Schedule Management: Crashing & Fasttracking

Crashing and Fast-Tracking the Schedule

Schedule Duration Compression

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Schedule Management: Crashing & Fasttracking

Lesson Summary

- In this lesson we will:
  - Demonstrate the technique of compressing the duration of a project by "crashing" the project schedule
  - Explore the ramifications of "crashing" a project schedule
  - Present the schedule compression technique of "fast-tracking"

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Shortening Project Duration

- Crashing;
  - trading off cost and schedule
  - Compressing the duration of select tasks by adding resources in a planned way to decrease the duration without changing the logical sequencing of the project (Fast Tracking)
- Fast tracking;
  - performing activities in parallel rather than waiting for one to end before the next one begins.
- Both these methods have built in risks, and may even end up delaying the projects estimated completion date so they should be used with caution.

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Normal and Crashing

- Crash: Expedite an activity, by applying additional resources
  - Specialized or additional equipment
  - More people (e.g., borrowed staff, temps)
  - More hours (e.g., overtime, weekends)

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No Free Lunch: Crashing Creates a Ripple Effect

- Crashing buys time, but nothing comes free
- Potential cost areas
  - Additional equipment/material
  - Extra labor
  - Negative effects on other projects
  - Reduced morale, from excessive hours/shifts
  - Lower quality, from the pressure of time, inexperienced and tired staff
    - "If you want it bad, you'll get it bad . . ."
  - Excessive overtime:
    → fatigue → errors → rework

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Limitations of Crashing

- Practical limitations of trying to do more in limited time
  - How many electricians can you fit into a panel closet anyway?
  - More people working on the task means more communication required

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When Trying to Crash a Project . . .

- Two basic principles
  - 1. Generally, focus on the critical path
    - Usually not helpful to shorten non-critical activities
    - Exception: When a scarce resource is needed elsewhere, e.g., in another project
  - 2. When shortening project duration, choose least expensive way to do it

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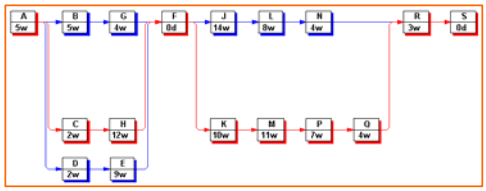
Network Diagram



A-C-H-F-K-M-P-Q-R-S:	*54*
A-D-E-F-K-M-P-Q-R-S:	51
A-B-G-F-K-M-P-Q-R-S:	49
A-C-H-F-J-L-N-R-S:	48
A-D-E-FJ-L-N-R-S:	45
A-B-G-F-J-L-N-R-S:	43

Critical path shown in red

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The "Uncrashed" Critical Path

Task	PERT Calculation (Weeks)	Critical Path
A	5	5
B	5	
C	2	2
D	2	
E	9	
F	0	0
G	4	
H	12	12
J	14	
K	10	10
L	8	
M	11	11
N	7	
P	7	7
Q	3	3
R	3	3
S	0	0
Critical Path		53

Desired project completion: 48 weeks

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Budgeted Cost of Tasks

Task	PERT Calculation (Weeks)	Critical Path	Budgetted Cost ($)
A	**5**	**5**	**15,000**
B	5		12,000
C	**2**	**2**	**3,000**
D	2		2,000
E	9		22,500
F	**0**	**0**	
G	4		6,000
H	**12**	**12**	**24,000**
J	14		26,000
K	**10**	**10**	**20,000**
L	8		16,000
M	**11**	**11**	**17,500**
N	4		6,000
P	**7**	**7**	14,000
Q	**3**	**3**	**12,000**
R	**3**	**3**	**4,000**
S	0	0	0
Critical Path		**53**	**200,000.00**

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Amount & Cost of Compression

Task	PERT Calculation (Weeks)	Critical Path	Budgetted Cost ($)	Possible Compression (weeks)	Crash Cost
A	**5**	**5**	**15,000**	**2**	
B	5		12,000	2	6,000
C	**2**	**2**	**3,000**	**1**	**2,500**
D	2		2,000	1	1,500
E	9		22,500	3	10,500
F	**0**	**0**			
G	4		6,000	0	
H	**12**	**12**	**24,000**	2	6,000
J	14		26,000	6	36,000
K	**10**	**10**	**20,000**	**5**	**9,000**
L	8		16,000	4	16,000
M	**11**	**11**	**17,500**	3	6,000
N	4		6,000	1	2,000
P	**7**	**7**	14,000	0	
Q	**3**	**3**	**12,000**	**1**	**5,000**
R	**3**	**3**	**4,000**	**1**	**2,000**
S	0	0	0	0	
Critical Path		**54**	**200,000.00**		

- Desired project duration = 48 Weeks
- Can compress up to 5 weeks, but at what cost?

