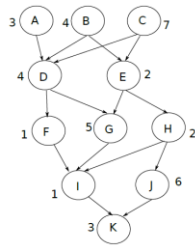


1. Midterm Fall



- a. Question: Using the metrics of this parallel task graph (you computed last activity) and analysis of List Scheduling, provide a lower bound and an upper bound of the time it would take to schedule this graph on 2 processors. Provide the bounds on 3 processors.

Ans. Lower Bound for 2 Processors –

$$\text{TotalWork}/\#\text{Processor} = 38/2 = 19$$

CP - 20

These both are lower bounds, but we consider lower value as inactive. So the lower bound of the graph is 20.

Lower Bound for 3 Processors –

$$\text{TotalWork}/\#\text{Processor} = 38/3 = 12$$

CP - 20

These both are lower bounds, but we consider lower value as inactive. So the lower bound of the graph is 20.

Upper Bound for 2 Processors –

$$\text{CP} + \text{TotalWork}/\#\text{Processor} = 20 + 19 = 39$$

Upper bound of the graph is 39.

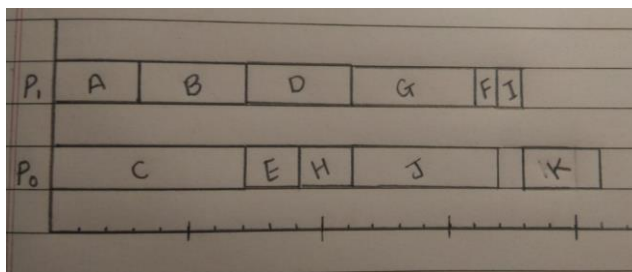
Upper Bound for 3 Processors –

$$\text{CP} + \text{TotalWork}/\#\text{Processor} = 20 + 12 = 32$$

Upper bound of the graph is 32.

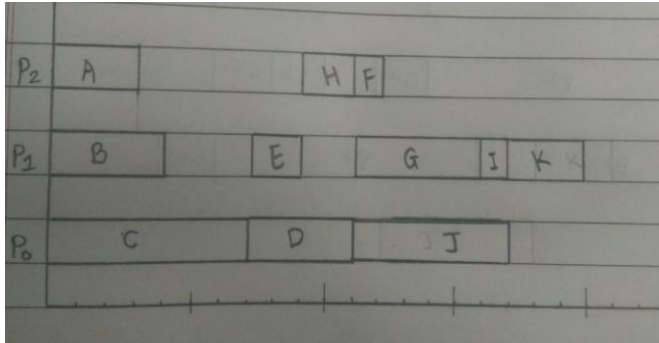
- b. Question: Use List Scheduling to build a schedule of this task graph on 2 processors.

Ans.

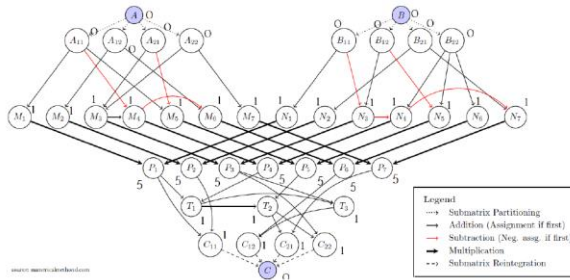


c. Question: Use List Scheduling to build a schedule of this task graph on 3 processors.

Ans.



2. Strassen



a. Using the metrics of this parallel task graph (you computed last activity) and analysis of List Scheduling, provide a lower bound and an upper bound of the time it would take to schedule this graph on 4 processors. Provide the bounds on 6 processors.

Ans. Lower Bound for 4 Processors -

$$\text{TotalWork} / \text{\#Processor} = 56/4 = 14$$

$$\text{CP} = 10$$

These both are lower bounds, but we consider lower value as inactive. So, the lower bound of the graph is 14.

