Assignment 4 due by 10 PM on 8/7 (100 Points)

Attached Files:

- Assignment 2 problems.pdf Assignment 2 problems.pdf - Alternative Formats (525.422 KB)
- Assignment 4 Specs.pdf Assignment 4 Specs.pdf - Alternative Formats (118.464 KB)

Assignment 4 Specs:

Located at BB/Assignments/Assignment 4
Submit to BB/Assignments/Assignment 4

Purpose: The purpose of this assignment is to practice your Project Management concepts using Microsoft Project and Microsoft Visio software by creating a Gantt chart, creating an ADA diagram, and answering a few questions.

Directions:

This assignment is from the end of Chapter 6: See attached for book exercises 1 and 2 specifications (Assn 2 probs).

A. Exercise 1 on ~~Page 256 in the 8th ed of the print book;~~ or on page 279 in 9th ed of the print book, or at the end of chapter 6 of the eBook. **Follow Exercise 1 directions and use Microsoft Project to create a Gantt chart and a Network diagram.** See course website/LinkedIn/Project Management Essential Training and Appendix A for detailed information on using Microsoft Project software.

Exercises

1. Using Figure 6-2, enter the activities, their durations (in days), and their relationships in Project 2016. Use a project start date of March 26, 2018 if you want the dates to match exactly. View the network diagram. Does it look like Figure 6-4? Print the network diagram on one page. Return to the Gantt chart view. To re-create Table 6-1, right-click the **Select All** button to the left of the Task Mode column heading and select **Schedule**. Alternatively, you can click the **View** tab and click the **Tables** button under the Data group and then select **Schedule**. You may need to move the split bar to the right to reveal all of the table columns. (See Appendix A—available on the Companion website for this text—for detailed information on using Project 2016.)
   Write a few paragraphs explaining what the network diagram and schedule table show about Project X's schedule.

Network Diagrams

Network diagrams are the preferred technique for showing activity sequencing. A **network diagram** is a schematic display of the logical relationships among project activities and their sequencing. Some people refer to network diagrams as project schedule network diagrams or PERT charts. PERT is described later in this chapter. Figure 6-2 shows a sample network diagram for Project X.

Note the main elements on this network diagram. The letters A through J represent activities with dependencies that are required to complete the project. These activities come from the WBS and activity definition process described earlier. The arrows represent the activity sequencing or relationships between tasks. For example, Activity A must be done before Activity D, and Activity D must be done before Activity H.

The format of this network diagram uses the **activity-on-arrow (AOA)** approach or the **arrow diagramming method (ADM)**—a network diagramming technique in which activities are represented by arrows and connected at points called nodes to illustrate the sequence of activities. A **node** is simply the starting and ending point of an activity. The first node signifies the start of a project and the last node represents the end.

Keep in mind that the network diagram represents activities that must be done to complete the project. It is not a race to get from the first node to the last node. *Every*

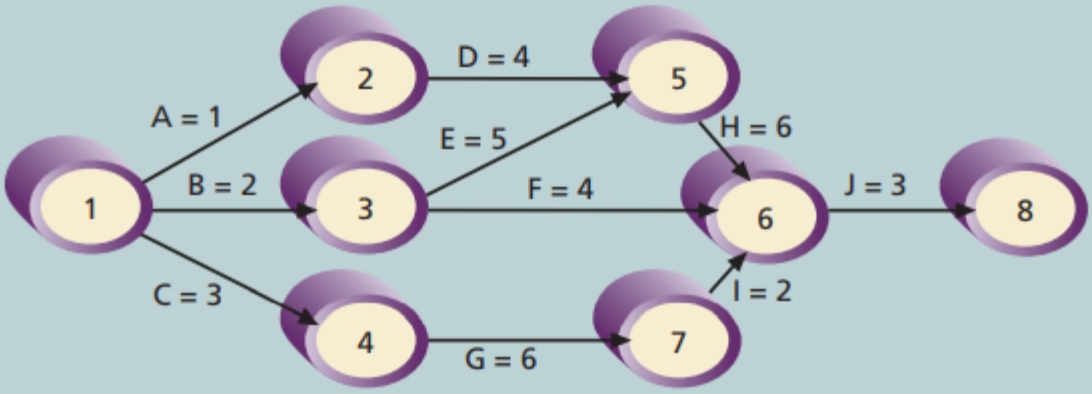


FIGURE 6-2 Network diagram for project X

activity on the network diagram must be completed in order to finish the project. Note also that not every item on the WBS needs to be shown on the network diagram; only activities with dependencies need to be shown. However, some people like to have start and end milestones and to list every activity. It is a matter of preference. For large projects with hundreds of activities, it might be simpler to include only activities with dependencies on a network diagram. Sometimes it is enough to put summary tasks on a network diagram or to break down the project into several smaller network diagrams.

