Gantt Chart (Tutorial Slides)

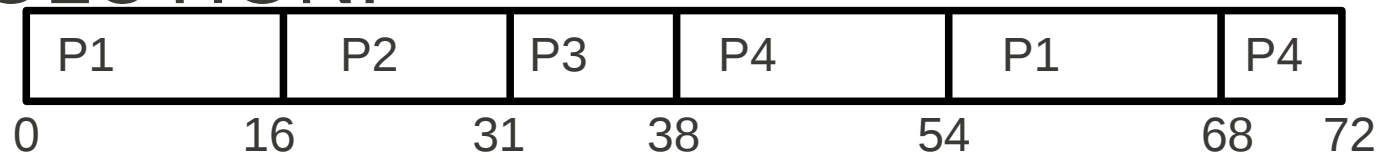
4-Aug-2017
CS303

Round Robin (1/4)

- Four processes with CPU-Burst times as:

  P1: 30, P2:15, P3:7, P4:20 time units
  Quanta=16

  SOLUTION:



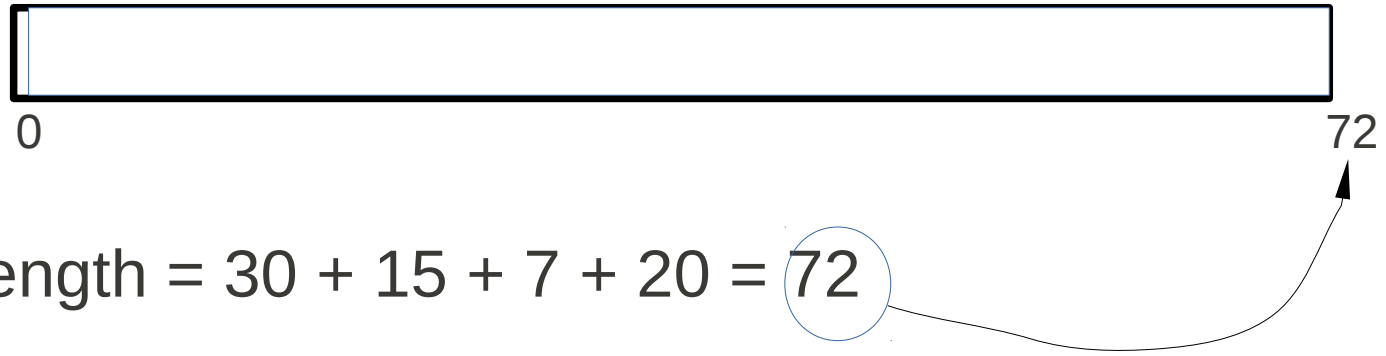
Round / Proc	1 (Remain Time for Ex (RTE) in this round)				2		
P1	30 *	14	14	14	14*	0	0
P2	15	15*	0	0	0	0	0
P3	7	7	7*	0	0	0	0
P4	20	20	20	20*	4	4*	0

Round Robin (1/10)

- Four processes with CPU-Burst times as:

  P1: 30, P2:15, P3:7, P4:20 time units
  Quanta=16

  SOLUTION:

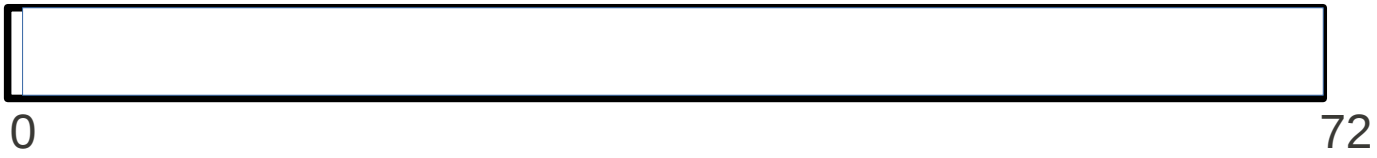


Round Robin (2/10)

- Four processes with CPU-Burst times as:

  P1: 30, P2:15, P3:7, P4:20 time units
  Quanta=16

  SOLUTION:



