



## **Level 5:**

# **Network Operating Systems and Security** *Administering Network Infrastructures utilising Core Intrinsic Network OS Services*

## **Worksheet from 1 to 5**

*Assignment to Network Operating System and Security course, at T.S.D. University, London Campus*

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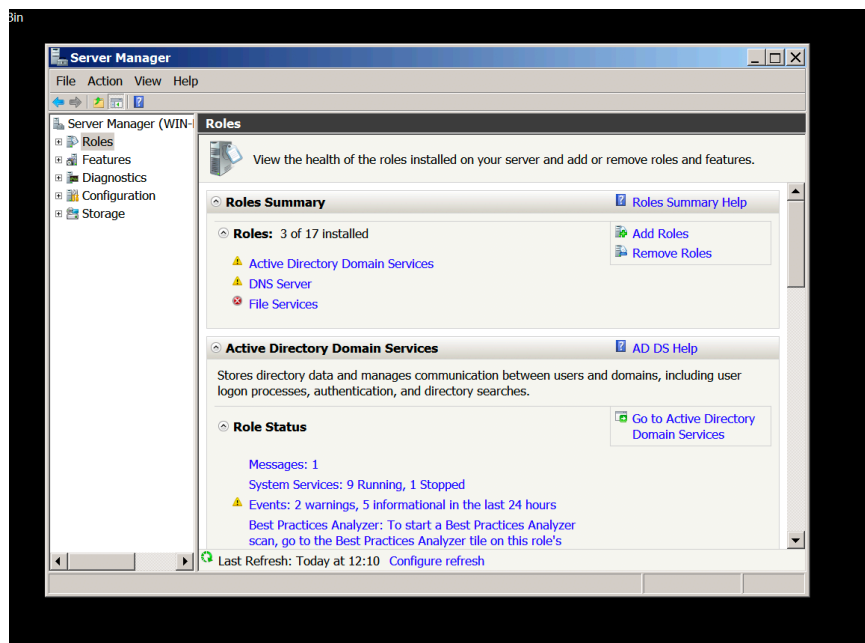
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## Worksheet 1: Building the NOS infrastructure using Active Directory.

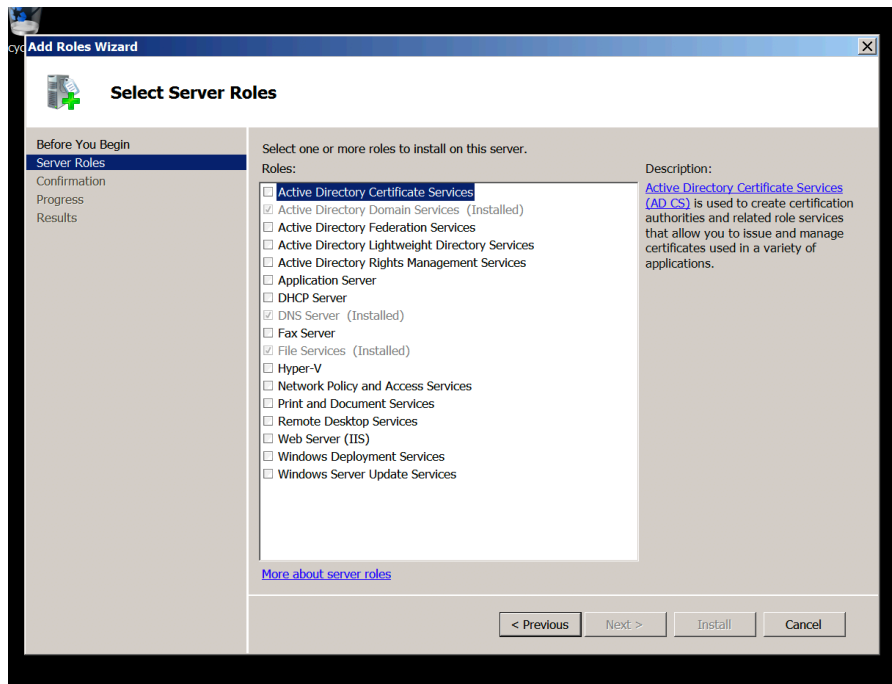
Task 1: Configure Virtual Networking and use the dcpromo tool to upgrade a Member server to a Domain Controller

In Server 1 we want to create a new domain, but before to proceed we need to add the Active Directory Domain Services role.

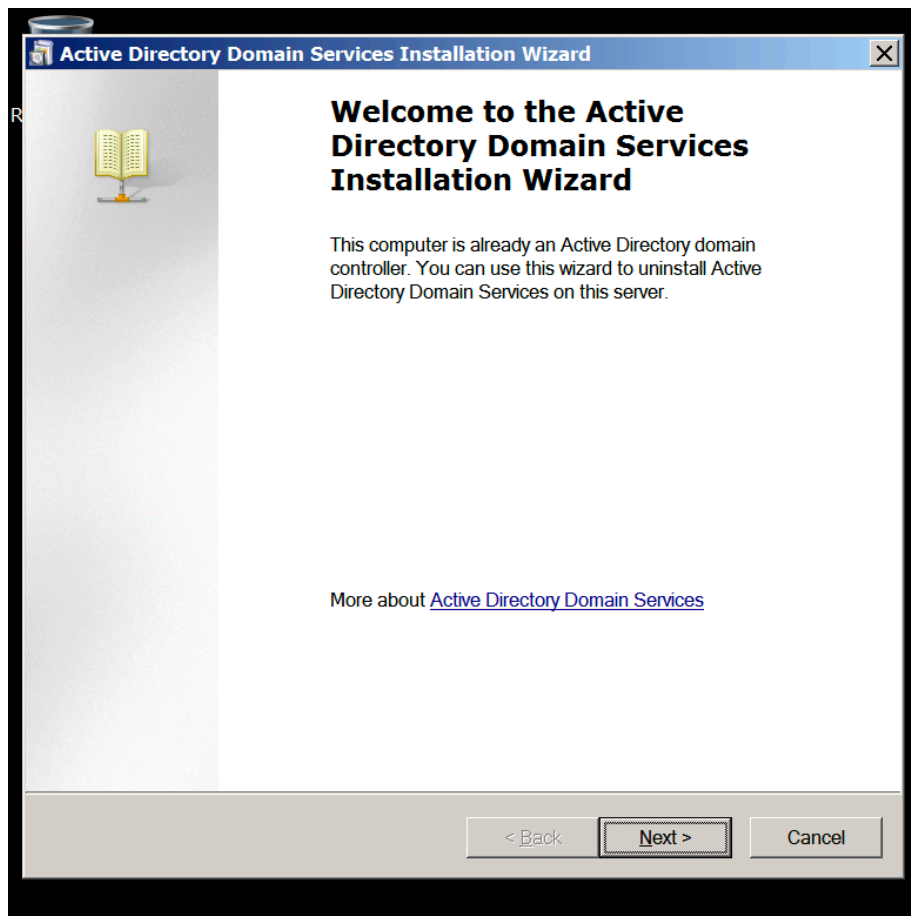
To do that we need to access to the Server Manager window and add new Roles.

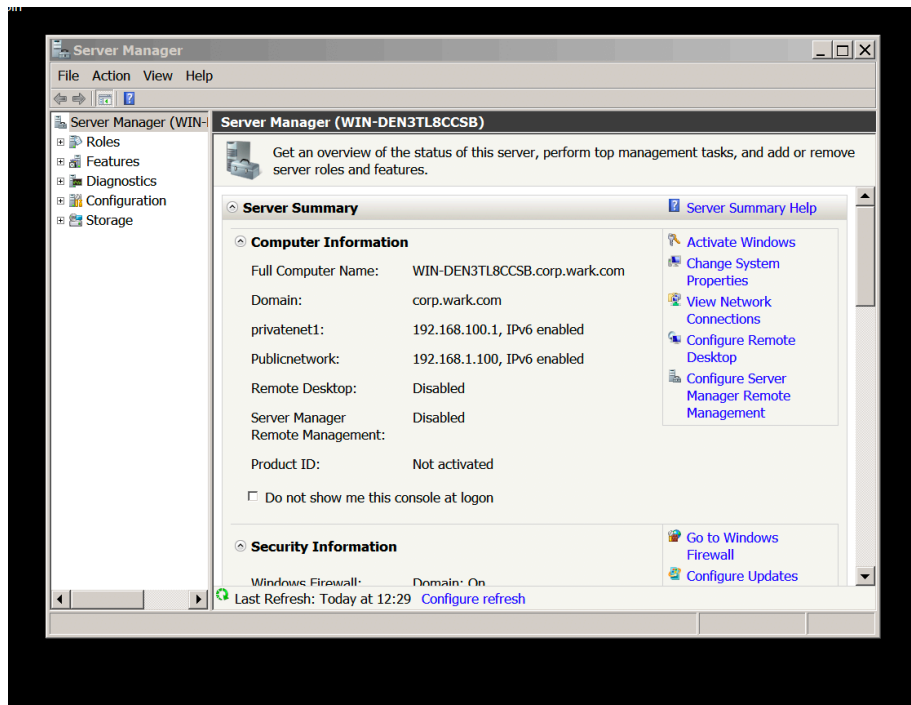


Adding new Roles we need to install Active Directory Domain Services



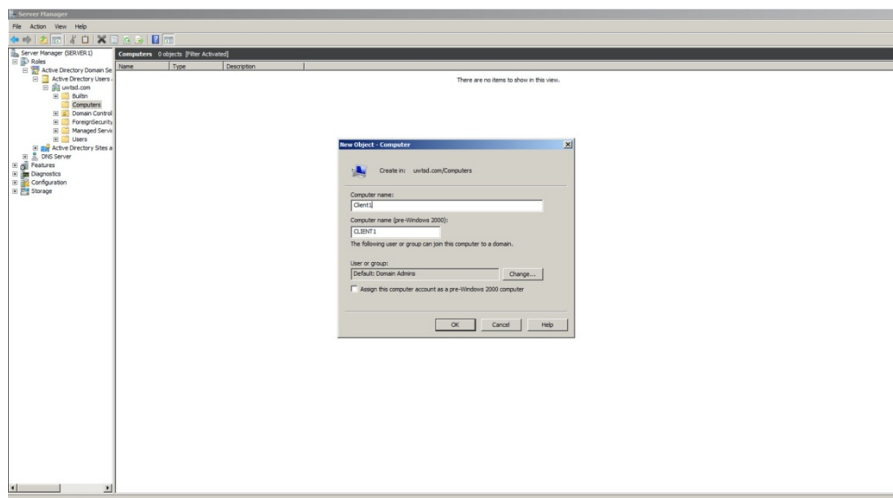
Now we can proceed to create an Active Directory Domain.



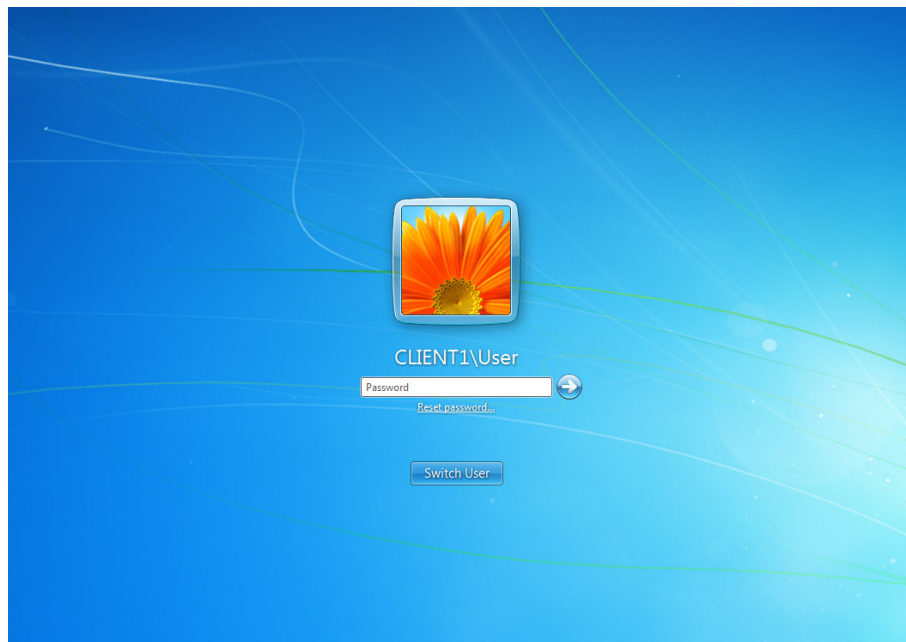


## Task 2: Installing Client Computers and Basic Object creation in the Active Directory

In the server we need to add a new computer, the client computer.



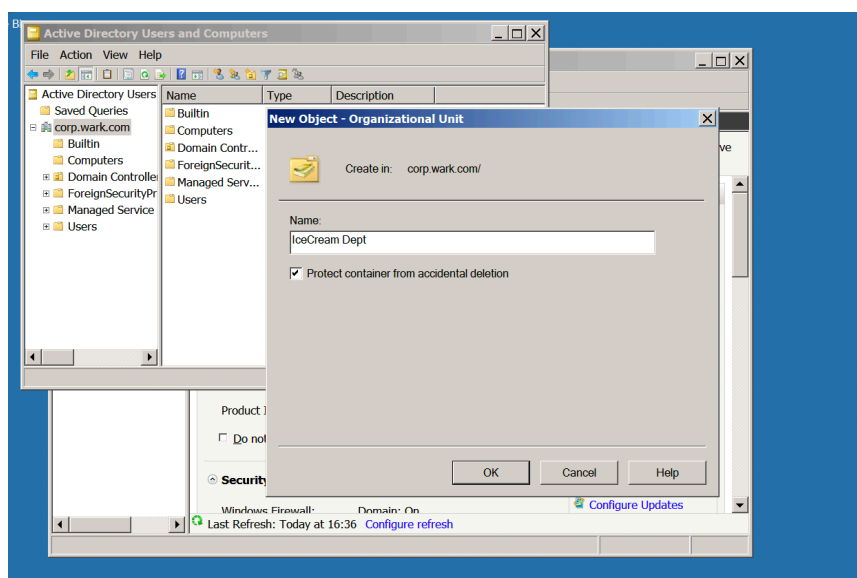
In the client computer after having installed the operative system, we also set up the all the parameters related to the IP address configuration. This is the output when we try to connect to our domain from client computer.

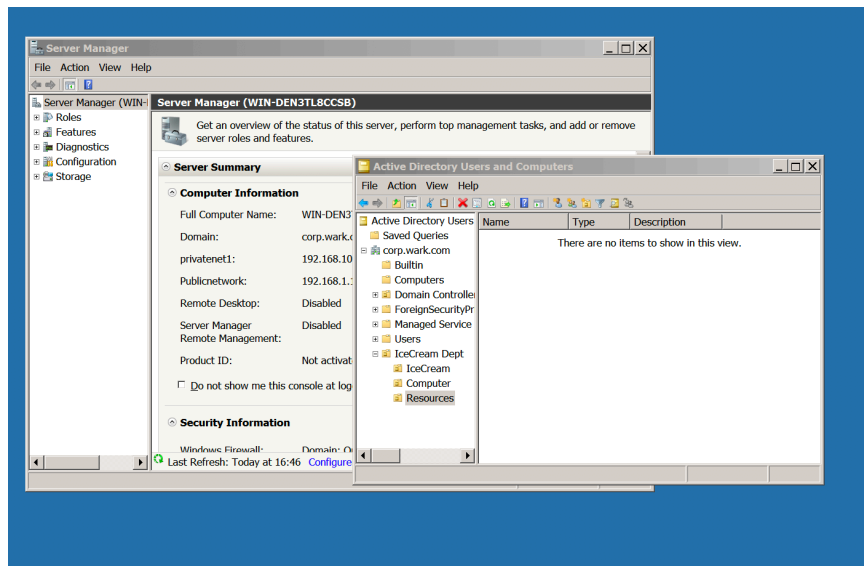


## Worksheet 2: Resource Management in Active Directory: Users, Computers and Groups

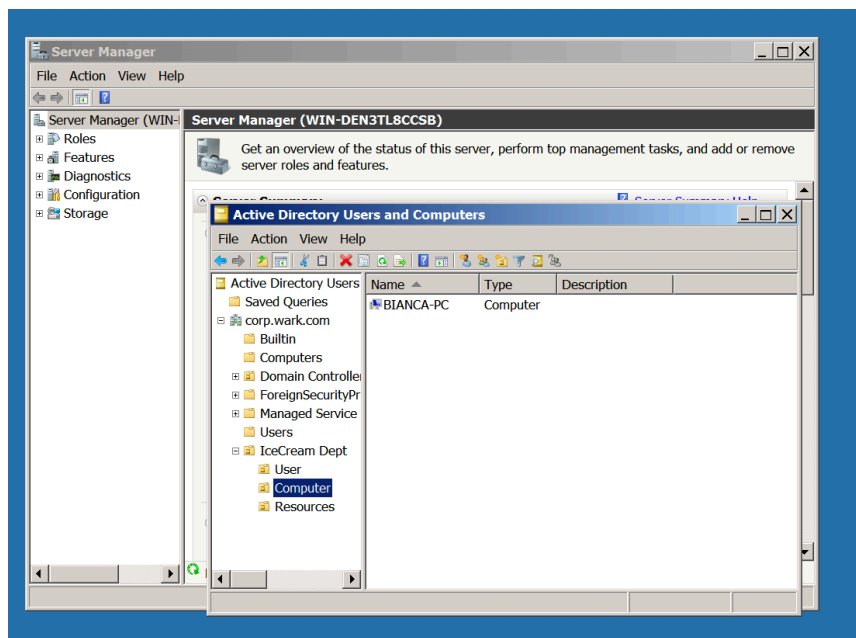
### Task 1: Creating an Organisational Unit Hierarchy.

In this task we are creating Organisational Unit in our domain to delegate administrative authorities and to distribute group policy. As first step in the Active Directory User and Computer, we create a new Organisational Unit 'IceCream Dept'.

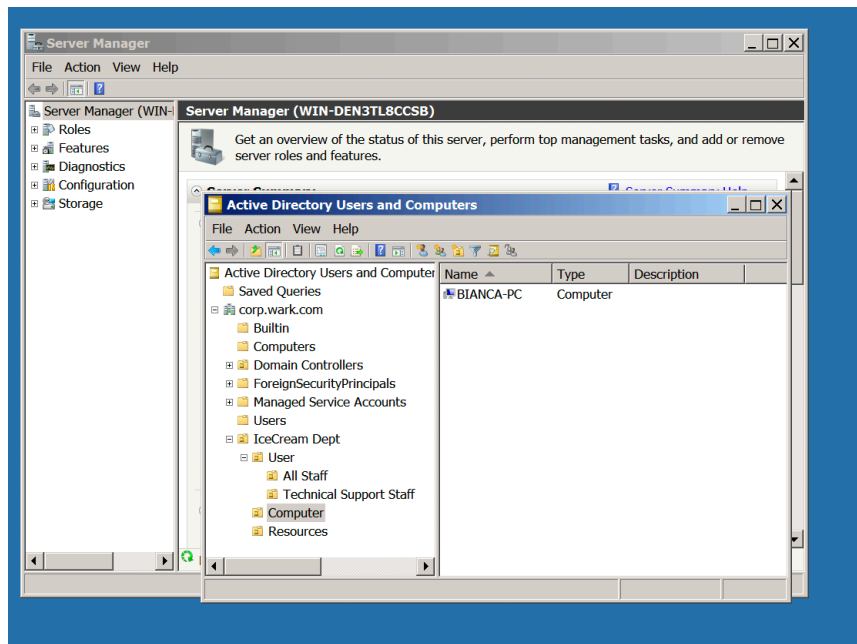




Within 'IceCream Dept' we are going to create other three OUs: 'User', 'Computer', 'Resources'. Inside Computer OU we drag in the default Computer OU previously created.

