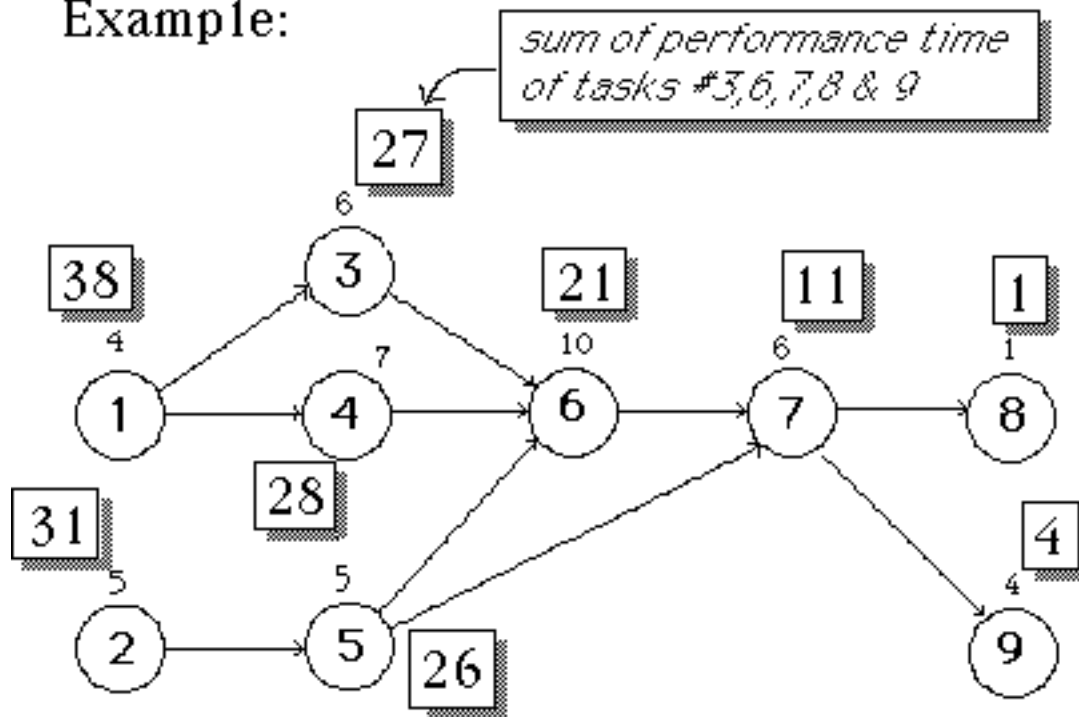


**RPWM****Ranked Positional Weight Method**

The **Positional Weight** of a task is the sum of the performance times of this task and all tasks which must follow it.



### Example:



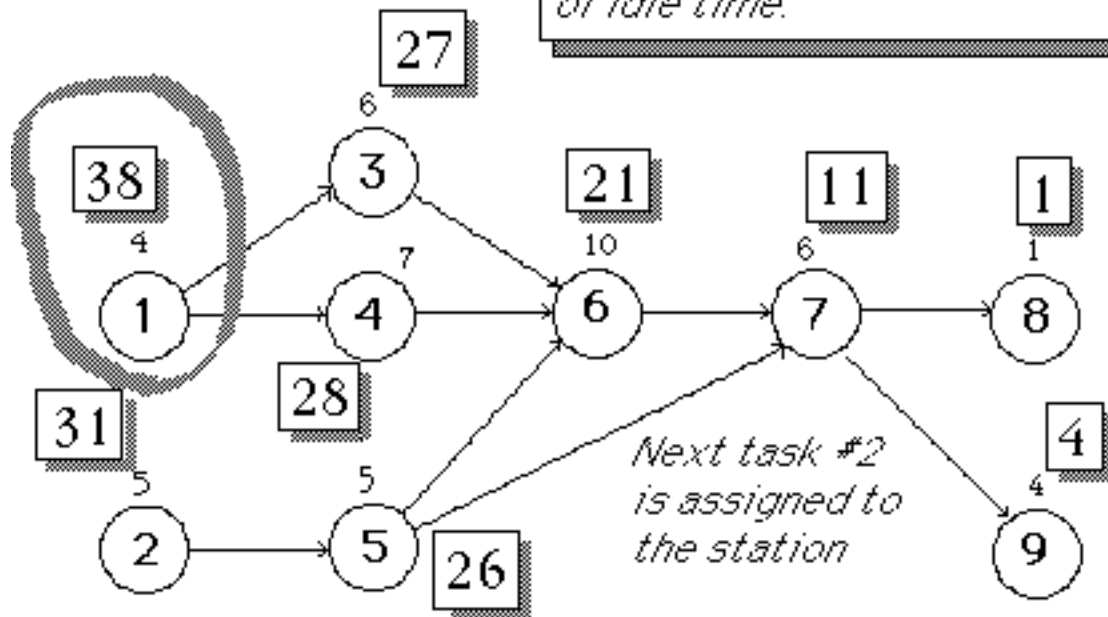
These POSITIONAL WEIGHTS are then sorted into descending order.

