Scheduling The Project

- Scheduling
  - Planning, budgeting and scheduling are all part of the same process
  - Planning a project, developing a budget for it, and scheduling all the of the many tasks involved are not easily separable
  - Budget must include both the amounts and **timing** of the resources received or expanded
  - One cannot prepare a budget without knowing the specifics of each task and the **time periods** during which the task must be undertaken.
  - Similarly, a project action implies a schedule just as a schedule implies a plan.
  - PERT (Program Evaluation and Review Technique) and Critical path Method (CPM) and Gantt Chart

Project Scheduling

- Project Schedule
  - Activities
  - Resources especially people

  - The project schedule answers two basic planning questions
    - What and when
    - But not How

Scheduling

- What Activities and Milestones
  - List of activities and their expected time of implementation
    - Diagrams (e.g. PERT network diagrams)
    - Table
    - Charts (e.g. Gantt charts)
    - Graphs
  - All this present two important information
    - Activities
    - Time of implementation

Scheduling

- The Activity List
  - This is often developed with the work breakdown structure (WBS) table
  - The WBS breaks down all project activities to a much lower level, called work tasks.
  - A schedule list of activities contains the following information:
    - Activity ID, Activity name, Description, start date, completion date, dependency, and responsibility.

The Language of Scheduling

- Activity
  - task or set of tasks
  - use resources
- Event
  - state resulting from completion of one or more activities
  - consume no resources or time
  - predecessor activities must be completed
- Network
  - diagram of nodes and arcs
  - used to illustrate technological relationships
- Path
  - series of connected activities between two events
- Critical Path
  - set of activities on a path that if delayed will delay completion of project

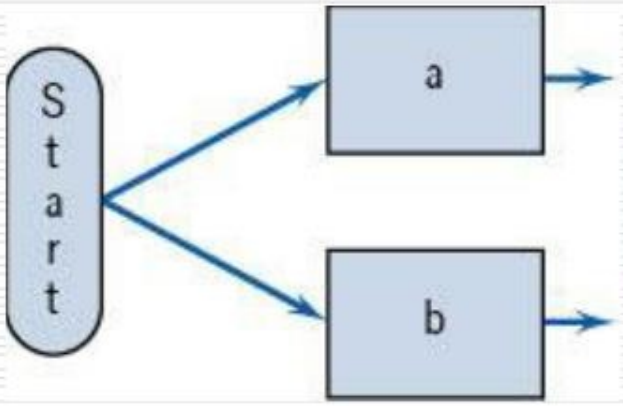
The Language of Scheduling
continued

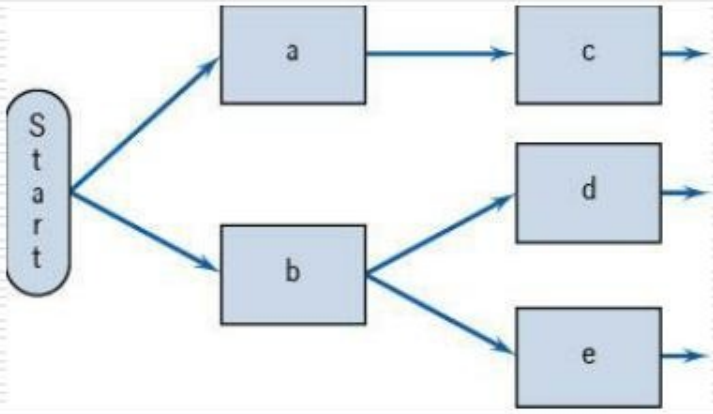
- Milestone and Baselines
  - Milestone are used as points of payment, measurement of progress on the project and for determining baselines.
  - IEEE definition of baseline includes "a formally agreed specification that then serves as the basis for further development"
    - Functional baseline: This document is the basis for all design and implementation, and in particularly it is the basis for system testing and acceptance.

