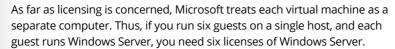requires a total of 12 servers to meet its needs. You could run each of these 12 servers on a separate computer, in which case you would have 12 computers in your server room, or you could use virtualization to run these 12 servers on just 2 computers. In effect, each of those computers would simulate 6 separate computer systems, each running one of your servers.

Each of the simulated computers is called a *virtual machine* (VM). For all intents and purposes, each virtual machine appears to be a complete, self-contained computer system with its own processor (or, more likely, processors), memory, disk drives, CD-ROM/DVD drives, keyboard, mouse, monitor, network interfaces, USB ports, and so on.

Like a real computer, each virtual machine requires an operating system to do productive work. In a typical network server environment, each virtual machine runs its own copy of Windows Server. The operating system has no idea that it's running on a virtual machine rather than on a real machine.

Here are a few terms you need to be familiar with if you expect to discuss virtualization intelligently:

- » **Host:** The actual physical computer on which one or more virtual machines run.

- » **Bare metal:** Another term for the host computer that runs one or more virtual machines.

- » **Guest:** Another term for a virtual machine running on a host.

- » **Guest operating system:** An operating system that runs within a virtual machine. By itself, a guest is just a machine; it requires an operating system to run. The guest operating system is what brings the guest to life.

  As far as licensing is concerned, Microsoft treats each virtual machine as a separate computer. Thus, if you run six guests on a single host, and each guest runs Windows Server, you need six licenses of Windows Server.

- » **Hypervisor:** The virtualization operating system that creates and runs virtual machines. For more information about hypervisors, read the next section, "Understanding Hypervisors."

- » **Hardware abstraction layer (HAL):** A layer of software that acts as a go-between to separate actual hardware from the software that interacts with it. An operating system provides a HAL, because it uses device drivers to communicate with actual hardware devices so that software running in the operating system doesn't have to know the details of the specific device it's interacting with. A hypervisor also provides a HAL that enables the guest operating systems in virtual machines to interact with virtualized hardware.

WARNING