PROJECT TIME MANAGEMENT

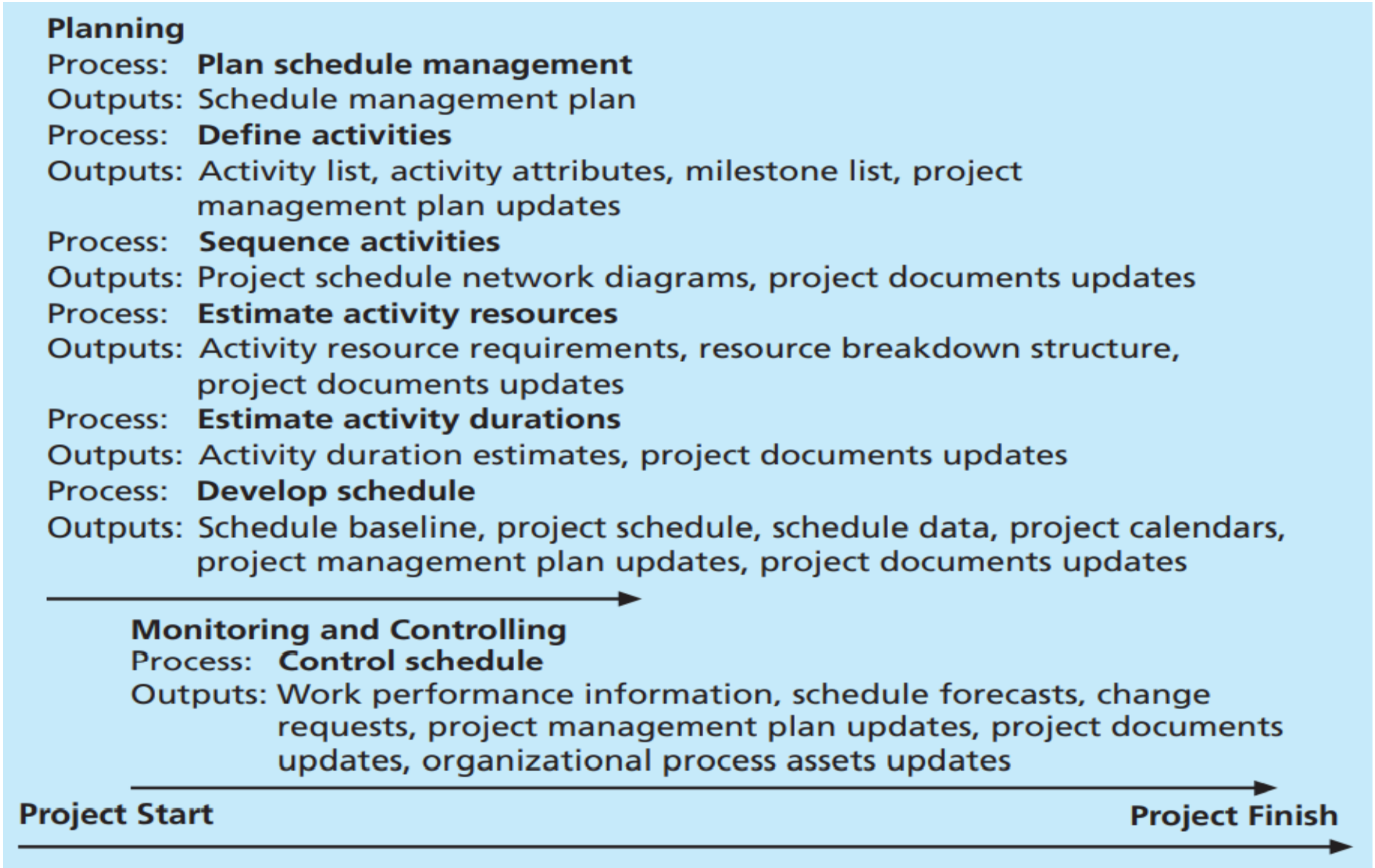
Definition

Project time Management?

The processes required to ensure timely completion of a project.

Processes in Project Time Management

- Planning schedule management
- Defining activities
- Sequencing Activities
- Estimating Activity Resources
- Estimating Activity duration
- Developing the Schedule
- Controlling the Schedule


Planning
Process: Plan schedule management
Outputs: Schedule management plan
Process: Define activities
Outputs: Activity list, activity attributes, milestone list, project management plan updates
Process: Sequence activities
Outputs: Project schedule network diagrams, project documents updates
Process: Estimate activity resources
Outputs: Activity resource requirements, resource breakdown structure, project documents updates
Process: Estimate activity durations
Outputs: Activity duration estimates, project documents updates
Process: Develop schedule
Outputs: Schedule baseline, project schedule, schedule data, project calendars, project management plan updates, project documents updates
Monitoring and Controlling
Process: Control schedule
Outputs: Work performance information, schedule forecasts, change requests, project management plan updates, project documents updates, organizational process assets updates
Project Start
Project Finish

Planning Schedule Management

- Project schedule model development
- The schedulling methodology
- Level of accuracy and units of measure
- Control threshold
- Rules of performance measurements
- Reporting format
- Process descriptions

Defining Activities

Defining activities : identifying the specific actions that will produce the project deliverables in enough detail to determine resource and schedule estimates.