At each step, the next task assigned to a station is the task with

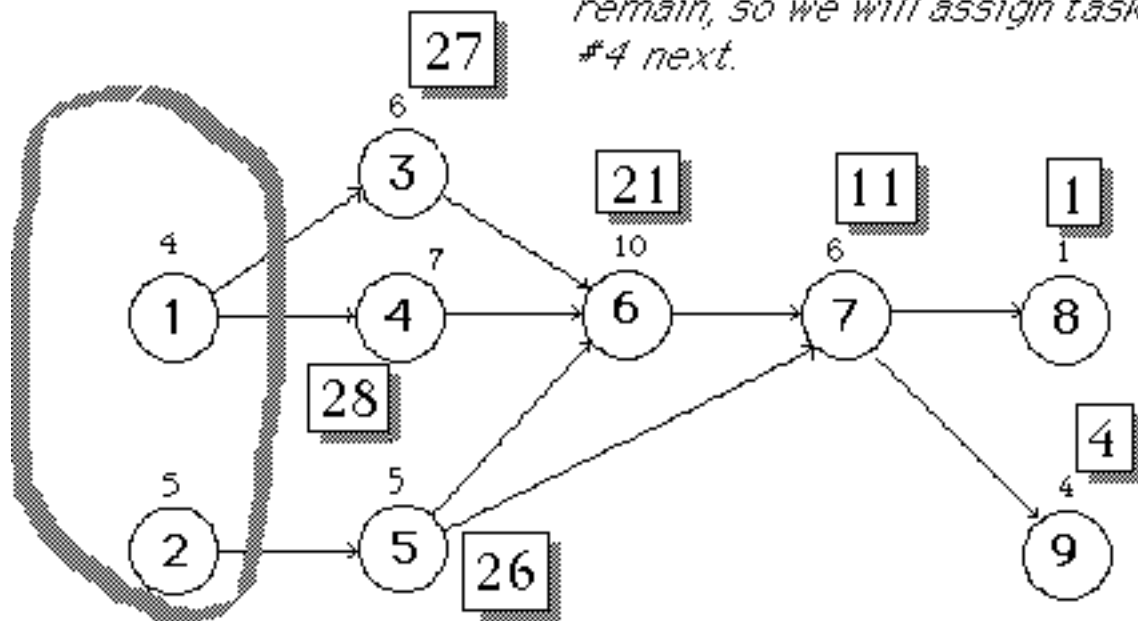
- the highest positional weight
- performance time  $\leq$  idle time remaining at the station
- all predecessors already assigned

Example:  
Cycle time=16

*Task #1 is first assigned to the first station, leaving 12 minutes of idle time.*

