A REVIEW
OF
PROJECT MANAGEMENT TOOLS AND TECHNIQUES

1. GANTT CHART

- was first conceived by Henry L. Gantt in 1917
- It is the most commonly used project scheduling and progress evaluation tool in use.
- is a simple horizontal bar chart that depicts project tasks against a calendar. Each bar represents a named project task. The tasks are listed vertically in the left-hand column. On a Gantt chart, the horizontal axis is a calendar timeline.

Advantages:

1. simplicity
2. The bars representing activities or tasks are drawn to scale; that is the size of the bar indicates the relative length of time it will take to complete each task.

Two Approaches:

1. Forward scheduling establishes a project start-date and then schedules forward from that date. Based on the planned duration of required tasks, and the allocation of resources to complete those tasks, a projected project completion date is calculated.
2. Reverse scheduling establishes a project deadline and then schedules backward from that date. Essentially, tasks, their duration, and resources must be chosen to ensure that the project can be completed by the deadline.

Predecessors and Constraints:

The start of any given task may be dependent on the start or completion of another previous task. Additionally, the completion of a task is frequently dependent on the completion of a prior task. Milestones almost always have several predecessors that signify those tasks that must be completed before you can say that the milestone has been achieved.

Sample estimating technique:

1. Estimate the minimum amount of time it would take to perform the task - called the Optimistic Time (OT).
   - The optimistic time estimate assumes that even the most likely interruptions or delays — such as occasional employee illnesses — will not happen.
   - Everything has to go perfectly to achieve this time
2. Estimate the maximum amount of time it would take to perform the task - called the Pessimistic Time (PT).
   - The pessimistic time estimate assumes that anything that can go wrong will go wrong.
   - one version of Murphy's Law that if something can go wrong, it will.
3. Calculate the Most Likely Time (MLT) that will be needed to perform the task.
   - The time required under normal circumstances.
4. Calculate the Expected Time (ET) as follows:

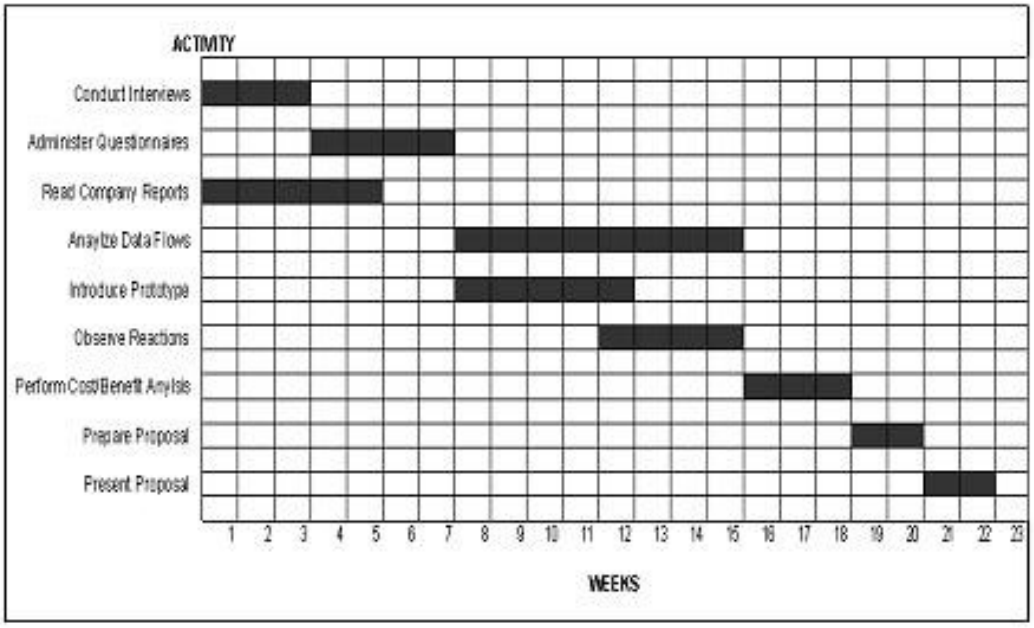
$$ET = \frac{OT + (4 \times MLT) + PT}{6}$$

