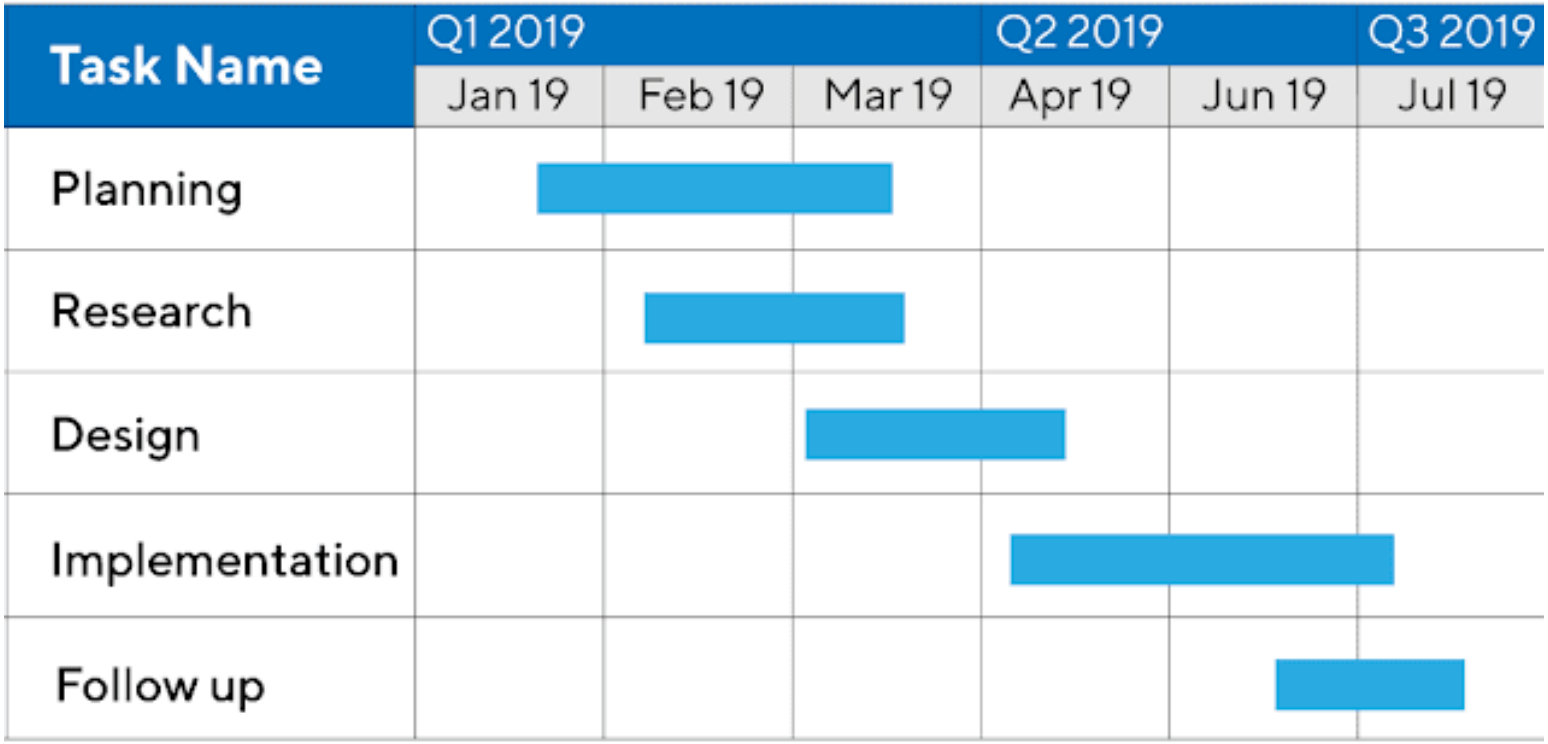
Chapter 2

Bar Charts and Milestone Charts

Tools or Techniques of Project Management

- Bar charts and Milestone charts
- Network diagrams

What is Bar Chart?



A bar chart, also known as a Gantt chart, introduced by Henry Gantt in 1900 AD, is a visual representation of a project schedule that is commonly used in project management. It displays the timeline of a project, along with the start and end dates of individual tasks or activities, using horizontal bars.