Building the Network

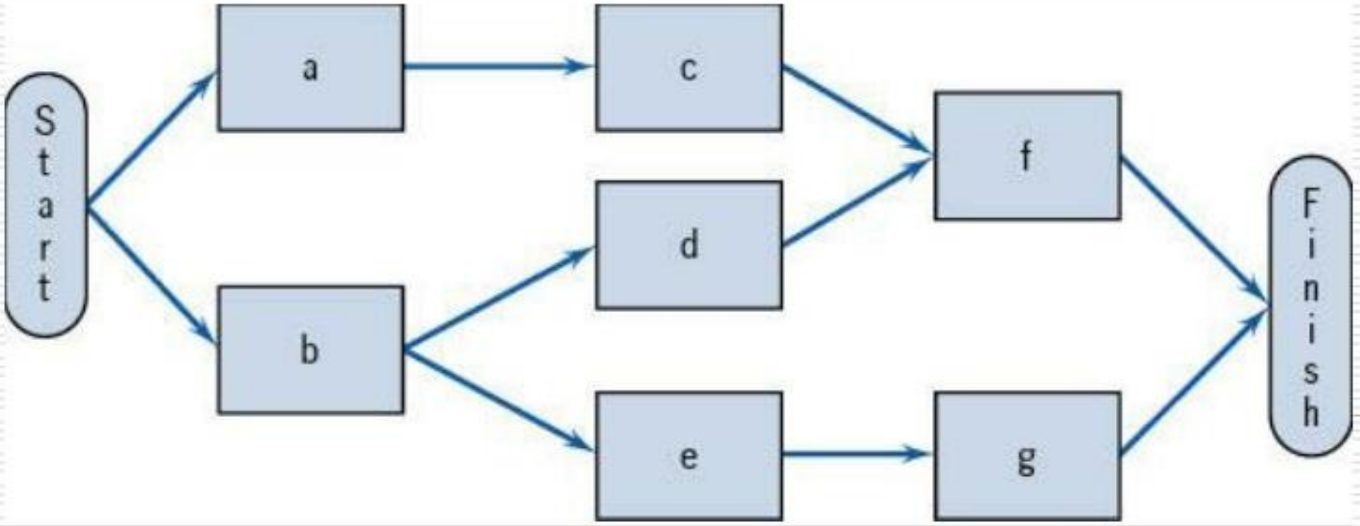
- Building the Network
  - Activity-on-Arrow (AOA) Network
    - Usually associated with PERT
  - Activity-on-Node (AON) Network
    - Usually associated with CPM
  - Example

