PROJECT MANAGEMENT : NETWORK ANALYSIS (CPM & PERT)

What is a project?

- ✓A project is an interrelated set of activities that has definite starting and ending points and that result in a unique product or service
- ✓Cuts across organizational lines – they need varied skills of different profession
- ✓Uncertainties like new technology & external environment can change the character of the project
- ✓Personnel, materials, facilities etc. are temporarily assembled to accomplish a goal within a specified time frame and then disbanded
- ✓Upon finish, a project releases lot of resources which were engaged in execution of the project

Example of project

- ✓Planning a wedding
- ✓Designing and implementing a computer system
- ✓Hosting a holiday party
- ✓Designing and producing a brochure
- ✓Executing an environmental clean-up of a contaminated site
- ✓Holding a high school reunion
- ✓Performing a series of surgeries on an accident victim

Definition of project:

A project is a one shot, time limited, goal directed, major undertaking, requiring the commitment of varied skills & resources. It also describes project as a combination of human and non human resources pooled together in a temporary organization to achieve specific purpose

Project Attributes

A project:

- Has a unique purpose.
- Is temporary.
- Is developed using progressive elaboration.
- Requires resources, often from various areas.
- Should have a primary customer or sponsor.
  - The **project sponsor** usually provides the direction and funding for the project.
- Involves uncertainty.

Project and Program Managers

Project managers work with project sponsors, project teams, and other people involved in projects to meet project goals.

Program: "A group of related projects managed in a coordinated way to obtain benefits and control not available from managing them individually."*

Program managers oversee programs and often act as bosses for project managers.

Project management is "the application of knowledge, skills, tools and techniques to project activities to meet project requirements."*

Project Management Tools and Techniques

Project management tools and techniques assist project managers and their teams in various aspects of project management.

Specific tools and techniques include:

Project charters, scope statements, and WBS (scope).

Gantt charts, **network diagrams, critical path analyses, critical chain scheduling (time).**

Cost estimates and earned value management (cost).

NETWORK ANALYSIS

Network Analysis refers to a number of techniques for the planning and control of complex projects.

The two most frequently used forms of network planning are:

1. Programme Evaluation and Review Technique (PERT)
2. Critical Path Method (CPM)

WHAT IS A NETWORK?

A network is a graphical diagram consisting of certain configuration of “Arrows” (➔) and “Nodes” (●) for showing the logical sequence of various tasks to be performed to achieve the project objective.

PERT / CPM Techniques

The initial step in PERT/CPM project scheduling process is the determination of all specific activities that comprise the project and their relationships.

EXAMPLE

Activity	Description	Duration (in weeks)	Immediate predecessor
A	Obtain the budget approval	2	-
B	Obtain the machine	5	A
C	Hire the operator	1	A
D	Install the machine	1	B
E	Train the operator	6	C
F	Produce the goods	1	D,E

TERMS USED IN A NETWORK

1. Activity: An effort that is required to complete a part of the project. It is represented by "➔".

2. Node: It represents the beginning or completion of an activity. It is represented by "●"

RULES OF NETWORK CONSTRUCTION

1. Each defined activity is represented by one and only one arrow in the network.

2. Before an activity can be undertaken, all activities preceding it must be completed.

3. The arrows depicting various activities are indicative of logical procedure only. The length and bearing of the arrows are of no significance.

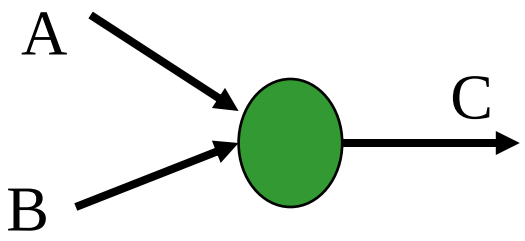
4. The arrow direction indicates the general progression in time. Head events and Tail events.

5. When a number of activities terminate at one event, it indicates that no activity emanating from that event may start unless all activities terminating there have been completed.

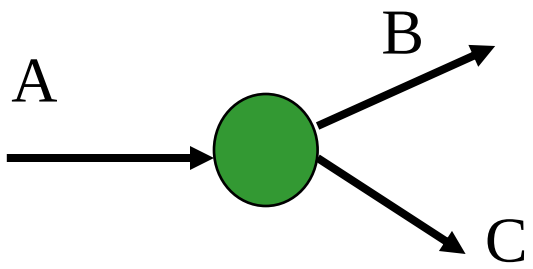
6. Events are identified by numbers.