Activity list: A tabulation of activities to be included on a project schedule

Activity attributes: schedule-related information about each activity, such as predecessors, successors, logical relationships, leads and lags, resource requirements, constraints, imposed dates, and assumptions related to the activity

Sequencing Activities

Inputs: the schedule management plan, activity list and attributes, project scope statement, milestone list, and organizational process asset

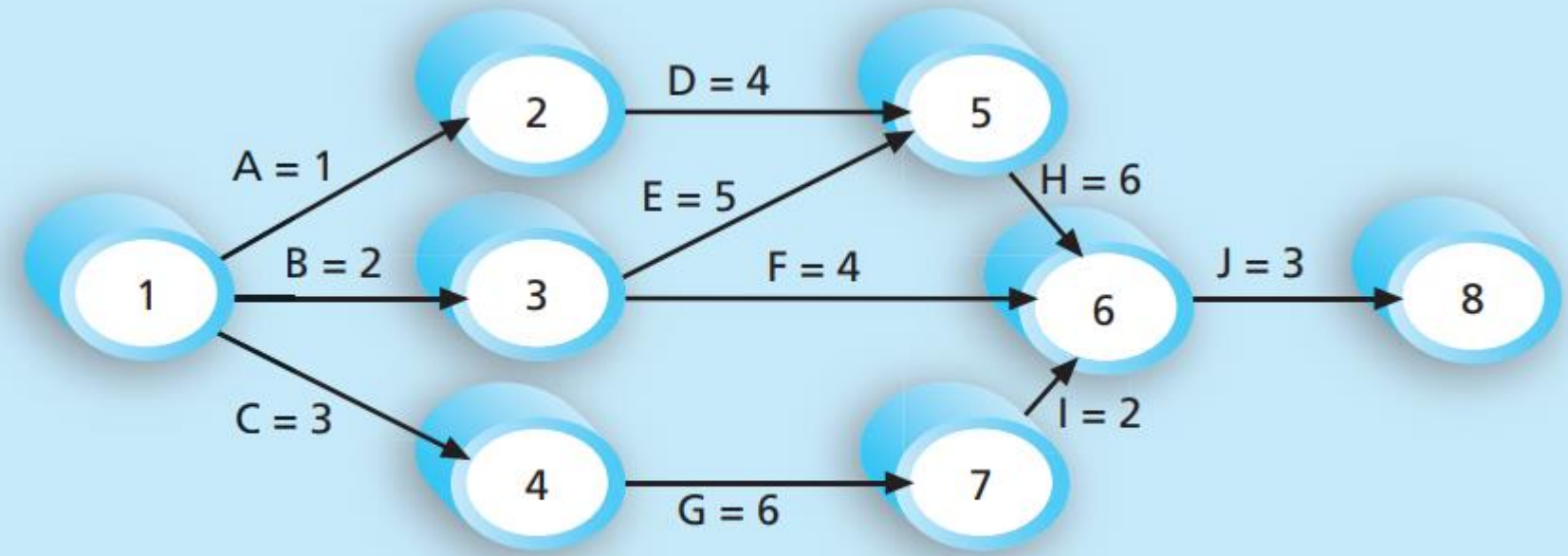
A dependency or relationship: the sequencing of project activities or tasks.

Basic reasons for creating dependencies

- Mandatory Dependencies
- Discretionary Dependencies
- External Dependencies

Network Diagrams

A network diagram: a schematic display of the logical relationships among project activities and their sequencing



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

Arrow Diagramming Method (ADM)

Also called activity-on-arrow (AOA) network diagrams

Activities are represented by arrows

Nodes or circles are the starting and ending points of activities

Process for Creating AOA Diagrams

1. Find all of the activities that start at node 1: Draw their finish nodes and draw arrows between node 1 and those finish nodes; put the activity letter or name and duration estimate on the associated arrow
2. Continue drawing the network diagram, working from left to right: Look for bursts and merges
   - **Bursts** occur when a single node is followed by two or more activities
   - A **merge** occurs when two or more nodes precede a single node
3. Continue drawing the project network diagram until all activities are included on the diagram that have dependencies
4. As a rule of thumb, all arrowheads should face toward the right, and no arrows should cross on an AOA network diagram

