CB 510
Project Management

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CPM Drawbacks in Resources

- CMP is a duration oriented approach

- CPM assumes resources to be unlimited and can be accesses all the time.

Resource problems

- Resource fluctuation (firing and hiring)
  - Resource loading profiles need to be smooth
  - Resources unconstrainted
  - Project duration is constrained

- Resource scheduling
  - Resources are constrained
  - Need to schedule start and finish day of each resource
  - Project duration can be changed, but minimally

Prioritizing Activities Competing on Resources

- The objective is to determine the start and finish date of an activity based on the resources undertaking them.

- The main obstacle here is to determine which activity to prioritize if both activities are scheduled to work in parallel.

Prioritizing Activities Competing on Resources

- There are number of optimizing models (LP, evolutionary algorithms, etc.)

- We are going to use a heuristic approach that allows us achieve minimal increase in duration while respecting the limitation in resources.

Can you figure out a rule?

Prioritizing Activities Competing on Resources

- We can prioritize the activities depending on their TF
  - This requires the recalculations of TF after each step

- We can prioritize the activities depending on the LS
  - This means that activities with earlier LS, are more critical than others.
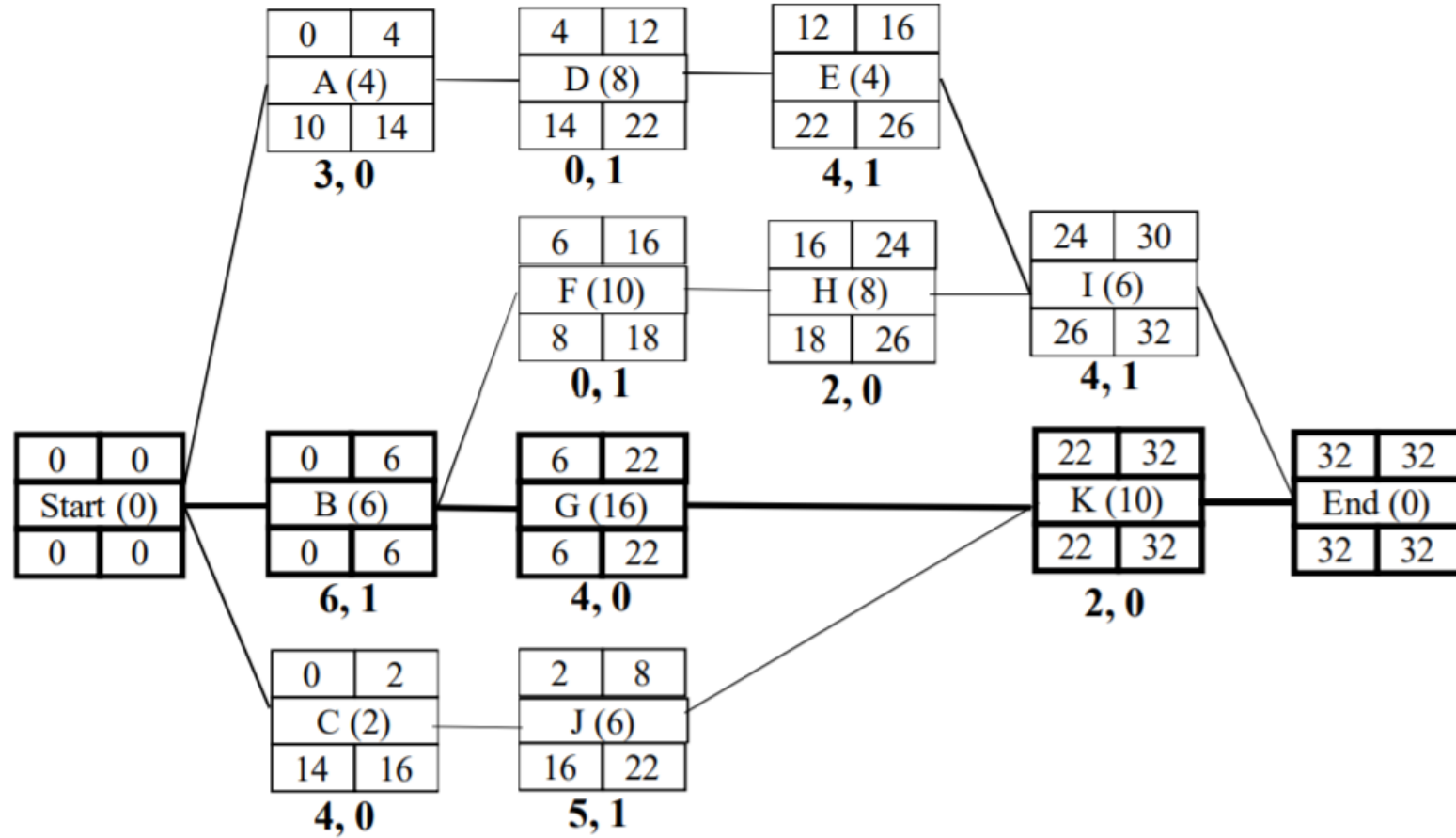
Resource Scheduling Process – CPM approach

- Prepare a complete CPM

- Calculate daily needed resources

- If demand is greater than available resources, determine the activities competing on the resources.

- Prioritize the activities' start date (and delay of some activities) depending on their LS.

- Tabulate your results

Example

Activity	Duration (Weeks)	Predecessors	Resource (units/week)	
			R1≤8	R2 ≤1
A	6	-	3	0
B	4	-	6	1
C	2	-	4	0
D	8	A	0	1
E	4	D	4	1
F	10	B	0	1
G	16	B	4	0
H	8	F	2	0
I	6	E, H	4	1
J	6	C	5	1
K	10	G, J	2	0

Example

Example

Current Date	Eligible Activities	Resources		Duration	LS	Decision	Finish Date
		R1 ≤ 8	R2 ≤ 1				

Example

Current Time	Eligible Activities	Resources		Duration	Earliest LS	Decision	Finish Time
		R1≤8	R2 ≤1				
0	B	6	1	6	0	Start	6
	A	3	0	4	10	Delay	-
	C	4	0	2	14	Delay	-
6	G	4	0	16	6	Start	22
	F	0	1	10	8	Start	16
	A	3	0	4	10	Start	10
	C	4	0	2	14	Delay	-
10	G	4	0	16	-	Continue	22
	F	0	1	10	-	Continue	16
	C	4	0	2	14	Start	12
	D	0	1	8	14	Delay	-
12	G	4	0	16	-	Continue	22
	F	0	1	10	-	Continue	16
	D	0	1	8	14	Delay	-
	J	5	0	6	16	Delay	-
16	G	4	0	16	-	Continue	22
	D	0	1	8	14	Start	24
	J	5	1	6	16	Delay	-
	H	2	0	8	18	Start	24

Example

Current Time	Eligible Activities	Resources		Duration	Earliest LS	Decision	Finish Time
		R1≤8	R2 ≤1				
22	D	0	1	8	-	Continue	24
	H	2	0	8	-	Continue	24
	J	5	1	6	16	Delay	-
24	J	5	1	6	14	Start	30
	E	4	1	4	22	Delay	-
30	E	4	1	4	22	Start	34
	K	2	0	10	22	Start	40
34	K	2	0	10	-	Continue	40
	I	2	0	6	26	Start	40