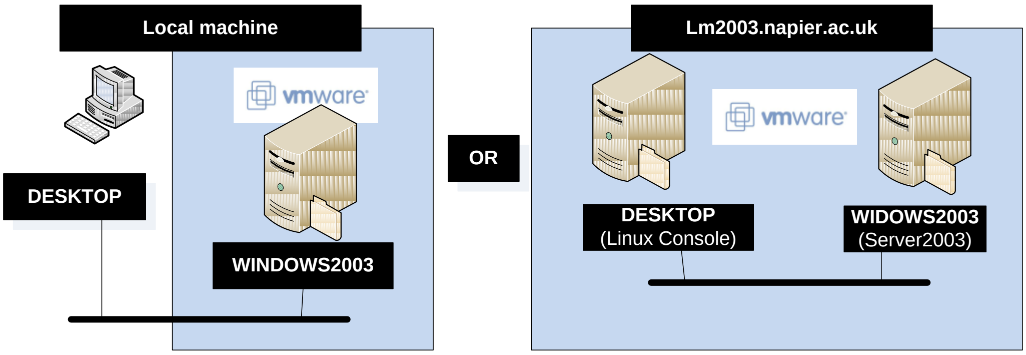
Week	Date	Teaching	Attended
3	24/01/10	Lab 2: Windows Services/Toolkit	

Aim: The aim of this lab is to investigate the discovery and configuration of services within Windows. It uses the Windows 2003 VM image (**WINDOWS2003**). You can either run VMWare Workstation on the local machine in the lab, or connect via a web browser to the www.LM2003.napier.ac.uk virtualisation server cluster. The Console (**DESKTOP**) on the local machine will be from Windows 7, where in LM2003 it is an Ubuntu console, as outlined below.



Time to complete:
4/5 hours (Two supervised hours in lab, and two/three additional hours, unsupervised).

Activities:

- Complete Lab 2: Windows Services/Toolkit.
  .pdf from WebCT or http://www.dcs.napier.ac.uk/~cs342/CSN10102/Lab2.pdf

- Complete the End Of Unit Test for this chapter at:
  http://buchananweb.co.uk/adv01.html

  Note: The module Handbook is available at:
  http://buchananweb.co.uk/adv/part1.pdf

Learning activities:
At the end of these activities, you should understand:

- How to define services in Windows.
- How to call-up configuration commands from a toolkit.

Reflective statements (end-of-exercise):

- How does the VM image setup itself up so that it can access the Internet, and that the local host can access the services within it?
- What are the key Windows commands used to discover the services which are being run?
- What are the key folder locations for Windows services?

Source code used:
http://buchananweb.co.uk/toolkit.zip

Lab 2: Windows Services/Toolkit

1.1 Details

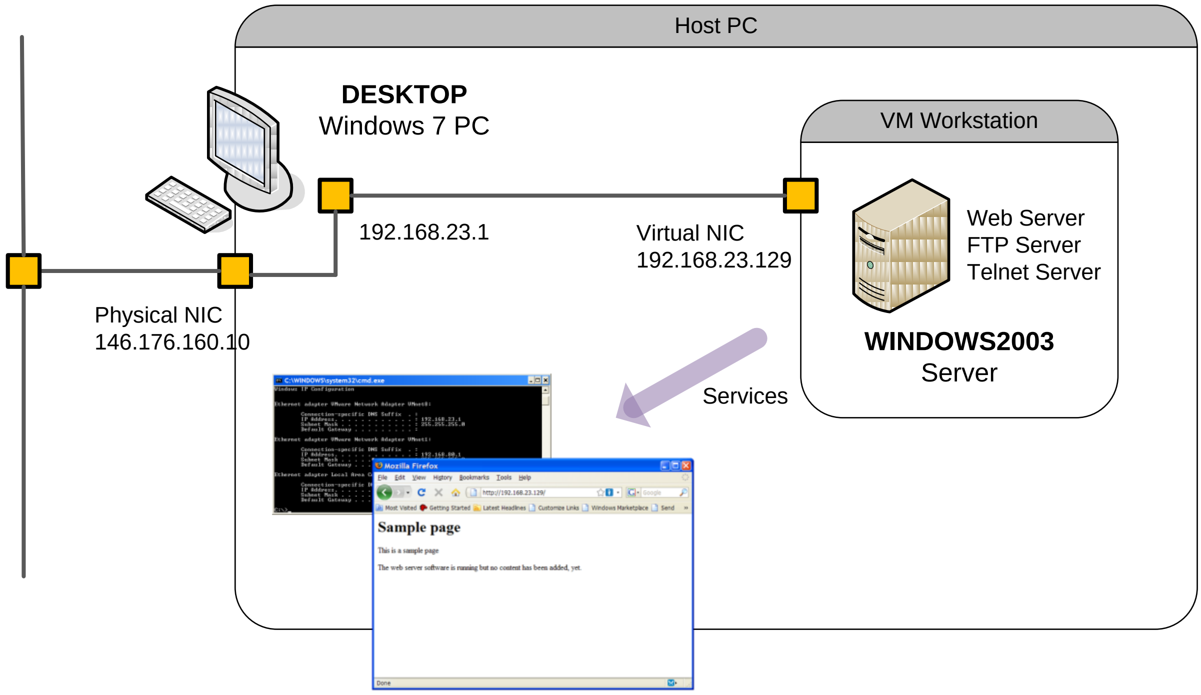
Aim: To provide a foundation in setup and consuming Windows services, and to continue building a software toolkit.