Example:

ACTIVITY	PRE	TIME (weeks)
A. Conduct interview	NONE	3
B. Administer questioners	A	4
C. Read company reports	NONE	4
D. Analyze data flows	B, C	8
E. Introduce prototype	B, C	5
F. Observe reactions	E	3

G. Perform Cost-benefit analysis	D	3
H. Prepare proposal	G	2
I. Present proposal	H	2

SAMPLE GANTT CHART



2. PERT/CPM Charts

A. PERT

- is a graphic networking technique.
- stands for Project Evaluation and Review Technique.
- Was developed in the late 1950s to plan and control large weapons development projects for the U.S. Navy.
- It was developed to make clear the interdependence of project tasks when projects are being scheduled.
- it is a chart that depict task, duration, and dependency information
- In planning, the PERT chart aids in determining the estimated time required to complete a given project, in deriving actual project dates, and in allocating resources.
- The primary uses and advantages of the PERT chart lie in its ability to assist in the planning and controlling of projects.
- As a control tool, the PERT chart helps the manager identify current and potential problems.

B. CPM

- Critical Path Method
- method of evaluation and managing large projects by isolating tasks, milestone events, and schedules and by showing interrelationships between them
- line connecting crucial events, any of which, if delayed, effects subsequent events, and ultimately, the completion of the project
- Particular attention should be paid to the critical path of a project.
- When a project manager identifies a critical task that is running behind schedule and that is in danger of upsetting the entire project schedule, alternative courses of action are examined.
- The critical path is a sequence of dependent project tasks that have the largest sum of estimated durations.

- Each task appearing on the critical path is referred to as a critical task.
- Critical tasks must be monitored closely by the project manager because any delays in those tasks will delay the entire project.

- The slack time available for any task is equal to the difference between the earliest and latest completion times.
- Tasks that have slack time can get behind schedule by an amount less than or equal to that slack time without having any impact on the project's final completion date.
- Understanding the critical path and slack resources in a project are indispensable to the project manager.

PERT versus Gantt Charting:

PERT is usually recommended for larger projects with high intertask dependency. Gantt is recommended for simpler projects. PERT and Gantt charts can be used in a complementary manner to plan, schedule, evaluate, and control systems development projects. Most information systems project managers seem to prefer Gantt charts because of their simplicity and ability to show the schedule of a project.

Important Abbreviations:

OT = optimistic time
MLT = most likely time
ES = Earliest Start Time
LS = Latest Start Time
PRE = Predecessor
PT = pessimistic time
ET = estimated time
EF = Earliest Forward Time
LF = Latest Forward Time
SLACK = $|LF| - |EF|$ OR $|LS| - |ES|$

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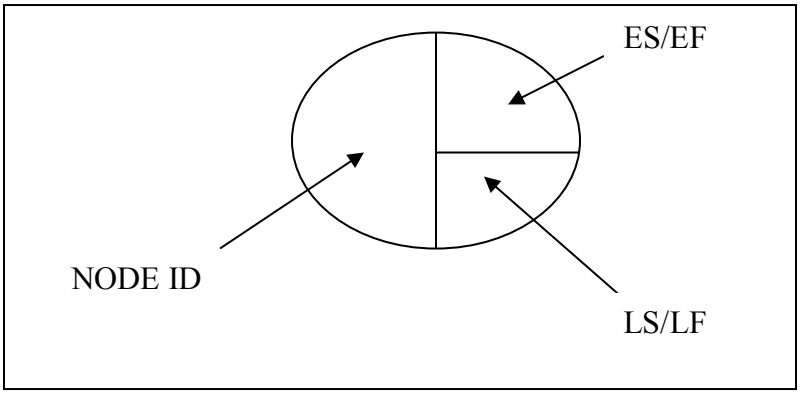


Example:

ACTIVITY	PRE	OT	MLT	PT
A	NONE	3	6	15
B	NONE	2	5	14
C	A	6	12	30
D	A	2	5	8
E	C	5	11	17
F	D	3	6	15
G	B	3	9	27
H	E, F	1	4	7
I	G	4	19	28

Requirement:

1. From the data above, solve for the Estimated Time (ET) in number of days.
2. Construct a PERT Diagram.
3. Identify the Critical Path.
4. Look for the ES, EF, LF, LS and the Slack Time.

