Foundations for Systems Development:

Managing the Information System Project

Prepared by:

Hiranya Prasad Bastakoti

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Introduction

- Project management (PM) may be the most important aspect of systems development.

- Effective PM helps to ensure
  - The meeting of customer expectations.
  - The satisfying of budget and time constraints.

- The nature of projects has changed from custom development to implementing packaged software and data warehousing.

- PM skills are difficult and important to learn.

Project Management

– Activities include planning work, assessing risk, estimating resources required, organizing the work, assigning tasks, controlling project execution, reporting progress, analyzing results

– Five major variables

1. Scope
2. Time
3. Cost
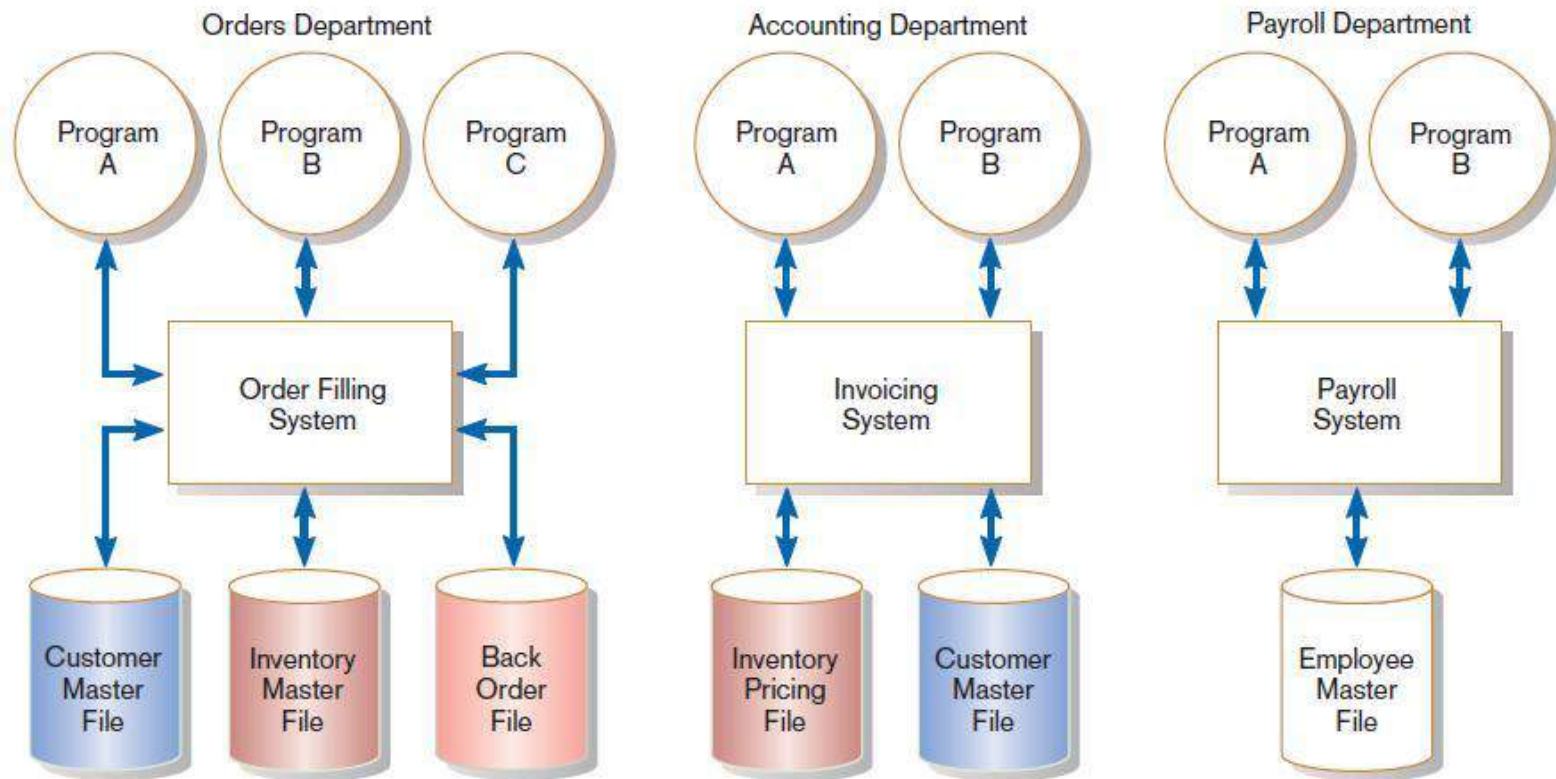4. Quality
5. Risk

Pine Valley Application Project

FIGURE 3-1
Three computer applications at Pine Valley Furniture: order filling, invoicing, and payroll
Source: Hoffer, Ramesh, and Topi, 2011.

Managing the Information Systems Project

- Project
  - A planned undertaking of related activities to reach an objective that has a beginning and an end

- Project management
  - A controlled process of initiating, planning, executing, and closing down a project

Managing the Information Systems Project (cont.)

- ## Project manager

  - A systems analyst with a diverse set of skills—management, leadership, technical, conflict management, and customer relationship—who is responsible for initiating, planning, executing, and closing down a project

- ## Deliverable

  - The end product of an SDLC phase

Deciding on Systems Projects

- System Service Request (SSR)
  - A standard form for requesting or proposing systems development work within an organization

- Feasibility study
  - A study that determines whether a requested system makes economic and operational sense for an organization

FIGURE 3-2
System Service Request for Purchasing Fulfillment System with name and contact information of the person requesting the system, a statement of the problem, and the name and contact information of the liaison and sponsor

Project Management Activities

FIGURE 3-4
A project manager juggles numerous activities

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Phases of Project Management Process

- Phase 1: Initiation

- Phase 2: Planning

- Phase 3: Execution

- Phase 4: Closedown

PM Phase 1: Project Initiation

- Assess size, scope and complexity, and establish procedures.
- Establish:
  - Initiation team
  - Relationship with customer
  - Project initiation plan
  - Management procedures
  - Project management environment and workbook
  - Project charter
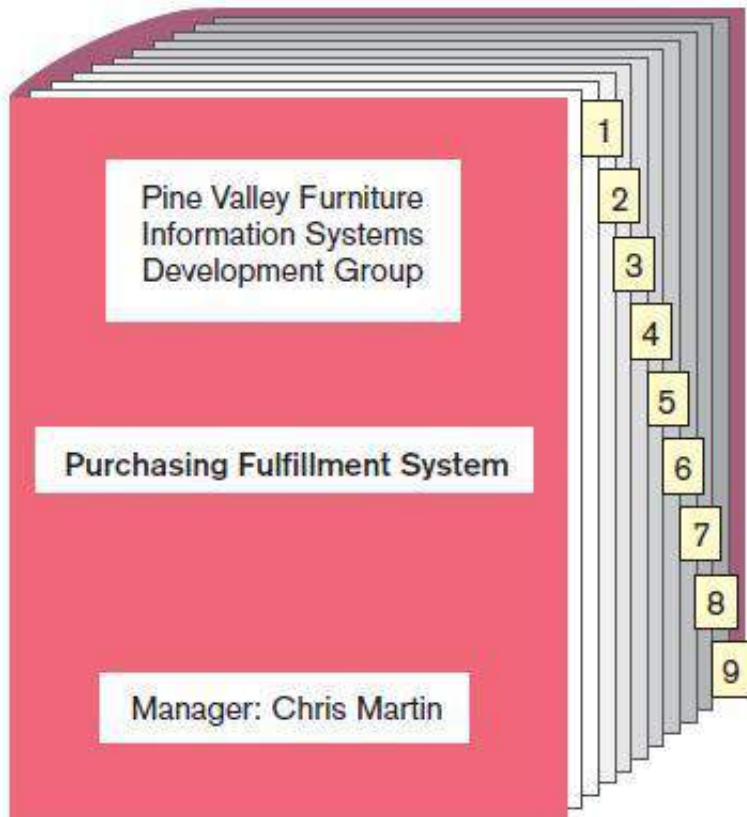
1. Project overview
2. Initiation plan and SSR
3. Project scope and risks
4. Management procedures
5. Data descriptions
6. Process descriptions
7. Team correspondence
8. Project Charter
9. Project schedule

FIGURE 3-6
The project workbook for the Purchase Fulfillment System project contains nine key documents in both hard-copy and electronic form.