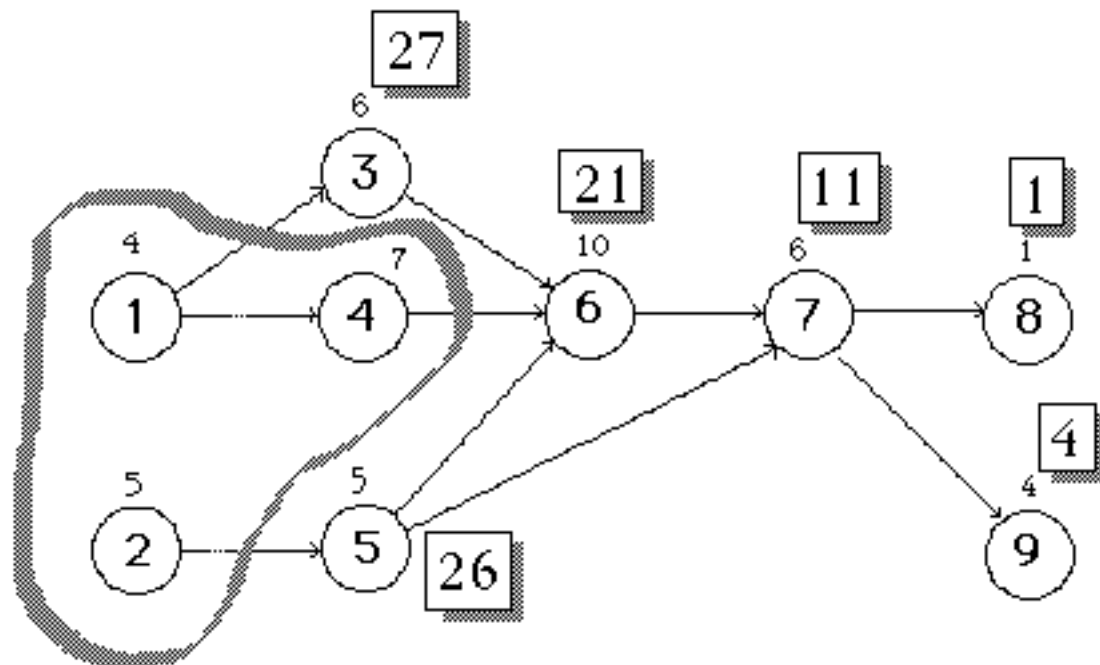


*After assigning task #2 to the station, 7 minutes of idle time remain, so we will assign task #4 next.*

