Project Time Management – Formulae section

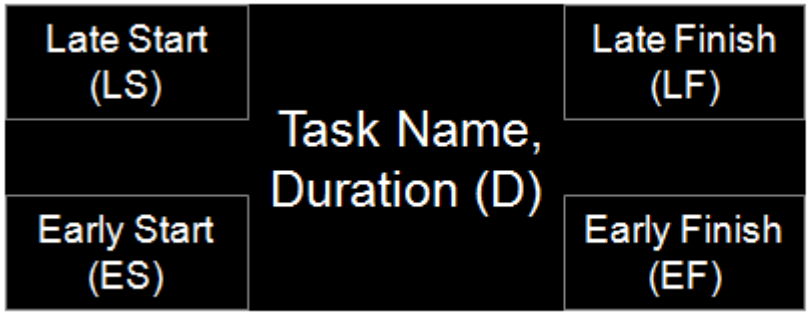
PERT Estimations

Term	Formula
PERT Value (Expected duration)	$\frac{\{\text{Pessimistic} + (4*\text{Most Likely}) + \text{Optimistic}\}}{6}$
Standard Deviation (Sigma)	$\frac{\text{Pessimistic} - \text{Optimistic}}{6}$
Variance	$(\text{Standard Deviation})^2$

For more than one task (e.g., for a project where all tasks lie on the critical path)

Term	Formula
Project PERT Value	Sum of PERT Values of individual tasks
Project Standard Deviation	Square root of project variance
Project Variance	Sum of variances of individual tasks

Tasks in Network Diagrams



EF = ES + D

LS = LF - D

Free Float:

- The amount of time that a schedule activity can be delayed without delaying the early start date of any immediately following schedule activities.
- Float =LF – EF = LS - ES

Total Float:

- Total amount of time that the schedule activity may be delayed from its early start date without delaying the project finish date or violating a schedule constraint.

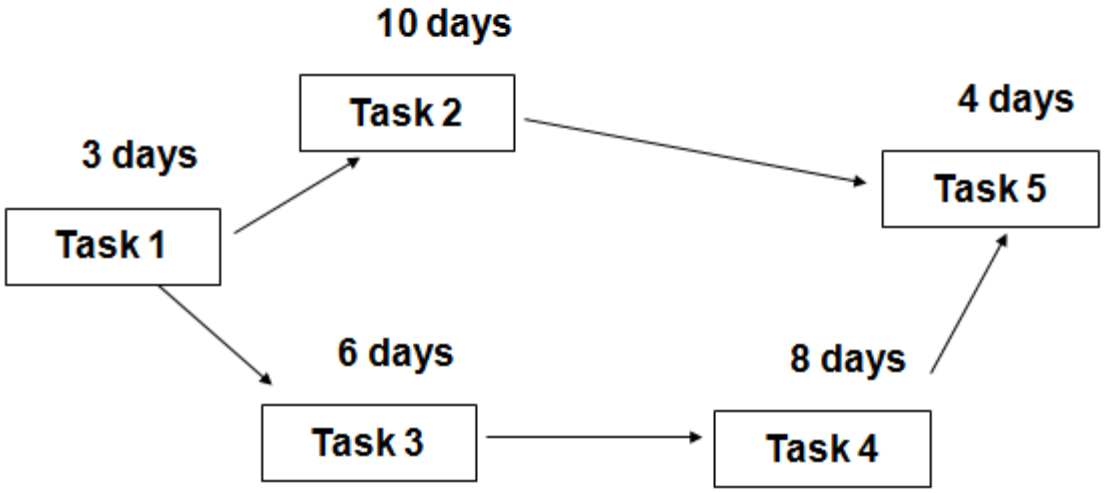
How to Calculate Critical Path for a Network Diagram

- Find out the lengths of all the paths in the network diagram
- The longest path is the critical path

Performing Network Analysis

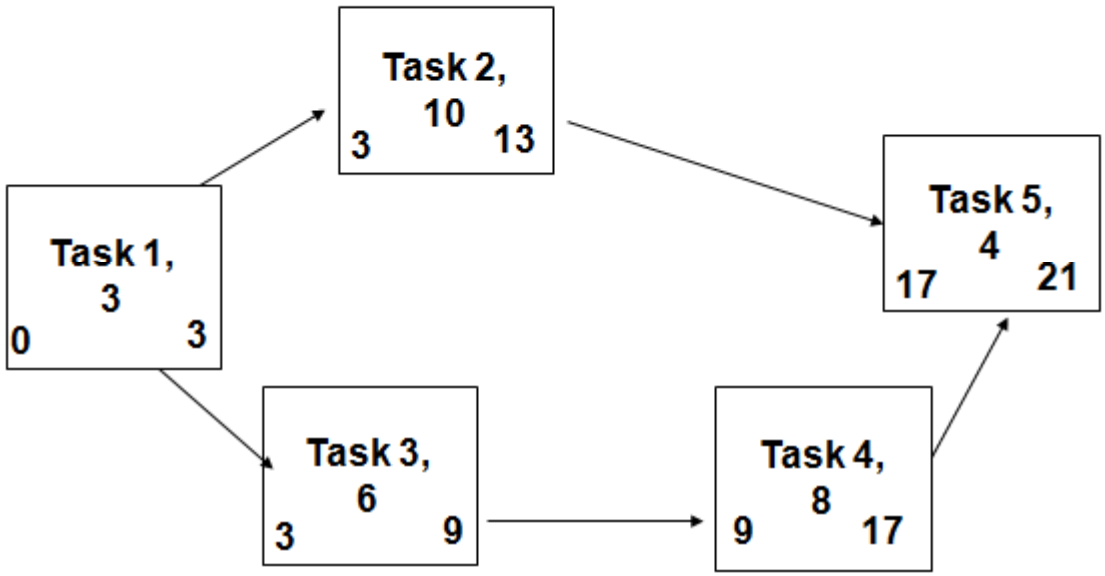
- Let us try to do this through an example.