Building the Network: AON

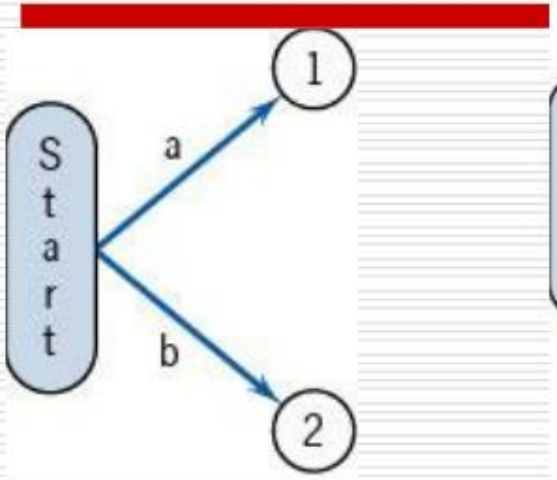


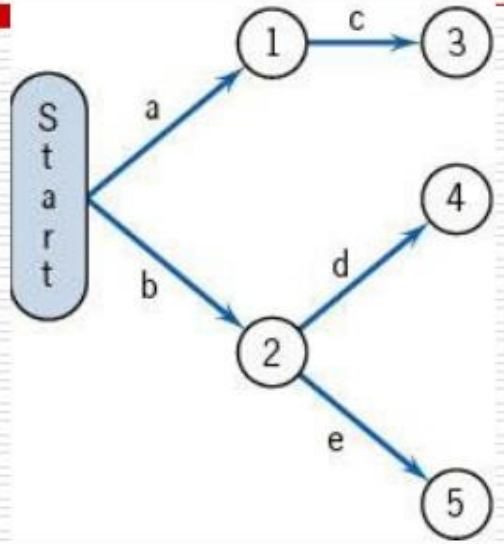


Task	Predecessor
a	-
b	-
c	a
d	b
e	b
f	c,d
g	e

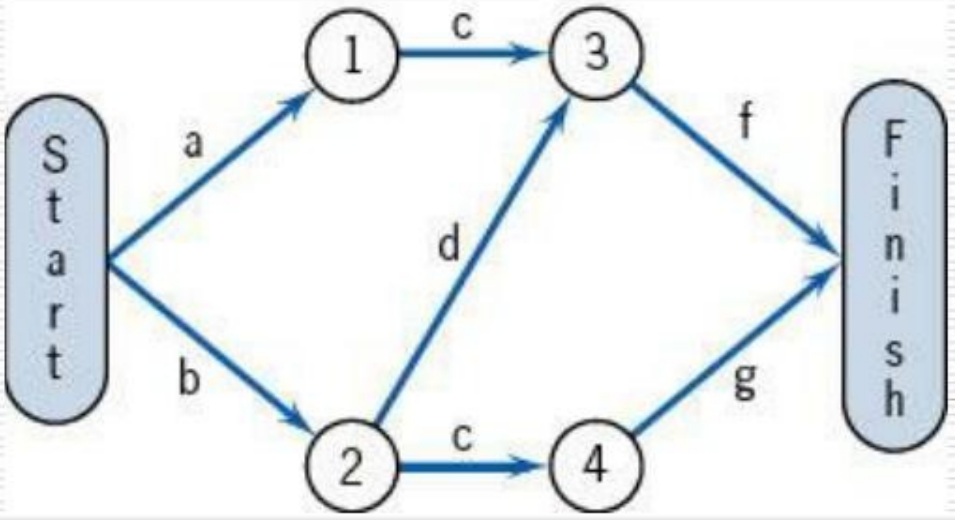


Building the Network: AOA

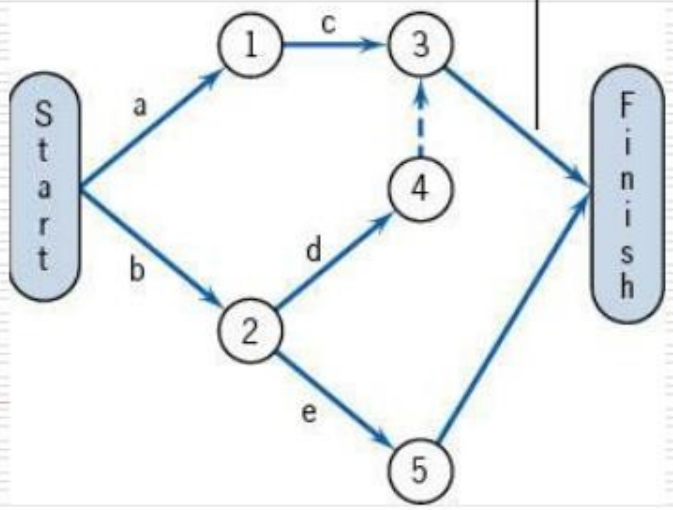




Task	Predecessor
a	-
b	-
c	a
d	b
e	b
f	c,d
g	e



Dummy Activity



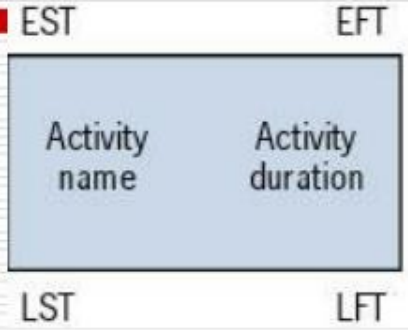
Scheduling

- Critical Part and Critical Time
  - Critical Path
    - set of activities on a path that if delayed will delay completion of project
  - Critical Time
    - time required to complete all activities on the critical path
  - Example
    - Table 5-2 A Sample Problem for Finding the Critical Path and Critical Time

