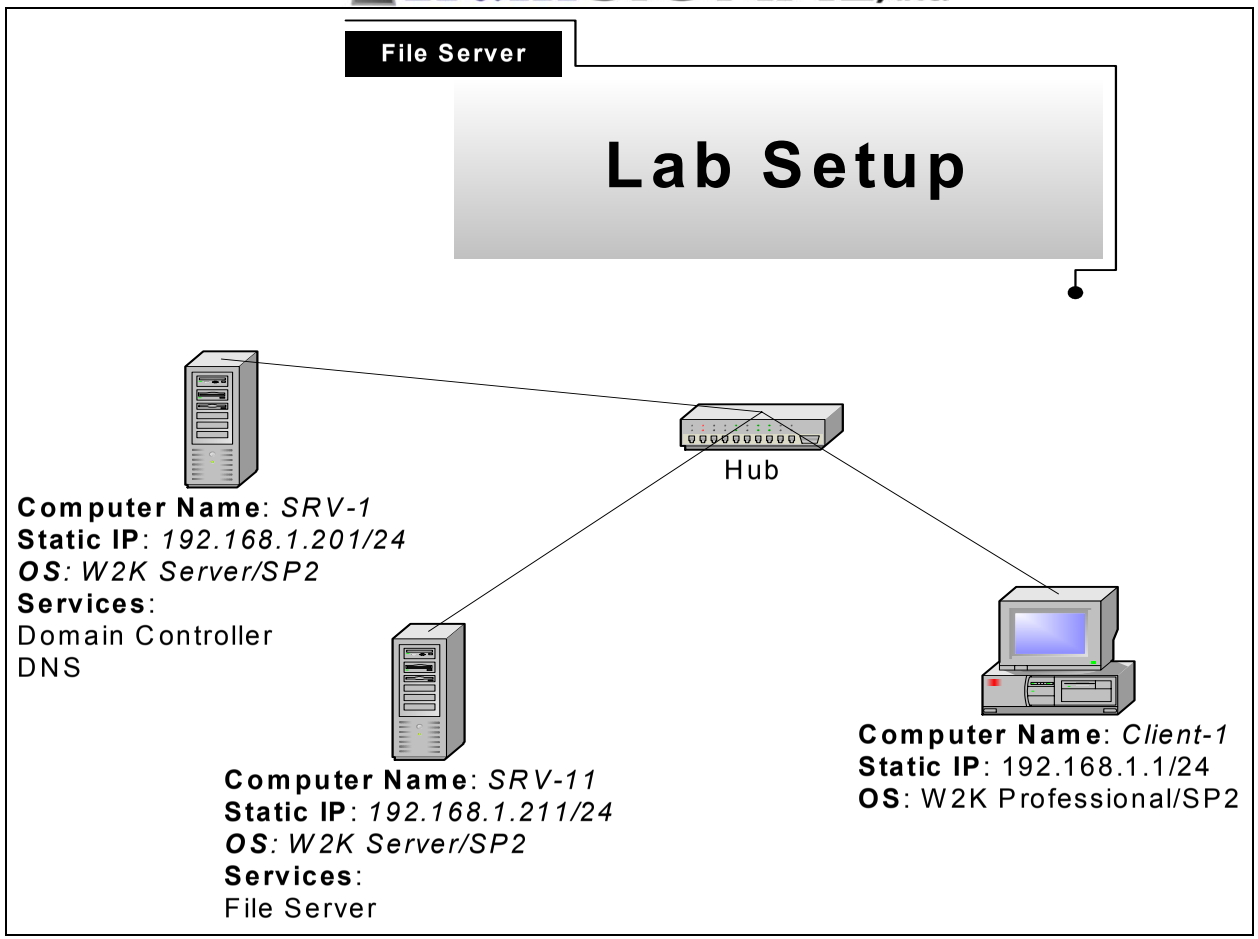
Building File Servers for
Ben & Brady's Ice Cream, Corp.

Mega Lab 2

Part 2 of 3 in the Building a Windows 2000/Server 2003
Server Series



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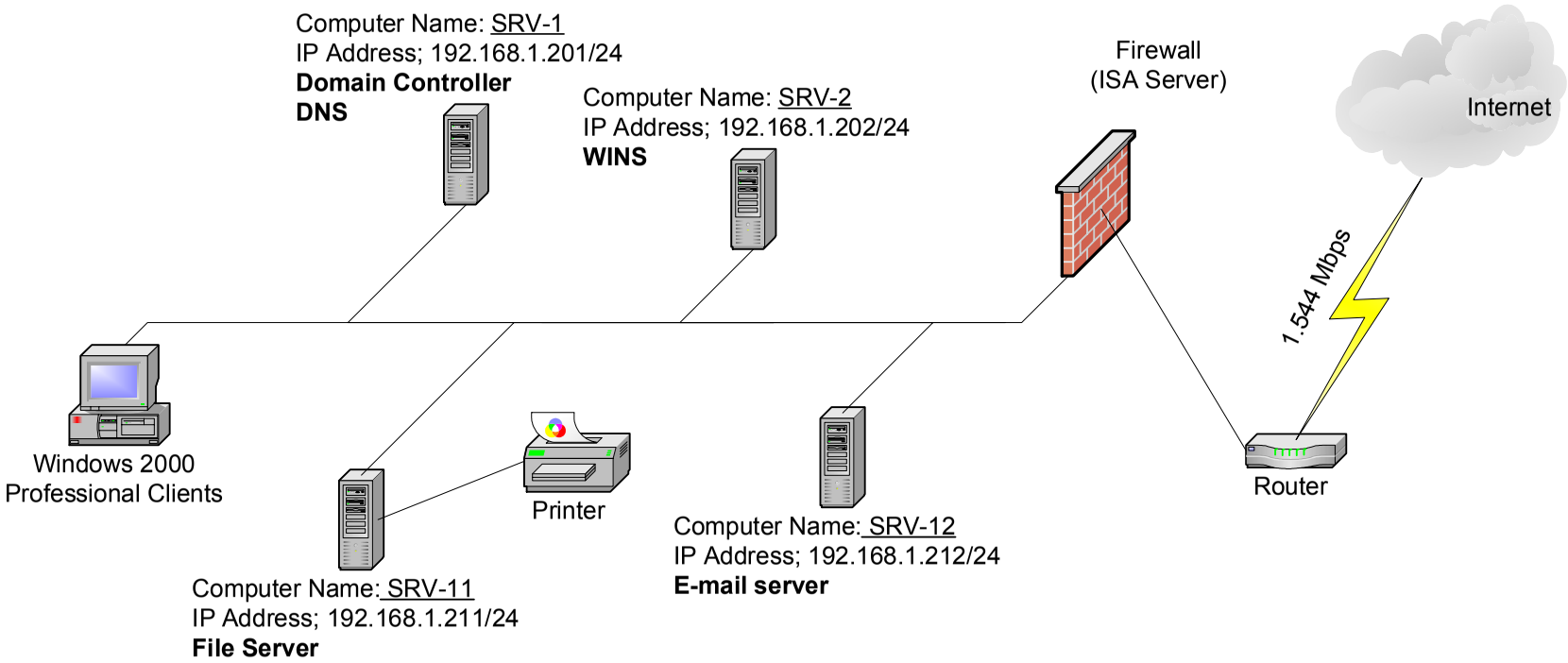
San Francisco Office

Ben & Brady's Ice Cream Co.



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Building File Servers for Ben & Brady's Ice Cream, Corp.

Mega Lab 2

Part 2 of 3 in the Building a Windows 2000 Server Series

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Introduction

Welcome to Train Signal!

This series of labs on Windows 2000 is designed to give you detailed, hands-on experience working with Windows 2000. Train Signal's Audio-Visual Lab courses are targeted towards the serious learner, those who want to know more than just the answers to the test questions. We have gone to great lengths to make this series appealing to both those who are seeking Microsoft certification and to those who want an excellent overall knowledge of Windows 2000.

Each of our courses puts you in the driver's seat, working for different fictitious companies, deploying complex configurations and then modifying them as your company grows. They are not designed to be a "cookbook lab," where you follow the steps of the "recipe" until you have completed the lab and have learned nothing. Instead, we recommend that you perform each step and then analyze the results of your actions in detail.

To complete these labs yourself, you will need three computers equipped as described in the Lab Setup section. You also need to have a foundation in Windows 2000 and TCP/IP concepts. You should be comfortable with installing Windows 2000 Professional or Server and getting the basic operating system up and running. Each of the labs in this series will start from a default installation of Windows 2000 and will then run you through the basic configurations and settings that you must use for the labs to be successful. It is very important that you follow these guidelines **exactly**, in order to get the best results from this course.

The course also includes a CD-ROM that features an audio-visual walk-through of all of the labs in the course. In the walk-through, you will be shown all of the details from start to finish on each step, for every lab in the course. During the instruction, you will also benefit from live training that discusses the current topic in great detail, making you aware of many of the associated fine points.

Thank you for choosing Train Signal!

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Lab Setup

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Setting up the Lab

1. Computer Equipment Needed

Item	Minimum	Recommended
Computers	(3) Pentium I 133 MHz	(3) Pentium II 300MHz or greater
Memory	128 MB	256 MB
Hard Drive	4 GB	4 GB or larger
NIC	1/machine	1/machine
Hubs	1	1
Network Cable	(3) Category 5 cables	(3) Category 5 cables

I strongly urge you to acquire all of the recommended equipment in the list above. It can all be easily purchased from Ebay for around $500 (less if you already have some of the equipment). This same equipment is used over and over again in all of Train Signal's labs and will also work great in all other sorts of network configurations that you may want to set up in the future. It will be an excellent investment in your education. You may also want to look into a disk imaging product such as Norton Ghost. Disk imaging software will save you a tremendous amount of time when it comes to reinstalling Windows 2000 for future labs. Many vendors offer trial versions or personal versions of their products that are very inexpensive.

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2. Computer Configuration Overview

Computer Number	1	2	3
Computer Name	SRV-1	SRV-11	Client-1
IP Address	192.168.1.201/24	192.168.1.211/24	192.168.1.1/24
OS	W2K Server	W2K Server	W2K Pro
Additional Configurations	Domain Controller DNS Server SP2	SP2 4 GB Hard Drive w/ 2 GB System partition.	SP2

3. Detailed Lab Configuration

*****Important Note*****
This lab should NOT be performed on a live production network. You should only use computer equipment that is not part of a business network AND that is not connected to a business network. Train Signal Inc., is not responsible for any damages. Refer to the full disclaimer and limitation of liability which appears at the beginning of this document and on our web site, www.trainsignal.com.

Computer 1

Computer 1 will be named SRV-1 and the operating system on this computer will be Windows 2000 Server or Advanced Server. You should also install Service Pack 2 to avoid any unforeseen problems. If you do not have a copy of Windows 2000 Server you can obtain an evaluation copy of Windows 2000 Advanced Server within the Microsoft Press series of books, and Service Pack 2 is available for download on Microsoft's web site.

SRV-1 will have a static IP address of 192.168.1.201 with a 255.255.255.0 subnet mask. The default gateway field can be left blank but you should enter this computer's own IP address for the Preferred DNS field (192.168.1.201).

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The alternate DNS Server field can be left blank. This computer will be set up as a Domain Controller by using the dcpromo.exe program. In order to make this machine a domain controller, DNS will need to be installed as well.

There are 2 ways to install DNS at this point - automatically when you run dcpromo.exe or manually **before** you run dcpromo.exe. For our purposes, we are going to install DNS automatically, when we run dcpromo.exe. Run dcpromo.exe on this machine and make the following selections as you are prompted: create a new domain; create a new domain tree; create a new forest of domain trees. The domain name for the scenario is benandbrady.com. Leave all the other settings at their defaults. When the wizard asks, install DNS by selecting Install and Configure DNS now. Next, choose Permissions Compatible for pre-Windows 2000 Computers. Then you will be asked for an AD password. For our purposes we will leave this blank. Active directory installation should then take place and you can restart the computer when you are prompted. **MAKE SURE** that the network card is plugged into a hub or into another computer with a crossover cable, otherwise Active Directory installation will fail, without giving you a clear cause. See figure 1, next page.

Computer 2

Computer 2 will be named SRV-11 and Windows 2000 (either version once again) will be installed on this computer with Service Pack 2. **It is important that this computer has at least a 4-gigabyte hard drive with a 2-gigabyte system partition in order to perform this lab.** Basically, do NOT create one partition using your whole hard drive during installation. Leave some *unpartioned or unallocated* space, 500 MB or more. The computer will be joined to the benandbrady.com domain as a member server. SRV-11 will have a static IP address of 192.168.1.211 with a 255.255.255.0 subnet mask. The default gateway can be left alone at this point. Configure the preferred DNS server setting to point to SRV-1, 192.168.1.201 and leave the alternate DNS setting blank. You will need to make this computer a member server of benandbrady.com by simply right clicking on the "My Computer" icon on the desktop and selecting Properties. Select the Network Identification tab, select Properties, select Domain and type in the domain name it will be joining, which is benandbrady.com and click OK. It will then ask for a username and password. Use the administrator account name and password from the benandbrady.com domain. When it has successfully joined, it will "welcome you to the domain" and then tell you that it needs to restart in order for the changes to take effect. After restarting the computer, **make sure you change the "Log on to" dialog box** to the domain rather than "this computer." See figure 1, next page.

Computer 3

Computer 3 will be named Client-1 and will have Windows 2000 Professional installed as the operating system. Client-1 will be joined to the benandbrady.com domain in the same way as SRV-11. Client-1 will have a static IP address of 192.168.1.1 with a 255.255.255.0 subnet mask. See figure 1, next page.

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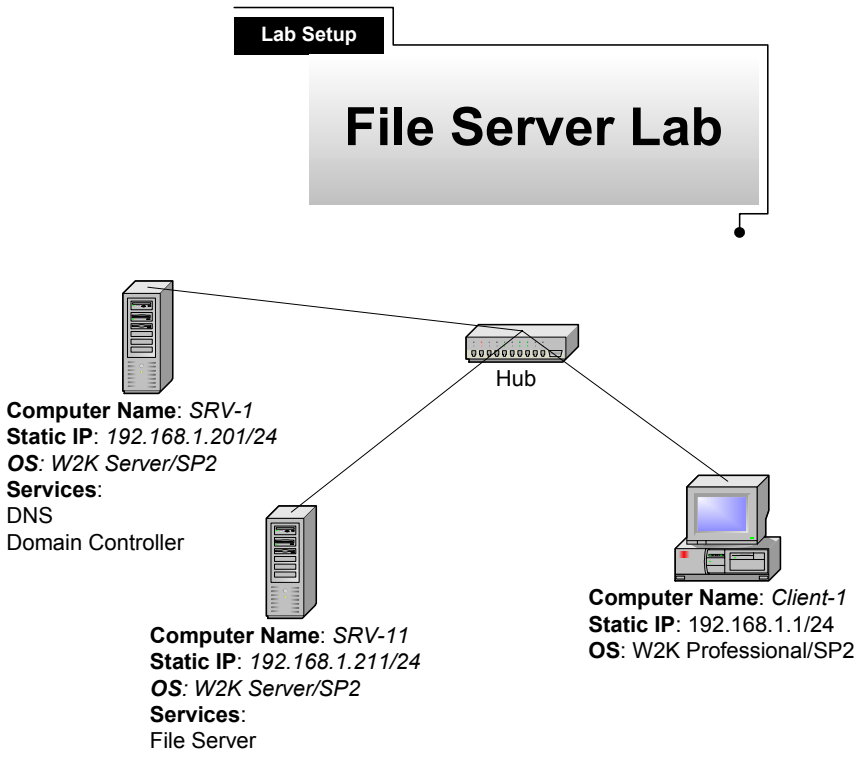
Important - You should test the network connections (using the PING command) between each of these machines to ensure that your network is set up properly. Testing before you get started will save you major time and effort later.

Domain Users & Groups

Create the following Domain Users and Groups in Active Directory. For example **Jack Straw** belongs to the **Marketing** group and has a username of **jstraw** with a password of **test**.

First Name	Last Name	Username	Password	Group
Jack	Straw	jstraw	test	Marketing
Jill	Smith	jsmith	test	Accounting
Sue	Stevens	sstevens	test	Sales
Bob	Hayes	bhayes	test	Administrators



(figure 1)

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Lab 1

Configuring the File Server

You will learn how to:

- Plan for and create a data partition
- Plan and create an organized folder/file structure
- Set permissions to control user access
- Connect to shares over the network
- Test permissions from the client computer

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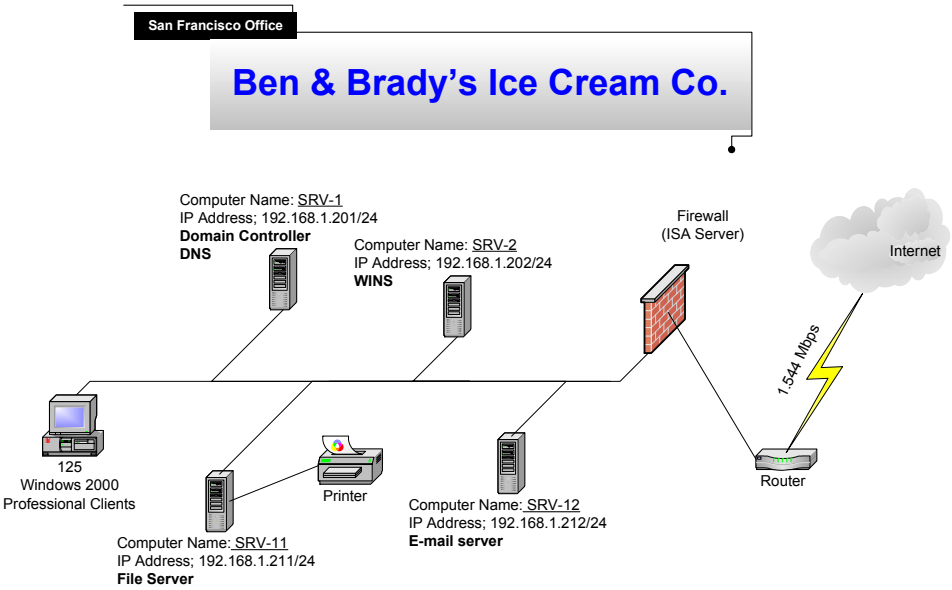
Scenario – Part One

Ben & Brady's Ice Cream Co., is a manufacturer of gourmet ice cream products that are sold internationally. Their main headquarters is located in San Francisco and they also have a manufacturing facility in Charlotte, North Carolina. The San Francisco office currently has 5 servers, all running Windows 2000 Server and 125 workstations, all running Windows 2000 Professional. They are connected to the Internet with a full T1 (1.544 Mbps), and Microsoft's ISA Server (firewall) protects the internal network. The facility in Charlotte is used to manufacture ice cream and to ship to Ben & Brady's east coast distributors. This location currently has 5 servers, all running Windows 2000 Server, and 30 workstations, also all running Windows 2000 Professional. Charlotte is connected to the Internet with a Fractional T1 (768 Kbps) and they also use ISA Server to protect their internal network. The two locations are connected together through a VPN formed between the two ISA Servers over the Internet.

You have worked for Ben & Brady's for about 6 months now, but so far you have been doing basic troubleshooting on user desktops. Although this type of troubleshooting is starting to get a little boring, you have learned a lot and your IT Manager, Jill, has been great about showing you the ropes inside the server room. Today, she has a special surprise for you. The old file server is on its last legs and the new server she ordered has arrived. You have been given the job of setting up the file server, from start to finish! You can't believe your luck. You have installed Windows 2000 Server many times before, but always on junky test lab computers (computers that were retired from user desktops). This server is enormous in comparison: 2 CPUs, 2 GB of memory and five 36 GB SCSI hard drives. You NOW have the power!