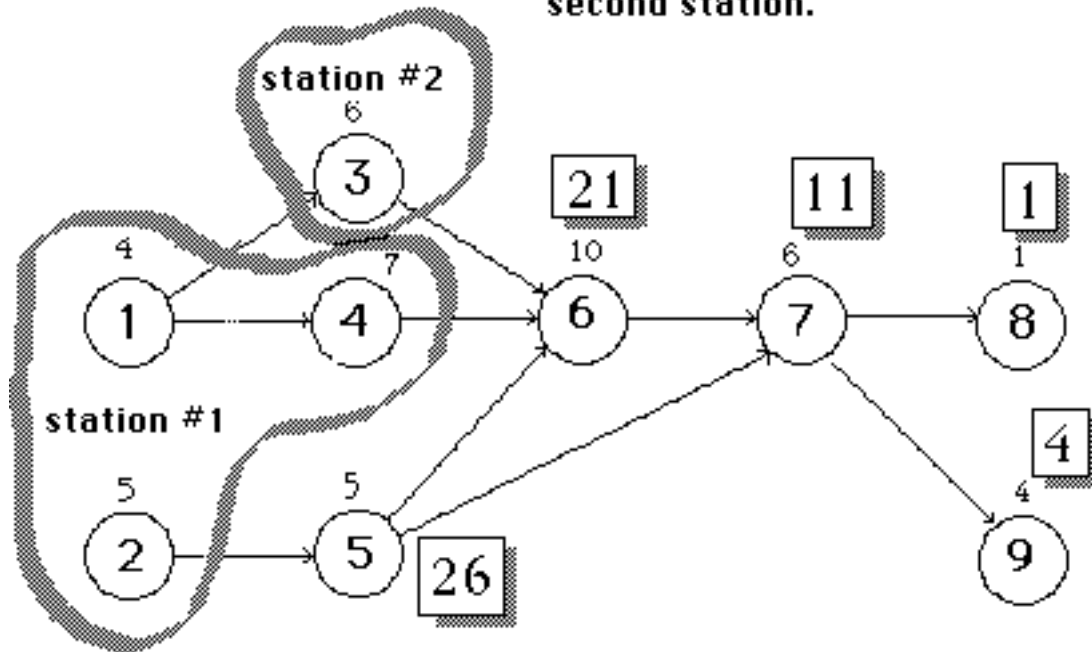


*Idle time at the first station is now zero, so we begin assigning to the second station.*

*Assign task #3 to station 2.*

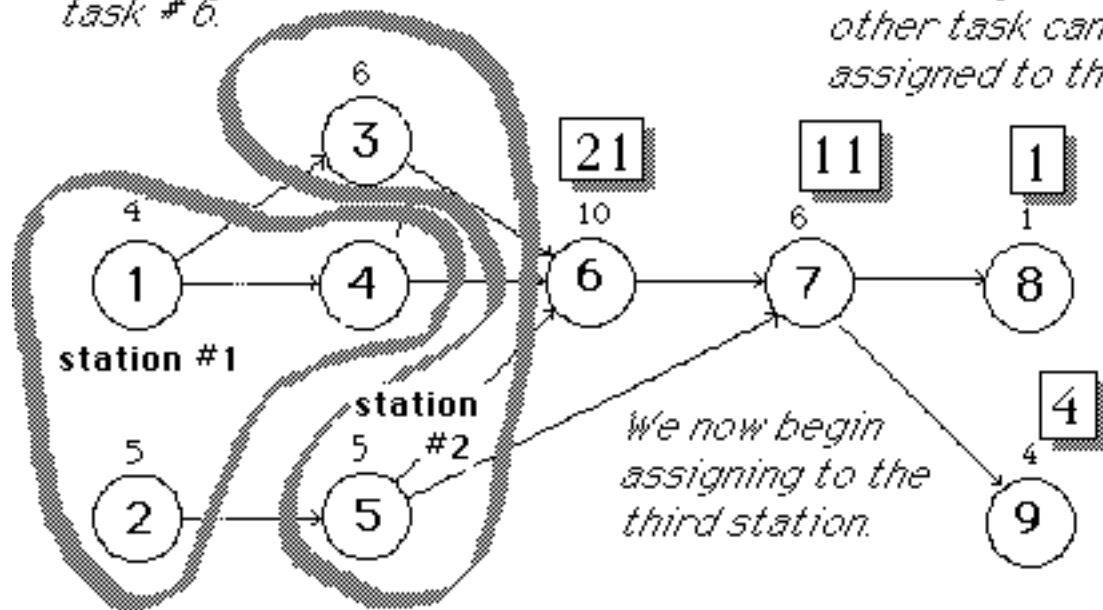


The next highest weighted task is task #5, so we add it to the second station.



*Only 5 minutes of idle time remain at station #2, which is not sufficient to assign task # 6.*