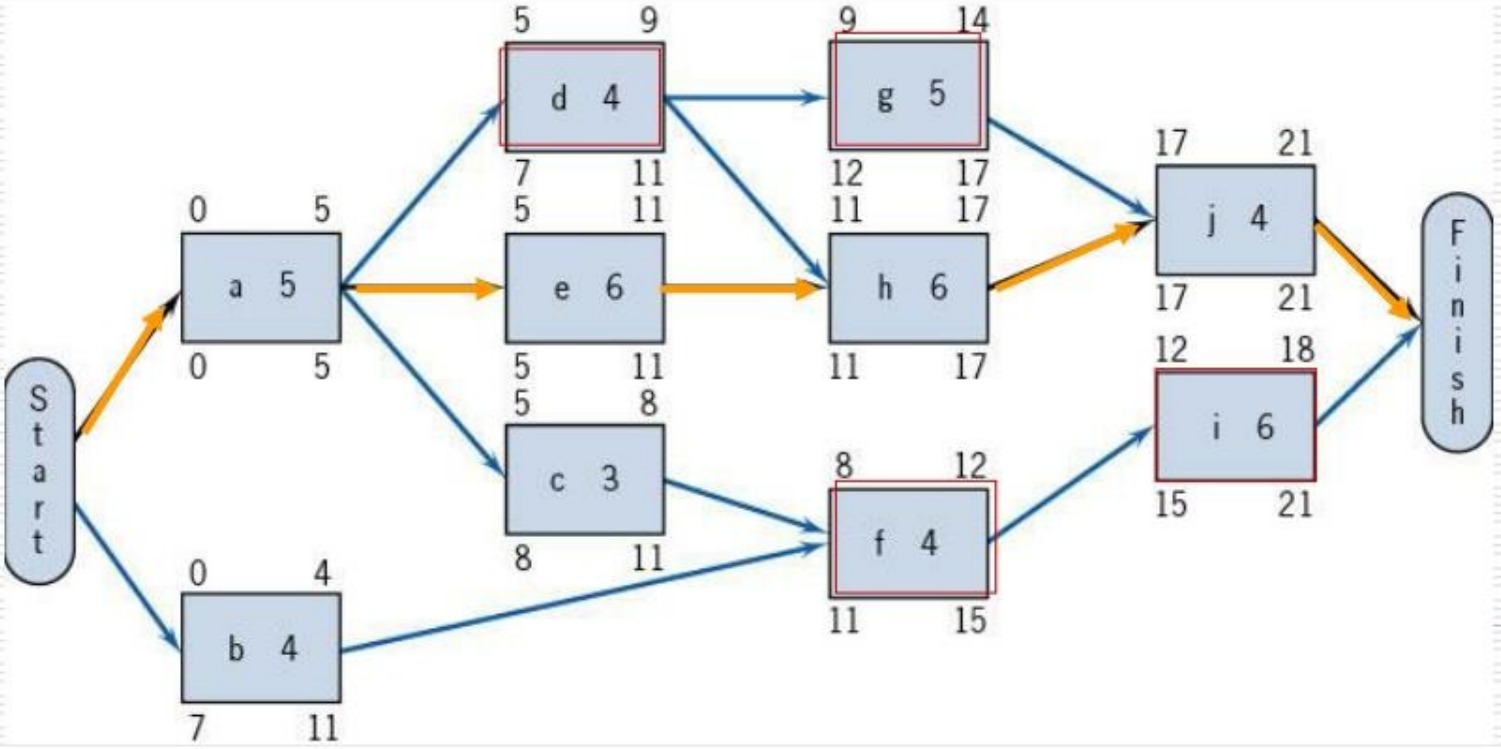
Activity	Predecessor	Duration
a	--	5 days
b	--	4
c	a	3
d	a	4
e	a	6
f	b, c	4
g	d	5
h	d, e	6
i	f	6
j	g, h	4

Critical Part and Time

The Critical Path and Time for Sample Project



EST—Earliest start time
EFT—Earliest finish time
LFT—Latest start time
LFT—Latest finish time