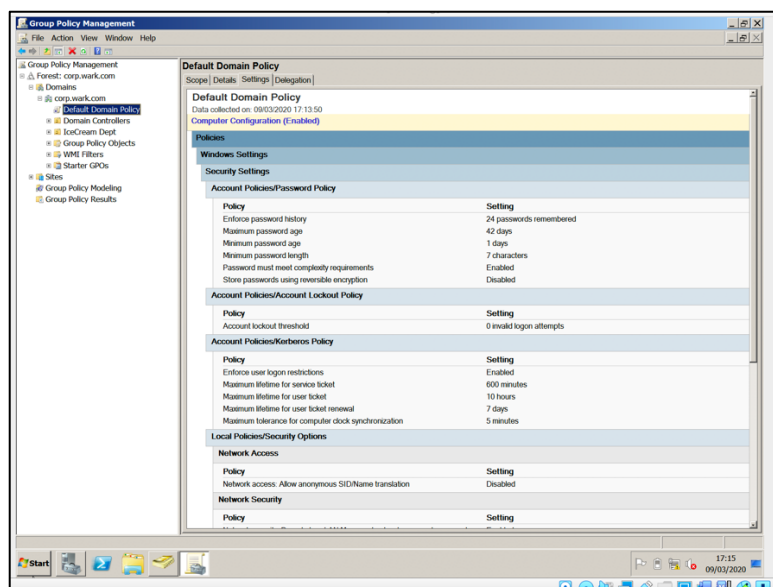


In the 'IceCream Dept' we have different kind of users that can be grouped in the more OUs: 'All users' and 'Technical Staff Support'. In this way we can manage these two different groups of users in different ways.

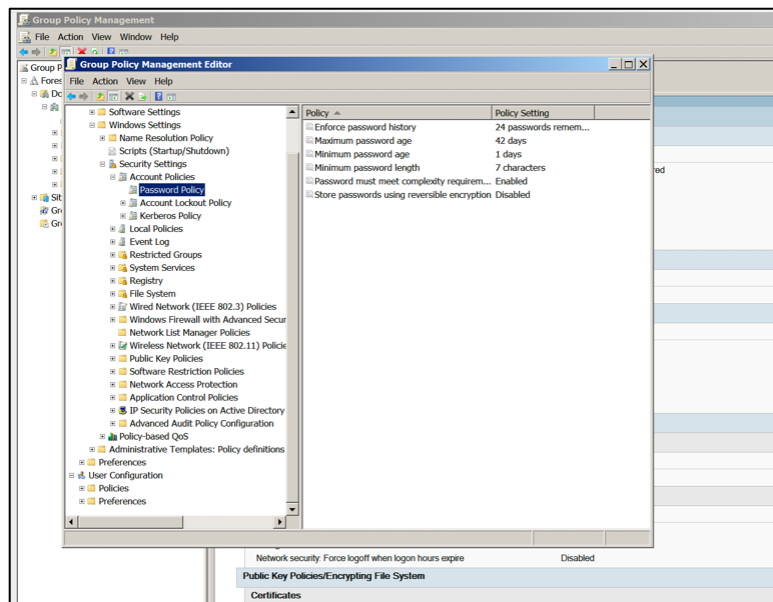


## Task 2: Creating and Managing Active Directory User and Computer accounts

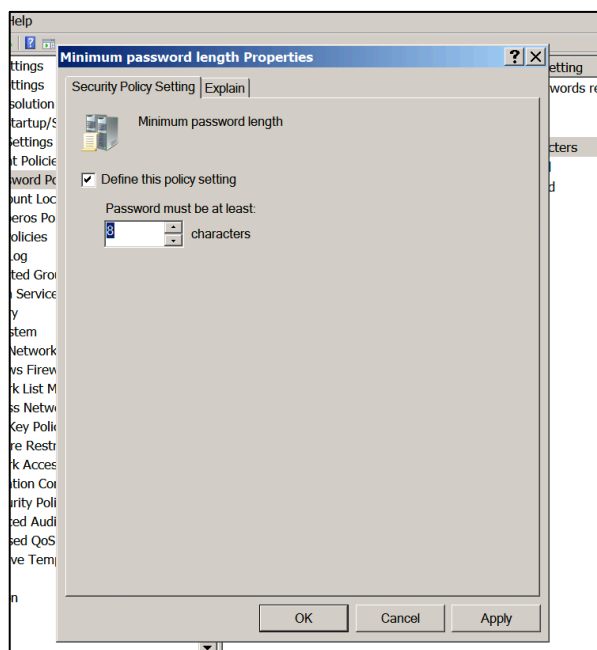
Now that we have created our OUs, we can start to populate them with different Users, so basically for each of them we need to create an access to the domain through the use of password. Before we need to check the Domain Security Policy set up by Microsoft, so we need to go to Group Policy Management in Administrative Tools.



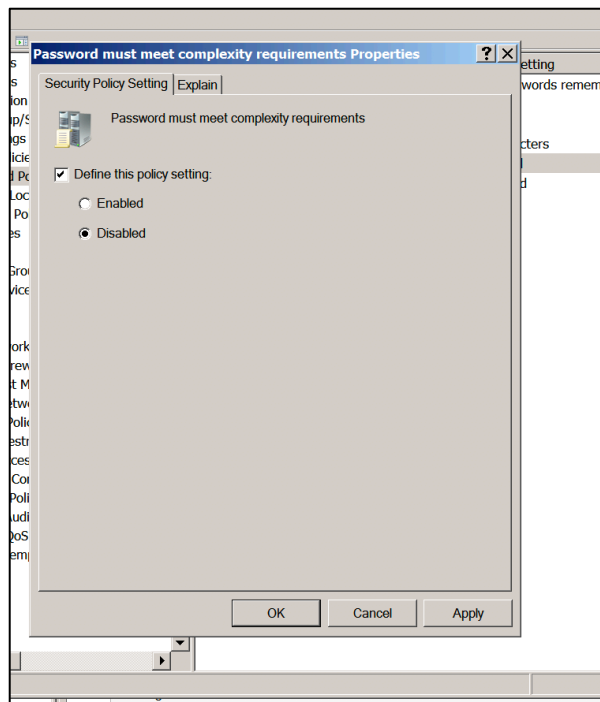
In the Default Domain Security Policy we can check and modify the Password Policy.



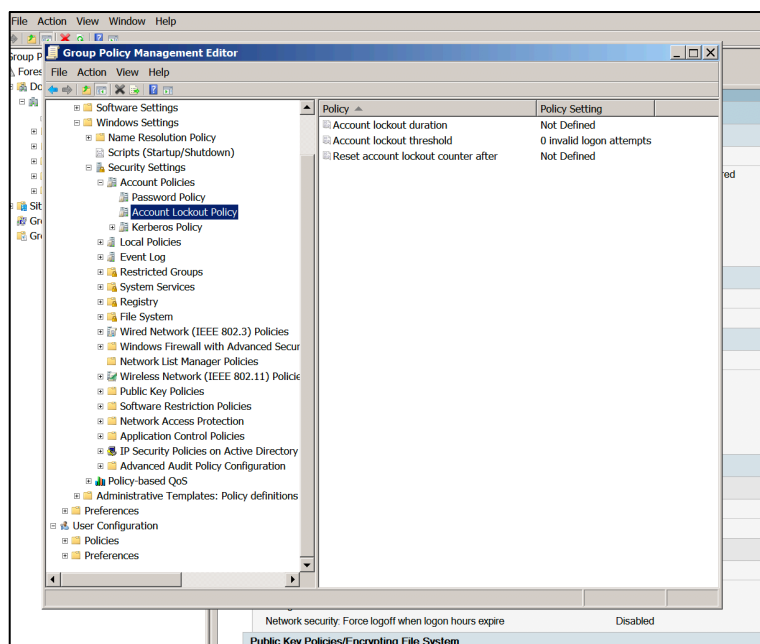
In this case we want to change the minimum password length from 7 to 8 characters.

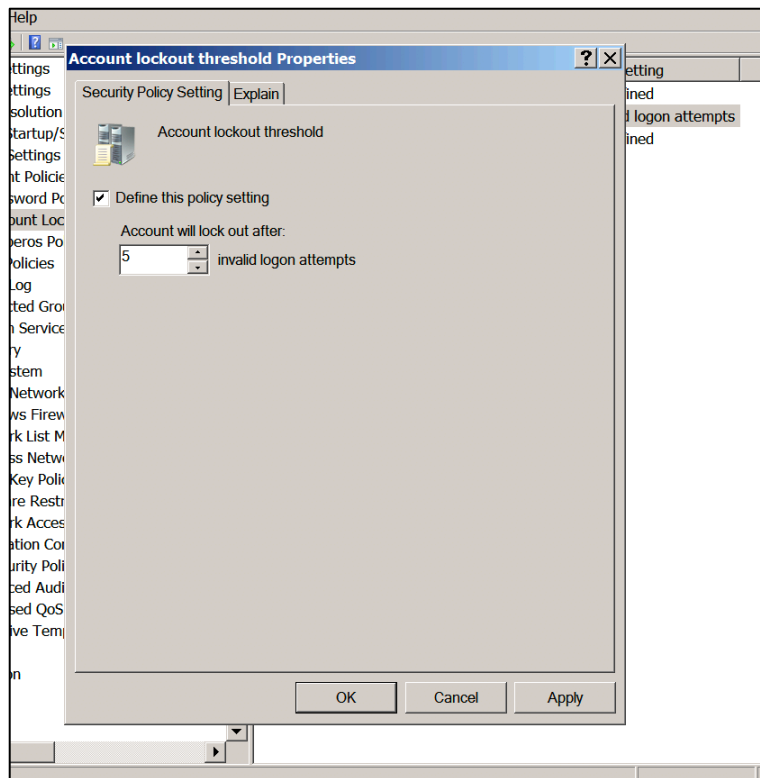


And we also want to disabled the option for the Password must meet complexity requirements field.

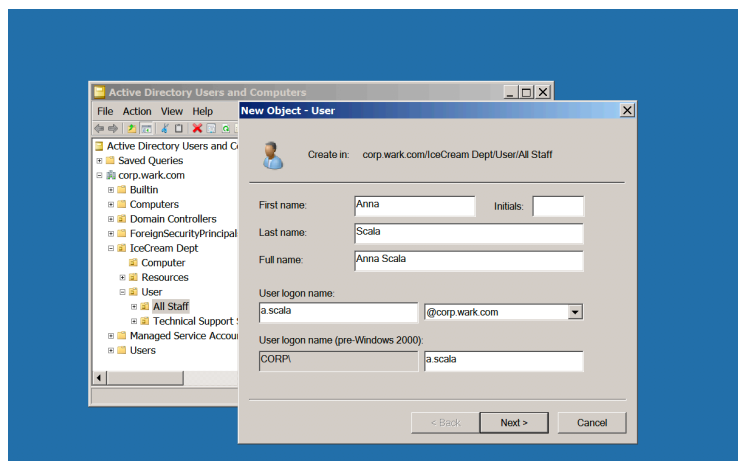


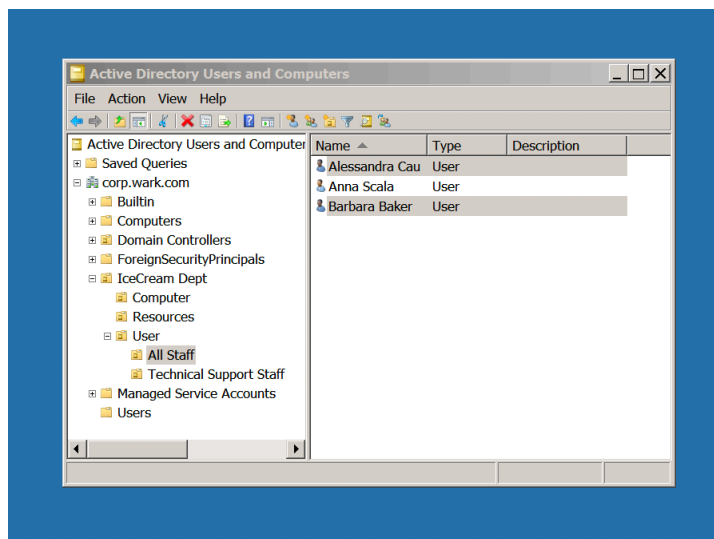
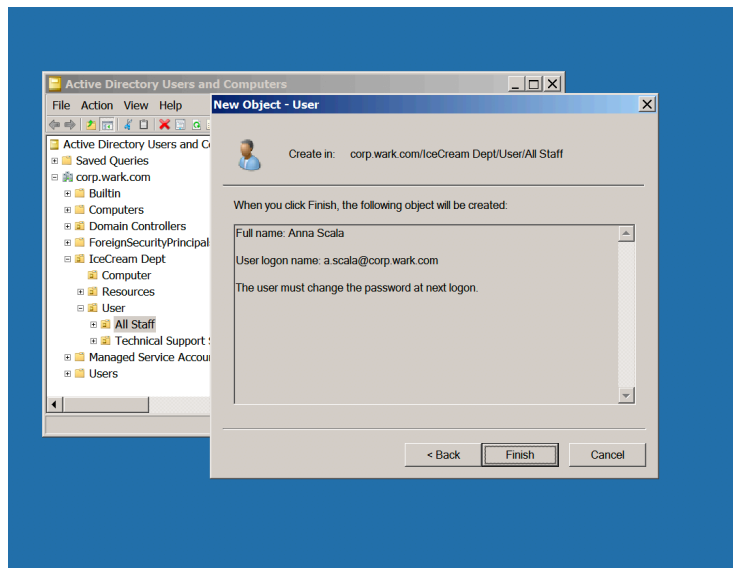
Now in 'Account Lockout Policy', clicking in the Account Lockout Threshold we can set 5 as value for invalid logon attempts.



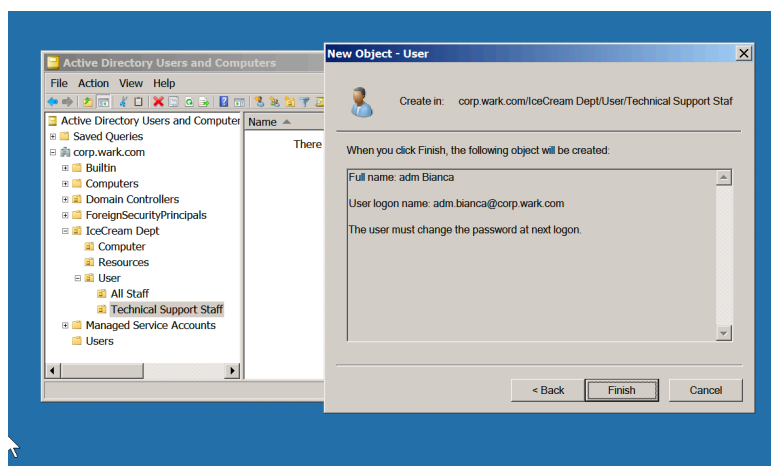


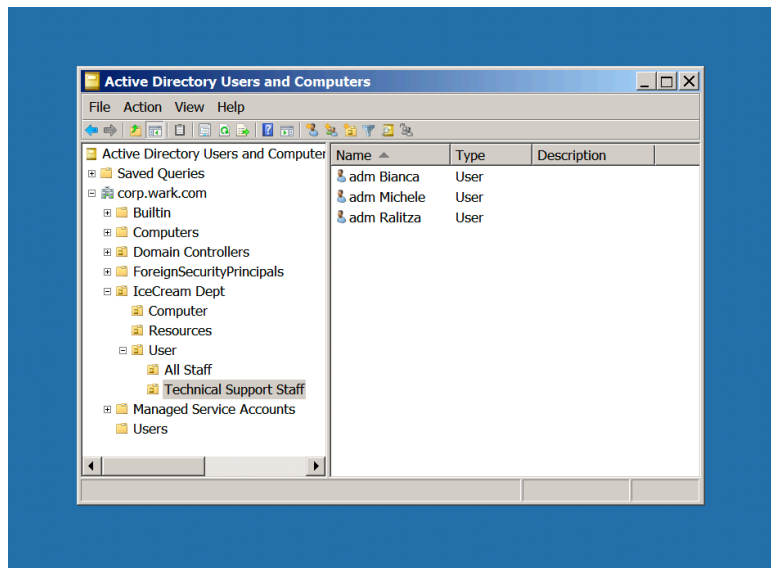
Now we can start to populate 'All staff' OU.



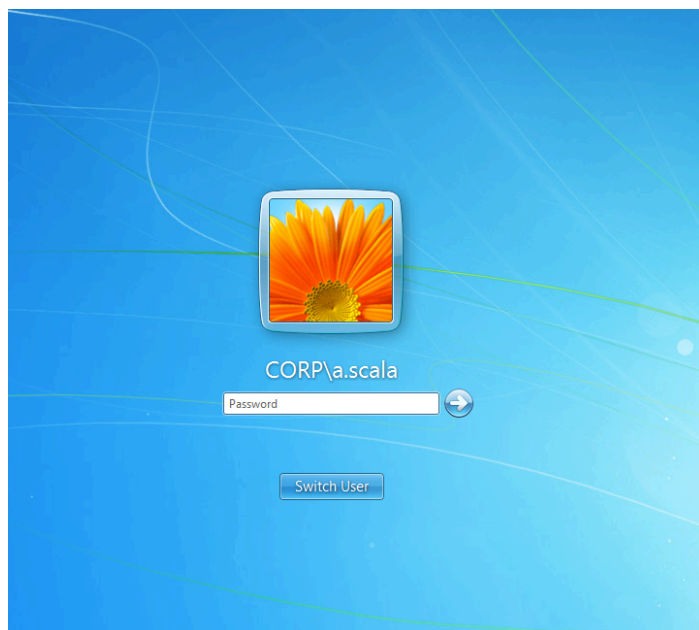


And 'Technical Support Staff' OU.

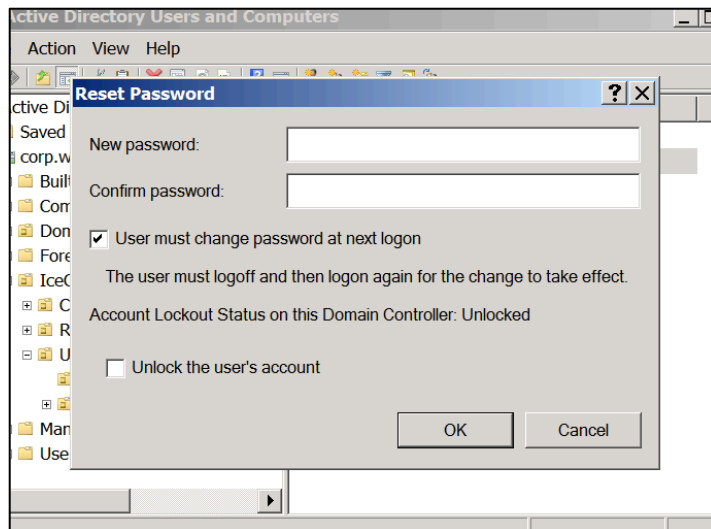




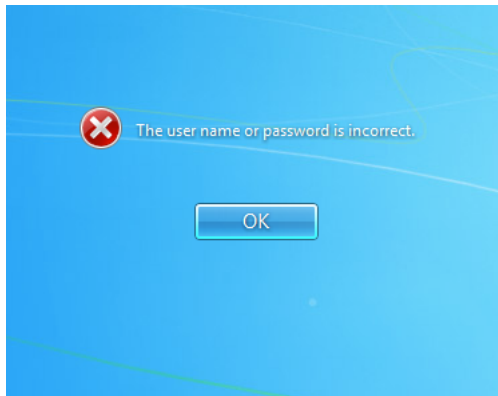
In this way every user could have access through a password inside the domain



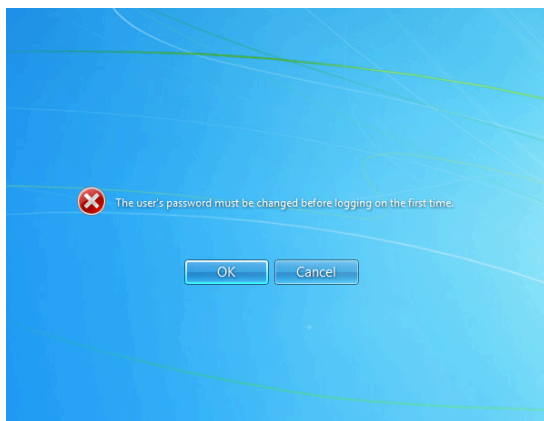
In the Active Directory we are able also to reset users password

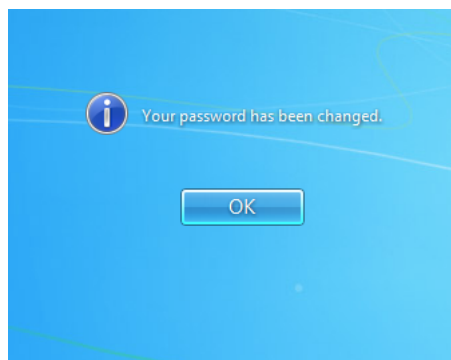
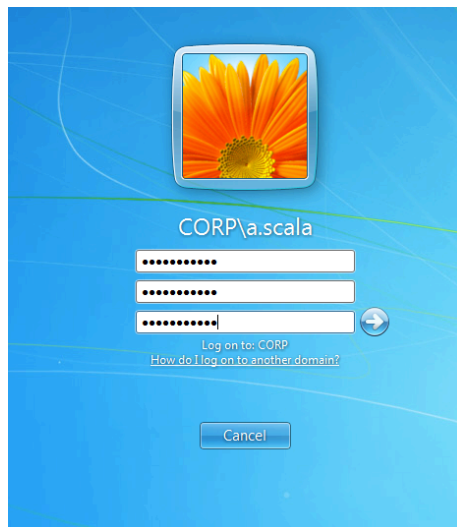


So for instance if the user 'Anna Scala' try to log in after we reset her password using the old one, this is what she will appear.

