



# **Project Management (Part 4) - You Want This Project Done When?**

**An Online Continuing Education Course for Engineers**

**Course Number: P-3009**

**Credit: 3 Hours / 3 PDH / 3 CPD**

# Project Management (Part 4) – You Want This Project Done When?

Stanley E. Portny, PMP

Used by arrangement with John Wiley & Sons, Inc.

## You Want This Project Done When?

---

### *In This Course*

- ▶ Creating a network diagram for your project
  - ▶ Using your network diagram to determine schedule possibilities
  - ▶ Approximating activity durations and forming your project's initial schedule
  - ▶ Presenting your project's schedule
- 

Project assignments always have deadlines. So even though you're not sure what your new project is supposed to accomplish, you want to know when it has to be finished. Unfortunately, when you find out the desired end date, your immediate reaction is often one of panic: "But I don't have enough time!"

The truth is, when you first receive your project assignment, you usually have no idea how long it'll take to complete. Initial reactions tend to be based more on fear and anxiety than on facts, especially when you're trying to juggle multiple responsibilities and the project sounds complex.

To help you develop a more realistic estimate of how long your project will take, you need an organized approach that clarifies how you plan to perform your project's activities, what schedules are possible, and how you'll meet deadlines that initially appear unrealistic. This course describes a technique that helps you proactively develop an achievable schedule (while keeping your anxiety in check).

**Note:** The discussion in this course on using network diagrams to develop project schedules is the most technically detailed presentation in this course series. Even though the technique takes about ten minutes to master, the explanations and illustrations can appear overwhelming at first glance. If this course is your first contact with flowcharts, I suggest you initially scan it for the main points and then read the different sections several times. The more you read the text, the more logical the explanations become. However, if you get frustrated with the technical details, take a break and come back to it later. You'll be surprised how much clearer the details are the second or third time around!

## Picture This: Illustrating a Work Plan with a Network Diagram

To determine the amount of time you need for any project, you have to determine the following two pieces of information:

- ✓ **Sequence:** The order in which you perform the activities
- ✓ **Duration:** How long each individual activity takes

For example, suppose you have a project consisting of ten activities, each of which takes one week to complete. How long will you take to complete your project? The truth is, you can't tell. You may finish the project in one week if you have the ability and resources to perform all ten activities at the same time. You may take ten weeks if you have to do the activities one at a time in sequential order. Or you may take between one and ten weeks if you have to do some but not all activities in sequence.

To develop a schedule for a small project, you can probably consider the durations and sequential interdependencies in your head. But projects with 15 to 20 activities or more — many of which you can perform at the same time — require an organized method to guide your analysis.

This section helps you develop feasible schedules by showing you how to draw network diagrams and then how to choose the best one for your project.

### Defining a network diagram's elements

A *network diagram* is a flowchart that illustrates the order in which you perform project activities. It's your project's test laboratory — it gives you a chance to try out different strategies before performing the work.

No matter how complex your project is, its network diagram has the following three elements: milestones, activities, and durations.

#### Milestone

A *milestone*, sometimes called an *event*, is a significant occurrence in the life of a project. Milestones take no time and consume no resources; they occur instantaneously. Think of them as signposts that signify a point in your trip to project completion. Milestones mark the start or end of one or more activities or the creation of deliverables. Examples of milestones are *draft report approved* and *design begun*.

#### Activity

An *activity* is a component of work performed during the course of a project. Activities take time and consume resources; you describe them by using action verbs. Examples of activities are *design report* and *conduct survey*.

### Remember

Make sure you clearly define activities and milestones. The more clearly you define them, the more accurately you can estimate the time and resources needed to perform them, the more easily you can assign them to someone else, and the more meaningful your reporting of schedule progress becomes.