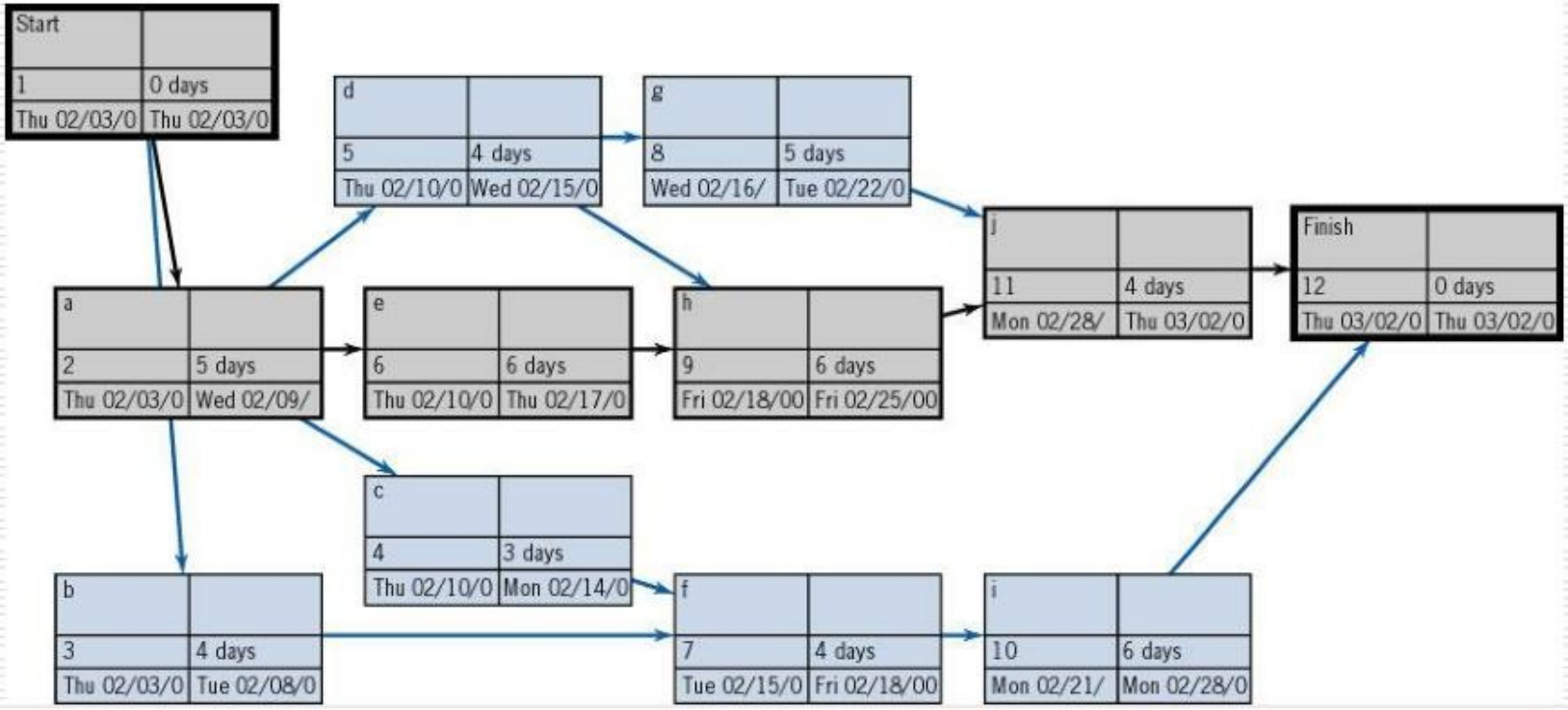


Scheduling

- Critical Part, Time and Slack
  - All activities, and thus all paths, must be completed to finish the project. The *shortest time* for completion of the network is equal to the *longest path* through the network.
  - Can activities not on the critical part be delayed without delaying the the project?
- Slack or Float
  - LST - EST = LFT - EFT = Slack
  - Project slack (activities on the critical part)

Critical Part and Time

A Modified Version of MSP Network



Gantt Charts

- Do
  - Enable important schedule information to be grasped quickly
  - It is easy to read
  - They are not adequate replacement for networks diagrams but they are complementary scheduling and control devices
  - It is the most popular way of exhibiting sets of related activities in the form of schedules

Gantt Charts

A Gantt Chart of a Sample Project

WBS	Task	Duration	Predecessors
1	a	10.67 days	
2	b	12.17 days	1
3	c	12.33 days	2
4	d	6 days	2
5	e	14.33 days	2
6	f	9.33 days	3, 4
7	g	10.33 days	4
8	h	7.83 days	5, 7