Project Charter

- A short document prepared for the customer describing project deliverables and outlining the work required to complete the project

- Elements:
    - Title and authorization date
    - Project manager name and contact information
    - Customer name and contact information
    - Project start and completion dates
    - Key stakeholders, roles, responsibilities
    - Project objectives and description
    - Key assumptions
    - Signatures of stakeholders

PM Phase 2: Project Planning

Define clear, discrete activities and the work needed to complete each activity. Tasks include:

1. Describing Project Scope, Alternatives, and Feasibility
2. Dividing the Project into Manageable Tasks
3. Estimating Resources and Creating a Resource Plan
4. Developing a Preliminary Schedule
5. Developing a Communication Plan

6. Determining Project Standards and Procedures
7. Identifying and Assessing Risk
8. Creating a Preliminary Budget
9. Developing a Project Scope Statement
10. Setting a Baseline Project Plan
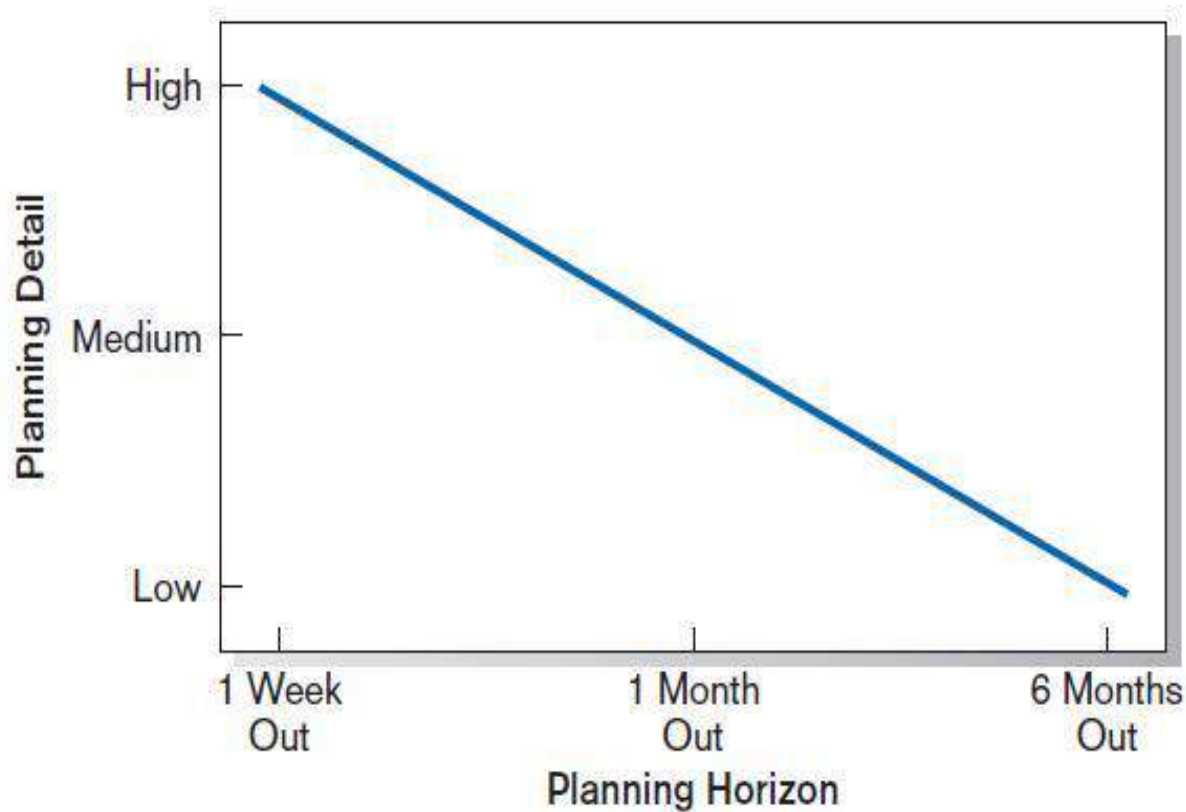
Planning Detail

FIGURE 3-8
Level of project planning detail should be high in the short term, with less detail as time goes on.

Project Scope, Alternatives, and Feasibility

- What problem or opportunity does the project address?

- What are the quantifiable results to be achieved?

- What needs to be done?

- How will success be measured?

- How will we know when we are finished?

Dividing Project into Manageable Tasks

- ## Work Breakdown Structure (WBS)
  - Division of project into manageable and logically ordered tasks and subtasks

- ## Scheduling Diagrams
  - Gantt chart: horizontal bars represent task durations

  - Network diagram: boxes and links represent task dependencies

Developing a Preliminary Schedule
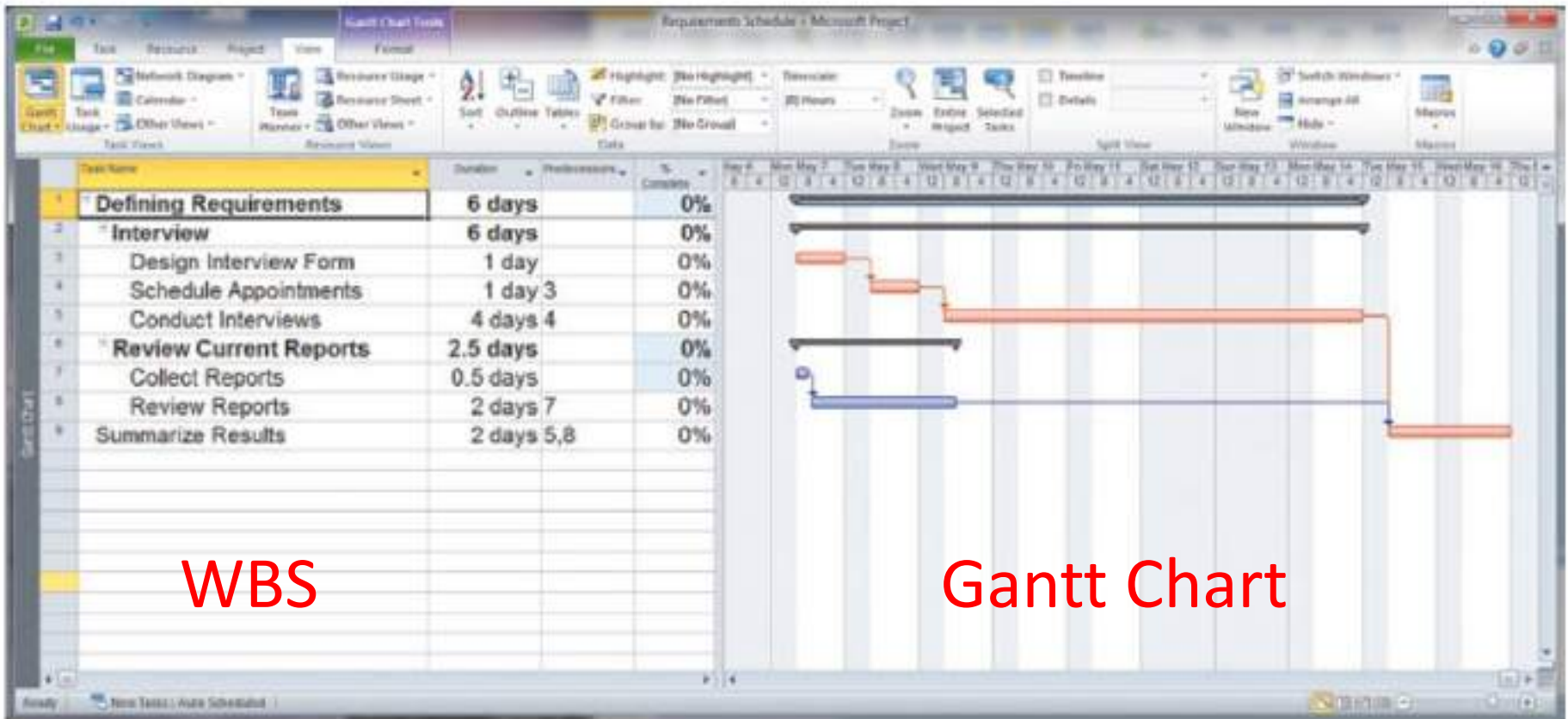
WBS

Gantt Chart

FIGURE 3-10

Gantt chart showing project tasks, duration times for those tasks, and predecessors

