

# Highest Response Ratio Next Scheduling Problem

-- By R.G.B

# Question

Schedule the following processes applying (Highest Response Ratio Next) HRN scheduling algorithm. Assume that P1 is the first process and processor is instantly available for processing

Process No.	P1	P2	P3	P4
Entry time after system start	1 sec	5 sec	10 sec	15 sec
Estimated required CPU service time	10 sec	10 sec	10 sec	10 sec

If P3 process needs only 2 seconds of CPU service time, does the Sequence of schedule differ or remain same?

# Solution

Process	Arrival time	Service / Burst time	Explanation
P1	1	10	It is the first process doesn't have to wait, find HRRN of p2 and p3 only because only p2,p3 are there in system at time of completion of execution of p1
P2	5	10	Now p1 finished execution and p2 and p3 are in queue
P3	10	10	P3 and p4 only in queue
P4	15	10	Only p4 remaining

- ❖ All times are measured in seconds
- ❖ In HRRN the process with highest HRRN priority value executes first

# Time = 1 sec

- Only p1(AT= 1 sec) is in the queue
- Waiting time = 0 sec(P1 is the first process in queue)
- HRRN priority =  $(WT+ST)/ST$
- For first process no need to check the priority because only P1 is in the queue at time = 1 sec
- Burst/ service time = 10 sec
- Completion time = 11 sec

At completion of process p1 i.e. time = 11 sec

- WE ARE ONLY CALCULATING FOR TIME = 11 SEC
- Now p2 (AT=5 )and p3(AT=10) are in the queue
- We have to find the HRRN priority value= $(ST+WT)/ST$
- For p2(WT=6) HRRN =  $(10+6)/10=1.6$
- For p3(WT=1) HRRN =  $(10+1)/10=1.1$
- So p2 starts executing because p2 have highest HRRN value
- Burst time = 10 sec
- Completion time = 21 sec

At completion of process p2 i.e. time = 21 sec

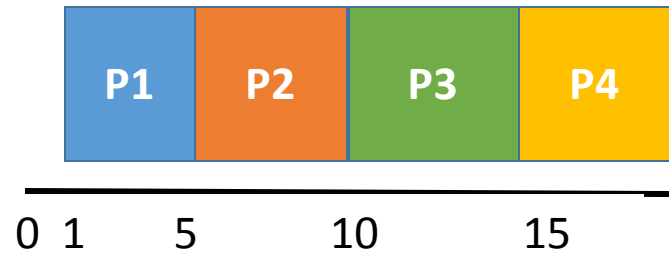
- WE ARE ONLY CALCULATING FOR TIME = 21 SEC
- Now p3 (AT=10 )and p4(AT=15) are in the queue
- We have to find the HRRN priority value= $(ST+WT)/ST$
- For p3(WT=15) HRRN  $= (10+15)/10 = 2.5$
- For p4(WT=6) HRRN  $= (10+6)/10 = 1.6$
- So p3 starts executing because p3 have highest HRRN value
- Burst time = 10 sec
- Completion time = 31 sec

At completion of process p3 i.e. time = 31 sec

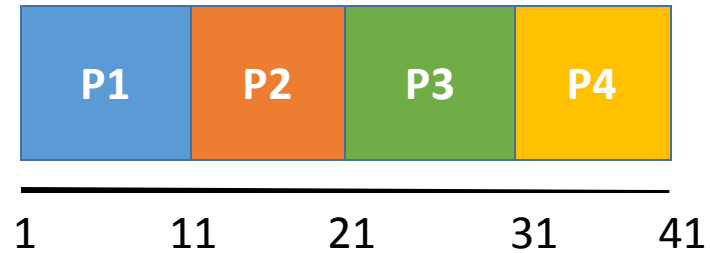
- Only p4 is left in the queue
- So no need to check priority
- Burst/ service time = 10 sec
- Completion time = 41 sec

# Chart representations

- According to arrival



- According to execution(P1,P2,P3,P4)





# Changing Service / burst time of P3 = 2 sec

Process	Arrival time	Service / Burst time	Explanation
P1	1	10	It is the first process doesn't have to wait, find HRRN of p2 and p3 only because only p2,p3 are there in system at time of completion of execution of p1
P2	5	10	Now p1 finished execution and p2 and p3 are in queue
P3	10	2	P3 and p4 only in queue
P4	15	10	Only p4 remaining

- ❖ All times are measured in seconds
- ❖ In HRRN the process with highest HRRN priority value executes first

# Time = 1 sec

- Only p1(AT= 1 sec) is in the queue
- Waiting time = 0 sec(P1 is the first process in queue)
- HRRN priority =  $(WT+ST)/ST$
- For first process no need to check the priority because only P1 is in the queue at time = 1 sec
- Burst/ service time = 10 sec
- Completion time = 11 sec

# At completion of process p1 i.e. time = 11 sec

- WE ARE ONLY CALCULATING FOR TIME = 11 SEC
- Now p2 (AT=5 )and p3(AT=10) are in the queue
- We have to find the HRRN priority value= $(ST+WT)/ST$
- For p2(WT=6) HRRN  $= (10+6)/10 = 1.6$
- For p3(WT=1) HRRN  $= (2+1)/2 = 1.5$
- So p2 starts executing because p2 have highest HRRN value
- Burst time = 10 sec
- Completion time = 21 sec

At completion of process p2 i.e. time = 21 sec

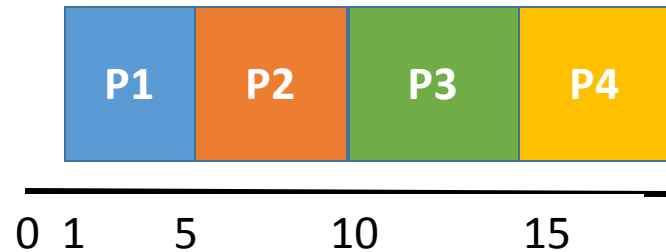
- WE ARE ONLY CALCULATING FOR TIME = 21 SEC
- Now p3 (AT=10 )and p4(AT=15) are in the queue
- We have to find the HRRN priority value= $(ST+WT)/ST$
- For p3(WT=15) HRRN = $(2+15)/2=8.5$
- For p4(WT=6) HRRN =  $(10+6)/10=1.6$
- So p3 starts executing because p3 have highest HRRN value
- Burst time = 2 sec
- Completion time = 23 sec

At completion of process p3 i.e. time = 23 sec

- Only p4 is left in the queue
- So no need to check priority
- Burst/ service time = 10 sec
- Completion time = 33 sec

# Chart representations

- According to arrival



- According to execution(P1,P2,P3,P4) Execution order not changed

