a *ripple effect* commonly occurs when we begin to rework the resource schedule to eliminate the sources of resource conflict. This ripple effect will become evident as we work through the steps necessary to level the sample project.

PHASE ONE Using Figure 12.13, examine the conflict point, January 12, for the tasks that require 10 resource units. Tasks C, D, and E are all scheduled on this day and have resource unit commitments of 4, 3, and 3 hours respectively. Therefore, the first phase in resource leveling consists of identifying the relevant activities to determine which are likely candidates for modification. Next, which activity should be adjusted? Using the priority heuristic mentioned previously, first examine the activities to see which are critical and which have some slack time associated with them. From developing the network, we know that activity C is on the critical path. Therefore, avoid reconfiguring this task if possible because any adjustment of its duration will adversely affect the overall project schedule. Eliminating activity C leaves us the choice of adjusting either activity D or activity E.

PHASE TWO Select the activity to be reconfigured. Both activities D and E have slack time associated with them. Activity D has three days of slack and activity E has one day. According to the rule of thumb, we might decide to leave activity E alone because it has the least amount of slack time. In this example, however, this option would lead to "splitting" activity D; that is, we would begin activity D on January 8, stop on the 12th, and then finish the last two days of work on January 15 and 16. Simply representing this option, we see in Figure 12.14, which shows the Gantt chart for our project, that the splitting process complicates our scheduling process to some degree. Note further that the splitting does not lengthen the overall project baseline, however; with the three days of slack associated with this task, lagging the activity one day through splitting it does not adversely affect the final delivery date.

For simplicity's sake, then, we will avoid the decision to split activity D for the time being, choosing the alternative option of adjusting the schedule for activity E. This option is also viable in that it does not violate the schedule baseline (there is slack time associated with this activity).

Figure 12.15 shows the first adjustment to the original resource-loading table. The three resource units assigned to activity E on January 12 are scratched and added back in at the end of the activity, thereby using up the one day of project slack for that activity. The readjusted resource-loading table now shows that January 12 no longer has a resource conflict, because the baseline date shows a total of seven resource units.

PHASE THREE After making adjustments to smooth out resource conflicts, reexamine the remainder of the resource table for *new* resource conflicts. Remember that adjusting the table can cause ripple effects in that these adjustments may disrupt the table in other places. This exact effect has occurred in this example. Note that under the adjusted table (see Figure 12.15), January 12 no longer shows a resource conflict; however, the act of lagging activity E by one day would create a conflict on January 22, in which 11 resource units would be scheduled. As a result, it is necessary to go through the second-phase process once more to eliminate the latest resource conflict.

Here again, the candidates for adjustment are all project tasks that are active on January 22, including activities E, F, I, and J. Clearly, activities E and F should, if possible, be eliminated as first choices given their lack of any slack time (i.e., they both now reside on a critical path).

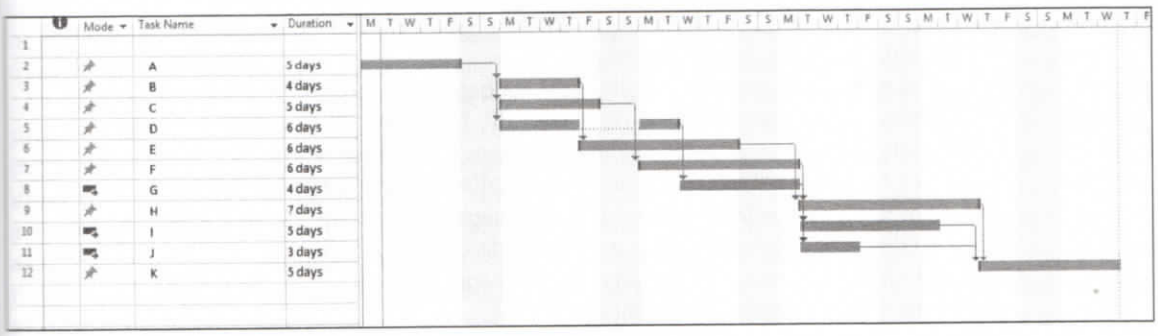

FIGURE 12.14 **Reconfiguring the Schedule by Splitting Activity D**

Source: MS Project 2013, Microsoft Corporation