# Process / CPU Scheduling Policies

# Example 1

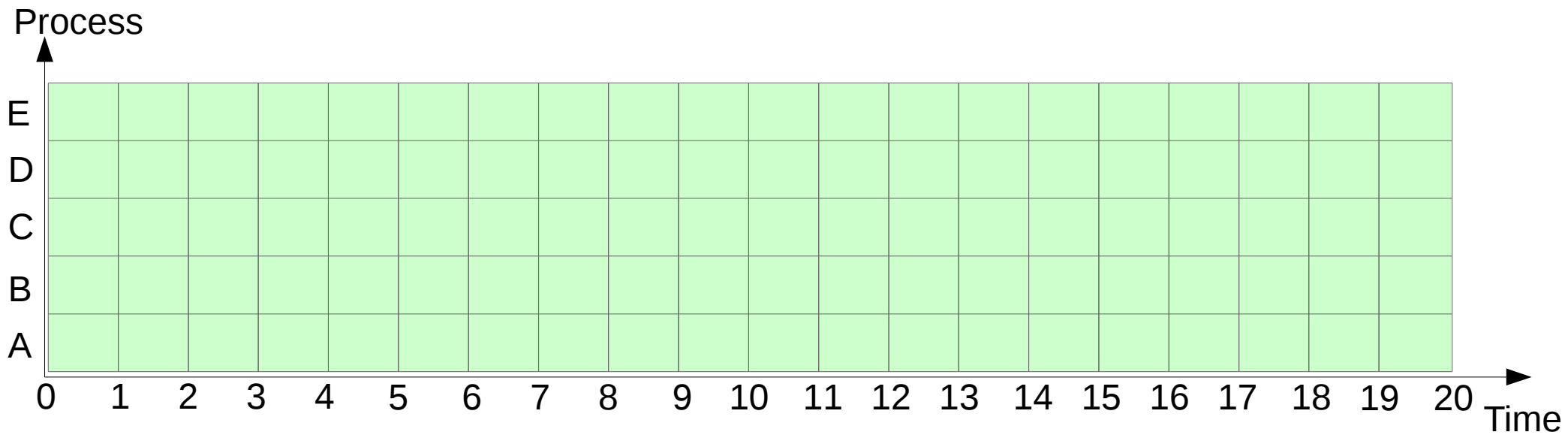
The following table gives details of processes.

| Process | AT | ST |
|---|---|---|
| A | 0 | 2 |
| B | 2 | 7 |
| C | 3 | 4 |
| D | 5 | 5 |
| E | 7 | 2 |

Total No. Of processes = 5

| Policy: FCFS | | | | | | |
|---|---|---|---|---|---|---|
| **Process** | **A** | **B** | **C** | **D** | **E** | **Average** |
| **FT** | | | | | | |
| **WT** | | | | | | (WT(a)+WT(b)+WT(c)+WT(d)+WT(e)) / Total number of processes |
| **TAT** | | | | | | (TAT(a)+TAT(b)+TAT(c)+TAT(d) + TAT(e)) / Total number of processes |
| **Schedule** | | | | | | |

Gantt / Time scale diagram



# Example 2

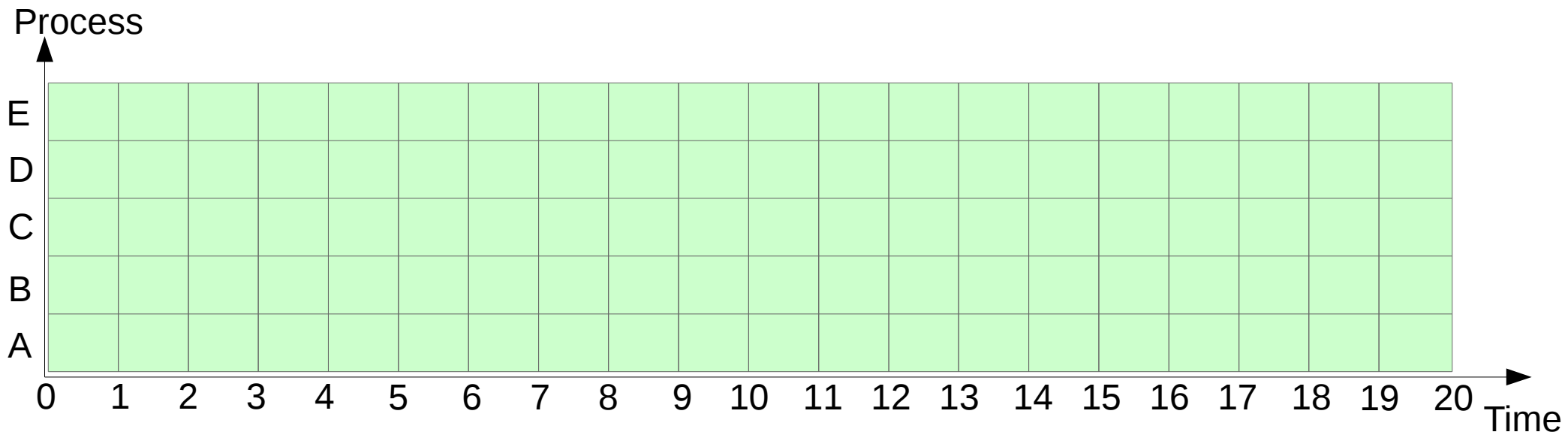
The following table gives details of processes.

| Process | AT | ST |
|---|---|---|
| A | 0 | 2 |
| B | 2 | 5 |
| C | 5 | 6 |
| D | 7 | 3 |
| E | 9 | 4 |