### Duration

*Duration* is the total number of work periods completing an activity takes. Several factors can affect duration:

- ✓ The amount of *work effort* (the amount of time a person needs to work full time on the activity to complete it) required.
- ✓ People's availability to work on the project.
- ✓ Whether multiple people can work on the activity at the same time.
- ✓ Capacity of nonpersonnel resources (for example, a computer's processing speed and the pages per minute that a copier can print) and their availability.
- ✓ Delay. For example, if your boss spends one hour reading your memo after it sat in her inbox for four days and seven hours, the activity's duration is five days, even though your boss spends only one hour reading it.

### Remember

The units of time describe two related but different activity characteristics. *Duration* is the number of work periods required to perform an activity; *work effort* is the amount of time a person needs to complete the activity. For example, suppose four people have to work together full time for five days to complete an activity. The activity's duration is five days. The work effort is 20 person-days (4 people times 5 days).

Understanding the basis of a duration estimate helps you figure out ways to reduce it. For example, suppose you estimate that testing a software package requires that it run for 24 hours on a computer. If you can use the computer only six hours in any one day, the duration for your software test is four days. Doubling the number of people working on the test doesn't reduce the duration to two days, but getting approval to use the computer for 12 hours a day does.

### Drawing a network diagram

Determining your project's end date requires you to choose the dates that each project activity starts and ends and the dates that each milestone is reached. You can determine these dates with the help of a network diagram.

### Remember

The *activity-on-node* technique (also called *activity-in-box* or *precedence diagramming method*)

for drawing a network diagram uses the following three symbols to describe the diagram's three elements:

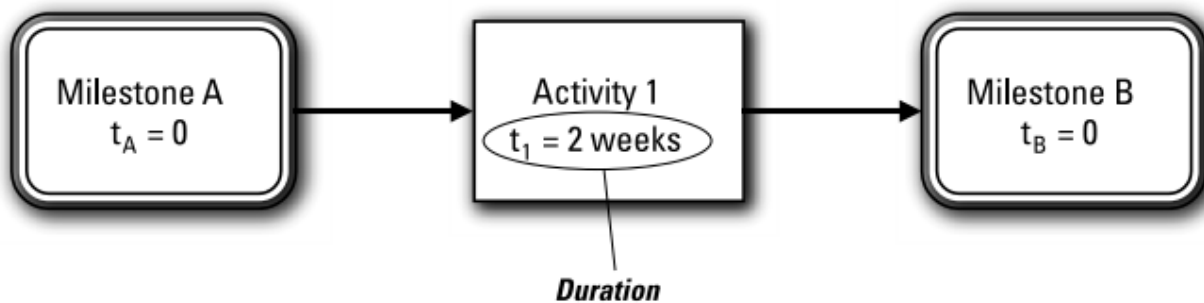
- ✓ **Boxes:** Boxes represent activities and milestones. If the duration is  $0$ , it's a milestone; if it's greater than  $0$ , it's an activity. Note that milestone boxes are sometimes highlighted with lines that are bold, double, or otherwise more noticeable.
- ✓ **Letter  $t$ :** The letter  $t$  represents duration.
- ✓ **Arrows:** Arrows represent the direction workflows from one activity or milestone to the next. Upon completing an activity or reaching a milestone, you can proceed either to a milestone or directly to another activity as indicated by the arrow(s) leaving that box.

Figure 1-1 presents a simple example of an activity-on-node network diagram. When you reach Milestone A (the box on the left), you can perform Activity 1 (the box in the middle), which you estimated will take two weeks to complete. Upon completing Activity 1, you reach Milestone B (the box on the right). The arrows indicate the direction of workflow.

---

Figure 1-1: The three symbols in an activity-on-node network diagram.

---



*Illustration by Wiley, Composition Services Graphics.*

**Note:** If you've worked with network diagrams in the past, you may have seen them drawn in another format called *activity-on-arrow*, also called the *classical approach*, an *arrow diagram*, or a *PERT chart* (see the section "Improving activity duration estimates" later in this course for an explanation of PERT analysis). This format represents milestones with circles and activities with arrows. However, because the activity-on-node technique is the one most used today, I draw all network diagrams in this course in this format.

