the jobs above. Draw vertical lines for key events and be sure to label the X-axis times as in the example. Please draw clearly. An unreadable graph will loose points.



Jackson deploys a 3-level MLFQ scheduler. The time slice is 1 for high priority jobs, 2 for medium priority, and 4 for low priority. This MLFQ scheduler performs a Priority Boost every 6 timer units. When the priority boost fires, the current job is preempted, and the runqueue is reset so that the first job in the runqueue is run next.

| Job | Arrival Time | Job Length      |
|-----|--------------|-----------------|
| A   | T=0          | <del>4</del> 10 |
| B   | T=0          | <del>16</del> 8 |
| C   | T=0          | <del>8</del> 2  |

(11 points) Show a scheduling graph for the MLFQ scheduler for the jobs above. Draw vertical lines for key events and be sure to label the X-axis times as in the example. Please draw clearly. An unreadable graph will loose points.