Scheduling Diagrams Network Diagram

FIGURE 3-13
A network diagram illustrating tasks with rectangles (or ovals) and the relationships and sequences of those activities with arrows (*Source:* Microsoft Corporation.)

Developing a Preliminary Budget

FIGURE 3-15
A financial cost and benefit analysis for a systems development project (*Source:* Microsoft Corporation.)

Spreadsheet software is good for this.

Developing a Communication Plan

- Who are stakeholders?

- What information does each stakeholder need?

- When should information be produced?

- What are sources of information?

- Who will collect, store and validate info?

- Who will organize and document info?

- Who is the contact person for each stakeholder?

- What is the appropriate/best format for info?

- What communication medium should be used?

Setting a Baseline Project Plan

- A **Baseline Project Plan** provides an estimate of the project's tasks and resource requirements and is used to guide the next project phase—execution. As new information is acquired during project execution, the baseline plan will continue to be updated.

PM Phase 3: Project Execution

- Plans created in prior phases are put into action.
- Actions
  - Execute baseline project plan.
  - Monitor progress against baseline plan.
  - Manage changes in baseline plan.
  - Maintain project workbook.
  - Communicate project status.

Monitoring Progress with a Gantt Chart

FIGURE 3-17

Gantt chart with tasks 3 and 7 completed and task 8 partially completed (*Source:* Microsoft Corporation.)
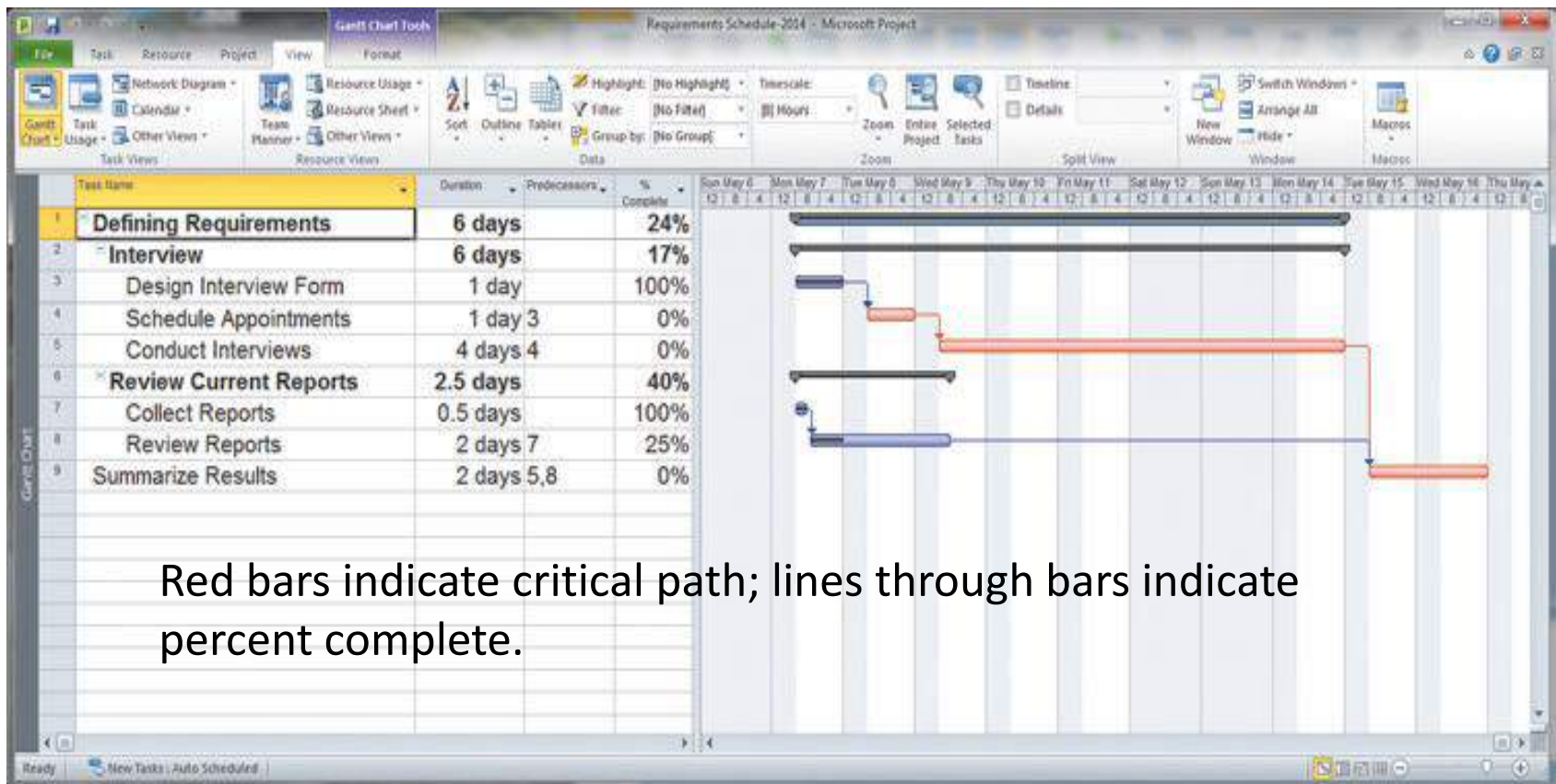
Red bars indicate critical path; lines through bars indicate percent complete.

Communication Methods

TABLE 3-2   Project Team Communication Methods

Procedure	Formality	Use
Project workbook	High	Inform Permanent record
Meetings	Medium to high	Resolve issues
Seminars and workshops	Low to medium	Inform
Project newsletters	Medium to high	Inform
Status reports	High	Inform
Specification documents	High	Inform Permanent record
Minutes of meetings	High	Inform Permanent record
Bulletin boards	Low	Inform
Memos	Medium to high	Inform
Brown bag lunches	Low	Inform
Hallway discussions	Low	Inform Resolve issues

PM Phase 4: Project Closedown

- Bring the project to an end.

- Actions
  - Close down the project.
  - Conduct post-project reviews.
  - Close the customer contract.

Representing and Scheduling Project Plans

- Gantt Charts
- Network Diagrams
- PERT Calculations
- Critical Path Scheduling
- Project Management Software

Gantt Charts vs. Network Diagrams

- Gantt charts
  - Show task durations.
  - Show time overlap.
  - Show slack time in duration.
- Network diagrams
  - Show task dependencies.
  - Do not show time overlap, but show parallelism.
  - Show slack time in boxes.