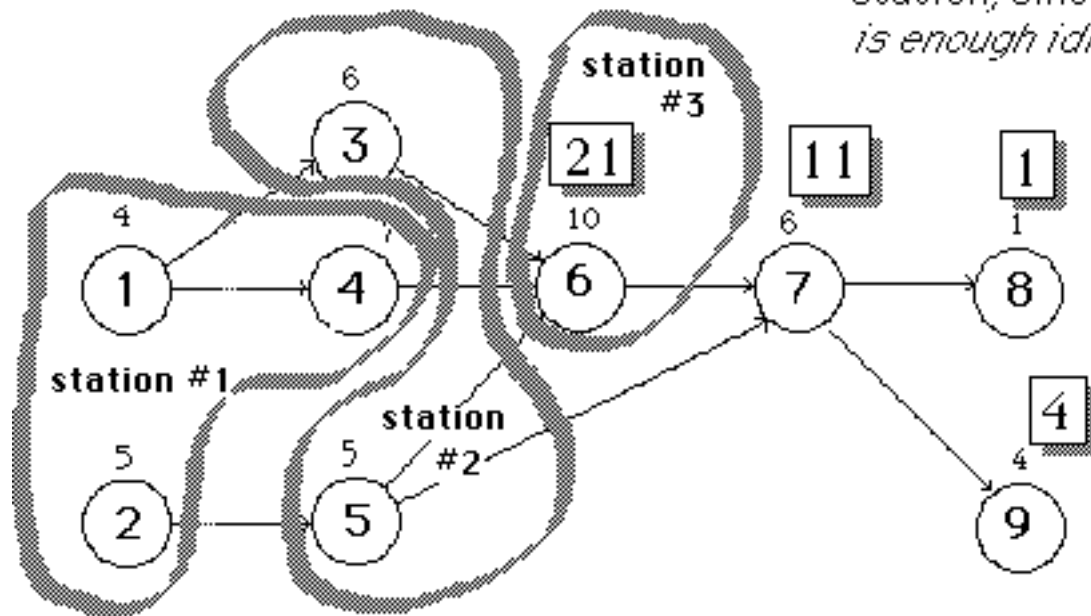
*Because task 6 must precede each of the remaining tasks, no other task can be assigned to this station.*





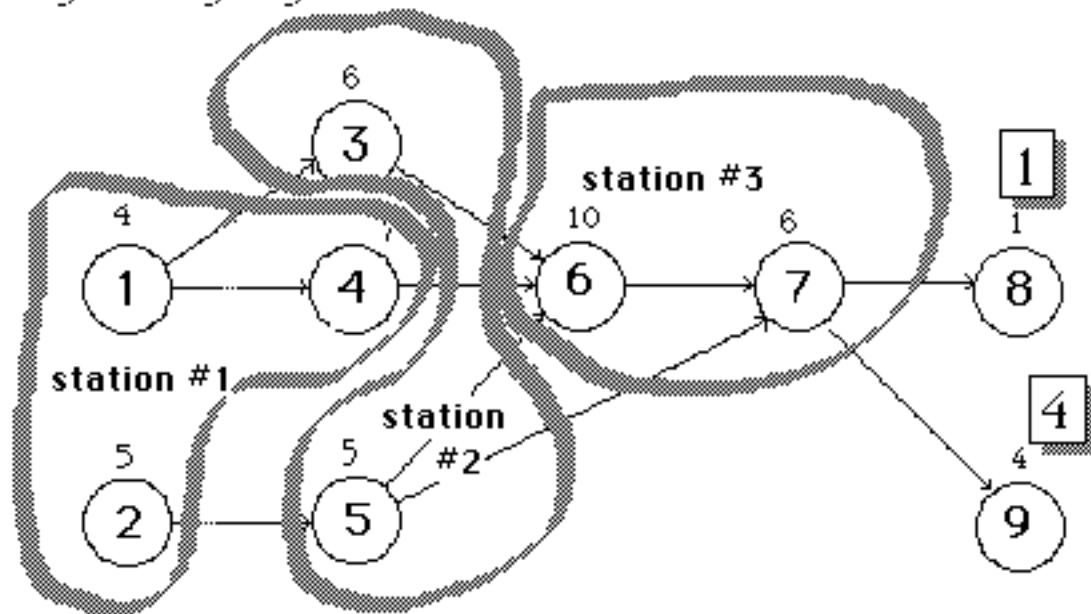
*We assign task #6 to the third station, leaving 6 minutes of idle time.*