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Scenario – Part Two

In your meeting with Jill, she has described how she wants you to set up the folder structure and the permissions. You will be creating a "Public" folder that is, in general, open to all of the users in the domain. Underneath the public folder you will also be creating four more folders, for "Marketing," "Sales," "Accounting," and a "General" folder. Each different department will be limited to viewing information only from their own specific departmental folder. The general folder will be open for the entire company to share information. In addition to limiting group access to certain folders, you also have to ensure that users do not alter the base folder structure. They should, however, have the capability to modify any information within their departmental folders. For example, a user in the marketing group should be able to open up the public→marketing folder, but they should not be able to modify it in any way. This user *should* be allowed to create, modify, read or delete any folders or files within the marketing folder. This is essentially the marketing department's playground. Also, the marketing user should have no access to the accounting or sales folders. Jill would also like you to create a software share on this server, which will contain both desktop and administrative software. In this lab, you are going to use srv-11 as your new file server for the San Francisco office. Srv-1 will only be used as a domain controller in this lab. On srv-11, you will be responsible for creating the data partition and the folder structure, and then setting permissions on the folders. You will then test client access from client-1 to ensure that the appropriate users have access to each of the data folders.

Planning for storage needs

One of the most important and first steps you should take *before* building your file server is *planning* for your file server. Some of the decisions you need to make will include the amount of storage space needed, the type of hard drive to use (IDE or SCSI), the type of fault tolerance to use (Hardware or Software RAID) if any, the number of partitions to create, which file systems to use on those partitions and how to set up your folder structure. You will need to determine all this and more based upon your company's needs and budget. We will cover some of these topics in the following section with others addressed later in the course within a separate lab.

Storage Space

Storage space is always difficult to determine. Calculating your storage needs really depends upon the types of files being saved on your file server and the number of users that are using it. In general, storage space is fairly cheap and you should plan on installing more than you estimate your company will need. Make sure that you plan at least two years ahead. You don't necessarily have to have all of the hard drives currently installed in your server, but make sure that the server is capable of supporting additional hard drives in the future. If you are still not sure how to determine the amount of storage space to install, come up with a figure that you feel is reasonable, on average, for each user to have, for example, 1,000

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MB/user. Multiply this figure by the number of users in your company and then double it. So, if you have 100 users, this will be 200,000 MB or approximately 200 GB. Also, take into account any information that you (the IT department) want to include on this server and add this to your total figure. You now have a rough number to use for actual storage space (not including fault tolerant volumes!).

Hard Drive

Another choice you have is the type of hard drive, SCSI or IDE. The recommended hard drives to use on servers are SCSI disks because they traditionally have faster data transfer rates than IDE drives. In addition, an array of SCSI drives can multitask whereas an array of IDE disks will wait until the other IDE disk transfers data before they attempt to transfer their own data, making SCSI disks work more efficiently with RAID (see next section). As you might expect, SCSI hard drives are also more expensive, usually costing around two to three times more than IDE hard drives. In order to keep costs down this Mega Lab only requires IDE hard drives on the servers you create. On a production file server, SCSI hard drives are almost always used.

RAID

RAID stands for Redundant Array of Independent (or Inexpensive) Disks - it is a method that is used on an array of hard disks to improve fault tolerance and data throughput. There are a variety of ways to implement RAID, through both dedicated server hardware or within the Windows 2000 software. Hardware RAID is more expensive but it is also faster and more reliable. Software RAID is less expensive because it comes built into the Windows 2000 operating system, but will not be as fast or reliable as a hardware RAID controller. There are three levels of RAID that can be used within Windows 2000: **RAID 0** also called a *striped volume;* **RAID 1** also called a *mirrored volume;* and **RAID 5** also called a *striped volume with parity*. Hardware RAID is becoming more and more affordable and even some low end servers now have hardware RAID controllers. For a file server, hardware RAID is almost always worth the expense.

Partitions

Once you have the taken care of the type and size of the hard drive(s) and the disk controller to which they will connect, it is time to consider how you will partition the hard drive(s). This is a concept that is often considered to be written in stone, but lack of planning can cause major headaches further down the road. Your first task is to decide on the size of the system/boot partition. Within Microsoft literature you often see recommended figures such as 1 GB minimum (if not smaller) and 2 GB. However, even 2 GB is much too small for this system/boot partition. Before you determine an exact size, you need to ask some questions. What will this partition contain? System/boot files? Data files? Program files? Typically, you want to store your data on its own separate partition(s). Program files,

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however, *are* often installed on the same partition where Windows 2000 is installed. What else might be installed on that partition? Service packs, hot fixes to the operating system, possibly even a future upgrade of Microsoft's newest server release. You need to make sure that you have plenty of room on the system/boot partition not only for Windows 2000 but also for anything else you might install on it. With a basic mix of Windows 2000 Server, service packs and a couple of programs, you will probably be well over 2 GB already. I would recommend a minimum of 5 GB with 10 GB or more probably a more ideal number. A data partition(s) should be created to separate and organize your data from the system files. One data partition is adequate, although you may want to create additional partitions for further organization. It's almost always better to keep it simple!

File Systems

Choosing a file system for your partitions is much easier with Windows 2000 than it was with NT 4.0. In NT 4.0 the system/boot partition was often formatted with the FAT16 file system, to allow for access using a DOS boot disk to troubleshoot the NT 4.0 installation. Windows 2000 has a command line program called the Recovery Console that allows you to troubleshoot NTFS partitions, virtually eliminating the need for the FAT file system. About the only time the FAT (FAT 16 or FAT32) file system is needed within Windows 2000 is if you are dual booting with an operating system that does not support NTFS, like Windows 95/98. You might set up a dual boot on a test server, but a production server will rarely have a dual boot setup with Windows 95/98. Take a look at the following table for more information on the differences between each of the file systems.

Supported by:		**FAT 16**	**FAT 32**	**NTFS**
Windows 2000		Yes	Yes	Yes
Windows NT		Yes	No	Yes
Windows 98		Yes	Yes	No
MS-DOS		Yes	No	No
Available Features:				
File Level Security		No	No	Yes
Disk Compression		No	No	Yes
Disk Quotas		No	No	Yes
Disk Encryption		No	No	Yes

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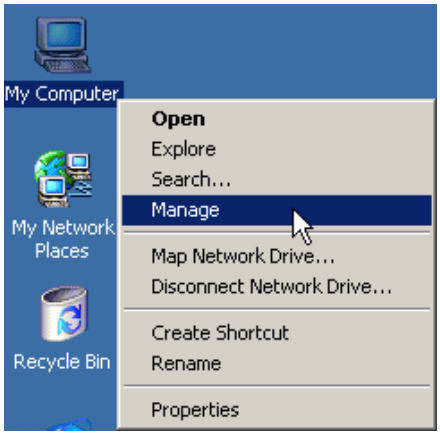
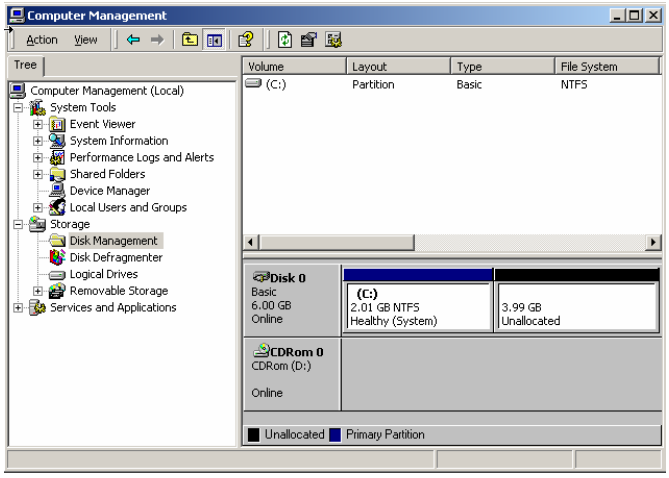
The Disk Management tool

The disk management tool contains disk information and allows you to manage tasks such as creating and deleting partitions on the physical hard disks.

1. Log on to **SRV-11**. On the desktop right click on **My Computer** → Select **Manage**.



2. This will open up the computer management console for the local computer. Select **Disk Management.** This will show you the disks that you have installed locally, as well as any CD-ROM drives. You should be able see the C: drive on Disk 0**,** with a 2 GB partition. This partition should be formatted with NTFS and you should also have at least 500 MB more of unallocated space.



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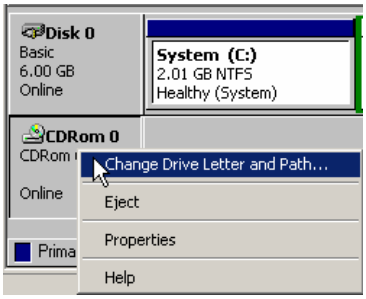
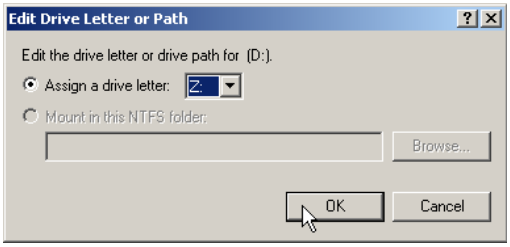
Changing drive letters

You can change drive letters in the disk management console to make it bit easer to manage partitions and drives. For example, let's say you want to assign the drive letter D: to a new partition but the CD-ROM is already using that drive letter. With the disk management tool, you can change the CD-Rom drive letter to any drive letter that is available. The only drive letter that cannot be changed is the drive that contains your system and boot files. You will change the drive letter of SRV-11's CD-ROM to Z:. This will allow you to create a new partition and assign it the drive letter D:

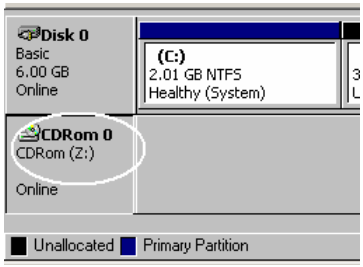
1. Right click on **CDRom 0** and select **Change Drive Letter and Path.**



2. Select the CD-Rom drive in question (most likely D) and click the **Edit** button**.** Then assign it the drive letter Z: and click **OK**.



3. A dialog box will ask you if you're sure that you want to continue, as changing the drive letter may cause programs to no longer run properly. Click **Yes**, because you should not have any programs currently running on this server that use the CD-ROM. Your CD-ROM drive should now have the drive letter Z: assigned to it.



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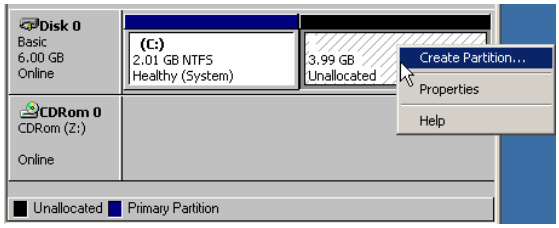
Creating a second partition

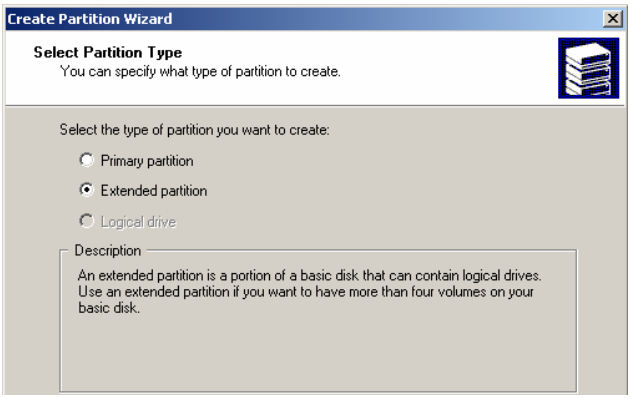
Now you will create a second partition on the physical hard disk. This will be used for sharing data on the network and will be assigned the drive letter D:

****NOTE**** You may see a partition referred to as a volume in some of the menus. Just remember that basic disks use partitions and dynamic disks use volumes.

1. Right click on the **Unallocated** space on Disk 0 and select **Create Partition**.



2. This will start a wizard that will walk you through the process of creating a partition. The first screen is just a welcome screen, click on **Next**. This screen will ask you what type of partition you want to create. You have two options: Primary and Extended. The only time you have to use a primary partition is if you are planning to install an operating system on that partition. You can create up to a total of four partitions, which can, if desired, include only one extended partition. In our case either a primary or an extended partition will work, so we will try out an extended partition on SRV-11. Select **Extended partition** and click **Next**.



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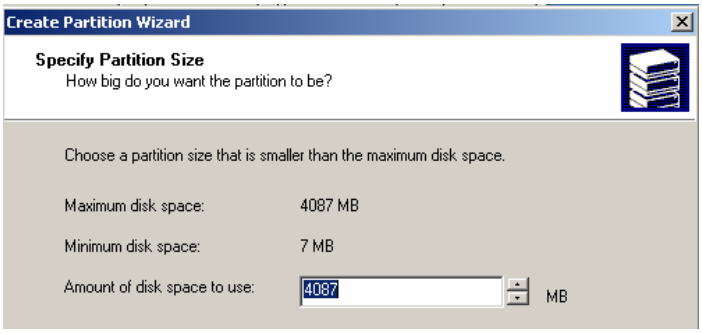
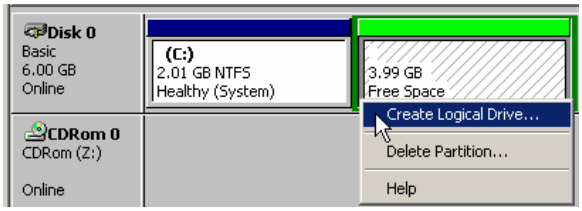
3. The next screen will ask how big you would like to make the partition. By default it will select the entire amount of unallocated space for the partition size. It will also show the maximum and minimum size you are able to select. Create at least a 2 GB partition. Click **Next**.

*****Note***** You can make the partition as big as you like (at least 500 MB), just remember that the bigger the partition is the longer it will take to format.



4. The final screen will show you a summary of all the selections you made in the wizard. Check to make sure that everything is OK and then click **Finish**.
5. Look at the new partition you have just created. The size you specified should be shown as Free Space. Extended partitions have to be divided up into logical drives before data can be written to them. All you have done so far is to create a partition on the hard disk and your next step is to create a logical drive, format it and assign a drive letter. Right click in the **Free Space** area and select **Create Logical Drive**.



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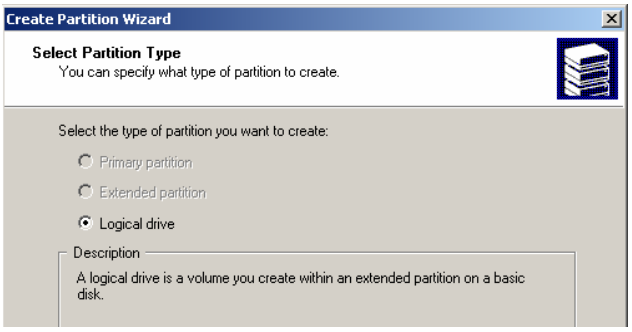
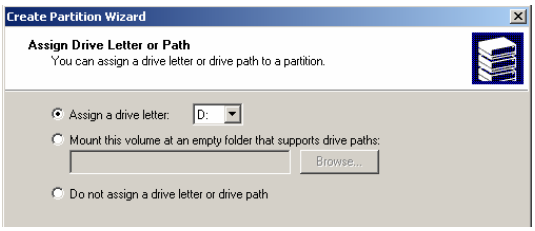
6. This will launch a wizard that will walk you through the process of creating a logical drive. The first screen is just a welcome screen, click on **Next**. The next screen will ask you what type of partition you would like to create - the only option available will be Logical because this is an extended partition created on the disk. Select **Logical drive** and click **Next**.



7. The next screen will ask how big you would like to make the logical drive. By default it will select the entire amount of free space available on this partition. It will also show you the maximum and minimum size you are able to select. Create at least a 2 GB logical drive. Click **Next.**
8. The next screen will ask you to assign a drive letter or path. You have 3 options here. The first option will show you all of the available drive letters that you can assign to the drive. The second option is only used if you want to mount this drive to a folder on another partition. Mounting volumes to folders is similar to the way that volumes are accessed in the UNIX operating system. This method of mounting a volume to a folder can also be used if you are running out of drive letters. The third option is to simply not assign any drive letter or path to the new drive. You can always assign a letter at a later time, just as you changed the drive letter for the CD-ROM, but you will not be able to use this drive until it is assigned a letter or path. Remember that you have already freed up the drive letter D: for this partition. Select **Assign a drive letter:** and then select the letter **D:.** Click **Next**.



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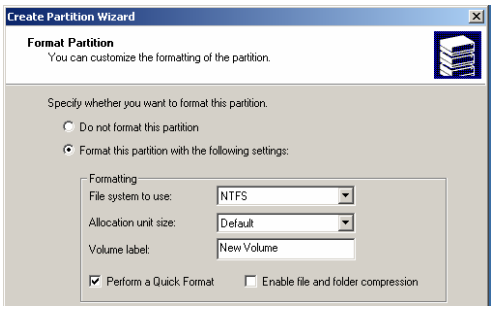
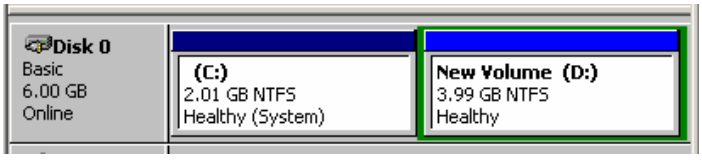
9. The next screen will give you the option of formatting the partition now or later. You will not be able to use the drive unless you format it with a file system. If you opt to format it now, you must specify which file system to use, the allocation unit size and the name of the volume (partition). You want to use NTFS as the file system in order to take advantage of all the features and the security it provides on the Windows 2000 operating system. Let Windows 2000 select the allocation unit size because it will select the best cluster size for you based on your partition size. You can give the volume (partition) a label now if you like, but, by default, the partition will be named New Volume. Leave the default name for now because you will change the labels for both the C: and D: drives in upcoming steps. Select the empty box next to **Perform a Quick Format** (the quick format will format the partition faster than a full format because it does not scan the disk for bad sectors). Performing a quick format is optional and it will not affect the lab in any way if you decide to do a full format instead. Select **Format this partition with the following settings:.** From the menu below select **NTFS, Default** (allocation unit size) and leave the Volume label as New Volume (you will set this later). After specifying these settings, click **Next.**



10. The final screen will show you a summary of all the selections you made in the wizard. Check to make sure everything that you set is OK and click **Finish**.

Once the format is complete, your Disk Management console should have a D: drive formatted with NTFS labeled New Volume.



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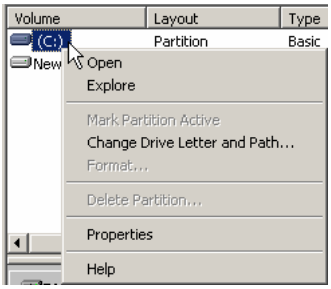
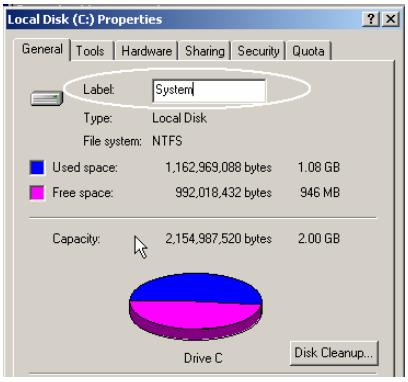
Labeling the partitions

You can make it easier to identify your partitions by giving them labels. For example, if you look at a drive and see the label "Software" next to the drive letter, you will know that the drive most likely holds some sort of software. Now, create labels for the partitions on the SRV-11 file server. Name the C: drive **System,** because it contains your system and boot files. Then name your D: drive **Data,** because that's where all of the data will be stored on this server.