Gantt Charts vs. Network Diagrams (Cont.)
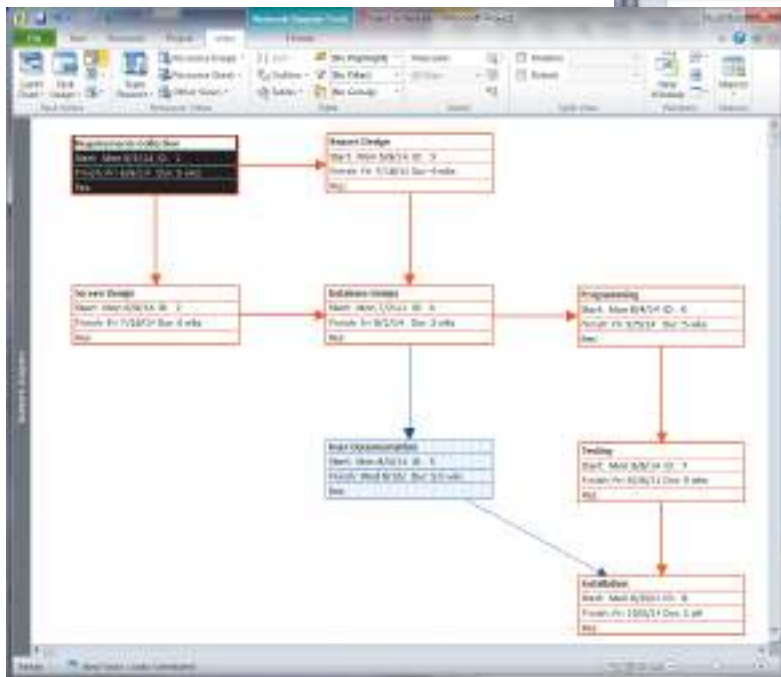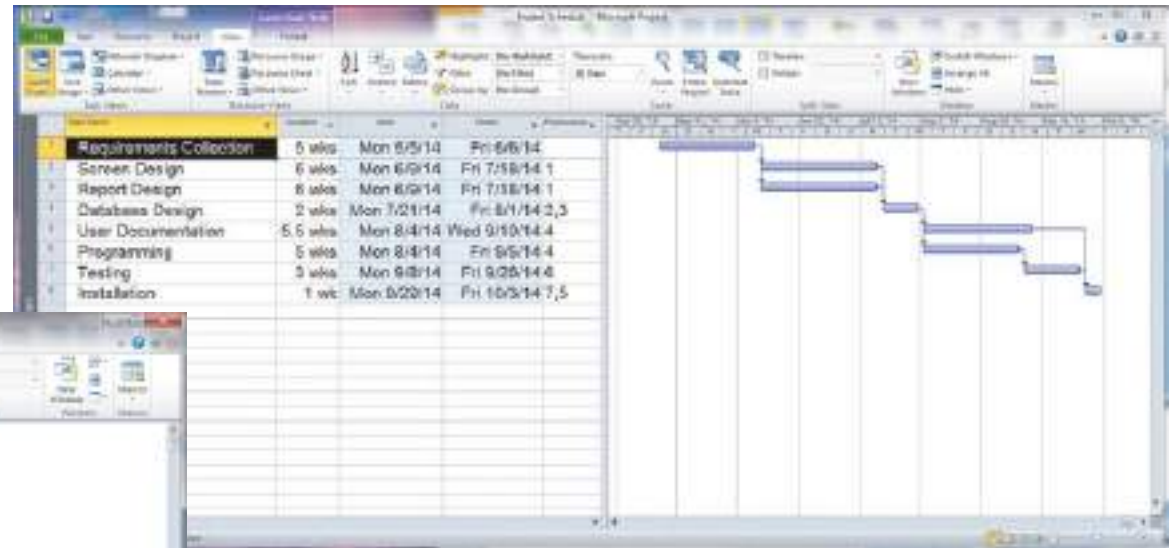
Figure 3-19
Graphical diagrams that depict project plans
(a) A Gantt chart
(b) A network diagram
(*Source:* Microsoft Corporation.)

Gantt Charts vs. Network Diagrams (Cont.)

Figure 3-21

A network diagram showing activities (represented by circles) and sequence of those activities (represented by arrows)
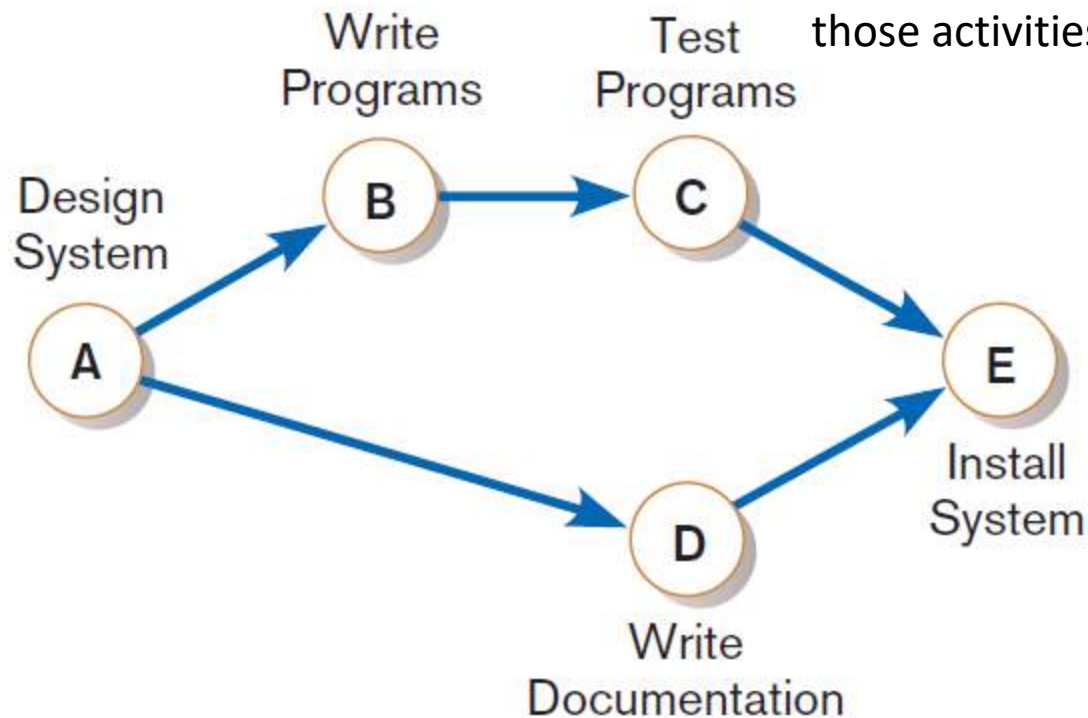
Estimating Task Duration

- PERT: Program Evaluation Review Technique
- Technique that uses optimistic (o), pessimistic (p), and realistic (r) time estimates to determine expected task duration
- Formula for Estimated Time:
  - ET = $(o + 4r + p)/6$

Example PERT Analysis

ACTIVITY	TIME ESTIMATE (in weeks)			EXPECTED TIME (ET) $\frac{o + 4r + p}{6}$
	o	r	p	
1. Requirements Collection	1	5	9	5
2. Screen Design	5	6	7	6
3. Report Design	3	6	9	6
4. Database Design	1	2	3	2
5. User Documentation	2	6	7	5.5
6. Programming	4	5	6	5
7. Testing	1	3	5	3
8. Installation	1	1	1	1

