

PLANTSCAPE SERVER NETWORKING

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SESSION OBJECTIVES

At the end of this section of the course the student will be able to:

- Assign and configure IP addresses to hosts in a networked PlantScape system.
- Create a TCP/IP hosts file for each host in a networked PlantScape system.
- Use the network utilities to verify the TCP/IP connection to each host.
- Assign and configure Computer Names to Windows'95 and Windows NT computers
- Assign and configure Windows'95 and Windows NT computers to a Workgroup

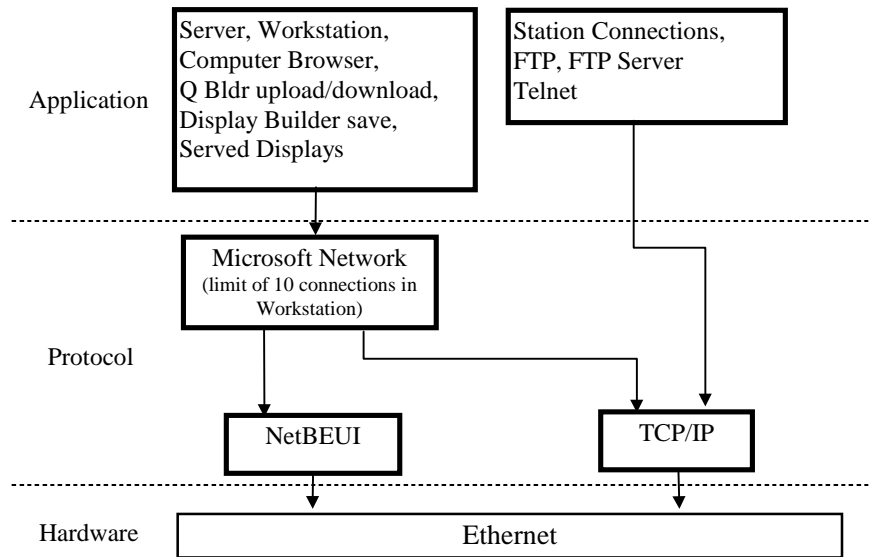
REFERENCES

Knowledge Builder: Getting Started

Network Model

Overview

Computers are usually connected together on a network so that the applications (programs) running in each of the computers are able to pass information to each other.



Hardware

The network hardware that PlantScape Server has been validated for use with is Ethernet.

It is possible for individual computers to be running a number of applications, each using different network protocols simultaneously over the same network hardware.

For example, a PlantScape Server may be connected to a number of Stations using TCP/IP, whilst simultaneously accessing a Novell file server.

Protocol

A protocol can be considered to be the “language” used when two applications communicate with each other. Some examples are:

- TCP/IP Transmission Control Protocol / Internet Protocol
- NetBEUI Net BIOS Extended User Interface
Used to connect to Windows NT and Windows '95 PCs,

Different applications use different protocols to perform information transfer, for example:

- PlantScape Server uses TCP/IP to transfer data to connected Stations.
- Displays are served from PlantScape Server to remote stations using the Microsoft Network.
- Microsoft File Manager and Explorer use the Microsoft Network to transfer file data between computers.