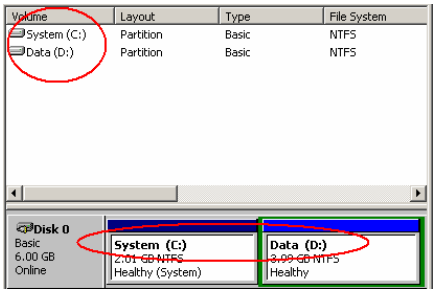
1. Right click on the **C:** drive and select **Properties**.



2. On the Properties page type in **System** as the label. Click **OK**.



3. Now follow the above steps and label the D: drive with **Data** in the same way.
4. Now, look on the disk management console - the drives will each have a label associated with the drive letter.



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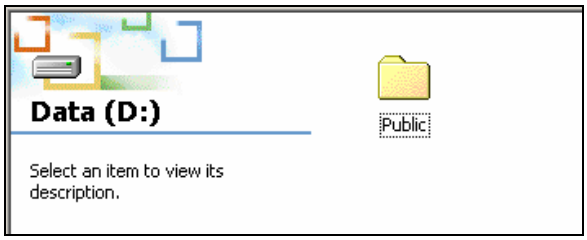
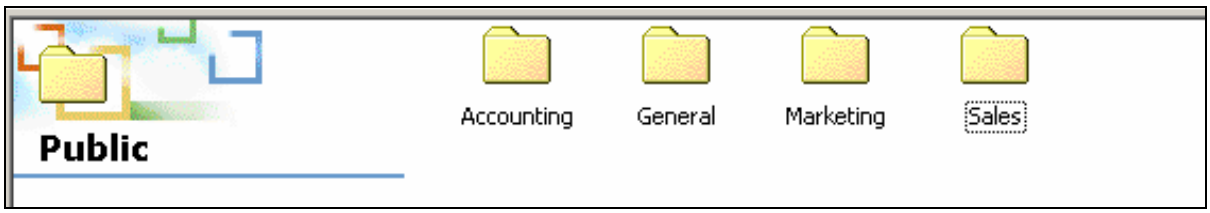
Creating an organized folder structure

Whenever you are creating a folder structure for a file server, you want to take the time to design an easy to use and organized structure. The folder structure should be easy for users to navigate and also easy for administrators to manage. This will take careful planning and testing before you implement any configurations into a production environment. The configuration will also vary widely, depending on the company's file sharing needs. For B & B's (Ben & Brady's Ice Cream, Corp.) network, you will create and share a public folder that will contain sub-folders for the different departments within the company. These departments include marketing, sales and accounting. In addition to the departmental folders, you will also create a general folder, to be used for general information and file sharing between departments. Each department will *only* have access to their own departmental folder and the general folder. You also will create and share a folder that will contain software used by the client computers on the network. Inside this software folder you will create another folder named Admin that only administrators will to be able to access and a folder named Users that all authenticated users on the network will be able to access.

1. Minimize the computer management console and open **Windows Explorer**. Open the **Data (D:)** drive. Right click in an empty space in the right pane and select **New→Folder**. Name the folder **Public.**



2. Open the **Public** folder and create four new folders within it. Create three folders for each of the specific departments and a general folder for the entire company to access.



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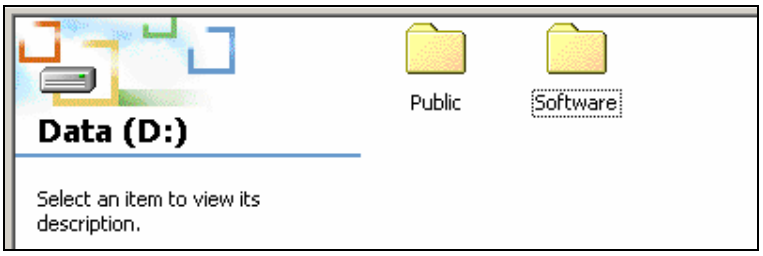
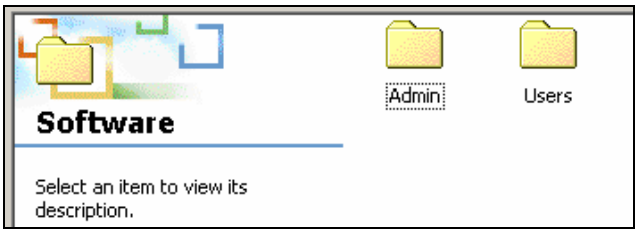
3. After creating the folders within the public folder go back to the **D:** drive and create a new folder named **Software**.

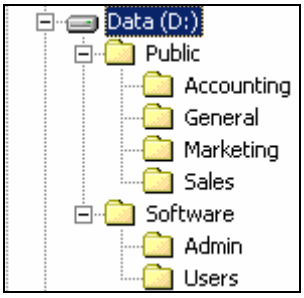


4. Open the **Software** folder and within it create 2 new folders - one named **Admin** and the other named **Users.** The admin folder will contain the software that only Administrators should have access to like anti-virus software, and the users folder will contain common software that everyone can access.



*****Note***** You don't have to place any actual software in the folders.

Your final folder structure should look like this:



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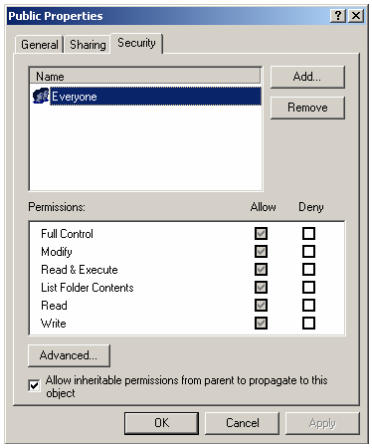
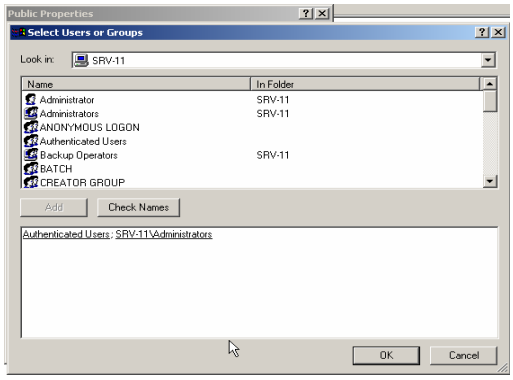
Setting permissions to control user access

After organizing and creating your folder structure, you need to set NTFS permissions on the folders. This way you will have control over what the users are able to access and do within the folder structure you have created. You want to set permissions that will allow users the ability to modify folders and files **within** the individual departmental and general folders but restrict them from making any changes to the actual folder structure.

1. Begin with the **Public** folder. Right click on the folder and select **Properties**. On the properties page select the **Security** tab. By default, the **Everyone** group has full control permission. You ultimately want to remove this group from the public folder. Before you do that you should add the administrators group and the authenticated users group to the security list, which is also known as the ACL (Access Control List).



2. Click on the **Add** button, which will bring up a list of users and groups. In the **Look in** box, select the computer name, SRV-11. Find and add the **Authenticated Users** group and also add the local **Administrators** group from **SRV-11**. Click **OK.**



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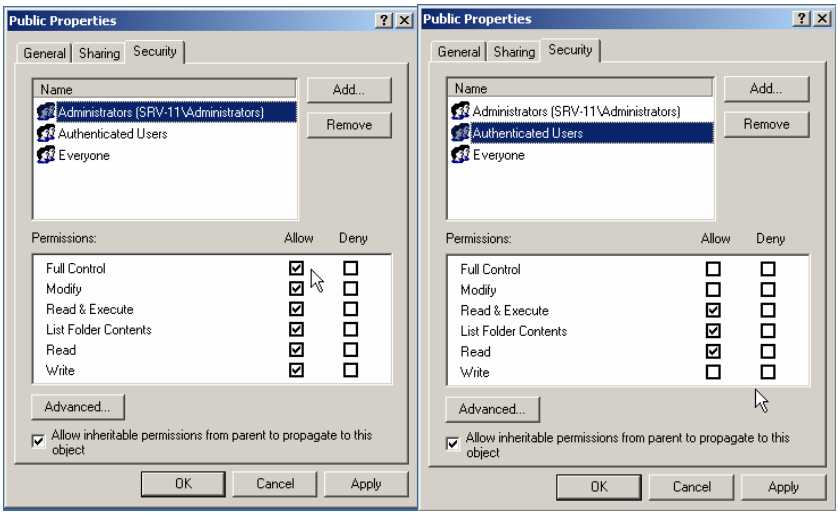
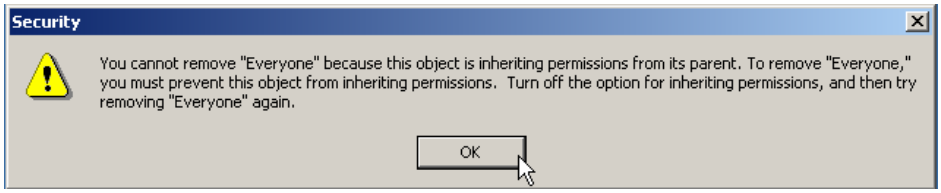
3. The two groups will now appear on the security list. By default, the new groups will have read, read & execute and list folder contents permissions only. This gives them permission to open, read and view the folders inside the Public folder. They will not be able to create, delete or modify any of the folders within or make any changes to the actual public folder itself. You should give the Administrators group full control of the public folder. Highlight **Administrators** and check the **Full Control** box in the **Allow** column. This will automatically select everything in the column. You can leave the default permissions for the Authenticated Users group.



4. The next step is to remove the Everyone group that currently has full control permissions on the public folder. Highlight the **Everyone** group and click **Remove**. You will get an error message stating that you can't remove the group because this object (folder) is inheriting the permissions from its parent. This message tells you that the inheritance check box is selected and is telling this folder to inherit permissions from the parent folder, which sets the Everyone group at full control. By default, every new folder you create will inherit permissions from its parent folder. Inheritance is a new feature in Windows 2000 that allows you to set permissions on the root folder and have them propagated down to all objects within it. Click **OK.**



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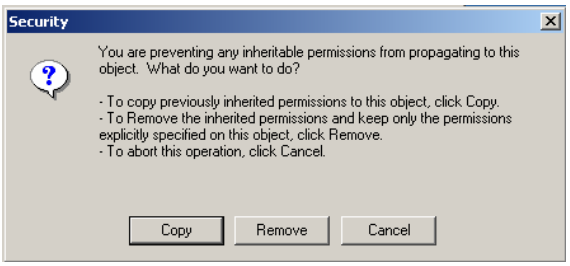
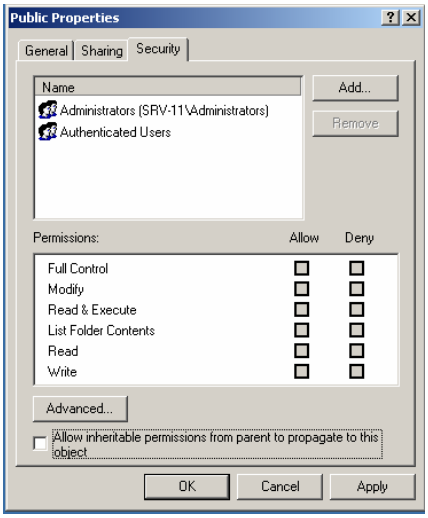
5. In order to remove the Everyone group, you have to disable the inheritance feature on this folder. This can be done on the bottom portion of the security page by un-checking the box that allows the inheritance. Go ahead and uncheck the **Allow inheritable permissions** box. This will bring up a dialog box that asks if you would like to copy the inherited permissions on this object (folder), remove the inherited permissions or abort this operation. If you select Copy, the Everyone group will still appear on the security list but you will be able to remove it without any problems. However, you want to get rid of the Everyone group, so should select Remove to delete the group from the security list (because it is the only inherited permission from the parent). Select **Remove.**



6. You should only have the Administrators group and the Authenticated Users group on the security list. Click **OK**.



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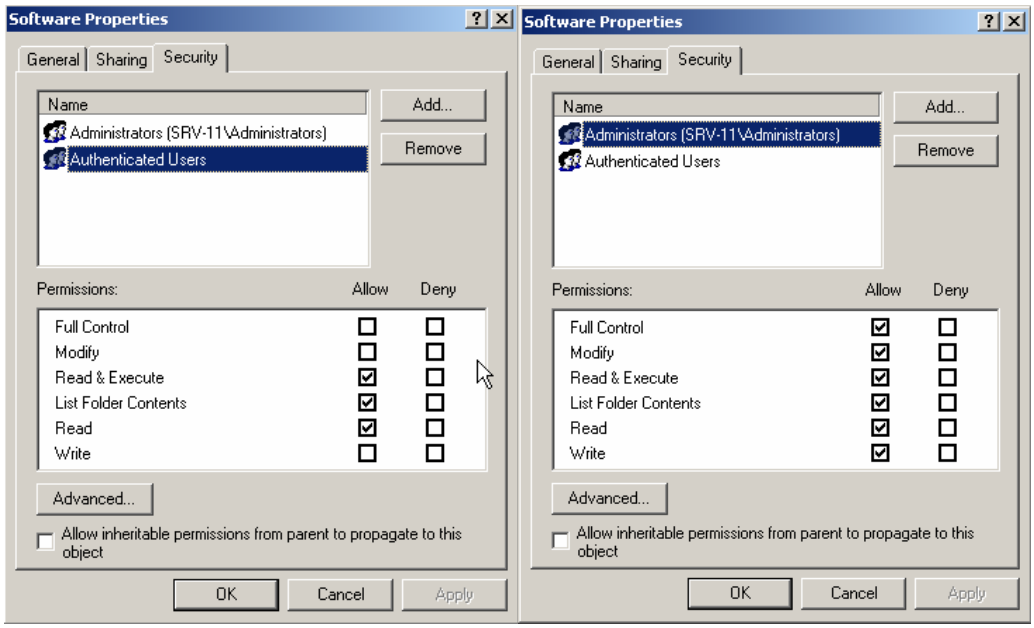
7. Now you need to modify the Permissions on the Software folder so that they're identical to those on the Public folder.



Assigning special permissions

The Public folder and the Software folder are your root folders. Here, you will set permissions, only allowing full folder control to the Administrators group. All other authenticated users have read, read & execute and list folder contents permissions. The next step is to specifically give group permissions to folders based on their departments. You should already have the groups created in the active directory and your next step is to add them to the folder security list, which they should be able to access to create, add, read, delete and modify files/folders. Remember that users must only be able to access the general folder and the folder for their own department within the public folder.

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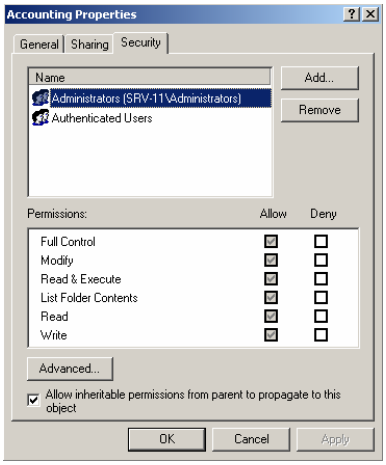
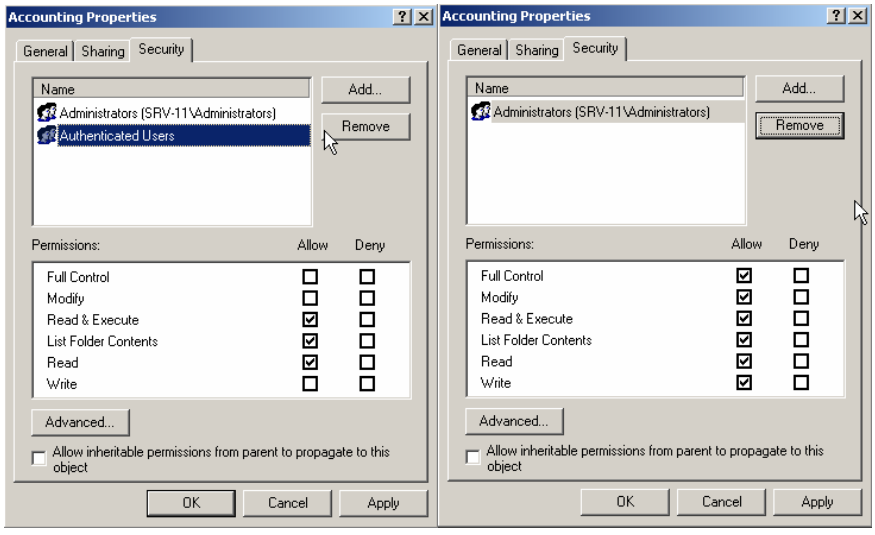
1. Open the **Properties** page of the Accounting folder located inside the Public folder and select the **Security** tab. Remember, that the folder will inherit the permissions from its root folder by default, so the accounting folder will have the same permissions that were set initially on the public folder.



2. You need to remove the Authenticated Users group and leave the Administrator group. The first step is to uncheck the **Allow inheritable permissions** box. You will see the dialog box, asking if you would like to copy or remove the inheritable permissions. In this case you will choose **Copy,** because you want to keep the Administrators group on the list with full control. You can now highlight the **Authenticated Users** group and **Remove** them from the list without any problems.



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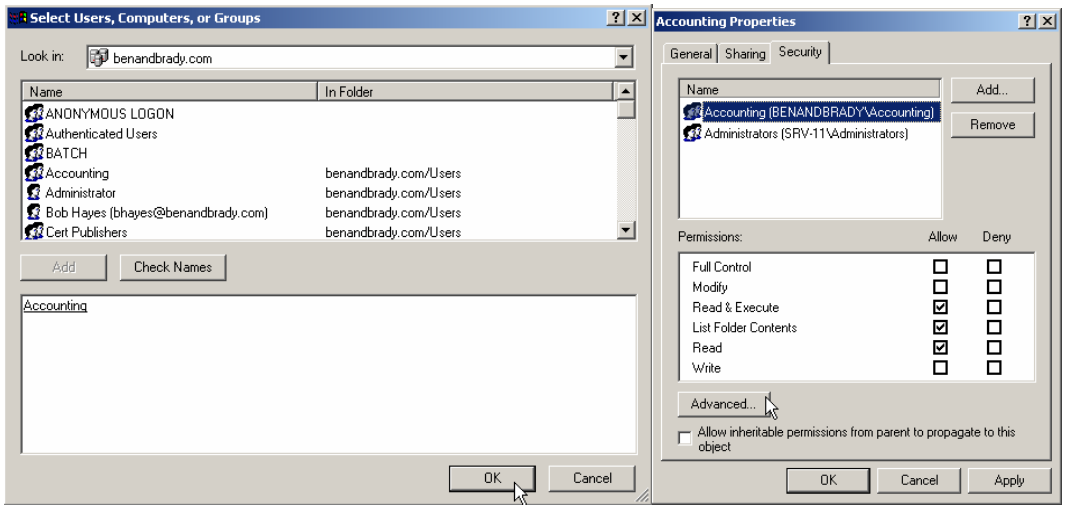
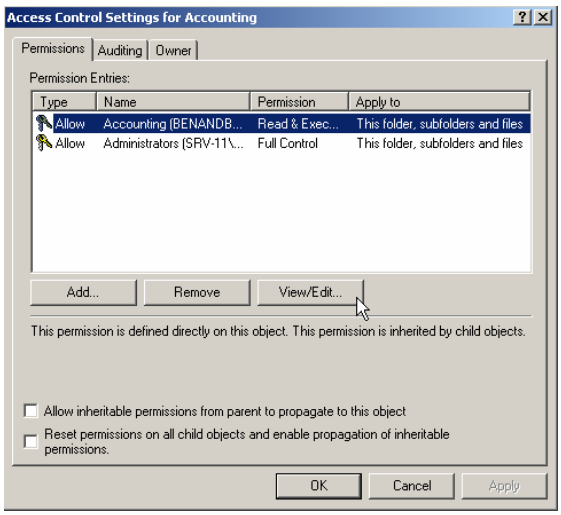
3. The next step is to add the Accounting group to the security list of the Accounting folder. Click **Add.** On the list of users and groups for benandbrady.com, find and add the Accounting group. Click **OK**.