FIGURE 3-22
Estimated time calculations for the SPTS project

A PERT CHART
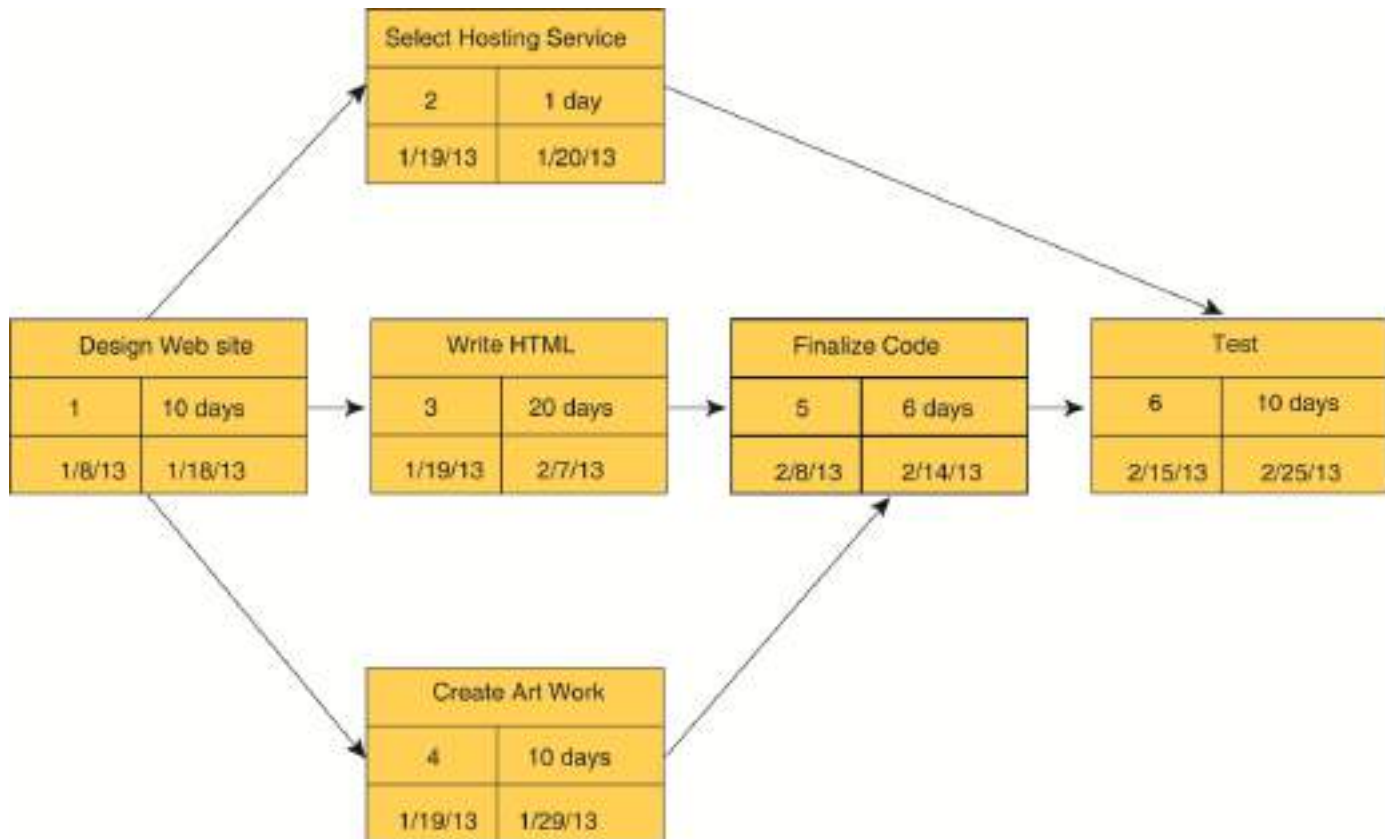
FIGURE 14-5   This is a simplified PERT chart for creating a small Web site. It shows the ordering of project tasks and the relationship of a task with preceding and succeeding tasks.

Critical Path Scheduling

- A scheduling technique whose order and duration of a sequence of task activities directly affect the completion

- *Critical path:* the shortest time in which a project can be completed

- *Slack time:* the time an activity can be delayed without delaying the project

Critical Path Example
(dependencies between tasks)

ACTIVITY	PRECEDING ACTIVITY
1. Requirements Collection	—
2. Screen Design	1
3. Report Design	1
4. Database Design	2,3
5. User Documentation	4
6. Programming	4
7. Testing	6
8. Installation	5,7

PRECEDING ACTIVITIES indicate the activities that must be completed before the specified activity can begin.

FIGURE 3-23 Sequence of Activities within the SPTS project

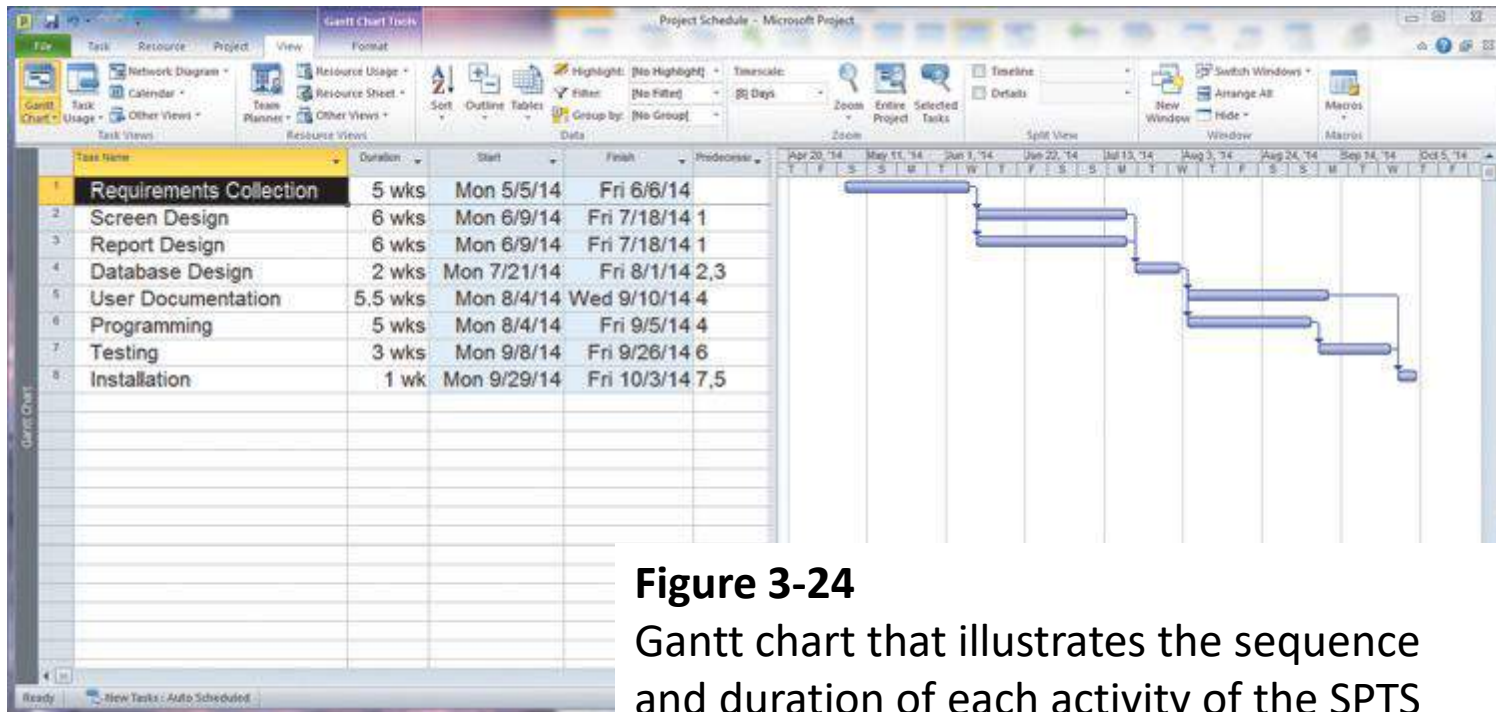# Critical Path Example (Cont.)

Figure 3-24
Gantt chart that illustrates the sequence and duration of each activity of the SPTS project
(*Source:* Microsoft Corporation.)