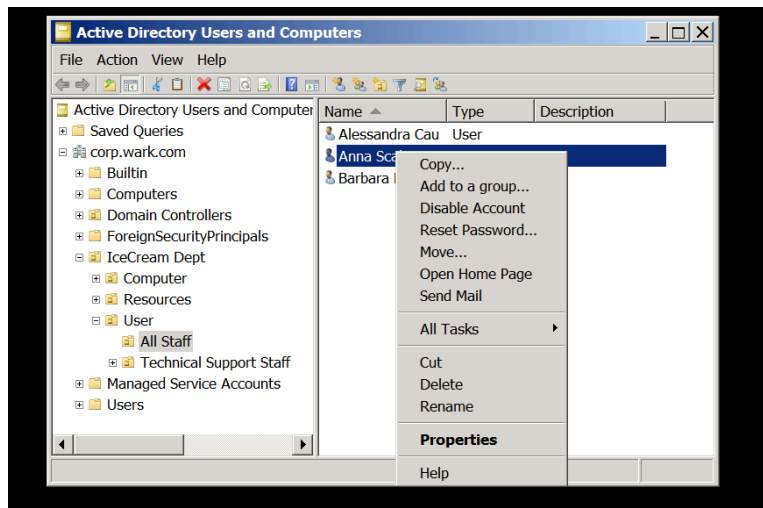


So she need to use the new password reset by the admin and she also need to change it.

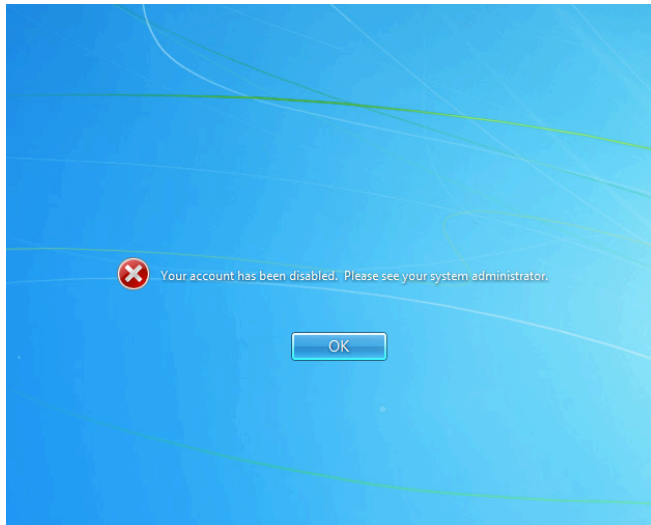




In the Active Directory we can also disable user account. In this case we are disabling 'Anna Scala' account.



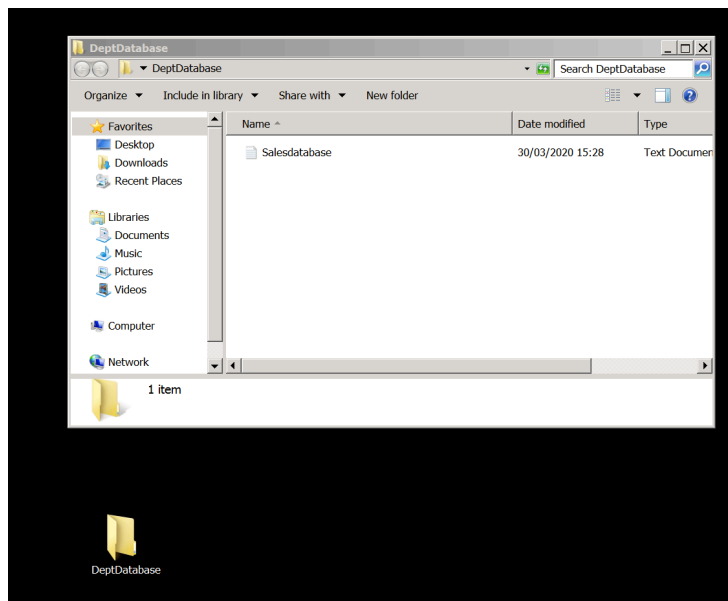
So when now she try to log in this message will appear.



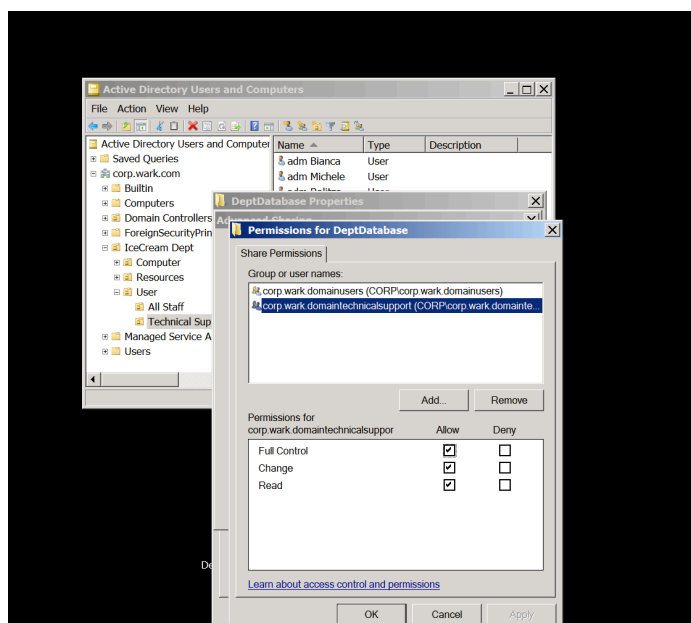
## Worksheet 3: Resource Management in Active Directory – Managing Access to Files and Folders, and Controlling Domain User Environments

Task 1: Managing local access and Network Access to files and folder objects in Active Directory.

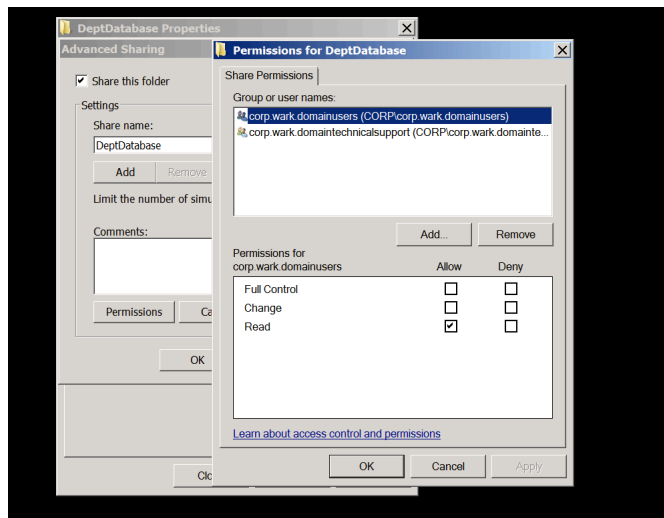
In this task we are going to share a file to two different groups of Users with different levels of permission. First of all we create a folder on the desktop of our Server and we insert a file inside.



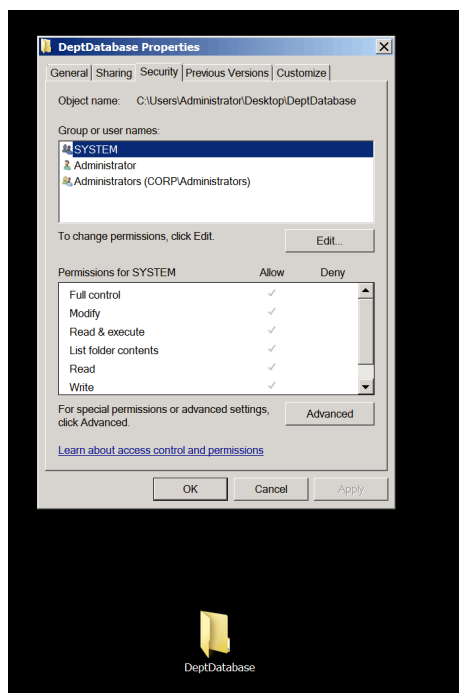
We are now going to share this folder with the Global group of Technical Support Staff allowing them to have the full control of the folder, so basically the member of this group can modify, create and delete the folder.



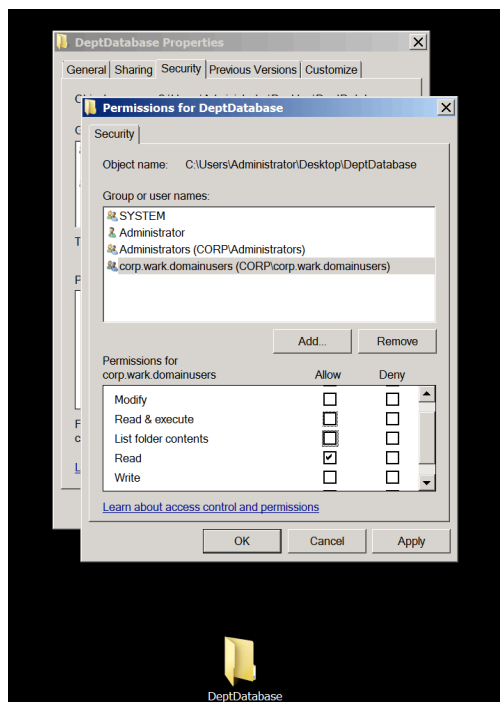
We are also going to share the folder with the All Staff users, allowing them to only read the file, so basically they cannot modify, delete or create anything inside the folder.



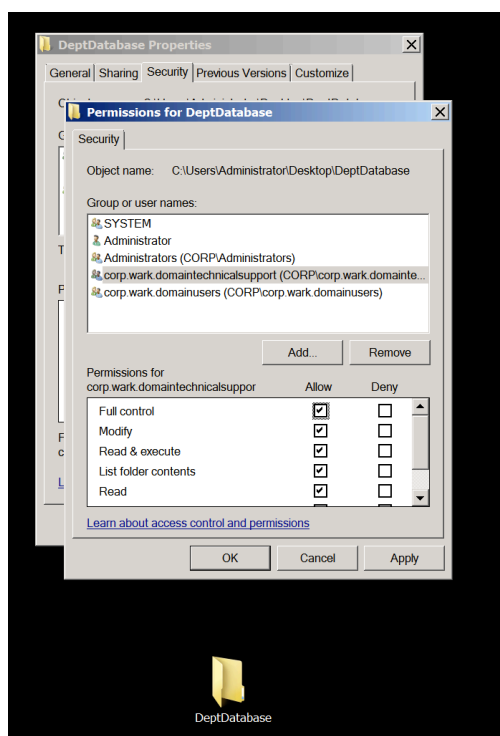
With this operations we only shared the folder, its content is still inside the local disk of the server and it is governed by NTFS(New Technology File System). To give to the different users groups the access to the folder content we need to configure NTFS permission in the Security tab of the shared folder.



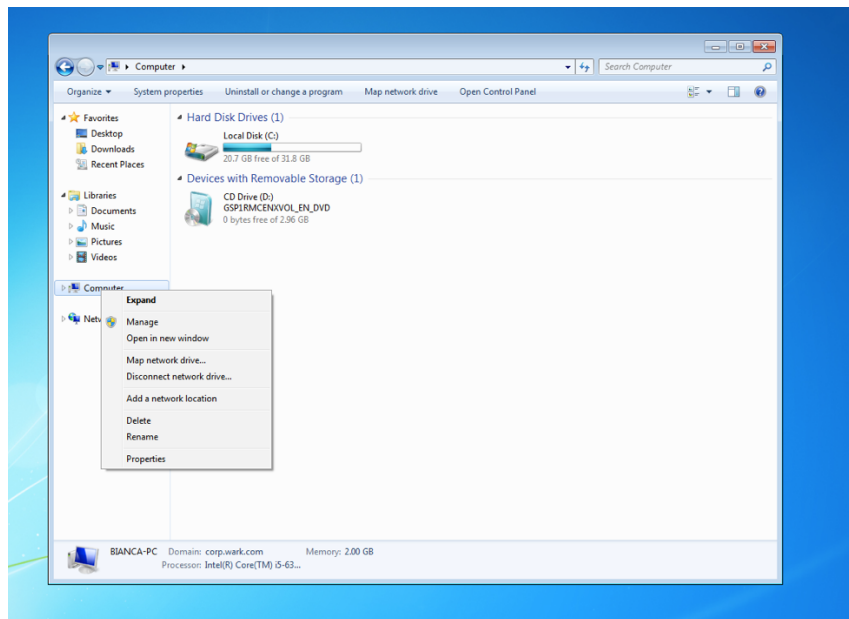
In the Permissions for the folder we add the two groups of users, allowing the All Staff User(domainusers) only for read permission.



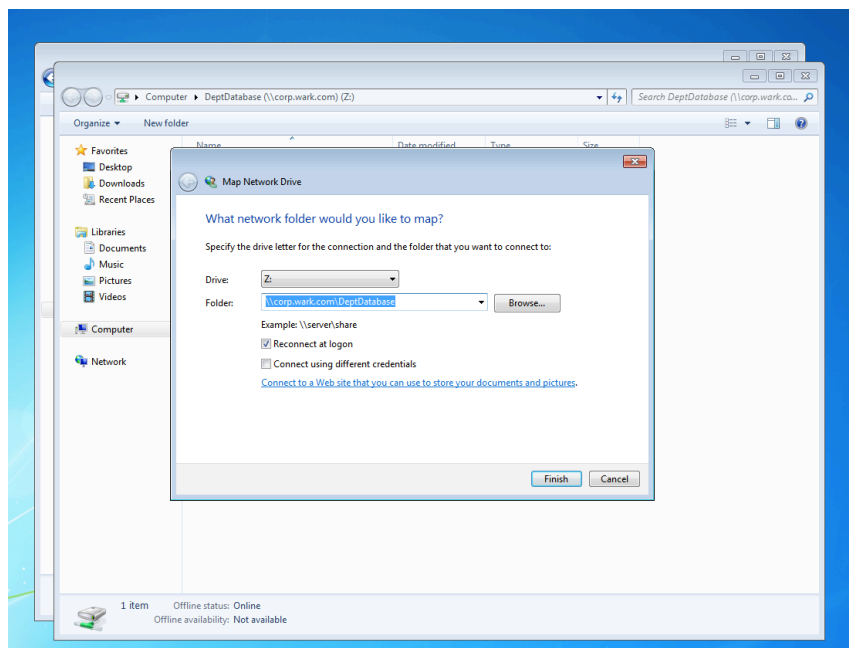
And allowing the Technical Support User to full file control.



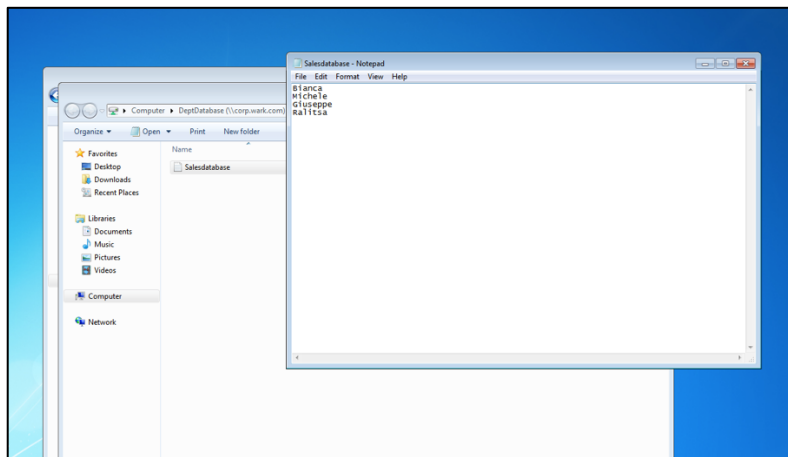
We can now log in the workstation as one of All Staff members to check the result of the previous operations. On the Computer we are going to look for Map network.



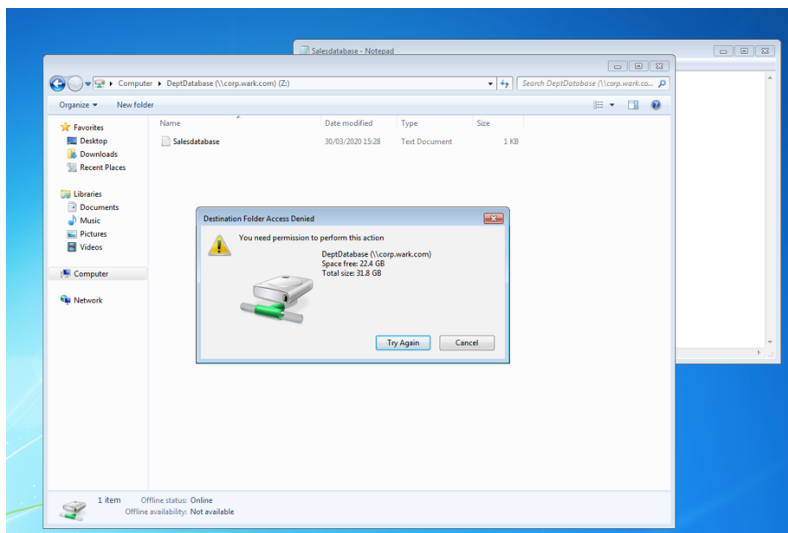
And we are going to insert the name of the shared folder.



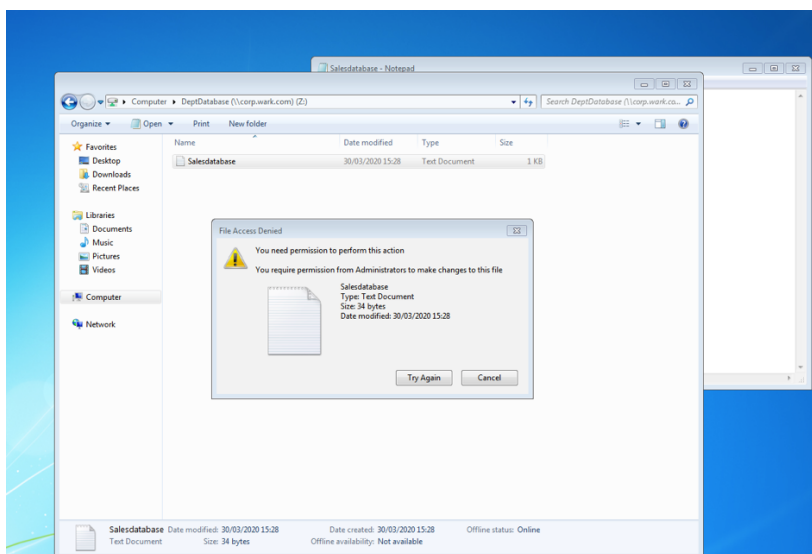
As we can see from the following screenshot the user found the folder with the shared file.