Microsoft Network

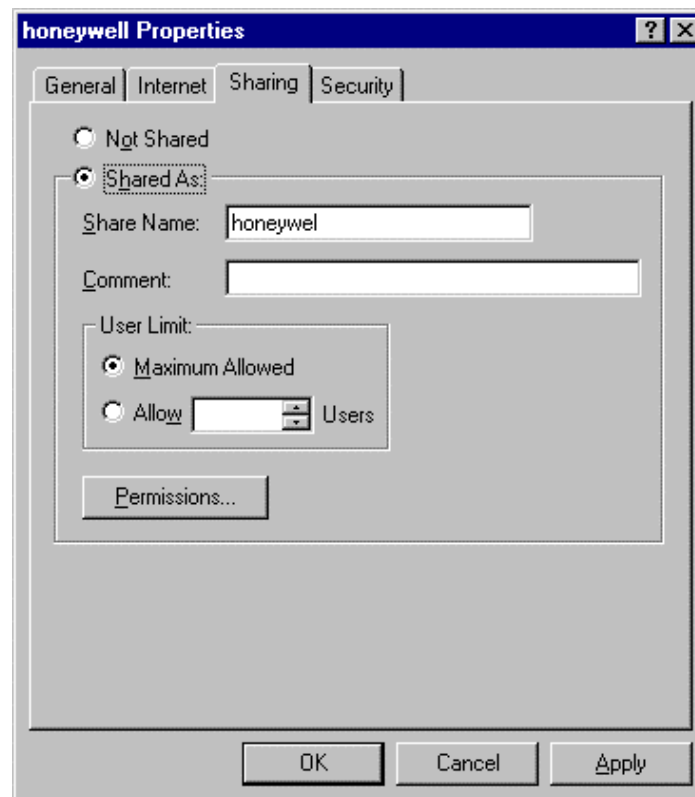
Computer Name

Every computer using the Microsoft Network must have a unique Computer Name within the local Workgroup or Domain.

Sharing with the Microsoft Network

The Microsoft Network enables one computer to access files or resources in another computer if that file (or its directory) or resource has been configured to be “shared”.

When a file, directory, or resource is shared it is given a Share Name, for example the directory “c:\honeywell” might be shared with a Share Name of “honeywel” (the single “l” is deliberate so that the sharename is 8 characters only).



Access rights to a shared file or directory can be limited depending on the level of security required.

Microsoft Network.....continued

Universal Naming Convention (UNC)

The Universal Naming Convention enables a shared directory to be addressed from another computer using the Computer Name preceded by double backslash “\\”.

For example, the command:

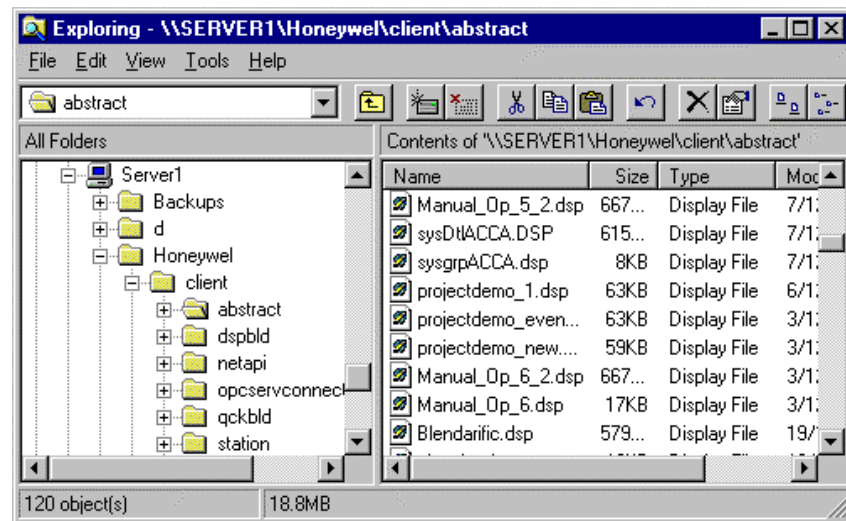
```
dir \\server1\honeywel\client\abstract
```

when run from a remote computer will produce a listing of the contents of the directory \client\abstract under the share name “honeywel” in the computer named “server1”.

Windows Explorer

Windows Explorer uses the Microsoft Network to provide access to shared files in other computers.

Explorer can be configured to display the full UNC pathname of a file selected from a remote computer:



TCP/IP

Overview

Each computer connected to a TCP/IP network is known as a host. The most fundamental element in TCP/IP configuration is the setting of an address for each host. This address is called the IP address.

IP Address Format

An IP address is defined by a unique 32 bit number. For easier representation this is usually divided into 4 bytes each of which is converted into its decimal number equivalent and separated by dots. This notation is known as the “dotted decimal” form. Here is an example:

Bit No.	31 24	23 16	15 8	7 0
Binary No.	11000001	00000000	00000000	00000001
Decimal Equivalent	193 .	0 .	0 .	1

Three Address Classes

An IP address comprises two parts, a Network ID and a Host ID. Addresses are divided into three types, or Classes: A, B, and C.