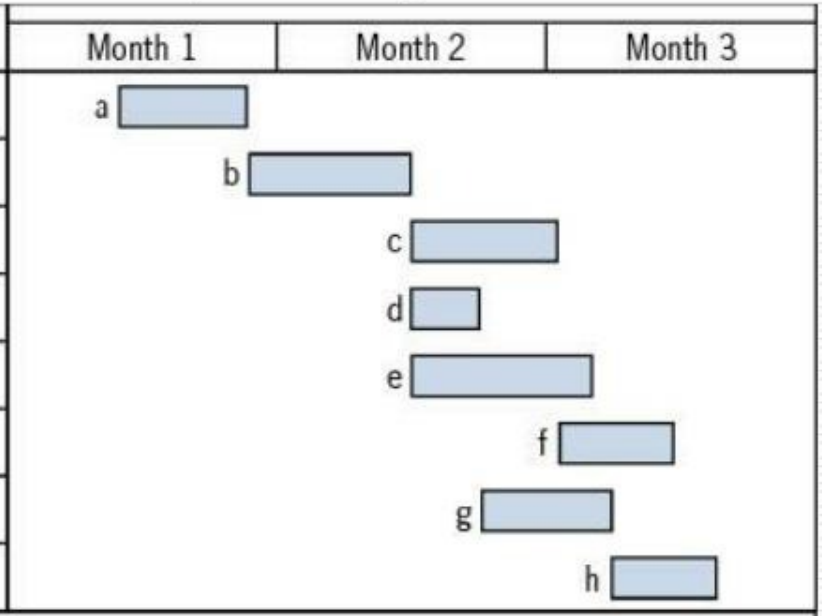


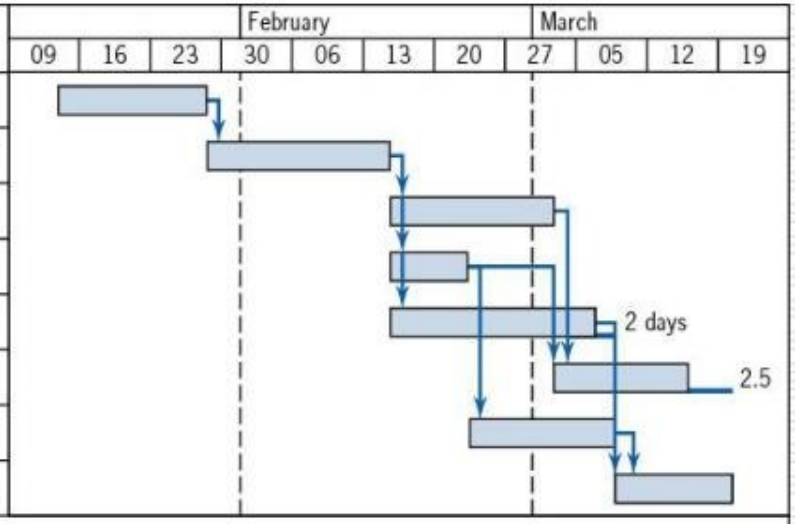
Figure 5.14

Task

Gantt Charts

A Gantt Chart of Sample Project Showing Critical Path, Path Connections, Slack, EST, LST, EFT, and LFT

WBS	Task	Estimate dur	Start	Finish	Late start	Late finish
1	a	10.67 days	01/14	01/28	01/14	01/28
2	b	12.17 days	01/28	02/15	01/28	02/15
3	c	12.33 days	02/15	03/03	02/18	03/07
4	d	6 days	02/15	02/23	02/15	02/23
5	e	14.33 days	02/15	03/07	02/17	03/09
6	f	9.33 days	03/03	03/16	03/07	03/20
7	g	10.33 days	02/23	03/09	02/23	03/09
8	h	7.83 days	03/09	03/20	03/09	03/20