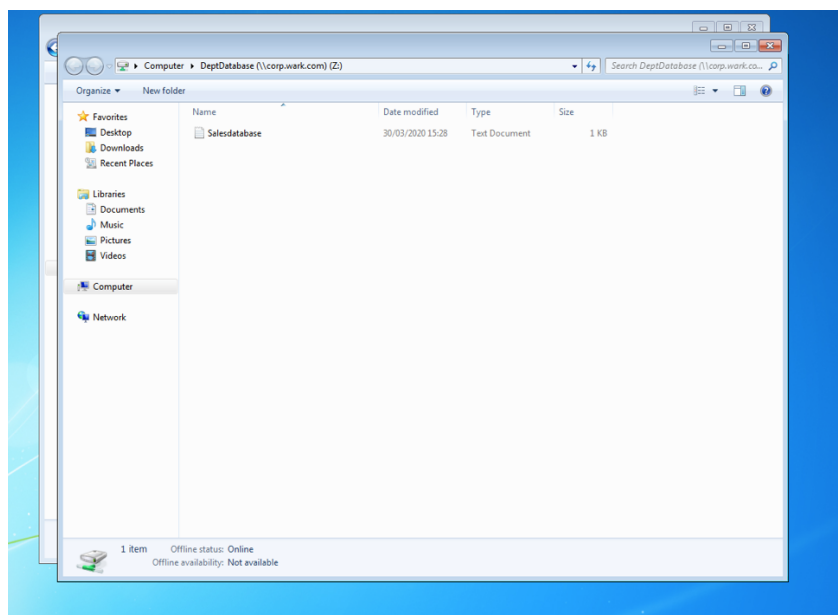
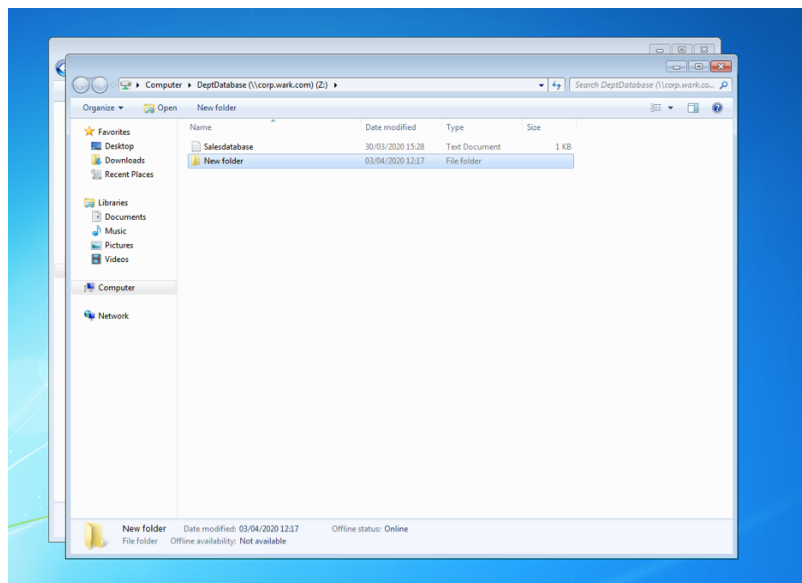
If the user try to create a new file or folder inside the shared one the system is giving the following output as expect it.



The same if the user try to delete the file from the shared folder.

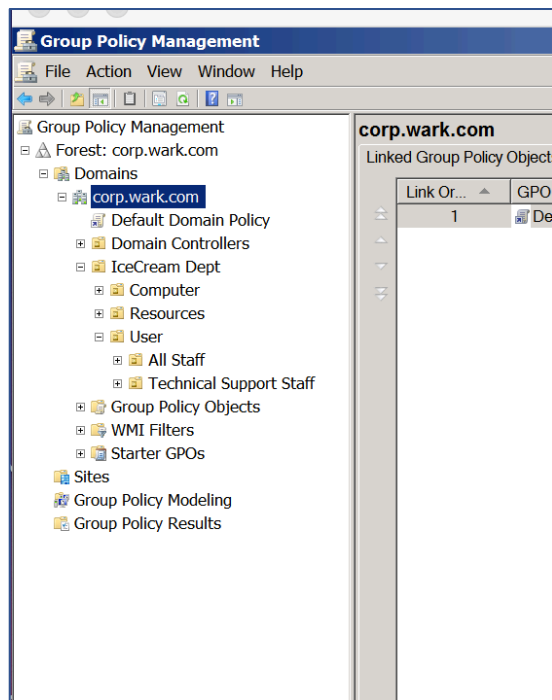


Let's try now to access the workstation as one of the users of the Technical Support Staff. When we found the shared folder in the Computer we can easily create a New Folder and Delete it with no restriction, as expected it.

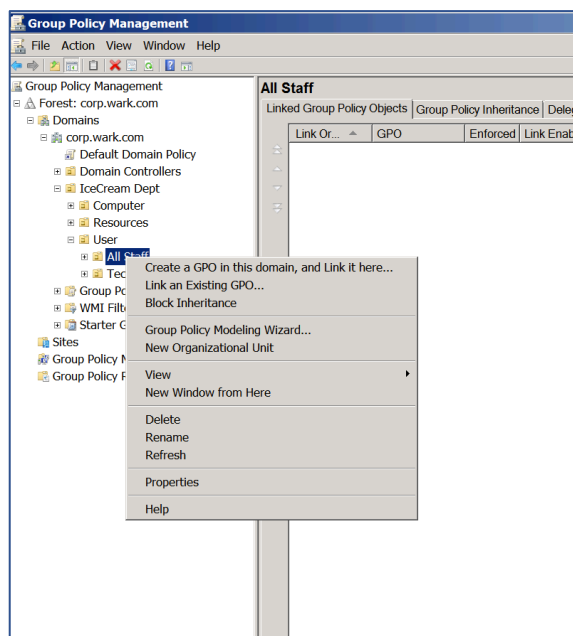


## Task 2: Controlling 'domain resources' using Organisational Units and Group Policy.

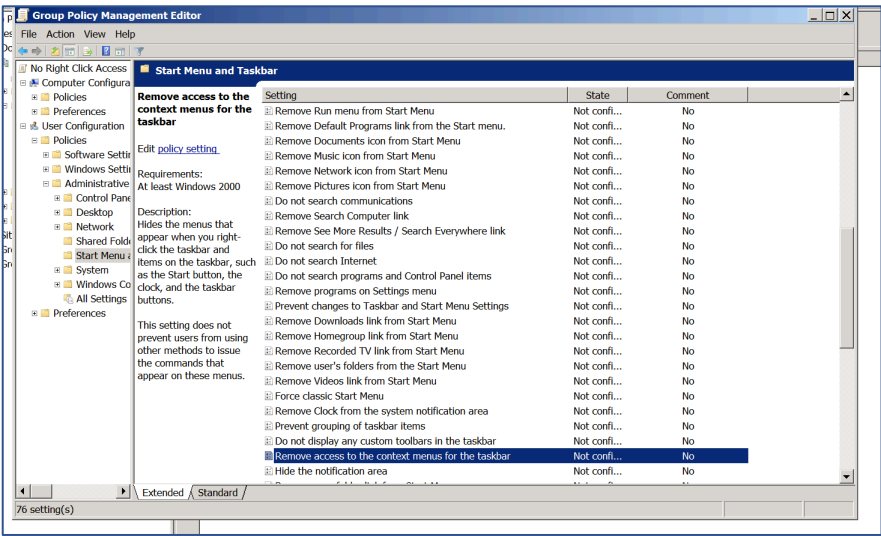
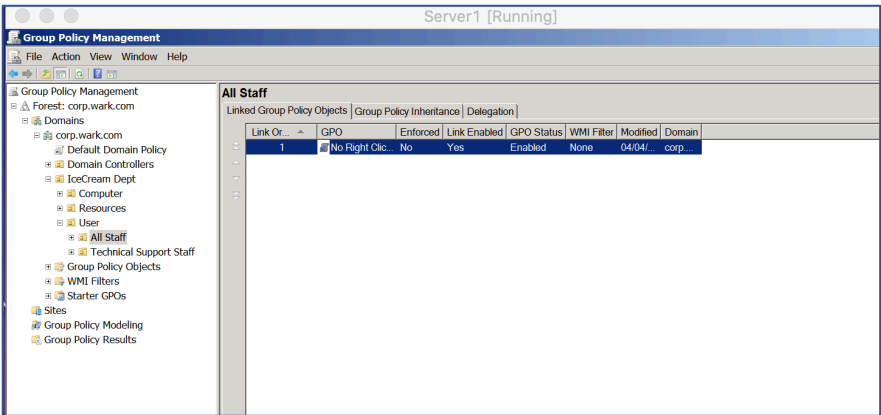
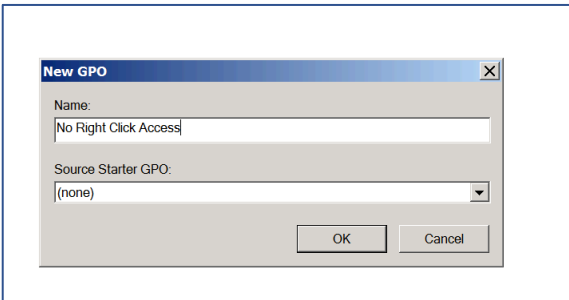
In this task we are going to manage Group Policy for our Organisational Units.



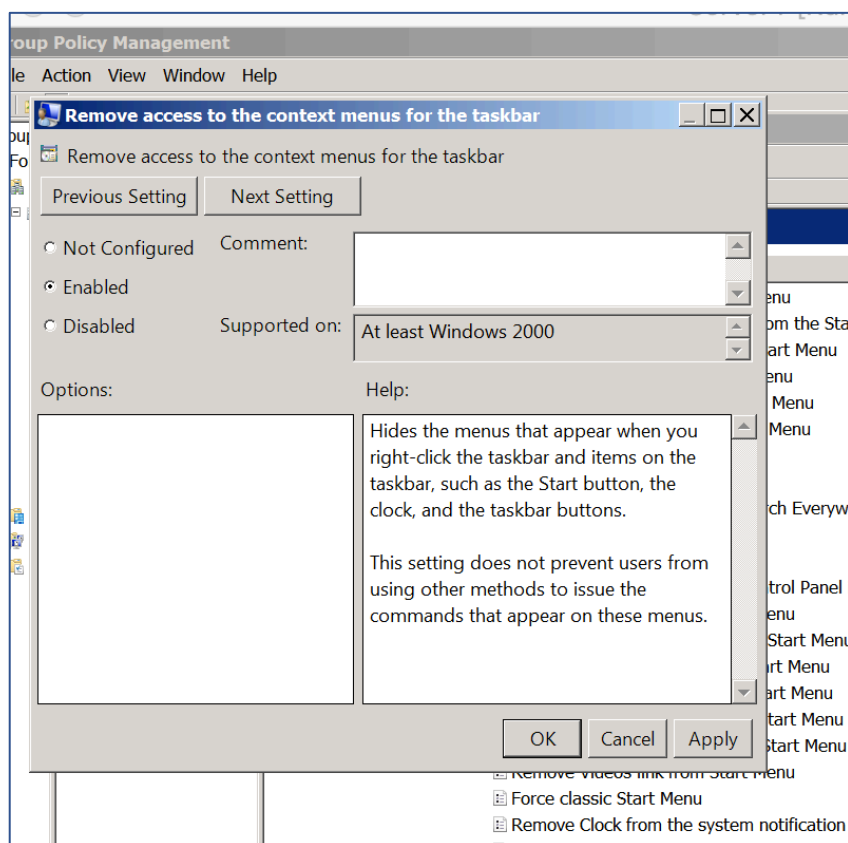
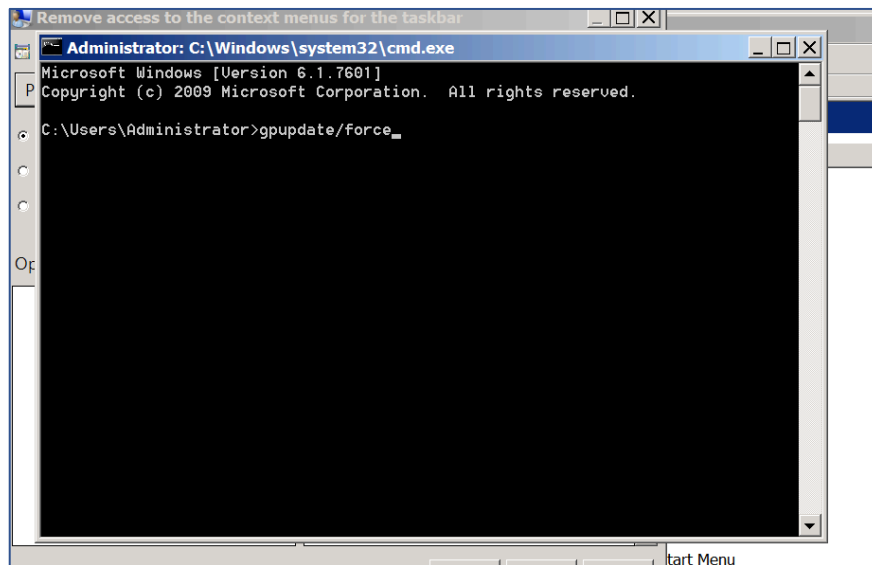
We start to create a new Group Policy Object(GPO) in 'All Staff' OU.



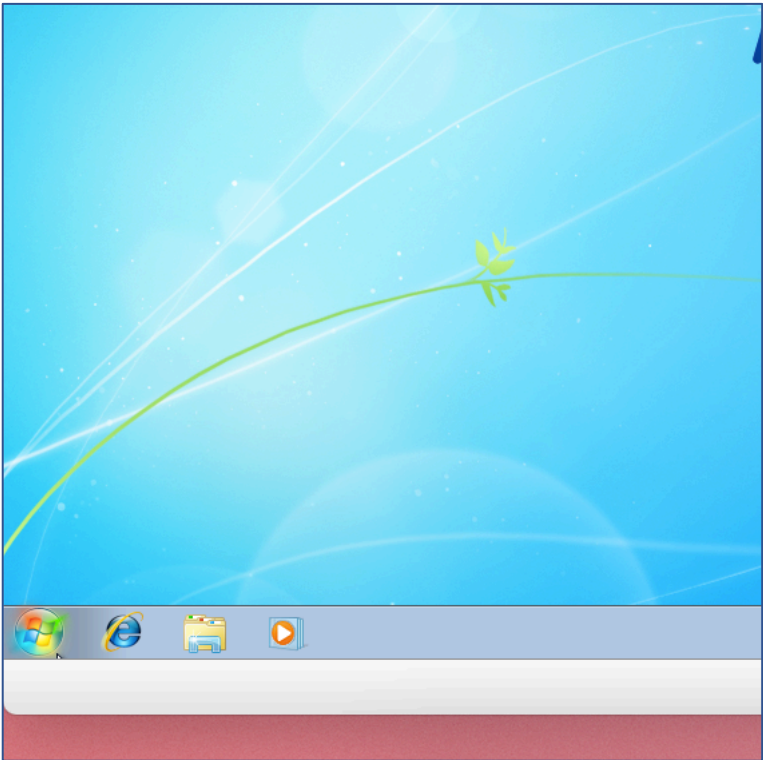
The name of the new GPO is No Right Click Access and it will forbid all the users inside the OU to right click on the Start button of Windows.



Before to enable this policy we need to force the policy update from the Command Line window.



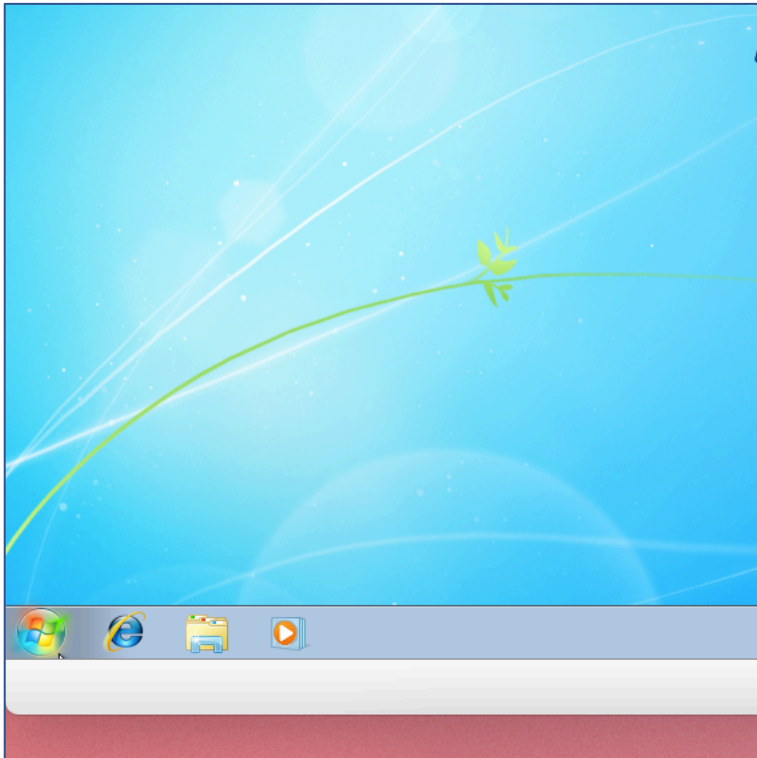
We can now check the output logging in the workstation as one of the user in 'All Staff' OU.



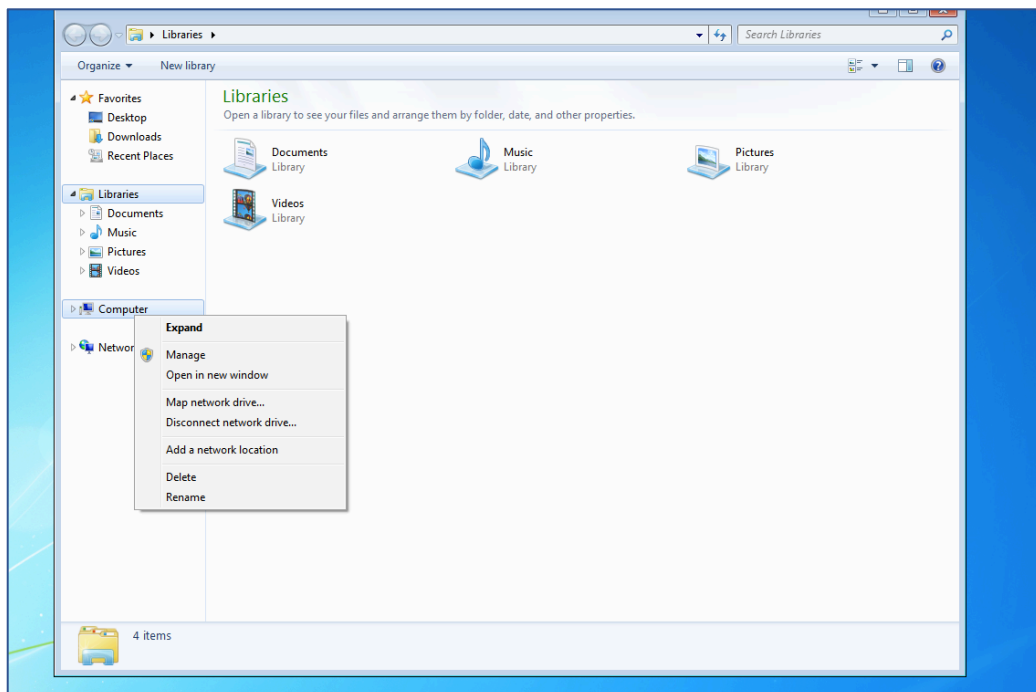
We also create other two GPO for 'All User' OU: the first is removing the icon of the Recycle Bin from the Desktop and the second is hiding Property from the menu by right-clicking on Computer.

| All Staff                                                           |                          |          |              |            |            |           |          |  |
|---------------------------------------------------------------------|--------------------------|----------|--------------|------------|------------|-----------|----------|--|
| Linked Group Policy Objects   Group Policy Inheritance   Delegation |                          |          |              |            |            |           |          |  |
| Link Or...                                                          | GPO                      | Enforced | Link Enabled | GPO Status | WMI Filter | Modified  | Domain   |  |
| 1                                                                   | No Right Click Access    | No       | Yes          | Enabled    | None       | 04/04/... | corp.... |  |
| 2                                                                   | No Recycle Bin           | No       | Yes          | Enabled    | None       | 04/04/... | corp.... |  |
| 3                                                                   | No Property for Computer | No       | Yes          | Enabled    | None       | 04/04/... | corp.... |  |

No Recycle Bin Output.