1.2 Windows Services

On-line demo:
http://buchananweb.co.uk/adv_security_and_network_forensics/threat01/threat01.htm

This part of the lab has two elements: the host machine (**DESKTOP**) and the Windows virtual server image (**WINDOWS2003**) as shown in Figure 1. The lab can be completed using VMWare Workstation on the local machine in the lab (shown in **Error! Reference source not found.**), or remotely on our LM2003 virtualisation server cluster, via a web browser (shown in Figure 2).

The local lab architecture is shown below. This requires the Windows2003 Server Virtual Machine to be run using VM Workstation on the local PC.



```
Windows IP Configuration

Ethernet adapter VMware Network Adapter VMnet8:

        Connection-specific DNS Suffix  . :
        IP Address. . . . . . . . . . . . : 192.168.23.1
        Subnet Mask . . . . . . . . . . . : 255.255.255.0
        Default Gateway . . . . . . . . . :

Ethernet adapter VMware Network Adapter VMnet1:

        Connection-specific DNS Suffix  . :
        IP Address. . . . . . . . . . . . : 192.168.80.1
        Subnet Mask . . . . .
        Default Gateway . . .

Ethernet adapter Local Area C

        Connection-specific D
        IP Address. . . . . .
        Subnet Mask . . . . .
        Default Gateway . . .

C:\>
```

Sample page

This is a sample page

The web server software is running but no content has been added, yet.

Figure 1 - Lab Architechture

An overview of Windows commands, to assist with the lab, can be found at:
http://www.microsoft.com/resources/documentation/windows/xp/all/proddocs/en-s/ntcmds.mspx

🖰 An overview of Linux commands, to assist with the lab, can be found at: http://www.computerhope.com/unix/overview.htm

The virtualisation server cluster lab architecture is shown in **Error! Reference source not found.** below. This requires a Linux VM Console and a Linux VM Server to be run in the Virtualisation Cluster (our Private Cloud).

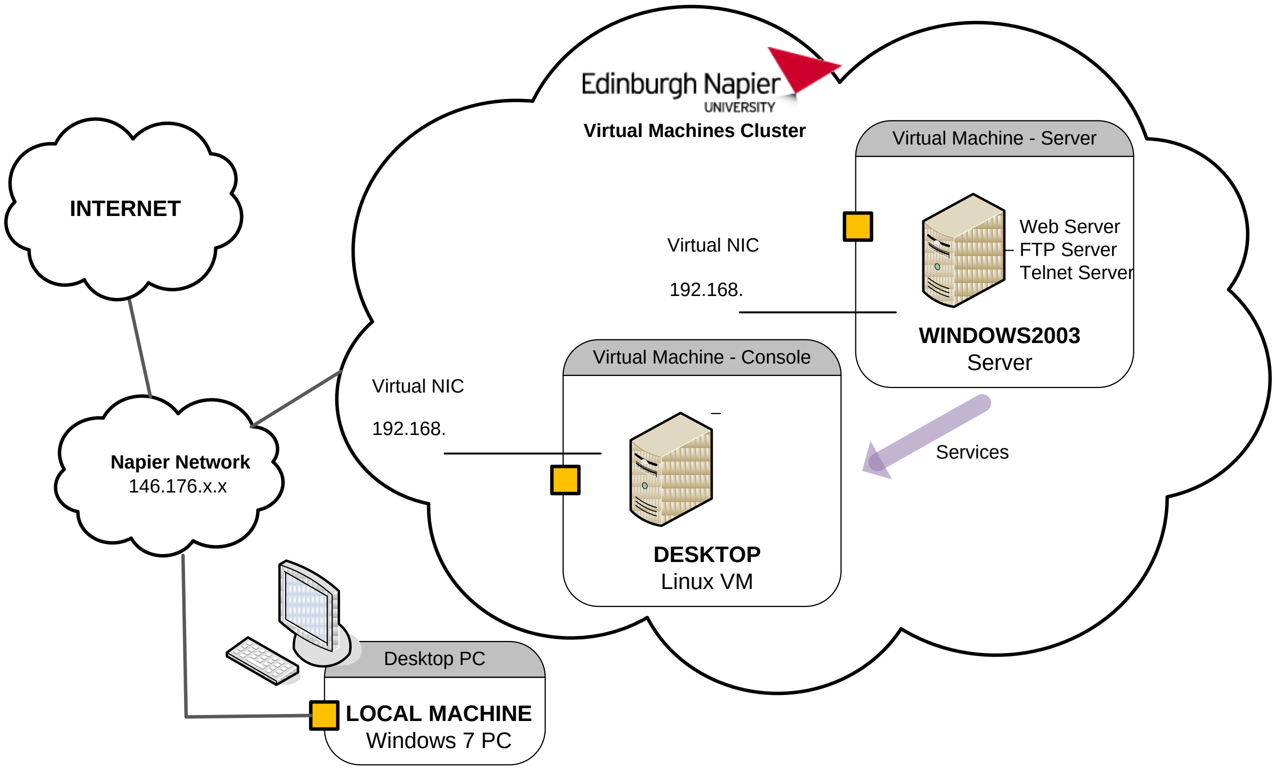


Figure 2 - Cluster Lab Architecture

L1.1 Run the Windows 2003 Server virtual machine in the **Adv Security Workspace** on the LM2003 cluster (or locally run the `.vmx` file, and power the virtual machine)