*We will next assign task #7 to this station, since there is enough idle time.*

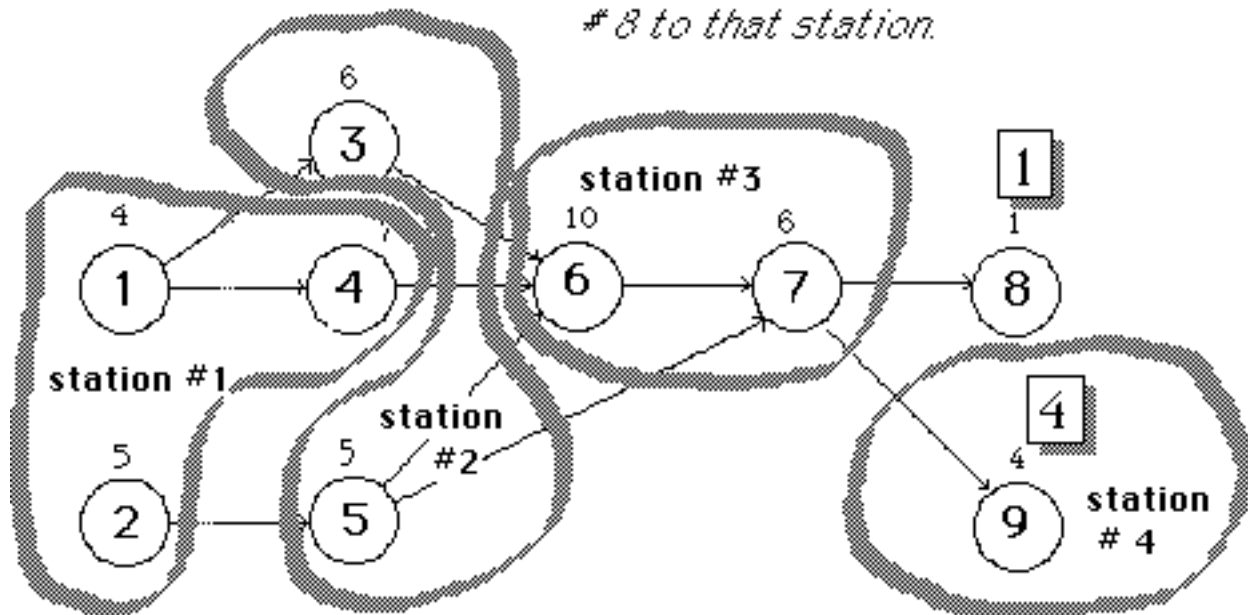


*Since there is zero idle time remaining at station #3, we begin assigning to a new station.*

