Project Time Management

Importance of Project Schedules

- Managers often cite delivering projects on time as one of their biggest challenges.
- Project time management is often cited as the main source of conflict on projects, and most IT projects exceed time estimates.
- Main processes include:
  1. Activity definition
  2. Activity sequencing
  3. Activity resource estimating
  4. Activity duration estimating
  5. Schedule development
  6. Schedule control

Individual Work Styles and Cultural Differences Cause Schedule Conflicts

- One dimension of the Myers-Briggs Type Indicator focuses on people's attitudes toward structure and deadline.
- Some people prefer to follow schedules and meet deadlines while others do not.
- Different cultures and even entire countries have different attitudes about schedules.

WBS = work breakdown structure

1. Activity Definition

- An **activity** or **task** is an element of work normally found on the WBS that has an expected duration, a cost, and resource requirements.
- Project schedules grow out of the basic documents that initiate a project.
  - The project charter includes start and end dates and budget information.
  - The scope statement and WBS help define what will be done.
- Activity definition involves developing a more detailed WBS and supporting explanations to understand all the work to be done, so you can develop realistic cost and duration estimates.

Activity Lists and Attributes

- An **activity list** is a tabulation of activities to be included on a project schedule. The list should include:
  - The activity name
  - An activity identifier or number
  - A brief description of the activity
- **Activity attributes** provide more information about each activity, such as predecessors, successors, logical relationships, leads and lags, resource requirements, constraints, imposed dates, and assumptions related to the activity.

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Milestones

- A **milestone** is a significant event that normally has no duration.
- It often takes several activities and a lot of work to complete a milestone.
- Milestones are useful tools for setting schedule goals and monitoring progress.

2. Activity Sequencing

- Involves reviewing activities and determining dependencies.
- A **dependency** or **relationship** relates to the sequencing of project activities or tasks.
- You *must* determine dependencies in order to use critical path analysis.

Three Types of Dependencies

- **Mandatory dependencies**: Inherent in the nature of the work being performed on a project; sometimes referred to as hard logic.
- **Discretionary dependencies**: Defined by the project team; sometimes referred to as soft logic and should be used with care because they may limit later scheduling options.
- **External dependencies**: Involve relationships between project and non-project activities.

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Network Diagrams

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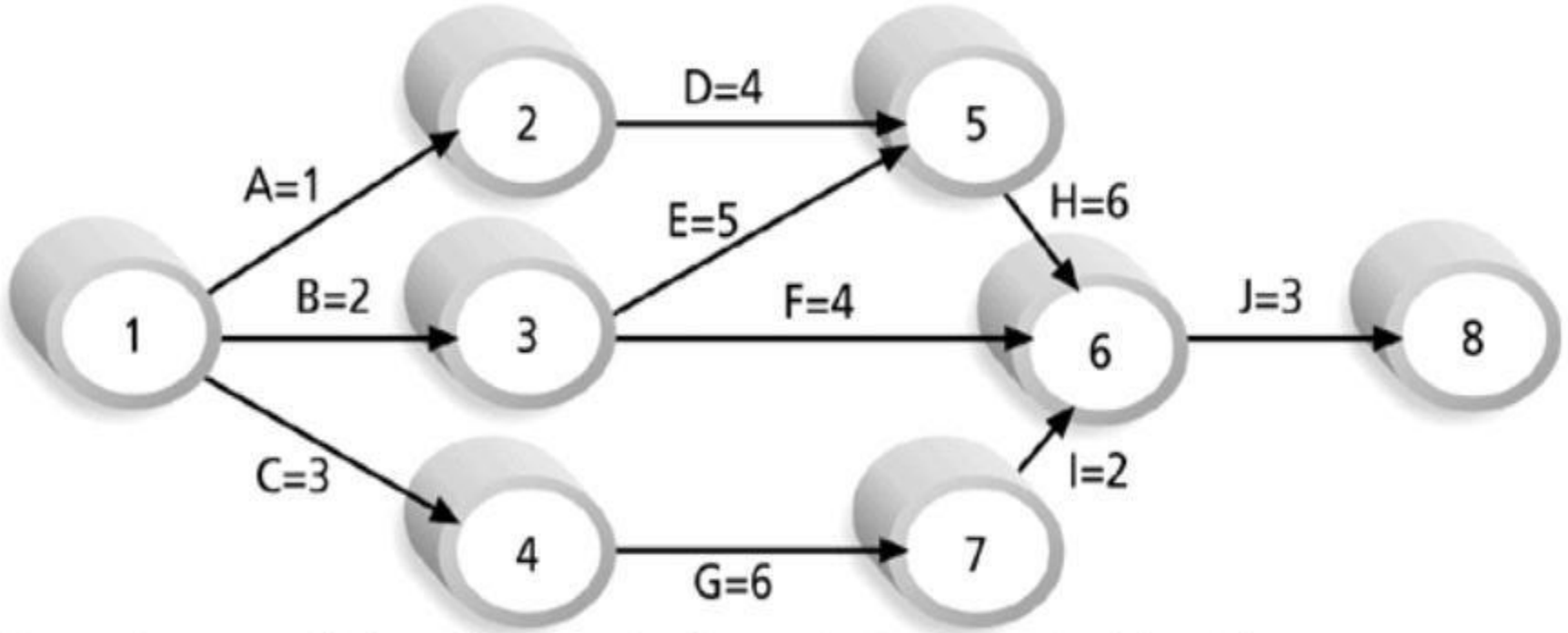
- Network diagrams are the preferred technique for showing activity sequencing.
- A **network diagram** is a schematic display of the logical relationships among, or sequencing of, project activities.
- Two main formats are the arrow and precedence diagramming methods.