Bit No.	31	30 24	23 0
Binary Address Format	0	Network ID	Host ID

Class A

Bit No.	31	30	29 16	15 0
Binary Address Format	1	0	Network ID	Host ID

Class B

Bit No.	31	30	29 8	7 0
Binary Address Format	1	1	Network ID	Host ID

Class C

TCP/IP.....continued

Class Identification

The following table shows how the class to which an address belongs can be readily identified by the value of its first decimal number. Also listed are the number of Host IDs that are available for each Network ID:

Class	Range of First Decimal Number	No. of Host IDs Available
A	1 to 126	16777214
B	128 to 191	65534
C	192 to 255	254

Basic Rules for IP Address Allocation

There are a number of basic rules that must be followed when allocating addresses to hosts:

- When connecting a PlantScape system to an existing network the Network Administrator should be consulted for appropriate IP addresses.
- When connecting a PlantScape system to a stand alone network the choice of address class and Network ID is totally arbitrary except that the Network ID must not consist of all (binary) ones or zeros.
- All hosts on the same section network must have the same Network ID in order for them to be able to communicate with each other.
- Each host on the same network must have a unique Host ID which must not consist of all (binary) ones or zeros.
- The address 127.0.0.1 (which can also be displayed as 127.1) is a special address enabling a host to test its own TCP/IP installation.

Fixed IP Address

The PlantScape Server **MUST** be allocated a fixed IP Address, not one that is dynamically allocated from a server using DHCP (Dynamic Host Configuration Protocol).

Subnet Mask, Gateway, and DNS Configuration

If the PlantScape TCP/IP network is to be connected to an existing network these parameters should be configured as instructed by the local network administrator.

If the PlantScape network is to be stand alone then these parameters can be left at their default settings.

TCP/IP.....continued

Hosts File

Each host can be given a name by which it can be referred (rather than having to use its numerical IP address).

Each host has to be informed of the hostnames of all the other hosts on its network that will be referenced by this method.

This is done by creating a file called “hosts” in each host. The “hosts” file is a list of IP addresses with their respective hostnames.

The task of maintaining the “hosts” files in a PlantScape system is made much simpler if one “hosts” file is created with all the necessary entries and then copied to each other host.

The location of the “hosts” file is shown in the following table:

Host Type	Pathname
Windows '95	c:\windows
Windows NT	c:\winnt\system32\drivers\etc

If a hosts file does not exist then the file “hosts.sam” can be used as a template.

An example “hosts” file is shown here:

```
127.1          localhost
a.b.c.d        server1
a.b.c.d        server2
a.b.c.d        stn03
a.b.c.d        stn04
```

where *a*, *b*, *c*, and *d* are chosen to suit the local network.

In this example two of the entries have been given two hostnames, either of which could be used to reference their associated host.

Attention

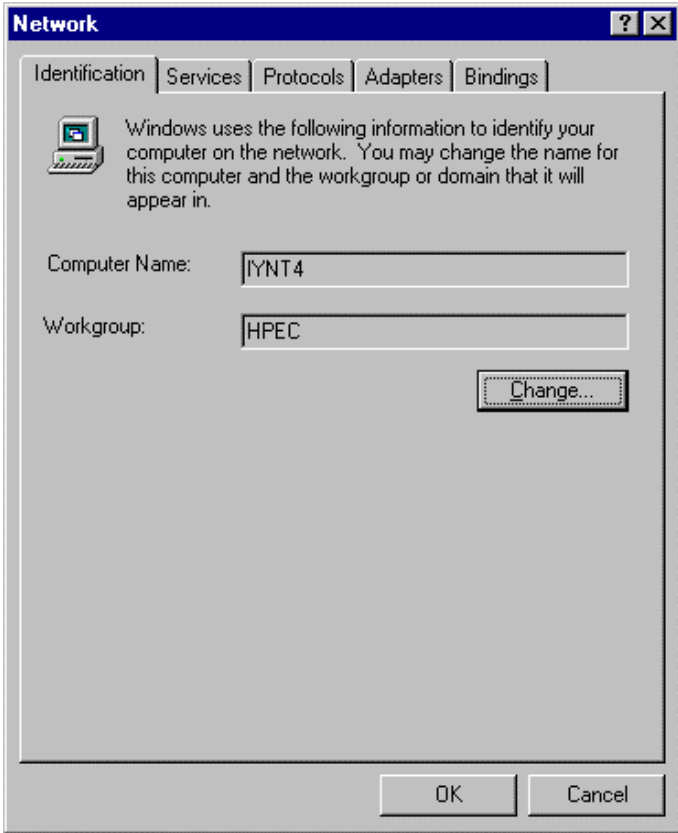
To simplify the network configuration the hostnames used should be identical to the corresponding Computer Names
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Lab Exercise - Setup Network on Windows NT 4.0