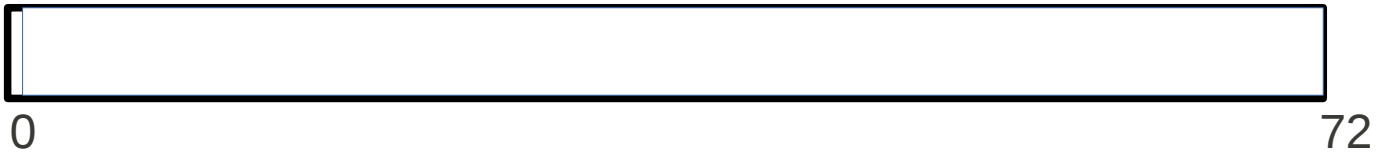
Draw a table to record Remaining time after each round

Round Robin (3/10)

- Four processes with CPU-Burst times as:

  P1: 30, P2:15, P3:7, P4:20 time units
  Quanta=16

  SOLUTION:



Draw a table to record Remaining time at each round

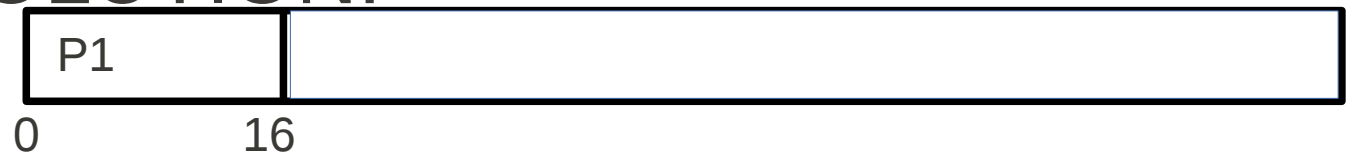
Round Proc	1 (Remain Time for Ex (RTE) in this round)				2		
P1							
P2							
P3							
P4							

Round Robin (4/10)

- Four processes with CPU-Burst times as:

  P1: 30, P2:15, P3:7, P4:20 time units
  Quanta=16

  SOLUTION:



* the process to which quanta is allocated

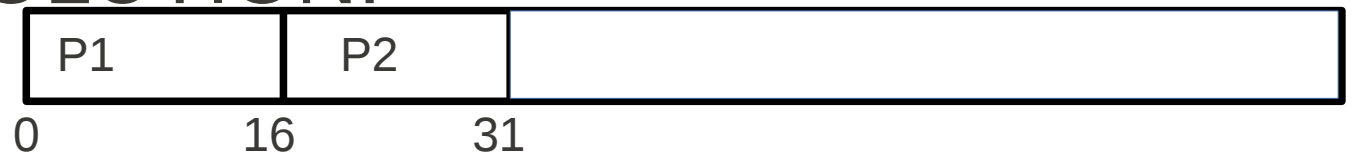
Round / Proc	1 (Remain Time for Ex (RTE) in this round)				2		
P1	30 *	14					
P2	15	15*					
P3	7	7					
P4	20	20					

Round Robin (5/10)

- Four processes with CPU-Burst times as:

  P1: 30, P2:15, P3:7, P4:20 time units
  Quanta=16

  SOLUTION:



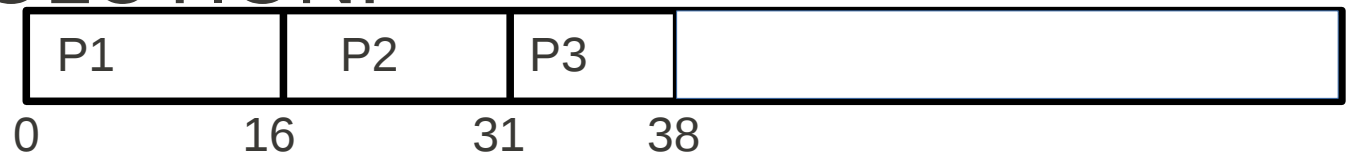
Round / Proc	1 (Remain Time for Ex (RTE) in this round)				2		
P1	30 *	14	14				
P2	15	15*	0				
P3	7	7	7*				
P4	20	20	20				

Round Robin (6/10)

- Four processes with CPU-Burst times as:

  P1: 30, P2:15, P3:7, P4:20 time units
  Quanta=16

  SOLUTION:



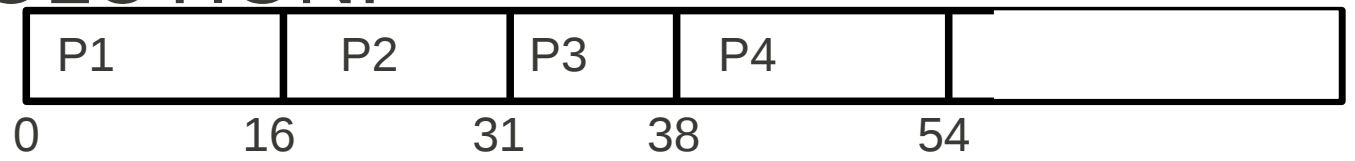
Round / Proc	1 (Remain Time for Ex (RTE) in this round)				2		
P1	30 *	14	14	14			
P2	15	15*	0	0			
P3	7	7	7*	0			
P4	20	20	20	20*			