Precedence Diagramming Method (PDM)

Also called activity-on-node (AON) network diagrams

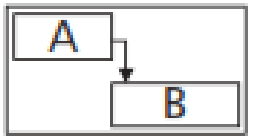
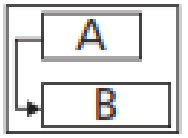
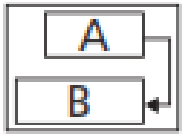
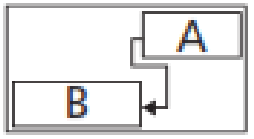
Activities are represented by boxes

Arrows show relationships between activities

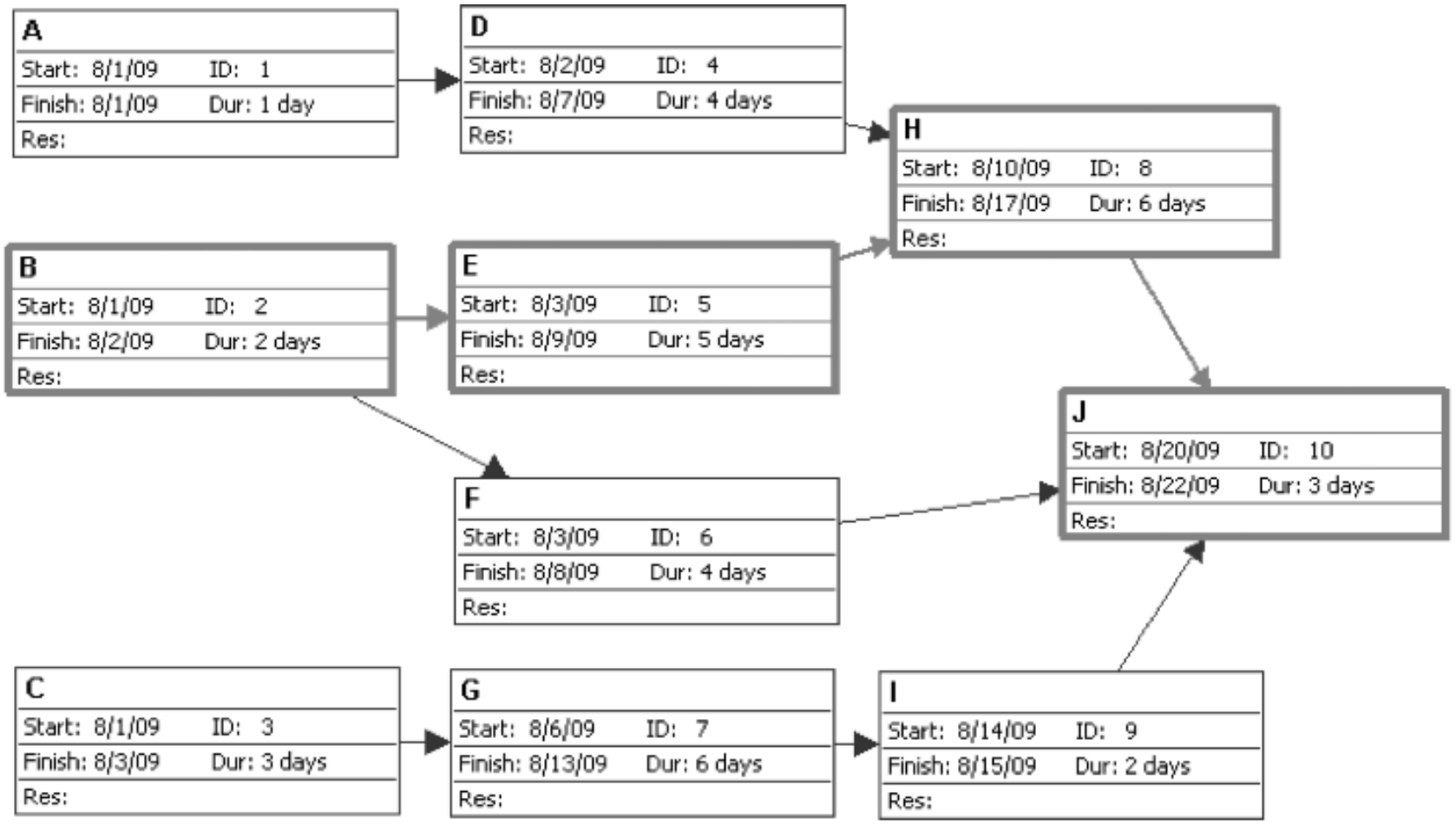
Task Dependency Types

Task dependencies

The nature of the relationship between two linked tasks. You link tasks by defining a dependency between their finish and start dates. For example, the "Contact caterers" task must finish before the start of the "Determine menus" task. There are four kinds of task dependencies in Microsoft Project.