Critical Path Example (Cont.)
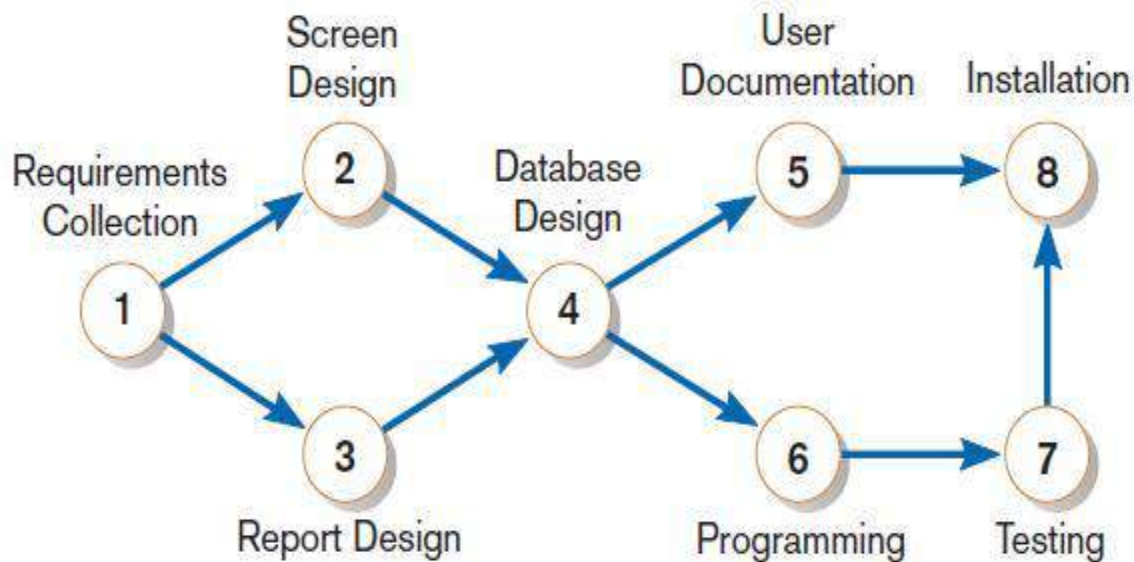
Network diagram shows dependencies

FIGURE 3-25

A network diagram that illustrates the activities (circles) and the sequence (arrows) of those activities

Determining the Critical Path

- Calculate the earliest possible completion time for each activity by summing the activity times in the longest path to the activity. This gives total expected project time.

- Calculate the latest possible completion time for each activity by subtracting the activity times in the path following the activity from the total expected time. This gives slack time for activities.

- Critical path contains no activities with slack time.

Critical Path Calculation

FIGURE 3-26

A network diagram for the SPTS project showing estimated times for each activity and the earliest and latest expected completion time for each activity
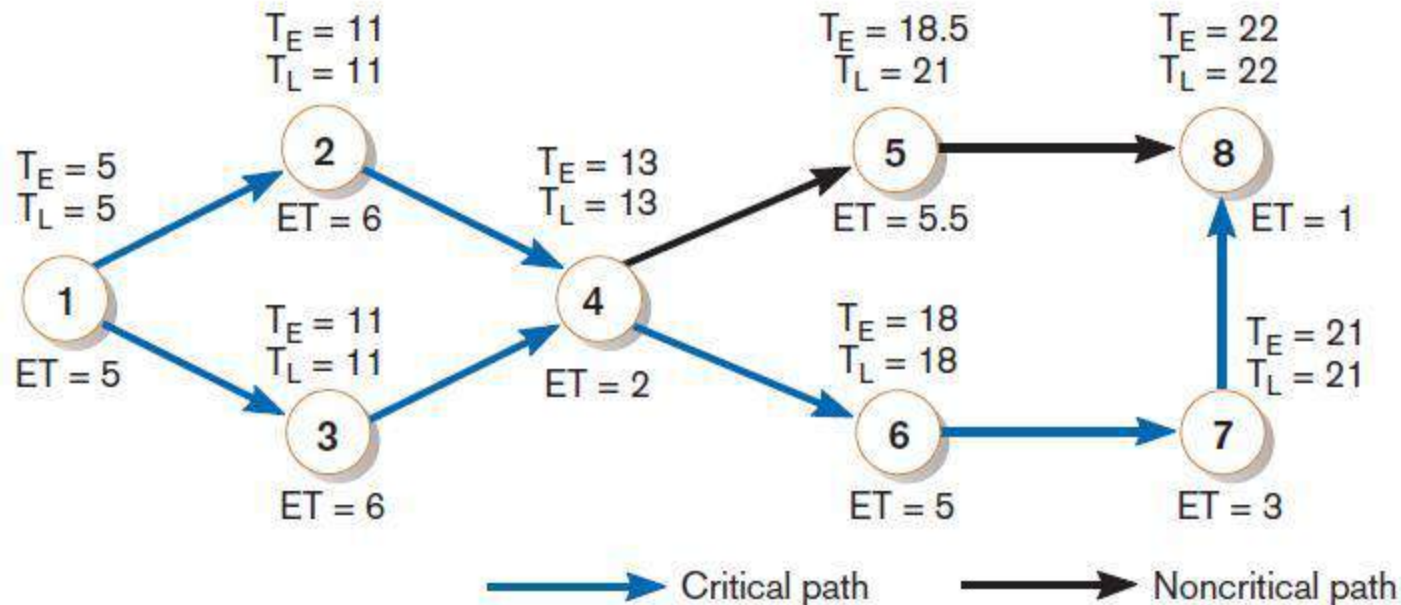
Early and late time calculations are determined and critical path established. (Note: Activity #5 can begin late without affecting project completion time.)

Critical Path Calculation (cont.)

FIGURE 3-27

Activity slack time calculations for the SPTS project; all activities except number 5 are on the critical path

ACTIVITY	T_E	T_L	SLACK $T_L - T_E$	ON CRITICAL PATH
1	5	5	0	✓
2	11	11	0	✓
3	11	11	0	✓
4	13	13	0	✓
5	18.5	21	2.5	
6	18	18	0	✓
7	21	21	0	✓
8	22	22	0	✓

Note the slack time in Activity #5.

Using Project Management Software

- Many powerful software tools exist for assisting with project management
- Project management software
  - Can automate many aspects of project management
  - Capabilities for:
    - Defining, ordering, editing tasks
    - Assigning resources to tasks
    - Tracking progress
  - Microsoft Project
    - Most widely used project management software
    - PERT, Gantt charts, critical path analysis
  - Increase in SaaS, open-source software
  - Project portfolio management software