Round Robin (7/10)

- Four processes with CPU-Burst times as:

  P1: 30, P2:15, P3:7, P4:20 time units
  Quanta=16

  SOLUTION:



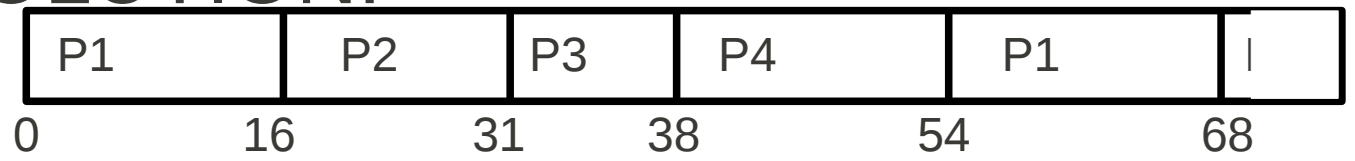
Round / Proc	1 (Remain Time for Ex (RTE) in this round)				2		
P1	30 *	14	14	14	14*		
P2	15	15*	0	0	0		
P3	7	7	7*	0	0		
P4	20	20	20	20*	4		

Round Robin (8/10)

- Four processes with CPU-Burst times as:

  P1: 30, P2:15, P3:7, P4:20 time units
  Quanta=16

  SOLUTION:



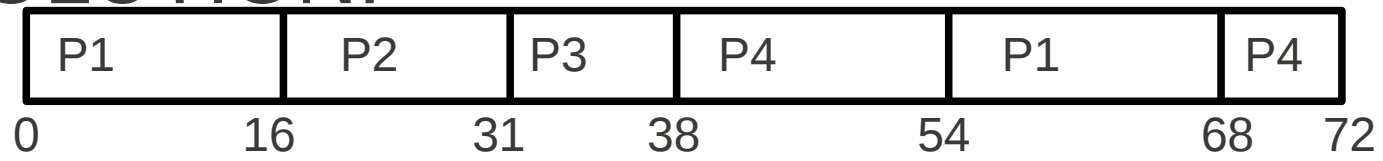
Round / Proc	1 (Remain Time for Ex (RTE) in this round)				2		
P1	30 *	14	14	14	14*	0	
P2	15	15*	0	0	0	0	
P3	7	7	7*	0	0	0	
P4	20	20	20	20*	4	4*	

Round Robin (9/10)

- Four processes with CPU-Burst times as:

  P1: 30, P2:15, P3:7, P4:20 time units
  Quanta=16

  SOLUTION:



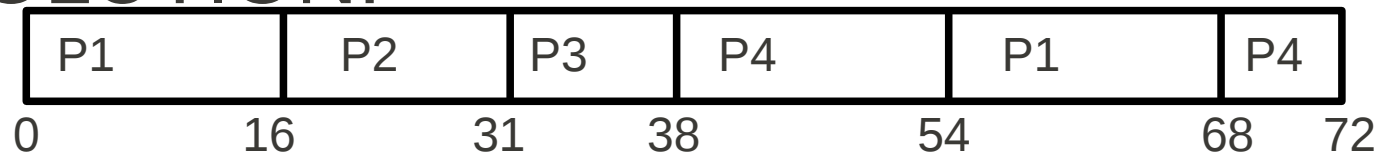
Round / Proc	1 (Remain Time for Ex (RTE) in this round)				2		
P1	30 *	14	14	14	14*	0	0
P2	15	15*	0	0	0	0	0
P3	7	7	7*	0	0	0	0
P4	20	20	20	20*	4	4*	0

Round Robin (10/10)

- Four processes with CPU-Burst times as:

  P1: 30, P2:15, P3:7, P4:20 time units
  Quanta=16

  SOLUTION:



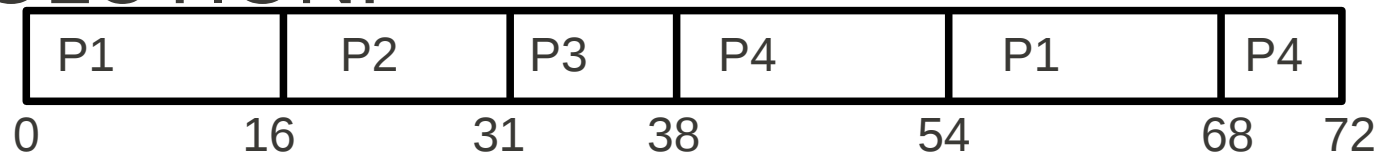
Round / Proc	1 (Remain Time for Ex (RTE) in this round)				2		
P1	30 *	14	14	14	14*	0	0
P2	15	15*	0	0	0	0	0
P3	7	7	7*	0	0	0	0
P4	20	20	20	20*	4	4*	0

Round Robin (1/4)

- Four processes with CPU-Burst times as:

  P1: 30, P2:15, P3:7, P4:20 time units
  Quanta=16

  SOLUTION:

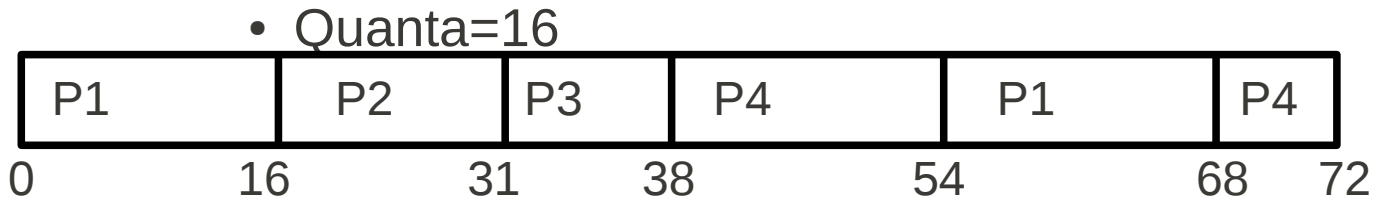


Round / Proc	1 (Remain Time for Ex (RTE) in this round)				2		
P1	30 *	14	14	14	14*	0	0
P2	15	15*	0	0	0	0	0
P3	7	7	7*	0	0	0	0
P4	20	20	20	20*	4	4*	0

Round Robin (2/4)

- Wait time:

  P1: 30, P2:15, P3:7, P4:20 time units



Ignoring CST:
WT_P1 = 54 – 16 = 38
WT_P2 = 16
WT_P3 = 31
WT_P4 = 68 – 16 = 52

Avg-WT = (38 + 16 + 31+ 52) / 4
= 137/4 = 34.25 time-units

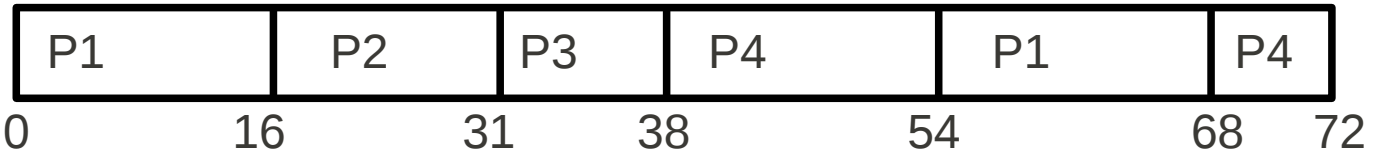
Considering CST:
Say 1 CST takes 1 time unit
WT_P1 = (54 + 4 * CST) – 16
= 38 + 4 CST = 42

WT_P2 = 16 + 1 CST = 17
WT_P3 = 31 + 2 CST = 33
WT_P4 = (68 + 5 * CST) – 16
= 52 + 5 * CST = 57

Avg-WT = (42 + 17 + 33+ 57) / 4
= 148/4 = 37.25 time-units

Round Robin (3/4)

