ACTIVITY DURATION ESTIMATES

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PMGT 690

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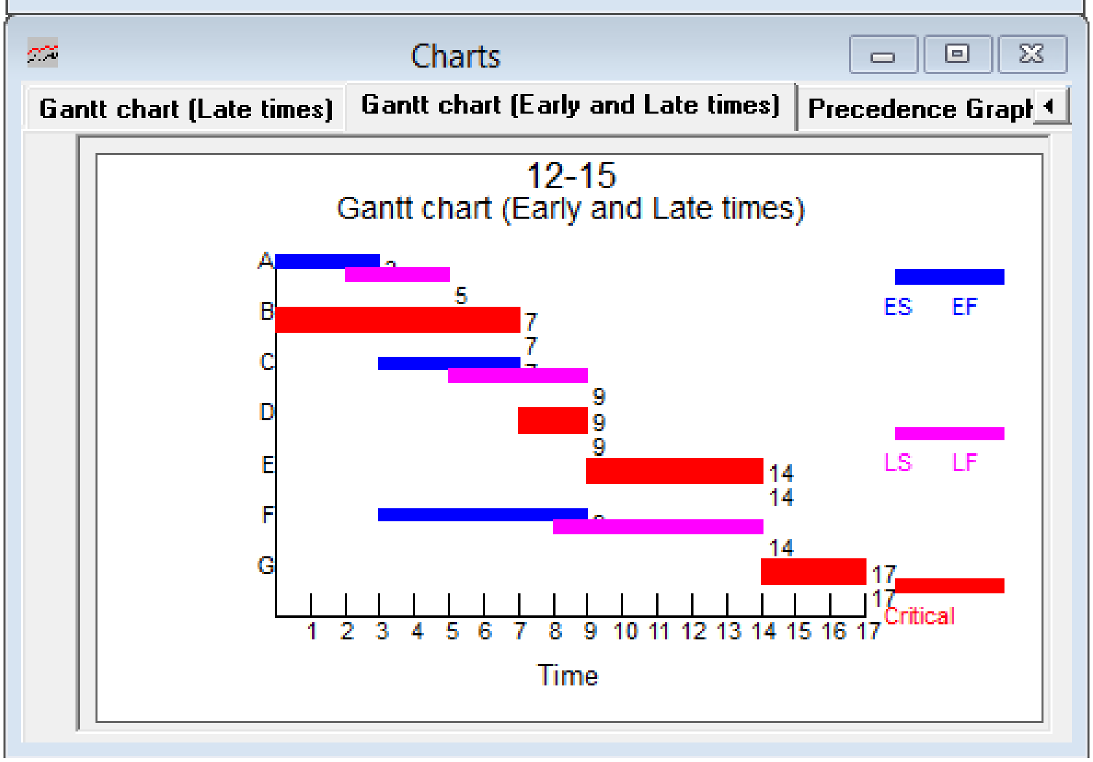
12-15 The following are the activity times for the project in Problem 12-14. Find the earliest, latest, and slack times for each activity. Then find the critical path. **(See QM results below)**

ACTIVITY	TIME (DAYS)
A	3
B	7
C	4
D	2
E	5
F	6
G	3

Project Management (PERT/CPM) Results

12-15 Solution

Activity	Activity time	Early Start	Early Finish	Late Start	Late Finish	Slack
Project	17					
A	3	0	3	2	5	2
B	7	0	7	0	7	0
C	4	3	7	5	9	2
D	2	7	9	7	9	0
E	5	9	14	9	14	0
F	6	3	9	8	14	5
G	3	14	17	14	17	0



12-19 Tom Schriber, a director of personnel of Management Resources, Inc., is in the process of designing a program that its customers can use in the job-finding process. Some of the activities include preparing resumés, writing letters, making appointments to see prospective employers, researching companies and industries, and so on. Some of the information on the activities is shown in the following table:

	DAYS			IMMEDIATE
ACTIVITY	***a***	***m***	***b***	**PREDECESSORS**
A	8	10	12	—
B	6	7	9	—
C	3	3	4	—
D	10	20	30	*A*
E	6	7	8	*C*
F	9	10	11	*B, D, E*
G	6	7	10	*B, D, E*
H	14	15	16	*F*
I	10	11	13	*F*
J	6	7	8	*G, H*
K	4	7	8	*I, J*
L	1	2	4	*G, H*

(a) Construct a network for this problem**. See Graph**

(b) Determine the expected time and variance for each activity. **See Chart**

(c) Determine ES, EF, LS, LF, and slack for each activity. **See Chart**

(d) Determine the critical path and project completion time. **See Chart & Graph**

(e) Determine the probability that the project will be finished in 70 days or less.