## Analyzing a Network Diagram

Think of your project as a trip you and several friends are planning to take. Each of you has a car and will travel a different route to the final destination. During the trip, two or more of your routes will cross at certain places. You agree that all people who pass through a common point must arrive at that point before anyone can proceed on the next leg of the journey. The trip is over when all of you reach the final destination.

You certainly don't want to undertake a trip this complex without planning it out on a road map. After all, planning your trip allows you to

- ✓ Determine how long the entire trip will take.
- ✓ Identify potential difficulties along the way.
- ✓ Consider alternate routes to get to your final destination more quickly.

This section helps you plan your project schedule by telling you how to read and interpret a roadmap (your network diagram), so you can determine the likely consequences of your possible approaches.

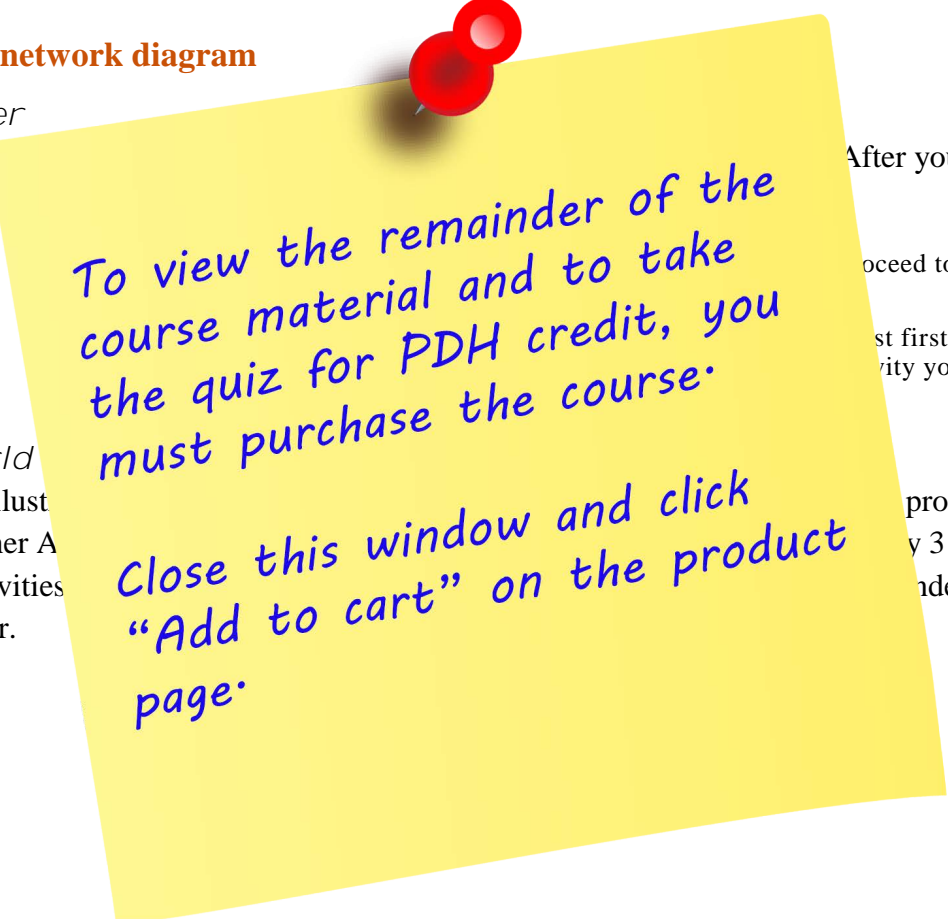
### Reading a network diagram

#### Remember

Use the following information to understand the network diagram.

#### Real World

Figure 1-2 illustrates how to work on either Activity 1 or both Activities 1 and 2 of each other.



To view the remainder of the course material and to take the quiz for PDH credit, you must purchase the course.

Close this window and click "Add to cart" on the product page.

After you

proceed to the next

step first complete the activity you want to

proceed to

Activity 3 by itself

independent