No Property for Computer Output.

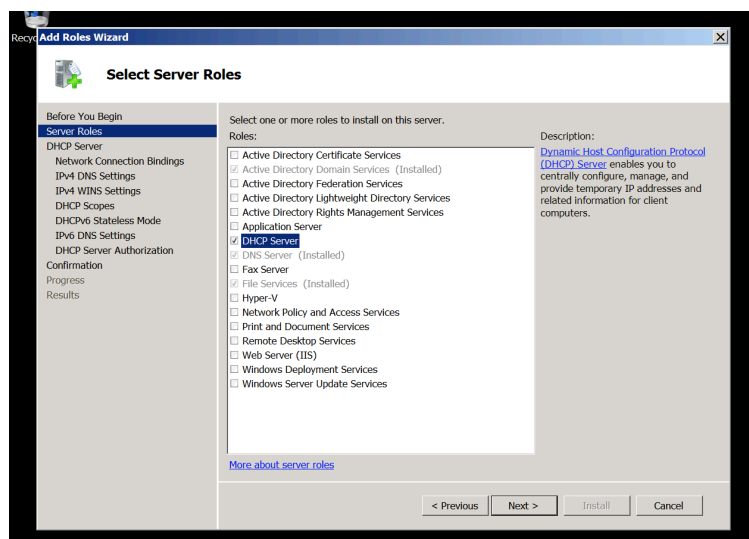
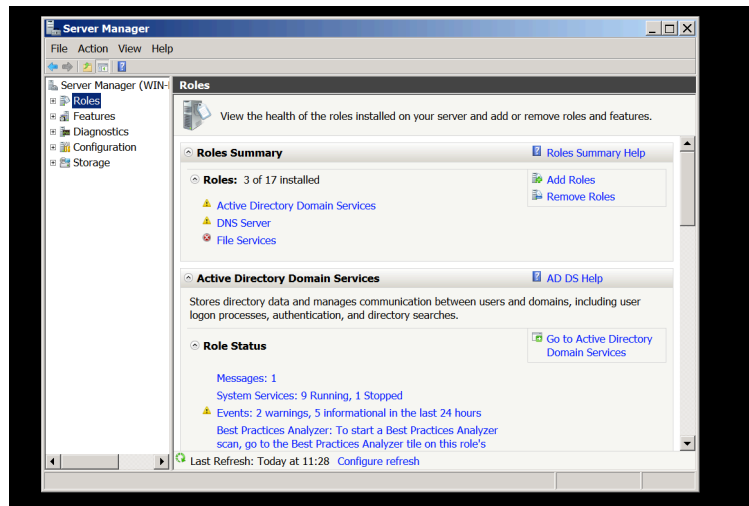


## Worksheet 4: Network Administration using DHCP

### Task 1: Installing and configuring the DHCP Service.

#### [PART A: INSTALL THE DHCP SERVICE].

To install the DHCP(Dynamic Host Configuration Protocol) we need to operate on the Server.  
So in in the Server Manager we Add a New Role.



**Add Roles Wizard**

**Select Network Connection Bindings**

Before You Begin  
Server Roles  
DHCP Server  
Network Connection Bindings  
IPv4 DNS Settings  
IPv4 WINS Settings  
DHCP Scopes  
DHCPv6 Stateless Mode  
IPv6 DNS Settings  
DHCP Server Authorization  
Confirmation  
Progress  
Results

One or more network connections having a static IP address were detected. Each network connection can be used to service DHCP clients on a separate subnet.

Select the network connections that this DHCP server will use for servicing clients.

Network Connections:

| IP Address                                        | Type |
|---------------------------------------------------|------|
| <input checked="" type="checkbox"/> 192.168.100.1 | IPv4 |
| <input checked="" type="checkbox"/> 192.168.1.100 | IPv4 |

Details  
Name: privatenet1  
Network Adapter: privatenet1  
Physical Address: 08-00-27-F3-EB-87

< Previous   Next >   Install   Cancel

**Add Roles Wizard**

**Specify IPv4 DNS Server Settings**

Before You Begin  
Server Roles  
DHCP Server  
Network Connection Bindings  
IPv4 DNS Settings  
IPv4 WINS Settings  
DHCP Scopes  
DHCPv6 Stateless Mode  
IPv6 DNS Settings  
DHCP Server Authorization  
Confirmation  
Progress  
Results

When clients obtain an IP address from the DHCP server, they can be given DHCP options such as the IP addresses of DNS servers and the parent domain name. The settings you provide here will be applied to clients using IPv4.

Specify the name of the parent domain that clients will use for name resolution. This domain will be used for all scopes you create on this DHCP server.

Parent domain:

Specify the IP addresses of the DNS servers that clients will use for name resolution. These DNS servers will be used for all scopes you create on this DHCP server.

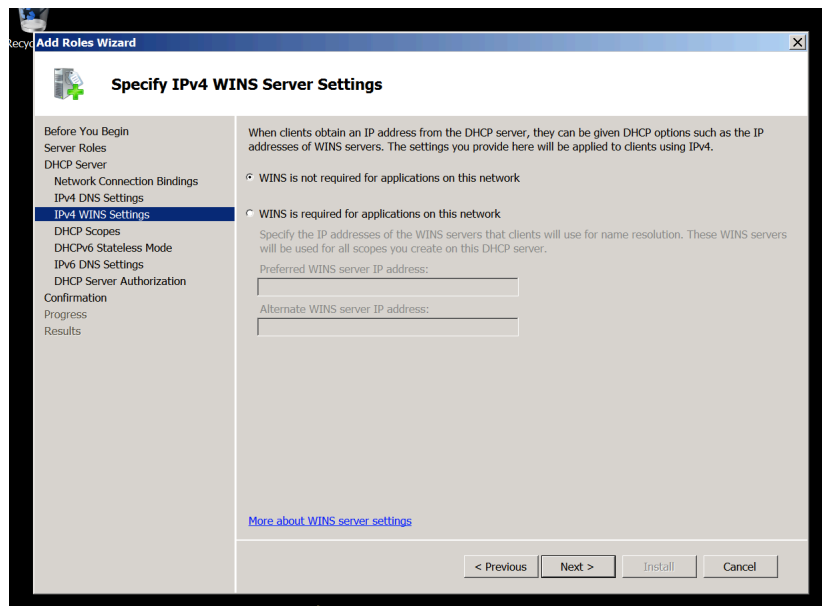
Preferred DNS server IPv4 address:

Alternate DNS server IPv4 address:

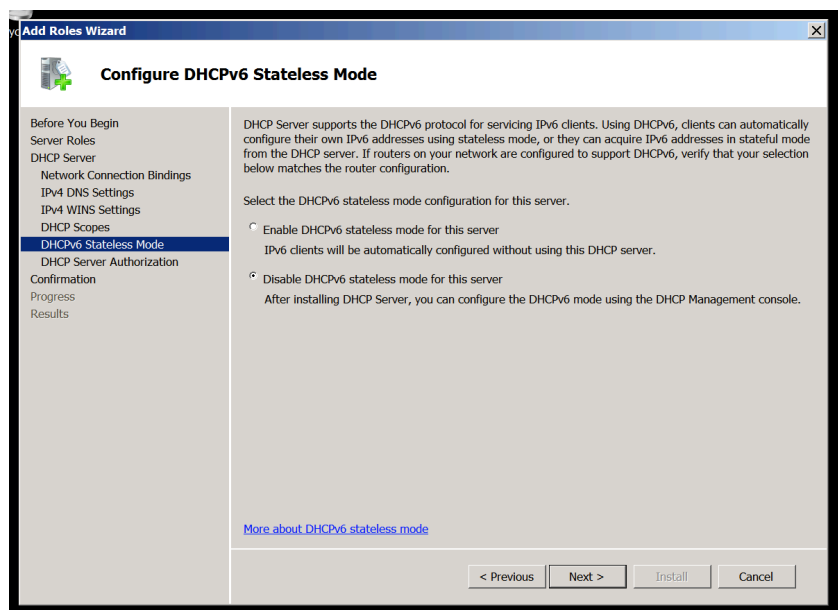
[More about DNS server settings](#)

< Previous   Next >   Install   Cancel

In this task we do not need WINS (Windows Internet Naming Service).



We also need to disable DHCPv6.



**Add Roles Wizard**

## Authorize DHCP Server

Before You Begin  
 Server Roles  
 DHCP Server  
 Network Connection Bindings  
 IPv4 DNS Settings  
 IPv4 WINS Settings  
 DHCP Scopes  
 DHCPv6 Stateless Mode  
**DHCP Server Authorization**  
 Confirmation  
 Progress  
 Results

Active Directory Domain Services (AD DS) stores a list of DHCP servers that are authorized to service clients on the network. Authorizing DHCP servers helps avoid accidental damage caused by running DHCP servers with incorrect configurations or DHCP servers with correct configurations on the wrong network.

Specify credentials to use for authorizing this DHCP server in AD DS.

☒ Use current credentials  
 The credentials of the current user will be used to authorize this DHCP server in AD DS.  
 User Name:

☐ Use alternate credentials  
 Specify domain administrator credentials for authorizing this DHCP server in AD DS.  
 User Name:

☐ Skip authorization of this DHCP server in AD DS  
 ⚠ This DHCP server must be authorized in AD DS before it can service clients.

[More about authorizing DHCP servers in AD DS](#)

**Add Roles Wizard**

## Confirm Installation Selections

Before You Begin  
 Server Roles  
 DHCP Server  
 Network Connection Bindings  
 IPv4 DNS Settings  
 IPv4 WINS Settings  
 DHCP Scopes  
 DHCPv6 Stateless Mode  
 DHCP Server Authorization  
**Confirmation**  
 Progress  
 Results

To install the following roles, role services, or features, click Install.

1 informational message below

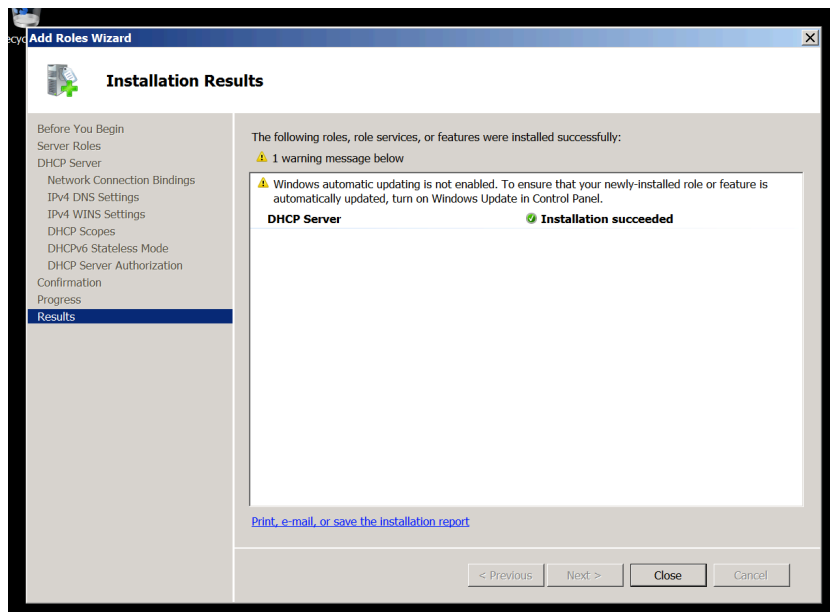
ⓘ This server might need to be restarted after the installation completes.

**DHCP Server**

|                               |                                                                |
|-------------------------------|----------------------------------------------------------------|
| Network Connection Bindings : | 192.168.100.1 (IPv4), 192.168.1.100 (IPv4)                     |
| IPv4 DNS Settings             |                                                                |
| DNS Parent Domain :           | corp.wark.com                                                  |
| DNS Servers :                 | 127.0.0.1                                                      |
| WINS Servers :                | None                                                           |
| Scopes :                      | No scopes defined                                              |
| DHCPv6 Stateless Mode :       | Disabled                                                       |
| DHCP Server Authorization :   | Authorize using credentials associated with CORP\Administrator |

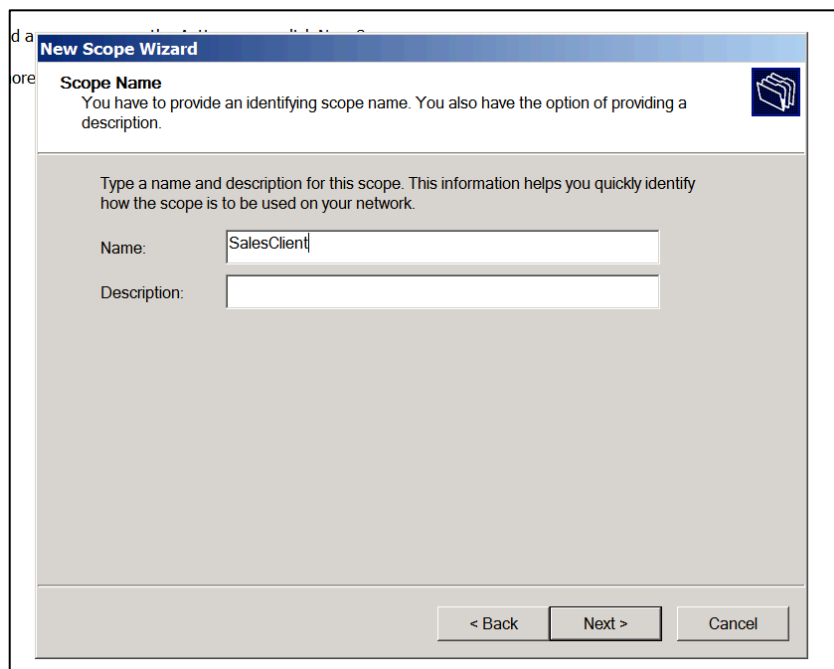
[Print, e-mail, or save this information](#)

We can now proceed to the installation.

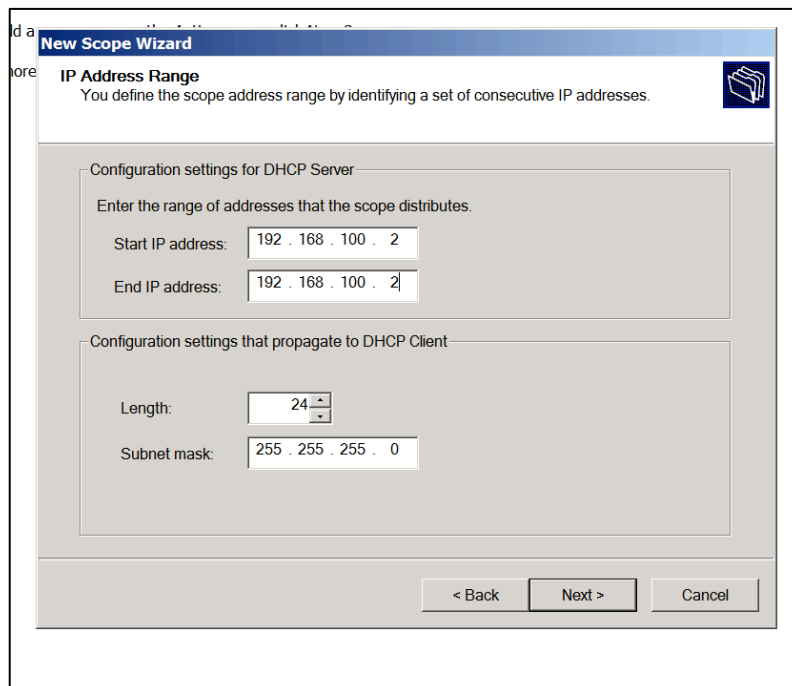


#### [PART B: CREATING A DHCP SCOPE FOR LEASING IP ADDRESSES TO DHCP CLIENTS ON THE PRIVATE NETWORK]

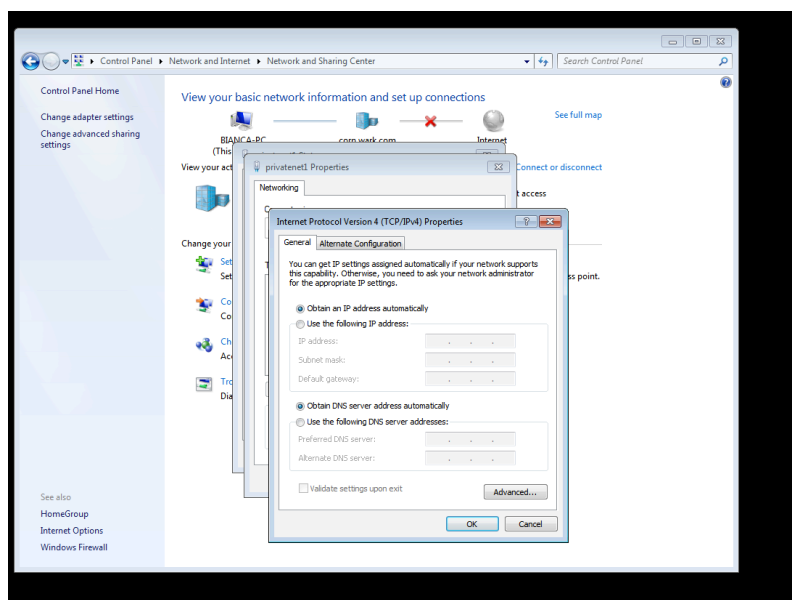
After DHCP has been installed we need to create a scope for our Private Network.



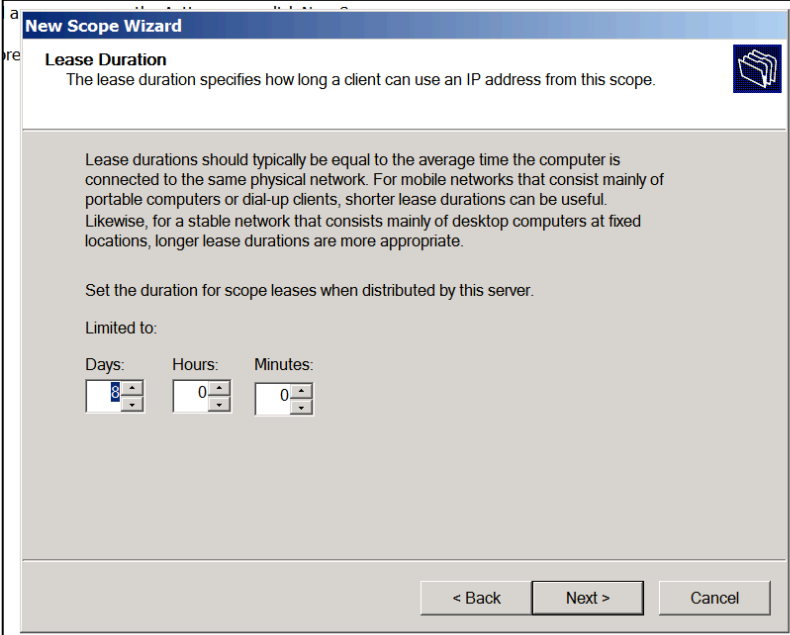
We also need to choose an IP Address Range of our Network and we are going to use the IP address of Client 1.



Having to check the client IP address for the IP Address Range we also modify the set up for IPv4 Properties. So from now the IP address and the DNS server are obtained automatically.



Back on our server we complete the definition of our new scope in Wizard.