- For the network diagram shown below, we have to calculate:
  - Critical path
  - Slack for all the tasks
  - The customer wants the tasks to be completed within 25 days, so we also have to calculate the project float.



Performing Network Analysis (continued)

- Step 1: Draw a Network Diagram (forward pass, calculate the ES and EF dates)



Please note: Task 5 can begin only after Task 2 and Task 4 are completed. So, the ES for Task 5 is 17 days (because Task 4 can be completed only after 17 days)

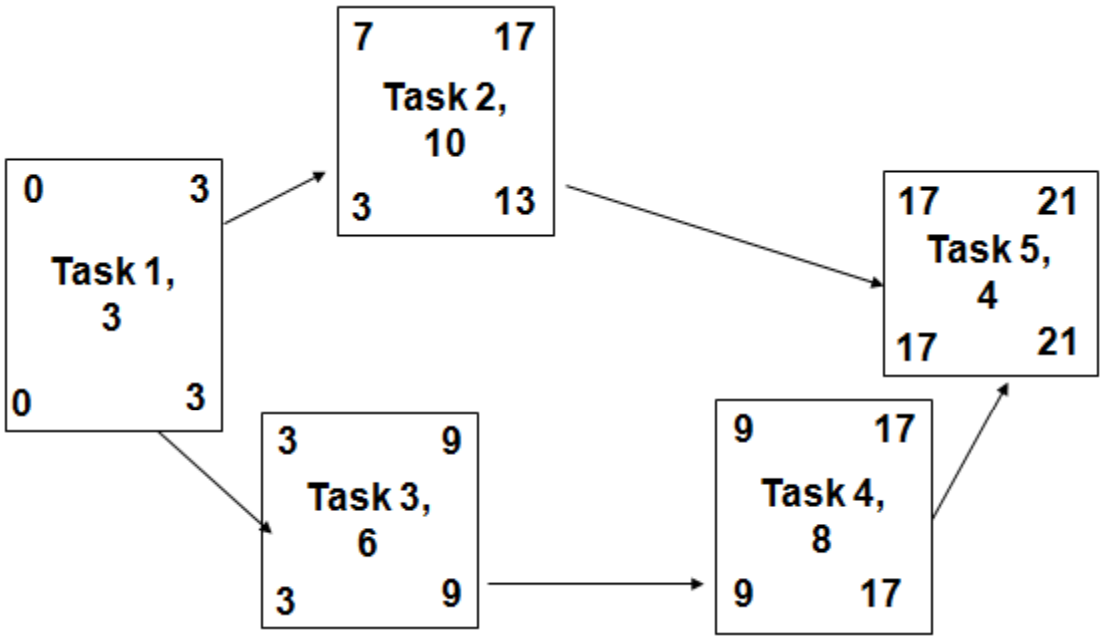
Performing Network Analysis (continued)

Step 2: Calculate the lengths of all paths and determine the Critical Path

- Length of all paths:
  - Task1 ->Task2 -> Task5 : 3+10+4 = 17 days
  - Task1 -> Task3 -> Task4 -> Task5 :3+6+8+4 = 21days
- Critical Path = Longest path = 21 days
- Please note that we obtained the same result for EF for Task5 (i.e. 21 days)

Performing Network Analysis (continued)

Step 3: Calculate Float in all tasks – Backward Pass



Please note:

- For all the tasks on the Critical Path (i.e., Task1, Task3, Task4, and Task5)
  EF = LF and ES = LS
- Hence, Slack for the tasks on the Critical Path = LF – EF = 0
- Slack for Task2 = LF – EF = 17 – 13 = 4

Performing Network Analysis (continued)

Step 4: Calculate Project Float

- Customer wants an end date of 25 days.
- Hence project float:

  = Total amount of time that the project can be delayed without delaying the externally imposed project completion date required by the customer.

  = 25 – 21 = 4 days

- Please note: The project float can be negative, i.e., the customer wants the task to be completed sooner than planned in the project schedule. The project, then, needs to be crashed or fast-tracked.

Crashing

- If we need to shorten the duration of the project, then it may be necessary to assign additional resources to tasks to decrease the time required to complete those tasks.
- Crashing is usually a simple exercise in which you examine different alternatives to get the desired duration compression with minimal increase in cost. There are several examples relating to crashing in the PMstudy chapter tests.

  Please note: You will find several questions on crashing in our chapter test on Project Time Management. Answering those questions will help you broaden your understanding of the concept of crashing.

Time Management Questions - Practice

- Chapter tests on time management have several mathematical questions.
- Please answer these questions to understand such of those concepts of time management that are explained in terms of mathematical formulae.

End of review of concepts on Time Management – formulae section