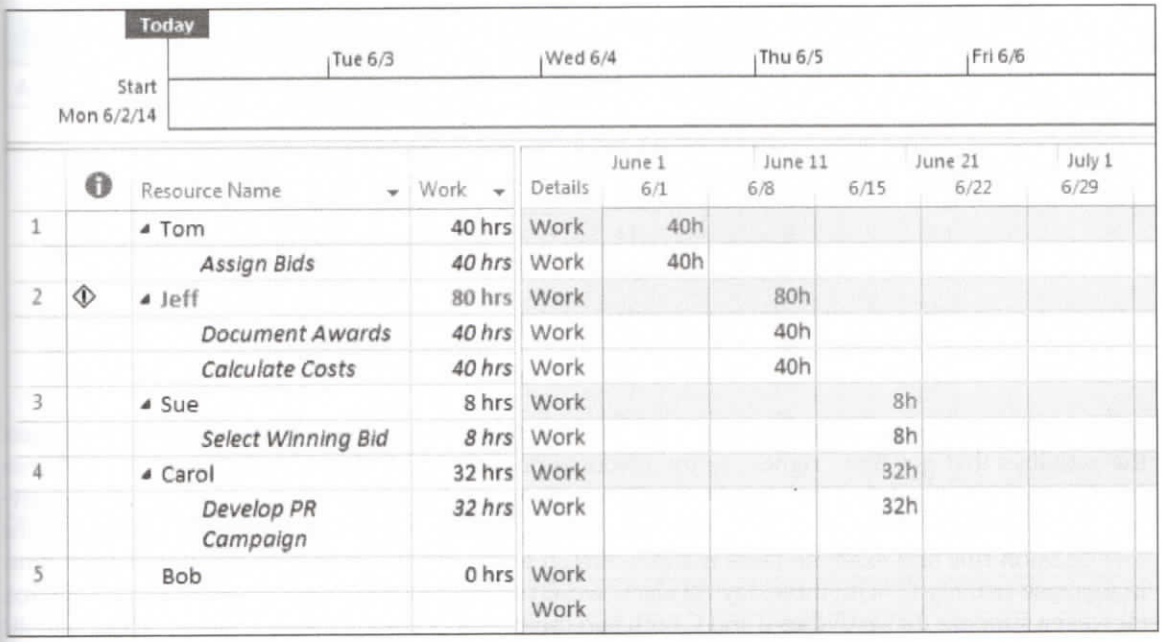

		Resource Name	Work	Details	June 1 6/1	June 11 6/8	6/15	June 21 6/22	July 1 6/29
1		◢ Tom	40 hrs	Work	40h				
		Assign Bids	*40 hrs*	Work	40h				
2	⚠	◢ Jeff	80 hrs	Work		80h			
		Document Awards	*40 hrs*	Work		40h			
		Calculate Costs	*40 hrs*	Work		40h			
3		◢ Sue	8 hrs	Work			8h		
		Select Winning Bid	*8 hrs*	Work			8h		
4		◢ Carol	32 hrs	Work			32h		
		Develop PR Campaign	*32 hrs*	Work			32h		
5		Bob	0 hrs	Work					
				Work					

FIGURE 12.6 **Example of Resource Usage Table with Overallocation**

Source: MS Project 2013, Microsoft Corporation

12.3 RESOURCE LEVELING

Resource leveling is the process that addresses the complex challenges of project constraints. With resource leveling we are required to develop procedures that minimize the effects of resource demands across the project's life cycle. Resource leveling, sometimes referred to as resource **smoothing**, has two objectives:

1. To determine the resource requirements so that they will be available at the right time
2. To allow each activity to be scheduled with the smoothest possible transition across resource usage levels

Resource leveling is useful because it allows us to create a profile of the resource requirements for project activities across the life cycle. Further, we seek to minimize fluctuations from period to period across the project. The farther in advance that we are able to anticipate and plan for resource needs, the easier it becomes to manage the natural flow from activity to activity in the project, with no downtime, while we begin searching for the resources to continue with project tasks. The key challenge consists of making prioritization decisions that assign the right amount of resources to the right activities at the right time.

Because resource management is typically a multivariate, combinatorial problem (i.e., one that is characterized by multiple solutions often involving literally dozens, hundreds, or even thousands of activity variables), the mathematically optimal solution may be difficult or infeasible to find due to the time required to solve all possible equation options. Hence, a more common approach to analyzing resource-leveling problems is to apply some **leveling heuristics**, or simplified rules of thumb, when making decisions among resource-leveling alternatives.[6]

Some simple heuristics for prioritizing resource allocation include applying resources to:

1. ***Activities with the smallest amount of slack.*** The decision rule is to select for resource priority those activities with the smallest amount of slack time. Some have argued that this decision rule is the best for making priority decisions, resulting in the smallest schedule slippage to the overall project.[7]
2. ***Activities with the smallest duration.*** Tasks are ordered from smallest duration to largest, and resources are prioritized accordingly.
3. ***Activities with the lowest activity identification number.*** (e.g., those that start earliest in the WBS). This heuristic suggests that, when in doubt, it is better to apply resources to earlier tasks first.
4. ***Activities with the most successor tasks.*** We select for resource priority those tasks that have the most tasks following behind them.
5. ***Activities requiring the most resources.*** It is common to first apply resources to those activities requiring the most support, and then analyze the remaining tasks based on the availability of additional resources.