Total No. Of processes = 5

| **Policy: SJF / SPN / STF / STN / SPF** | | | | | | |
|---|---|---|---|---|---|---|
| **Process** | **A** | **B** | **C** | **D** | **E** | **Average** |
| **FT** | | | | | | |
| **WT** | | | | | | (WT(a)+WT(b)+WT(c)+WT(d)+WT(e)) / Total number of processes |
| **TAT** | | | | | | (TAT(a)+TAT(b)+TAT(c)+TAT(d) + TAT(e)) / Total number of processes |
| **Schedule** | | | | | | |

Gantt / Time scale diagram



# Example 3

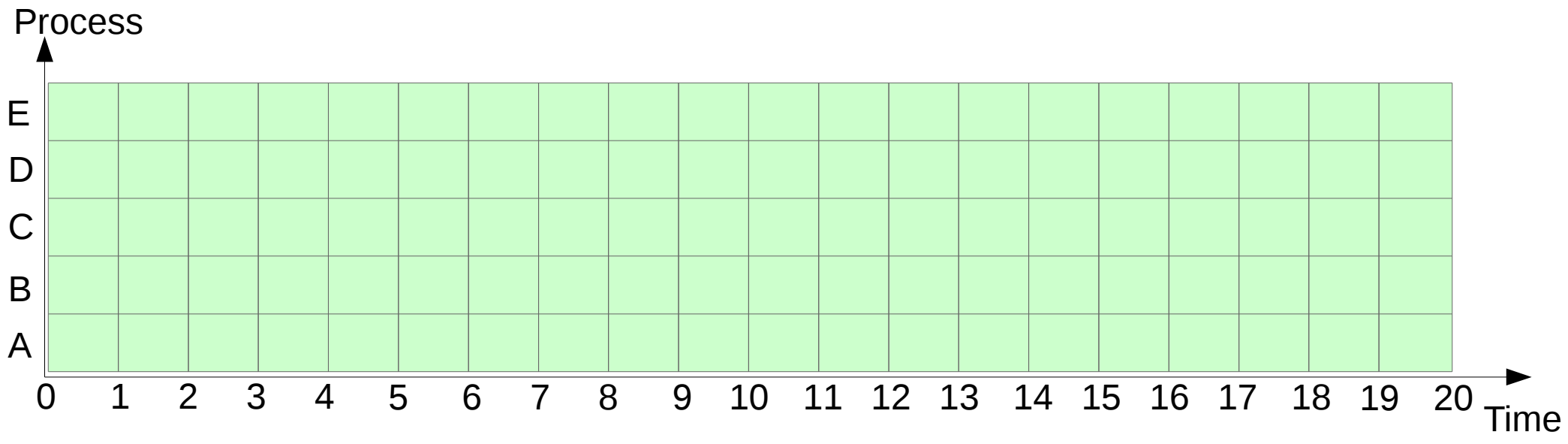
The following table gives details of processes.

| Process | AT | ST | Pr. |
|---|---|---|---|
| A | 0 | 3 | 2 |
| B | 0 | 6 | 3 |
| C | 0 | 4 | 5 |
| D | 0 | 5 | 4 |
| E | 0 | 2 | 1 |

Total No. Of processes = 5

| **Policy: Priority** | | | | | | |
|---|---|---|---|---|---|---|
| **Process** | **A** | **B** | **C** | **D** | **E** | **Average** |
| **FT** | | | | | | |
| **WT** | | | | | | (WT(a)+WT(b)+WT(c)+WT(d)+WT(e)) / Total number of processes |
| **TAT** | | | | | | (TAT(a)+TAT(b)+TAT(c)+TAT(d) + TAT(e)) / Total number of processes |
| **Schedule** | | | | | | |

Gantt / Time scale diagram



# Example 4

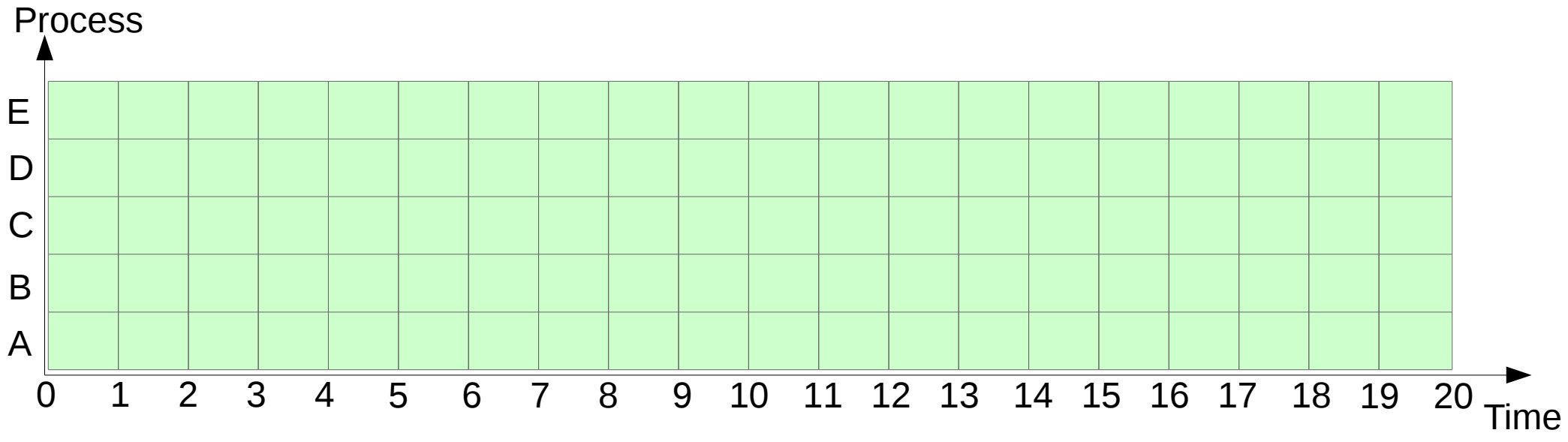
The following table gives details of processes.