4. You want to give the Accounting group permission to *read, write, modify, create and delete* files & folders located *inside* the Accounting folder, but not to the accounting folder itself. Therefore, the Accounting group will require special permissions on the Accounting folder. You can set these special permissions by going into the advanced settings in the security list. Click the **Advanced** button. On the advanced settings page, highlight the **Accounting** group and click the **View/Edit** button.



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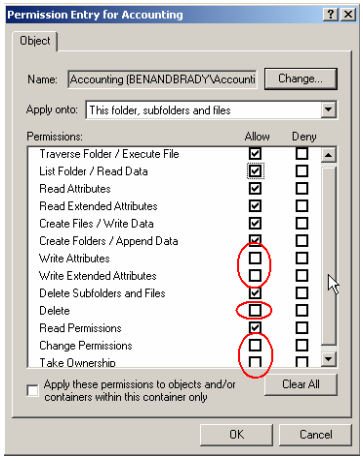
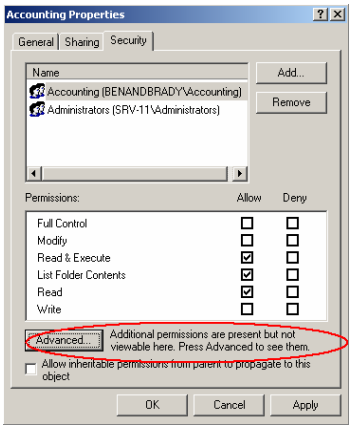
5. From this screen, you can set special permissions that are more specific than those available on the regular security page. You can read each of the permissions on the list - most of them are pretty self-explanatory. You will check the **Allow** boxes for all permissions except for **Write Attributes**, **Write Extended Attributes**, **Delete**, **Change Permission** and **Take Ownership** (these are circled below). This prevents users in the group from deleting, taking ownership or changing the permissions within the accounting folder itself, whilst still allowing them to read, write, modify, create and delete files that are contained inside the folder. By not selecting **Write Attributes** and **Write Extended Attributes**, you ensure that users in the group will not be able to change attributes on the files and folders. An attribute is a setting on the file or folder that allows you to change its characteristics (i.e. hidden and read only). After selecting the appropriate boxes, click **OK** and return to the security properties tab for the Public folder.



6. Next, highlight the **Accounting** group. Notice that, next to the Advanced button, there is now a message stating that there are advanced permissions set for the selected group.



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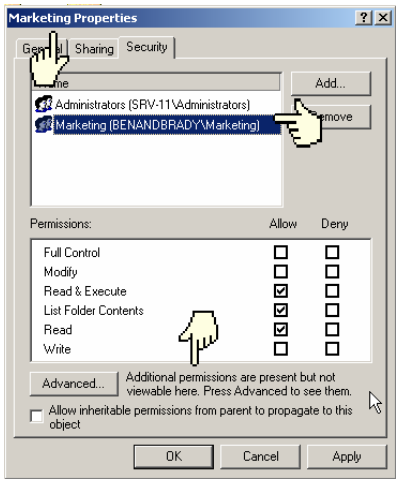
7. Next, you will set permissions on the rest of the folders in the Public folder, the same way you set permissions on the Accounting folder. Administrators will have Full Control for all of the folders and the groups will have special permissions set on each folder. See the following figures for more information.

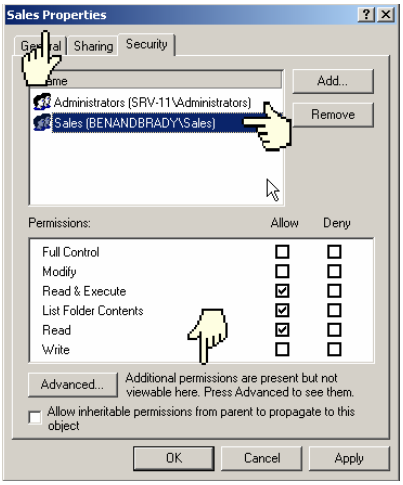
Marketing Folder

Marketing Group → Special Permissions
Administrators → Full Control



Sales Folder

Sales Group → Special Permissions
Administrators → Full Control



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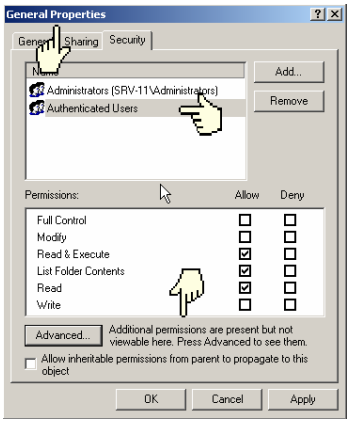
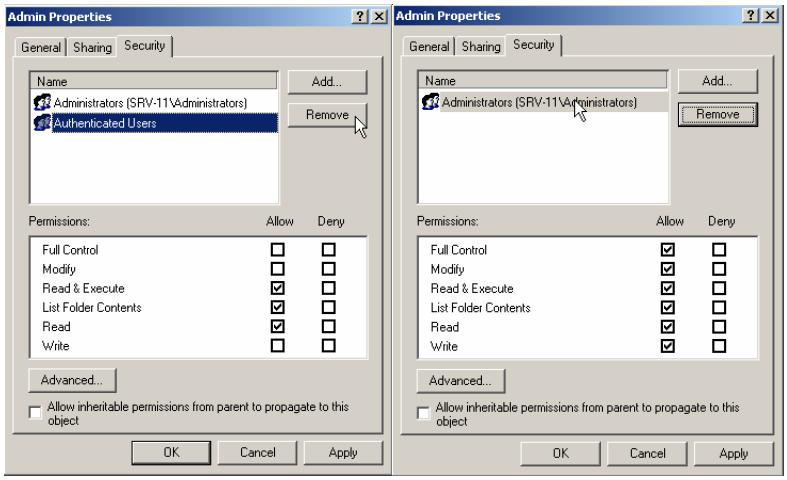
General Folder

Authenticated Users Group → Special Permissions
Administrators → Full Control



8. Now, open the **Software** folder and set the following permissions for the folders inside. The Administrators should have **Full Control** to both the Admin and Users folders. Authenticated Users should not be able to access the Admin folder (they shouldn't be listed at all) but they must have **Read, Execute and List Contents** permissions for the Users folder.
9. Open the **Security List** on the Admin folder**.** Uncheck the **Allow inheritable permissions** box and **Copy** the inherited permissions. Highlight **Authenticated Users** and click **Remove**. All you will be left with in the security list is the Administrators group with full control permissions. Click **OK**. From this point, any user that does not belong to the Administrators group will be denied access to the Admin folder.



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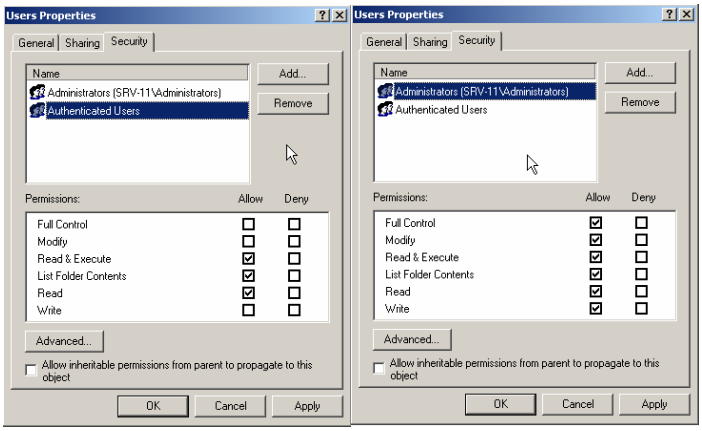
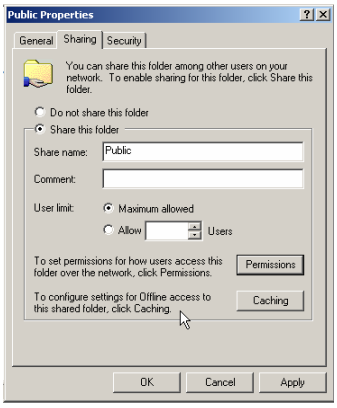
10. Open the **Security List** for the Users folder**.** By default, Administrators already have Full Control permission to this folder and Authenticated Users have Read, Execute and List Contents permissions because it is inherited from the root folder, Software. No additional changes need to be made on this folder because the inherited permissions from the root folder will accomplish our goal of giving the Administrators Full Control and the Authenticated users Read, Execute and List Contents permissions. Click **OK**.



Sharing folders on the Network

Now that you have set the permissions on the folders, you are ready to share them and make sure that your users can connect to them.

1. Open the **Properties** page for the Public folder and select the **Sharing** tab. Then select the **Share this folder** option.



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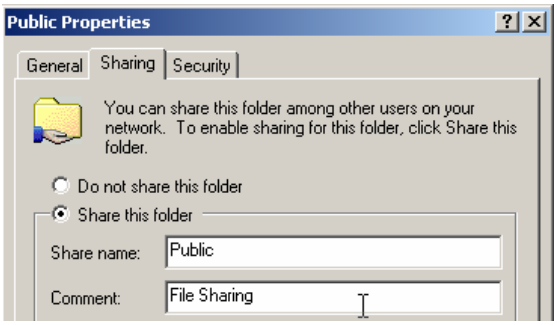
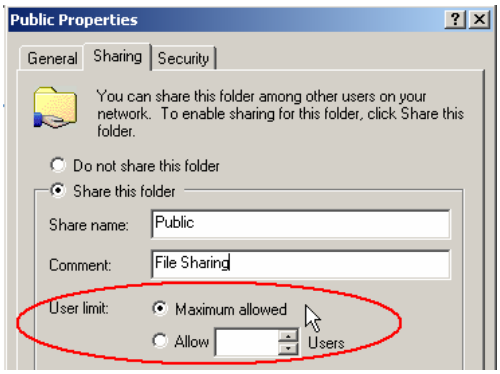
2. The next step is to assign a Share name. You can keep the current name (the same name as the folder) or you can change the share name to anything you like. The share name is the name that users will see when they are searching for the shared folder on the network. You can place a comment to describe the share in the Comment box under it. Type **File Sharing** in the box to give the share a description.



3. You also have the option of setting a limit on the maximum number of users that are allowed to connect to the share at any one time. By default, it is already set to Maximum allowed. You can change this to 10 users, for example, so that no more than 10 users are able to connect to this share at one time. When the 11th user tries to connect to the share, they will be denied access. We are not concerned with the number of users connecting to the Public share, so leave the **Maximum allowed** selection checked.



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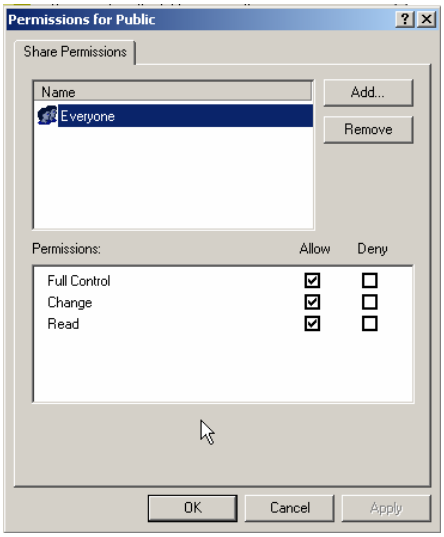
4. The next step is to set share permissions. Share permissions are different from the NTFS permissions that you set on the folders earlier, as they are the only types of permissions available on FAT partitions. On a NTFS partition, share permissions and NTFS permissions combine together to determine a user's effective permission to a resource. Because calculating share permissions and NTFS permissions can lead to great confusion, a good strategy on a production file server is to leave share permissions at their default settings and control access to resources through NTFS permissions. By default, when you share a resource, the Everyone group has full control, according to the share permission. The effective permission of this resource can only be determined by looking at the NTFS permissions also associated with the resource and calculating the permissions based on both NTFS and Share permissions. Leaving the Share permissions at Everyone, Full Control on a resource is not a security issue ***if*** you lock down access to the resource using NTFS permissions! Therefore, we will be leaving the share permissions at their default settings -**Everyone, Full Control.**



5. Share the Software folder with the same settings as the Public folder. **Do not change the permissions on the software folder (or the public folder).**

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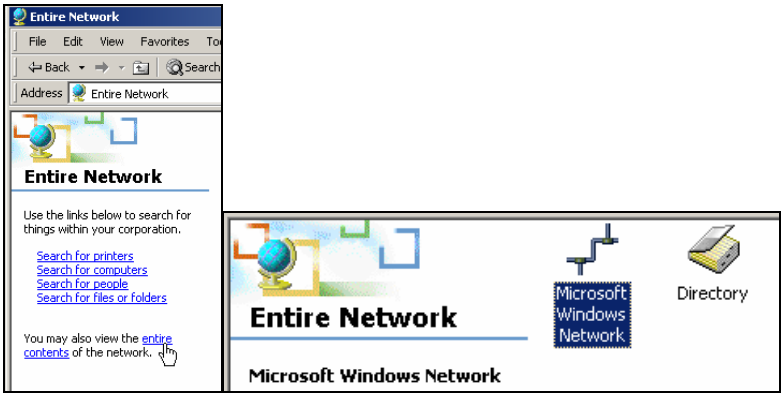
Connecting to the Network Shares

1. Log on to **Client-1** with the user name **jsmith.** This user should have been created in the Lab Setup. This user works in accounting and belongs to the Accounting Group**,** so they should have access to the Accounting folder in the Public share and the Users folder in the Software share. To open the shared folder, browse to the shares using **My Network Places.**
2. From the desktop open **My Network Places.** On the next screen open the **Entire Network.**

3. The next screen will be blank except for the options available on the left. Select the last option: **view the entire contents of the network**. Then you will get the option of browsing the directory or browsing a Microsoft Windows Network. By opening the directory you will be able to browse the Active Directory for users and groups in benandbrady.com. Instead of the directory, you will open **Microsoft Windows Network.**



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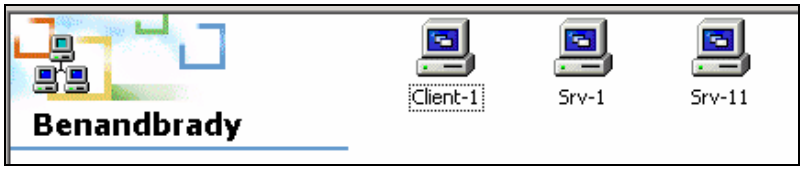
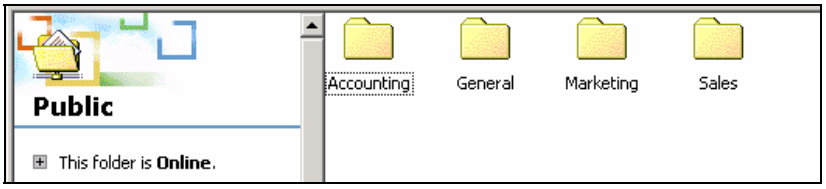
4. Inside, you will see all of the Microsoft Domains and workgroups that are physically and logically connected together. Unless you are plugged into a school or work network, you will probably only see the benandbrady.com domain. Open the **benandbrady.com domain** to view all of the computers on the domain.

5. You should now see all of the computers that belong to the benandbrady.com domain. Find and open the computer **SRV-11**.



6. Inside SRV-11 you should have two shared folders for Public and Software. If there were any printers being shared from this computer you will be able to find them inside the printers folder.

7. Now go ahead and open the **Public** share. You should see the 4 folders created - 3 folders for the specific departments and 1 general folder for the entire company.



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Testing file and folder security

1. Try to open the **Marketing** folder. You should get a message saying that **Access is denied.** This is because the user you logged on with does not have permission to access this folder. Click **OK**.

2. Now try to open the **Sales** folder. You should get the same message saying that **Access is denied.** Once again, you do not have permission to access this folder. Click **OK**.

3. Now try to access the **General** folder. You should be able to open it without any problems. Once inside the General folder, try to create a new folder named **Jill Smith**. You should not have any problems creating it as all Authenticated Users on the benandbrady.com domain have access to open, read, write, delete and create new files and folders within the General folder.

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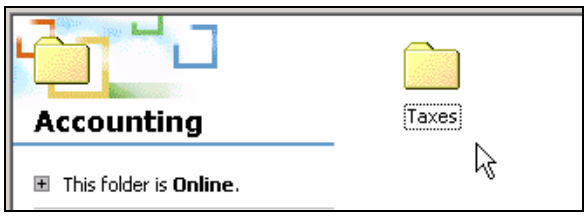
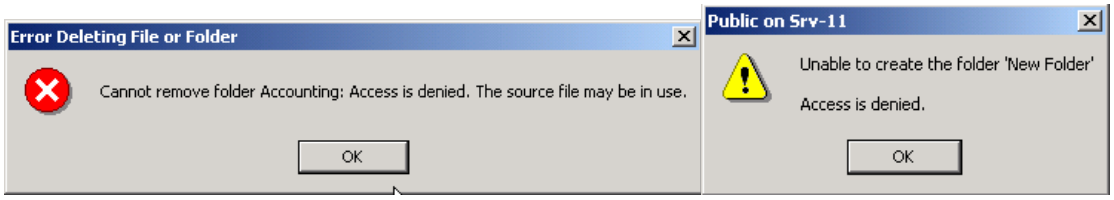
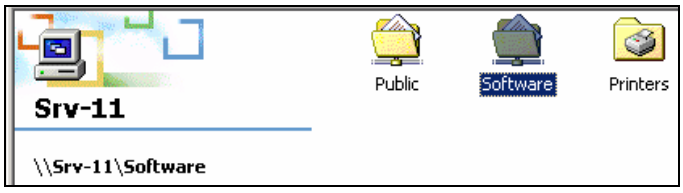
4. Go back to the **Public** folder and try to open the **Accounting** folder. You should be able to open it without any problems because this user belongs to the Accounting Group that has been given folder access permissions. Now create a new folder named **Taxes.** Once again, you should have no problem doing this based on the special permissions previously assigned.



5. Next, go back to the **Public** folder and try deleting the **Accounting** folder. You should get an error message stating that **Access is denied.** Jill Smith only has read and list access to this folder. Click **OK**. Try creating a new folder inside the public folder. You should again be denied access. Click **OK.** Only administrators have full control permissions to manage the base folder structure. This will prevent users from accidentally deleting or modifying the base folder structure.