Log in to the server using: Username: **Administrator**, Password: **napier**).

Within the WINDOWS2003 virtual server, open a command line window (Start>Run>cmd) and determine the virtual servers IP address using the Windows command **`ipconfig`**.

Similarly, from DESKTOP open a command line window and determine the IP Address of the DESKTOP.

☞ Complete the IP Addressing diagram in **Error! Reference source not found.** or 5, depending on which architecture you are using. Fill in the IP addresses(s) of the DESKTOP machine, and the WINDOWS2003 virtual server.

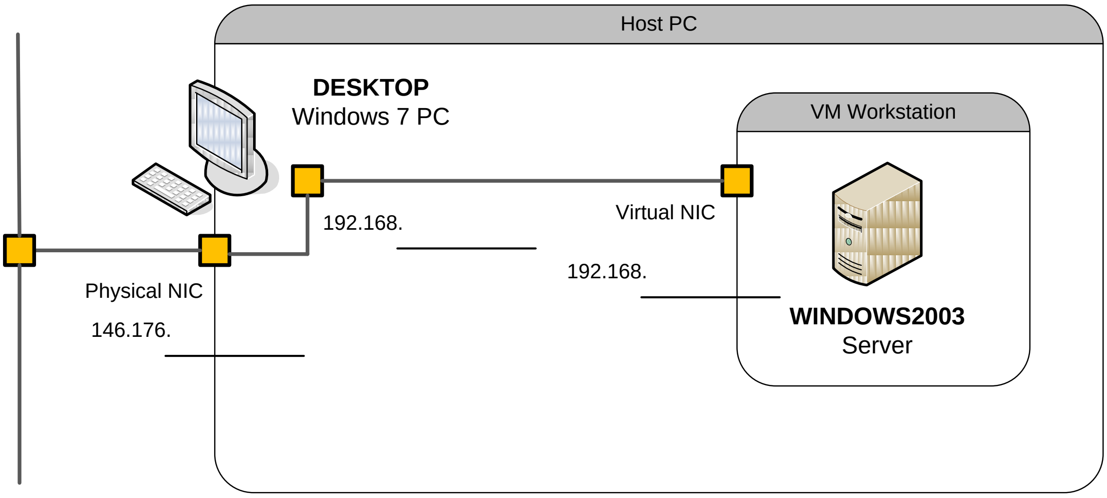


Figure 3 –Lab1 Local IP Addressing

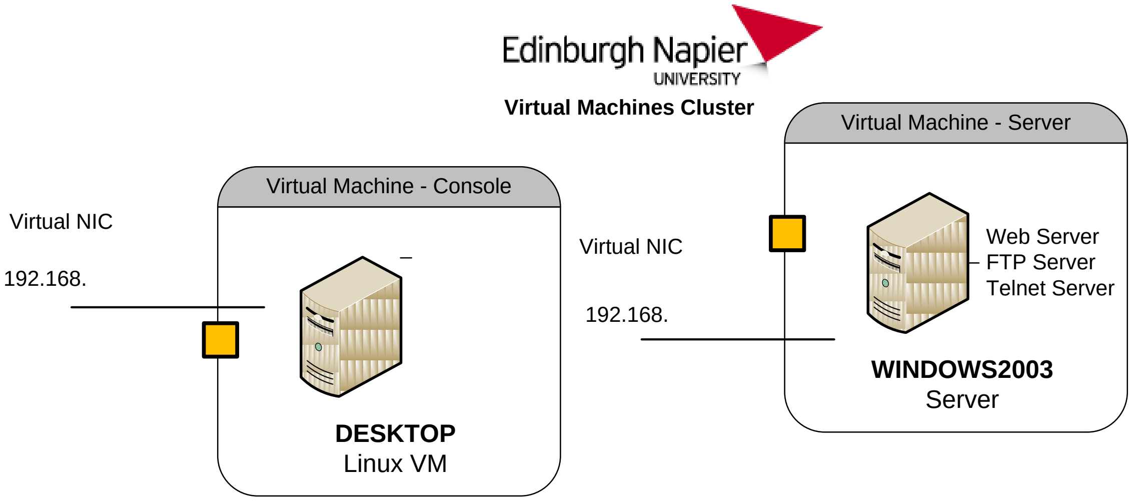


Figure 4 - Cluster IP Addressing

L1.2 To check connectivity, from DESKTOP, `ping` WINDOWS2003, and vice-versa.