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Cost of Crashing

Task M = 3 x $2,000 = $6,000
Task R = 1 x $2,000 = $2,000
Task C – 1 x $2,500 = $2,500
Total: 5 $10,500

Task	PERT Calculation (Weeks)	Critical Path	Budgetted Cost ($)	Possible Compression (weeks)	Crash Cost	Crash Cost/wk
A	**5**	**5**	**15,000**	**2**	**9,000**	**4500**
B	5		12,000	2	6,000	3000
C	**2**	**2**	**3,000**	**1**	**2,500**	**2500**
D	2		2,000	1	1,500	1500
E	9		22,500	3	10,500	3500
F	**0**	**0**				
G	4		6,000	0		
H	**12**	**12**	**24,000**	**2**	**6,000**	**3000**
J	14		26,000	6	36,000	6000
K	**10**	**10**	**20,000**	**3**	**9,000**	3000
L	8		16,000	4	16,000	**4000**
M	**11**	**11**	**17,500**	**3**	**6,000**	**2000**
N	4		6,000	1	2,000	2000
P	**7**	**7**	**14,000**	**0**		
Q	**3**	**3**	**12,000**	**1**	**4,500**	**4500**
R	**3**	**3**	**4,000**	1	**2,000**	**2000**
S	0	0	0	0		
Critical Path		**53**	**200,000.00**			

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We need to compress 5 weeks

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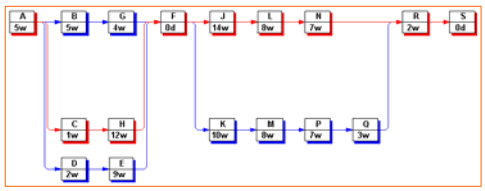
Network Diagram - Crashed



New critical path: 49 weeks

Critical path shown in red

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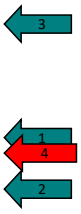
Task	# wk.	$/wk.	Cost
Task M	3	2,000	6,000
Task R	1	2,000	2,000
Task C	1	2,500	2,500
Total	5		10,500

Task	# wk.	$/wk.	Cost
Original crash	4		10,500
Task N	1	2,000	2,000
Total	5		12,500

Task	PERT Calculation (Weeks)	Critical Path	Budgetted Cost ($)	Possible Compression (weeks)	Crash Cost	Crash Cost/wk
A	5	5	15,000	2	9,000	4500
B	5		12,000	2	6,000	3000
C	2	2	3,000	1	2,500	2500
D	2		2,000	1	1,500	1500
E	9		22,500	3	10,500	3500
F	0	0				
G	4		6,000	0		
H	12	12	24,000	2	6,000	3000
J	14		26,000	6	36,000	6000
K	10	10	20,000	3	9,000	3000
L	8		16,000	4	16,000	4000
M	11	11	17,500	3	6,000	2000
N	4		6,000	1	2,000	2000
P	7	7	14,000	0		
Q	3	3	12,000	1	4,500	4500
R	3	3	4,000	1	2,000	2000
S	0	0	0	0		
Critical Path		53	200,000.00			



We need to compress 5 weeks

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Cost of Crashing

- Initial crash compressed the schedule by 5 weeks but an alternate critical path emerged, resulting in an effective crash of only 4 weeks
- Cash flow
  - Uncompressed - $3,773/week
  - Compressed - $4,427/week
- Compressed Cost: $200,000 + 12,500 = 212,500
  - 6.25% cost premium for compression

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Fast-tracking/Concurrency

- "Fast-tracking" – Concurrent or overlapping tasks
- Both refer to overlapping project phases
  - E.g., design/build and construction management

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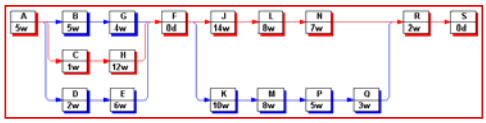
Fast-tracking Example



Critical path = 49 weeks

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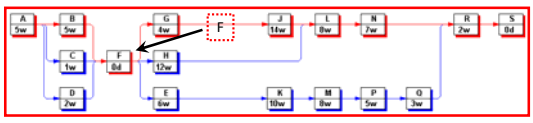
Fast-tracking Example



Revised Critical path = 45 weeks

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Fast-tracking/Concurrency

- Pros:
  - Can shorten project duration
  - Can reduce product development cycles
  - Can help meet clients' demands
- Cons:
  - Can increase cost through redesigns, excessive changes, rework, out-of-sequence installation, and more

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"Cost, Schedule, or Performance: Pick Any Two . . ."

- Assuming fixed performance specifications, tradeoff areas must be in time or cost
- Time-limited or resource-limited
- If all three dimensions are fixed, the system is "overdetermined"
  - Normally, no tradeoffs are possible
  - But, something has to give . . .

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Trade-off Alternatives

	Time	Cost	Performance
Constrain	●		
Enhance			●
Accept		●	

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