6. Now go back and try to open the **Software** share on SRV-11**.**



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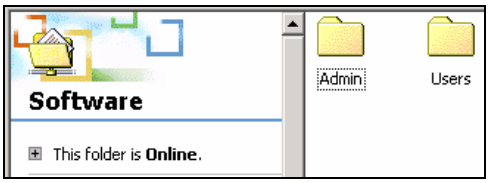
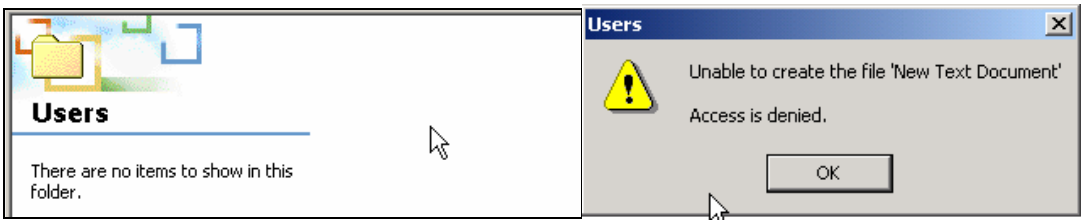
7. You should be able to see the Admin and Users folders. Try to open the **Admin** folder. You should be denied access because only administrators have access to this folder. Now try to open the **Users** folder. You should be able to open it without any problems.



8. The Users folder is empty, but this is where you could store any software, software updates or software related files that the administrator has shared out to the users in the network. Try to create a new text file in the **Users** folder by right clicking in an empty space and selecting **New→Text Document.** You should be denied access.



9. Next, log off and try logging on with the other users created in this lab setup to see if your permissions are set correctly for each user. Spend some time testing permissions thoroughly. Make sure that you try every possibility and work the bugs out before releasing your folder structure to Ben & Brady's users.

First Name	Last Name	Username	Password	Group
Jack	Straw	jstraw	test	Marketing
Jill	Smith	jsmith	test	Accounting
Sue	Stevens	sstevens	test	Sales
Bob	Hayes	bhayes	test	Administrators

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Lab 2

Configuring the Distributed File System (DFS) on File Servers

You will learn how to:

- Configure a Domain based DFS
- Create a DFS root and add DFS links
- Configure fault tolerance for DFS
- Create DFS root and DFS link replicas
- Test the DFS for fault tolerance

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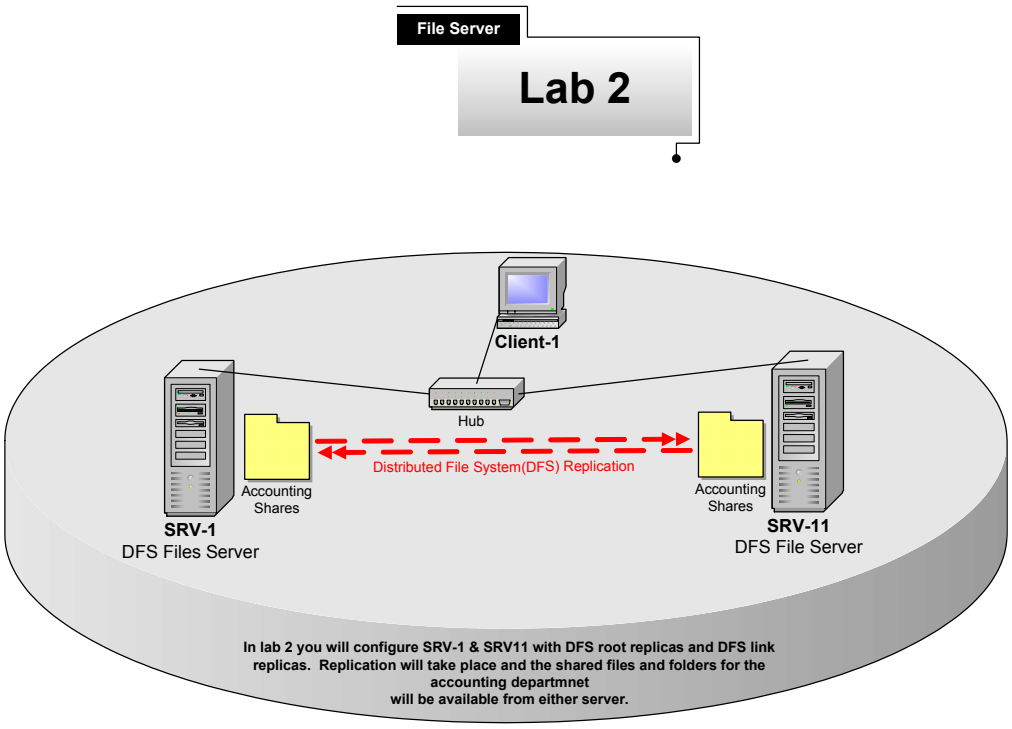
Scenario

In your next meeting with Jill, she congratulates you on the great job you did with the folder structure and asks if you're up for a new challenge. You tell her you're ready for anything she has in mind. She begins to tell you that the accounting department currently needs to access many different folders located on various servers including the new file server you've just set up. She would like you to make it easier and more efficient for department users to access the shares and explains that this can be done by creating a DFS (Distributed File System) server and placing all of their shares into a DFS root. She also wants to have fault tolerance for the accounting department's shares. The last time one of the file servers went down the CFO was not able to work with the accounting files and the company was fined by the IRS for not filing taxes on time. Therefore it's critical that those files are always available to the accounting department in case either of the file servers goes down.

In this lab, you will create a DFS server for the accounting department on srv-11. You will also create fault tolerance for the DFS server by creating DFS root replicas and DFS link replicas on srv-1. You will then test the DFS setup and fault tolerance from client-1 by taking one of the server's offline and trying to connect to different shares on the network.



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Creating a Distributed File System (DFS)

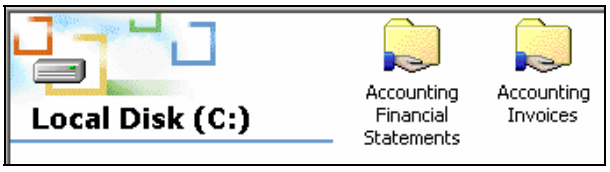
DFS stands for Distributed File System, which is a greatly improved and very useful feature included with Windows 2000. DFS allows you to set up one location, called a DFS root, that links to shared resources located on multiple servers, effectively bringing all of these different shares together in one folder. This is ideal on networks that have a lot of servers and shares. For example, if you need to access a share on srv-11 for one file and then access another share on srv-1 for a different file, you will have to find both shares individually and remember where each of the shares are located. This might not that big of a deal with two shares but just imagine if you had to access fifteen different files from shares on fifteen different servers - much more difficult! With DFS, you can combine all fifteen shares logically in one folder (the actual shares will still exist on their respective servers) and have your users connect to that one folder, so that it will appear as if all of their resources are together in one place. There are two types of DFS that you can implement in Windows 2000; there is a stand-alone DFS and a domain-based DFS. The biggest difference between them is that a domain-based DFS provides fault tolerance and requires Active Directory to be running on the network, while a stand-alone DFS can be set up on a network that does not have Active Directory but it does not offer fault tolerance. You will be setting up a domain based DFS in this lab. Before you can get started on DFS, you need to build a folder structure for the accounting department.

Setting up the network for DFS

SRV-1

1. Create the following folders on SRV-1:

   C:\Accounting Invoices
   C:\Accounting Financial Statements



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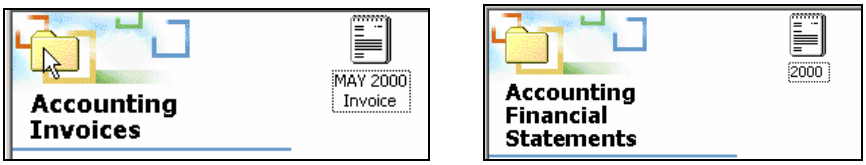
2. Create the following files inside their respective folders:

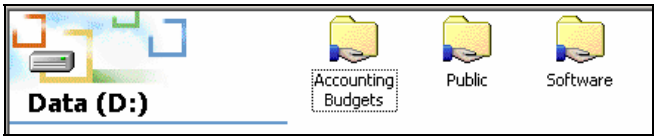
   C:\Accounting Invoices\MAY 2000 Invoice.txt
   C:\Accounting Financial Statements\2000.txt



SRV-11

1. Create the following folder on SRV-11:

   D:\Accounting Budgets



2. Create the following file inside the Accounting Budgets folder:

   D:\Accounting Budgets\Marketing Budget 2000.txt

Creating a DFS Root for the Accounting department

1. The first step in setting up DFS is to create a DFS root. To create the DFS root, first create a folder and then share it. The name of the folder doesn't matter as long as it makes sense to you and the users that will be connecting to it. Log on to **SRV-11** and open **Windows Explorer**. On the D: drive, **Create** and **Share** a folder named **Accounting Root**.

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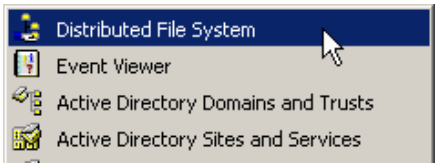
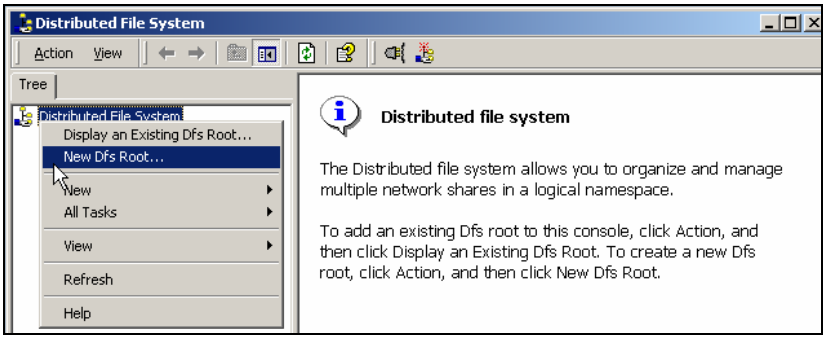
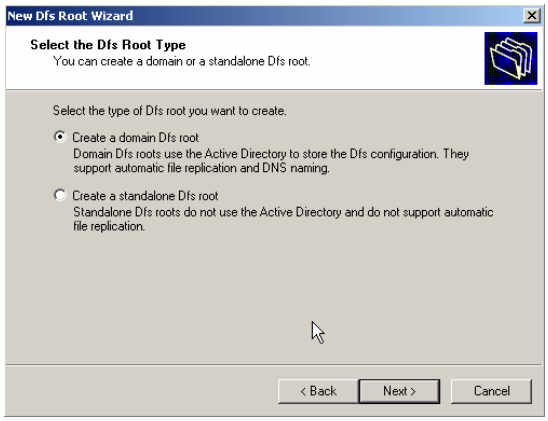
2. Close **Windows Explorer** and open the **DFS administrator** tool on SRV-11. Go to **Start→Programs→Administrative Tools→Distributed File System**.



3. Right click on **Distributed File System** in the left pane of the management console and select **New DFS Root**.



4. A wizard will start up and walk you through the process of creating a DFS root. The first screen is just a welcome screen, click **Next**. The next screen will ask you to specify the type of root you want to create. Select **Create a domain DFS root** and click **Next**.



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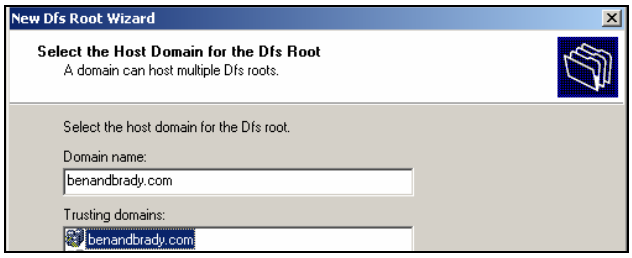
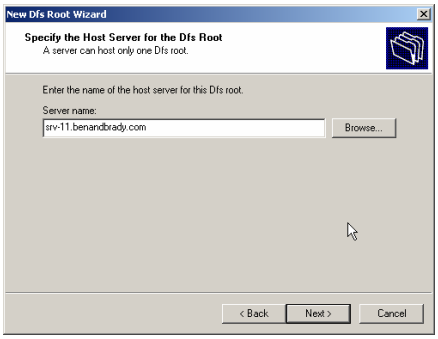
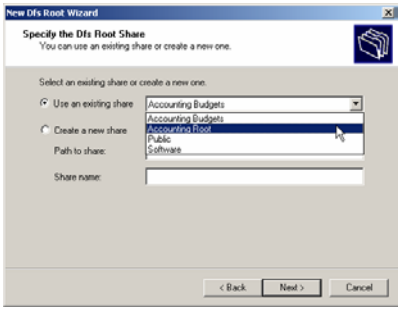
5. The next screen will ask you to specify the domain name where the DFS root will be hosted. Select **benandbrady.com** from the trusting domains list and click **Next.**



6. On the next screen, you are asked to specify the name of the server that will host the DFS root. By default the server upon which you are running the wizard will appear. If you are placing the DFS root on a different server, simply type in the name of the computer or browse for it. Make sure that **srv-11.benandbrady.com** appears for the server name and click **Next**.



7. The next screen will ask you to specify the DFS root share. You have already created the share to use in an earlier step, but you also have the option of creating a new one here. Select **Use an existing share** and choose **Accounting Root** as the share. It is also worth noting that it would be better to plan out the name of the DFS root share ahead of time rather than simply thinking of a name during the DFS wizard. Click **Next.**



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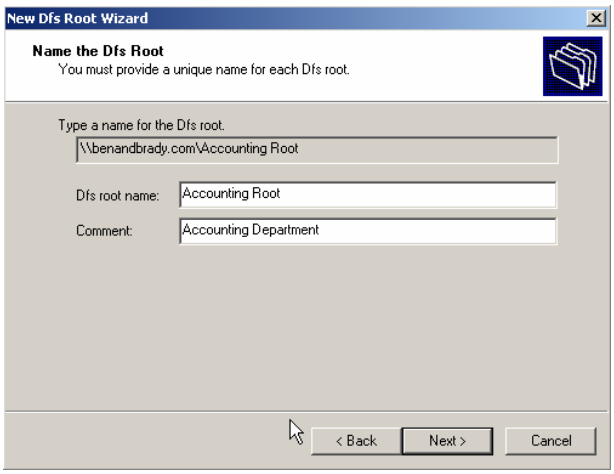
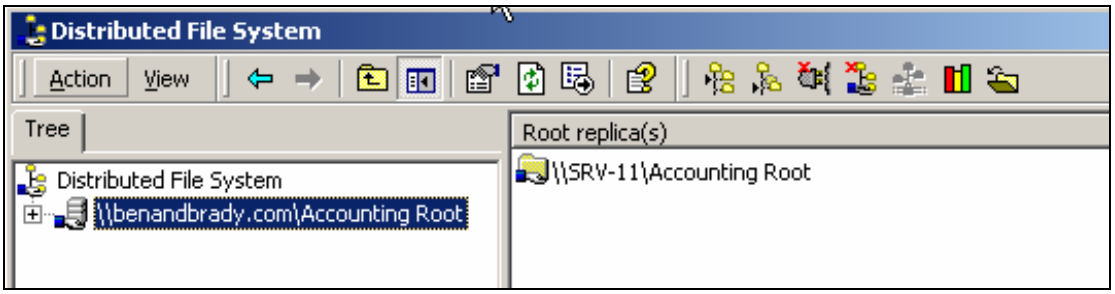
8. The next screen will ask you to name the DFS root. You have the option of giving the DFS root a different name from the DFS root share name. This is the same as naming a share differently from the folder name. By default, it will place the name of the DFS root share as the DFS root name. Here, you will leave the default name, **Accounting Root,** because the share was created for use as the DFS root share only. You also have the option of attaching a comment to the DFS root - you can use this to give the DFS root a description of what it will be used for. In this case you can type in **Accounting Department**, because that is the only department that will be accessing this particular DFS root. Click **Next**.



9. The last screen will show a summary of the settings you made in the wizard and you should confirm that all the settings are correct and click **Finish**. You should now see the DFS root appear in the left pane of the DFS management console.



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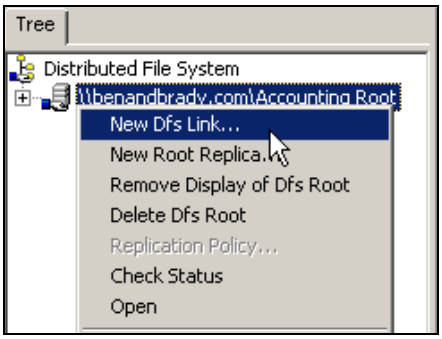
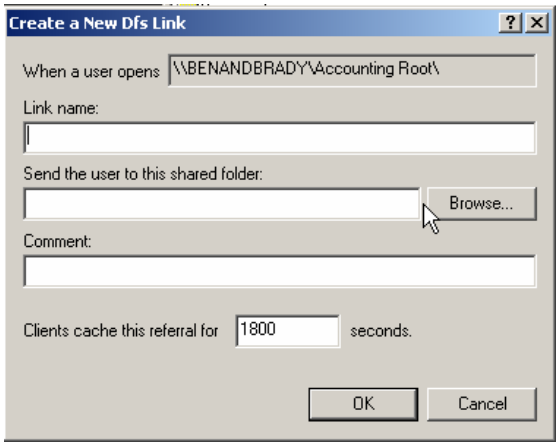
Adding DFS Links

The next step in building your DFS infrastructure is to add links. The DFS root is only a starting point for DFS and, for it to be truly beneficial, you need to add DFS links that point to shares on the network. When the users open the DFS root (which appears to them like any normal share) they will see all of the available folders, which are links to the actual shared folders. In the following steps, you will create links for the different shares that the accounting department uses on SRV-1 and SRV-11.

1. In the left pane of the DFS management console, right click on the **\\benandbrady.com\Accounting Root** and select **New Dfs Link**.



2. This will open up a dialog box where you must enter the information required to create a DFS link. You can give the link a name first or you can enter the location of the folder first - the order doesn't matter. You can either type the path to the shared folder or you can browse to it by clicking **Browse**.



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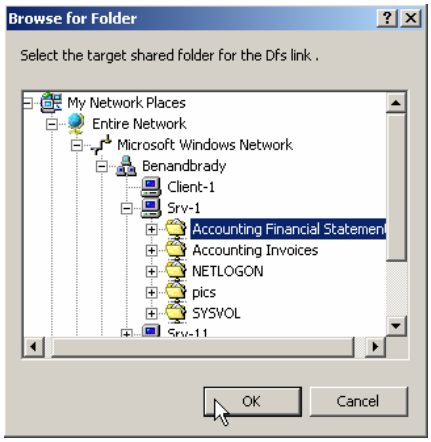
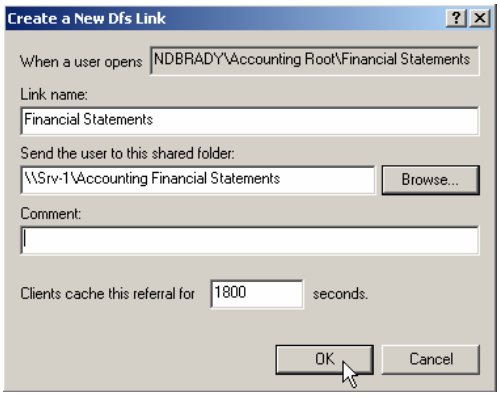
2. Search for **Srv-1** in the benandbrady.com domain and select the share **Accounting Financial Statements.** Click **OK**.