Solution 1:

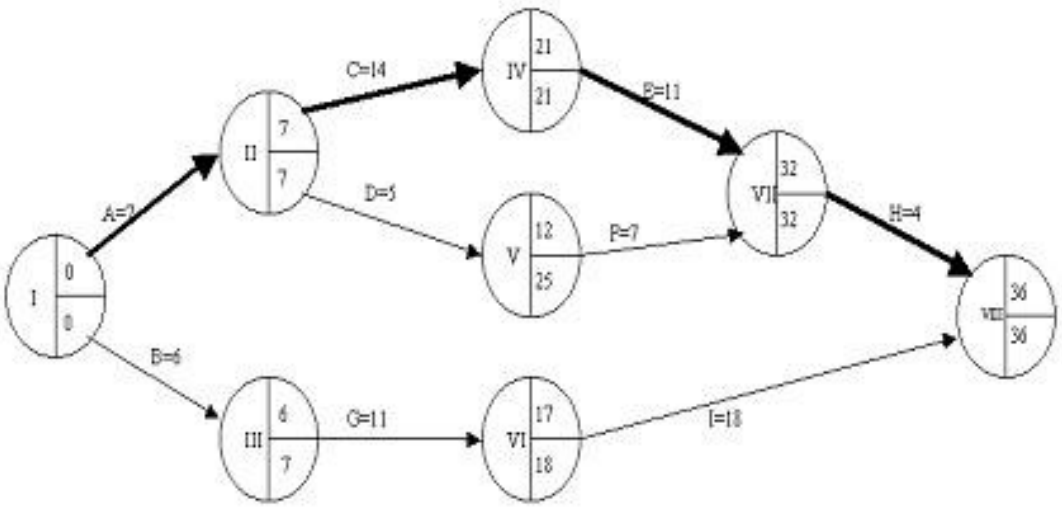
$$ET = \frac{OT + (4 \times MLT) + PT}{6}$$

$$A = \frac{3 + (4 \times 6) + 15}{6}$$

$$= 7$$

Solution 2:

The PERT DIAGRAM



Critical Path: A – C – E – H = 36
Other Paths: A – D – F – H = 23
B – G – I = 35

Solution 3:

Critical Path = A – C – E – H ⟶

Solution 4:

ACTIVITY	PRE	OT	MLT	PT	ET	ES	EF	LS	LF	SLACK
A	NONE	3	6	15	*7*	*0*	*7*	*0*	*7*	*0*
B	NONE	2	5	14	*6*	*0*	*6*	*1*	*7*	*1*
C	A	6	12	30	*14*	*7*	*21*	*7*	*21*	*0*
D	A	2	5	8	*5*	*7*	*12*	*20*	*25*	*13*
E	C	5	11	17	*11*	*21*	*32*	*21*	*32*	*0*
F	D	3	6	15	*7*	*12*	*19*	*25*	*32*	*13*
G	B	3	9	27	*11*	*6*	*17*	*7*	*18*	*1*
H	E, F	1	4	7	*4*	*32*	*36*	*32*	*36*	*0*
I	G	4	19	28	*18*	*17*	*35*	*18*	*36*	*1*

PRACTICE THIS.

ID	Task Name	Predecessors		O (min)	M (most likely)	P (max)
10	Start					
100	PHASE 1	140				
110	Task A	10		2	4	6
120	Task B	10		3	5	9
130	Task C	110		4	5	7
140	Task D	110		4	6	10
200	PHASE 2	220	230			
210	Task E	120	130	4	5	7
220	Task F	140		3	4	8
230	Task G	210		3	5	8

Requirement:

1. From the data above, solve for the Estimated Time (ET) in number of days.
2. Construct a PERT Diagram.
3. Identify the Critical Path.
4. Look for the ES, EF, LF, LS and the Slack.
5. Make a Gantt Chart.

Prepare your solution. This problem will come out in Quiz 4-A.