| Process | AT | ST | Pr. |
|---|---|---|---|
| A | 0 | 3 | 2 |
| B | 1 | 6 | 4 |
| C | 2 | 4 | 3 |
| D | 3 | 5 | 1 |
| E | 4 | 2 | 1 |

Total No. Of processes = 5

| **Policy: Priority** | | | | | | |
|---|---|---|---|---|---|---|
| **Process** | **A** | **B** | **C** | **D** | **E** | **Average** |
| **FT** | | | | | | |
| **WT** | | | | | | (WT(a)+WT(b)+WT(c)+WT(d)+WT(e)) / Total number of processes |
| **TAT** | | | | | | (TAT(a)+TAT(b)+TAT(c)+TAT(d) + TAT(e)) / Total number of processes |
| **Schedule** | | | | | | |

Gantt / Time scale diagram



# Example 5

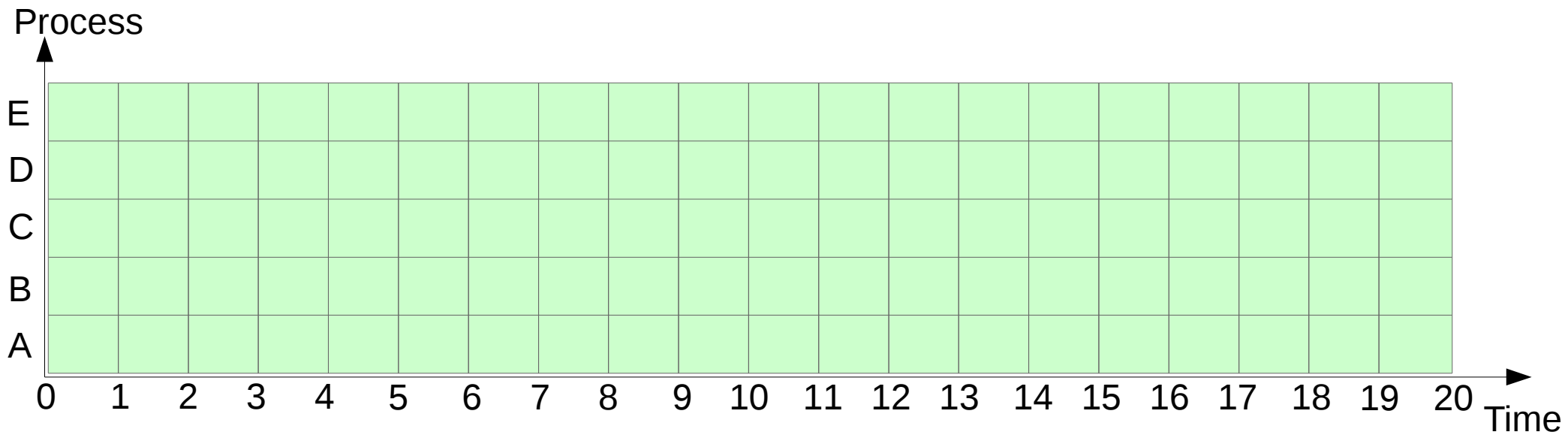
The following table gives details of processes.

| Process | AT | ST |
|---|---|---|
| A | 0 | 2 |
| B | 0 | 4 |
| C | 2 | 4 |
| D | 6 | 5 |
| E | 9 | 5 |

| Policy: Highest Response Ratio Next | | | | | | |
|---|---|---|---|---|---|---|
| **Process** | **A** | **B** | **C** | **D** | **E** | **Average** |
| **FT** | | | | | | |
| **WT** | | | | | | (WT(a)+WT(b)+WT(c)+WT(d)+WT(e)) / Total number of processes |
| **TAT** | | | | | | (TAT(a)+TAT(b)+TAT(c)+TAT(d) + TAT(e)) / Total number of processes |
| **Schedule** | | | | | | |

Total No. Of processes = 5

Gantt / Time scale diagram



# Example 5.1

The following table gives details of processes.