3. Back in the dialog box you should now have the path to the shared folder. Next you need to give the link a name. For this lab, name it **Financial Statements,** because all the links that will be created on this root belong to the accounting department. You also have the option of attaching a comment to the link for a description, but remember that this is optional and can be left blank. The last option is to set the amount of time in seconds that the client will locally cache the information of where the link is located. By caching the information locally, the client will be able to connect to share more efficiently. The default setting for this is 1800 seconds, which means that the client will check to make sure the information is still correct and online every 1800 seconds. Click **OK**.



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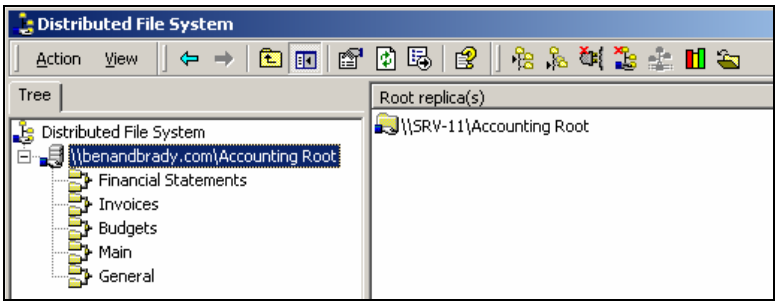
4. Next, you will create DFS links for the rest of the accounting department's shares.

Link Name	Share Path
Invoices	\\srv-1\Accounting Invoices
Budgets	\\srv-11\Accounting Budgets
Main	\\srv-11\Public\Accounting
General	\\srv-11\Public\General

*****Note***** \\ indicates a Universal Naming Convention (UNC). This is used to connect to shares using the following convention: \\server name\share name. For example, the UNC path \\srv-1\Accounting Invoices, indicates the computer name SRV-1 and the share on SRV-1 named Accounting Invoices.

When you are done it should look like this:



Connecting to the DFS server from the client

1. Log on to C**lient-1** with the username **jsmith**. This user belongs to the accounting group so she should be able to access all of the resources for the accounting department without any problems. Instead of having to browse the network to find various shares, the user can now connect directly to the DFS Root, Accounting Root, and access all of the shares from one location.

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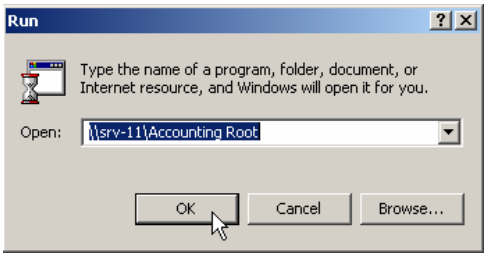
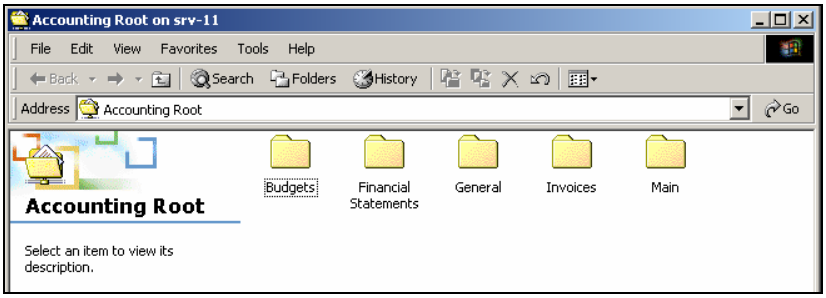
2. Instead of browsing for the DFS root through My Network Places, try using the UNC (Universal Naming Convention) to connect to the DFS root share. If you correctly type the UNC in the Run dialog box, it will connect you directly to this share. Try to open the share for the DFS root from the Run dialog box. Go to **Start→Run** and type in **\\srv-11\Accounting Root** and click **OK**.



3. This will open up a window to the DFS root share and show all of the links created within it. The only downside to using the UNC is that you have to know the exact name of the computer and the share for it to work. If you forget either, you will have to browse My Network Places to find the shares.



Creating a DFS root replica

DFS is a great solution for the network browsing problem discussed earlier. The next problem though is what happens once your users become used to seeing all of their folders under the DFS root and then you take it away? Of course you would not just *take it away* from your users. But…SRV-11, the server that holds the DFS root, could go down. If this happens the DFS root goes down too and none of the links under the root will be accessible through it, even though the actual server that contains the folder/file is running fine. The users could go back to browsing for their resources, but how many will remember how to do that or where to find their resources, after using a DFS for so long?

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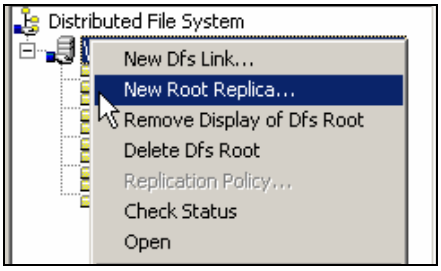
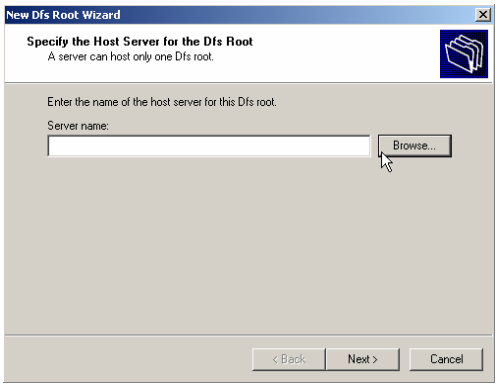
A DFS root replica is created for fault tolerance. It can only be created within a domain based DFS root. Here's how the DFS root replica works: the root will be placed on at least two separate servers within the domain and the DFS root locations will be recorded within Active Directory. So, if a DFS root server were to go down, the users connecting to the DFS root with the domain UNC name **\\benandbrady\Accounting Root,** would never know one of the servers was down because the other DFS root replica would take over and continue to connect them to the DFS links without any interruption.

1. Log on to **SRV-11** and open the **DFS management console**. Right click on the **\\benandbrady.com\Accounting Root** DFS root and select **New Root Replica**.



2. The New DFS Root Wizard will start. The first screen will ask you to specify the name of the server that will host the DFS root replica. You can either browse to the server or enter the computer name. Click the **Browse** button.



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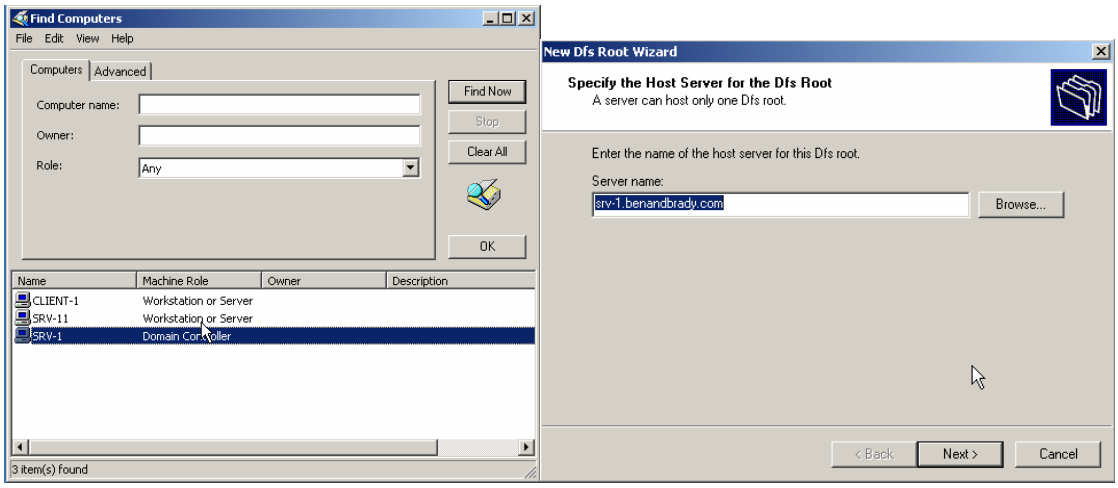
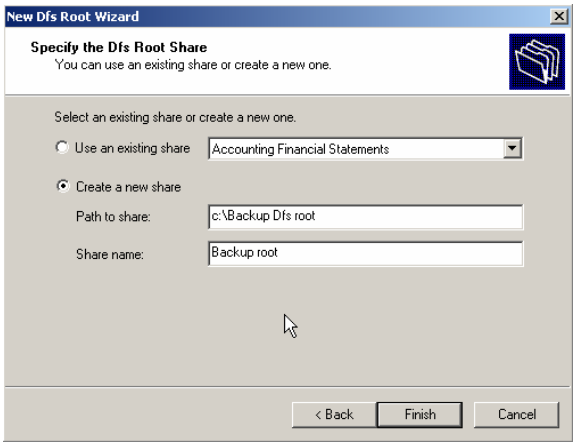
3. This will find all of the computers that are available on the network. Just remember that the computer you select must be running Windows 2000 Server in order for the DFS root replica to work. It will not let you choose a computer running a client operating system like Windows 2000 Professional **or** a Windows 2000 Server that already has a DFS root installed (only 1 DFS root/server!). You can try to choose **Client-1** but it will give you an error message and will not allow you to continue. Find and select **SRV-1,** then click **OK**. Make sure the computer name is correct on the wizard and click **Next**.



4. The next step is to specify the DFS root share on SRV-1. You did not create a new share for the replica so you can use the **Create a new share** option. Type the path, folder name and share name you want the new DFS root share to have. Type in **C:\Backup Dfs root** for the **Path to share** and **Backup Root** for the **Share name**. Click **Next**.



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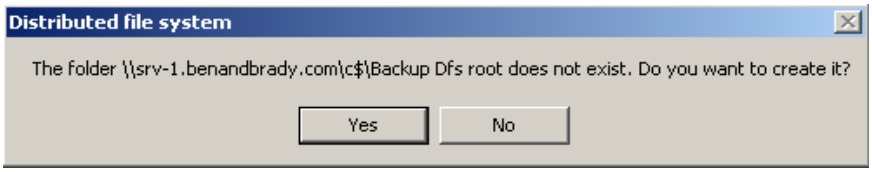
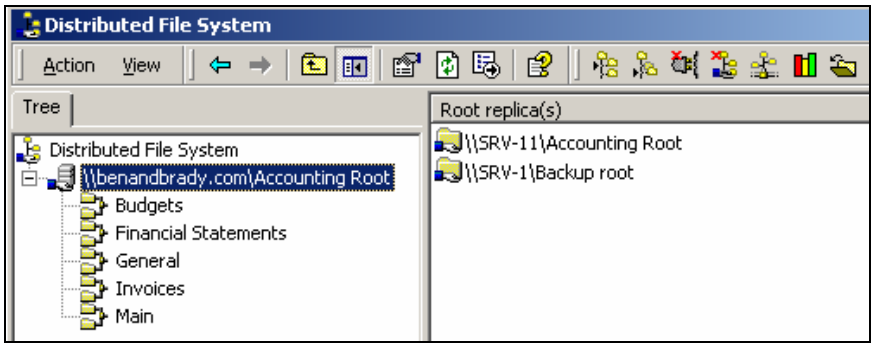
5. You will get a message telling you that the folder you specified does not exist and you will have the option of creating it immediately. Click **Yes**. This will create and share the folder for you.

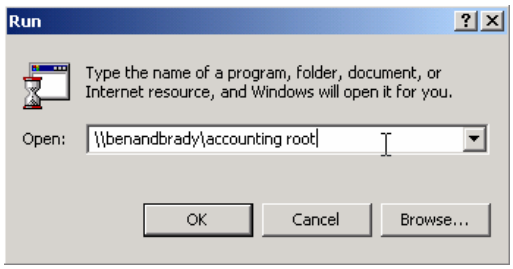


6. That will end the new DFS root replica wizard and bring you back to the DFS management console. Highlight the **\\benandbrady\Accounting Root** in the left pane and you should now see both of the DFS root replicas in the right pane, the original root share on SRV-11 and the root replica created on SRV-1.



Testing the DFS root replica for fault tolerance

1. Log on to **Client-1** with the username **jsmith** and try to connect to the DFS root using the domain name instead of the computer name in the UNC path. Go to **Start→Run** and then type in **\\benandbrady\Accounting Root** and click **OK**.



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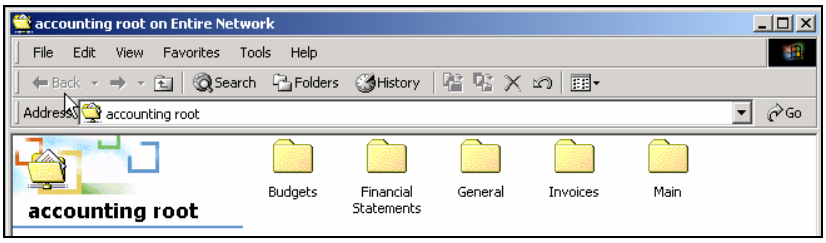
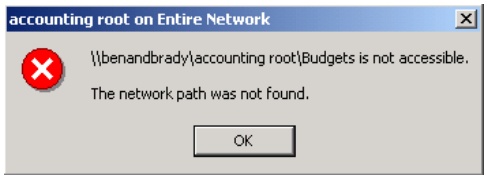
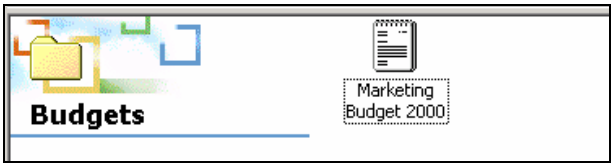
2. You should be able open the DFS root without any trouble. Close the window for the **accounting root** share.



3. In order to test the root replicas for fault tolerance you will need to take SRV-11 offline and try to connect to the accounting root again. Find the network cable that goes from the **SRV-11** NIC to the hub and unplug it.
4. Try to connect to the DFS root share once again with the UNC **\\benandbrady\Accounting Root.** You should still be able to connect to it without any problem. That's because the request for the DFS root is directed to Active Directory and Active Directory (the DC/SRV-1) will realize that the DFS root on SRV-11 is not available and will only connect users to the DFS root replica that is currently functioning.
5. Now try to open the link for **Budgets**. You should get an error message saying that the network path was not found. Why did you receive this error? Because SRV-11 is offline and the share is not reachable. Keep in mind that configuring root replicas does nothing for replicating the files as they are folders contained within the DFS links. Root replicas only contain information on where the shares are located. The link still shows up, but as the error message indicates, the computer can not be found. Click **OK** to close the error message.



6. Connect the cable for **SRV-11** back into the hub and try to access **Budgets** again. Now that SRV-11 is back online, the user should be able to connect to the share and view the text file for the Marketing budget for the year 2000.



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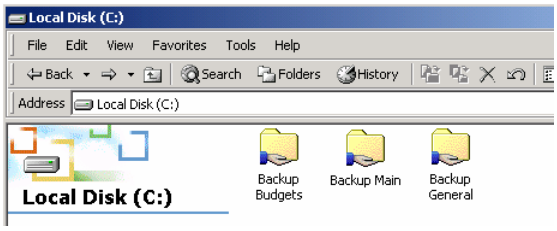
Creating DFS link replicas for fault tolerance

If you want true fault tolerance for all of the different resources within the DFS, you will have to create link replicas as well as root replicas. Creating link replicas will replicate (copy) all of the information from one folder (link) over to another. If a server is unavailable, as in our last example, the user should be redirected over to the functioning server with the same information. This should all work seamlessly without the user being aware of anything going on in the background. In order to configure replicas for the lab, you need to create new shares on the servers upon which the replicas will be placed.

1. Create and share the following Folders.

SRV-1

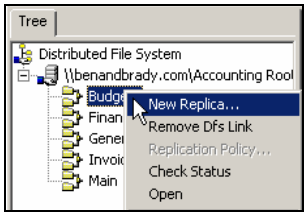
Folders: C:\Backup Budgets
C:\Backup Main
C:\Backup General



SRV-11

Folders: D:\Backup Financial Statements
D:\Backup Invoices

2. Log on to **SRV-11** and open the **DFS management** console. Right click on the **Budgets** link and select **New Replica**.



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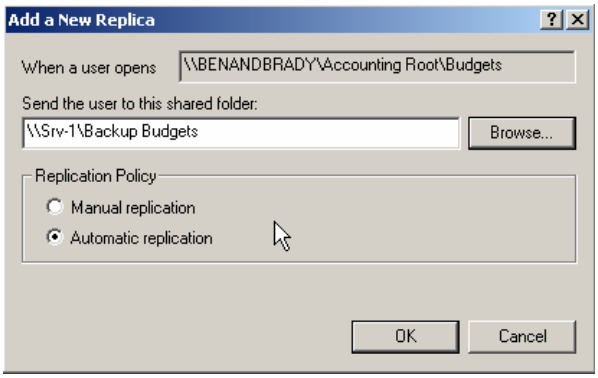
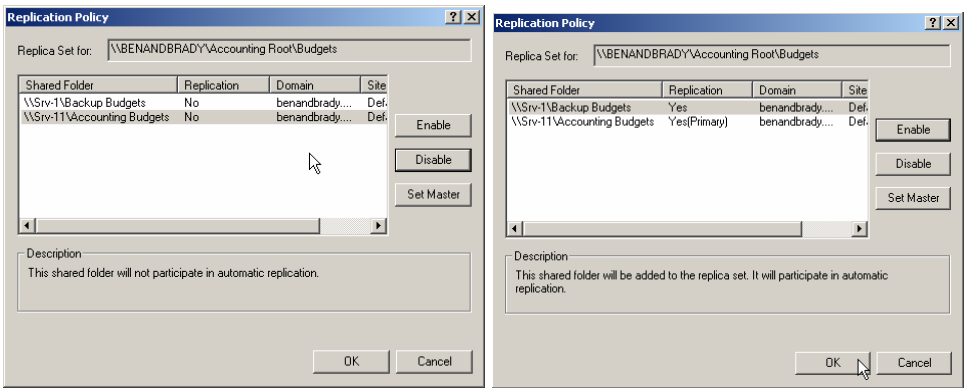
3. A dialog box will appear asking you to enter the share name of where you want the replica to point. You can either type in the UNC name **\\srv-1\Backup Budgets** or browse for the share created for the budgets link on SRV-1. You then have to specify how you want the two shares to replicate. The Manual replication option will only replicate the two shares when it is forced to. The Automatic replication option will replicate the two shares automatically so that both shares contain the same information. Complete automation is our goal here, so select **Automatic replication** and click **OK**.



4. By selecting the automatic replication option you now have to specify which one of the shares actually holds the data. The one with the data will be set as the Master (primary) and all of the data currently in the folder will be replicated over to the other DFS link. You will only have to set the master the first time the shares replicate as they will thereafter both replicate any changes, regardless of which share changes. Select the **\\Srv-11\Accounting Budgets** share and click the **Enable** button. You must be careful when you enable the share because the first one you enable will automatically be set as the Master (primary) share. If you select the wrong share, you can always change it by using the Set Master button. Now select the **\\Srv-1\Backup Budgets** share. Make sure that both shares are enabled for replication and the **\\Srv-11\Accounting Budgets** share is set as the Master (primary). Click **OK**. From now on, any changes that are made within either one of the shares will be automatically updated to the other.



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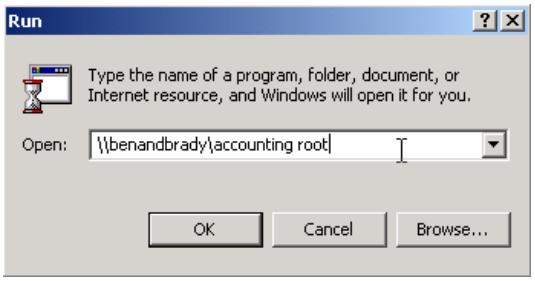
5. Make all of the DFS links fault tolerant by setting up new replicas for all current DFS links. Match up the current DFS links with the corresponding backup share you created, as you did with the Budgets DFS link.

