

Study guide by ExamNotes.net

Exam 70-222

Migrating from Microsoft Windows NT 4.0 to Microsoft Windows 2000

Abstract

This ExamNotes Study Guide intends to provide you with information to prepare for the Microsoft W2K 70-222 Exam.

ExamNotes Study Guide Topics Covered

- Different migration types
- Evaluate the migration environment
- Prepare the environment for migration
- Plan and Deploy a Domain Upgrade
- Migrate domains to native or mixed mode
- Perform test deployments
- Implement recovery and fall back mechanisms
- Domain Restructure
- Appropriate Tools for migration

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Before you start

This study guide provides you with information on the many different aspects of "W2K Migration". You should not use this information as your first step into Active Directory, as this exam is targeted towards candidates with solid background on the Microsoft product family. Background on NT 4 is a must, as you need to completely understand the domain structure and trust model of NT 4. You would also need to understand the concept of Active Directory in order for your migration path to be "smooth enough".

By all means read more than one book on the subject and make sure you understand the material well enough. There is no quick way to succeed for this topic. The exam has a lot of questions that do require real life experience. You are suggested to set up 3 machines, one as NT 4 PDC, one as BDC, and one as a Win98 or NT WS client. Try out the upgrade yourself.

You must fully understand all the related concepts and be able to think intelligently to decide what is correct and what is not. This study note can only provide you with a certain degree for assistance in preparation. You must work things out and gain experience before even trying to sign up for the exam.

Restructure At a glance	Migration At a glance
Determine the reasons for restructuring domains.	Determine your migration roadmap.
Determine when to restructure domains.	Determine supported upgrade paths.
Move users and groups.	Examine your existing domain structure.
Move computers.	Develop your recovery plan.
Move member servers.	Determine your strategy for upgrading domain controllers.
Establish trusts.	Determine the order for upgrading domains.
Clone security principals.	Determine when to move to native mode.
Switch to native mode.	

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Migration Planning

Most of the time business-related goals drive the initial migration decision. Examples include the effect of disruption on production systems, final system performance, and ways to increase mean time between failures. No goal is ever driven by the need to implement specific technical features.

Questions you might ask regarding a migration decision would be:

- Is upgrade appropriate for you?
- In what order do you need to upgrade?
- In what order do you need to upgrade domain controllers?
- In what order do you need to upgrade domains?
- In what order do you need to upgrade servers and clients?
- When do you need to switch the domain to native mode?

The planning process consists of the following phases:

1. Design the Windows 2000 forest.
2. Plan the migration of Windows NT domains to Windows 2000 native domains and deploy new features of Windows 2000 Server.
3. Plan the restructure of the Windows 2000 domains if necessary.

Of course, due to different situations, you may need to defer deployment of some of the system features until a later date.

A critical question you should ask yourself - Are your business applications compatible with Windows 2000? If they won't run after migration, you better think twice. Also an important concept to consider is to interoperate with both Windows legacy systems and non-Microsoft operating systems ... headaches.

As part of your domain upgrade plan, carefully manage the transition to the Windows 2000 forest by defining the forest namespace properly, creating the root domain as well as the child domains of the forest carefully, and setting up policies that for sure will not obstruct your future plans.

Since you will be upgrading your servers, make sure they are physically enough for running W2K:

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Requirements:

Component	Minimum	Suggested
CPU	Pentium 133	Pentium II or higher
Memory	128 MB	256 MB or higher
Hard disk space	1 GB	2 GB or higher
Networking	NIC	NIC
Display	VGA	SVGA
CD-ROM	needed for CD based installation	needed for CD based installation
Keyboard and mouse	required	required
Sound card	not required	required for visually impaired users

All hardware should appear on the Windows 2000 Hardware Compatibility List. Otherwise troubles may exist during the upgrade. You can run `winnt32 /checkupgradeonly` to check for compatible hardware and software.