Sample Activity-on-Arrow (AOA) Network Diagram for Project X



Note: Assume all durations are in days; A=1 means Activity A has a duration of 1 day.

3. Activity Resource Estimating

- Before estimating activity durations, you must have a good idea of the quantity and type of resources that will be assigned to each activity.
- Consider important issues in estimating resources:
  - How difficult will it be to complete specific activities on this project?
  - What is the organization's history in doing similar activities?
  - Are the required resources available?

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4. Activity Duration Estimating

- **Effort** is the number of workdays or work hours required to complete a task.

  Ex : Let's say you begin to paint your house. You work for 6 hours a day for 9 days. Your effort would then be the amount of time you take in a day multiplied by the number of days you work, which would be 54 hours. The effort you put in is 54 hours**.**

- **Duration** includes the actual amount of time worked on an activity *plus* the elapsed time.

  Ex : Above example Duration = 9 Days

- Effort does not normally equal duration.
- **Elapsed time** is the time between designating a resource to a task and the completion of the task. In simple terms, it is the passage of calendar days.

  Ex : you work on a construction project for eight days from Monday to the next Wednesday, with a weekend (Saturday and Sunday) in between. Your elapsed time is 10 days since the non-working days are also counted.

Three-Point Estimates

- Instead of providing activity estimates as a discrete number, such as four weeks, it's often helpful to create a **three-point estimate**:
  - – An estimate that includes an optimistic, most likely, and pessimistic estimate, such as three weeks for the optimistic, four weeks for the most likely, and five weeks for the pessimistic estimate.