7. The activities are identified by the numbers of their starting and ending events or by alphabets.

8. A network should have only one initial and terminal node.



Merge Event



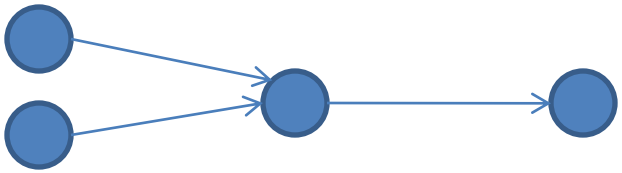
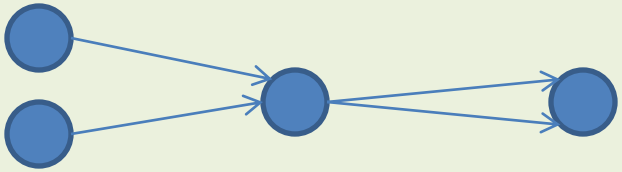
Burst Event

10. Parallel activities between two events, without intervening events, are prohibited. When two or more parallel activities in a project have the same head and tail events, dummy activities are needed in constructing the network.

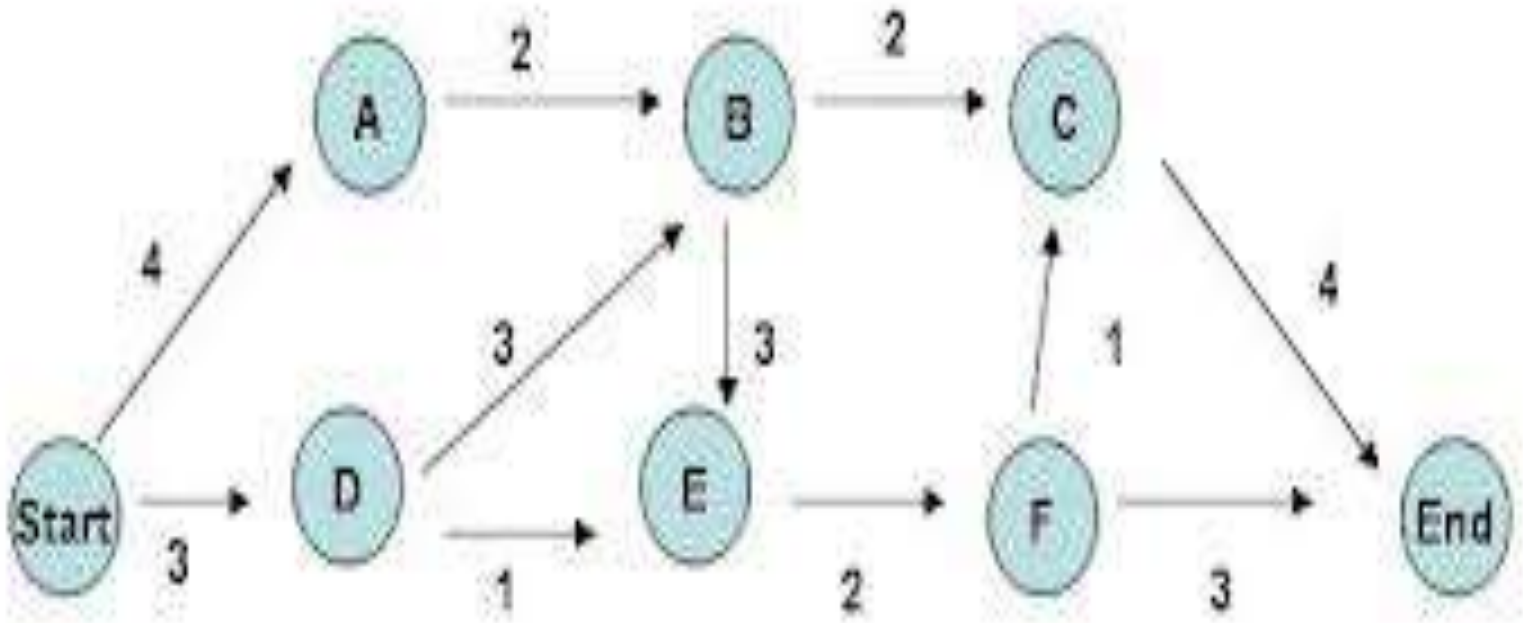
    Dummy activities do not consume time or resources. An efficient network contains a minimum number of dummy activities required to portray the correct precedence relationships.