Assuming that you have a list of the project activities and their start and finish nodes, follow these steps to create an AOA network diagram:

1. Find all of the activities that start at Node 1. Draw their finish nodes, and draw arrows between Node 1 and each of the finish nodes. Put the activity letter or name on the associated arrow. If you have a duration estimate, write it next to the activity letter or name, as shown in Figure 6-2. For example, A = 1 means that the duration of Activity A is one day, week, or other standard unit of time. Be sure to put arrowheads on all arrows to signify the direction of the relationships.
2. Continue drawing the network diagram, working from left to right. Look for bursts and merges. **Bursts** occur when two or more activities follow a single node. A **merge** occurs when two or more nodes precede a single node. For example, in Figure 6-2, Node 1 is a burst because it goes into Nodes 2, 3, and 4. Node 5 is a merge preceded by Nodes 2 and 3.
3. Continue drawing the AOA network diagram until all activities are included.
4. As a rule of thumb, all arrowheads should face toward the right, and no arrows should cross on an AOA network diagram. You may need to redraw the diagram to make it look presentable.

Even though AOA or ADM network diagrams are generally easy to understand and create, a different method is more commonly used: the precedence diagramming method.

The **precedence diagramming method (PDM)** is a network diagramming technique in which boxes represent activities. It is particularly useful for visualizing certain types of time relationships.

Figure 6-3 illustrates the types of dependencies that can occur among project activities based on a Microsoft Project help screen. After you determine the reason for a dependency between activities (mandatory, discretionary, or external), you must determine the type of dependency. Note that the terms *activity* and *task* are used interchangeably, as are *relationship* and *dependency*. The four types of dependencies or relationships between activities include the following:

- **Finish-to-start dependency**: A relationship in which the "from" activity or predecessor must finish before the "to" activity or successor can start. For example, you cannot provide user training until after software or a new system has been installed. Finish-to-start is the most common type of relationship or dependency, and AOA network diagrams use only finish-to-start dependencies.
- **Start-to-start dependency**: A relationship in which the "from" activity cannot start until the "to" activity or successor is started. For example, on IT projects, a group of activities might start simultaneously, such as the many tasks that occur when a new system goes live.
- **Finish-to-finish dependency**: A relationship in which the "from" activity must be finished before the "to" activity can be finished. One task cannot finish before another finishes. For example, quality control efforts cannot

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.

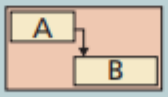
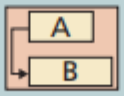
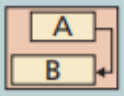
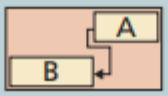
Task dependency	Example	Description
Finish-to-start (FS)		Task (B) cannot start until task (A) finishes.
Start-to-start (SS)		Task (B) cannot start until task (A) starts.
Finish-to-finish (FF)		Task (B) cannot finish until task (A) finishes.
Start-to-finish (SF)		Task (B) cannot finish until task (A)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

FIGURE 6-3 Task dependency types

finish before production finishes, although the two activities can be performed at the same time.

- **Start-to-finish dependency**: A relationship in which the "from" activity must start before the "to" activity can be finished. This type of relationship is rarely used, but it is appropriate in some cases. For example, an organization might strive to stock raw materials just in time for the manufacturing process to begin. A delay in starting the manufacturing process should delay completion of stocking the raw materials. Another example would be a babysitter who wants to finish watching a young child but is dependent on the parent's arrival. The parent must show up or "start" before the babysitter can finish the task.

I. Using Figure 6-2, enter the activities, their durations (in days), and their relationships in Project 2019. Use a project start date of March 26, 2018 for the dates to match exactly.

Save the Microsoft Project file using *your last name – Project File.MPP* as file name, e.g., Hashemi – Project File.MPP.

II. View the network diagram from within the Gantt chart your created in step I. Does it look like Figure 6-4?
   - If not, repeat step I to get an exact match, and repeat step II until you get an exact match.
   - If yes, Print the network diagram on one page.

Take a screenshot of the printed network diagram page and save it as PDF using *your last name – Network Diag.PDF* as file name, e.g., Hashemi – Network Diag PDF.

   - Return to the Gantt chart view. Print the Gantt chart on one page and take a screenshot of the Gantt chart and save it as PDF using *your last name – Gannt Chart.PDF* as file name, e.g., Hashemi – Gantt Chart PDF.

