LECTURE 4

CPM Analysis for AOA

FERDINAND FASSA

OUTLINE LECTURE 4

- REVIEW LECTURE 3
- INTRODUCTION CPM
- Calculating the Critical Path

Terminology CPM

- ***Critical*** - Activities, events, or paths which, **IF DELAYED, WILL DELAY THE COMPLETION OF THE PROJECT.** A project's critical path is understood to mean that sequence of critical activities that connect the project's start event to its finish event

- ***Path*** - The series of connected activities (or intermediate events) between any two events in a network or

- ***Path*** - Any route along the network from start to finish

Critical Path Method

Critical Path – path with the longest total duration

This is the shortest time in which the project can be completed.

Critical Activity – an activity on the critical path

*If a critical activity is delayed, the entire project will be delayed. Close attention must be given to critical activities to prevent project delay. There may be more than one critical path.

CPM is a network diagramming technique used to **PREDICT TOTAL PROJECT DURATION**.

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- Each activity has four essential elements:
  - scope,
  - duration,
  - start, and
  - finish.

Calculating the Critical Path

- Develop a good network diagram.
- Add the duration estimates for all activities on each path through the network diagram.

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- The critical path does *not* necessarily contain all the critical activities; it only accounts for time.
- There can be more than one critical path if the lengths of two or more paths are the same.
- The critical path can change as the project progresses.

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Note:

- If one or more of the activities on the critical path takes longer than planned, the whole project schedule will slip. (*unless* the project manager takes corrective action).

Simple Example

Suppose that you meet with two friends and decide to go on a hunting trip.

- ✓ One friend will go to get the food,
- ✓ the other will go to get the hunting gear,
- ✓ and you will go to prepare your Jeep.

After each person finishes his or her assignment, you will drive together to the hunting location.

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suppose that:

the first activity (getting the food) requires 2 hours

the second activity (getting the hunting gear), 3 hours

and the third (getting the Jeep ready), 4 hours.

If all three activities started at 8:00 A.M. (when each of you would leave to perform his or her task),

the following activity (driving to the hunting location) cannot start until all three of you return

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If everything works according to plan,

- ✓ the first person will return with the food at 10:00 A.M.;
- ✓ the second, with the hunting gear, at 11:00 A.M.;
- ✓ and you, with the Jeep ready, at 12:00 P.M.

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Now, ask yourself the following question:

Which activity ‘‘drives,’’ or controls, the schedule?

1/2/3..??

The answer is the third activity (preparing the Jeep).

Any delay in your return will delay the trip (past 12:00 P.M.).

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In contrast,

- ✓ your first friend will have 2 extra hours to ‘‘waste,’’ and
- ✓ your second friend, 1 extra hour.

- ✓ They can choose to use the extra time however they like

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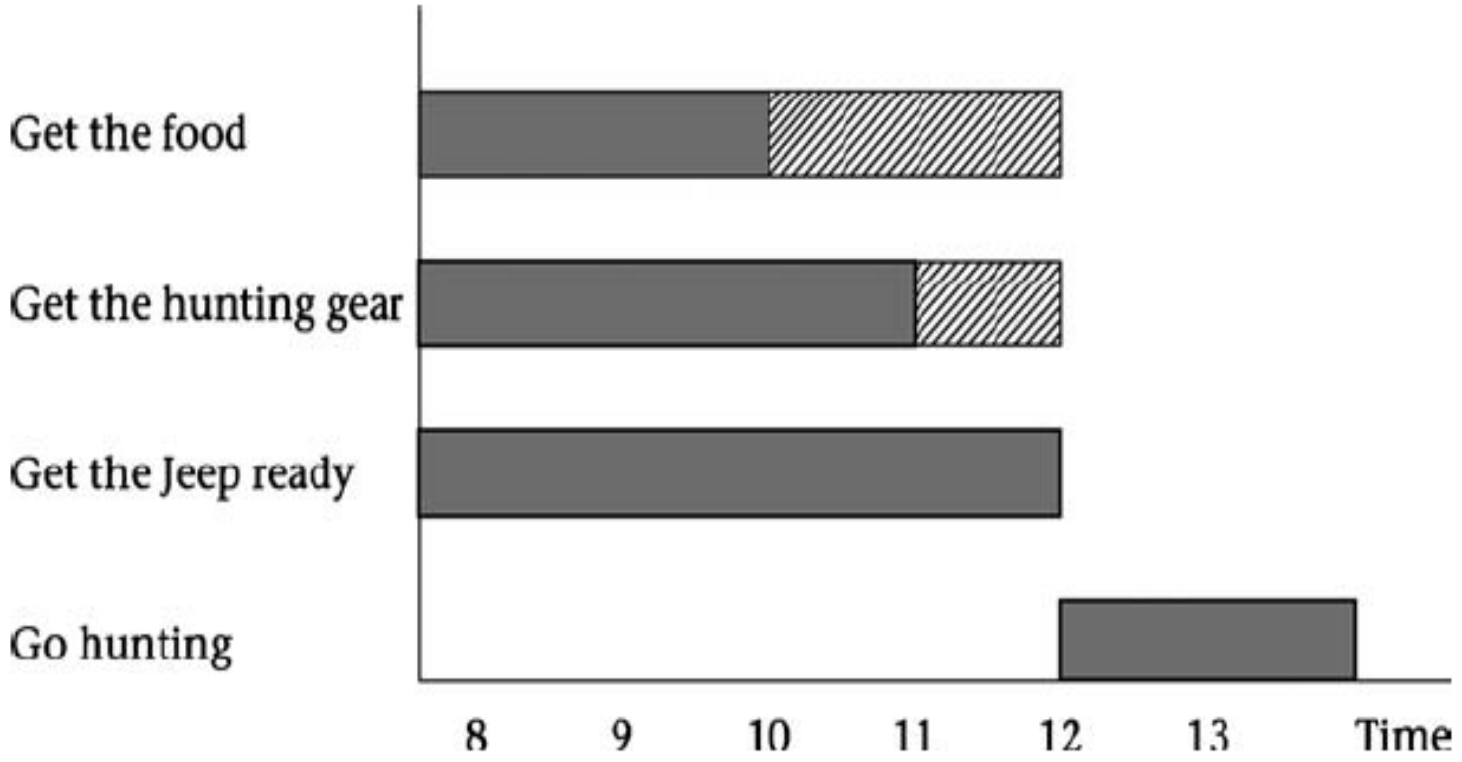

