Highest Response Ration Next (HRRN) NPE

PID/P #	AT	BT
1	0	3
2	2	6
3	4	4
4	6	5
5	8	2

- ✓Response Ratio = (w+s)/s ; where w is wait time s is service time
- ✓Criteria is Response Ratio Maximisation ; Non Premptive
- ✓SJF Variant to mitigate Starvation
- ✓Favours shorter jobs but also limits wait time of longer jobs
- ✓Jobs long waiting over shorter ones

P1	P2	P3	P5	P4

0 3 9 13 15 20

@ 13: P4=(7+5)/5=2.4
P5=(5+2)/2=3.5

Calculate RR for P3 toP5 when there is competition
RR @ t=9 ;
P3=(5+4)/4 = 2.25
P4= (3+5)/5=1.6
P5=(1+2)+2=1.5

HRRN – 2nd Example

PID/P #	AT	BT
1	1	1
2	4	2
3	5	6
4	6	2
5	7	4

Response Ratio @ t=6 ;

P3=(1+6) / 6 = 1.1

P4= (0+2)/ 2=1

@ 12:

P4=(6+2)/2=4

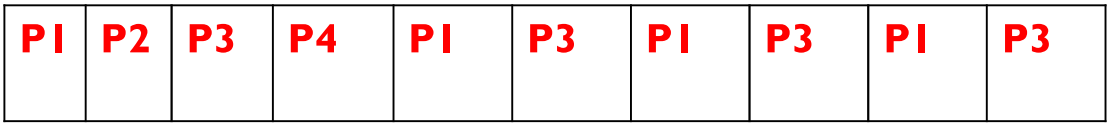
P5=(5+4)/4=2.05

E	P1	E	P2	P3	P4	P5

0 1 2 4 6 12 14 18

A Few more numericals on RR

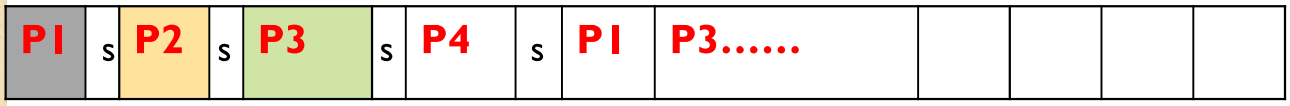
✓Assume there are 4 processes in a setup with burst times of 4,1,8 and 1 respectively. Assume all arrive at the same time instant t and TQ=1. Compute the finish times and wait times of all processes.



0 1 2 3 4 5 6 7 8 9 14

Ready Q Order: P1,P2,P3,P4,P1,P3

❖Assume there are n processes following a Round Robin scheduling strategy with context switch time of s. Find the time quantum q for a process Pi to get its turn back at the processor for a gurantee of t seconds.



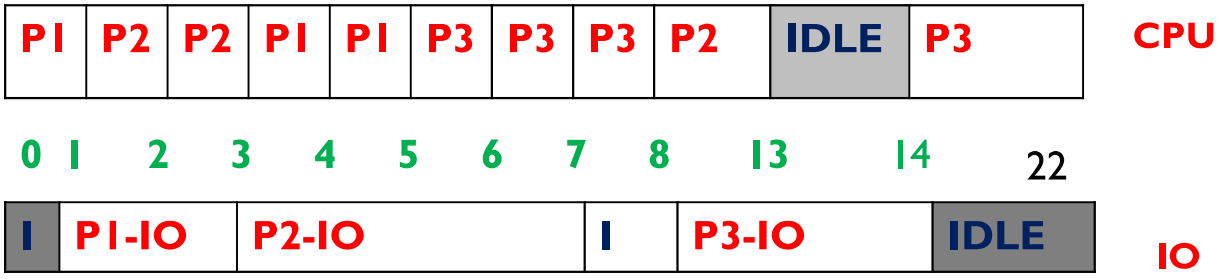
q q q q

From above setup; t= 4s+3q ; q= (t-4s) / 3 ; in general q= (t-ns) / (n-1)

Numericals on Scheduling

PID/P #	AT	CPU Time1	IO Time	CPU Time2	FT
1	0	1	2	2	5
2	1	2	4	5	13
3	2	3	6	8	22

Given the above process setup; compute the finish times of all processes; a process spends time both on cpu and io. I/O time can be overlapped with CPU but cpu times cannot be overlapped and the ordering of CPU 1 followed by IO followed by CPU 2 needs to be maintained. (also IO is not overlapped across processes)



Overlapped IO Scheduling

PID/P#	AT	IO Time1	CPU	IO Time 2	FT
1	0	4	14	2	20
2	0	8	28	4	50
3	0	12	42	6	94