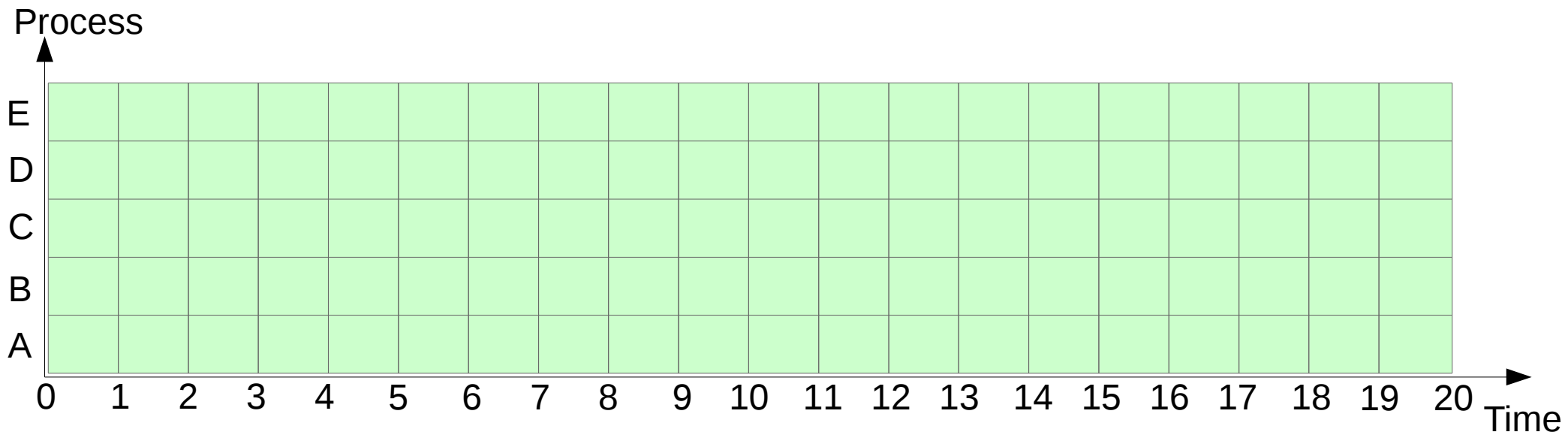
| Process | AT | ST |
|---|---|---|
| A | 0 | 2 |
| B | 0 | 4 |
| C | 2 | 4 |
| D | 6 | 5 |
| E | 9 | 5 |

Total No. Of processes = 5

| **Policy: Highest Response Ratio Next** | | | | | | |
|---|---|---|---|---|---|---|
| **Process** | **A** | **B** | **C** | **D** | **E** | **Average** |
| **FT** | | | | | | |
| **WT** | | | | | | (WT(a)+WT(b)+WT(c)+WT(d)+WT(e)) / Total number of processes |
| **TAT** | | | | | | (TAT(a)+TAT(b)+TAT(c)+TAT(d) + TAT(e)) / Total number of processes |
| **Schedule** | | | | | | |

Consider context switching time of 1 unit.

Gantt / Time scale diagram



# Example 6

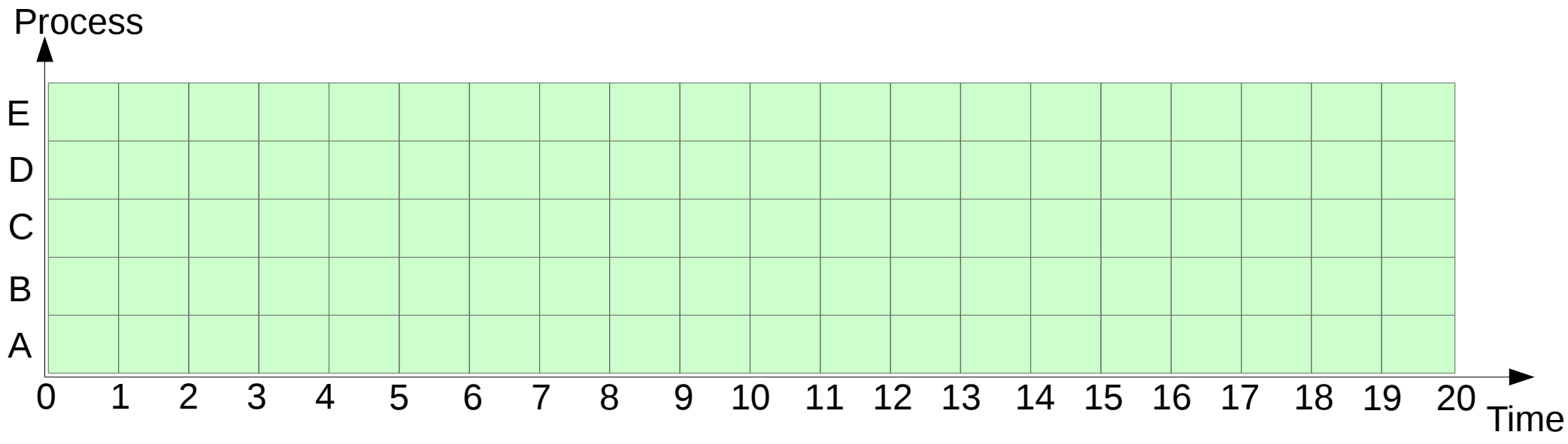
The following table gives details of processes.

| Process | AT | ST | Pr. |
|---|---|---|---|
| A | 0 | 2 | 2 |
| B | 0 | 5 | 1 |
| C | 5 | 6 | 3 |
| D | 7 | 3 | 4 |
| E | 9 | 4 | 4 |

Total No. Of processes = 5

| **Policy: Highest Response Ratio Next** | | | | | | |
|---|---|---|---|---|---|---|
| **Process** | **A** | **B** | **C** | **D** | **E** | **Average** |
| **FT** | | | | | | |
| **WT** | | | | | | (WT(a)+WT(b)+WT(c)+WT(d)+WT(e)) / Total number of processes |
| **TAT** | | | | | | (TAT(a)+TAT(b)+TAT(c)+TAT(d) + TAT(e)) / Total number of processes |
| **Schedule** | | | | | | |