Introduction

Proceed with the lab exercise listed below. Ask your Course Manager for any assistance if you are not sure what you are expected to do.

This exercise will enable you to examine the network configuration of a Windows NT 4.0 computer.

Step	Action
1	<p>Minimise Station (if it is occupying your screen).</p> <p>Open the Network dialogue box with the following sequence:</p> <p>Start→Settings→Control Panel</p> <p>and double click on the Network icon.</p> 

continued on next page

Lab Exercise - Setup Network on Windows NT 4.0.....continued

2	<p>Under the Identification tab set:</p> <p>Computer Name: server1, server2, or stn0#</p> <p>Workgroup: HPEC</p> <p>A Workgroup is a group of computers that would be expected to share files or other information. This would normally include the PlantScape server(s) and station(s).</p>
3	<p>Under the Protocols tab select TCP/IP and click on Properties...</p> <p>Select the IP Address tab and then select the required Network Adapter from the drop down list.</p> <p>Specify:</p> <p>IP Address: 159.99.16.4#</p> <p>Subnet Mask: 255.255.255.0</p> <p>Default Gateway: leave unchanged</p>
4	<p>The Adapters tab contains hardware settings which do not require changing on your computer.</p>
5	<p>If no changes have had to be made to the network settings click the Cancel buttons to exit from the Network dialogue box.</p> <p>If changes have been made the PC will require to be rebooted when the Network dialogue box is exited by clicking OK.</p>
6	<p>Procede to the Lab Exercise “Configure TCP/IP Hosts file”.</p>

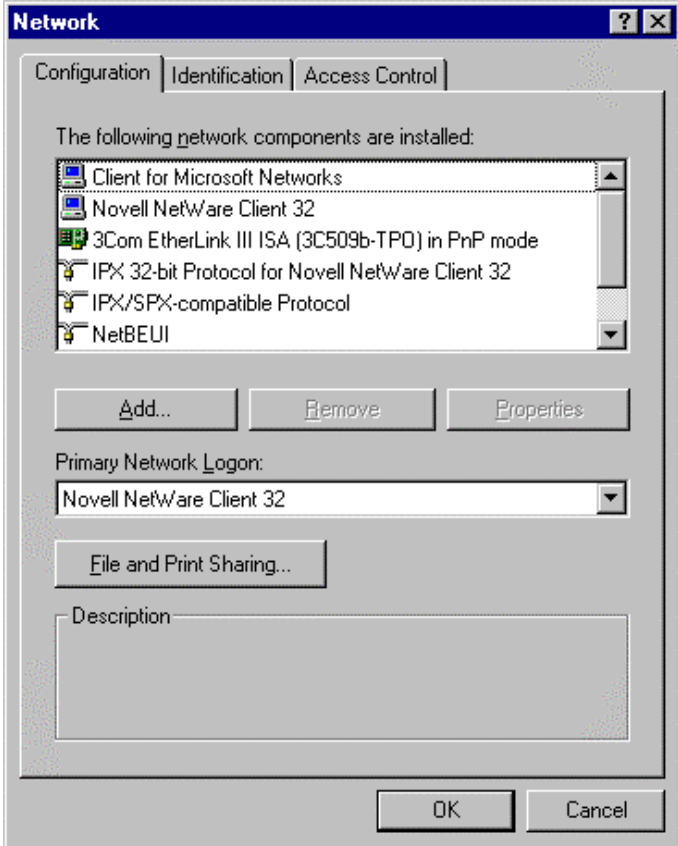
Lab Exercise - Setup Network on Windows'95

Introduction

Proceed with the lab exercise listed below.