**New Scope Wizard**

**Lease Duration**  
The lease duration specifies how long a client can use an IP address from this scope.

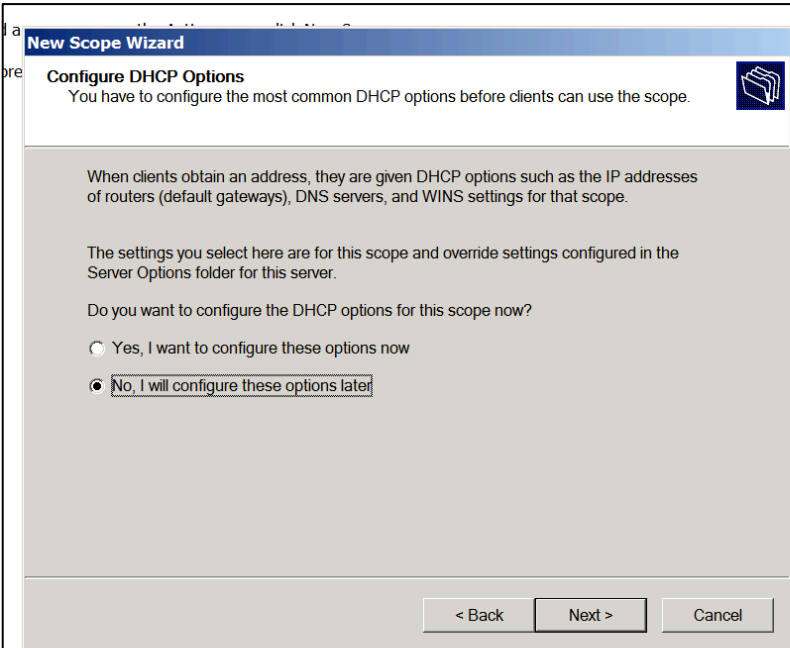
Lease durations should typically be equal to the average time the computer is connected to the same physical network. For mobile networks that consist mainly of portable computers or dial-up clients, shorter lease durations can be useful. Likewise, for a stable network that consists mainly of desktop computers at fixed locations, longer lease durations are more appropriate.

Set the duration for scope leases when distributed by this server.

Limited to:

Days:  Hours:  Minutes:

< Back   Next >   Cancel



**New Scope Wizard**

**Configure DHCP Options**  
You have to configure the most common DHCP options before clients can use the scope.

When clients obtain an address, they are given DHCP options such as the IP addresses of routers (default gateways), DNS servers, and WINS settings for that scope.

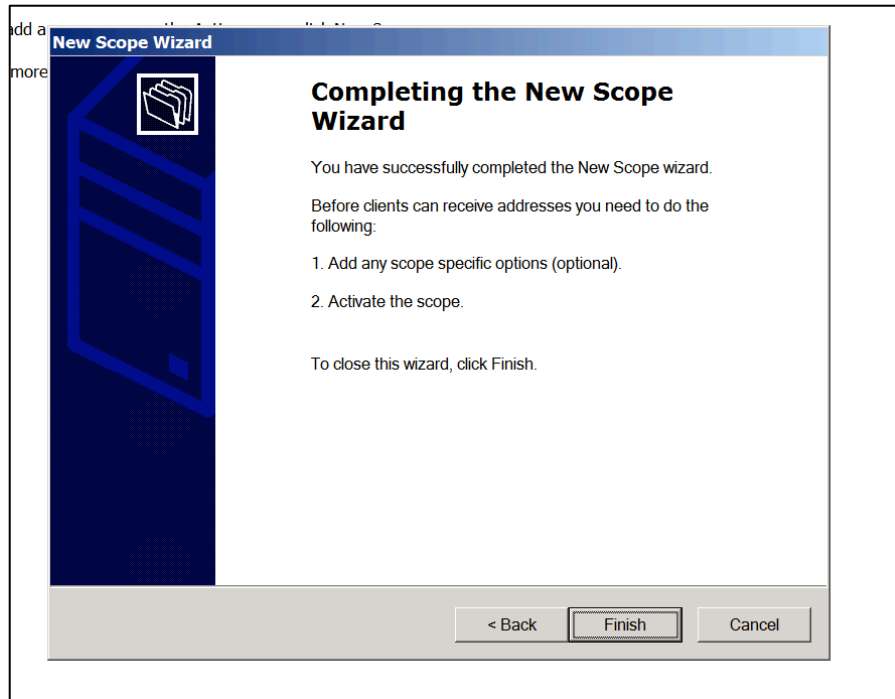
The settings you select here are for this scope and override settings configured in the Server Options folder for this server.

Do you want to configure the DHCP options for this scope now?

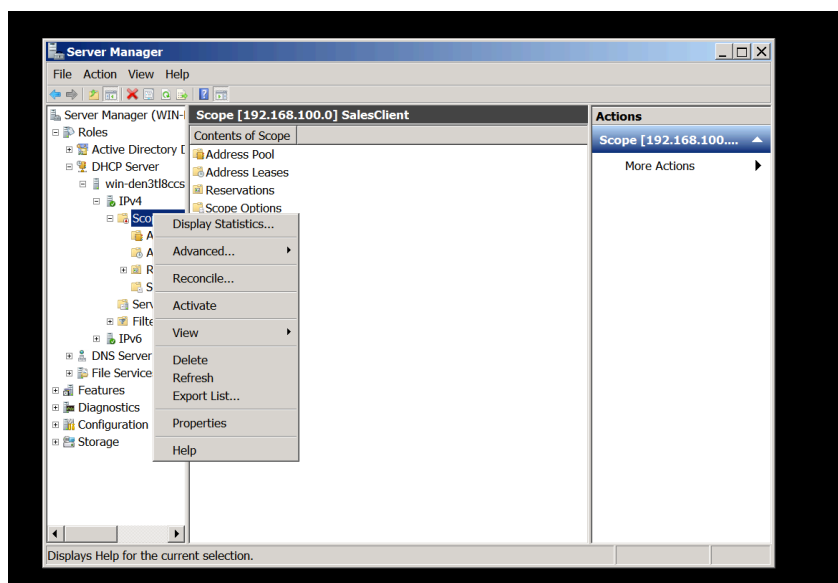
☐ Yes, I want to configure these options now

☒ No, I will configure these options later

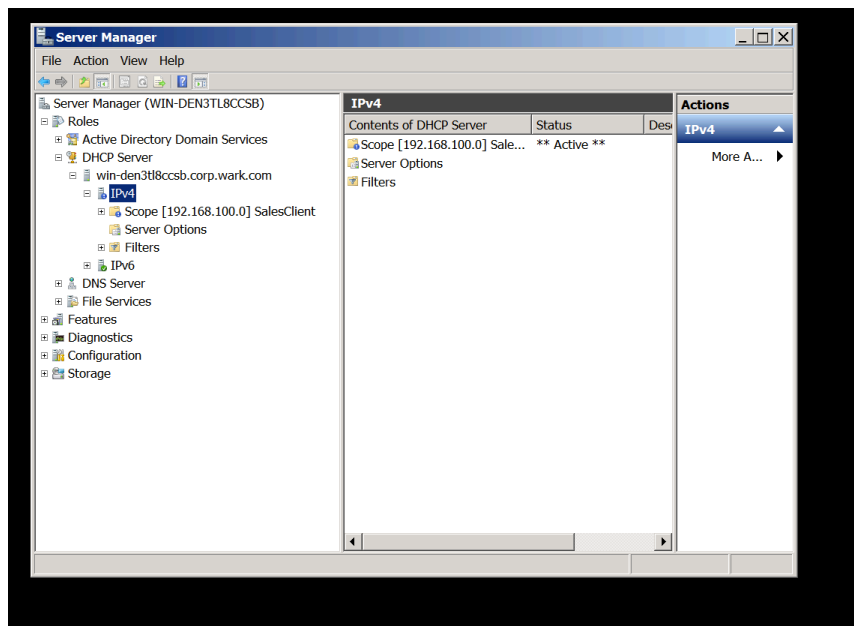
< Back   Next >   Cancel



Now we can activate our scope from the console tree.



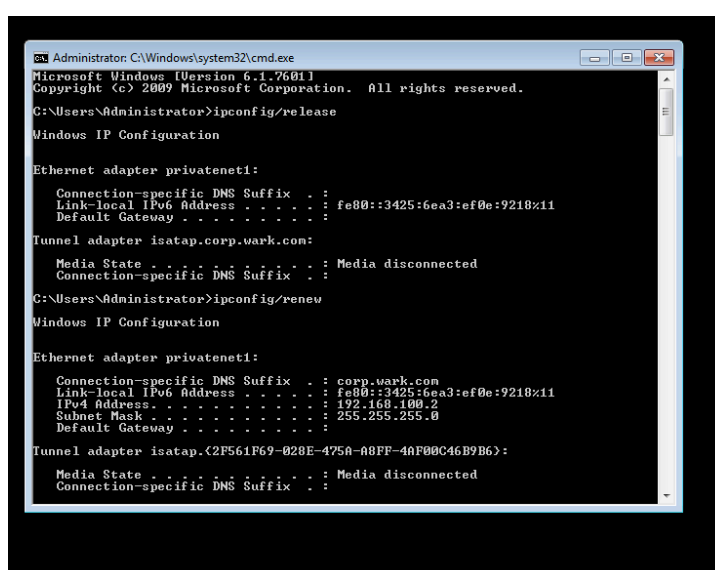
This is the output after the activation process.



## PART C: TESTING DHCP LEASES

In this part we are going to test the Dynamic Host Configuration Protocol on the computer of Client 1, logging in as Administrator.

In Command prompt we need to force the refresh of the DHCP IP address of the computer to request a different IP address. So We use the command `ipconfig /release` first to force the client to immediately give up its lease by sending the server a DHCP release notification. And then we use the command `ipconfig/renew` to request a new IP address. In this case the IP Address is the same because of the new scope we create in the previous task.



```
Administrator: C:\Windows\system32\cmd.exe

C:\Users\Administrator>ipconfig/all

Windows IP Configuration

Host Name . . . . . : Bianca-PC
Primary Dns Suffix . . . . . : corp.wark.com
Node Type . . . . . : Hybrid
IP Routing Enabled. . . . . : No
WINS Proxy Enabled. . . . . : No
DNS Suffix Search List. . . . . : corp.wark.com

Ethernet adapter privatenet1:

Connection-specific DNS Suffix . : corp.wark.com
Description . . . . . : Intel(R) PRO/1000 MT Desktop Adapter
Physical Address. . . . . : 08-00-27-35-96-1F
DHCP Enabled. . . . . : Yes
Autoconfiguration Enabled . . . . : Yes
Link-local IPv6 Address . . . . . : fe80::3425:6ea3:ef0e:9218%11(Preferred)
IPv4 Address. . . . . : 192.168.100.2(Preferred)
Subnet Mask . . . . . : 255.255.255.0
Lease Obtained. . . . . : 06 April 2020 14:43:15
Lease Expires . . . . . : 14 April 2020 14:43:14
Default Gateway . . . . . :
DHCP Server . . . . . : 192.168.100.1
DHCPv6 IAID . . . . . : 235405351
DHCPv6 Client DUID. . . . . : 00-01-00-01-25-F3-00-EF-08-00-27-35-96-1F

DNS Servers . . . . . : 127.0.0.1
NetBIOS over Tcpip. . . . . : Enabled

Tunnel adapter isatap.corp.wark.com:

Media State . . . . . : Media disconnected
Connection-specific DNS Suffix . : corp.wark.com
Description . . . . . : Microsoft ISATAP Adapter
Physical Address. . . . . : 00-00-00-00-00-00-E0
DHCP Enabled. . . . . : No
Autoconfiguration Enabled . . . . : Yes

C:\Users\Administrator>
```

Server1 [Running]

Manager

ion View Help

Manager (WIN-DEN3TL8CCSB)

Active Directory Domain Services

HCP Server

| Address Leases    |                         |                     |      |              |             |                |
|-------------------|-------------------------|---------------------|------|--------------|-------------|----------------|
| Client IP Address | Name                    | Lease Expiration    | Type | Unique ID    | Description | Network Access |
| 192.168.100.2     | Bianca-PC.corp.wark.com | 14/04/2020 14:28:38 | DHCP | 08002735961f |             | Full Access    |

Client1 [Running]

Recycle Bin

Administrator: C:\Windows\system32\cmd.exe

C:\Users\Administrator>ipconfig/all

Windows IP Configuration

Host Name . . . . . : Bianca-PC

Primary Dns Suffix . . . . . : corp.wark.com

Node Type . . . . . : Hybrid

IP Routing Enabled. . . . . : No

WINS Proxy Enabled. . . . . : No

DNS Suffix Search List. . . . . : corp.wark.com

Ethernet adapter privatenet1:

Connection-specific DNS Suffix . : corp.wark.com

Description . . . . . : Intel(R) PRO/1000 MT Desktop Adapter

Physical Address. . . . . : 08-00-27-35-96-1F

DHCP Enabled. . . . . : Yes

Autoconfiguration Enabled . . . . : Yes

Link-local IPv6 Address . . . . . : fe80::3425:6ea3:ef0e:9218%11(Preferred)

IPv4 Address. . . . . : 192.168.100.2(Preferred)

Subnet Mask . . . . . : 255.255.255.0

Lease Obtained. . . . . : 06 April 2020 14:43:15

Lease Expires . . . . . : 14 April 2020 14:43:14

Default Gateway . . . . . : 192.168.100.1

DHCP Server . . . . . : 192.168.100.1

DHCPv6 IAID . . . . . : 235405351

DHCPv6 Client DUID. . . . . : 00-01-00-01-25-F3-00-EF-08-00-27-35-96-1F

DNS Servers . . . . . : 127.0.0.1

NetBIOS over Tcpip. . . . . : Enabled

Tunnel adapter isatap.corp.wark.com:

Media State . . . . . : Media disconnected

Connection-specific DNS Suffix . : corp.wark.com

Description . . . . . : Microsoft ISATAP Adapter

Physical Address. . . . . : 00-00-00-00-00-00-E0

DHCP Enabled. . . . . : No

Autoconfiguration Enabled . . . . : Yes

C:\Users\Administrator>

In this part we are going to configure DHCP scope option. In the DHCP console we are going to change the IP Address of the Router with the server one.



```

C:\Administrator>C:\Windows\system32\cmd.exe
Microsoft Windows [Version 6.1.7601]
Copyright (c) 2009 Microsoft Corporation. All rights reserved.

C:\Users\Administrator>ipconfig /renew

Windows IP Configuration

Ethernet adapter privatenet1:

    Connection-specific DNS Suffix . : corp.wark.com
    Link-local IPv6 Address . . . . . : fe80::3425:6ea3:ef06:9218::1
    IPv4 Address. . . . . : 192.168.100.2
    Subnet Mask . . . . . : 255.255.255.0
    Default Gateway . . . . . :

Tunnel adapter istatap.corp.wark.com:

    Media State . . . . . : Media disconnected
    Connection-specific DNS Suffix . : corp.wark.com

C:\Users\Administrator>ipconfig/all

Windows IP Configuration

Host Name . . . . . : Bianca-PC
Primary Dns Suffix . . . . . : corp.wark.com
Node Type . . . . . : Hybrid
IP Routing Enabled. . . . . : No
WINS Proxy Enabled. . . . . : No
DNS Suffix Search List. . . . . : corp.wark.com

Ethernet adapter privatenet1:

    Connection-specific DNS Suffix . : corp.wark.com
    Physical Address. . . . . : {ac:10:00:00:00:00} NT Desktop Adapter
    DHCP Enabled. . . . . : Yes
    Autoconfiguration Enabled . . . . : Yes
    Link-local IPv6 Address . . . . . : fe80::3425:6ea3:ef06:9218::1(Preferred)
    IPv4 Address. . . . . : 192.168.100.2(Preferred)
    Subnet Mask . . . . . : 255.255.255.0
    Lease Expires . . . . . : 06 April 2020 14:43:15
    Lease Obtained . . . . . : 14 April 2020 15:08:32
    Default Gateway . . . . . : 192.168.100.1
    DHCP Server . . . . . : No
    DHCPv6 Server . . . . . : No
    DHCPv6 Client DUID. . . . . : 00-01-80-01-25-F3-00-EP-00-00-27-35-96-F1

DNS Servers . . . . . : 127.0.0.1
NetBIOS over Tcpip. . . . . : Enabled

Tunnel adapter istatap.corp.wark.com:

    Media State . . . . . : Media disconnected
    Connection-specific DNS Suffix . : corp.wark.com
    Description . . . . . : Microsoft ISatap Adapter
    Physical Address. . . . . : 20-00-00-00-00-00-00-00
    DHCP Enabled. . . . . : No
    Autoconfiguration Enabled . . . . : Yes

C:\Users\Administrator>_

```

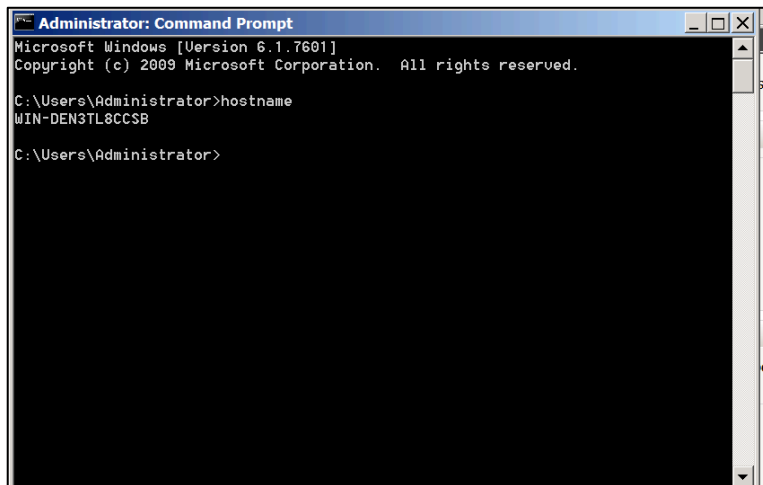


## Worksheet 5: Planning and Deploying DNS in the Network Infrastructure

### Task 1: Understanding DNS operation; Planning and deploying DNS

Task (A). Check the Host Name and Fully Qualified Domain Name of your Server.