Gantt / Time scale diagram



# Example 7

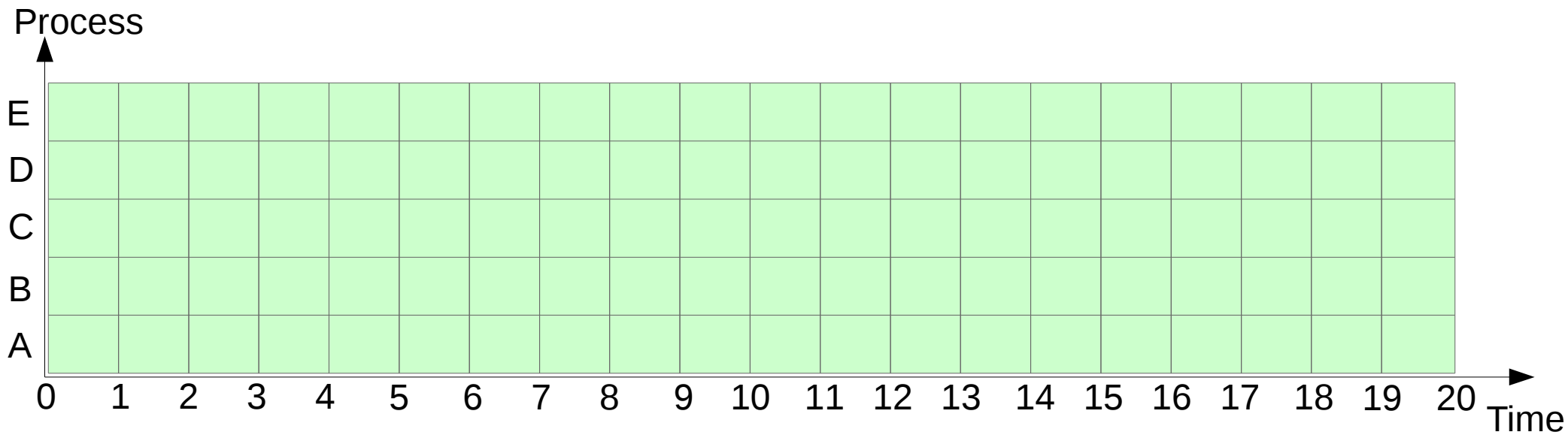
The following table gives details of processes.

| Process | AT | ST |
|---|---|---|
| A | 0 | 3 |
| B | 2 | 6 |
| C | 4 | 4 |
| D | 6 | 5 |
| E | 8 | 2 |

Total No. Of processes = 5

| **Policy: Round-Robin (RR) time quantum (q = 2)** | | | | | | |
|---|---|---|---|---|---|---|
| **Process** | **A** | **B** | **C** | **D** | **E** | **Average** |
| **FT** | | | | | | |
| **WT** | | | | | | (WT(a)+WT(b)+WT(c)+WT(d)+WT(e)) / Total number of processes |
| **TAT** | | | | | | (TAT(a)+TAT(b)+TAT(c)+TAT(d) + TAT(e)) / Total number of processes |
| **Schedule** | | | | | | |

Gantt / Time scale diagram



# Example 8

RR->AT->Pr

The following table gives details of processes.

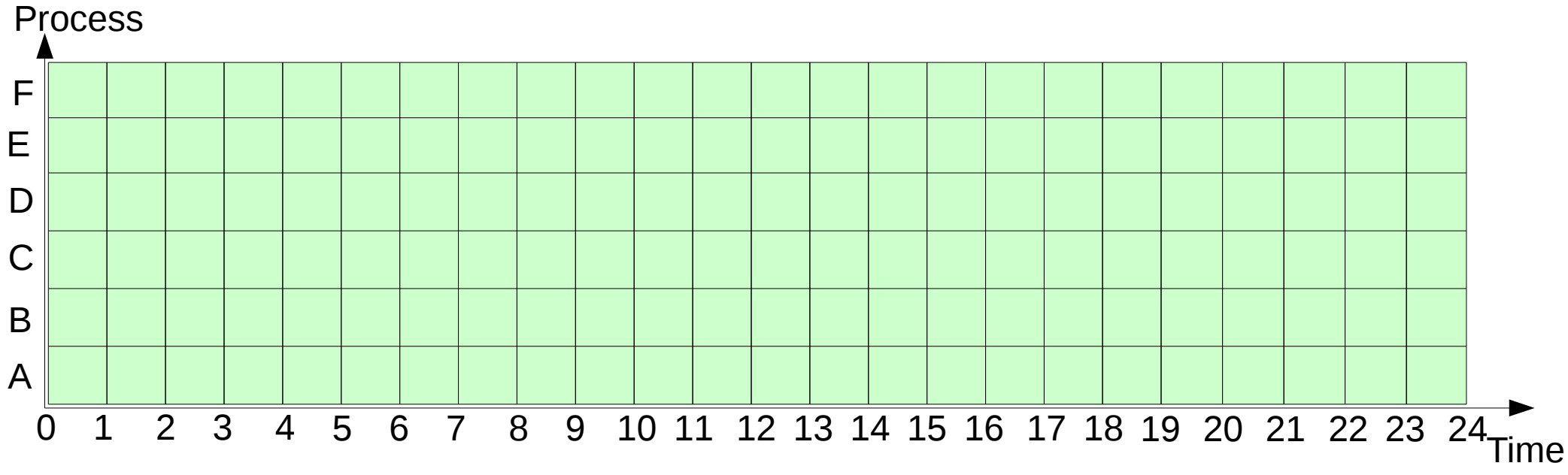
| Process | AT | ST |
|---|---|---|
| A | 0 | 3 |
| B | 1 | 5 |
| C | 3 | 2 |
| D | 9 | 5 |
| E | 9 | 5 |
| F | 10 | 4 |

| **Policy: Highest Response Ratio Next (q = 3)** | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Process** | **A** | **B** | **C** | **D** | **E** | **F** | **Average** |
| **FT** | | | | | | | |
| **WT** | | | | | | | (WT(a)+WT(b)+WT(c)+WT(d)+WT(e)) / Total number of processes |
| **TAT** | | | | | | | (TAT(a)+TAT(b)+TAT(c)+TAT(d) + TAT(e)) / Total number of processes |
| **Schedule** | | | | | | | |