Lower Bound for 6 Processors -

$$\text{TotalWork} / \text{\#Processor} = 56/6 = 9$$

$$\text{CP} = 10$$

These both are lower bounds, but we consider lower value as inactive. So, the lower bound of the graph is 10.

Upper bound for 4 Processors -

$$\text{CP} + \text{TotalWork} / \text{\#Processors} = 10 + 14 = 24$$

So, the upper bound of graph is 24.

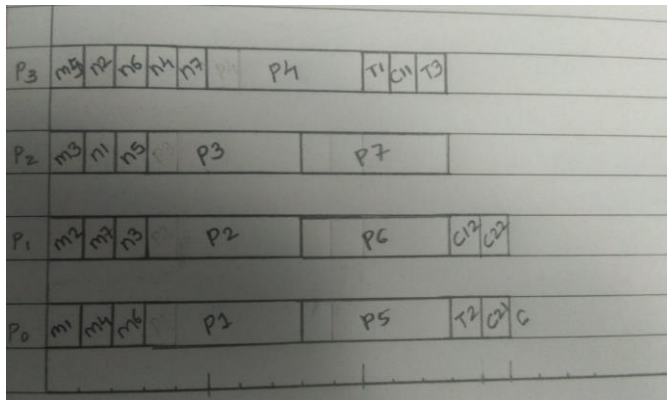
Upper bound for 6 Processors -

$$\text{CP} + \text{TotalWork} / \text{\#Processors} = 10 + 9 = 19$$

So, the upper bound of graph is 19.

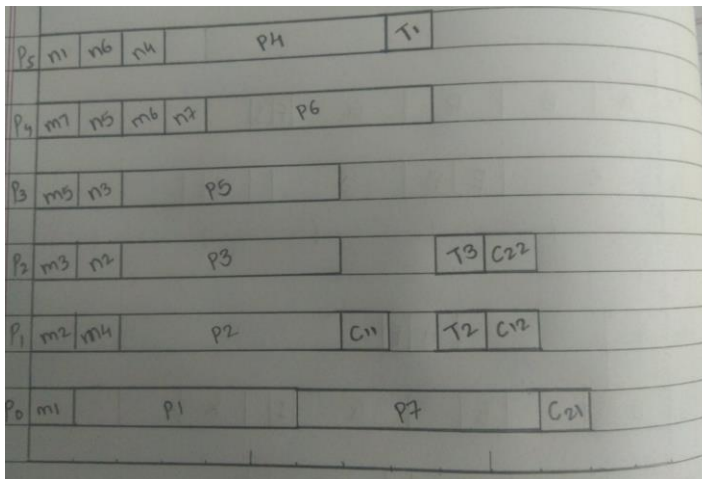
b. Question: Use List Scheduling to build a schedule of this task graph on 4 processors.

Ans.

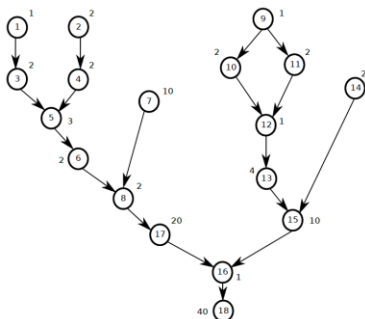


c. Question: Use List Scheduling to build a schedule of this task graph on 6 processors.

Ans.



3. Lemon Pie



a. Question. Using the metrics of this parallel task graph (given in the video lecture) and analysis of List Scheduling, provide a lower bound and an upper bound of the time it would take to schedule this graph on 2 processors. Provide the bounds on 4 processors.

Ans. Lower Bound for 2 Processors -

$$\text{TotalWork} / \text{\#Processor} = 107/2 = 53$$

$$\text{CP} = 73$$

The lower bound of the graph is 73.

Lower Bound for 4 Processors -

$$\text{TotalWork} / \text{\#Processor} = 107/4 = 27$$

$$\text{CP} = 73$$

These both are lower bounds, but we consider lower value as inactive. So, the lower bound of the graph is 73.