- TAT
  - P1: 30, P2:15, P3:7, P4:20 time units
  - Q=16



Ignoring CST:
TAT_P1 = 16
TAT_P2 = 31
TAT_P3 = 38
TAT_P4 = 72

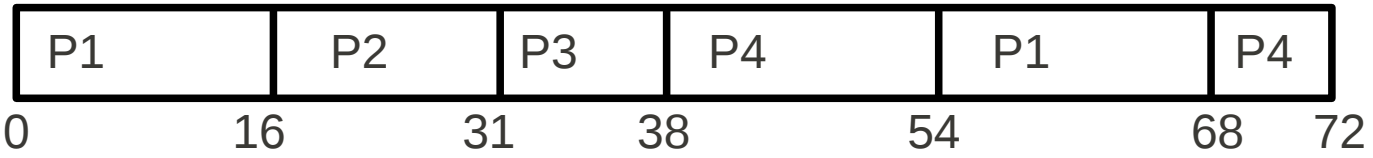
Avg-TAT = (16 + 31+ 38 + 72) / 4
= 157/4 = 39.25 time-units

Considering CST:
TAT_P1 = (68 + 4 * CST)
= 72
TAT_P2 = 31 + 1 CST = 32
TAT_P3 = 38 + 2 CST = 40
TAT_P4 = (72 + 5 * CST) = 77

Avg-TAT = (72 + 32 + 40 + 77) / 4
= 221/4 = 55.25 time-units

Round Robin (4/4)

- CPU-utilisation and Throughput
  - P1: 30, P2:15, P3:7, P4:20 time units
  - Q=16



Ignoring CST:
CPU-Utilisation = 72 / 72 * 100
= 100 %

Throughput = 4 / 72

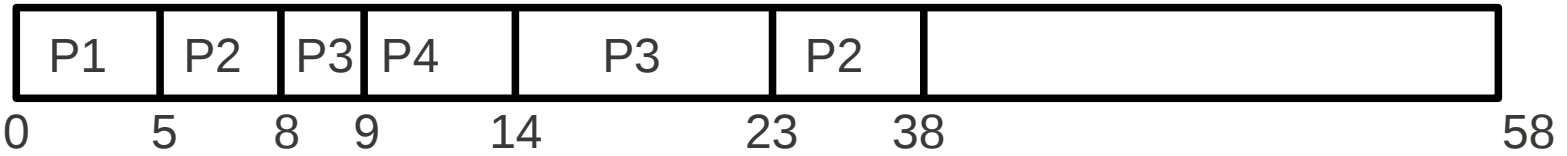
Considering CST:
CPU-Utilisation= 72 / (72 + 5CST)
= 72/77 = 93.5 %

Throughput =
4 / 77 processes per unit time

Shortest Job Remaining Time (1/4)

- Four processes with (CPU-Burst, Arrival-times) as: P1(25,0), P2(18,5), P3(10,8), P4(5,9)

SOLUTION

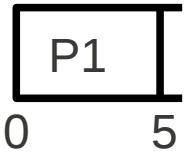


Time / Arr / Proc	0 (Remaining Time (RTJ))	5 RTJ	8	9	14	23	38	58
P1	25*	20	20	20	20	20	20*	E
P2	Not Arrived (NA)	18*	15	15	15	15*	E	
P3	NA	NA	10*	9	9*	E		
P4	NA	NA	NA	5*	Exited (E)			

Shortest Job Remaining Time (1/4)

- Four processes with (CPU-Burst, Arrival-Time) as: P1(25,0), P2(18,5), P3(10,8), P4(5,9)

SOLUTION

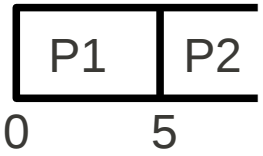


Time / Arr / Proc	0 (Remaining Time (RTJ))	5 RTJ	8	9	14	23	38	58
P1	25*							
P2	Not Arrived (NA)							
P3	NA							
P4	NA							

Shortest Job Remaining Time (1/4)

- Four processes with (CPU-Burst, Arrival-times) as: P1(25,0), P2(18,5), P3(10,8), P4(5,9)

SOLUTION

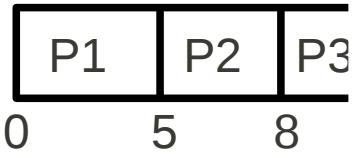


Time / Arr / Proc	0 (Remaining Time (RTJ))	5 RTJ	8	9	14	23	38	58
P1	25*	20						
P2	Not Arrived (NA)	18*						
P3	NA	NA						
P4	NA	NA						

Shortest Job Remaining Time (1/4)

- Four processes with (CPU-Burst, Arrival-times) as: P1(25,0), P2(18,5), P3(10,8), P4(5,9)

