

Lecture 9

–Scheduling Algorithms for Related Jobs Without Connection Costs

These algorithms are used for scheduling a group of related jobs on an arbitrary number of independent machines, assuming the connection costs among the jobs are equal to zero.

The idea of these algorithms

- The related jobs are represented by a directed acyclic graph model(DAG).
- Each node(job) in the DAG gets a “level,” which tells us how “important” that job.

- **Highest Level First with Estimated Time scheduling algorithm (HLFET)**

How does the HLFET algorithm work?

- Compute the level for each job i , which represents the length of the longest path (in terms of processing time) from the node n_i to the end node.
- Sort jobs so the highest-level ones are processed first.
- Start assigning jobs to the machines as they become free.
- Only schedule a job when all its parents are done (respect dependencies).

Example:

Suppose you have the following jobs:

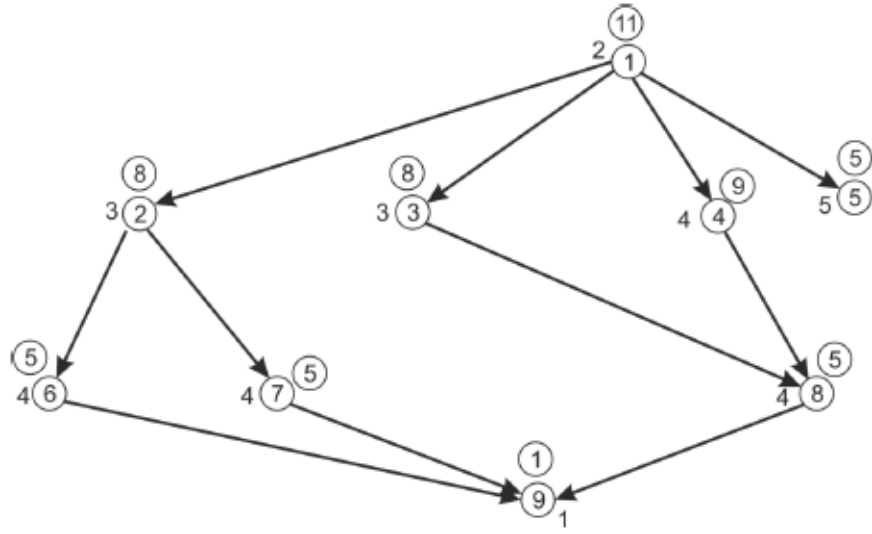
J_i	p_i
J_1	2
J_2	3
J_3	3
J_4	4
J_5	5
J_6	4
J_7	4
J_8	4
J_9	1

The relations among the jobs are defined in the following set:

$$\prec = \{(J_1, J_2), (J_1, J_3), (J_1, J_4), (J_1, J_5), (J_2, J_6), (J_2, J_7), (J_3, J_8), (J_4, J_8), (J_6, J_9), (J_7, J_9), (J_8, J_9)\}$$

Find the optimal scheduling for the problem $9|3||C_{max}$ above using the HLFET algorithm.

Solution:



M_1	J_1	J_4				J_8				idle			J_9		
M_2	idle	J_3			J_5					idle					
M_3	idle	J_2			J_6				J_7			idle			
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14

Thus the completion time will be $C_{\max} = 14$