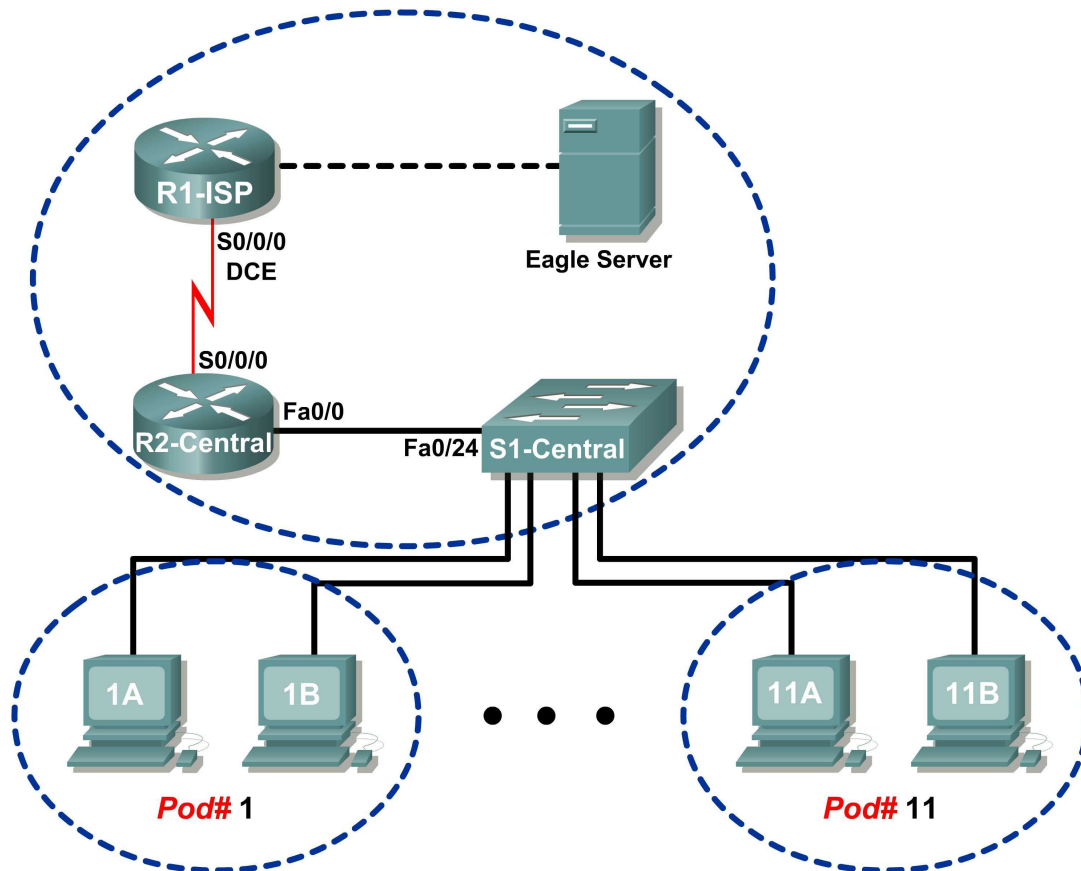


## Lab 3.4.2: Managing a Web Server

### Topology Diagram



### Addressing Table

Device	Interface	IP Address	Subnet Mask	Default Gateway
R1-ISP	S0/0/0	10.10.10.6	255.255.255.252	N/A
	Fa0/0	192.168.254.253	255.255.255.0	N/A
R2-Central	S0/0/0	10.10.10.5	255.255.255.252	10.10.10.6
	Fa0/0	172.16.255.254	255.255.0.0	N/A
Eagle Server	N/A	192.168.254.254	255.255.255.0	192.168.254.253
	N/A	172.31.24.254	255.255.255.0	N/A
hostPod#A	N/A	172.16. Pod#.1	255.255.0.0	172.16.255.254
hostPod#B	N/A	172.16. Pod#.2	255.255.0.0	172.16.255.254
S1-Central	N/A	172.16.254.1	255.255.0.0	172.16.255.254

## Learning Objectives

Upon completion of this lab, you will be able to:

- Download, install, and verify a web server application
- Verify the default web server configuration file
- Capture and analyze HTTP traffic with Wireshark

## Background

Web servers are an important part of the business plan for any organization with a presence on the Internet. Web browsers are used by consumers to access business web sites. However, web browsers are only half of the communication channel. The other half of the communication channel is web server support. Web server support is a valuable skill for network administrators. Based on a survey by Netcraft in January, 2007, the following table shows the top three web server applications by percent of use:

Web Server	Percent of use
Apache	60 %
Microsoft	31 %
Sun	1.6 %

## Scenario

In this lab you will download, install, and configure the popular Apache web server. A web browser will be used to connect to the server, and Wireshark will be used to capture the communication. Analysis of the capture will help you understand how the HTTP protocol operates.