Figure 6-4 illustrates Project X using the precedence diagramming method. Notice that the activities are placed inside boxes, which represent the nodes on this diagram. Arrows show the relationships between activities. This figure was created using Microsoft Project, which automatically places additional information inside each node. Each task box includes the start and finish dates, which are labeled Start and Finish; the task ID number, labeled ID; the task's duration, labeled Dur; and the names of resources, if any, that are assigned to the task. These resources are labeled Res. The border of boxes for tasks on the critical path appears automatically in red in the Microsoft Project network diagram view.

The precedence diagramming method is used more often than AOA network diagrams and offers a number of advantages over the AOA technique. First, most project management software uses the precedence diagramming method. Second, using this method avoids the need to use dummy activities. **Dummy activities** have no duration and no resources, but are occasionally needed on AOA network diagrams to show logical relationships between activities. These activities are represented with dashed arrow lines and have zeros for their duration estimates. Third, the precedence diagramming method shows different dependencies among tasks, whereas AOA network diagrams use only finish-to-start dependencies. You will learn more about activity sequencing using Project 2016 in Appendix A (available on the Companion website for this text).

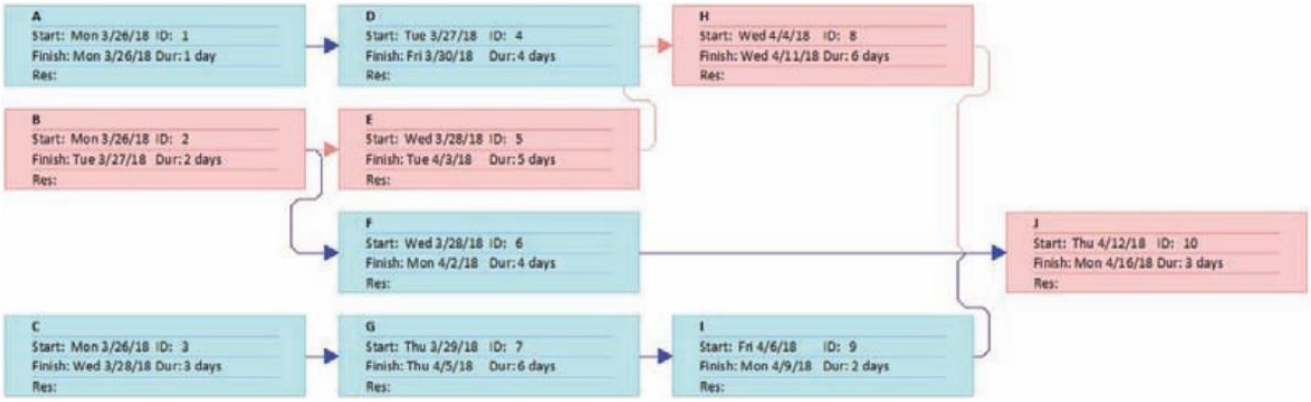


FIGURE 6-4 Precedence diagramming methods (PDM) network diagram for project X

III. To re-create Table 6-1, right-click the Select All button to the left of the Task Mode column heading and select Schedule. Alternatively, you can click the View tab and click the Tables button under the Data group and then select Schedule. You may need to move the split bar to the right to reveal all of the table columns.
   - Take a screenshot of the Schedule Table 6-1 and save it as PDF using *your last name – Table 6-1.PDF* as file name, e.g., Hashemi – Table 6-1 PDF.

TABLE 6-1 Free and total float or slack for project X

Task Name	Start	Finish	Late Start	Late Finish	Free Slack	Total Slack
A	3/26/2018	3/26/2018	3/28/2018	3/29/2018	0d	2d
B	3/26/2018	3/27/2018	3/26/2018	3/28/2018	0d	0d
C	3/26/2018	3/28/2018	3/28/2018	4/2/2018	0d	2d
D	3/27/2018	3/30/2018	3/29/2018	4/4/2018	2d	2d
E	3/28/2018	4/3/2018	3/28/2018	4/4/2018	0d	0d
F	3/28/2018	4/2/2018	4/6/2018	4/12/2018	7d	7d
G	3/29/2018	4/5/2018	4/2/2018	4/10/2018	0d	2d
H	4/4/2018	4/11/2018	4/4/2018	4/12/2018	0d	0d
I	4/6/2018	4/9/2018	4/10/2018	4/12/2018	2d	2d
J	4/12/2018	4/16/2018	4/12/2018	4/16/2018	0d	0d

through this small network diagram: Path A-C has a duration of 12 days (5 + 7), and path B-C has a duration of 17 days (10 + 7). Because path B-C is longer, it is the critical path. There is no float or slack on this path, so the early and late start and finish dates are the same. However, Task A has 5 days of float or slack. Its early start date is day 0, and its late start date is day 5. Its early finish date is day 5, and its late finish date is day 10. Both the free and total float amounts for Task A are 5 days.