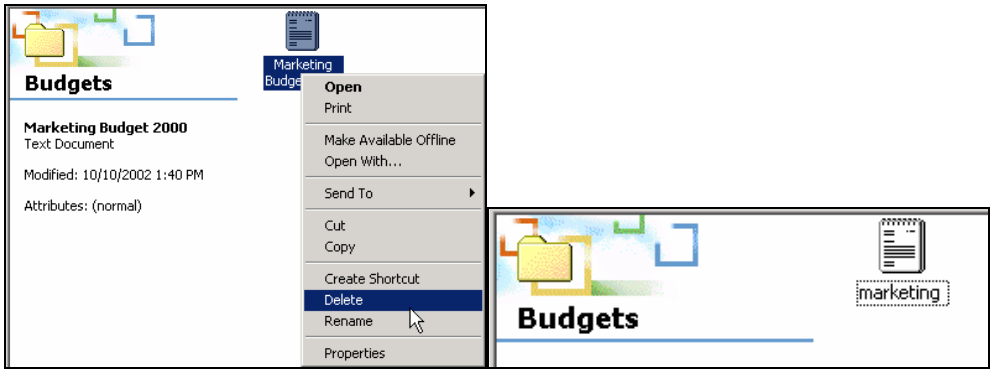
Financial Statements → \\Srv-11\Backup Financial Statements
General → \\Srv-1\Backup General
Invoices → \\Srv-11\Backup Invoices
Main → \\Srv-1\Backup Main

Testing DFS for complete fault tolerance

1. Log on to **Client-1** with the username **jsmith** and connect to the DFS root using the domain name in the UNC path **\\benandbrady\Accounting Root.**



2. You should be able to reach the DFS root share **\\benandbrady\accounting root** without any trouble. Now open the **Budget** folder and delete the text file for **Marketing Budget 2000** and create a new text file named **Marketing,** just to make sure the user is able to work within the folder.



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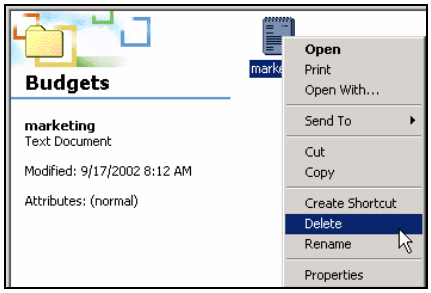
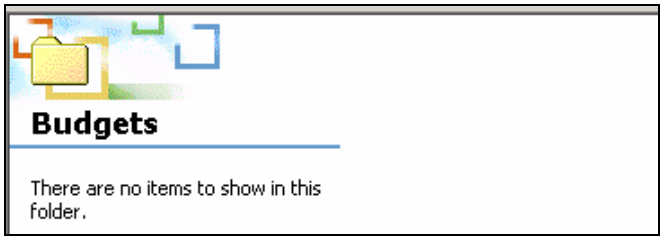
3. Close the Window for the **Accounting Root** share. Now take the server, SRV-11, offline by disconnecting the network cable from the hub. Remember, the first time you took SRV-11 offline you were not able to access the Budgets folder from the DFS root link, even though you could see it. That's because you only had root replicas set up for the network and there was no fault tolerance set up on the DFS links.
4. Open the DFS root folder **\\benandbrady\accounting root** and try to access the **Budgets** folder again, now that SRV-11 is offline. You should see the text file named marketing that you created and you should be able to open, edit and delete it, even though the server upon which it was originally shared is not online. Now delete the **marketing** text file and see if the file reappears when you bring SRV-11 back online.



5. Close the Window. Plug the network cable for **SRV-11** back into the hub to bring the server back online.
6. Open the DFS root folder **\\benandbrady\accounting root** and open the **Budgets** folder. Notice that the budget folder is empty - that's because when SRV-11 was brought back online it replicated with SRV-1. SRV-1 then updated SRV-11 that the marketing file has been deleted. SRV-11 accepts that the file has been deleted when it came back online, because, after the first time replication takes place, there is no longer a primary (master) server. DFS replication then uses multi-master replication to synchronize the data on each share, in much the same way that domain controllers replicate Active Directory. The user who connects to this share will never know when or if a server was ever down as long as one of the servers with the share is up and running. You now have a fully fault tolerant DFS infrastructure for users to connect to.



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Lab 3

Enabling disk quotas and mapping network drives on the File Server

You will learn how to:

- Enable default disk quotas for all users
- Create disk quotas for individual users
- Map and delete a network drive using a Windows 2000 GUI
- Map and delete a network drive using the NET USE command
- Create a script for deleting and creating network drives

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Scenario

Jill calls you into her office on a Monday morning and tells you that the users are abusing the storage space on the file server by placing their MP3 files and e-books on the public share in order to share them with other users. Jill asks you to limit the amount of disk space for all users so that they can only save up to 100MB on the public share. There will be some users that will be granted more storage space in the future but, by default, all users must have the 100MB limit. There is also a problem with some users having a hard time finding files on the pubic share – they are not working efficiently because they spend too much time trying to find them. You need to try to make it easier for everyone to find their resources on the network.

In this lab, you will be working with disk quotas on the data partition of the file server, SRV-11. You will be assigning 100MB of storage space to users by default and then testing different scenarios to see how each one affects the disk quota. You will also learn how disk quotas are calculated, how you can determine the owner of a file and the effects that copying and moving a file within the partition will have on disk quotas. Your last task will be to create network drives using the Windows 2000 Wizard (GUI) and login scripts using the NET USE command.

Disk Quotas

Disk quotas allow the administrator to control and monitor the amount of disk space a user can use on a single partition. Disk quotas only work with the NTFS file system and can only be enabled on partitions, not on the physical hard drive or on a folder. Disk quotas can be used in situations where you want to limit users from using too much disk space on a partition by storing large and sometimes unnecessary files. Before enabling disk quotas you need to know how much storage space the users on your network actually need. You want to give them enough space so that they are able to work, without giving them too much flexibility, thereby causing you to add more storage space to your server every other week.

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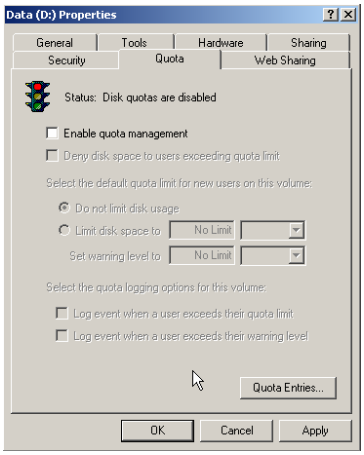
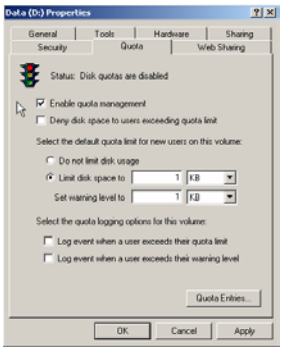
Enabling disk quotas

1. Log on to **SRV-11**. You can enable disk quotas by opening **My Computer** from the desktop and then selecting the drive upon which you want to enable disk quotas. On SRV-11 you want to enable disk quotas on the drive that you are using for file sharing, the (Data) D: drive. Right click on the **D:** drive and select **Properties.** On the properties page select the **Quota** tab.



2. By default, disk quotas are disabled. The traffic light in the top left hand corner shows you the status of disk quotas on this particular partition. The red light means disk quotas are disabled and green means they are enabled. The yellow light will only show up whenever the information for disk quotas is being rebuilt. Click the **Enable quota management** check box to enable disk quotas and set the different options.



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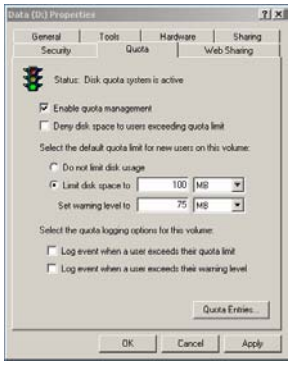
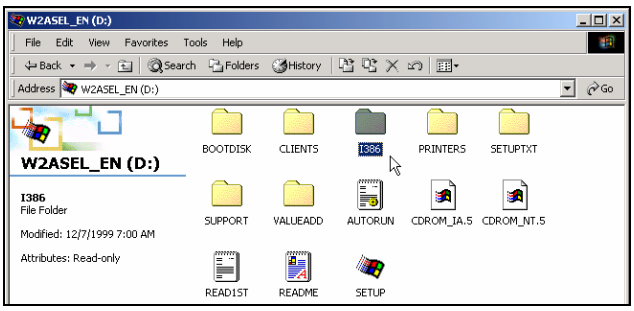
3. The first option is the Deny disk space to users exceeding quota limit - this means exactly what it says**.** When you enable this option any user who exceeds their quota limit will be denied any more disk space. By default this option is not enabled and will therefore only show a warning in the quota entries that the user has exceed the limit, but it will not stop them from taking up more storage space. Enable the **Deny disk space to users exceeding quota limit.**
4. The next option allows you to specify the default amount of disk space to allocate to each user on this partition. You can set it so that there are no limits on disk usage for this partition by selecting the **Do not limit disk usage** option. You may want to use this option if you only want to limit a couple of users to a certain amount of space without affecting remaining users. Then you are given two options to set the amount of disk space and when to show a warning. The default for both options is set to 1 KB. Change **Limit disk space** to 100MB and the **Set warning level** to 75MB. Click **Apply** and the red light on the traffic signal should now turn green to show that disk quotas are enabled. Click **OK**.



Testing disk quotas from Client-1

1. Log on to **Client-1** with the username **sstevens (Sue Stevens)** from the sales department. Insert the **Windows 2000 CD-ROM** and find the **I386** folder that is located on the CD.



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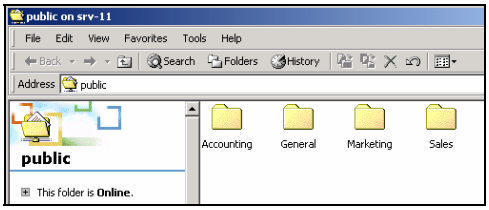
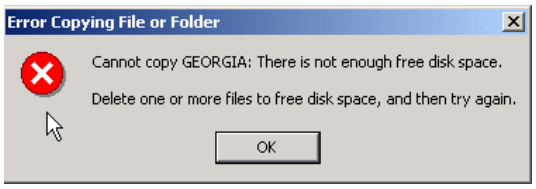
2. Now, from the command prompt **(start→run)** open the public folder by using the UNC name **\\srv-11\public.**

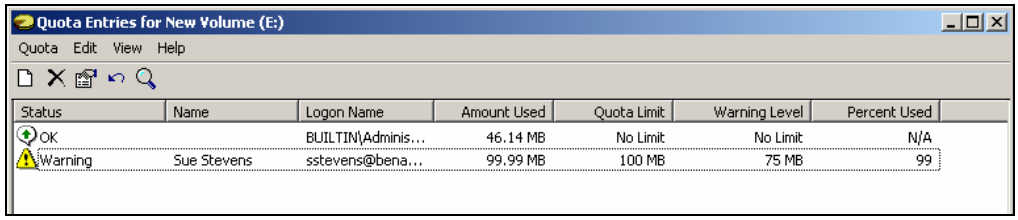


3. Next, open the **Sales** folder and try to copy the **i386 folder** from the CD-ROM into the **Sales** folder. The i386 folder is a little over 300MB so if the disk quota is set properly, this user should not be able to copy it over entirely as the the default setting for disk quotas is set to 100MB. You should get an error message before the folder is able to copy over completely saying that there is no free disk space. If you get this message then you know that you have successfully setup disk quotas on the (Data) D: drive.



Setting individual user disk quotas

1. Log on to **SRV-11** and open the quota properties tab for the (Data) D: drive. On the bottom of the page click the **Quota Entries** button. This is where you can add, delete and view quota information on a per user basis. If you look at the status for the user Sue Stevens, it will show a warning that she is close to the limit of 100MB (this warning will first appear at 75MB, as per the specification on the previous page). It will not allow the user any disk storage above the 100MB mark. Any file that will cause this total to be exceeded will be denied. So, if you did not set the deny disk space for users exceeding the quota limit option, this user will be able to continue using as much disk space as she wants. In this case, disk quotas will only show you an alert saying that the user has exceeded their limit.



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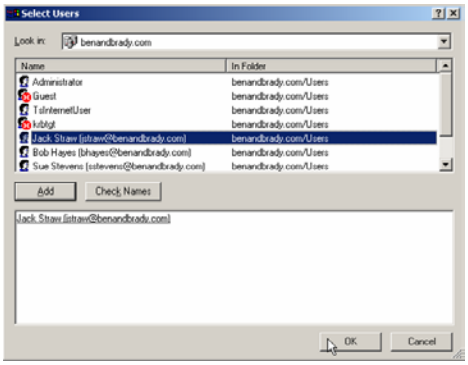
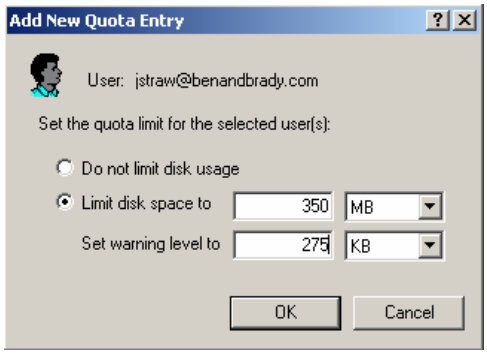
2. On the Quota Entries menu select **Quota→New Quota Entry**. This will bring up a list of available users, find and add the user **Jack Straw (jstraw@benandbrady.com)** then click **OK**. Remember, that disk quotas can only be set for individual users, so you will not be shown any groups or OU's on this list.



3. After clicking OK, a dialog box will appear asking you to set the limit for the user you selected, Jack Straw. This user needs extra disk space so you can assign him a higher limit or no limit at all. Set **Limit disk space to** 350MB and the Set **warning level to** 275MB and click **OK.** Now all other users will have the default setting, 100MB of disk space, except for Jack Straw to whom you have specifically given extra disk space. Close the Quota Entries windows and click **OK** on the Quota Properties page.



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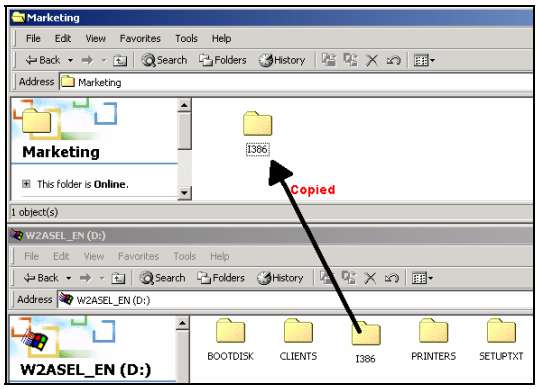
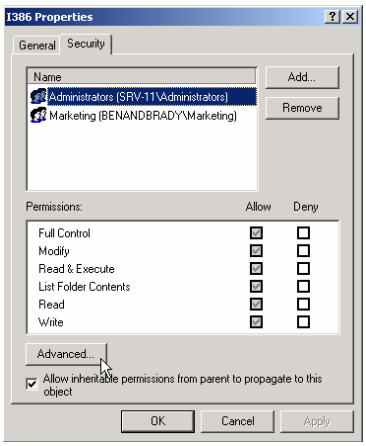
Testing the individual quota entry for a specific user

1. Log on to **Client-1** with the username **jstraw (Jack Straw)**. Insert **the Windows 2000 CD-ROM** and find the **I386** folder on the CD. Now, from the command prompt open the public folder by using the UNC name **\\srv-11\public**.
2. Next, open the **Marketing** folder and try to copy the **I386 folder** from the CD-ROM into it. The files should be able to copy over completely without any problems because this user has a disk quota limit of 350MB and the i386 folder is just a little over 300MB. This copy would cause a warning to be issued, however, because warnings were set to be issued at 275 MB.



Finding the owner

1. Open the **Properties** page of the **I386 folder** that was copied over to the **Marketing** folder from the CD-ROM. Select the **Security** tab. From the Security tab, click on the **Advanced** button.



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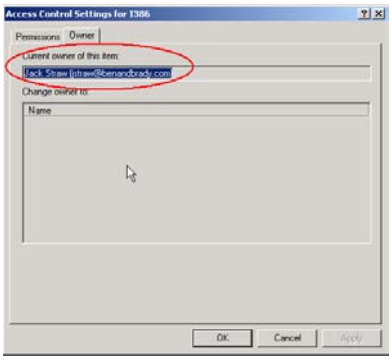
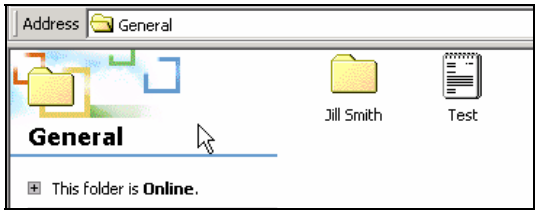
2. On the Advanced Security page, select the **Owner** tab. A window will pop up warning you that you only have permission to view the current owner of this folder. Click **OK**. By default, the user who created the folder will also be owner of the file or folder. Anytime a user creates or copies a file or folder, that user will become the owner and will be charged with using the disk space. Disk quotas refer to the owner of the file or folder to determine which user will be charged with using up disk space. By default, only administrators have the permissions necessary to change the ownership of files and folders. Non-administrative users have to be specifically assigned the take ownership permission to be able to take ownership of a folder or file.



The effect of copying files on disk quotas

1. Log on to **SRV-11** and delete the **I386** folder from the **Marketing** and the **Sales** folders and then empty the **Recycle Bin** to make sure that users are not being charged with any disk usage.
2. Log on to **Client-1** with the username **sstevens (Sue Stevens)** and then open the **Public** share folder.
3. Now open the **General** folder and create a text file named **Test**.



4. Log off and then log back on with the username **jstraw (Jack Straw)** and open the **Public** share folder.

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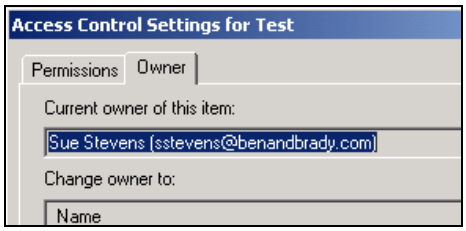
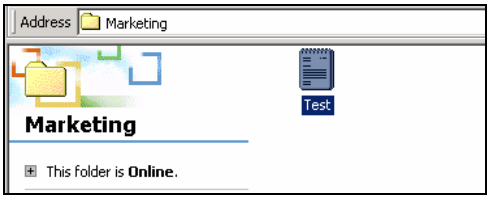
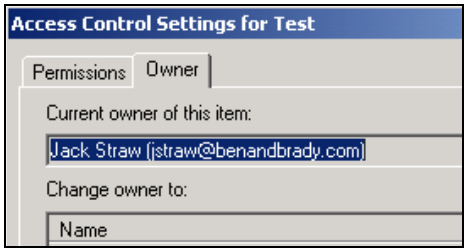
5. Find out who owns the text file named **Test**. Notice that the owner of the file is **Sue Stevens (sstevens@benandbrady.com)** therefore she is being charged for disk usage on this file. Close the **Properties** page of the Test file.