Ask your Course Manager for any assistance if you are not sure what you are expected to do.

This exercise will enable you to examine the network configuration of a Windows'95 computer.

Step	Action
1	<p>Minimise Station (if it is occupying your screen).</p> <p>Open the Network dialogue box with the following sequence:</p> <p>Start→Settings→Control Panel</p> <p>and double click on the Network icon.</p> 

continued on next page

Lab Exercise - Setup Network on Windows'95.....continued

2	<p>Under the Identification tab set:</p> <p>Computer Name: server1, server2, or stn0#</p> <p>Workgroup: HPEC</p> <p>Computer Description: Any_Text</p> <p>A Workgroup is a group of computers that would be expected to share files or other information. This would normally be the PlantScape server(s) and station(s).</p>
3	<p>Under the Access Control tab select Share-Level (default) or User-Level access control and click OK.</p>
4	<p>Select the Configuration tab and from the “Network Component installed in your computer” list choose the TCP/IP protocol.</p> <p>Click Properties and select the IP Address tab. Choose to Specify an IP Address and set:</p> <p>IP Address: 159.99.16.4# Subnet Mask: 255.255.255.0</p> <p>and click on OK.</p>
5	<p>Click File and Print sharing. Check both options to give other computers access to your files and printer.</p> <p>Click OK.</p>
6	<p>If no changes have had to be made to the network settings click the Cancel buttons to exit from the Network dialogue box.</p> <p>If changes have been made the PC will require to be rebooted when the Network dialogue box is exited by clicking OK.</p>
7	<p>Procede to the Lab Exercise “Configure TCP/IP Hosts file”.</p>

Lab Exercise - Configuring TCP/IP Hosts file - Win NT 4.0 & '95

Introduction

Proceed with the lab exercise listed below. Ask your Course Manager for any assistance if you are not sure what you are expected to do.

This exercise will enable you to create the hosts file of your Windows NT or Windows'95 computer.

Step	Action
1	Open Notepad with the following sequence: Start→Programs→Accessories→Notepad
2	From the pull-down menus select File→Open and open the file: c:\winnt\system32\drivers\etc\hosts (Win NT) c:\windows\hosts (Windows'95) Open "hosts.sam" as a template if "hosts" does not exist.
3	Ensure that the hosts file contains the following entries as a minimum..... 127.1 localhost a.b.c.d server1 a.b.c.d server2 n.n.n.n stn0# where <i>n.n.n.n</i> is your station's IP address, # is your station number, and <i>a.b.c.d</i> are provided by your instructor. You could also add entries for the other stations on your network.
4	Save the new or modified hosts file.
5	Start a second copy of Notepad and open the "hosts" file in server1. Is it equivalent to your hosts file? Should it be the same? Discuss with your instructor
6	Proceed to Exercise "Test your TCP/IP connection"

Lab Exercise - Test your TCP/IP Connection - Win NT & '95

Introduction

Proceed with the lab exercise listed below. Ask your Course Manager for any assistance if you are not sure what you are expected to do.

This exercise will enable you to test the network connection, and the hosts file, of a Windows NT or Windows'95 computer.

Step	Action
1	Open a command prompt with the sequence: Start→Programs→MS-DOS Prompt (Win'95) or Start→Programs→Command Prompt (NT 4.0)
2	Test the network connection of your computer by using the Ping utility which sends and retrieves “round trip” packets to another computer. Enter the following command: ping host_name<Enter> or ping IP_address<Enter> where <i>host_name</i> and <i>IP_address</i> correspond to any computer on the network.
3	Ping automatically repeats four times and displays messages indicating whether it was able to resolve the hostname into an IP address, and whether the specified computer was communicating.
4	If the test was unsuccessful check the network connection of your computer and the one that you were “Pinging”, or check the hosts file for a correct entry. Repeat step 2.
5	Successful completion of both tests verifies the network connection of your computer, the network connection of the computer that you “pinged”, and the operation of your hosts file.