*We will next assign task #9 to the fourth station.*

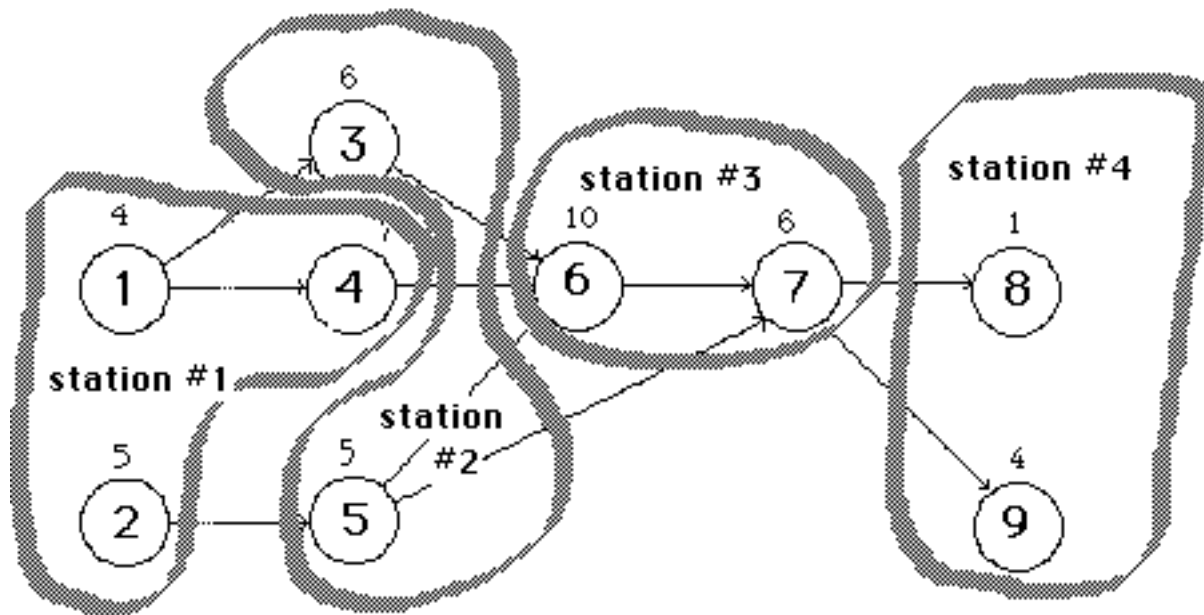


*Idle time remaining at station 4 is 12 minutes, so we will next add task # 8 to that station.*

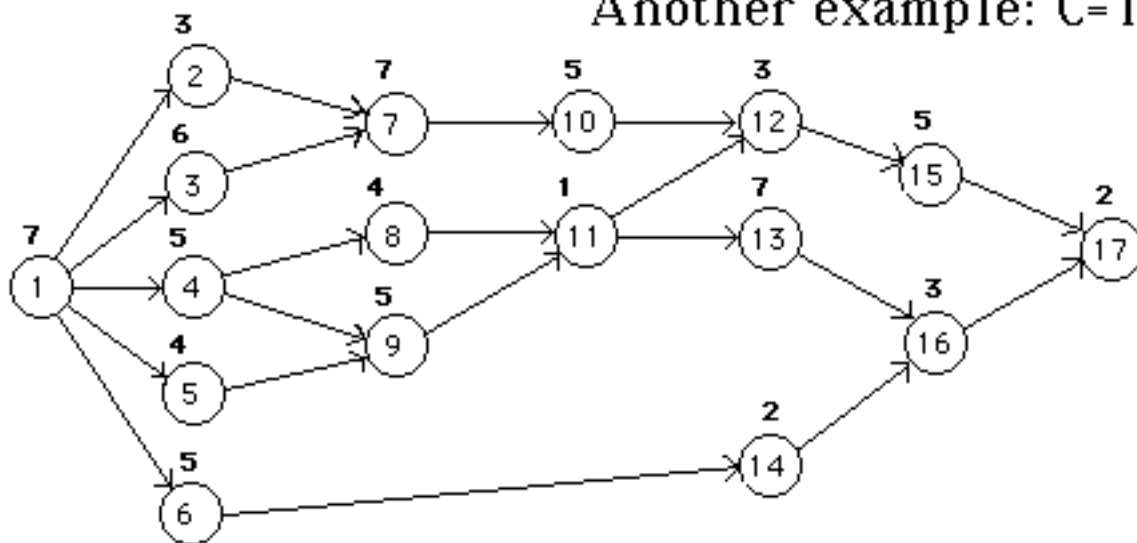


# The final balance:

Idle time = 16, balance delay = 25%



### Another example: C=15



Ranked Positional Weight  
Heuristic Method

Task	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
P	7	3	6	5	4	5	7	4	5	5	1	3	7	2	5	3	2
Weight	74	25	28	35	30	12	22	25	26	15	21	10	12	7	7	5	2
Rank	1	6	4	2	3	11	8	7	5	10	9	13	12	14	15	16	17

### Ranked Positional Weight Heuristic Method

#### Station #1

Add Task 1 to station 1 ← rank is # 1

Time at station 1 is now 7

(Idle time: 8 )

Add Task 4 to station 1 ← rank is # 2

Time at station 1 is now 12

(Idle time: 3 )

Add Task 2 to station 1 ← rank is # 6 (not enough idle time

Time at station 1 is now 15 for tasks ranked # 3, 4, & 5!)