SOLUTION

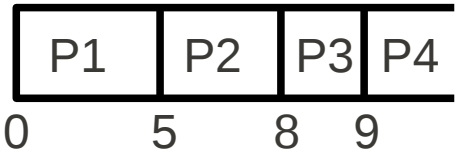


Time / Arr / Proc	0 (Remaining Time (RTJ))	5 RTJ	8	9	14	23	38	58
P1	25*	20	20					
P2	Not Arrived (NA)	18*	15					
P3	NA	NA	10*					
P4	NA	NA	NA					

Shortest Job Remaining Time (1/4)

- Four processes with (CPU-Burst, Arrival-times) as: P1(25,0), P2(18,5), P3(10,8), P4(5,9)

SOLUTION

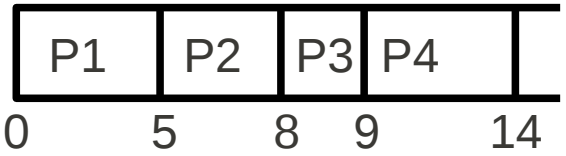


Time / Proc / Arr	0 (Remaining Time (RTJ))	5 RTJ	8	9	14	23	38	58
P1	25*	20	20	20				
P2	Not Arrived (NA)	18*	15	15				
P3	NA	NA	10*	9				
P4	NA	NA	NA	5*				

Shortest Job Remaining Time (1/4)

- Four processes with (CPU-Burst, Arrival-times) as: P1(25,0), P2(18,5), P3(10,8), P4(5,9)

SOLUTION

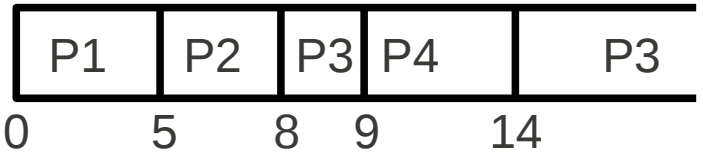


Time / Proc	0 (Remaining Time (RTJ))	5 RTJ	8	9	14	23	38	58
P1	25*	20	20	20	20			
P2	Not Arrived (NA)	18*	15	15	15			
P3	NA	NA	10*	9	9*			
P4	NA	NA	NA	5*	Exited (E)			

Shortest Job Remaining Time (1/4)

- Four processes with (CPU-Burst, Arrival-times) as: P1(25,0), P2(18,5), P3(10,8), P4(5,9)

SOLUTION

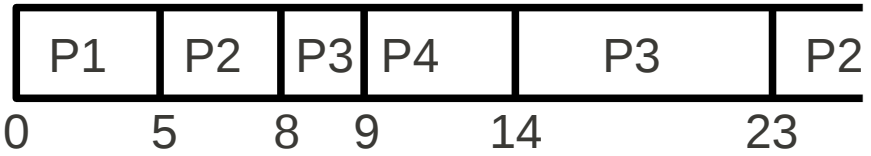


Time / Proc	0 (Remaining Time (RTJ))	5 RTJ	8	9	14	23	38	58
P1	25*	20	20	20	20			
P2	Not Arrived (NA)	18*	15	15	15			
P3	NA	NA	10*	9	9*			
P4	NA	NA	NA	5*	Exited (E)			

Shortest Job Remaining Time (1/4)

- Four processes with (CPU-Burst, Arrival-times) as: P1(25,0), P2(18,5), P3(10,8), P4(5,9)

SOLUTION

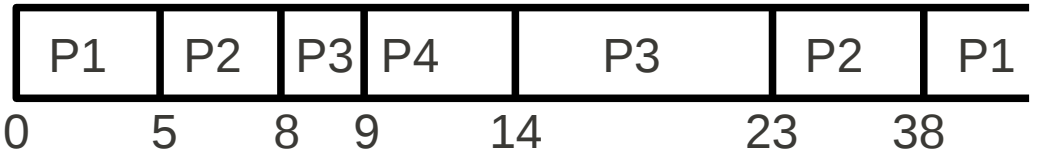


Time / Arr / Proc	0 (Remaining Time (RTJ))	5 RTJ	8	9	14	23	38	58
P1	25*	20	20	20	20	20		
P2	Not Arrived (NA)	18*	15	15	15	15*		
P3	NA	NA	10*	9	9*	E		
P4	NA	NA	NA	5*	Exited (E)			

Shortest Job Remaining Time (1/4)

- Four processes with (CPU-Burst, Arrival-times) as: P1(25,0), P2(18,5), P3(10,8), P4(5,9)