Project Start Date
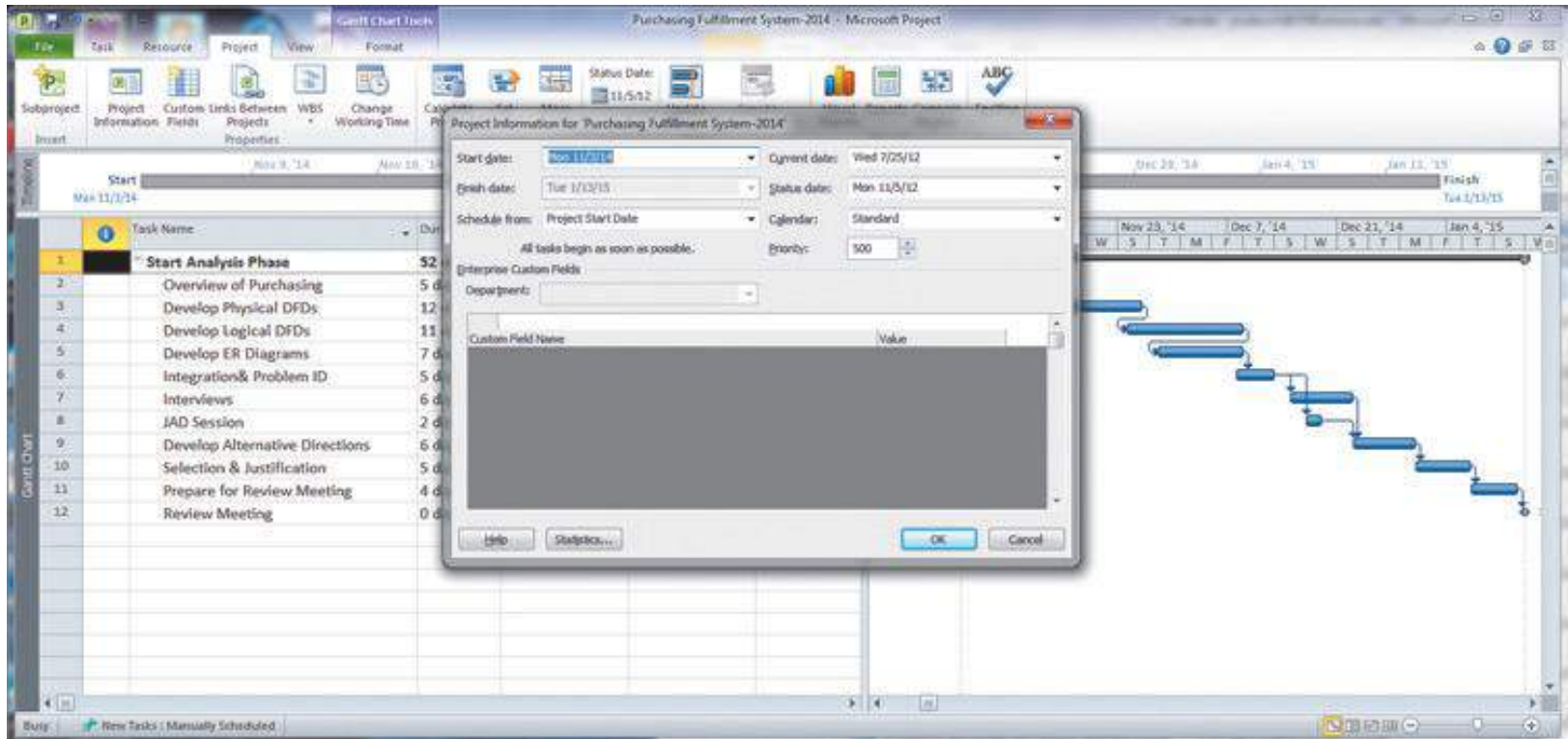
Entering Tasks

FIGURE 3-29
Entering tasks and assigning task relationships in Microsoft project for Windows (*Source:* Microsoft Corporation.)

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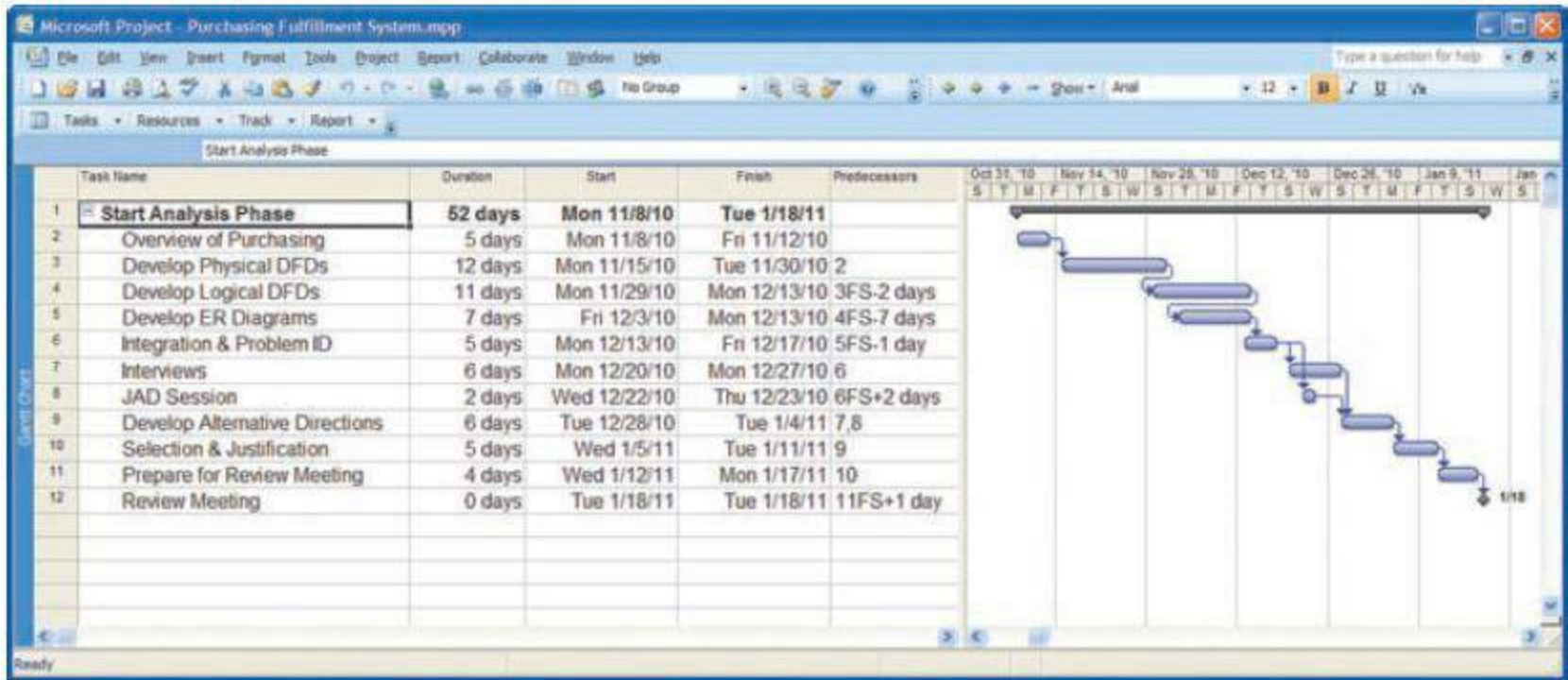
Viewing Network Diagram

