16CSCI08I
Software Project Management

Lab (6)

Topics to be covered:

- Why scheduling?
- Key terminologies for scheduling
- PERT
  - Example
  - Exercises

Lab (6)

Scheduling Algorithms

PERT

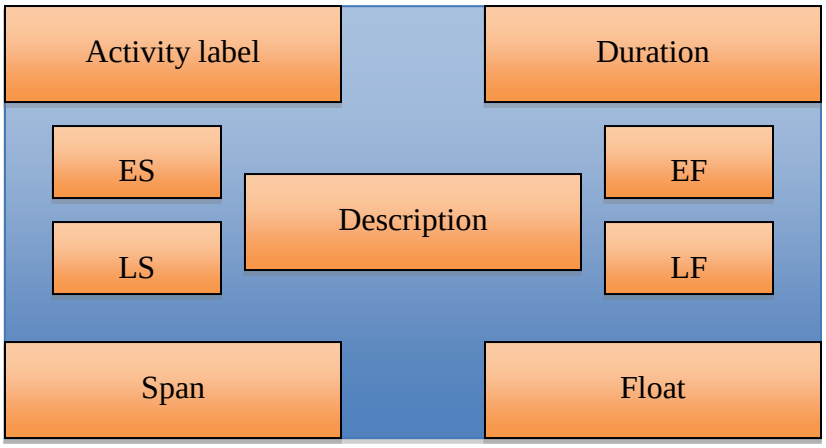
In the previous tutorials, we created a step-by-step plan for the project and have estimated the expected size and effort. We now focus on arranging, or rather scheduling, these tasks visually so that we can identify which tasks are more crucial than others.

Before moving further, we need to clarify some terminologies that are vital for scheduling tasks:

Activity	• Task to be performed
Event	• Completion of one or more activities
Network	• combination of activities and events
Path	• Series of connected activities between any 2 events
Critical	• Any member of the network that if delayed causes the delay of the entire project

The network technique that we will use for scheduling will be PERT: Program Evaluation Review Technique, using the activity on node representation (AON). The AON representation is where activities are represented as nodes with events (represented as arrows) connecting between them.

A node consists of the following information:



- ✓ The activity label represents the name of the activity
- ✓ The ES stands for Earliest Start
- ✓ The EF stands for Earliest Finish (= ES + Duration)
- ✓ The LS stands for Latest Start (= LF - Duration)
- ✓ The LF stands for Latest Finish
- ✓ The span represents the maximum time allowed for an activity (= LF – ES)
- ✓ The float represents the possible time for delay (= Span – Duration)

The following are important aspects that need to be taken into account when creating an AON diagram:

- Precedence is the basis of the network

- **Forward pass:**
  - The ES of a task is the EF of the task before it (its predecessor)
  - In the case that there is more than one predecessor, we take the most late EF
- We will now move from the end to the start, in other terms backtrack.
- Backtracking will allow for the calculation of the LS and LF
- Once the LS and LF are calculated, we can calculate the float and span.

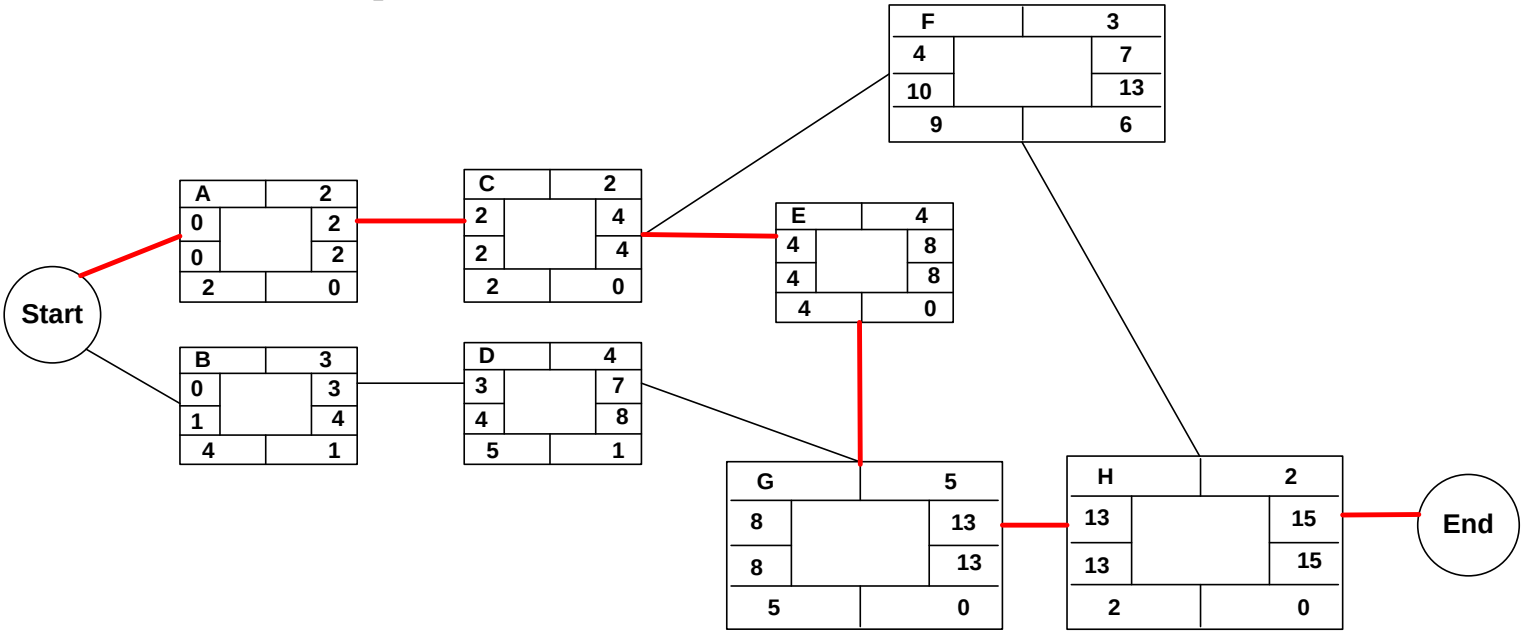
- **Backward pass:**
  - We begin from the end
  - The LS of an activity = EF of the one before it
  - LF of current activity = LS of the following one
  - In the case that there is more than one following activity, take the earliest LS
  - LS = LF – Duration
- We now can calculate the span and float through the above-mentioned equations.

- **Critical Path:**
  - It represents the activities and events which if delayed would cause the delay of the entire project
  - They are activities with float = 0 provided that there is a path that connects the Start to End with activities of float 0

Example:

Activity	Description	Predecessor	Duration (Weeks)
A	Build internal components	----	2
B	Modify roof and floor	----	3
C	Construct collection stack	A	2
D	Pour concrete and install frame	B	4
E	Build hi-temp burner	C	4
F	Install control system	C	3
G	Install air pollution control device	D, E	5
H	Inspect and test	F, G	2

The critical path: A, C, E, G, H



Exercises:

A.

Task	Predecessor	Duration (Days)
A	----	5
B	A	7
C	B	6
D	A	5
E	D	10
F	B	15
G	B	8
H	G	8
I	C	4
J	G	4
K	E, F	5
L	I, H	3

B.

Task	Predecessor	Duration (Hours)
1	----	0.5
2	1	1
3	1	4
4	2	3
5	4	6
6	4	1
7	3, 4	7
8	7	2
9	5	0.5
10	8	1
11	9, 10	3
12	6, 11	0.5