Task dependency	Example	Description
Finish-to-start (FS)		Task (B) cannot start until task (A) finishes.
Start-to-start (SS)		Task (B) cannot start until task (A) starts.
Finish-to-finish (FF)		Task (B) cannot finish until task (A) finishes.
Start-to-finish (SF)		Task (B) cannot finish until task (A) starts.

Sample PDM Network Diagram



Activity Resource Estimating

Inputs: a project's schedule management plan, activity list, activity attributes, resource calendars, risk register, activity cost estimates, enterprise environmental factors, and organizational process assets such as policies regarding staffing and outsourcing

Outputs: a list of activity resource requirements, a resource breakdown structure, and project documents updates

Estimating Activity Durations

Duration: the actual amount of time worked on an activity plus elapsed time

Inputs: the schedule management plan, activity list, activity attributes, activity resource requirements, resource calendars, project scope statement, risk register, resource breakdown structure, enterprise environmental factors, and organizational process assets

Outputs: the estimates themselves and project documents updates

DEVELOPING THE SCHEDULE

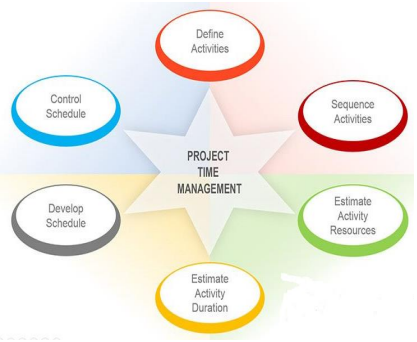
The goal of developing a realistic project schedule is to provide a basis for monitoring project progress for the time dimension of the project.

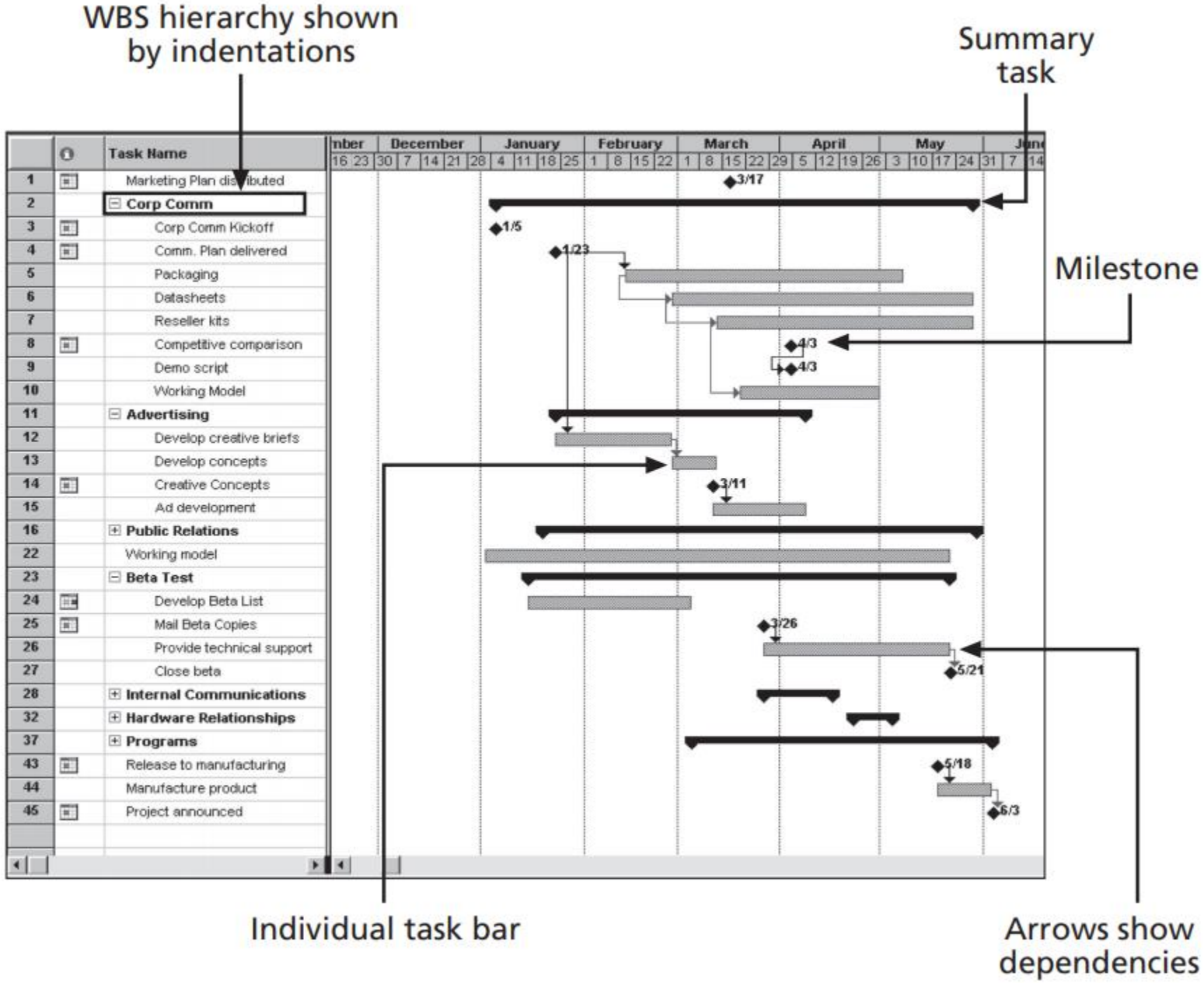
The main outputs of this process are the project schedule, a schedule baseline, schedule data, project calendars, project management plan updates, and project documents updates.