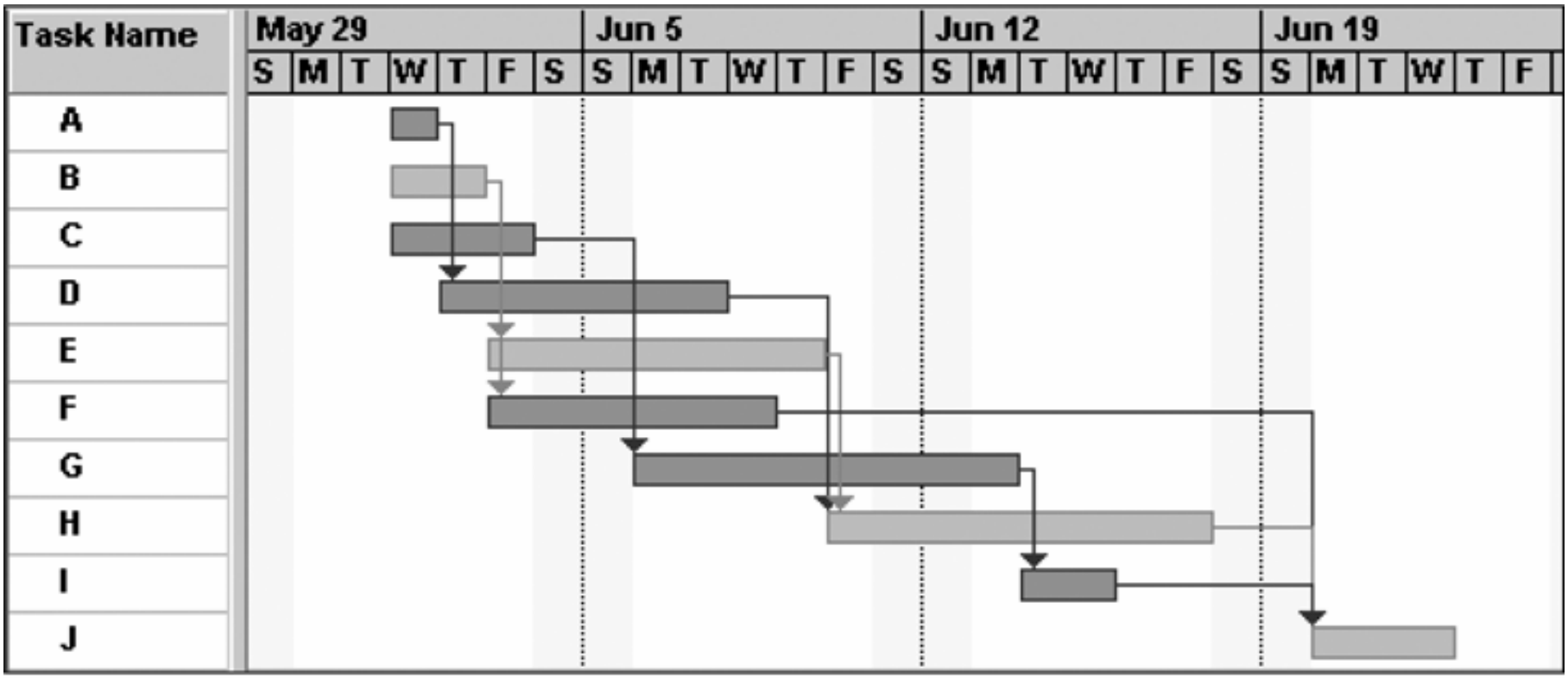
5. Schedule Development

- Uses results of the other time management processes to determine the start and end dates of the project.
- Ultimate goal is to create a realistic project schedule that provides a basis for monitoring project progress for the time dimension of the project.
- Important tools and techniques include Gantt charts, critical path analysis, critical chain scheduling, and PERT analysis.