☞ Were the pings successful?

YES/NO

L1.3 From WINDOW2003, run `netstat -a`, and determine the services that are running on the server.

☞ List some of the services, and their protocol/port number?

Note: Use the –h flag to get help for the command. The –n flag can be used to find the numeric port numbers of the listening servers, and the IANA Port Numbers web page lists the official services and their protocol/portnumbers.

SERVICE: Web

L1.4 In WINDOWS2003, navigate to the IIS folder `C:\inetpub`

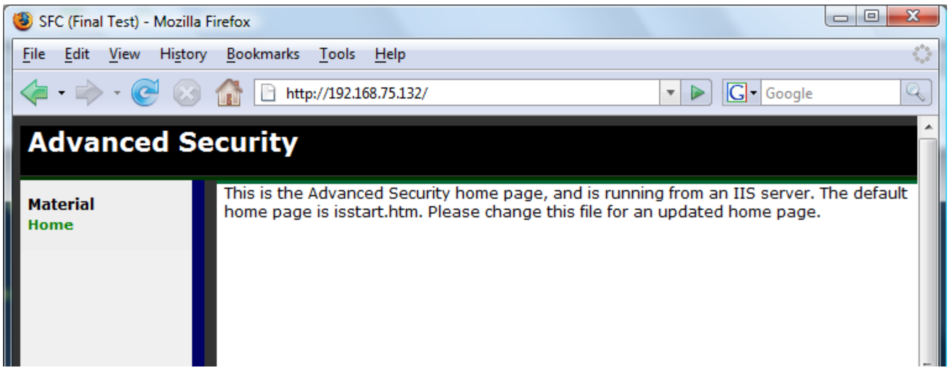
☞ What are the names of some of the folders?

In WINDOWS2003, go to the IIS Web Server folder `C:\inetpub\wwwroot`.

☞ What are the names of some of the files in this folder?

☞ What type of files does the folder contain?

L1.3 From DESKTOP, connect to the Web Server using a Web Browser, and the URL **`http://w.x.y.z`**, where w.x.y.z is the IP address of WINDOWS2003, as shown below.



This is the Advanced Security home page, and is running from an IIS server. The default home page is isstart.htm. Please change this file for an updated home page.

Figure L1.1 Web server HTTP connection

Now connect to the Web Server, but this time using telnet:

```
telnet w.x.y.z 80
```

and then use the HTTP GET command:

```
GET /iisstart.htm
```

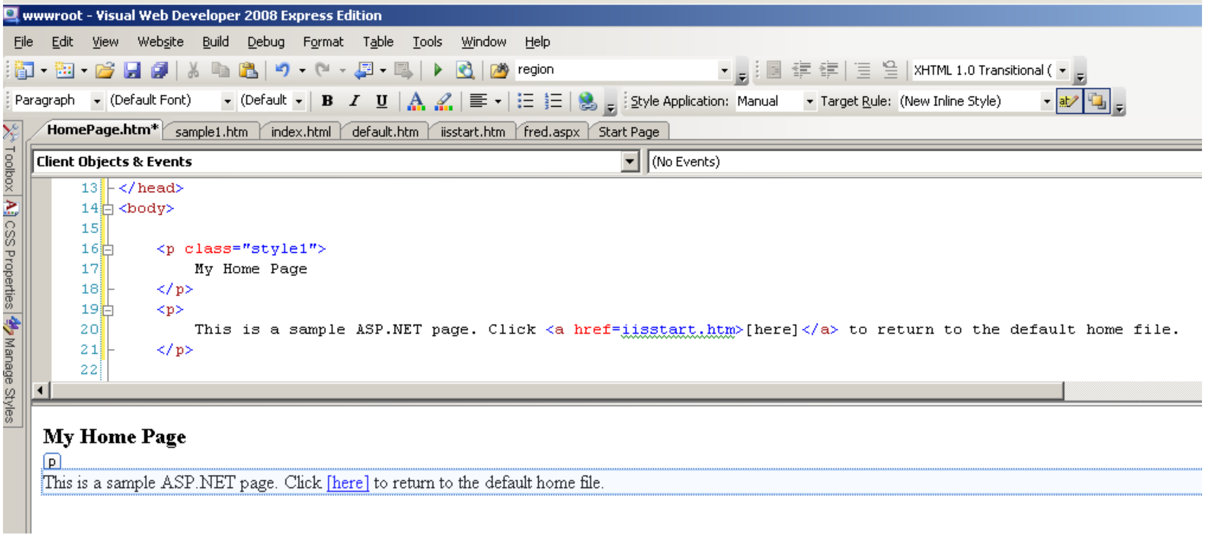
☞ What is the result, and how does it relate to accessing the home page of the Web server?

L1.4 On WINDOWS2003, using **Microsoft Web Developer Express** (register with your live email account if necessary), open up the `C:\inetpub\wwwroot` Web folder, and Add a New Item to create your own home page, as shown below. (see the video for guidance if necessary)

Next modify `iisstart.htm` so that it has a link to your home page. The home page contain the following,:

My Home Page

This is a sample page. Click [here] to return to the default home file.



```
</head>
<body>

    <p class="style1">
        My Home Page
    </p>
    <p>
        This is a sample ASP.NET page. Click <a href=iisstart.htm>[here]</a> to return to the default home file.
    </p>

```

My Home Page

p

This is a sample ASP.NET page. Click [here] to return to the default home file.