Z = 7 – 68.67 / 3.51 = 0.38 or 64.8%

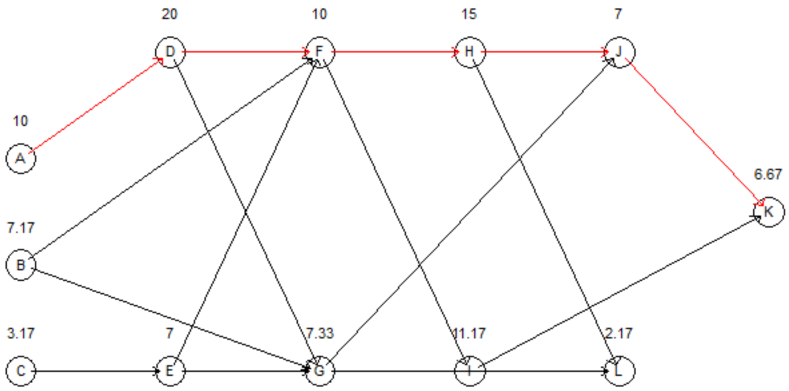
(f) Determine the probability that the project will be finished in 80 days or less.

Z = 80 – 68.67 / 3.51 = 3.23 or 99.9%

(g) Determine the probability that the project will be finished in 90 days or less.

Z = 90 – 68.67 / 3.51 = 6.08 or 100%

12-19
Precedence Graph



Project Management (PERT/CPM) Results

12-19 Solution

Activity	Activity time	Early Start	Early Finish	Late Start	Late Finish	Slack	Standard Deviation
Project	68.67						3.51
A	10	0	10	0	10	0	.67
B	7.17	0	7.17	22.83	30	22.83	.5
C	3.17	0	3.17	19.83	23	19.83	.17
D	20	10	30	10	30	0	3.33
E	7	3.17	10.17	23	30	19.83	.33
F	10	30	40	30	40	0	.33
G	7.33	30	37.33	47.67	55	17.67	.67
H	15	40	55	40	55	0	.33
I	11.17	40	51.17	50.83	62	10.83	.5
J	7	55	62	55	62	0	.33
K	6.67	62	68.67	62	68.67	0	.67
L	2.17	55	57.17	66.5	68.67	11.5	.5

Activity time computations

12-19 Solution

	Optimistic time	Most Likely time	Pessimistic time	Activity time	Standard Deviation	Variance
A	8	10	12	10	.67	.44
B	6	7	9	7.17	.5	.25
C	3	3	4	3.17	.17	.03
D	10	20	30	20	3.33	11.11
E	6	7	8	7	.33	.11
F	9	10	11	10	.33	.11
G	6	7	10	7.33	.67	.44
H	14	15	16	15	.33	.11
I	10	11	13	11.17	.5	.25
J	6	7	8	7	.33	.11
K	4	7	8	6.67	.67	.44
L	1	2	4	2.17	.5	.25
Project results						
Sum of crit act var						12.33
Square root of total					3.51	

12-21 The air pollution project discussed in the chapter has progressed over the past several weeks, and it is now the end of week 8. Lester Harky would like to know the value of the work completed, the amount of any cost overruns or underruns for the project, and the extent to which the project is ahead of or behind schedule by developing a table like Table 12.8. The revised cost figures are shown in the following table: **(See Table Below)**

ACTIVITY	**PERCENT OF COMPLETION**	**ACTUAL COST ($)**
A	100	20,000
B	100	36,000
C	100	26,000
D	100	44,000
E	50	25,000
F	60	15,000
G	10	5,000
H	10	1,000

ACTIVITY	**TOTAL BUDGETED COST ($)**	**PERCENT OF COMPLETION**	**VALUE OF WORK COMPLETED ($)**	**ACTUAL COST ($)**	**ACTIVITY DIFFERENCE ($)**
A	22,000	100	22,000	20,000	**-2,000**
B	30,000	100	30,000	36,000	**6,000**
C	26,000	100	26,000	26,000	**0**
D	48,000	100	48,000	44,000	**-4,000**
E	56,000	50	28,000	25,000	**-3,000**
F	30,000	60	18,000	15,000	**-3,000**
G	80,000	10	8,000	5,000	**-3,000**
H	16,000	10	1,600	1,000	**-600**
Total					**-9,600** ***Underrun***

Activities under budget are ahead of schedule A,D,E,F,G,H. C is on schedule. B is over budget and behind schedule.

12-31 The managing partner of the Scott Corey accounting firm (see Problem 12-30) has decided that the system must be up and running in 16 weeks. Consequently, information about crashing the project was put together and is shown in the following table:

ACTIVITY	IMMEDIATE PREDECESSOR	NORMAL TIME (WEEKS)	CRASH TIME (WEEKS)	NORMAL COST ($)	CRASH COST ($)
A	—	3	2	8,000	9,800
B	—	4	3	9,000	10,000
C	*A*	6	4	12,000	15,000
D	*B*	2	1	15,000	15,500
E	*A*	5	3	5,000	8,700
F	*C*	2	1	7,500	9,000
G	*D, E*	4	2	8,000	9,400
H	*F, G*	5	3	5,000	6,600

(a) If the project is to be finished in 16 weeks, which activity or activities should be crashed to do this at the least additional cost? What is the total cost of this? **I would crash 1 week in project G as it will only cost $700 and will decrease total time to 16 weeks.**