Figure 4.1 Bar chart for introductory hunting trip example

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For instance, they could do the following:

- Get an early start, finish early, then take a break
- Get a late start:
  - 10:00 A.M. for the first person and
  - 9:00 A.M. for the second and finish at 12:00 P.M.
- Take breaks between work periods

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- We will call this extra time **FLOAT.**
- Your friends will have to watch their time carefully
- so that they do not waste more time than the float that they have:
- 2 hours for the first person and 1 hour for the second.

float is the amount of time an activity can be delayed without delaying the early start of any immediately following activities.

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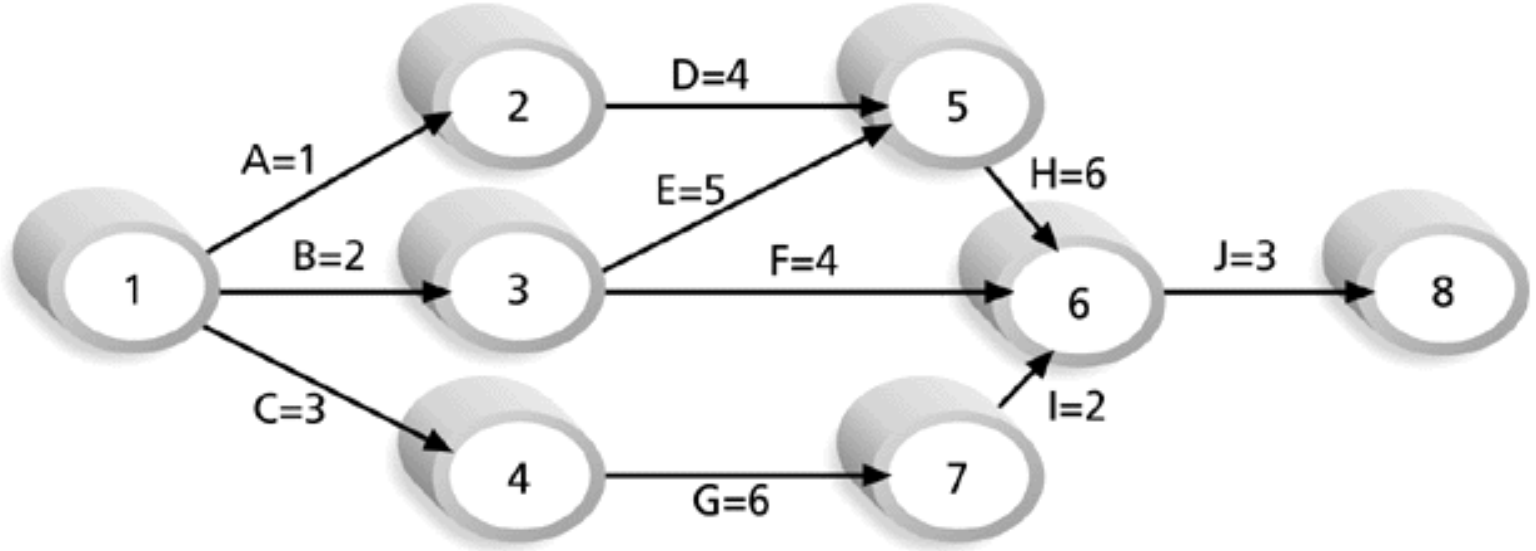
- Any delay past these float times will result in a delay in the entire schedule.
- You, however, have no float. You are running on a tight schedule. Your activity is critical.
- This scenario provides a simplified example of the **Critical Path Method (CPM).**

Figure 1 Determining the Critical Path for Project X



Note: Assume all durations are in days.

Path 1:	A-D-H-J	Length = 1+4+6+3 = 14 days
Path 2:	**B-E-H-J**	**Length = 2+5+6+3 = 16 days**
Path 3:	B-F-J	Length = 2+4+3 = 9 days
Path 4:	C-G-I-J	Length = 3+6+2+3 = 14 days

Since the critical path is the longest path through the network diagram, Path 2, B-E-H-J, is the critical path for Project X.

Using the Critical Path to Shorten a Project Schedule

- Two main techniques for shortening schedules:
  - **Shortening** the duration of critical activities or tasks by adding more resources or changing their scope.
  - **Fast tracking** activities by doing them in parallel or overlapping them.

Importance of Updating Critical Path Data

- It is important to update project schedule information to meet time goals for a project.
- The critical path may change as you enter actual start and finish dates.
- If you know the project completion date will slip, negotiate with the project sponsor.

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