SOLUTION

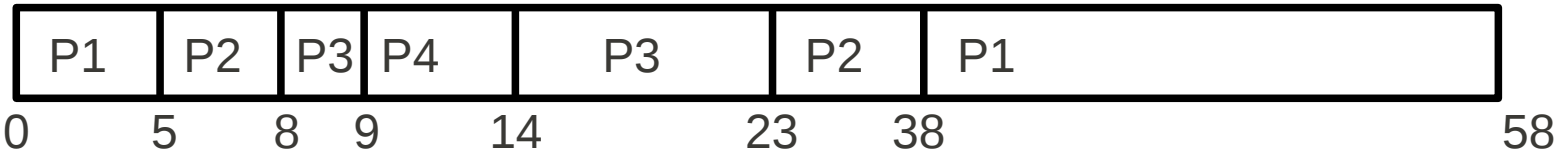


Time / Arr / Proc	0 (Remaining Time (RTJ))	5 RTJ	8	9	14	23	38	58
P1	25*	20	20	20	20	20	20*	
P2	Not Arrived (NA)	18*	15	15	15	15*	E	
P3	NA	NA	10*	9	9*	E		
P4	NA	NA	NA	5*	Exited (E)			

Shortest Job Remaining Time (1/4)

- Four processes with (CPU-Burst, Arrival-times) as: P1(25,0), P2(18,5), P3(10,8), P4(5,9)

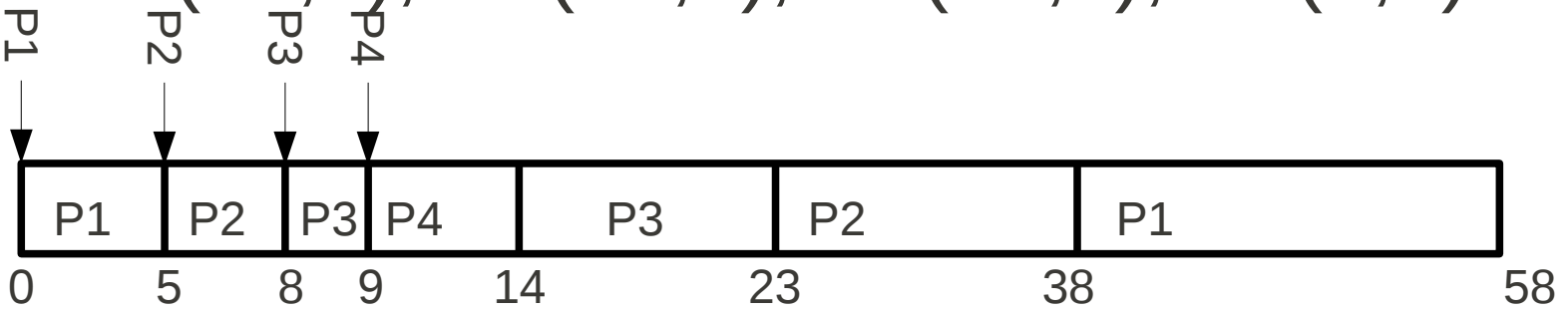
SOLUTION



Time / Arr / Proc	0 (Remaining Time (RTJ))	5 RTJ	8	9	14	23	38	58
P1	25*	20	20	20	20	20	20*	E
P2	Not Arrived (NA)	18*	15	15	15	15*	E	
P3	NA	NA	10*	9	9*	E		
P4	NA	NA	NA	5*	Exited (E)			

Shortest Job Remaining Time (2/4)

- Four processes with (CPU-Burst, Arrival-times) as: P1(25,0), P2(18,5), P3(10,8), P4(5,9)



Ignoring CST:
WT_P1 = 38 - 5 = 32
WT_P2 = 23 - 3 = 20
WT_P3 = 14 - 1 = 13
WT_P4 = 9