Critical task Task Stack

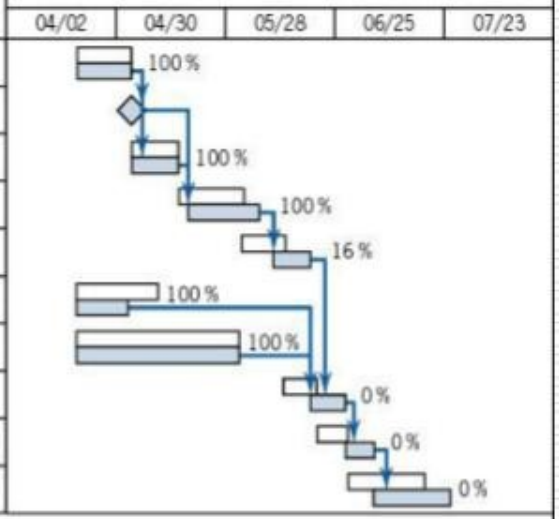
Critical path and stack shown

Gantt Charts

A Progress Report on a Day Care Project Showing Actual Progress Versus Baseline

Day Care Investigation

ID	Task Name	Actual Dur.	Baseline Dur.	Start	Finish	Baseline Start	Baseline Finish
1	Develop employee survey to assess need and desire	2 wks	2 wks	04/21	05/04	04/21	05/04
2	Send survey out to staff	0 days	0 days	05/04	05/04	05/04	05/04
3	Develop ad campaign to get staff to participate in survey	1.67 wks	1.67 wks	05/05	05/17	05/05	05/17
4	Surveys return	2.33 wks	11.67 wks	05/19	06/05	05/17	06/01
5	Analyze results	0.2 wks	1.27 wks	06/09	06/19	06/02	06/12
6	Meet with YMCA to assess and verify proposal for service	2 wks	3 wks	04/21	05/04	04/21	05/11
7	Identify other centers in the area (usage, fee structure, etc.)	5.83 wks	5.83 wks	04/21	06/01	04/21	06/01
8	Cost/Benefit analysis	0 days	7.5 days	06/19	06/28	06/12	06/21
9	Go/No Go decision	0 wks	1.07 wks	06/28	07/06	06/21	06/29
10	If Go – develop implementation action plan	0 wks	3 wks	07/06	07/27	06/29	07/20



Project start date: 04/21
Project current date: 10/04

Task
Progress
Baseline task
Completed milestone
Milestone

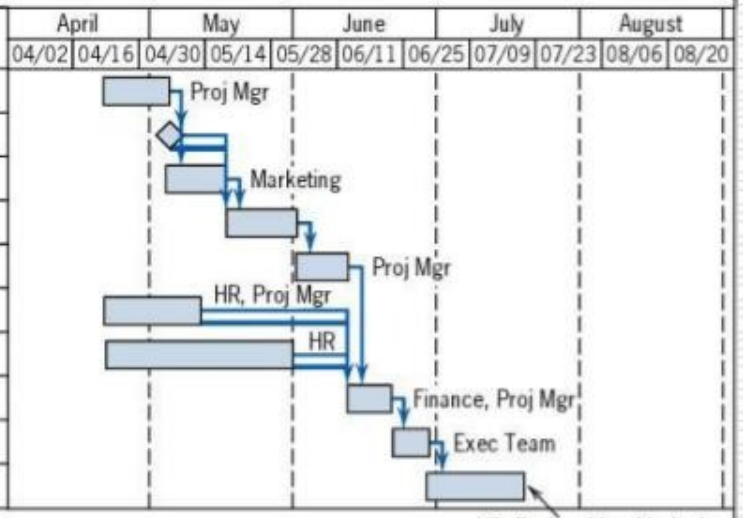
Progress shown

Gantt Charts

A Gantt Chart of a Day Care Project Showing Expected Durations, Critical Path, Milestone, and Resource Requirements

Day Care Service Investigation Project Plan

ID	Task Name	Predecessors	TE Duration
1	Develop employee survey to assess need and desire		2 wks
2	Send survey out to staff	1	0 days
3	Develop ad campaign to get staff to participate in survey	1	1.67 wks
4	Surveys returned	2, 3	11.67 days
5	Analyze results	4	1.27 wks
6	Meet with YMCA to assess and verify proposal service		3 wks
7	Identify other centers in the area (usage, fee structure, etc.)		5.83 wks
8	Cost/Benefit analysis complete	6, 7, 5	7.5 days
9	Go/No Go decision	8	1.07 wks
10	If Go – develop implementation action plan	9	3 wks



Critical path, slack, and resources sho | Task | Critical task | Milestone | Slack