11. Looping is not permitted in a network.

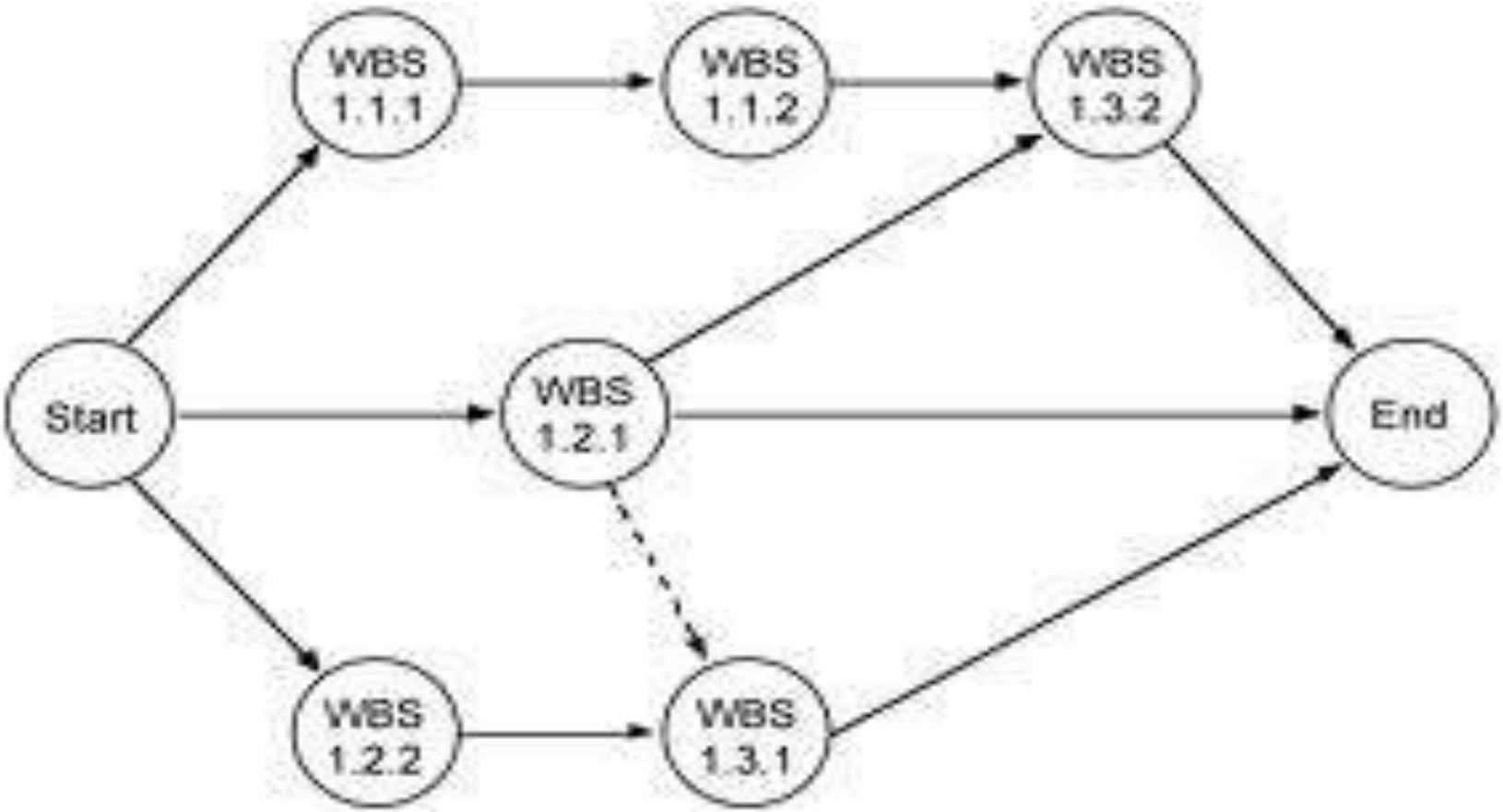
NETWORK SYMBOLS

SYMBOL	MEANING
	Activity
	Event
	Activity A must be completed before Activity B completed
	Activities A & B can occur concurrently, but both must be completed before activity C can begin
	Activities A & B must be completed before activities C & D can begin, but C can begin independently of D & vice versa

SAMPLE NETWORK



DUMMY ACTIVITY



CRITICAL PATH METHOD

CPM aims at the determination of the time to complete a project and the important activities on which a manager shall focus attention.

PROCEDURE

☞ Consider all the paths in a project, beginning with the start event and stopping at the end event.

☞ For each path, calculate the time of execution.

☞ The path with the largest time is called the critical path and the activities along this path are called critical activities or bottleneck activities.

THANK YOU