Total No. Of processes = 6

Given: Pr(D)=2, Pr(E)=1

Gantt / Time scale diagram



# Example 9

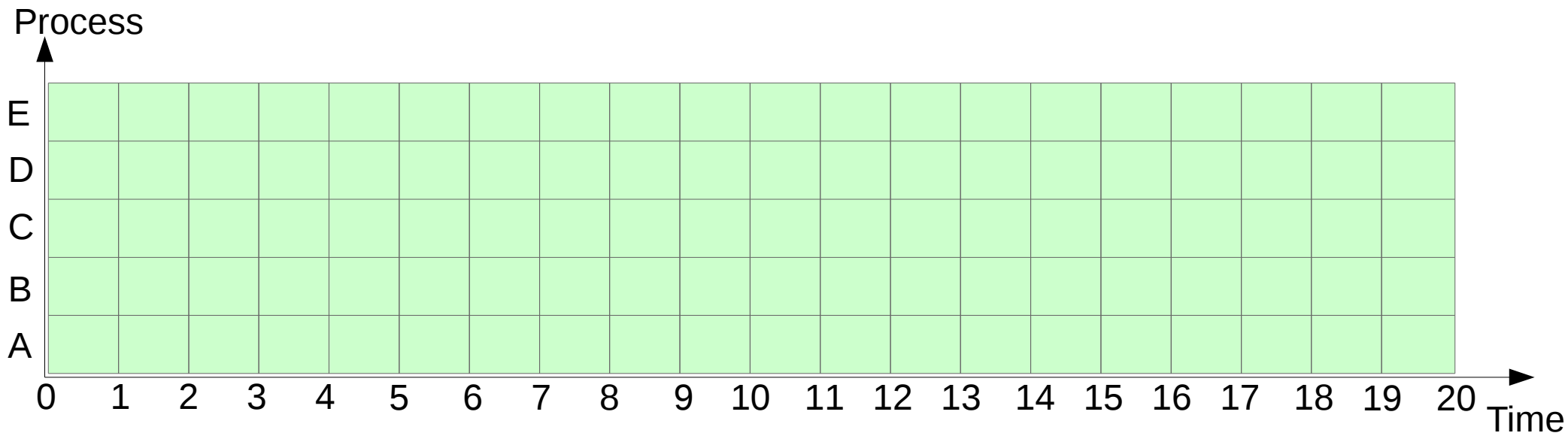
The following table gives details of processes.

| Process | AT | ST |
|---|---|---|
| A | 0 | 3 |
| B | 1 | 6 |
| C | 2 | 4 |
| D | 3 | 5 |
| E | 4 | 2 |

Total No. Of processes = 5

| **Policy: Shortest Remaining Time Next (SRTN)** | | | | | | |
|---|---|---|---|---|---|---|
| **Process** | **A** | **B** | **C** | **D** | **E** | **Average** |
| **FT** | | | | | | |
| **WT** | | | | | | (WT(a)+WT(b)+WT(c)+WT(d)+WT(e)) / Total number of processes |
| **TAT** | | | | | | (TAT(a)+TAT(b)+TAT(c)+TAT(d) + TAT(e)) / Total number of processes |
| **Schedule** | | | | | | |

Gantt / Time scale diagram



# Example 10

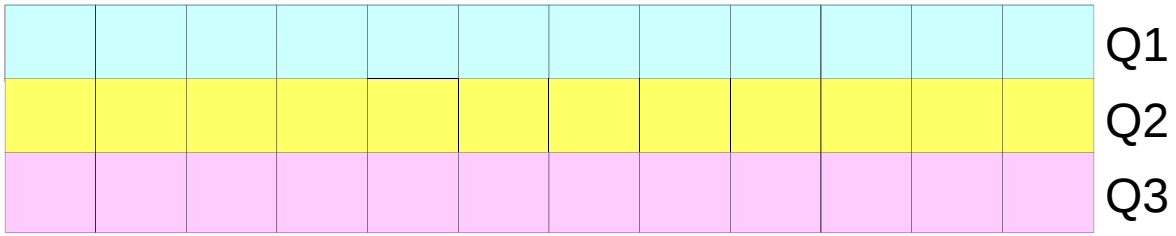
The following table gives details of processes.

| Process | AT | ST |
|---|---|---|
| A | 0 | 3 |
| B | 2 | 6 |
| C | 4 | 4 |
| D | 6 | 5 |
| E | 8 | 2 |