Upper bound for 2 Processors -

$$\text{CP} + \text{TotalWork} / \text{\#Processors} = 73 + 53 = 126$$

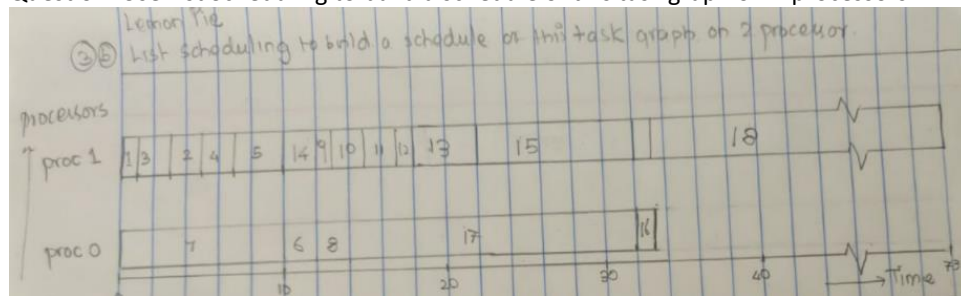
So, the upper bound of graph is 106.

Upper bound for 4 Processors -

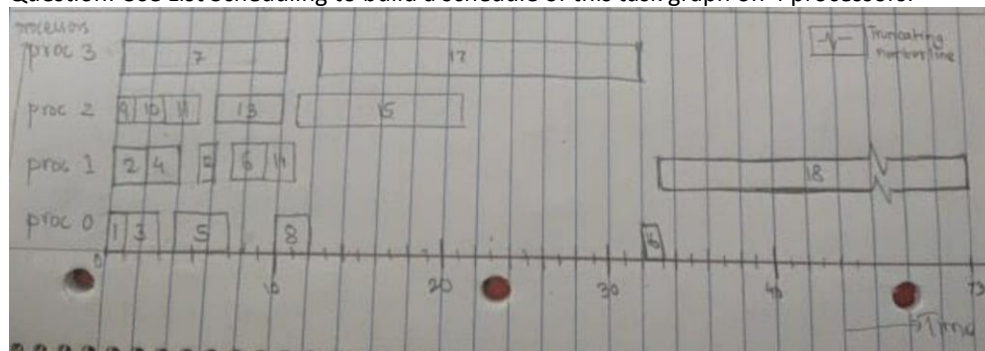
$$\text{CP} + \text{TotalWork} / \text{\#Processors} = 73 + 27 = 100$$

So, the upper bound of graph is 80.

b. Question: Use List Scheduling to build a schedule of this task graph on 2 processors.



c. Question: Use List Scheduling to build a schedule of this task graph on 4 processors.



4. Independent Tasks 1



- a. Question: Using the metrics of this parallel task graph (you computed last activity) and analysis of List Scheduling, provide a lower bound and an upper bound of the time it would take to schedule this graph on 3 processors. Provide the bounds on 4 processors.

Ans. Lower Bound for 3 Processors -

$$\text{TotalWork} / \text{\#Processor} = 9/3 = 3$$

$$\text{CP} = 3$$

The lower bound of the graph is 3.

Lower Bound for 4 Processors -

$$\text{TotalWork} / \text{\#Processor} = 9/4 = 2$$

$$\text{CP} = 3$$

These both are lower bounds, but we consider lower value as inactive. So, the lower bound of the graph is 3.