Gantt Charts

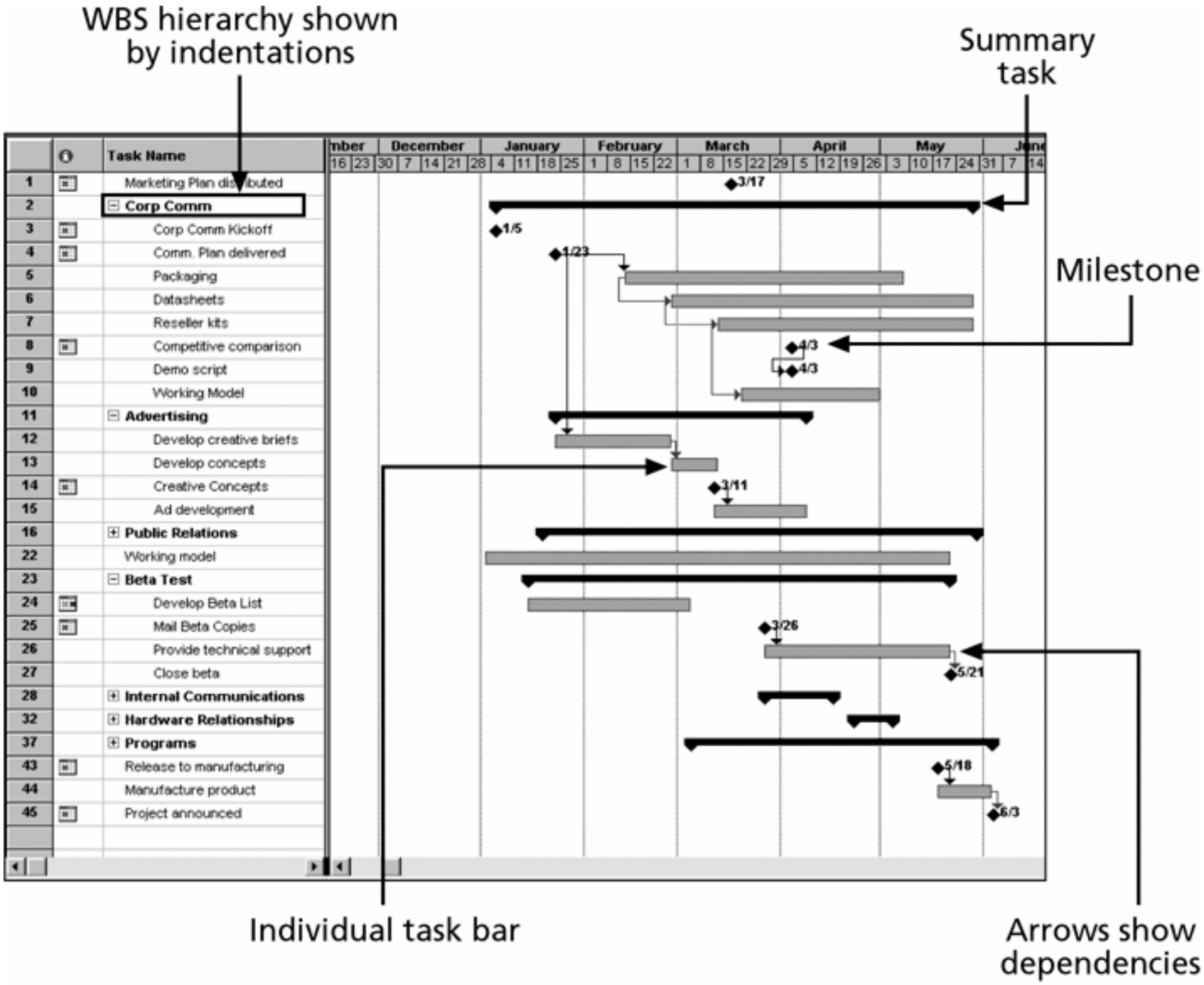
- **Gantt charts** provide a standard format for displaying project schedule information by listing project activities and their corresponding start and finish dates in a calendar format.
- Symbols include:
  - **Black diamonds**: Milestones
  - **Thick black bars**: Summary tasks
  - **Lighter horizontal bars**: Durations of tasks
  - **Arrows**: Dependencies between tasks

Gantt Chart for Project X



Note: In Project 2003 darker bars are red to represent critical tasks.

Gantt Chart for Software Launch Project



Adding Milestones to Gantt Charts

- Many people like to focus on meeting milestones, especially for large projects.
- Milestones emphasize important events or accomplishments in projects.
- You typically create milestone by entering tasks that have a zero duration, or you can mark any task as a milestone.

SMART Criteria

- Milestones should be:
  - **S**pecific
  - **M**easurable
  - **A**ssignable
  - **R**ealistic
  - **T**ime-framed

Critical Path Method (CPM)

- **CPM** is a network diagramming technique used to predict total project duration.
- A **critical path** for a project is the series of activities that determines the *earliest time* by which the project can be completed.
- The critical path is the *longest path* through the network diagram and has the least amount of slack or float.
- **Slack** or **float** is the amount of time an activity can be delayed without delaying a succeeding activity or the project finish date.

