COLLEGE OF THE NORTH ATLANTIC QATAR

TIME MANAGEMENT: PART 2

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Critical Path & Slack: Recap

- The **Critical Path** is the shortest amount of time we can complete the project.
- We determine Critical Path by making a left-to-right pass across the network and finding the **earliest start time** each task can start. By the time we get to the end task, we know the earliest time the whole project can be finished.

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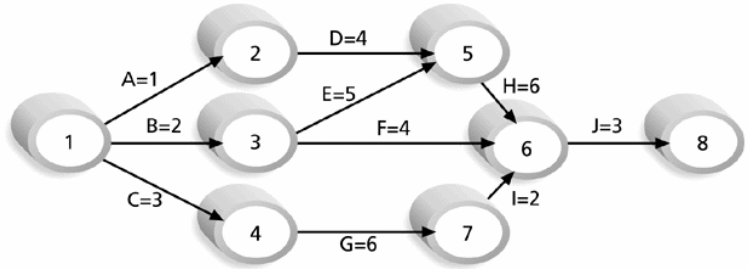
Critical Path Example



Note: Assume all durations are in days.

Path 1:	A-D-H-J	Length = 1+4+6+3 = 14 days
Path 2:	**B-E-H-J**	**Length = 2+5+6+3 = 16 days**
Path 3:	B-F-J	Length = 2+4+3 = 9 days
Path 4:	C-G-I-J	Length = 3+6+2+3 = 14 days

Since the critical path is the longest path through the network diagram, Path 2, B-E-H-J, is the critical path for Project X.

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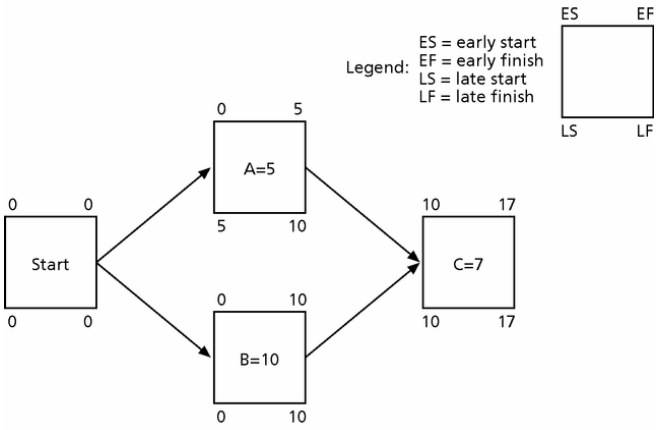
Slack

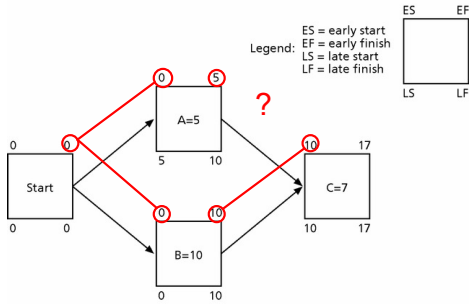
- **Slack** is the amount of time a task can be delayed without changing the Critical Path.
- A task on the Critical Path has no (zero) slack.
- We calculate Slack by making a right-to-left pass across the network and find the **latest start date** for each task.

- Latest Start Date - Earliest Start Date = Slack
- To find Slack:

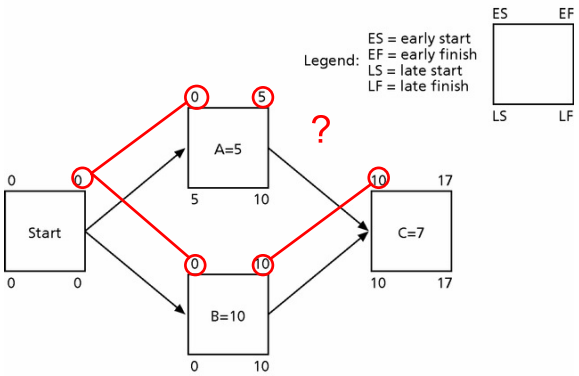


Forward Pass

- In our forward pass, we fill in the early dates: Early Start and Early Finish.
- The Critical Path are those tasks where the Early Finish of the Preceding Task is the Same as the Early Start of a Following Task.