6. Now open the **General** folder and *copy* the text file named **Test** over to the Marketing folder.



7. Once the file is copied over to the Marketing folder, open the properties of the file and find who the owner of the Test file is. Notice that the owner of the file is now Jack Straw (jstraw@benandbrady.com). The ownership changed because this user, Jack Straw, *copied* the file over from the General folder. Remember that when you copy a file from one location to another, you are creating a new file that is a duplicate of the original. So, this user basically created a new file in the Marketing folder and will therefore become the owner of this new file and will subsequently be charged for using disk space on the (Data) D: drive. Close the **Properties** page of the Test file.



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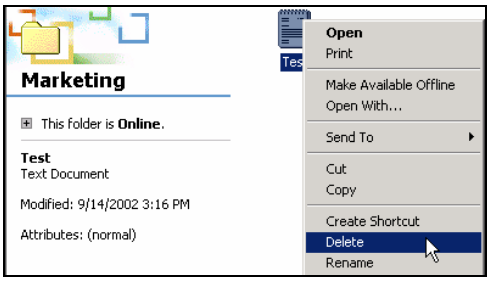
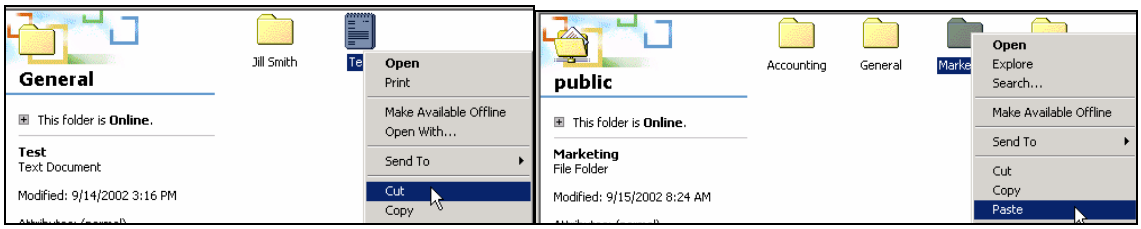
The effect of moving files on disk quotas

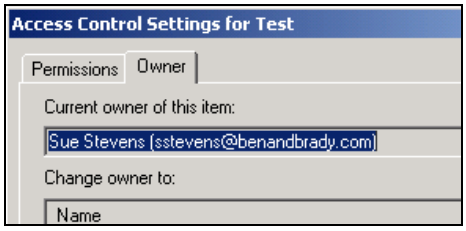
1. Delete the **Test** file in the Marketing folder.



2. Open the **General** folder and this time *cut* the **Test** file and then *paste* it into the **Marketing** folder. This is equivalent to *moving* the Test file.



3. Now open the **Marketing** folder and find who the owner of the Test file is. Notice that this time the ownership of the file did not change because the file was moved to the marketing folder instead of being copied. When a file is moved, the original file is taken from one location and placed in another, so that a new file is not created. Therefore, this is the original file and the ownership does not change. Close the **Properties** page of the Test file and return to the desktop.



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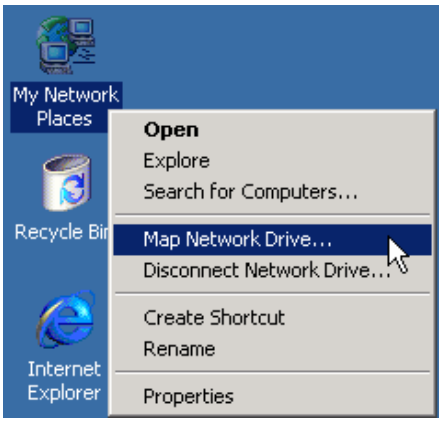
Mapping a network drive

An easy way to have the users reach their network shares is to map network drives on their client computers. A mapped network drive is basically a shortcut to a share on the network that is assigned a drive letter. For example, if a user wants to connect to a share that has been mapped to the client computer with the drive letter X:, all the user will have to do is to open the X: drive from Windows Explorer to reach the network share. There are basically two ways to map a network drive in Windows 2000. One is by using a GUI (Graphic User Interface) in Windows and the other is by using the CLI (Command Line Interface) with the *Net Use* command. We will also look at automating the process of mapping network drives with some logon scripts.

Map Network Drive Tool (GUI)

There are many different places from which you can map a network drive using a GUI in Windows 2000. You can do it directly from the share in Windows Explorer, in My Computer, in My Network Places and even by right clicking on My Computer or My Network Places on the desktop. It doesn't matter which method you choose, as they run the same program that will ask you for the same information - a drive letter to assign to the share and the shared folder to map to.

1. You will map a network drive for the Public share using the drive letter P: from the My Network Places icon on the desktop. On the desktop simply right click on **My Network Places** and select **Map Network Drive.**



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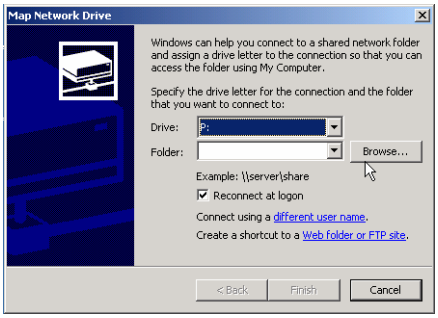
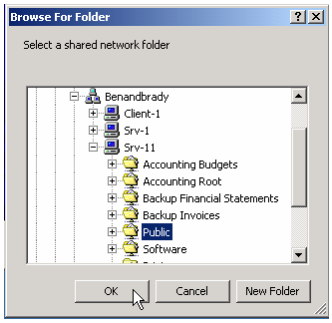
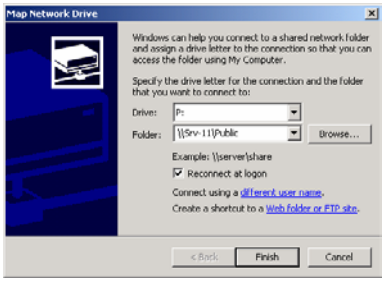
2. The program for mapping a network drive will start and ask you to specify the drive letter to use. The program will have a drop down box with all the available drive letters. Select **P:** for the drive letter (you can use anything but I try to use drive letters that match the first letter of the share name). You also have to specify the folder to which you want to map. You can either specify the UNC name for the share or browse to find it. Click the **Browse** button.



3. Find the **Public** share located on SRV-11 and click **OK**.



4. You should now have the drive letter P: selected and the UNC name **\\Srv-11\Public** appearing in the folder section. You also have the option to Reconnect at logon, which is set by default. This option maps this network drive every time the user logs on. It is useful because you won't have to manually map the drive every time the user logs off and on. There may also be times that you don't want the user to be able to connect to the drive again and all you have to do in this instance is uncheck this option with the result that the next time the user logs on, the network drive will not be mapped. Leave the **Reconnect at logon** option on and click **Finish**.



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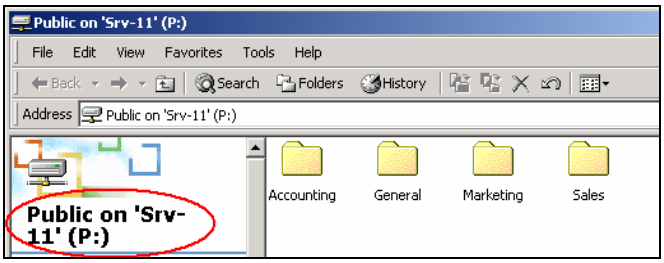
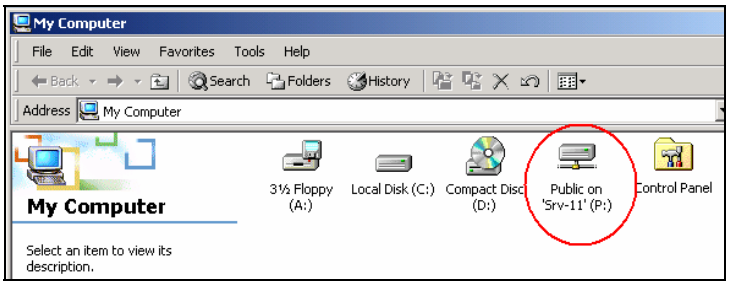
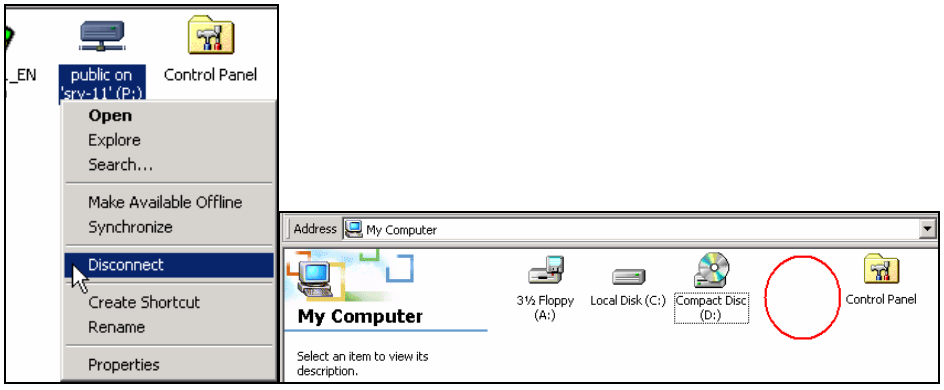
5. The wizard will then close and the mapped drive will automatically open. You will be able to see the folders that are located in the public share and in the left pane you will see the drive letter and label of Public on 'Srv-11' (P:). Close the **Window**.



6. Double click on **My Computer** from the desktop and you will see that you now have a Public on 'Srv-11' (P:) drive that you can use to easily connect directly to the public share.



7. To remove the network drive, all that you have to do is right click on the **Public on 'Srv-11' (P:)** drive and select **Disconnect.** The drive will then disappear within seconds. Close the **My Computer** window.



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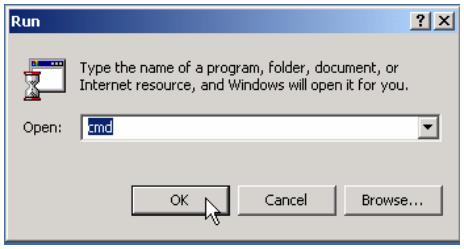
Mapping a network drive using the NET USE command

1. First, open the **command prompt**. Click **Start→Run** then type in **cmd** and click **OK**.



2. From the command prompt, type in **NET USE/HELP** and press **Enter.** This will show you all of the options and switches that are available to use with this command as well as the definition of what this command does.

```
C:\>NET USE /HELP
The syntax of this command is:

NET USE [devicename | *] [\\computername\sharename[\volume] [password |
        [/USER:[domainname\]username]
        [/USER:[dotted domain name\]username]
        [/USER:[username@dotted domain name]
        [[/DELETE] | [/PERSISTENT:{YES | NO}]]

NET USE {devicename | *} [password | *] /HOME

NET USE [/PERSISTENT:{YES | NO}]


NET USE connects a computer to a shared resource or disconnects a
computer from a shared resource. When used without options, it lists
the computer's connections.
```

3. To map the network drive letter P, to the public share, you have to know that the drive letter is available and also the exact UNC name of the public folder. From the command prompt, there is no wizard to tell you what letters are available or a browse button to use! Once you have obtained the necessary information, you can type in **NET USE P: \\SRV-11\PUBLIC** and press **Enter** (make sure that you put a space after P:). You will then get a message underneath the command telling you the command was completed successfully and then a window to the Public on 'Srv-11' (P:) drive will open just as it did when you used the Map Network Drive program to map the network drive. Close the window for the **Public on 'Srv-11' (P:)** drive.

```
C:\>NET USE P: \\SRV-11\PUBLIC
The command completed successfully.


C:\>_
```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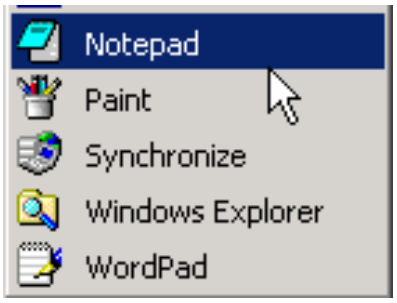
4. You can now open **My Computer** again and will find that you have a Public on 'Srv-11' **(P:)** drive.
5. To delete the network drive from the command line, the only information you need is the drive letter you want to delete. You would then type in **NET USE P: /DELETE** and press **Enter**. You will get a message telling you that the P: drive was deleted successfully. Open **My Computer** to make sure that it was deleted. Type **EXIT** to close the command prompt.

Mapping a network drive using a logon script

Mapping network drives with a GUI seems pretty simple and convenient, so why would you ever want to use the command line? You may need to use the command line to map a network drive if you are having trouble with your network and you cannot connect to shares using the GUI. You may also want to learn the **Net Use** command to create simple logon scripts to map network drives. A login script will come in handy if you have many users on your network requiring mapped network drives. Using a logon script allows you to automate the process of mapping network drives on each computer in the network. You can write a logon script by placing net use commands into a text file and then renaming it with a .bat extension. To truly automate this process, you would then deploy the logon script using group policy.

1. You can create a script using Notepad. Open it by going to **Start→Programs→Accessories→Notepad.**



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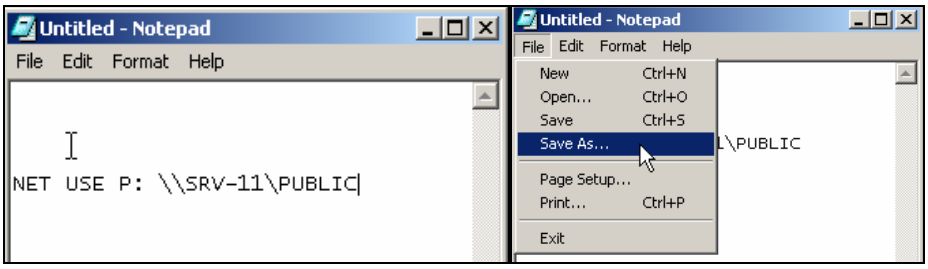
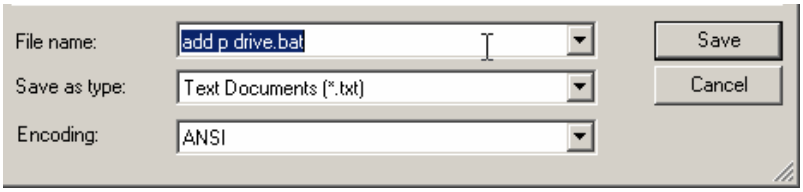
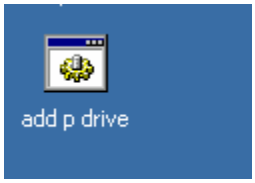
2. Within notepad, type in the net use command to map the Public share to the P: drive: **NET USE P: \\SRV-11\PUBLIC**. Then from the **File menu** select **Save As**.



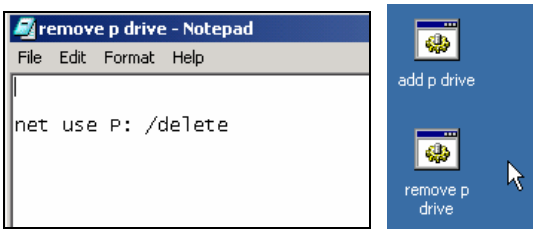
3. Save the file on the desktop and name it **add p drive.bat.** Make sure that you save the file with the **.bat** extension regardless of your chosen file name because this is what will turn it into a batch file. This allows the file to run like a program, executing each line within the file. If you save the file as a text file (.txt), you will not be able to run it as a logon script. Click **Save As** and close the file.



4. You should now have a batch file on your desktop named add p drive. If you open the file it will run the command that you saved in it. In this case it will run the command NET USE P: \\SRV-11\PUBLIC and map the network drive for you. Double click on the **batch file** and the Public on 'Srv-11' (P:) drive window will open. Close the window and open **My Computer** to confirm that the Public on 'Srv-11' (P:) drive was mapped.



5. Now create a batch file that will delete the P: drive and save it on the desktop with the name **remove p drive.bat.**



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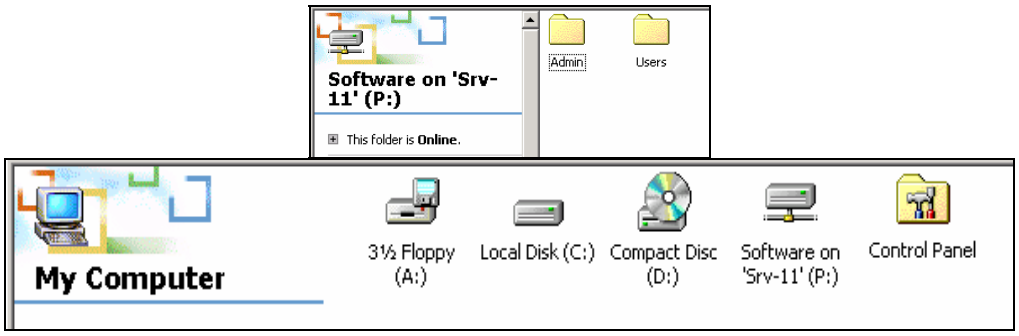
6. Now run the batch file to remove the P: drive and open **My Computer** to see if worked.

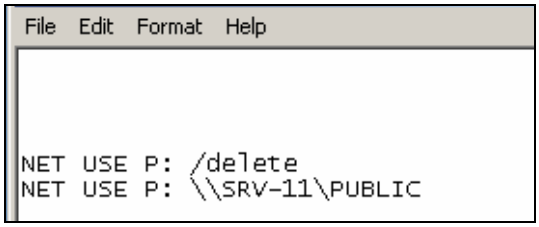
Combining the add and delete commands

In some cases you may have to combine the commands into one script. You should first enter the command to delete the drive and then enter the command to add the drive. For example, you may get a user who knows how to map drives and decides to use the drive letter P: for another share. If you try running the add script on this user's computer you will get an error that the drive letter is already in use. So, by combining the two commands into one batch file and placing the delete command first the script will first delete any drive using the drive letter P: and then add the correct network drive to use with the drive letter P:

1. On the desktop right click **My Network Places** and select **Map Network Drive** and map the share **\\srv-11\software** with the **P:** drive letter. The software share should open and you'll be able to see the drive in My Computer as Software on 'Srv-11' (P:). Close both windows.



2. Open **Notepad** and create a batch file with both the net use commands to be deleted and add the **P:** drive. Save it as **remove and add p.bat** on the desktop.



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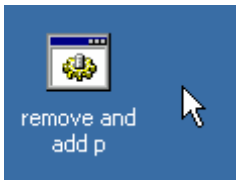
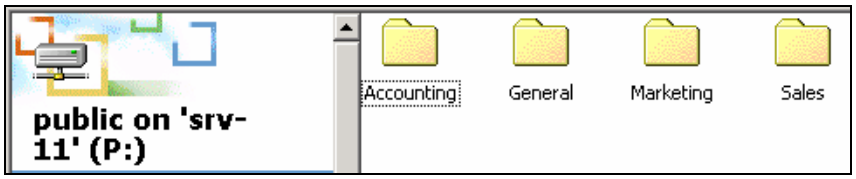
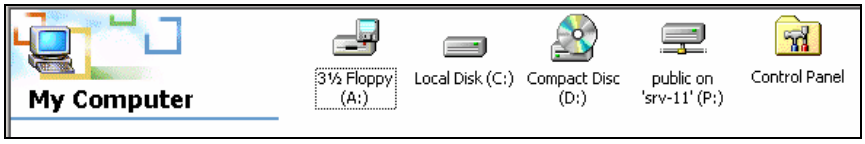
3. Next, double click on the **remove and add p** batch file on the desktop to test and see if the script will work.



4. The public share should now open up as Public on 'Srv-11' (P:). Open **My Computer** to make sure that Public on 'Srv-11' (P:) also appears.





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