

switch, the VMs can communicate with each other via the switch. And they can communicate with devices on the physical network via the connections through the host computer's network interfaces.

Looking at the Benefits of Virtualization

You might suspect that virtualization is inefficient because a real computer is inherently faster than a simulated computer. Although it's true that real computers are faster than simulated computers, virtualization technology has become so advanced that the performance penalty for running on a virtualized machine rather than a real machine is only a few percent.

The small amount of overhead imposed by virtualization is usually more than made up for by the simple fact that even the most heavily used servers spend most of their time twiddling their digital thumbs, waiting for something to do. In fact, many servers spend nearly *all* their time doing nothing. As computers get faster and faster, they spend even more of their time with nothing to do.

Virtualization is a great way to put all this unused processing power to good use.

Besides this basic efficiency benefit, virtualization has several compelling benefits:

- » **Hardware cost:** You typically can save a lot of money by reducing hardware costs when you use virtualization. Suppose that you replace ten servers that cost \$4,000 each with one host server. Granted, you'll probably spend more than \$4,000 on that server, because it needs to be maxed out with memory, processor cores, network interfaces, and so on. So you'll probably end up spending \$10,000 or \$15,000 for the host server. Also, you'll end up spending something like \$5,000 for the hypervisor software. But that's still a lot less than the \$40,000 you would have spent on ten separate computers at \$4,000 each.
- » **Energy costs:** Many organizations have found that going virtual has reduced their overall electricity consumption for server computers by 80 percent. This savings is a direct result of using less computer hardware to do more work. One host computer running ten virtual servers uses approximately one-tenth the energy that would be used if each of the ten servers ran on separate hardware.