(b) List all the paths in this network. After the crashing in part (a) has been done, what is the time required for each path? **Path A,E,G,H = 16 weeks, A,C,F,H = 14 weeks, Path B,D,G,H = 14 weeks**

Project Management (PERT/CPM) Results

(untitled) Solution

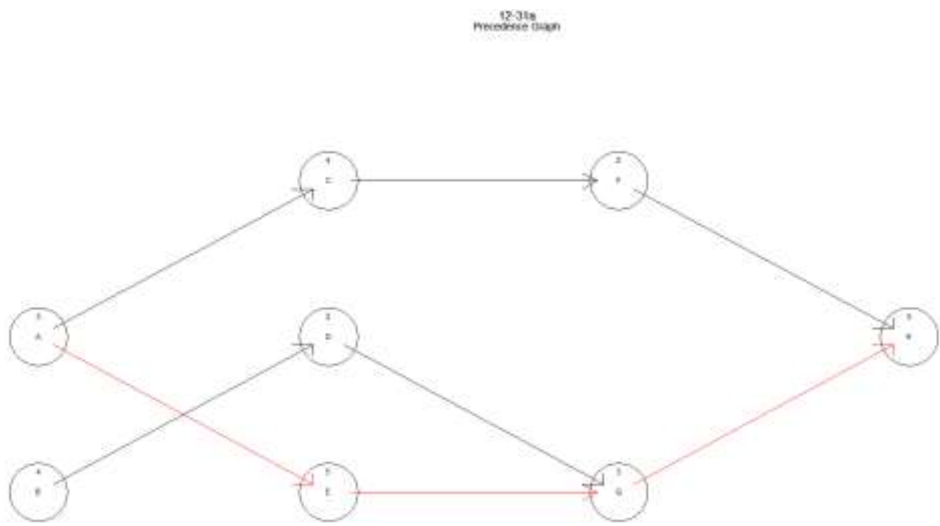
Activity	Normal time	Crash time	Normal Cost	Crash Cost	Crash cost/pd	Crash by	Crashing cost
Project	17	10					
A	3	2	8000	9800	1800	1	1800
B	4	3	9000	10000	1000	0	0
C	6	4	12000	15000	1500	2	3000
D	2	1	15000	15500	500	1	500
E	5	3	5000	8700	1850	2	3700
F	2	1	7500	9000	1500	1	1500
G	4	2	8000	9400	700	2	1400
H	5	3	5000	6600	800	2	1600
TOTALS			69500				13500

Crash schedule

(untitled) Solution

Project time	Period cost	Cumulative cost	A	B	C	D	E	F	G	H
17	0	0								
16	700	700							1	
15	800	1500							1	1
14	800	2300							1	2
13	1800	4100	1						1	2
12	2200	6300	1		1				2	2
11	3350	9650	1		2		1		2	2
10	3850	13500	1		2	1	2	1	2	2

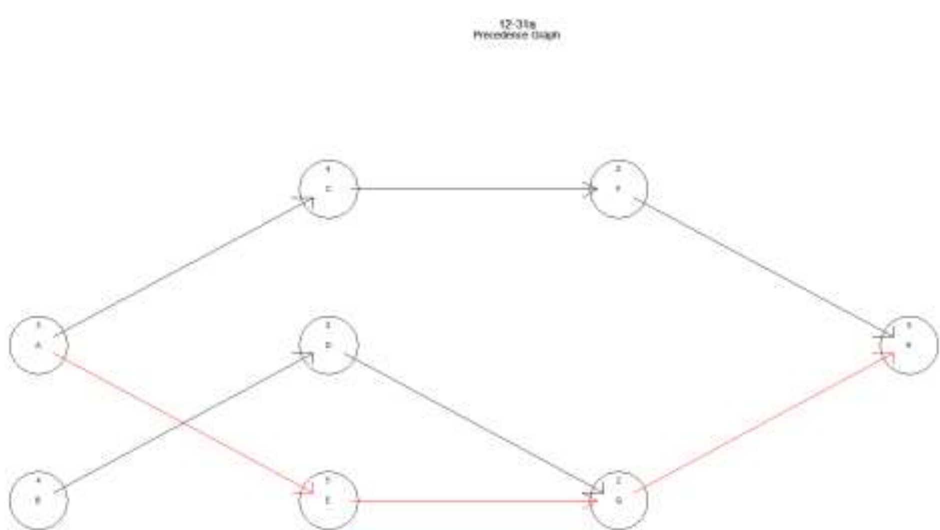
16 Weeks:



If the project completion time must be reduced another week so that the total time is 15 weeks, which activity or activities should be crashed? Solve this by inspection. Note that it is sometimes better to crash an activity that is not the least cost for crashing if it is on several paths rather than to crash several activities on separate paths when there is more than one critical path.

I would again crash project G another week. The cost would be $1400 and the total time would be 15 weeks.

15 weeks:



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Howard J. Weiss (2010). Pearson Education: QM for Windows (Version 4) [Software]. Available from http://wps.prenhall.com/bp_weiss_software_1/1/358/91664.cw/