From Server 1 hostname

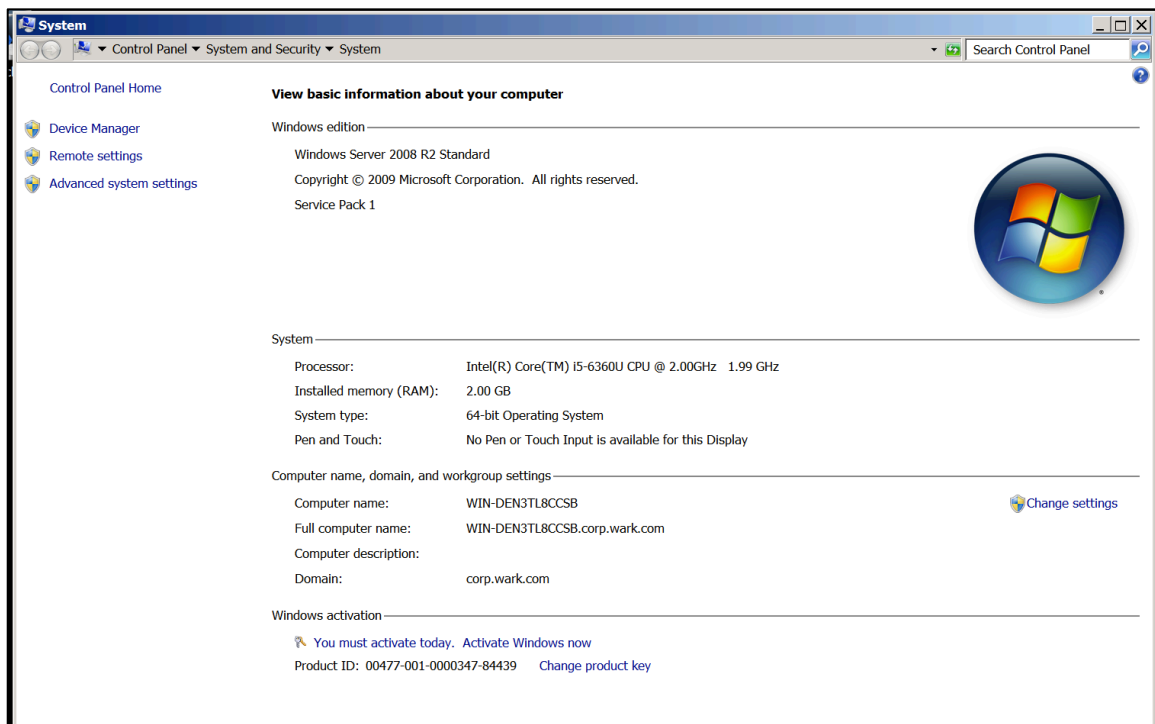


```
Administrator: Command Prompt
Microsoft Windows [Version 6.1.7601]
Copyright (c) 2009 Microsoft Corporation. All rights reserved.

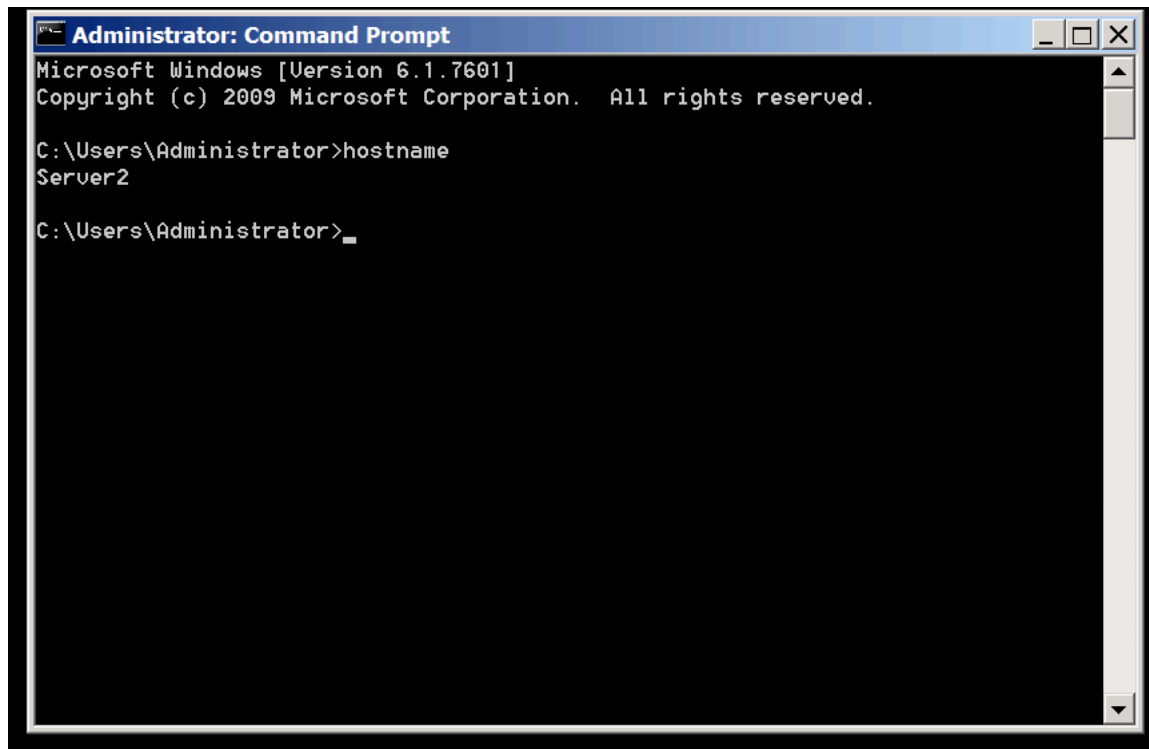
C:\Users\Administrator>hostname
WIN-DEN3TL8CCSB

C:\Users\Administrator>
```

From server 1 **Fully Qualified Domain Name**



From server 2 hostname

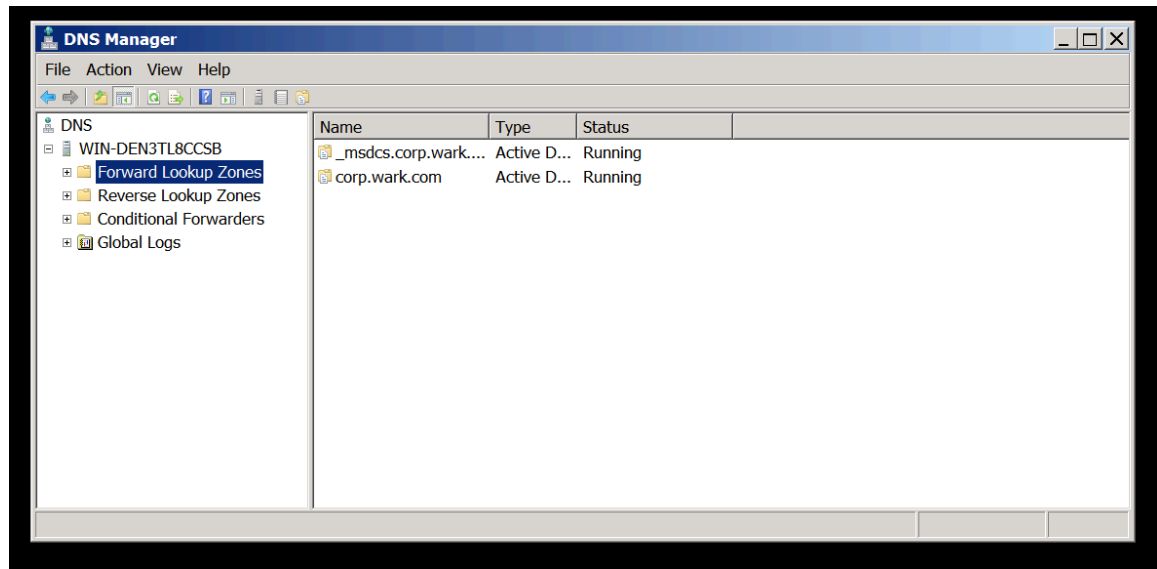


From server 2 Fully Qualified Domain Name



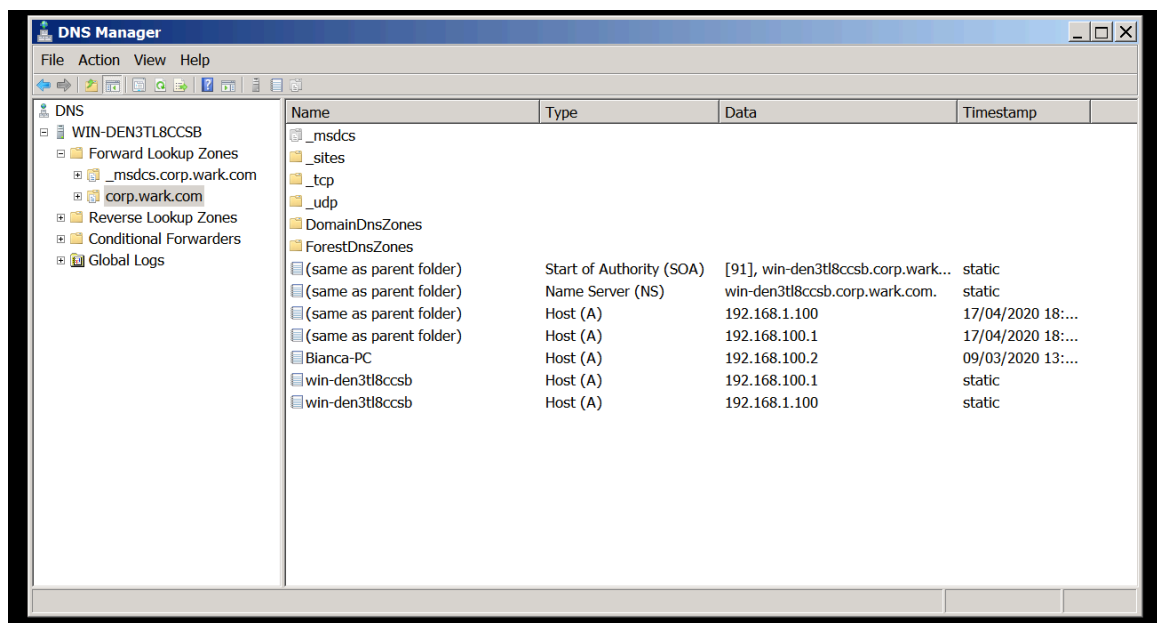
Task (B). Installing the DNS Server Service.

DNS Server Service is already installed on Server 1



Task 2: Storing and Maintaining DNS Data.

Task (A):

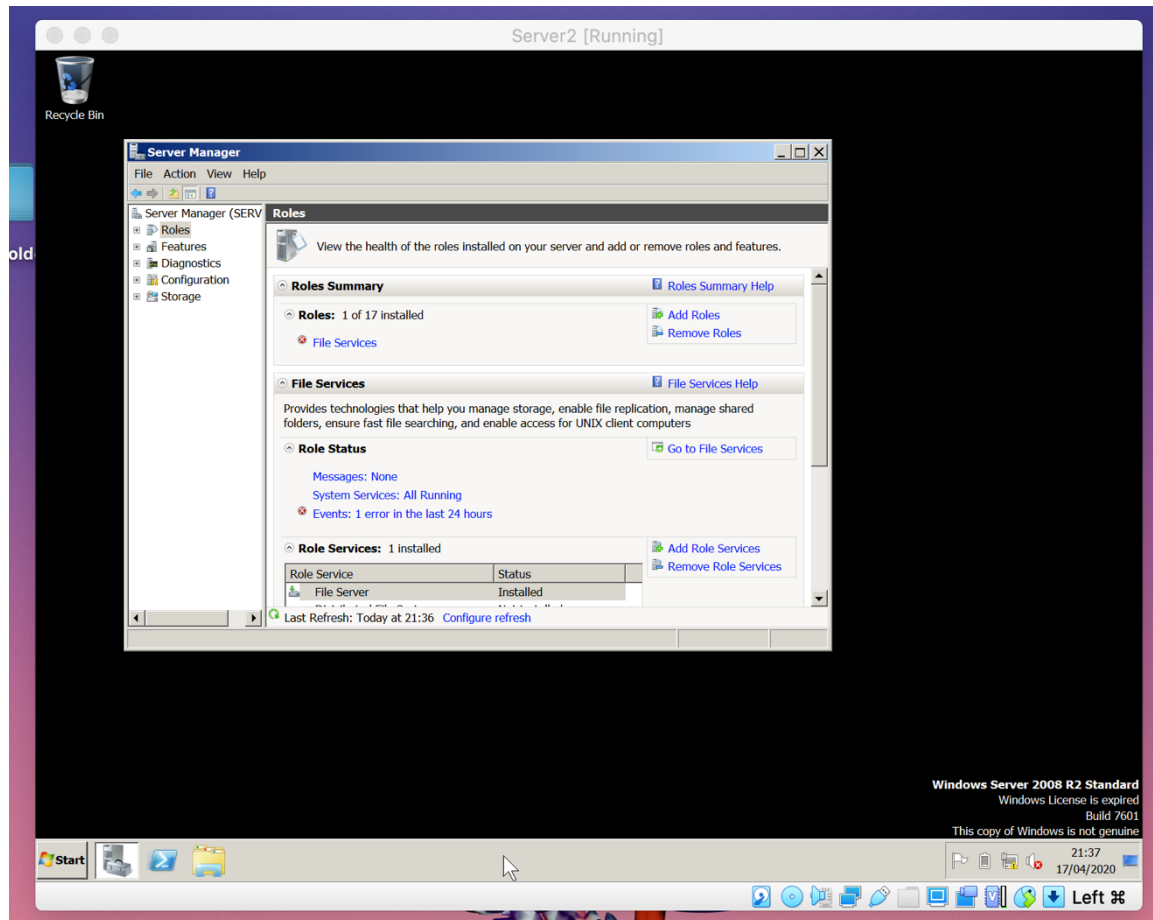


### Task 3. DNS Application.

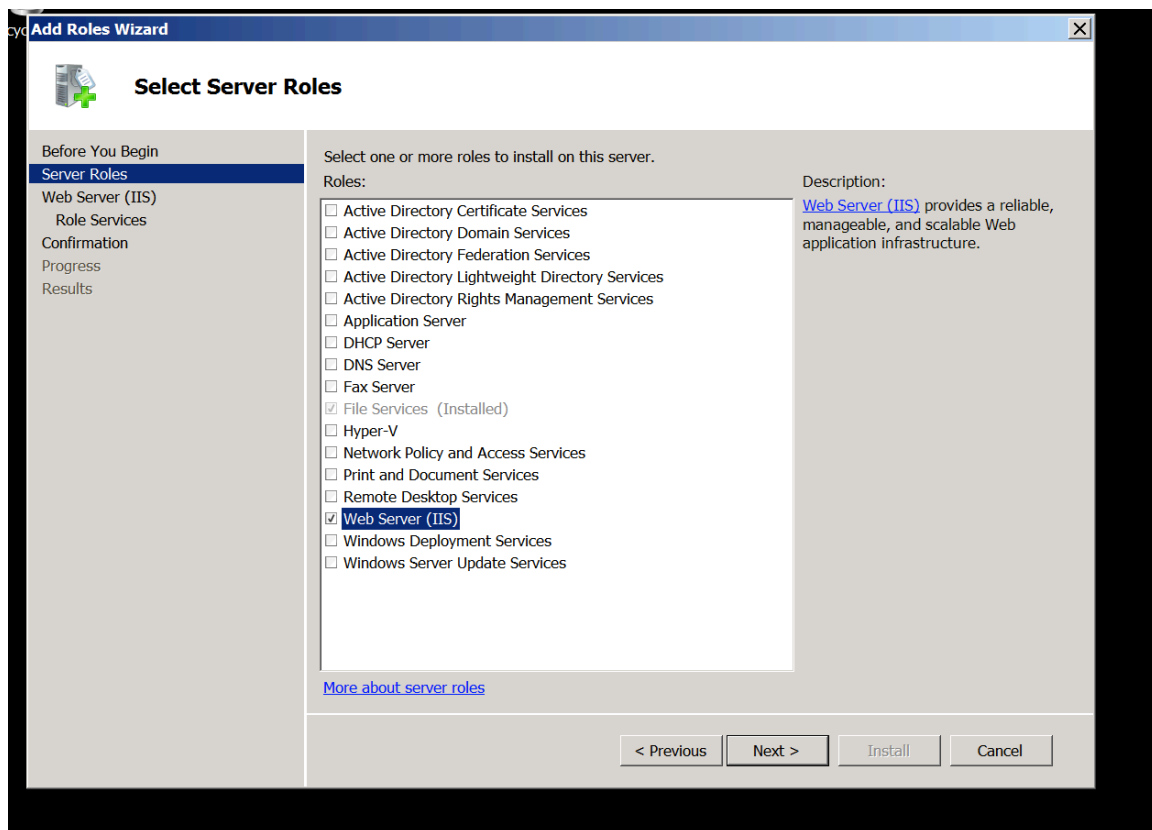
#### Installing a Web Server (IIS)

To execute this task the instruction in the worksheet are not clear so I find another way to obtain the same result.

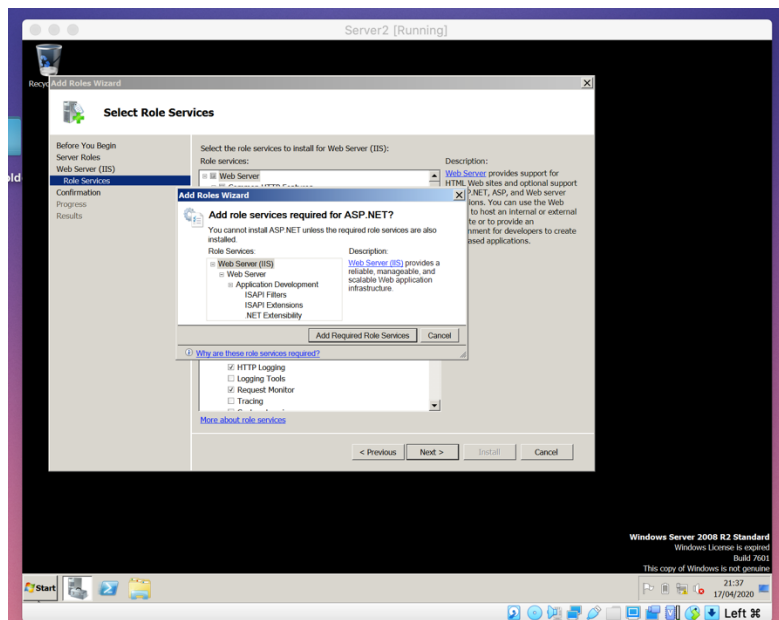
The first step is to install a Web Server(IIS) on Server 2. To do so in Server Manager Console I clicked on Add Roles

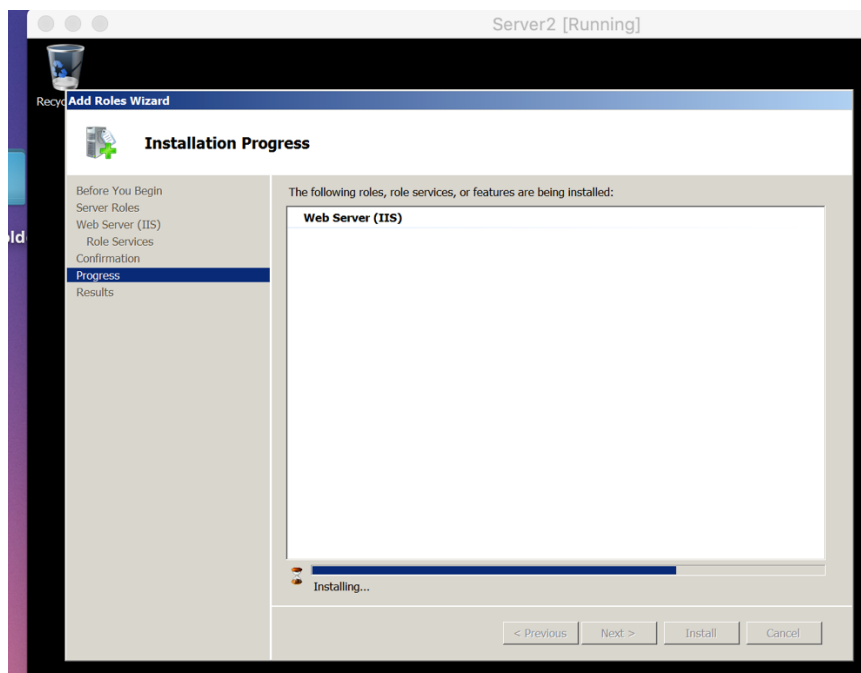
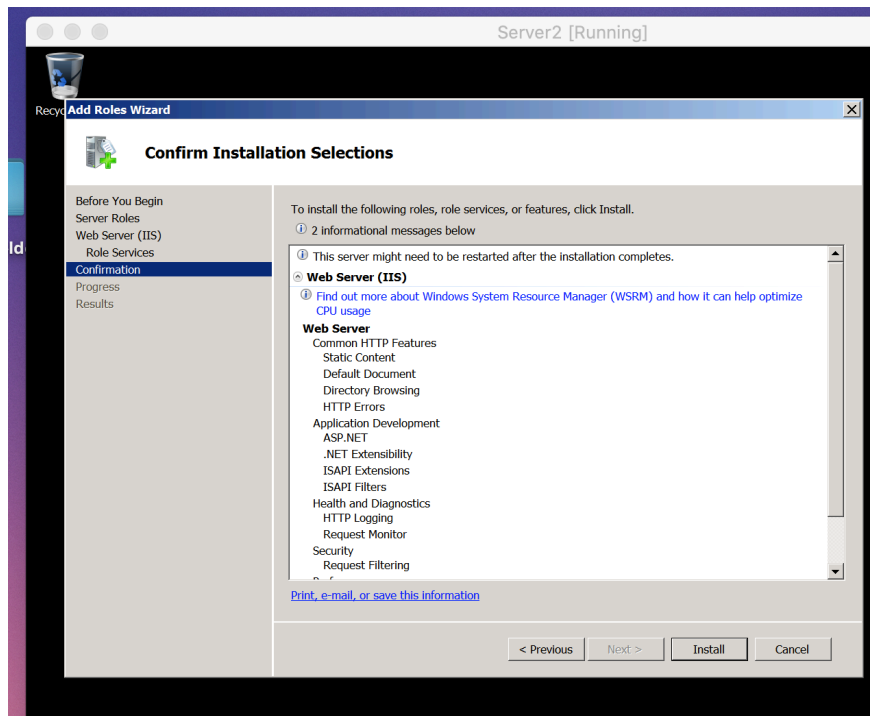