You can run `winnt32.exe` to upgrade from a previous version of Windows NT. Note that Windows 2000 Server will upgrade and preserve settings from the following operating systems: Windows NT 3.51 and 4.0 Server, Windows NT 4.0 Terminal Server, and Windows NT 4.0 Enterprise Edition. However, upgrade paths do not exist for Windows NT 3.51 with Citrix or Microsoft BackOffice Small Business Server. Also, upgrade installations from a network file share are not supported, meaning you must do a CD-based upgrade. As there are registry and program differences between Windows NT and 2000, upgrade packs or migration DLLs might be needed. Setup will look for these automatically.

Domain Upgrade

Domain Upgrade is referred to as "in-place upgrade" or "upgrade". It is the process of upgrading the PDCs and the BDCs of a Windows NT domain from NT Server to Windows 2000 Server. On the contrary, Domain Restructure is referred to as "domain consolidation.", which is a complete redesign of the domain structure to aim at having fewer and larger domains. Note that the above upgrade and restructure options are not mutually exclusive. You may upgrade first and then restructure, or restructure right from the start. Generally speaking, if you can solve your migration requirements by doing a two-phase migration, you should restructure after upgrade.

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If your domain structure cannot be salvaged, restructure at the beginning of the migration process. If you cannot avoid impacting your production environment, go ahead and restructure at the beginning of the migration process. In any case, it is recommended that you restructure after completing the upgrade but before using new W2K features like application deployment or Group Policy.

A successful domain upgrade basically accomplishes the following:

- Maintains access to NT domains through existing Windows NT trust relationships.
- Maintains access to NT servers and to Windows 95 and Windows 98 clients.
- Maintains user account passwords.

When planning an upgrade, you need to:

- Determine the upgrade paths to use.
- Examine the existing domain structure.
- Develop a recovery plan.
- Determine the order for domain upgrade.
- Determine the strategy for upgrading domain controllers.
- Determine when to switch to native mode.

Regarding the order of upgrade, keep in mind that you do not have to upgrade your server infrastructure to Windows 2000 Server before upgrading clients, but you won't be able to access the features of Active Directory until you upgrade your domain controllers.

Supported OS Upgrade Paths:

	Upgrade to W2K Professional	Upgrade to W2K Server
Windows 3.x	No	No
Windows NT 3.1	No	No
Windows NT Workstation 3.51	Yes	No
Windows NT Server 3.51	No	Yes
Windows 95 and Windows 98	Yes	No
Windows NT Workstation 4.0	Yes	No
Windows NT Server 4.0	No	Yes

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Although NT domains use explicit one-way trusts to connect to the forest, domains upgraded as part of the same forest will be connected by transitive two-way trusts by default. You may want to find out which trusts must remain explicit beforehand.

Early in your migration planning, you should consider how much disk space you will need to store the objects required by Active Directory. Take a look at this table:

Object	Disk Space Required in bytes
User object	3.6K
Organizational unit	1.1K
Attribute	100
Public key certificate	1.7K

During the upgrade, you want to be sure that the following are achieved:

- Minimize disruption to the production (working) environment
- Maintain system performance
- Increase mean time between failures / Decrease downtime
- Minimize admin overhead
- Maximize "quick wins" - obtain earliest access to the new key features
- Maintain system security

Disaster Recovery

You should track all changes to the domain while the offline PDC remains offline, because if a disaster occurs you may need to roll back to the offline PDC.

For Windows NT domain that contains only a single domain controller, add a BDC and then fully synchronize them. This will prevent the domain from becoming orphaned if the upgrade to the PDC fails: Once synchronized, remove the BDC from your network and keep it in a safe place. If something goes wrong you can still rely on the complete copy of your network in your BDC.

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The Upgrade and Switching Process

The first step is to upgrade the PDC to Windows 2000 Server. After that you should upgrade all the BDCs as soon as possible, and then switch the domain to native mode.