Tools and techniques assist in schedule development:

- Gantt Chart
- Critical Path Analysis
- Critical Chain Schedulling
- PERT analysis

Gantt Chart

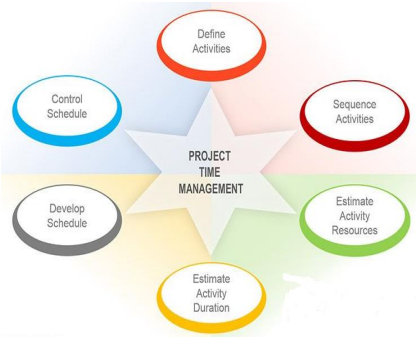

Define Activities
Sequence Activities
Estimate Activity Resources
Estimate Activity Duration
Develop Schedule
Control Schedule
PROJECT TIME MANAGEMENT


WBS hierarchy shown by indentations
Summary task
Milestone
Individual task bar
Arrows show dependencies
Task Name
Marketing Plan distributed
Corp Comm
Corp Comm Kickoff
Comm. Plan delivered
Packaging
Datasheets
Reseller kits
Competitive comparison
Demo script
Working Model
Advertising
Develop creative briefs
Develop concepts
Creative Concepts
Ad development
Public Relations
Working model
Beta Test
Develop Beta List
Mail Beta Copies
Provide technical support
Close beta
Internal Communications
Hardware Relationships
Programs
Release to manufacturing
Manufacture product
Project announced
December
January
February
March
April
May
3/17
1/5
1/23
4/3
4/3
3/11
3/26
5/21
5/18
6/3