Why Bar Charts

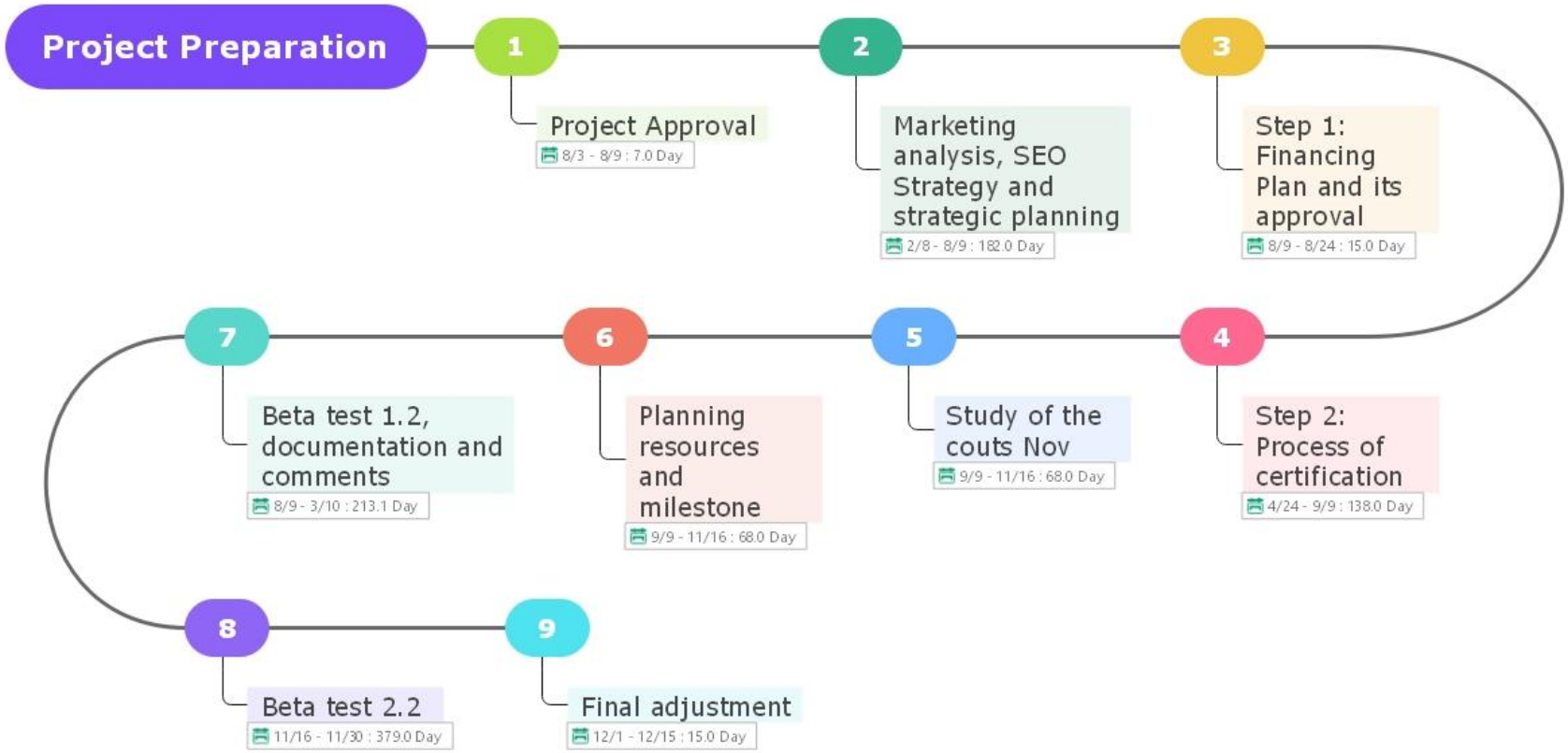
Some of the benefits of using bar charts in project planning:

1. **Visual representation:** Bar charts provide a visual representation of project tasks and their duration, making it easier to understand the project timeline and identify potential issues.
2. **Task dependencies:** Bar charts can also show the dependencies between tasks, helping project managers to identify critical paths and ensure that tasks are completed in the correct order.
3. **Resource allocation:** Bar charts can be used to allocate resources and ensure that team members are assigned tasks according to their availability and skill set.

4. **Progress tracking:** Bar charts can be updated to reflect the progress of tasks, enabling project managers to track the status of the project and identify any delays or issues that need to be addressed.
5. **Communication:** Bar charts can be shared with stakeholders and team members to keep everyone informed about the project status and progress.