Calculating the Critical Path

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

Determining the Critical Path for Project X

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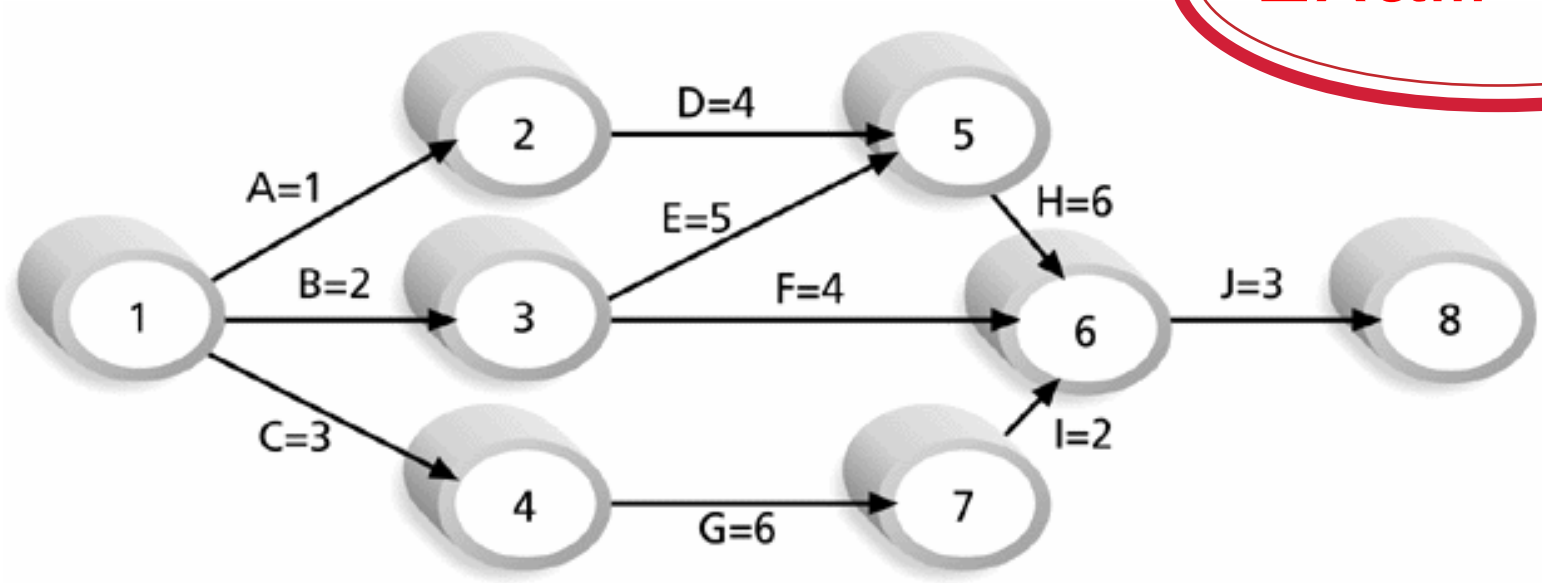

Note: Assume all durations are in days.

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

- Three main techniques for shortening schedules:
  - **Shortening** the duration of critical activities or tasks by adding more resources or changing their scope.
  - **Crashing** activities by obtaining the greatest amount of schedule compression for the least incremental cost.
  - **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.

Program Evaluation and Review Technique (PERT)

- PERT is a analysis technique used to estimate project duration when there is a high degree of uncertainty about the individual activity duration estimates.
- PERT uses **probabilistic time estimates**:
  - Duration estimates based on using optimistic, most likely, and pessimistic estimates of activity durations, or a three-point estimate.

PERT Formula and Example

- PERT weighted average **=**

$$\frac{\text{optimistic time} + 4\text{X most likely time} + \text{pessimistic time}}{6}$$

- Example:

PERT weighted average =

$$\frac{8 \text{ workdays} + 4 \text{ X } 10 \text{ workdays} + 24 \text{ workdays}}{6} = \textbf{12 days}$$

where:

optimistic time= 8 days

most likely time = **10 days**

pessimistic time = 24 days

Therefore, you'd use **12 days** on the network diagram instead of 10 when using PERT for the above example.

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6. Schedule Control

- Perform reality checks on schedules.
- Allow for contingencies.
- Don’t plan for everyone to work at 100 percent capacity all the time.
- Hold progress meetings with stakeholders and be clear and honest in communicating schedule issues.

Schedule Control

- Goals are to know the status of the schedule, influence factors that cause schedule changes, determine that the schedule has changed, and manage changes when they occur.
- Tools and techniques include:
  - Progress reports.
  - A schedule change control system.
  - Project management software, including schedule comparison charts, such as the tracking Gantt chart.
  - Variance analysis, such as analyzing float or slack.
  - Performance management, such as earned value

Summary

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