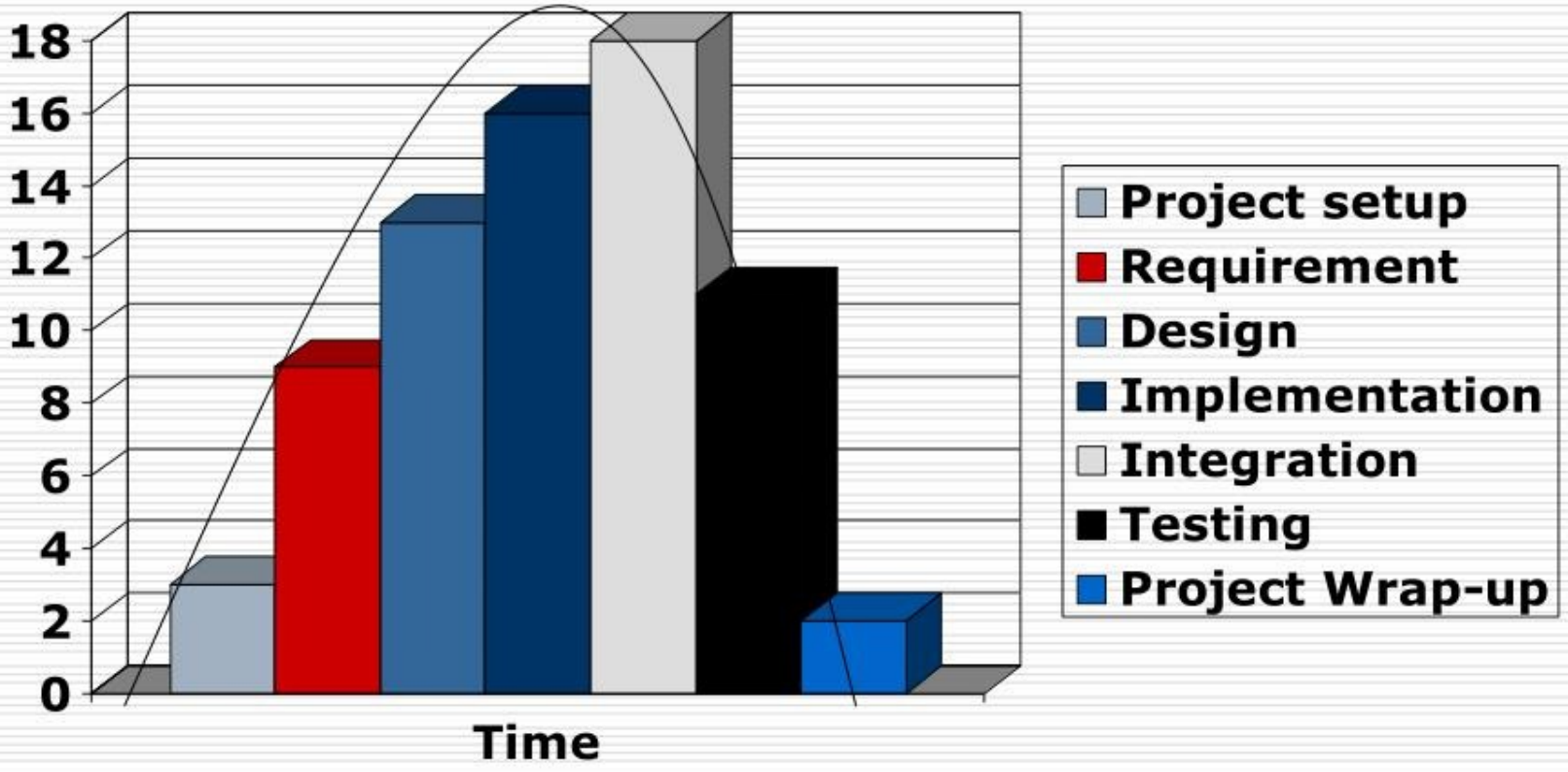
Project start date: 04/21
Project finish date: 07/20

Scheduling HR

- The most important and most valuable project resource is the development team (people)

- The team size
  - The development team size is influenced by
    - # of activities
    - Intensity or complexity of the activities

Development team size



Scheduling Resources

- Resources
  - Work place
  - Equipments
  - Vendors and subcontractors

Scheduling

- Monitoring and updating the schedule
  - It is not a static document
  - Period report