Overall, bar charts are a useful tool for project planning and management as they provide a clear visual representation of the project timeline, dependencies, and progress.

Milestone charts



A milestone chart is a modified version of a bar chart that is used in project planning to show major project milestones or events. Unlike a bar chart, which shows the duration of individual tasks or activities, a milestone chart shows only the start or end dates of major project milestones.

Why Milestone Charts

Some of the benefits of using milestone charts:

1. **Focus on key events:** Milestone charts focus on the key events or milestones of a project, rather than the individual tasks. This can help project managers to keep the project on track and ensure that key milestones are achieved on time.
2. **Communication:** Milestone charts can be used to communicate the project timeline and milestones to stakeholders and team members, providing a clear and concise summary of the project status.
3. **Identify critical milestones:** Milestone charts can help project managers to identify the critical milestones of a project and ensure that they are given sufficient attention and resources.

4. **Monitoring progress:** Milestone charts can be used to monitor progress towards key project milestones, enabling project managers to identify any delays or issues that need to be addressed.
5. **Flexibility:** Milestone charts can be easily updated as the project progresses, enabling project managers to adapt to changing circumstances and ensure that the project stays on track.

Overall, milestone charts are a useful tool for project planning and management as they provide a clear overview of the project timeline and milestones, enabling project managers to monitor progress and ensure that key milestones are achieved on time.

Why Milestone Charts in place of Bar Charts?

Bar charts, also known as Gantt charts, are commonly used in project planning and management. Here are some of the benefits of using bar charts in project planning:

- **Focus on key events:** Milestone charts focus on the key events or milestones of a project, which can be more important to stakeholders than the individual tasks. In contrast, bar charts show all tasks, which can be overwhelming and less effective in highlighting the most important events.
- **Simplification:** Milestone charts are simpler and easier to read than bar charts, as they only show key events and milestones. This can be helpful for stakeholders who may not be familiar with project management tools or terminology.
- **Better communication:** Milestone charts can be more effective in communicating the overall project status and progress to stakeholders, as they provide a clear and concise summary of the project timeline and key events.

- **Greater flexibility:** Milestone charts can be more flexible than bar charts when changes occur in the project timeline. They are easier to modify without causing confusion among team members, stakeholders, or clients.
- **Better alignment with project objectives:** Milestone charts are designed to align with project objectives and goals, highlighting the progress of the most important events. In contrast, bar charts may not be as effective in emphasizing key events and milestones that are critical to project success.

Overall, milestone charts may be a better choice than bar charts in certain situations, especially when the project timeline and milestones are more important than individual tasks, and when simpler and clearer communication is required.