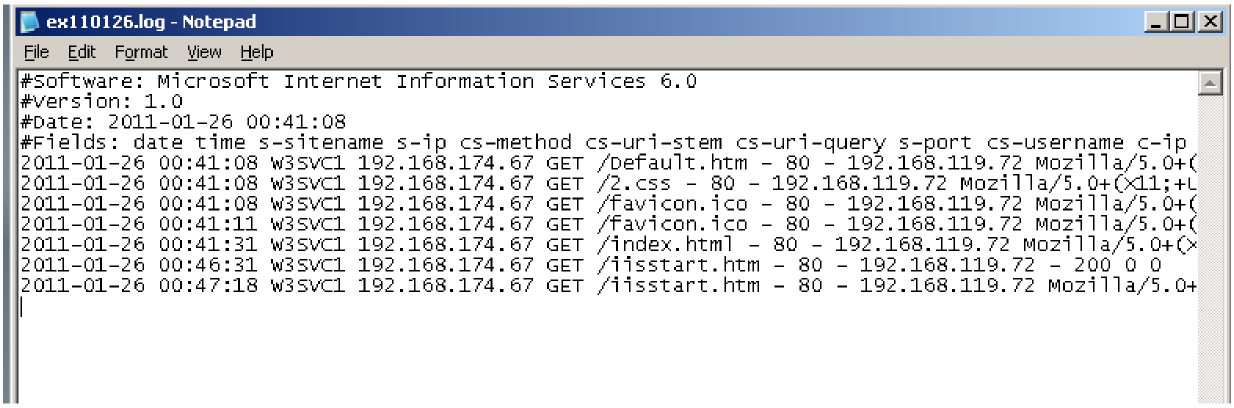
Figure L1.2 Create a new Web page

☞ Can you access this page, via a browser, from DESKTOP?

YES/NO

☞ On WINDOWS2003, go to `C:\WINDOWS\system32\LogFiles\W3SVC1`. What are the contents of the folder, and using a text viewer/editor, what do the files contain?

☞ How might these log files be used to trace malicious activity?



```
#Software: Microsoft Internet Information Services 6.0
#Version: 1.0
#Date: 2011-01-26 00:41:08
#Fields: date time s-sitename s-ip cs-method cs-uri-stem cs-uri-query s-port cs-username c-ip
2011-01-26 00:41:08 W3SVC1 192.168.174.67 GET /Default.htm - 80 - 192.168.119.72 Mozilla/5.0+(
2011-01-26 00:41:08 W3SVC1 192.168.174.67 GET /2.css - 80 - 192.168.119.72 Mozilla/5.0+(X11;+L
2011-01-26 00:41:08 W3SVC1 192.168.174.67 GET /favicon.ico - 80 - 192.168.119.72 Mozilla/5.0+(
2011-01-26 00:41:11 W3SVC1 192.168.174.67 GET /favicon.ico - 80 - 192.168.119.72 Mozilla/5.0+(
2011-01-26 00:41:31 W3SVC1 192.168.174.67 GET /index.html - 80 - 192.168.119.72 Mozilla/5.0+(X
2011-01-26 00:46:31 W3SVC1 192.168.174.67 GET /iisstart.htm - 80 - 192.168.119.72 - 200 0 0
2011-01-26 00:47:18 W3SVC1 192.168.174.67 GET /iisstart.htm - 80 - 192.168.119.72 Mozilla/5.0+
```

Figure L1.3 IIS Web Server Log File

SERVICE: Telnet

L1.5 Connect to the Telnet Server on WINDOWS2003 from DESKTOP, using **`telnet w.x.y.z`**, (where w.x.y.z is the IP address of WINDOWS2003). Login in as Administrator user (password: napier).

☞ What is the default home folder for Telnet on WINDOWS2003?

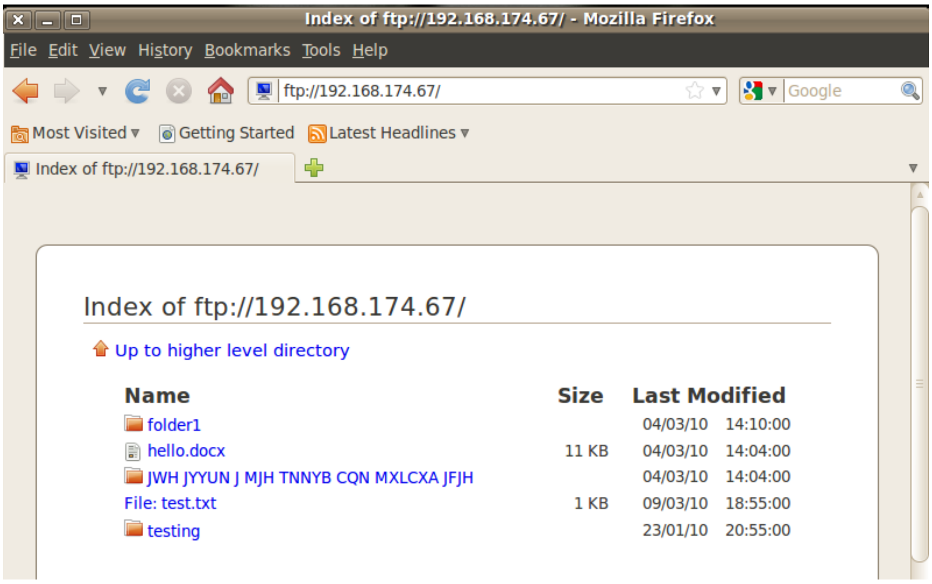
☞ List the contents of the folder?