A domain is still considered as a Windows NT domain if the PDC has not been upgraded to Windows 2000. When you upgrade the PDC and BDCs, the domain is in the intermediate state called the mixed mode. Mixed mode has certain limitations:

Feature	Mixed Mode support
Transitive trusts for Kerberos authentication	Yes.
Active Directory organizational units (OUs)	Yes.
Active Directory security groups	No.
IntelliMirror	Yes.
Windows Installer	Yes.
64-bit memory architecture	Yes.
Active Directory scalability	Yes.
Kerberos authentication	Yes.
MMC	Yes.
Group Policy	Yes.
Security configuration and analysis	Yes.
Active Directory multiple-master replication	Yes.

As you can see from the above table, Active Directory security groups as an important security measure is NOT supported in mixed mode.

Group Type Support in Mixed Mode:

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Group	Membership	Scope	Support in Mixed Mode
Local	<ul style="list-style-type: none"> The same forest Other trusted forests Trusted pre-2000 domains 	<ul style="list-style-type: none"> Computer wide 	Yes
Domain Local	<ul style="list-style-type: none"> The same forest Other trusted forests Trusted pre-2000 domains 	<ul style="list-style-type: none"> The local domain 	No
Global	<ul style="list-style-type: none"> Local domain 	<ul style="list-style-type: none"> Any trusted domain 	Yes
Universal	<ul style="list-style-type: none"> The same forest 	<ul style="list-style-type: none"> Any trusted native mode domain 	No

Another important area of concern is the ability to nest group. Active Directory store must update in a single transaction. A change to the membership requires the whole membership list to be replicated. If the list is large problem will occur. Microsoft's recommendation on group membership is 5,000 members. The only way to get around with this is to nest groups to increase the effective number of members. This requires your domain to be in native mode.

Note that when you set the native mode switch, the domain can still contain member servers running Windows NT Server 4.0. Also, once you switch to native mode, you cannot switch back to mixed mode.

It is recommended that you upgrade your domains in the order as follow:

1. Account domains
2. Resource domains

Guidelines to follow when upgrading the Account domains:

- Mitigate risk and maintain control. Upgrade the account domains in which you have the easiest access to domain controllers first.
- Minimize disruption. Upgrade the account domains with fewer users and with local control of domain controllers first to minimize disruption to the

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greatest number of users. After you have gained experience, move on to upgrading the larger account domains.

- Identify account domains that are targets for restructure. Since you cannot consolidate domains into a target domain that does not exist, so you better identify the account domains to be restructured.

In NT, resource domains were used to hold resources. Resource domains are for limiting the size of the account database and for providing local administrative capability. You can upgrade your resource domain to be in the same forest as the user account domains, then limit the capabilities of the local administrators with Windows 2000 delegation of administration features. Remember, after the PDC is upgraded, you must create a new domain local group to hold the resource administrators. You must also use Windows 2000 delegated administration to grant them sufficient privilege to carry out their roles.

To upgrade resource domains, choose domains in which new applications will require Windows 2000 platform or features first. Then choose domains with many clients. Finally choose domains that are targets for restructure.

During the switch from mixed mode to native mode, the following will happen:

- Netlogon synchronization is switched off.
- Cannot add BDC any longer.
- Only Active Directory multiple-master replication between domain controllers is active.
- All domain controllers can now perform directory updates.
- Windows 2000 will designate the role of PDC emulator to the former PDC. All pre-Windows 2000 clients will use the PDC emulator to locate the PDC and perform password changes.

PDC emulator appears as a Windows 2000 domain controller to other Windows 2000 computers, and as a Windows NT PDC to pre 2000 computers. The PDC emulator can still be used to create new security principals and to replicate these changes to the Windows NT BDCs, and if the PDC emulator becomes unavailable, and if another Windows 2000 domain controller exists in the domain, then that domain controller will need to be made as the PDC emulator. The bottom line is, when everything is W2K, you do not need PDC emulator at all.

After the upgrade, Windows NT local groups become Windows 2000 local groups, and Windows NT global groups become Windows 2000 global groups. When you switch to native mode, all local groups on the PDC become domain local groups.

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NTLM is an authentication protocol that is the default protocol for network authentication in Windows NT. It is retained in Windows 2000 only for backward compatibility purposes. In W2K, Kerberos Authentication is the default. Kerberos authentication is a ticket-based protocol, meaning users are issued Ticket Granting Tickets (TGTs) by the Key Distribution Center (KDC) on a Windows 2000 domain controller at initial logon. TGTs contain authentication information about the user.