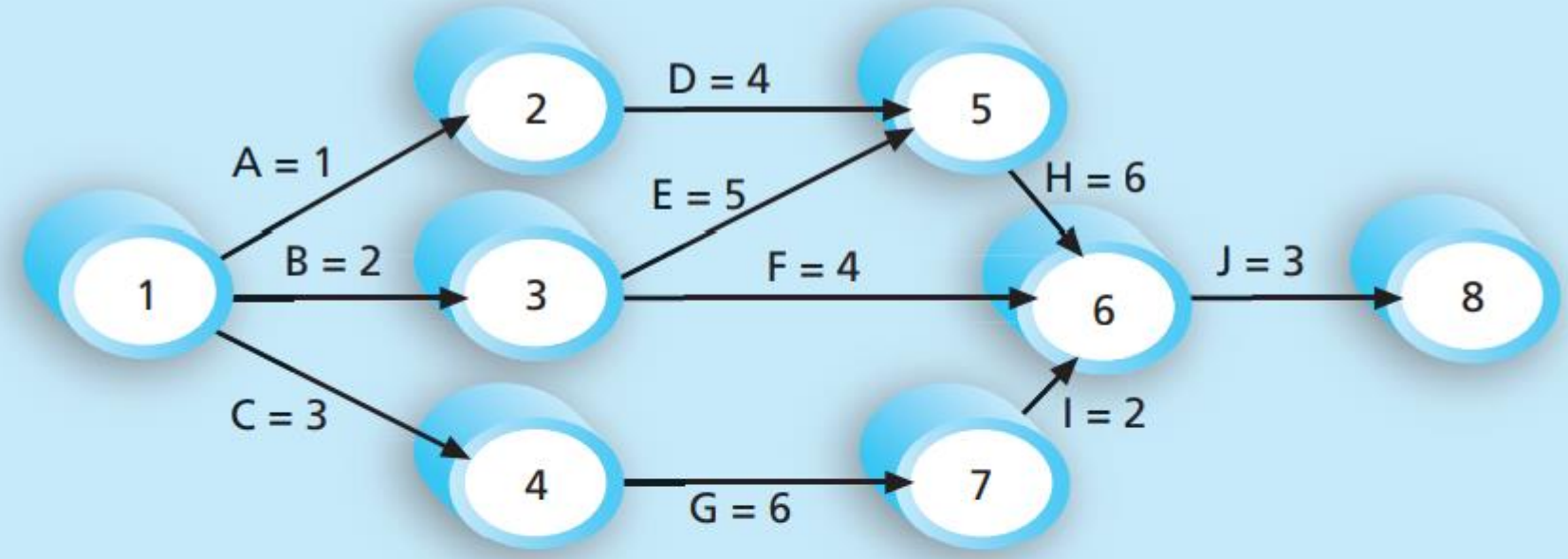
Critical Path Method

Calculating the Critical Path:

- First 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



Critical Path Method

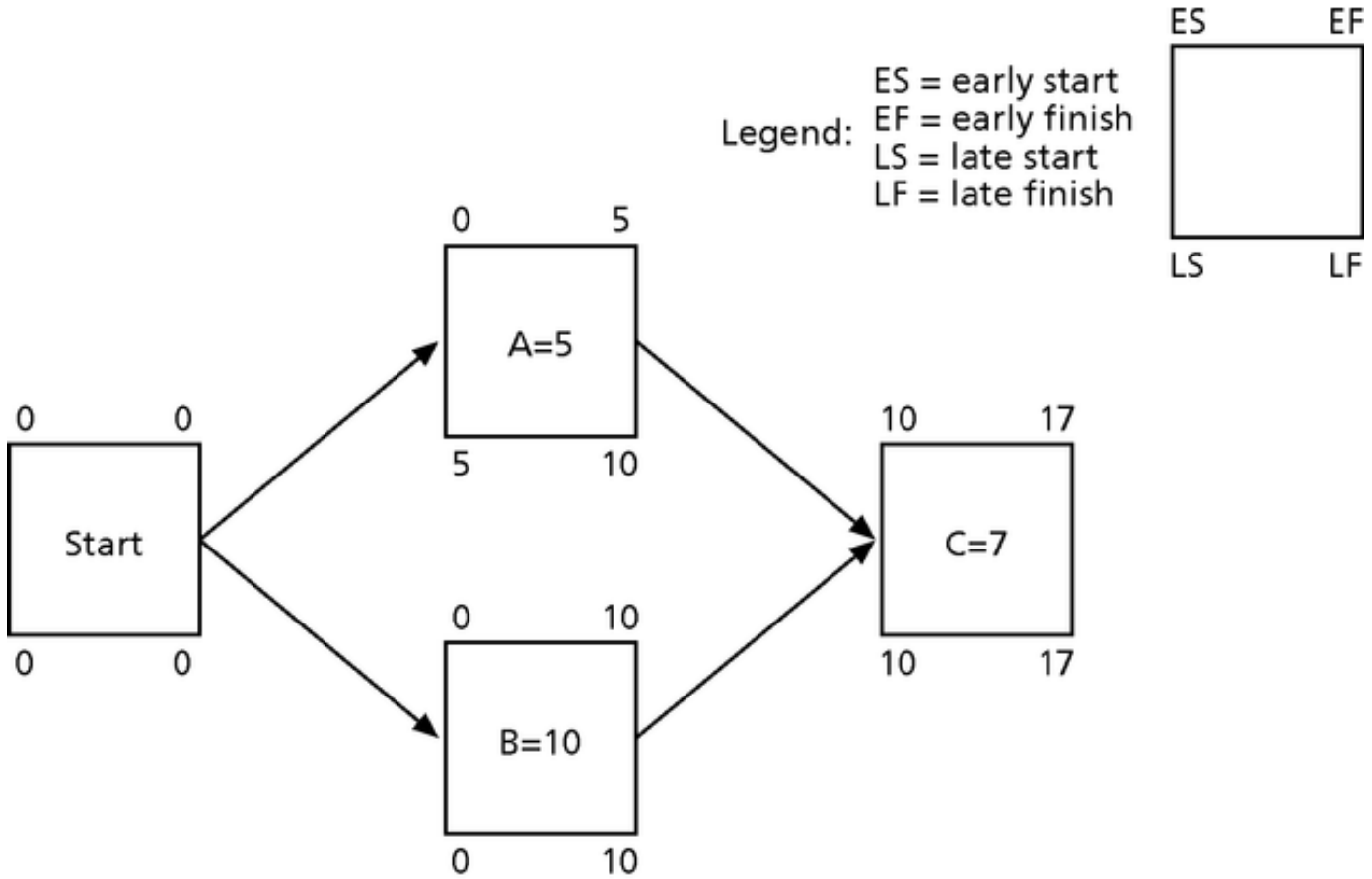


Note: Assume all durations are in days.