Avg-WT = (32 + 20 + 13+ 9) / 4
= 74/4 = 18.5 time-units

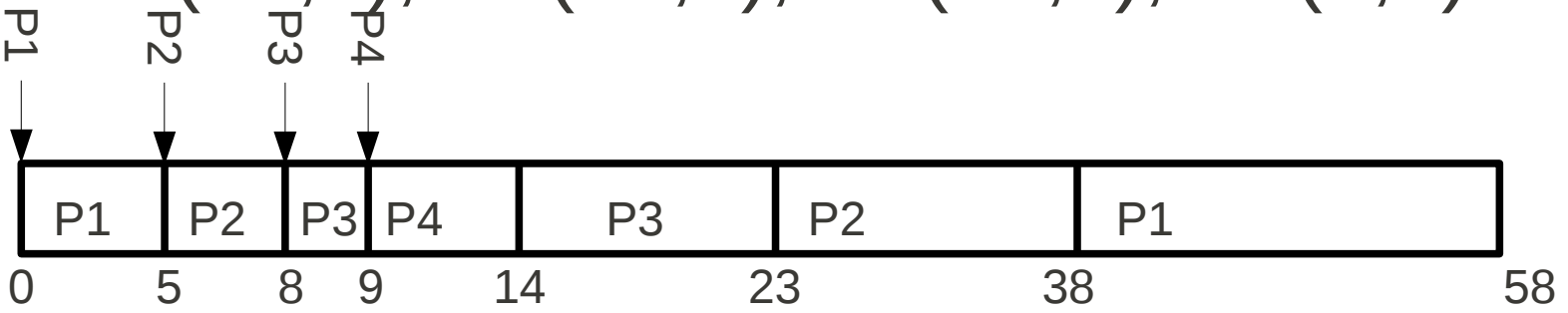
Considering CST:
Say 1 CST takes 1 time unit
WT_P1 = 32 + 6 CST = 38

WT_P2 = 20 + 5 CST = 25
WT_P3 = 13 + 4 CST = 17
WT_P4 = 9 + 3 CST = 12

Avg-WT = (38 + 25 + 17+ 12) / 4
= 92/4 = 23 time-units

Shortest Job Remaining Time (3/4)

- Four processes with (CPU-Burst, Arrival-times) as: P1(25,0), P2(18,5), P3(10,8), P4(5,9)



Ignoring CST:
TAT_P1 = 58
TAT_P2 = 38
TAT_P3 = 23
TAT_P4 = 14

Avg-TAT = (58 + 38 + 23+ 14) / 4
= 133/4 = 33.25 time-units

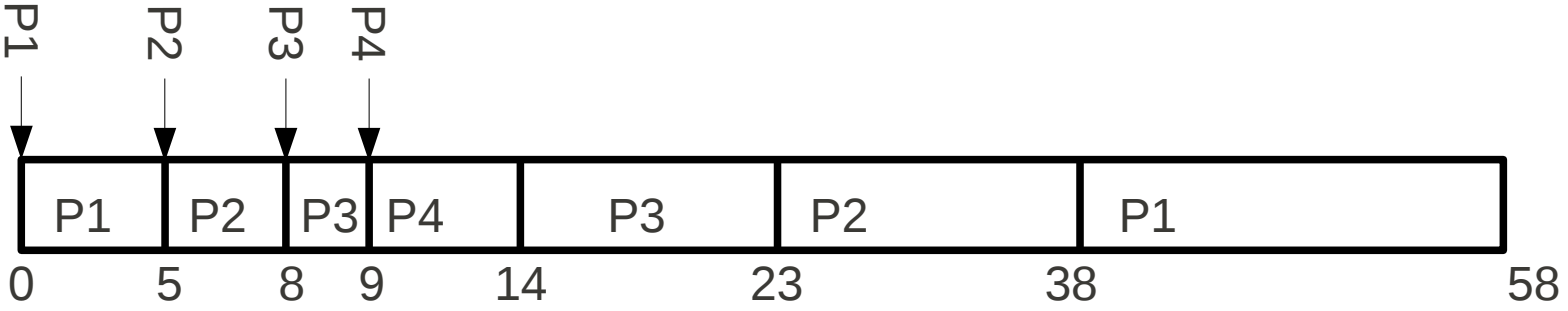
Considering CST:

TAT_P1 = 58 + 6 CST = 64
TAT_P2 = 38 + 5 CST = 43
TAT_P3 = 23 + 4 CST = 27
TAT_P4 = 14 + 3 CST = 17

Avg-TAT = (64 + 43 + 27 + 17) / 4
= 151/4 = 37.75 time-units

Shortest Job Remaining Time (4/4)

- Four processes with (CPU-Burst, Arrival-times) as: P1(25,0), P2(18,5), P3(10,8), P4(5,9)



Ignoring CST:
CPU-Utilisation = 58 / 58 * 100
= 100 %

Throughput = 4 / 58

Considering CST:
CPU-Utilisation= 58 / (58 + 6CST)
= 58/64
= 90.625 %

Throughput = 4 / 64
processes per unit time