TGTs are encrypted with a key known by the KDC. After the client obtains the TGT, it will be presented to the domain controller for additional service tickets to connect to other servers in the domain.

Replication

Windows NT Server's replication facility is known as the LAN Manager Replication Service. It uses the concept of import and export directories. File Replication service FRS in Windows 2000 Server is the replacement. Since Windows 2000 Server does not support LAN Manager Replication Service, you will need to include a strategy in your upgrade plan for moving to FRS.

FRS in Windows 2000 Server is automatically configured. Every domain controller (and ONLY domain controller) has a replicated System Volume with the name SYSVOL. Any change is replicated in multiple-master fashion to other domain controllers automatically.

To keep LAN Manager Replication Service available during the upgrade process, upgrade the server hosting the export directory only after all the other servers hosting import directories have been upgraded. If unfortunately the export server is the PDC, select a new export server and reconfigure LAN Manager Replication Service.

Another way of supporting LAN Manager is by creating a bridge between LAN Manager Replication Service and FRS to keep both services operate. You do this by selecting a Windows 2000 domain controller to regularly copy the files that will be replicated to the Windows NT export directory via a scheduled script.

If you are using Routing and Remote Access Service in Windows NT, consider to upgrade it early in the process of upgrading member servers.

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Domain Restructure

The top reasons for domain restructure are:

- Greater Scalability.
- Admin Delegation.
- Finer Admin Granularity.

Restructuring will generally involve the following:

- Moving security principals, users and global groups, computers, and member servers.
- Establishing trusts.
- Cloning security principals.

Always remember, when you move a security principal between domains, the security principal must be issued a new SID for the account in the new domain. Windows 2000's SIDhistory is an attribute of Active Directory security principals for storing the former SIDs of moved objects

Moving creates a new identical account in a destination domain and removes the account from the source domain. The move operation cannot be undertaken if there are problems with the migration. To be safe, you should migrate users incrementally to a Windows 2000 domain while maintaining the old accounts in the source domain. You do this through cloning - creating a duplicate user or group through the use of ClonePrincipal.

The last step of restructuring involves the decommission of the source domain. This involves powering off and removing first the source domain BDCs and then the source domain PDC.

Tools for Migration

You use ClonePrincipal to migrate users incrementally to a Windows 2000 environment without impacting your existing Windows NT environment. In addition to migration, you can consolidate large numbers of small resource domains into Windows 2000 OUs by using ClonePrincipal to clone local groups.

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ClonePrincipal is a utility that consists of:

DSUtils.ClonePrincipal, a COM object supporting three methods: AddSidHistory, CopyDownlevelUserProperties, and Connect.

Netdom is a tool that allows you to manage Windows 2000 domains and trust relationships from the command line. You may use Netdom to join a Windows 2000 computer to a Windows NT or Windows 2000 domain, with the options to:

- specify the OU for the computer account
- generate a random computer password for the initial join

You may use Netdom to manage computer accounts for domain member clients and member servers. Activities include Add, Remove, and Query. You also use Netdom to establish and manipulate one- or two-way trust relationships between domains.

Active Directory Sizer lets you estimate the hardware required for deploying Active Directory in an organization based on the organization's profile, domain information and site topology. You may want to use it before the migration takes place.

By ways of user inputs and internal formulas, Sizer estimates the number of:

- Domain controllers per domain per site.
- Global Catalog servers per domain per site.
- CPUs per machine and type of CPU.
- Disks needed for Active Directory data storage.
- Amount of memory required.
- Network bandwidth utilization.
- Domain database size.
- Global Catalog database size.
- Inter-site replication bandwidth required.

Sysprep is a utility that helps prepare a Non Domain controller Win2K Computers for disk duplication or imaging. Creating an image of a reference computer is preferable to using other unattended answer files, as it is generally faster and easier to distribute. For migrating your non-DC servers or clients to W2K, you may consider this as an option.

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