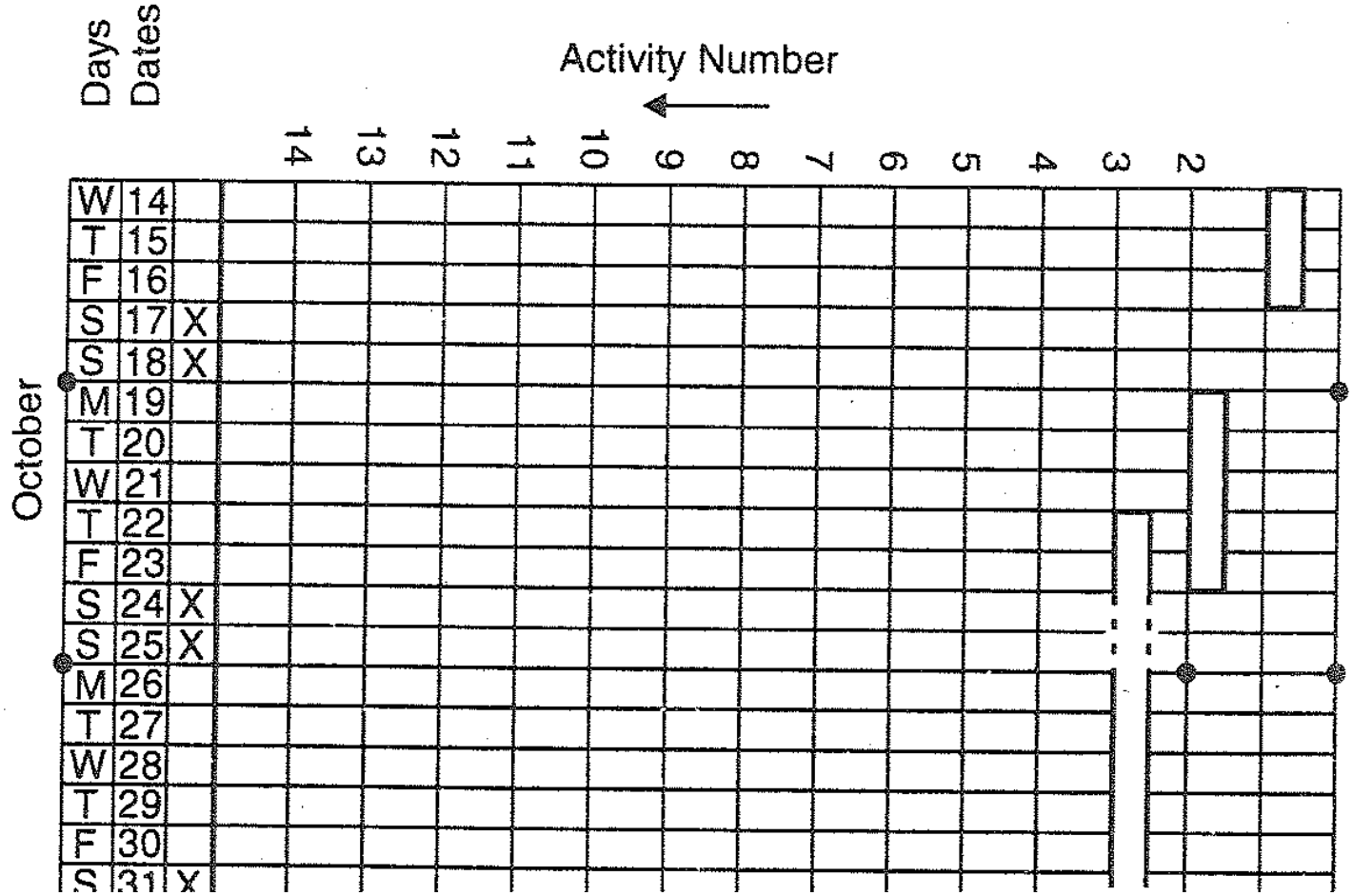
Bar Chart

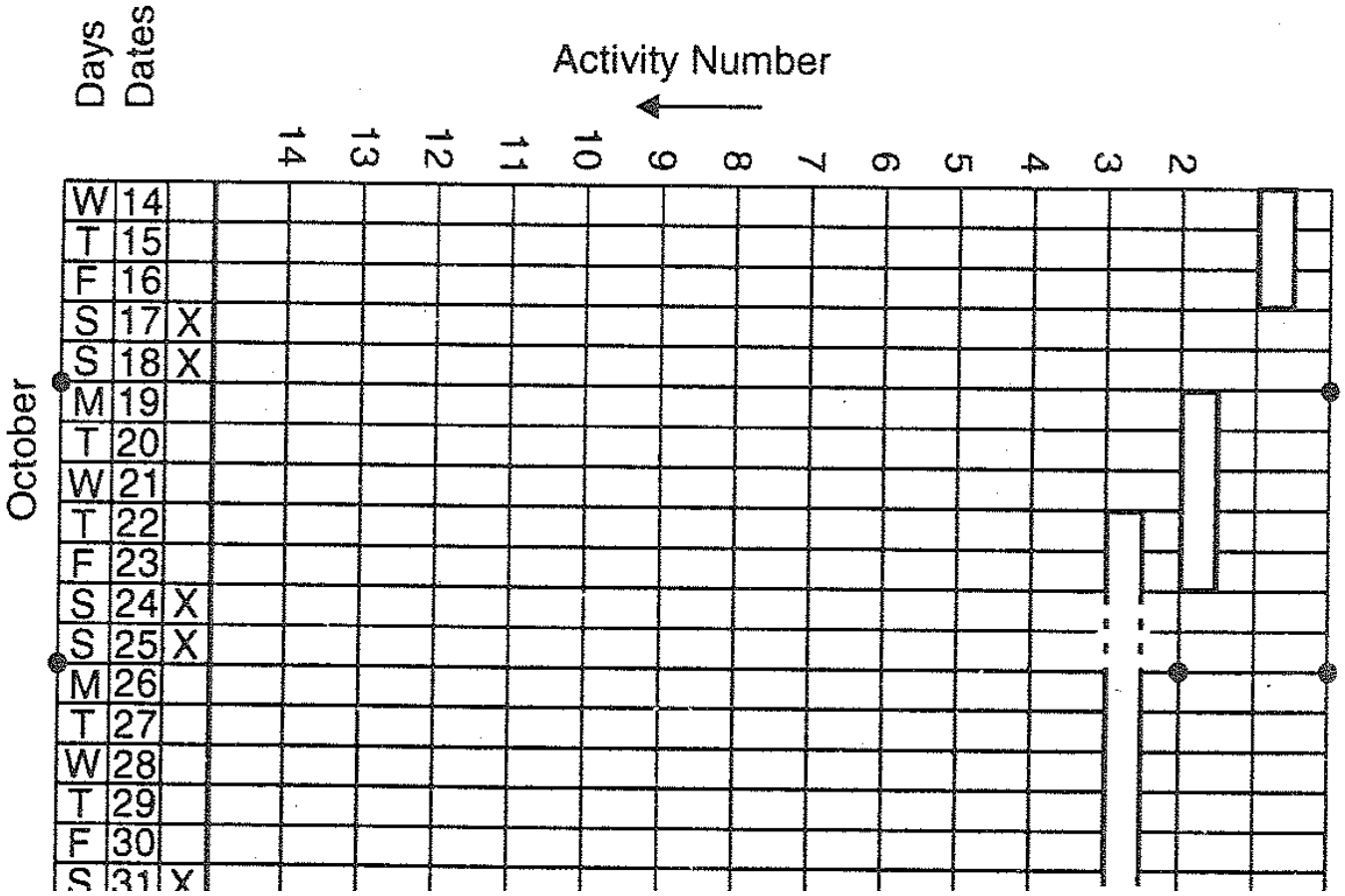
Example 2.3. *A typical small house construction project consists of the following operations along with the time set for its completion.*

S. No.	Operation	Time (in days)
1.	Survey, design and layout	3
2.	Construction of foundations	5
3.	Construction of super	
4.	Roofing	5
5.	Fixing doors and window frames	2
6.	Plumbing and house drainage	3
7.	Electric fitting	3
8.	Plastering	4
9.	Flooring	4
10.	Carpentry work	4
11.	Construction of boundary wall and other minor items	3
12.	Land shaping and clearing	2
13.	White washing of walls and painting of doors	3
14.	Inauguration	1

The project commences on Wednesday, 14th October. Assuming five working days in a week, prepare bar chart of the project.

State the assumptions made. Also determine (a) total time, and date of completion of the project (b) expected progress by 10th November.




Days
Dates
Activity Number
14
13
12
11
10
9
8
7
6
5
4
3
2
October
W 14
T 15
F 16
S 17 X
S 18 X
M 19
T 20
W 21
T 22
F 23
S 24 X
S 25 X
M 26
T 27
W 28
T 29
F 30
S 31 X

the following assumptions regarding the sequence of various activities :

(*i*) Activity 2 can start only after activity is 1 over.

(*ii*) Activity 3 can start even when half the work of activity 2 is over.

(*iii*) Activity 4 and 5 can start concurrently, but only after activity 3 is over.

(*iv*) Activity 6 and 7 can start concurrently, but only after activity 5 is complete.

(*v*) Activity 8 can start only after activities 6 and 7 are complete.

(*vi*) Activity 9 can start even when half of activity 8 is over.

(*vii*) Activity 10 can start only when activity 9 is over.

(*viii*) Activity 11 can start only when activity 8 is over.

(*ix*) Activity 12 can start only when activity 11 is over.

(*x*) Activity 13 can start even when activity 10 is half over.

(*xi*) Activity 14 is the last activity which marks the completion of the project.

Cross (×) denotes the day on which there will be no construction work.

From the bar chart shown in Fig. 2.5, we find that project will be complete on 30th November—48 days after its start. Also, the progress upto 10th November will be as follows :

(*a*) Activities 1, 2, 3 and 5 will be completely over.

(*b*) Activities 4, 6 and 7 will have 2 days work left.

