Time Estimation

Lecture in the
CS6022 – Software Project Management

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TOPICS COVERED

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- What is a Project?
- Project Management.
- Advantages of Project Management.
- Skills required for Project Management.
- Project Management Phases.
- Project Management Areas & Processes.
- Project Management Methodologies.

QUOTE

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About learning from failure:

"Human beings, who are almost unique [among animals] in having the ability to learn from the experience of others, are also remarkable for their apparent disinclination to do so."

- Douglas Adams

PERT

- Fundamental ingredient for PERT and CPM is use of network systems – graphically depicting the current problems or proposed project.
- When a network is constructed, certain conventions are followed to represent project graphically to represent the relation between activities and events.
- Activity:
  - All projects may be viewed as being composed of operations or tasks called activities.
  - Includes expenditure of time and resources for their accomplishment.
  - Depicted by a single arrow (activity arrows are called arcs).
  - Head of the arrow shows the sequence or flow of activities.
  - Activity cannot begin until the completion of preceding activity.
  - Predecessor activity: Prior to the state of another activity.
  - Successor activity: Activities cannot be started until one or more of the activities completed.
  - Concurrent activity: Activities that can be accomplished concurrently.
- Event: Specific accomplishment in the project and takes place at a particular instant of time.

GUIDELINES FOR CONSTRUCTING NETWORK DIAGRAM

- Each activity is represented by one and only one arrow in the network. Therefore no single activity can be represented twice in the network.
- No activities can be identified by the same beginning and an end events. In such case dummy is introduced to resolve the problem.
- Before an activity can be undertaken, all activities preceding must be completed. Thus network should be developed by logical or technical dependencies between various activities.
- Arrows depicting various activities are indicative of the logical precedence only.
- Flow should be from Left to right.
- Arrows should not be crossed unless it is completely unavoidable.
- Arrows should be straight or not curved or bent.
- Angle between the arrows should be as large as possible.
- Each activity have a tail and head event.
- Dangling (to disconnect a network) must be avoided.
- Fulkerson's rule:
  - Number the events so that "no event can be numbered until all preceding events have been numbered.
  - Number at the head of the arrow is larger than the tail.

NETWORK DIAGRAM

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Activity Code	Activity Description	Pre-requisites
A	Erect Site workshop	-
B	Fence Site	-
C	Bend reinforcement	A
D	Dig foundation	B
E	Fabricate steel work	A
F	Install concrete plant	B
G	Place reinforcement	C,D
H	Concrete foundation	G,F
I	Paint steel work	E
J	Erect steel work	H,I
K	Give finishing touches	J

NETWORK DIAGRAM

Activity Code	Activity Description	Pre-requisites
A		-
B		A
C		A
D		B
E		D
F		D
G		D
H		B
I		C,E
J		G
K		F,I,J
L		K
M		H,G
N		M

NETWORK DIAGRAM

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Activity No.	Activity Description	Preceding activities	Normal		Crash		Cost per week (Rs.)
			Time in weeks	Cost (Rs.)	Time in weeks	Cost (Rs.)	
A		--	9	12,000	6	18,000	2,000
B		A	14	14,000	4	24,000	1,000
C		A	4	2,000	3	2,400	400
D		C	6	44,000	4	56,000	6,000
E		--	14	1,600	13	1,800	200
F		E	6	4,000	6	4,000	--
G		B,D	5	4,000	3	4,800	400
H		F,G	2	12,000	1	14,000	2,000
			60	93,600	40	1,25,000	

COST ESTIMATION

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$$Cost\ per\ week = \frac{Crash\ Cost - Normal\ Cost}{Normal\ Time - Crash\ Time}$$

- Critical Path = A→ B → G → H

Activity	Cost/Week	Maximum Reduction(weeks) (Normal Time – Crash Time)
A	2,000	3
B	1,000	10
G	400	2
H	2,000	1

Cheapest Activity is “G”

- Costing Rs.400/week & can be reduced by 2 weeks
- Reduce by one week to check if there is a change in Critical Path
- Total Cost = Rs.93,600 + 400 = Rs. 94,000/-
- Reducing by one more week Cost = Rs. 94,400/-

COST ESTIMATION

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Activity	Cost/Week	Maximum Reduction(weeks) (Normal Time – Crash Time)
A	2,000	3
B	1,000	10
G	400	2
H	2,000	1

Cheapest Activity is “B”

- Costing Rs.10000/week & can be reduced by 10 weeks
- Can be reduced to maximum 4 weeks making the second independent path as Critical Path
- Total Cost = Rs. 94,400/- + 4000/- = Rs.98,400/-
- Second Critical Path:

  A → C → D → G → H

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Activity	Cost/Week	Maximum Reduction(weeks) (Normal Time – Crash Time)
A	2,000	3
B C & D	1,000 400+6000	10
H	2,000	1

NETWORK DIAGRAM

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Activity No.	Activity Description	Preceding activities	Normal		Crash		Cost per week (Rs.)
			Time in weeks	Cost (Rs.)	Time in weeks	Cost (Rs.)	
A		--	10	20,000	7	30,000	
B		--	8	15,000	6	20,000	
C		B	5	8,000	4	14,000	
D		B	6	11,000	4	15,000	
E		B	8	9,000	5	15,000	
F		E	5	5,000	4	8,000	
G		A,D,C	12	3,000	8	4,000	

Indirect Cost = Rs. 400 / Day

THANKS!

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