Using project management software is a much faster and easier way to determine early and late start and finish dates and free and total slack amounts for activities. Table 6-1 shows the free and total slack for all activities on the network diagram for Project X using the data from Figure 6-8 and assuming that Tasks A, B, and C started on March 26, 2018. (The network diagram is shown in Figure 6-4, which was created with Microsoft Project.) The data in this table was created by selecting the Schedule Table view in Microsoft Project.

Knowing the amount of float or slack allows project managers to know whether the schedule is flexible and how flexible it might be. For example, at 7 days (7d), Task F has the most free and total slack. The most slack on any other activity is only 2 days (2d). Understanding how to create and use slack information provides a basis for negotiating project schedules. See the Help information in Microsoft Project or research other resources for more detailed information on calculating slack.

IV. Use Word to write a few paragraphs explaining what the network diagram and schedule table show about Project X's schedule. Save the file as *your last name – Answers.docx*, e.g., Hashemi – Answers.docx.

A network diagram is a graphical representation of a project and is composed of a series of connected arrows and boxes to describe the inter-relationship between the activities involved in the project. Boxes or nodes represent the activity description, and arrows show the relationship among the activities.

A Schedule Network Analysis is a graphical representation of a schedule showing each sequenced activity and the time it takes to finish each one. It's used to identify early and late start dates, as well as early and late finish dates, for the uncompleted portions of project schedule activities .

Since the critical path is the longest path through the network diagram, we could find the critical path for Project X from the network diagram. When we know the critical path, we could make clear which activities determine the earliest completion of the project X. It means when we make schedule, we should pay attention to those critical activities to shorten the schedule. We could allocate more resources to those activities to shorten the project schedule. We also could reduce some critical activities' duration to shorten the project schedule.

From the schedule table, we could easily find early and late start and finish dates and free and total slack amounts for activities. When we know the number of float or slack, we could determine whether this schedule is flexible and its flexible grade. Then we could use this as the basis to negotiate the project schedule.

So, both of network diagram and schedule table are useful tools to help set down and adjust the Project X's schedule.

B. Exercise 2 a, b, c, & d on page 257 in the 8th ed of the print book; or on page 280 in 9th ed of print book, or at the end of chapter 6 of the eBook. **Follow Exercise 2. a, b, c and d directions and use Microsoft Visio to draw an AOA network diagram** representing the project**.** See course website/LinkedIn/Visio Essential Training.

2. Consider Table 6-2. All duration estimates or estimated times are in days, and the network proceeds from Node 1 to Node 9. (Note that you can easily change this table to create multiple exercises.)

TABLE 6-2 Network diagram data for a small project

Activity	Initial Node	Final Node	Estimated Duration
A	1	2	2
B	2	3	2
C	2	4	3
D	2	5	4
E	3	6	2
F	4	6	3
G	5	7	6
H	6	8	2
I	6	7	5
J	7	8	1
K	8	9	2

a. Draw an AOA network diagram representing the project. Put the node numbers in circles and draw arrows from node to node, labeling each arrow with the activity letter and estimated time.

b. Identify all of the paths on the network diagram and note how long they are, using Figure 6-8 as a guide for how to represent each path.

c. What is the critical path for this project and how long is it?

d. What is the shortest possible time needed to complete this project?

I. Put the node numbers in circles and draw arrows from node to node, labeling each arrow with the activity letter and estimated time.

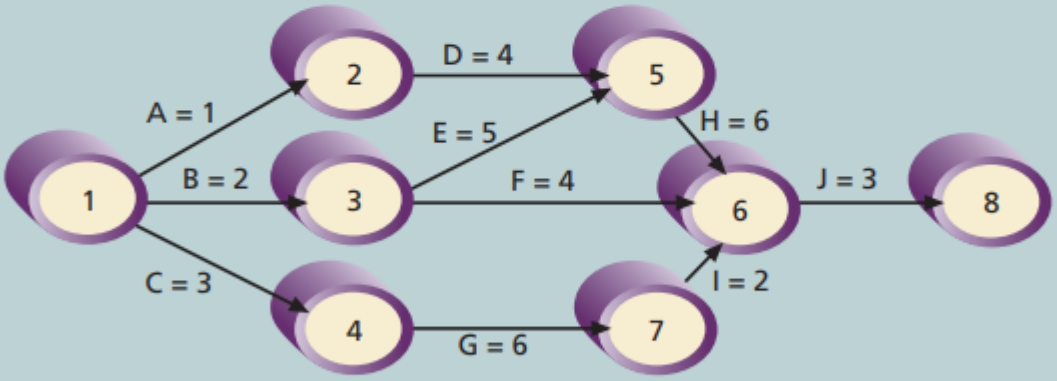
II. Identify all of the paths on the network diagram and note how long they are, using Figure 6-8 as a guide for how to represent each path.

