



Chapter VI

Network Development for Online Computer Labs

Introduction

In the previous chapter, we have discussed the issues relate to the server-side configurations. After servers are developed, our next task is to develop networks that will connect the servers to the client computers. Networks are also used to teach networking related courses. In these courses, students work on network configuration, network management, network security, and Web related tasks. These types of trainings are necessary to meet the requirements from the e-commerce industry. Our students need a network administrator's account for practice. Being a network administrator gives students a good opportunity to gain network problem solving skills.

The configuration of a network will depend on the needs and requirements of teaching and hands-on practice. In this chapter, we will discuss issues related to the implementation of networks for each type of online computer lab model. We will start with the peer-to-peer lab model in which computers are connected through a switch or several crossover network cables.

Next, we will discuss network implementation issues for a small computer lab in which computers are connected through multiple switches and at least one router. Based on the teaching and hands-on practice requirements, the computers in the lab can be configured to join a workgroup or join a domain.

For a medium computer lab, multiple networks will be constructed. Computers in these networks need to communicate with one another. For this type of lab, more network equipment is needed and the configuration is also more complicated. Multiple switches and routers will be used to construct the networks. These computers may be configured to join one of the domains depending on the requirements of teaching and hands-on practice.

In this chapter, we will also discuss the network implementation issues of large computer labs. For a large computer lab, multiple medium online computer labs are connected through a wide area network (WAN) or through the Internet. For this type of network, the network developing process often involves outside companies such as a telephone company and a technology consulting company.

In this chapter, we will specify, in detail, what network equipment to use and how computers communicate with each other within a network and between different types of networks. An online computer lab involves a number of network technologies and equipment. In this chapter, we will investigate how network equipment is used in a network infrastructure and discuss network topologies, network deployment, and management techniques. The discussion will provide some of the up-to-date information in the fields such as wireless LANs (WLANs), VoIP, content networking, and storage networking. We will have a brief discussion about these equipment and technologies, and how they can be used to meet the teaching and hands-on practice requirements.

Lastly, this chapter will present a case study about the network configuration of a medium online computer lab. In this case study, all the servers developed in the previous chapter will be linked together and configured to be ready for an online technology-based course.

Background

Each of our computer lab models requires a network to allow computers to communicate with each other. To meet the requirement, we need to properly construct a network computing environment for an online computer lab. Depending on the operating system installed on the network server, a network can be categorized as a Windows network, a Linux network, or a UNIX network.

For a Windows network, Windows Server 2003 and Windows Server 2000 are the main network operating systems Hunt and Bragg (2005). These network servers

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