(Idle time: 0 )

No additional tasks may be added to this station.

Task	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
P	7	3	6	5	4	5	7	4	5	5	1	3	7	2	5	3	2
Weight	74	25	28	35	30	12	22	25	26	15	21	10	12	7	7	5	2
Rank	1	6	4	2	3	11	8	7	5	10	9	13	12	14	15	16	17

Station #2

Add Task 5 to station 2 ← rank is #3  
 Time at station 2 is now 4  
 (Idle time: 11 )

Add Task 3 to station 2 ← rank is #4  
 Time at station 2 is now 10  
 (Idle time: 5 )

Add Task 9 to station 2 ← rank is #5  
 Time at station 2 is now 15  
 (Idle time: 0 )

No additional tasks may be added to this station.

Task	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
P	7	3	6	5	4	5	7	4	5	5	1	3	7	2	5	3	2
Weight	74	25	28	35	30	12	22	25	26	15	21	10	12	7	7	5	2
Rank	1	6	4	2	3	11	8	7	5	10	9	13	12	14	15	16	17

Station #3

Add Task 8 to station 3  
 Time at station 3 is now 4  
 (Idle time: 11 )  
 Add Task 7 to station 3  
 Time at station 3 is now 11  
 (Idle time: 4 )  
 Add Task 11 to station 3  
 Time at station 3 is now 12  
 (Idle time: 3 )

ranks are  
 # 7, 8, & 9

Task	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
P	7	3	6	5	4	5	7	4	5	5	1	3	7	2	5	3	2
Weight	74	25	28	35	30	12	22	25	26	15	21	10	12	7	7	5	2
Rank	1	6	4	2	3	11	8	7	5	10	9	13	12	14	15	16	17



Station #4

Add Task 10 to station 4

Time at station 4 is now 5

(Idle time: 10 )

Add Task 6 to station 4

Time at station 4 is now 10

(Idle time: 5 )

Add Task 12 to station 4

Time at station 4 is now 13

(Idle time: 2 )

Add Task 14 to station 4

Time at station 4 is now 15

(Idle time: 0 )

No additional tasks may be added to this station.



rank is #10



rank is #11

task 13 is ranked #12, but  
there is insufficient idle  
time remaining at the station

Task	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
P	7	3	6	5	4	5	7	4	5	5	1	3	7	2	5	3	2
Weight	74	25	28	35	30	12	22	25	26	15	21	10	12	7	7	5	2
Rank	1	6	4	2	3	11	8	7	5	10	9	13	12	14	15	16	17

Station #5

Add Task 13 to station 5

Time at station 5 is now 7

(Idle time: 8 )

Add Task 15 to station 5

Time at station 5 is now 12

(Idle time: 3 )

Add Task 16 to station 5

Time at station 5 is now 15

(Idle time: 0 )

No additional tasks may be added to this station.

Task	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
P	7	3	6	5	4	5	7	4	5	5	1	3	7	2	5	3	2
Weight	74	25	28	35	30	12	22	25	26	15	21	10	12	7	7	5	2
Rank	1	6	4	2	3	11	8	7	5	10	9	13	12	14	15	16	17

Ranked Positional Weight Heuristic Method
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Station #6

Add Task 17 to station 6

Time at station 6 is now 2

(Idle time: 13 )

No additional tasks may be added to this station.

\*\*\* Line is now balanced.

\*\*\*Done\*\*\*

Task	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
P	7	3	6	5	4	5	7	4	5	5	1	3	7	2	5	3	2
Weight	74	25	28	35	30	12	22	25	26	15	21	10	12	7	7	5	2
Rank	1	6	4	2	3	11	8	7	5	10	9	13	12	14	15	16	17

Ranked Positional Weight Heuristic Method
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Solution
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Number of Stations: 6

Station	Idle time	Tasks
1	0	1 2 4
2	0	3 5 9
3	3	7 8 11
4	0	6 10 12 14
5	0	13 15 16
6	13	17

Balance delay: 0.177778