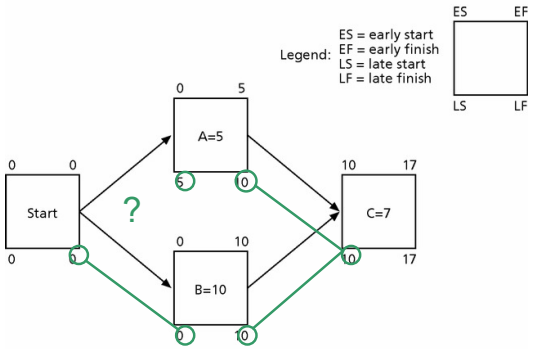
- Because the Early Finish of A is 5 days earlier than the Early Start on C, A **cannot** be on the Critical Path.



Backward Pass

- Once we've completed all the Early Dates and know our Critical Path, we can work backwards and calculate our Slack.
- A slack is how much we can delay a task without delaying the project.
- Remember, a task on the Critical Path has **no** slack!

- This time we look at the latest start and finish dates:
- The latest A can start is 5 days after the project start, so it has 5 days of Slack



More on the Critical Path

- A project team at Apple computer put a stuffed gorilla on the top of the cubicle of the person currently managing a critical task
- The critical path is *not* the one with all the critical or important activities; it only accounts for time
  - Example, for Disney's Animal Kingdom, ***growing grass*** was on the critical path

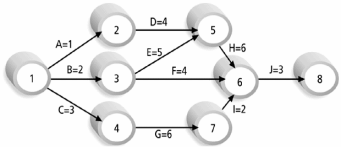
- There can be more than one critical path if the lengths of two or more paths are the same
- The critical path can change as the project progresses

Using Critical Path Analysis to Make Schedule Trade-offs

- **Free slack** or **free float** is the amount of time an activity can be delayed without delaying the early start of any immediately following activities
- **Total slack** or **total float** is the amount of time an activity may be delayed from its early start without delaying the planned project finish date

Free and Total Float or Slack for Project X

Task Name	Start	Finish	Late Start	Late Finish	Free Slack	Total Slack
A	8/1/09	8/1/09	8/3/09	8/3/09	0d	2d
B	8/1/09	8/2/09	8/1/09	8/2/09	0d	0d
C	8/1/09	8/3/09	8/3/09	8/7/09	0d	2d
D	8/2/09	8/7/09	8/8/09	8/9/09	2d	2d
E	8/3/09	8/9/09	8/3/09	8/9/09	0d	0d
F	8/3/09	8/8/09	8/14/09	8/17/09	7d	7d
G	8/8/09	8/13/09	8/8/09	8/15/09	0d	2d
H	8/10/09	8/17/09	8/10/09	8/17/09	0d	0d
I	8/14/09	8/15/09	8/18/09	8/17/09	2d	2d
J	8/20/09	8/22/09	8/20/09	8/22/09	0d	0d



Using the Critical Path to Shorten a Project Schedule

- Three main techniques for shortening schedules
  - Shortening durations of critical activities/tasks by adding more resources or changing their scope
  - **Crashing** activities by obtaining the greatest amount of schedule compression for the least incremental cost
  - **Fast tracking** activities by doing them in parallel or overlapping them

Importance of Updating Critical Path Data

- It is important to update project schedule information to meet time goals for a project
- The critical path may change as you enter actual start and finish dates
- If you know the project completion date will slip, negotiate with the project sponsor

References

- Stutzke, R.D., "Improving the Accuracy of Early Software Estimates". March 5, 2005. Available at: http://sw-estimation.com/papers.html
- http://en.wikipedia.org/wiki/COCOMO