Network Diagrams

Network methods, also known as network analysis or critical path analysis, are a set of techniques used in project planning to identify the critical path and optimize the project schedule. The two most commonly used network methods are the Program Evaluation and Review Technique (PERT) and the Critical Path Method (CPM).

The PERT method involves breaking down a project into a series of tasks or activities, estimating the time required for each task, and identifying the dependencies between tasks.

The project schedule is then created by using a probabilistic model to estimate the probability of completing each task on time, and by using a network diagram to identify the critical path - the sequence of tasks that must be completed on time in order to complete the project on schedule.

Both PERT and CPM are useful tools for project planning and management, as they provide a clear and concise view of the project schedule and help to identify potential bottlenecks or delays. They are particularly useful for large and complex projects, where many tasks are interdependent and must be completed in a specific sequence.

What is PERT?

PERT (Program Evaluation and Review Technique) is a project management tool used to plan, schedule, and control complex projects. PERT was developed in the 1950s by the U.S. Navy to manage the Polaris submarine missile program.

PERT is designed to help project managers identify the critical path of a project, which is the sequence of activities that must be completed on time for the project to be completed within its deadline. PERT uses a network diagram to represent the project and the relationships between the activities.

The PERT diagram includes the following elements:

- **Activities:** Each activity is represented by a node on the diagram, and the arrows between the nodes show the sequence in which the activities must be completed.
- **Duration:** Each activity is assigned a duration, which is the time required to complete the activity.
- **Dependencies:** The arrows between the nodes show the dependencies between the activities. For example, an activity may not start until another activity is completed.

- **Critical path:** The critical path is the sequence of activities that must be completed on time for the project to be completed within its deadline. The critical path is determined by calculating the longest path through the network diagram.
- **Slack time:** Slack time is the amount of time an activity can be delayed without affecting the project deadline.

What is CPM?

CPM (Critical Path Method) is a project management tool used to plan, schedule, and control complex projects. CPM was developed in the late 1950s by DuPont Corporation to manage plant maintenance projects.

CPM is designed to help project managers identify the critical path of a project, which is the sequence of activities that must be completed on time for the project to be completed within its deadline. CPM uses a network diagram to represent the project and the relationships between the activities.

CPM assumes that activity durations are deterministic, meaning that the duration of each activity is known with certainty. CPM uses this information to calculate the expected duration of the project and to identify the critical path.

CPM can also be used to calculate the earliest start time and earliest finish time for each activity, the latest start time and latest finish time for each activity, and the total float time for each activity.

The CPM diagram includes the following elements:

- **Activities:** Each activity is represented by a node on the diagram, and the arrows between the nodes show the sequence in which the activities must be completed.
- **Duration:** Each activity is assigned a duration, which is the time required to complete the activity.
- **Dependencies:** The arrows between the nodes show the dependencies between the activities. For example, an activity may not start until another activity is completed.
- **Critical path:** The critical path is the sequence of activities that must be completed on time for the project to be completed within its deadline. The critical path is determined by calculating the longest path through the network diagram.
- **Slack time:** Slack time is the amount of time an activity can be delayed without affecting the project deadline.

PERT vs CPM

PERT (Program Evaluation and Review Technique) and CPM (Critical Path Method) are both project management tools used to plan and schedule activities in a project. While they share some similarities, they also have some differences.

Here are some key differences between PERT and CPM:

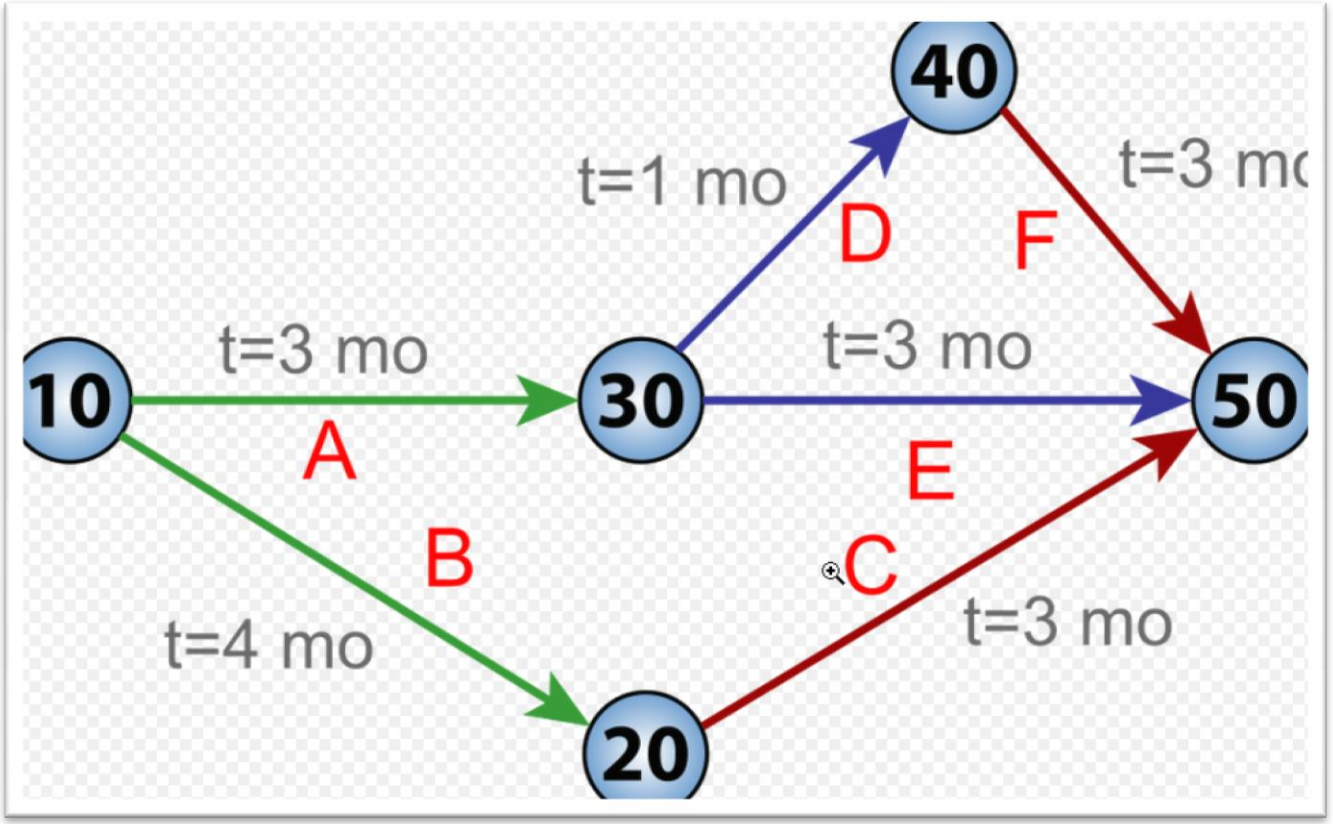
1. **Focus:** PERT is primarily used for projects where the time required for each activity is uncertain. It is designed to handle projects with a high degree of uncertainty. CPM, on the other hand, is used for projects where the time required for each activity is known with a high degree of certainty. It is designed to handle projects with a low degree of uncertainty.

2. **Network Diagram:** Both PERT and CPM use a network diagram to represent the activities in a project, but they differ in the way they are drawn. PERT uses a more complex diagram, with multiple arrows between nodes representing different possible outcomes for each activity. CPM uses a simpler diagram, with a single arrow between nodes representing a single outcome for each activity.
3. **Time Estimates:** PERT uses three time estimates for each activity: optimistic, most likely, and pessimistic. These estimates are used to calculate the expected time for each activity. CPM uses a single time estimate for each activity, based on historical data or expert judgment.

4. **Critical Path:** The critical path is the sequence of activities that must be completed on time in order to complete the project on time. In PERT, the critical path is determined by the activities with the longest expected duration. In CPM, the critical path is determined by the activities with the least amount of slack time.
5. **Probability:** PERT uses probability to calculate the likelihood of completing the project within a certain time frame. CPM does not use probability, but instead focuses on identifying the critical path and managing the schedule to ensure that the project is completed on time.

In summary, PERT is designed for projects with a high degree of uncertainty, while CPM is designed for projects with a low degree of uncertainty. PERT uses a more complex network diagram and multiple time estimates, while CPM uses a simpler diagram and a single time estimate. PERT calculates the probability of completing the project within a certain time frame, while CPM focuses on identifying the critical path and managing the schedule to ensure that the project is completed on time.

PERT Network Diagram



PERT network chart for a seven-month project with five milestones (10 through 50) and six activities (A through F).