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.

Calculating Early and Late Start and Finish Dates



Free and Total Float or Slack for Project X

Task Name	Start	Finish	Late Start	Late Finish	Free Slack	Total Slack
A	8/1/09	8/1/09	8/3/09	8/3/09	0d	2d
B	8/1/09	8/2/09	8/1/09	8/2/09	0d	0d
C	8/1/09	8/3/09	8/3/09	8/7/09	0d	2d
D	8/2/09	8/7/09	8/8/09	8/9/09	2d	2d
E	8/3/09	8/9/09	8/3/09	8/9/09	0d	0d
F	8/3/09	8/8/09	8/14/09	8/17/09	7d	7d
G	8/8/09	8/13/09	8/8/09	8/15/09	0d	2d
H	8/10/09	8/17/09	8/10/09	8/17/09	0d	0d
I	8/14/09	8/15/09	8/18/09	8/17/09	2d	2d
J	8/20/09	8/22/09	8/20/09	8/22/09	0d	0d

Critical Chain : Multitasking Example

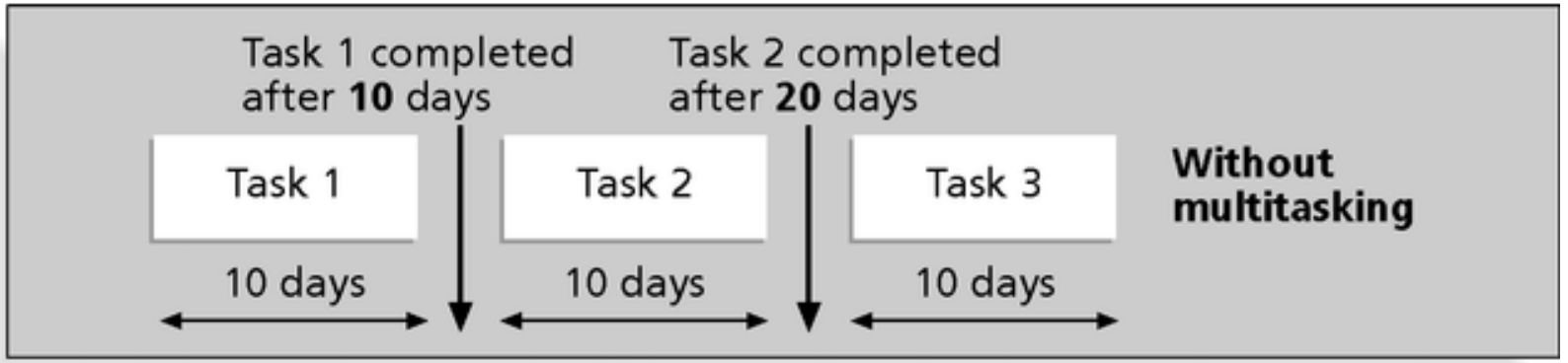


Figure 6-10a. Three Tasks Without Multitasking

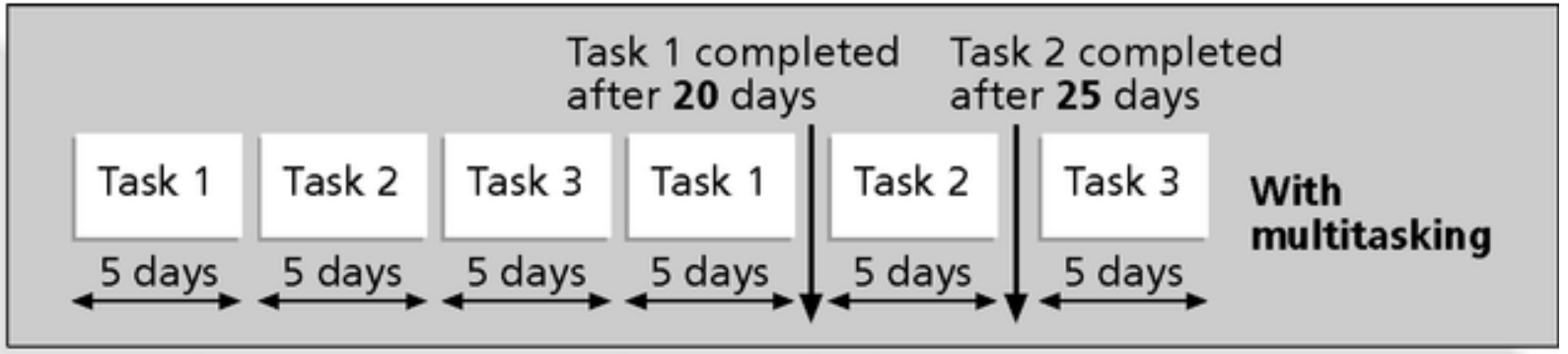
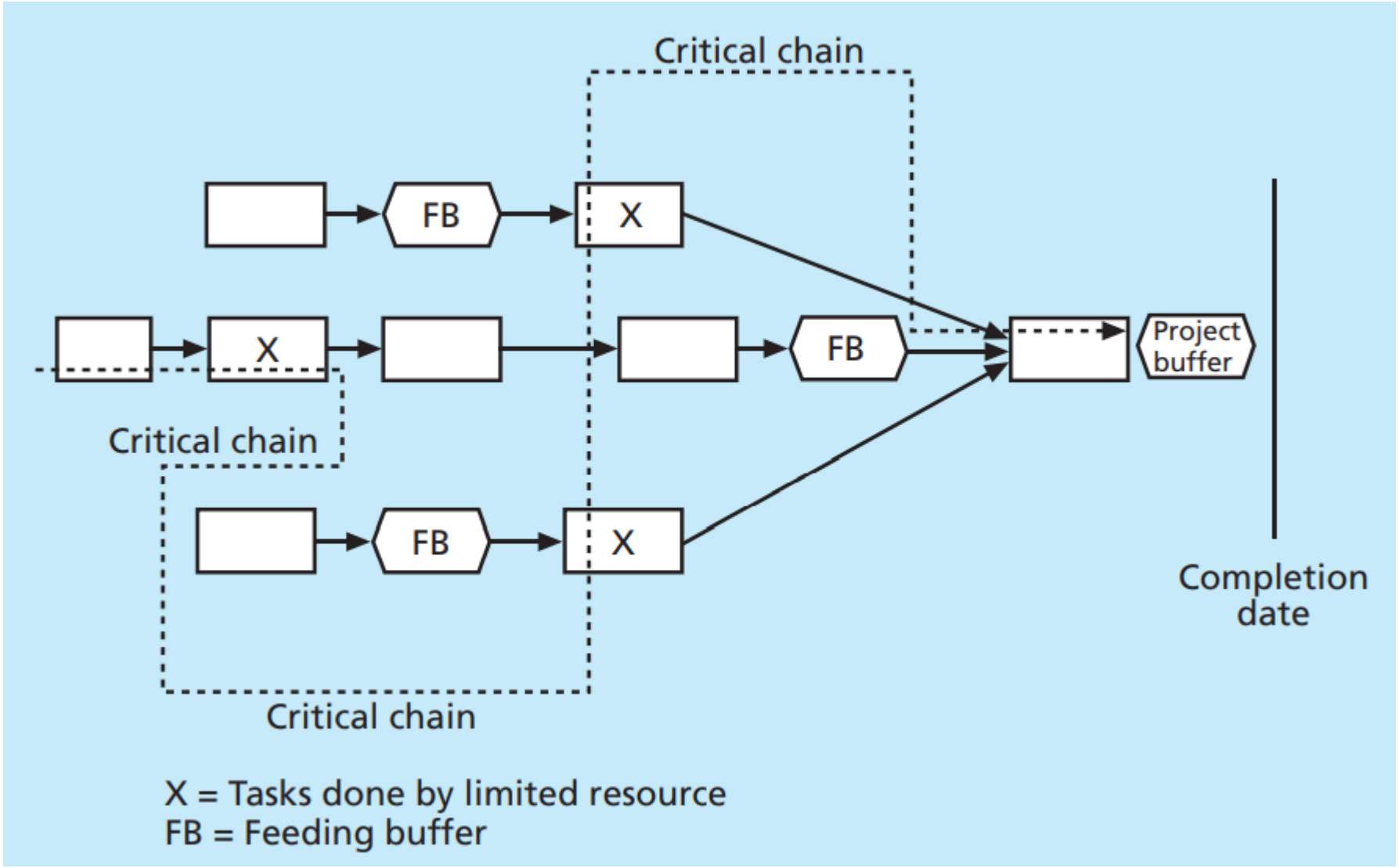


Figure 6-10b. Three Tasks With Multitasking

Critical Chain Scheduling



Program Evaluation and Review Technique (PERT)

- **PERT** is a network 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**, and

pessimistic time = 24 days

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

Schedule Control

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

Schedule Control (continued)

- 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 like the tracking Gantt chart
  - Variance analysis, such as analyzing float or slack
  - Performance management, such as earned value (chapter 7)

Reality Checks on Scheduling

- First review the draft schedule or estimated completion date in the project charter
- Prepare a more detailed schedule with the project team
- Make sure the schedule is realistic and followed
- Alert top management well in advance if there are schedule problems

Working with People Issues

- Strong leadership helps projects succeed more than good PERT charts
- Project managers should use:
  - Empowerment
  - Incentives
  - Discipline
  - Negotiation