In Add Roles Wizard I selected Web Server (IIS) to install



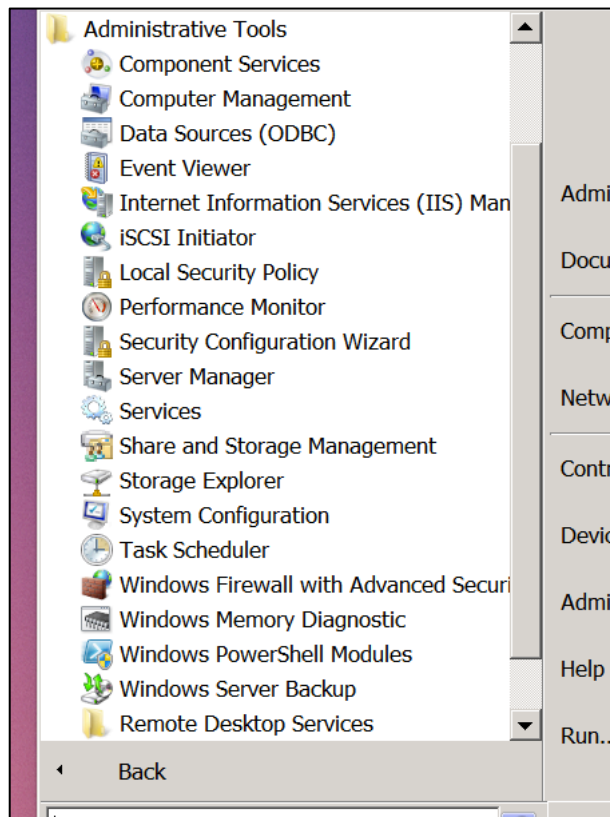
I also choose an extra feature to install ASP.NET



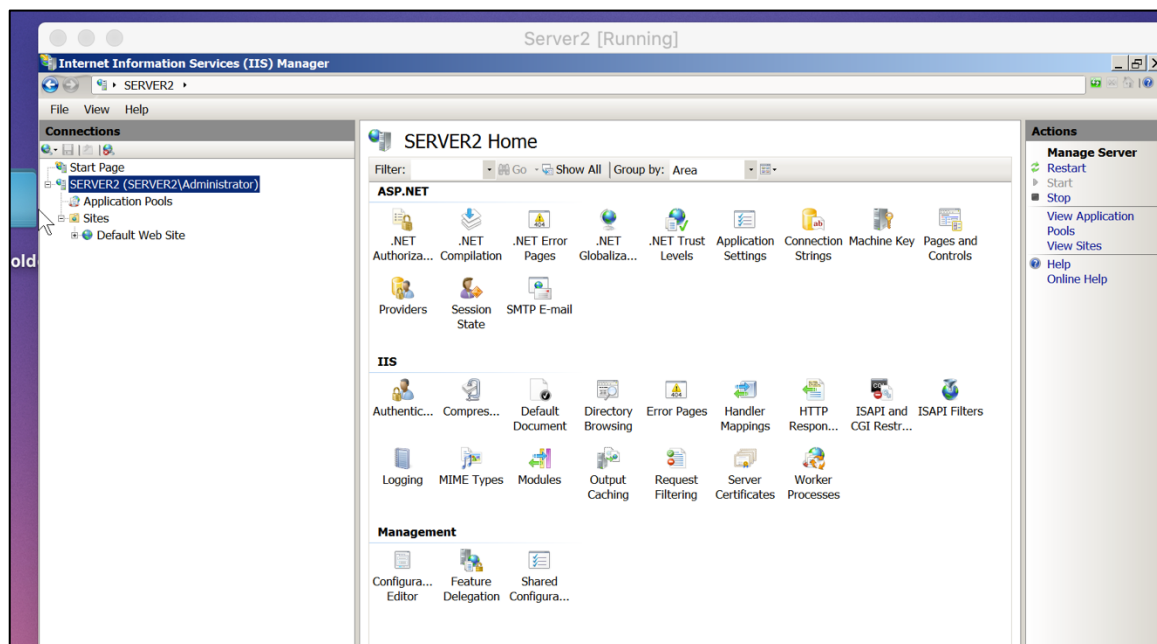


## Creating a Virtual Directory

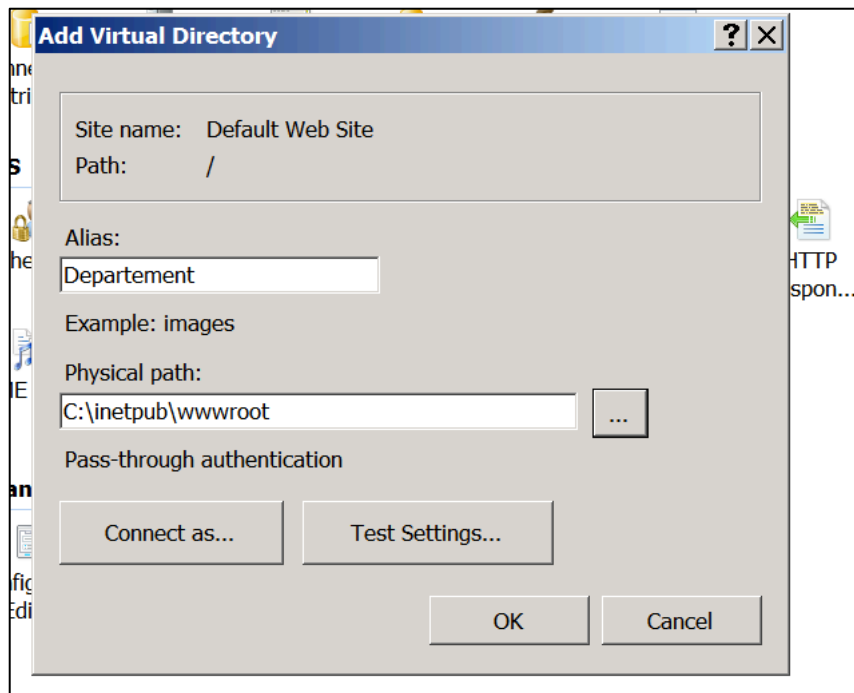
At installation completed in Administrative Tools we can now open IIS Management console



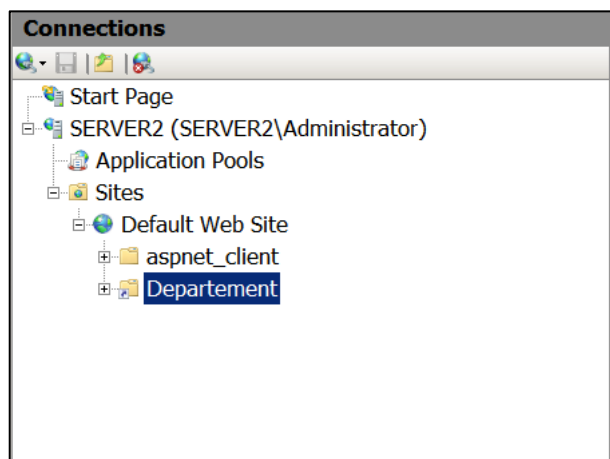
We can now right click on Default Web site to create a virtual directory



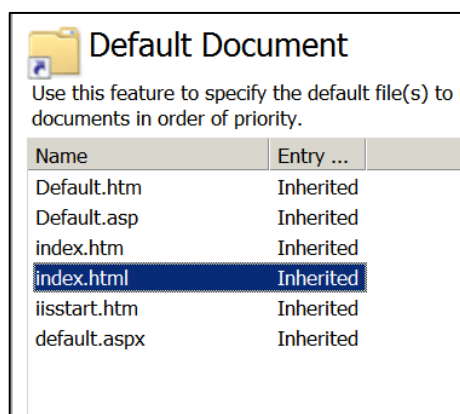
As alias name I choose Departement and as physical path inside the folder inetpub\wwwroot



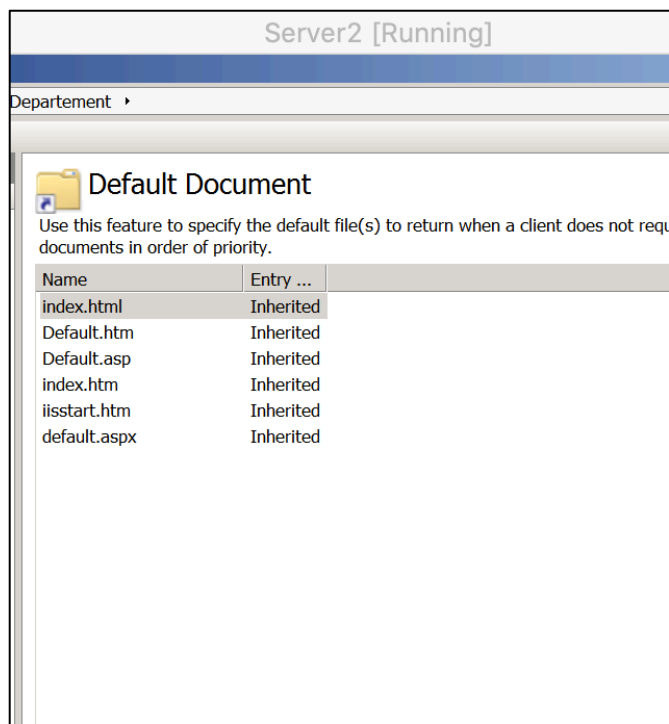
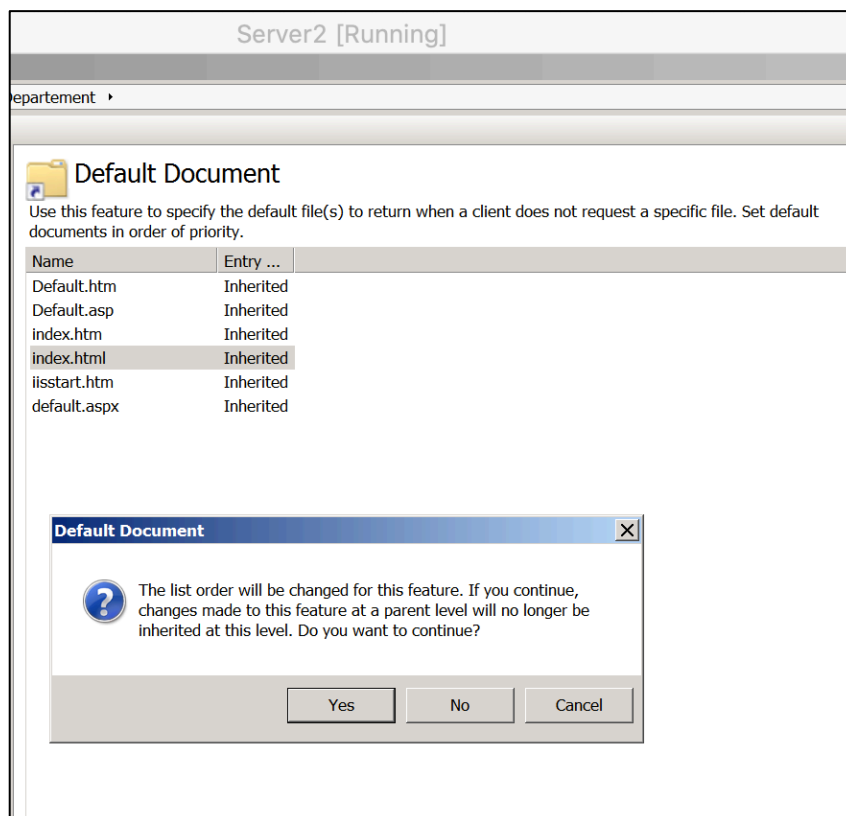
We can now click on the Departement virtual directory



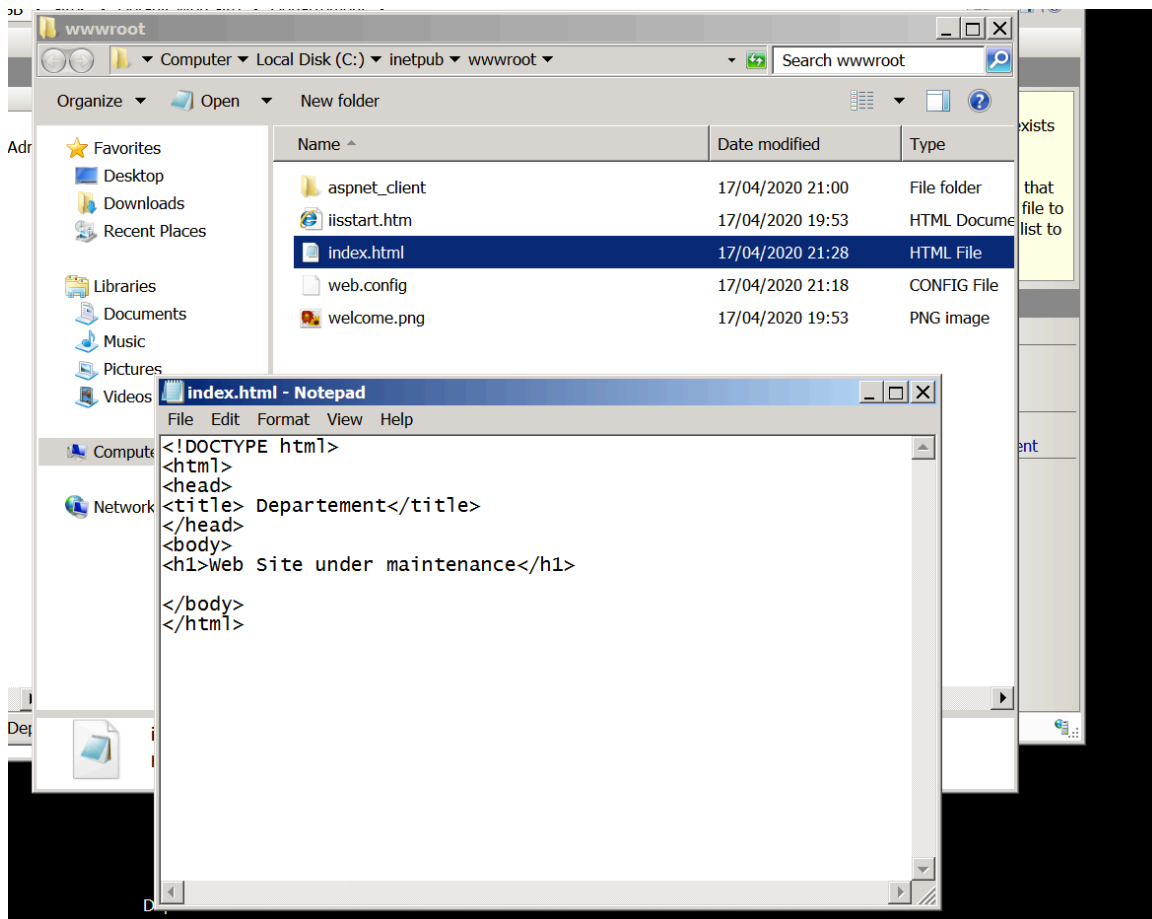
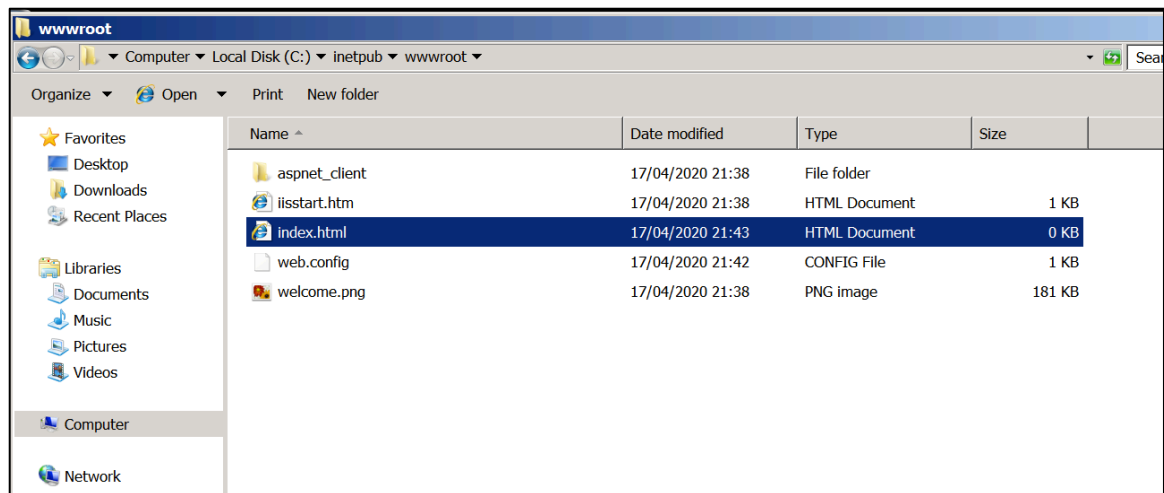
And then on default document where we choose the index.html as our page to create



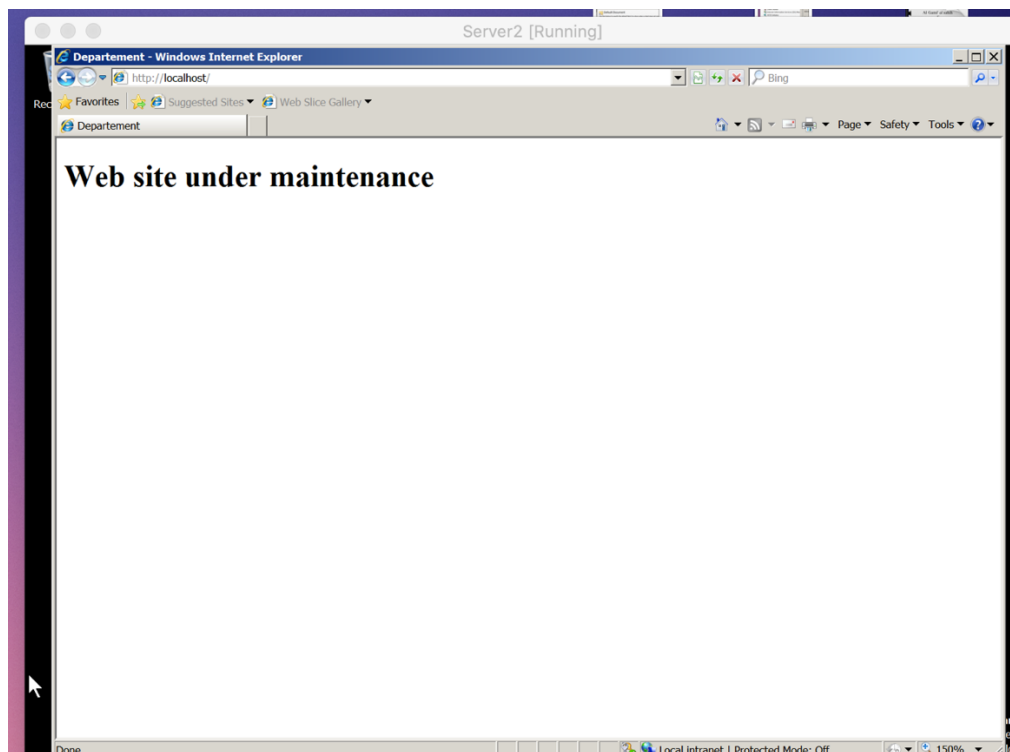
So we need to put index.html in first place in the list as it has to be the default page to open.



We can now create our page, creating a file index.html in the wwwroot folder



We save our page and we open it from internet explorer from Server 2 to check



Now we will open the same page from server 1