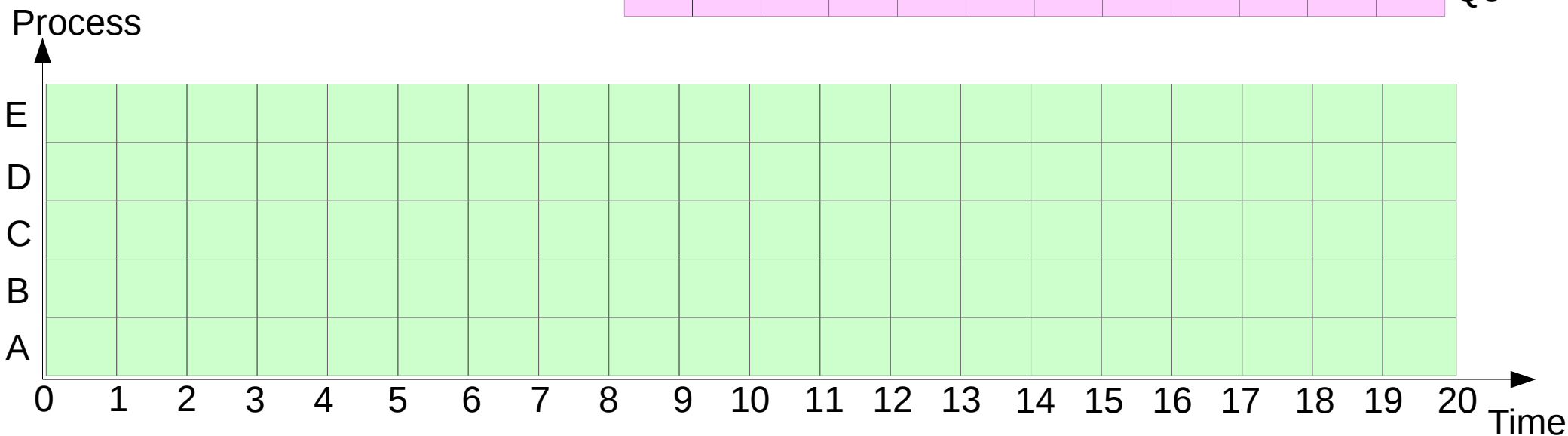
Total No. Of processes = 5

Using MLQ (3 Qs, RR(t=1,2,3)) CPU scheduling policy, Q-assignment (Q1:ST<=2, Q2:2<ST<=5, Q3>=6)

| Policy: Multi-Level Queue (MLQ) | | | | | | |
|---|---|---|---|---|---|---|
| **Process** | **A** | **B** | **C** | **D** | **E** | **Average** |
| **FT** | | | | | | |
| **WT** | | | | | | (WT(a)+WT(b)+WT(c)+WT(d)+WT(e)) / Total number of processes |
| **TAT** | | | | | | (TAT(a)+TAT(b)+TAT(c)+TAT(d) + TAT(e)) / Total number of processes |
| **Schedule** | | | | | | |




Gantt / Time scale diagram



# Example 11

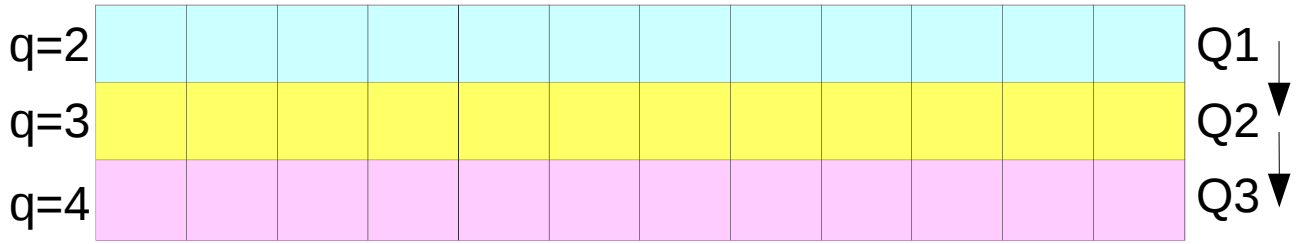
Using MLFQ (3 Qs, RR(t=2,3,4)) CPU scheduling policy

The following table gives details of processes.

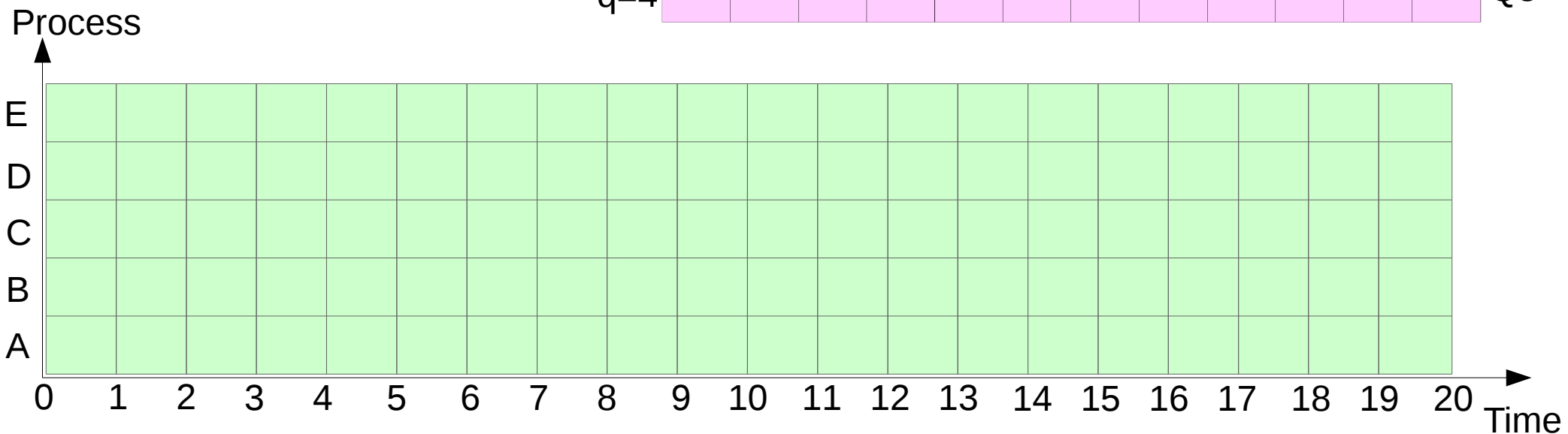
| Process | AT | ST |
|---|---|---|
| A | 0 | 3 |
| B | 2 | 6 |
| C | 4 | 4 |
| D | 6 | 5 |
| E | 8 | 2 |