### Task 1: Download, Install, and Verify the Apache Web Server.

The lab should be configured as shown in the Topology Diagram and logical address table. If it is not, ask the instructor for assistance before proceeding.

#### Step 1: Download the software from Eagle Server.

The Apache web server application is available for download from Eagle Server.

1. Use a web browser and URL [ftp://eagle-server.example.com/pub/eagle\\_labs/eagle1/chapter3](ftp://eagle-server.example.com/pub/eagle_labs/eagle1/chapter3) to access and download the software. See Figure 1.



Figure 1. FTP Download Screen for the Apache Web Server

2. Right-click the file and save the software on the pod host computer.

## Step 2: Install the Apache web server on the pod host computer.

1. Open the folder where the software was saved, and double-click the Apache file to begin installation. Choose default values and consent to the licensing agreement. The next installation step requires customized configuration of the web server, shown in Figure 2.

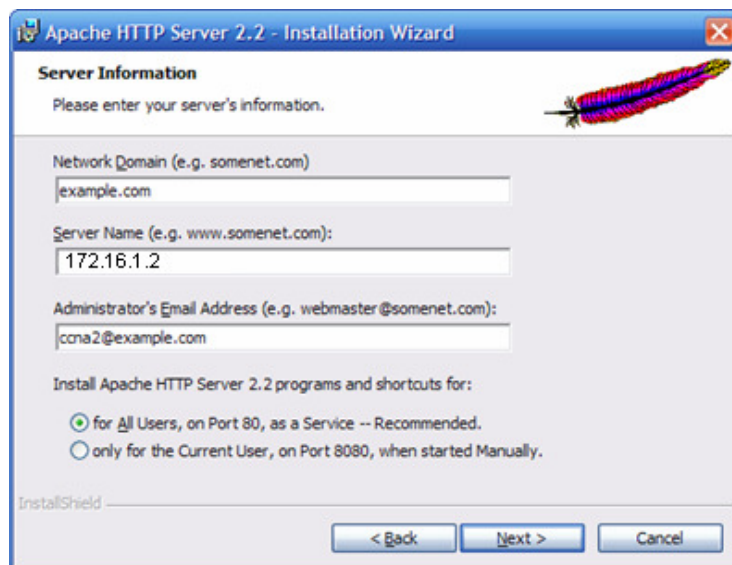


Figure 2. Customized Configuration Screen

Use the following values:

Information	Value
Network Domain	example.com
Server Name	IP address of computer
Administrator's E-mail Address	ccna*@example.com

\* For example, for users 1 through 22, if the computer is on Pod 5, Host B, the administrator's e-mail number is [ccna10@example.com](mailto:ccna10@example.com)

2. Accept the recommended port and service status. Click **Next**.
3. Accept the default typical installation, and click **Next**.

What is the default installation folder?

4. Accept the default installation folder, click **Next**, and then **Install**. When the installation has finished, close the screen.

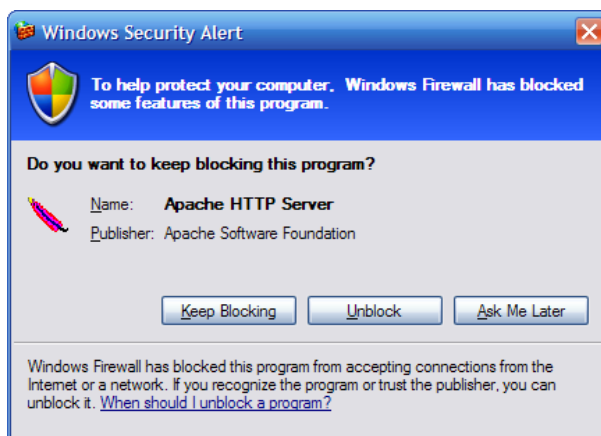


Figure 3. Windows Security Alert

**Note:** If a Windows Security Alert is displayed, select unblock. See Figure 3. This will permit connections to the web server.

### Step 3: Verify the web server.

The **netstat** command will display protocol statistics and connection information for this lab computer.