☞ Which command did you use?

Quit from Telnet, using the **`exit`** command.

SERVICE: FTP

L1.6 From your host, connect to the FTP Server from DESKTOP using your Web browser and the URL **`ftp://w.x.y.z`** where w.x.y.z is the IP address of WINDOWS2003.



Index of ftp://192.168.174.67/ - Mozilla Firefox
File Edit View History Bookmarks Tools Help
ftp://192.168.174.67/
Google
Most Visited
Getting Started
Latest Headlines
Index of ftp://192.168.174.67/

Index of ftp://192.168.174.67/

Up to higher level directory

Name	Size	Last Modified
folder1		04/03/10 14:10:00
hello.docx	11 KB	04/03/10 14:04:00
JWH JYYUN J MJH TNNYB CQN MXLCXA JFJH		04/03/10 14:04:00
File: test.txt	1 KB	09/03/10 18:55:00
testing		23/01/10 20:55:00

Figure L1.4 FTP connection

Repeat this using:

`telnet w.x.y.z 21`

and then enter the commands in bold (and note the commands that you get beside the sample return ones):

```
220 Microsoft FTP Service
HELP
214 The following commands are recognised ...
ABOR
ACCT
...
USER Administrator
331 Password required for Administrator.
PASS napier
230 User Administrator logged in.
SYST
215 Windows_NT
TYPE I
200 Type set to I.
PASV
227 Entering Passive Mode (192,168,75,132,4,65).
LIST
```

☞ Did you see the output of the LIST command?

YES/NO

The **PASV** FTP command opens up a second channel, using a high (above 1024) port number, for the data transfer. This is calculated from the last two digits of the Passive Mode response (227 response). It is calculated as 256 times the second last digital plus the last digital. So, in this case, it is:

Port = 4*256+65 = 1089

Next open up the data transfer by creating a new Telnet connection, in a 2nd command window such as:

```
telnet w.x.y.z 1089
```

Now try the **LIST** command again, in the 1st command window.

☞ Did the LIST command succeed?

YES/NO

☞ How might type of FTP cause a security problem?

SERVICE: SMTP

L1.1 From your host, use the following command:

```
telnet w.x.y.z 25
```

and connect to the SMTP server. Next enter the commands in bold:

```
220 napier Microsoft ESMTP MAIL Service, Version: 6.0.3790.3959 ready at  Sun,
0 Dec 2009 21:56:01 +0000
help
214-This server supports the following commands:
214 HELO EHLO STARTTLS RCPT DATA RSET MAIL QUIT HELP AUTH TURN ETRN
        BDAT VRFY
helo me
250 napier Hello [192.168.75.1]
mail from: email@domain.com
250 2.1.0 email@domain.com....Sender OK
rcpt to: fred@mydomain.com
250 2.1.5 fred@mydomain.com
Data
354 Start mail input; end with <CRLF>.<CRLF>
From: Bob <bob@test.org>
```

```
To: Alice <alice@ test.org >
Date: Sun, 20 Dec 2009
Subject: Test message

Hello Alice.
This is an email to say hello
.
250 2.6.0 <NAPIERMp7lzvxrMVHFb00000001@napier> Queued mail for delivery
```

L1.7 Go to WINDOWS2003, and go into the `C:\inetpub\mailroot\queue` folder, and view the queued email message.

☞ Outline the format of the EML file?

☞ How might this type of programmable sending of mail messages be abused?

SERVICE: Find the service?

L1.8 From your host connect to Port 7 using telnet.

☞ What is the service being connected to, and what protocol/port number pair does it use?