Total No. Of processes = 5

| Policy: Multi-Level Feedback Queue (MLFQ) | | | | | | |
|---|---|---|---|---|---|---|
| **Process** | **A** | **B** | **C** | **D** | **E** | **Average** |
| **FT** | | | | | | |
| **WT** | | | | | | (WT(a)+WT(b)+WT(c)+WT(d)+WT(e)) / Total number of processes |
| **TAT** | | | | | | (TAT(a)+TAT(b)+TAT(c)+TAT(d) + TAT(e)) / Total number of processes |
| **Schedule** | | | | | | |




Gantt / Time scale diagram



# Example 12

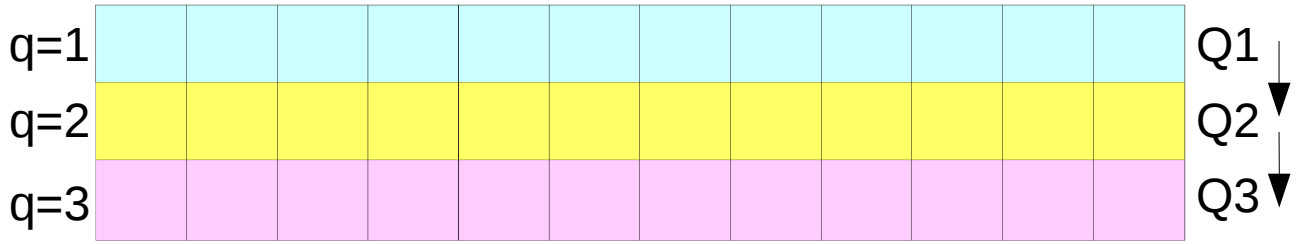
The following table gives details of processes.

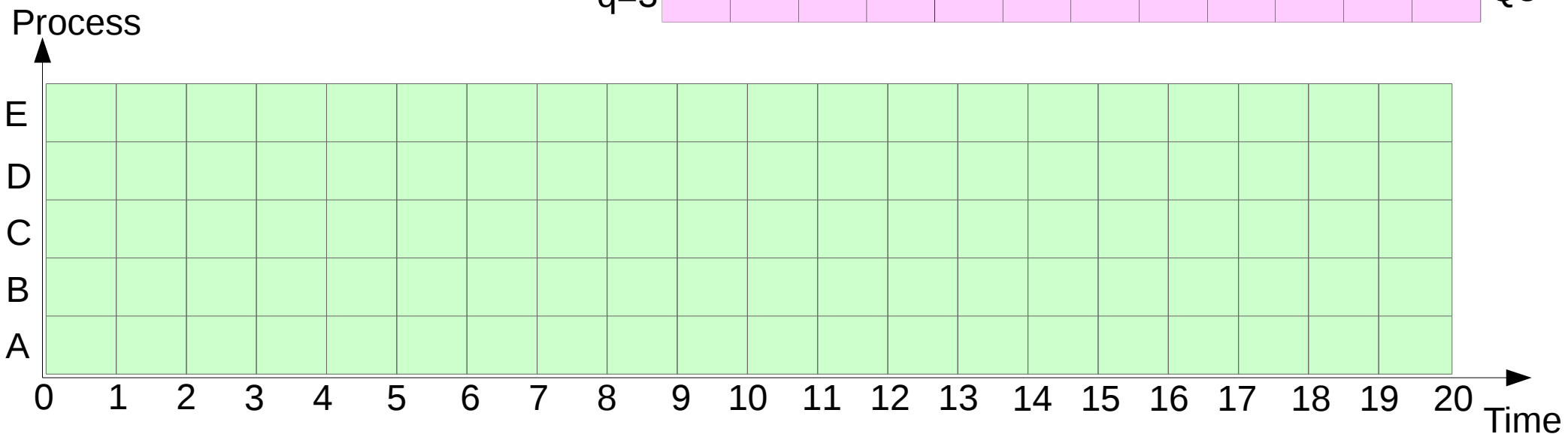
| Process | AT | ST |
|---|---|---|
| A | 0 | 3 |
| B | 2 | 6 |
| C | 4 | 4 |
| D | 6 | 5 |
| E | 8 | 2 |

Total No. Of processes = 5

Using MLFQ (3 Qs, RR(t=1), HRRN(t=2), SJF(t=3)) CPU scheduling policy

| Policy: Multi-Level Feedback Queue (MLFQ) | | | | | | |
|---|---|---|---|---|---|---|
| **Process** | **A** | **B** | **C** | **D** | **E** | **Average** |
| **FT** | | | | | | |
| **WT** | | | | | | (WT(a)+WT(b)+WT(c)+WT(d)+WT(e)) / Total number of processes |
| **TAT** | | | | | | (TAT(a)+TAT(b)+TAT(c)+TAT(d) + TAT(e)) / Total number of processes |
| **Schedule** | | | | | | |




Gantt / Time scale diagram