1. Choose **Start > Run** and open a command line window. Type **cmd**, and then click **OK**. Use the **netstat -a** command to discover open and connected ports on your computer:

```
C:\>netstat -a
Active Connections
```

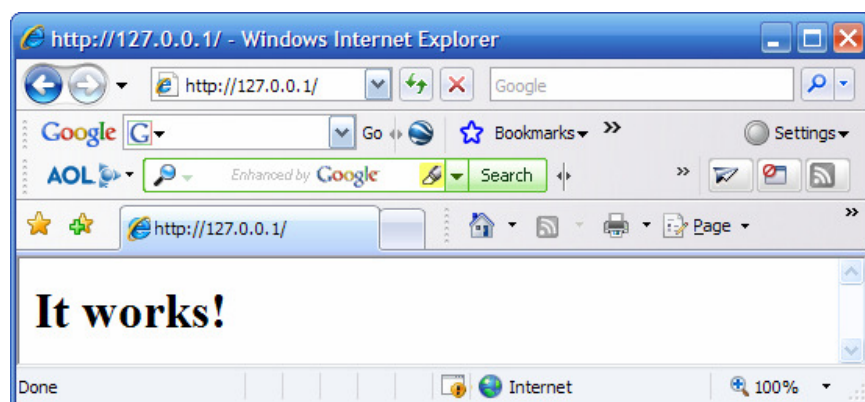
Proto	Local Address	Foreign Address	State
TCP	GW-desktop-hom:http	GW-desktop-hom:0	LISTENING
TCP	GW-desktop-hom:epmap	GW-desktop-hom:0	LISTENING
TCP	GW-desktop-hom:microsoft-ds	GW-desktop-hom:0	LISTENING
TCP	GW-desktop-hom:3389	GW-desktop-hom:0	LISTENING

<output omitted>  
C:\>

2. Using the command **netstat -a**, verify that the web server is operating properly on the pod host computer.

The Apache web server monitor icon  should be visible on the lower right side of the screen, close to the time.

3. Open a web browser, and connect to the URL of your computer. A web page similar to Figure 4 will be displayed if the web server is working properly.



**Figure 4. Web Server Default Page**

The 127.0.0.0 / 8 network address is reserved and is used for local IP addresses. The same page should be displayed if the URL is changed to the IP address on the Ethernet interface or to any host IP address in the 127.0.0.0 / 8 network range.

4. Test the web server on several different IP addresses from the 127.0.0.0 / 8 network range. Fill in the following table with the results:

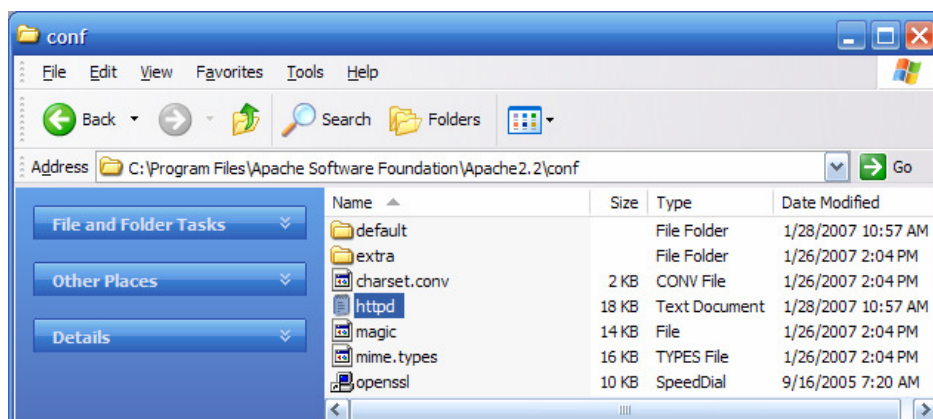
IP Address	Status	Explanation
127.0.0.1		
127.255.255.254		
127.255.255.255		
127.0.0.0		

## Task 2: Verify the Default Web Server Configuration File.

### Step 1: Access the `httpd.conf` file.

A system administrator may find the need to verify or modify the default configuration file.

Open the Apache web server configuration file, `C:\Program Files\Apache Software Foundation\Apache2.2\conf\httpd.conf`. See Figure 5.