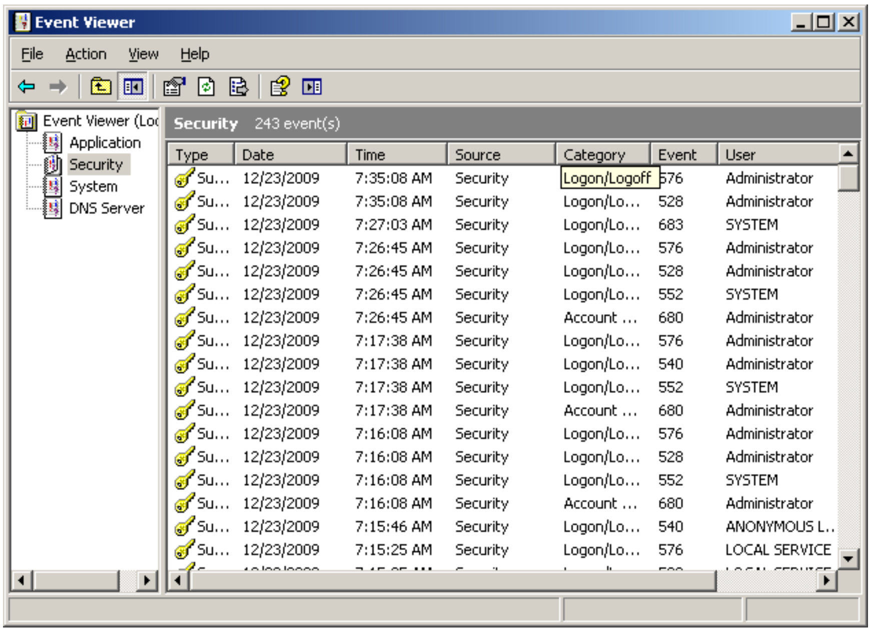
AUDIT LOGGING

L1.9 Auditing and logging are important in terms of tracing activities.

☞ Check in the Event Viewer in WINDOW2003 (Figure L1.5), that the logon event has been added. How might this be used to trace activity?

☞ From Local Security Policy, find the option to change option so that Privileged Access is audited. What is the option:

☞ From Local Security Policy, find the option to change option so that the Guest Account cannot login. What is the option:



Type	Date	Time	Source	Category	Event	User
Su...	12/23/2009	7:35:08 AM	Security	Logon/Logoff	576	Administrator
Su...	12/23/2009	7:35:08 AM	Security	Logon/Lo...	528	Administrator
Su...	12/23/2009	7:27:03 AM	Security	Logon/Lo...	683	SYSTEM
Su...	12/23/2009	7:26:45 AM	Security	Logon/Lo...	576	Administrator
Su...	12/23/2009	7:26:45 AM	Security	Logon/Lo...	528	Administrator
Su...	12/23/2009	7:26:45 AM	Security	Logon/Lo...	552	SYSTEM
Su...	12/23/2009	7:26:45 AM	Security	Account ...	680	Administrator
Su...	12/23/2009	7:17:38 AM	Security	Logon/Lo...	576	Administrator
Su...	12/23/2009	7:17:38 AM	Security	Logon/Lo...	540	Administrator
Su...	12/23/2009	7:17:38 AM	Security	Logon/Lo...	552	SYSTEM
Su...	12/23/2009	7:17:38 AM	Security	Account ...	680	Administrator
Su...	12/23/2009	7:16:08 AM	Security	Logon/Lo...	576	Administrator
Su...	12/23/2009	7:16:08 AM	Security	Logon/Lo...	528	Administrator
Su...	12/23/2009	7:16:08 AM	Security	Logon/Lo...	552	SYSTEM
Su...	12/23/2009	7:16:08 AM	Security	Account ...	680	Administrator
Su...	12/23/2009	7:15:46 AM	Security	Logon/Lo...	540	ANONYMOUS L...
Su...	12/23/2009	7:15:25 AM	Security	Logon/Lo...	576	LOCAL SERVICE

Figure L1.5 Windows Event viewer

1.3 Toolkit Development 2 – WinDump

Video demo of part 2 of the toolkit software development: http://buchananweb.co.uk/adv_security_and_network_forensics/toolkit02/toolkit02.htm

The objective of this series of labs is to build an integrated toolkit. Today we add the **WinDump** command line network packet analyser. WinDump is the Windows version of the UNIX tcpdump network analyser.

For more on WinDump see the home page: http://www.winpcap.org/windump/default.htm

Download:

http://buchananweb.co.uk/toolkit.zip

and extract to a local folder. Next open up **toolkit.sln**, and double click on **client.cs**. (Refer to http://buchananweb.co.uk/dotnetclientserver.zip for a completed version).

L2.1 Select the **[WinDump]** tab, and double click on the Combo Box (cbInterfacesWin). Next add the following code: (cut & paste the code from the .pdf)

```
      stopProcess("windump");
      if (processCaller2 != null) processCaller2.Cancel();

      processCaller2 = null;
      int ind = cbInterfacesWin.SelectedIndex+1;
      string args="-q -i "+ind;
      if (this.cbVerbose.Checked) args += " -v ";
      if (tbOption.Text.Length > 0) args += " " + tbOption.Text;

       runProgram2("WinDump.exe",args );
```

Next add the method:

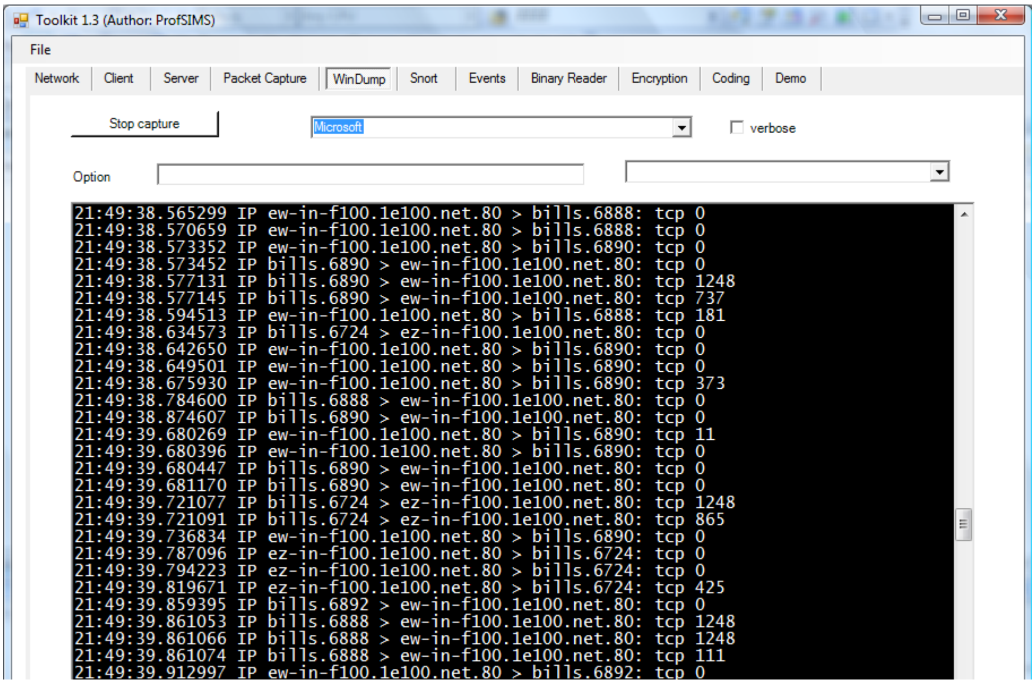
```
        public void stopProcess(string name)
        {
            try
            {
                Process[] pArry = Process.GetProcesses();

                foreach (Process p1 in pArry)
                {
                    string s = p1.ProcessName;
                    s = s.ToLower();

                    if (s.CompareTo(name) == 0)
                    {
                        p1.Kill();
                    }
                }
            }
            catch (Exception ex)
            { }

        }
```

Test the program, as shown below.



```
21:49:38.565299 IP ew-in-f100.1e100.net.80 > bills.6888: tcp 0
21:49:38.570659 IP ew-in-f100.1e100.net.80 > bills.6888: tcp 0
21:49:38.573352 IP ew-in-f100.1e100.net.80 > bills.6890: tcp 0
21:49:38.573452 IP bills.6890 > ew-in-f100.1e100.net.80: tcp 0
21:49:38.577131 IP bills.6890 > ew-in-f100.1e100.net.80: tcp 1248
21:49:38.577145 IP bills.6890 > ew-in-f100.1e100.net.80: tcp 737
21:49:38.594513 IP ew-in-f100.1e100.net.80 > bills.6888: tcp 181
21:49:38.634573 IP bills.6724 > ez-in-f100.1e100.net.80: tcp 0
21:49:38.642650 IP ew-in-f100.1e100.net.80 > bills.6890: tcp 0
21:49:38.649501 IP ew-in-f100.1e100.net.80 > bills.6890: tcp 0
21:49:38.675930 IP ew-in-f100.1e100.net.80 > bills.6890: tcp 373
21:49:38.784600 IP bills.6888 > ew-in-f100.1e100.net.80: tcp 0
21:49:38.874607 IP bills.6890 > ew-in-f100.1e100.net.80: tcp 0
21:49:39.680269 IP ew-in-f100.1e100.net.80 > bills.6890: tcp 11
21:49:39.680396 IP ew-in-f100.1e100.net.80 > bills.6890: tcp 0
21:49:39.680447 IP bills.6890 > ew-in-f100.1e100.net.80: tcp 0
21:49:39.681170 IP bills.6890 > ew-in-f100.1e100.net.80: tcp 0
21:49:39.721077 IP bills.6724 > ez-in-f100.1e100.net.80: tcp 1248
21:49:39.721091 IP bills.6724 > ez-in-f100.1e100.net.80: tcp 865
21:49:39.736834 IP ew-in-f100.1e100.net.80 > bills.6890: tcp 0
21:49:39.787096 IP ez-in-f100.1e100.net.80 > bills.6724: tcp 0
21:49:39.794223 IP ez-in-f100.1e100.net.80 > bills.6724: tcp 0
21:49:39.819671 IP ez-in-f100.1e100.net.80 > bills.6724: tcp 425
21:49:39.859395 IP bills.6892 > ew-in-f100.1e100.net.80: tcp 0
21:49:39.861053 IP bills.6888 > ew-in-f100.1e100.net.80: tcp 1248
21:49:39.861066 IP bills.6888 > ew-in-f100.1e100.net.80: tcp 1248
21:49:39.861074 IP bills.6888 > ew-in-f100.1e100.net.80: tcp 111
21:49:39.912997 IP ew-in-f100.1e100.net.80 > bills.6892: tcp 0
```

Figure L1.6 WinDump running from the Toolkit