Chapter III

IINetwork: An Interactive Learning Tool for Communication Networks

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Abstract

A country or a nation would be immobilized without computers and data communication networks. Computer networking courses are being offered by not only universities and tertiary institutions but also many technical colleges and secondary schools worldwide. The cost associated with purchasing networking devices and equipment to enable students to gain practical experience in setting up a customised network can be significant. Therefore, networking fundamentals are taught by combination of textbooks and lecture-only methods in many schools and publicly funded tertiary institutions. This chapter describes the development and use of an interactive learning tool called iNetwork for teaching and learning computer communication networks. iNetwork provides an environment in which students can experiment with different network configurations and gain hands-on learning experience in computer and data communication networks without the need for expensive equipment.

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Learning Objectives

After completing this chapter, you will be able to:

- List and describe the main features of iNetwork.
- Discuss the usefulness of iNetwork in teaching and learning contexts.
- Explain how iNetwork can be used in the classroom to enhance teaching and learning various aspects of computer communication networks.
- Define the following key terms: ARP, DHCP, DNS, firewall, OSPF, RIP, TCP/IP, and VPN.
- Suggest further enhancements to iNetwork.

Introduction

Communication networks form an important part of business and society today. As the Internet has continued to expand, so has the demand for education in networking. Traditionally providers of networking subjects and courses were limited to universities and technical colleges. At present, IT and networking subjects are being introduced into most high schools. The cost involved with providing every student with the equipment necessary to set up a practical network is significant, particularly for schools and publicly funded tertiary institutions, and consequently most networking concepts are taught using a combination of standard textbook- and lecture-based approaches and limited laboratories on small networks.

In this chapter, we present a solution to the above-mentioned resource and cost problem which aims at improving the way networking is commonly taught. Our solution will allow users to gain authentic practice in experimenting with different network configurations without the cost of providing each student with their own networking equipment. The chapter reports on the requirements, development, and evaluation of an interactive learning tool called iNetwork, which allows users to assemble and simulate custom networks composed of commonly used networking devices. iNetwork lets students simulate the running of these custom-built networks, identify problems, and learn more about communication networks.

In the development of iNetwork, a packet-capturing software was used to monitor the behaviour of an experimental network. The data thus obtained was integrated into this tool so that it could simulate the real-life behaviour of a
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