**Figure 5. Apache Web Server Configuration File**

### Step 2: Review the `httpd.conf` file.

Numerous configuration parameters allow the Apache web server to be fully customizable. The “#” character indicates a comment for system administrators, exempt from access by the web server. Scroll down the configuration file, and verify the following settings:

Value	Meaning
<code>#Listen 12.34.56.78:80</code> <code>Listen 80</code>	Listen on TCP port 80 for all incoming connections. To accept connections from only this host, change the line to <code>Listen 127.0.0.1 80</code> .
<code>ServerAdmin ccna2@example.com</code>	If there are problems, e-mail the web server at this e-mail address.
<code>ServerName 172.16.1.2:80</code>	For servers without DNS names, use the IP address:port number.
<code>DocumentRoot "C:/Program Files/Apache Software Foundation/Apache2.2/htdocs"</code>	This is the root directory for the web server.
<code>&lt;IfModule dir_module&gt;</code> <code>    DirectoryIndex index.html</code> <code>&lt;/IfModule&gt;</code>	<code>DirectoryIndex</code> sets the file that Apache will serve if a directory is requested. If no page is requested from that directory, display <code>index.html</code> if it is present.

### Step 3: Modify the web server default page.

Figure 4 shows the default web page from file `index.html`. Although this page is sufficient for testing, something more personal should be displayed.

1. Open folder `C:\Program Files\Apache Software Foundation\Apache2.2\htdocs`. The file `index.html` should be present. Right-click the file, and choose **Open With**. From the pull-down list, choose **notepad**. Change the file content to something similar to the following example:

```
<html><body><h1>Welcome to the Pod1HostB Web Server!!!</h1>
<center><b>
Operated by me!
</center></b>
Contact web administrator: ccna2@example.com
</body></html>
```

2. Save the file, and refresh the web browser. Or, open URL <http://127.0.0.1>. The new default page should be displayed. As changes to `index.html` are made and saved, simply refresh the web browser to view the new content.

## Task 3: Capture and Analyze HTTP Traffic with Wireshark.

Wireshark will not capture packets sent from or to the 127.0.0.0 network on a Windows computer. The interface will not display. To complete this task, connect to either a student's computer or Eagle Server and analyze the data exchange.

### Step 1: Analyze HTTP traffic.

1. Start Wireshark, and set the capture interface to the interface bound to the 172.16 network. Open a web browser, and connect to another computer with an active web server.

Why does `index.html` *not* have to be entered in the URL for the file contents to be displayed?

- Deliberately enter a web page that is not on the web server, as shown in Figure 6. Note that an error message is displayed in the web browser.



**Figure 6. 404 Not Found Error**

Figure 7 contains a captured HTTP session. File index.htm was requested from the web server, but the server did not have the file. Instead, the server sent a **404** error. The web browser simply displayed the server response “The page cannot be found”.

No. -	Time	Source	Destination	Protocol	Info
20	14.384747	172.16.1.2	172.16.1.1	TCP	1149 > http [SYN] Seq=0 Len=0 MSS=1460
21	14.384993	172.16.1.1	172.16.1.2	TCP	http > 1149 [SYN, ACK] Seq=0 Ack=1 win=65535 Len=0 MSS=1460
22	14.385030	172.16.1.2	172.16.1.1	TCP	1149 > http [ACK] Seq=1 Ack=1 win=64240 Len=0
23	14.388292	172.16.1.2	172.16.1.1	HTTP	GET /index.htm HTTP/1.1
24	14.389299	172.16.1.1	172.16.1.2	HTTP	HTTP/1.1 404 Not Found (text/html)
25	14.541723	172.16.1.2	172.16.1.1	TCP	1149 > http [ACK] Seq=256 Ack=423 win=63818 Len=0

**Figure 7. Wireshark Capture of HTTP Traffic**

- Highlight the capture line with the 404 error, and move into the second (middle) Wireshark window. Expand the line-based text-data record.

What are the contents?

#### Task 4: Challenge

Modify the default web server configuration file `httpd.conf` and change the `Listen 80` line to `Listen 8080`. Open a web browser and access URL <http://127.0.0.1:8080>. Verify with the `netstat` command that the new web server TCP port is 8080.

#### Task 5: Reflection

Web servers are an important component of e-commerce. Depending on the organization, the network or web administrator has the responsibility of maintaining the corporate web server. This lab demonstrated how to install and configure the Apache web server, test for proper operation, and identify several key configuration parameters.

The student modified the default web page `index.html` and observed the effect on the web browser output.

Finally, Wireshark was used to capture an HTTP session of a file not found. The web server responded with an HTTP 1.1 error 404 and returned a file not found message to the web browser.

### Task 6: Clean Up

During this lab the Apache web server was installed on the pod host computer. It should be uninstalled. To uninstall the web server, click **Start > Control Panel > Add or Remove Programs**. Click **Apache Web Server**, and then click **Remove**.

Unless directed otherwise by the instructor, turn off power to the host computers. Remove anything that was brought into the lab, and leave the room ready for the next class.