Path	Activity Nodes		Duration		Days
A-B-E-H-K	(1-2-3-6-8-9)	=	2 + 2 + 2 + 2 + 2	=	10 days
A-B-E-I-J-K	(1-2-3-6-7-8-9)	=	2 + 2 + 2 + 5 + 1 + 2	=	14 days
A-C-F-H-K	(1-2-4-6-8-9)	=	2 + 3 + 3 + 2 + 2	=	12 days
A-C-F-I-J-K	(1-2-4-6-7-8-9)	=	2 + 3 + 3 + 5 + 1 + 2	=	16 days
A-D-G-J-K	(1-2-5-7-8-9)	=	2 + 4 + 6 + 1 + 2	=	15 days

Figure 6-8 shows the AOA network diagram for Project X again. Note that you can use either the AOA or precedence diagramming method to determine the critical path on projects. Figure 6-8 shows all of the paths—a total of four—through the network diagram. Note that each path starts at the first node (1) and ends at the last node (8) on the AOA network diagram. This figure also shows the length or total duration of each path through the network diagram. These lengths are computed by adding the durations of each activity on the path. Because path B-E-H-J has the longest duration at 16 days, it is the critical path for the project.

What does the critical path really mean? Even though the critical path is the *longest* path, it represents the *shortest* time required to complete a project. If one or more activities on the critical path take longer than planned, the whole project schedule will slip *unless* the project manager takes corrective action.

Project teams can be creative in managing the critical path. For example, Joan Knutson, a well-known author and speaker in the project management field, often describes how a gorilla helped Apple Inc. complete a project on time. Team members worked in an area with cubicles, and whoever was in charge of the current task on the critical path had a stuffed gorilla on top of his or her cubicle. Everyone knew that person was under the most time pressure and did not need distractions. When a critical task was completed, the person in charge of the next critical task received the gorilla.



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.

FIGURE 6-8 Determining the critical path for project X

is also equal to the early start date of each subsequent activity unless an activity has multiple predecessors. When an activity has multiple predecessors, its early start date is the latest of the early finish dates of those predecessors. For example, Tasks D and E immediately precede Task H in Figure 6-8. The early start date for Task H, therefore, is the early finish date of Task E, because it occurs later than the early finish date of Task D. A **backward pass** through the network diagram determines the late start and late finish dates for each activity in a similar fashion. The **late start date** is the latest possible time an activity might begin without delaying the project finish date. The **late finish date** is the latest possible time an activity can be completed without delaying the project finish date.

III. Save the AOA network diagram using *your last name – AOA Diag.vsdx* as file name, e.g., Hashemi – AOA Diag vsdx.

IV. Take a screenshot of the AOA diagram and save it as PDF using *your last name – AOA.PDF* as file name, e.g., Hashemi – AOA PDF.

C. Use the answers Word file from step A.IV (*your last name – Answers.docx*) for yours answers to the following questions. Insert your full name for page heading.

What is the critical (longest) path for this project and how long is it?

A-C-F-I-J-K = 2+3+3+5+1+2 = 16 Days long

What is the shortest possible time needed to complete this project?

The shortest possible time required to complete the project is the time required by the critical path, which is 16 days.

Otherwise, if asking for shortest path, which is 10 days long:

A-B-E-H-K = 2+2+2+2+2 = 10 Days

D. Copy and paste to the end of the Word file images of the above four files:

(your last name – **Gannt Chart.PDF**

your last name – **Network Diag.PDF**

your last name – **Table 6-1.PDF**,

your last name – **AOA.PDF**

E. Attach and submit the following three files to BB/Assignments/Assignment 4.

1. The Microsoft Project file (*your last name – Project File.MPP*) (35 Points)
2. The Microsoft Visio file (your last name – AOA Diag.vsdx) (35 Points)
3. The answer Word file (*your last name – Answers.docx*) (30 Points)