Upper bound for 3 Processors -

$$\text{CP} + \text{TotalWork} / \text{\#Processors} = 3 + 3 = 6$$

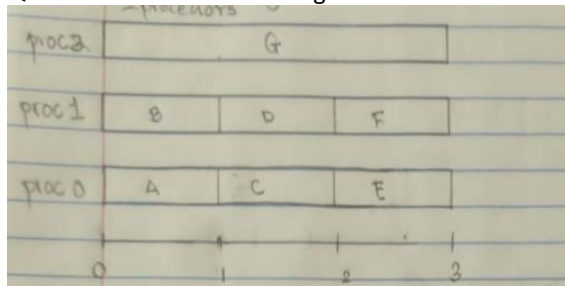
So, the upper bound of graph is 6.

Upper bound for 4 Processors -

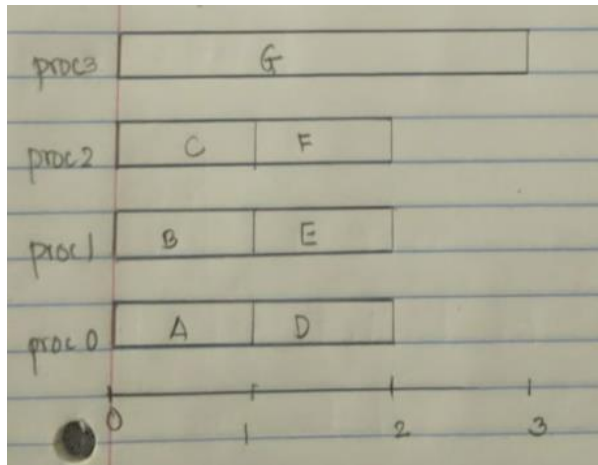
$$\text{CP} + \text{TotalWork} / \text{\#Processors} = 3 + 2 = 5$$

So, the upper bound of graph is 5.

- b. Question: Use List Scheduling to build a schedule of this task graph on 3 processors.



- c. Question: Use List Scheduling to build a schedule of this task graph on 4 processors.



5. Independent Tasks 2



- a. Question: Using the metrics of this parallel task graph (you computed last activity) and analysis of List Scheduling, provide a lower bound and an upper bound of the time it would take to schedule this graph on 3 processors. Provide the bounds on 4 processors.

Ans. Lower Bound for 3 Processors -

$$\text{TotalWork} / \text{\#Processor} = 33/3 = 11$$

$$\text{CP} = 6$$

These both are lower bounds, but we consider lower value as inactive. So, the lower bound of the graph is 11.

Lower Bound for 4 Processors -

$$\text{TotalWork} / \text{\#Processor} = 33/4 = 8$$

$$\text{CP} = 6$$

These both are lower bounds, but we consider lower value as inactive. So, the lower bound of the graph is 8.

Upper bound for 3 Processors -

$$\text{CP} + \text{TotalWork} / \text{\#Processors} = 6 + 11 = 17$$

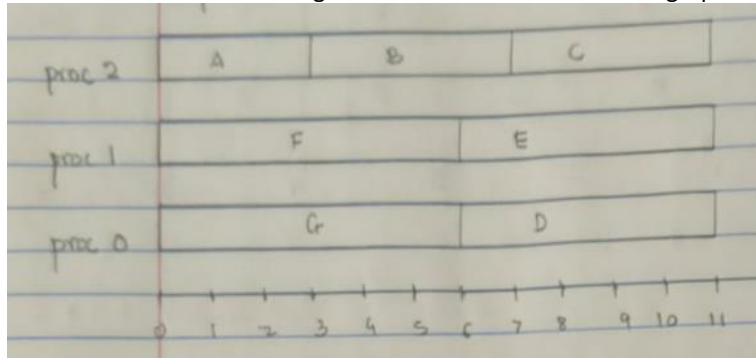
So, the upper bound of graph is 17.

Upper bound for 4 Processors -

$$\text{CP} + \text{TotalWork} / \text{\#Processors} = 6 + 8 = 14$$

So, the upper bound of graph is 14.

- b. Question: Use List Scheduling to build a schedule of this task graph on 3 processors.



- c. Question: Use List Scheduling to build a schedule of this task graph on 4 processors.