FIGURE 3-30
Viewing project information as a network diagram in Microsoft Project for Windows (*Source:* Microsoft Corporation.)
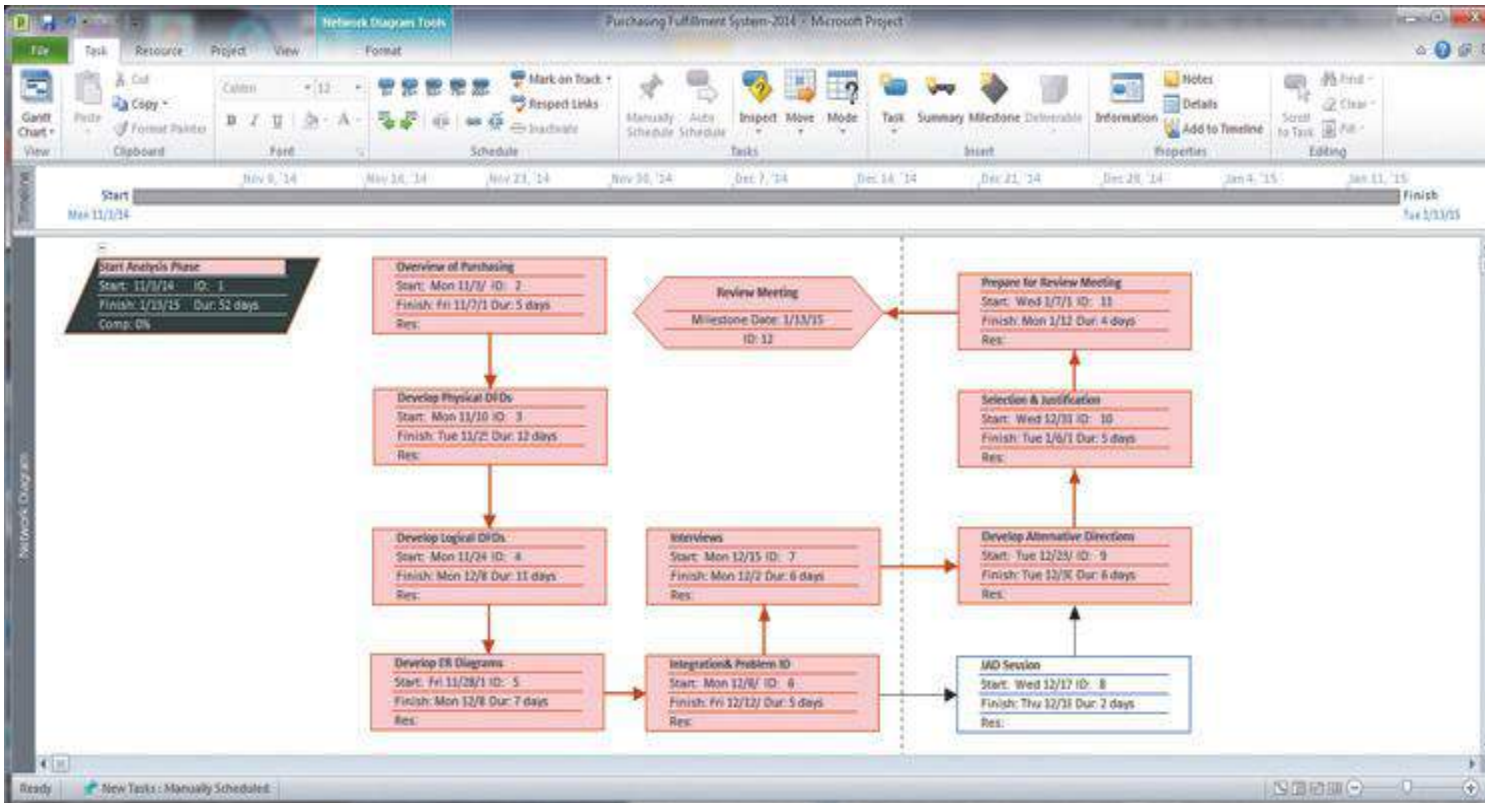
Hexagon shape indicates a milestone.

Red boxes and arrows indicate critical path (no slack).

Viewing Gantt Chart

FIGURE 3-31

Gantt chart showing progress of activities (right frame) versus planned activities (left frame)

Black line at top indicates a summary activity (composed of subtasks). Diamond shape indicates a milestone.

Review Questions

1. Contrast the following terms:
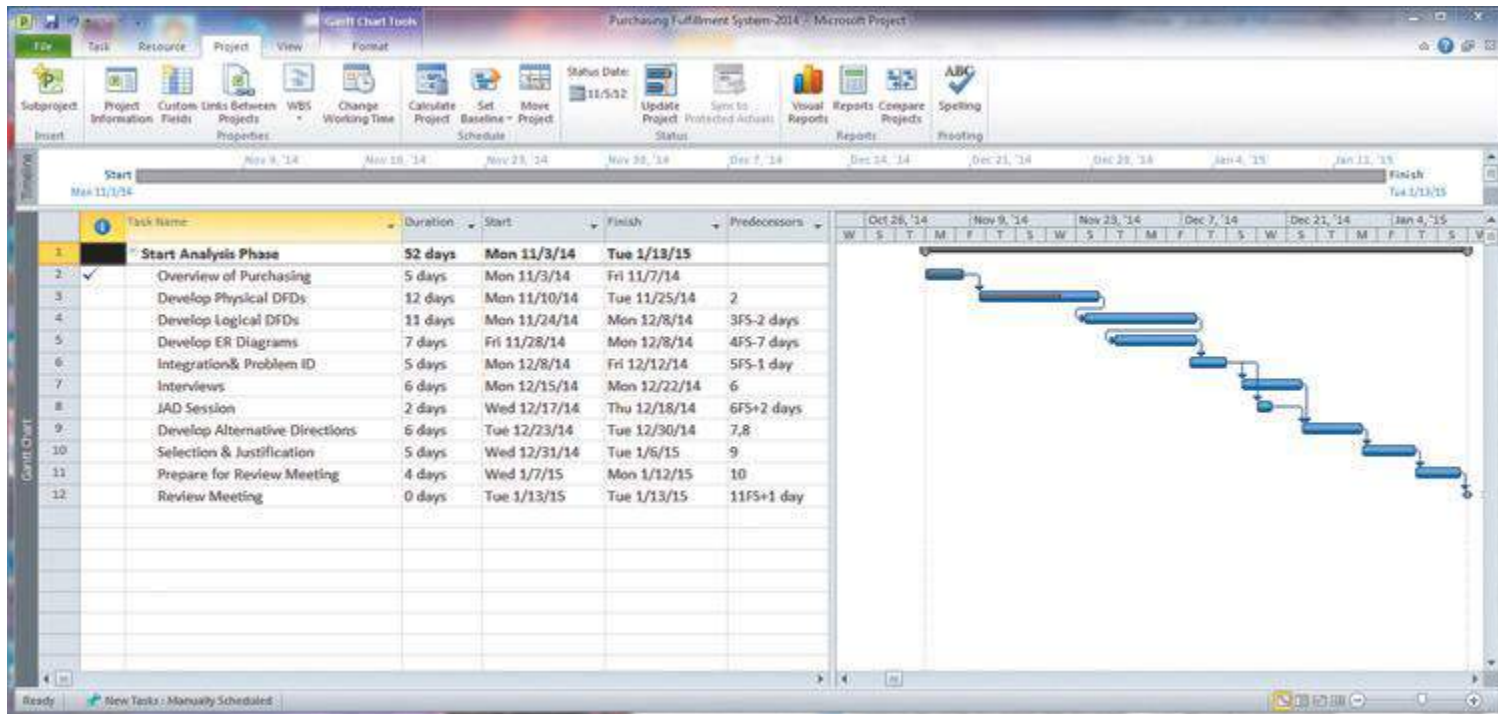
   a. Critical path scheduling, Gantt, network diagramming, slack time b. Project, project management, project manager c. Project initiation, project planning, project execution, project closedown d. Project workbook, resources, work breakdown structure

2. Discuss the reasons why organizations undertake information systems projects

3. List and describe the common skills and activities of a project manager. Which skill do you think is most important? Why?

4. Describe the activities performed by the project manager during project initiation

5. Which of the four phases of the project management process do you feel is most challenging? Why

6. Describe the activities performed by the project manager during project planning.

7. Describe the activities performed by the project manager during project execution.

8. List various project team communication methods and describe an example of the type of information that might be shared among team members using each method. .

9. Describe the activities performed by the project manager during project closedown.

10. What characteristics must a project have in order for critical path scheduling to be applicable?

11.Calculate the expected time for the following activities.

Activity	Optimistic Time	Most Likely Time	Pessimistic Time	Expected Time
A	3	7	11	
B	5	9	13	
C	1	2	9	
D	2	3	16	
E	2	4	18	
F	3	4	11	
G	1	4	7	
H	3	4	5	
I	2	4	12	
J	4	7	9	

12.A project has been defined to contain the following list of activities along with their required times for completion

Activity No.	Immediate Activity	Time (weeks)	Predecessors
1	Collect requirements	3	
2	Analyze processes	2	1
3	Analyze data	2	2
4	Design processes	6	2
5	Design data	3	3
6	Design screens	2	3,4
7	Design reports	4	4,5
8	Program	5	6,7
9	Test and document	7	7
10	Install	2	8,9

a.Draw a network diagram for the activities.

b.Draw a Gantt Chart for the activities.

 c. Show the critical path.