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Prepared by OS Integration

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Contents

Compaq Tips and Tricks for Novell Directory Services (NDS)

Abstract: This Integration Note provides some of the most useful tips and tricks to help network administrators, developers, and users in planning, designing, managing, and optimizing Novell Directory Services (NDS).

More specifically, we offer tips in the following areas:

- Migrating from NetWare 4.1x to NetWare 5 and an upgraded NDS
- Planning and designing your NDS
- Replicating your NDS
- Extending a schema
- Managing your NDS
- Improving NDS operations

Then we provide up-to-date information on NDS v8, LDAP, NDS for NT v2.0, NDS Tru64, and integrating AOL Instant Messenger into NDS.

Lastly, we list some great, information-packed websites where you can find more NDS information.

Help us improve our technical communication. Let us know what you think about the technical information in this document. Your feedback is valuable and will help us structure future communications. Please send your comments to: Novell.feedback@Compaq.com

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Compaq Tips and Tricks for Novell Directory Services (NDS)
Integration Note prepared by OS Integration

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Overview of Novell Directory Services

A well-integrated family of distributed directory-based services, Novell Directory Services (NDS) organizes, categorizes, and names all resources within a network—servers, volumes (data), applications, printers, and with NetWare 5, workstations. The result? Accelerated user access, increased security across the Internet, and better central management of your enterprise networks. Since NDS also works well with Linux, Solaris, OS/390, and Microsoft Windows NT3.51 and 4.0, it can be ported to other operating systems or installed in heterogeneous (a big word for mixed) and multi-platform networks.

Too many kudos, too little space.

A quick history lesson, then we'll get rolling on the good stuff. In 1994 Compaq and Novell were already jointly testing NDS and soon offered network users, developers, and administrators the benefit of access to all available objects (resources). The unique design of NDS provided these features:

- Single point of network administration
- Flexible and scalable directory database schema
- Consistent cross-development environment
- Unequaled network security

NetWare 3 bindery services gently gave way to this new database concept of networked services and user information distributed globally over the entire network. NetWare 4.x quickly took advantage of the new technology, a technology that continues to evolve and expand. Then, NetWare 5 offered an enhanced version of NDS with innovative management capabilities, such as catalog services, simplified login, role-based management, and LDAP v3 (explained later) support.

NetWare 5 and NDS soared in popularity. Authentication, Access Control List, Public Key Infrastructure (PKI), top-down, hierarchical architecture, public-key cryptography, and digital certificates became common office terms, much like *coffee* and *break time(!).*

Now NDS v8 has hit the deck running and is edging closer and closer to a comprehensive, full-service directory! NDS v8 allows any LDAP-enabled client (yes, we'll get to LDAP soon), browser, or application to access information stored in the NDS database. In addition to performance enhancements, NDS v8 includes an additional container object called domain, allows complete auxiliary class support—NetWare 5 only supported three auxiliary classes— and extends NDS into the Internet and enterprise directory niches with no loss of functionality.

The bottom line: NDS v8 is today's full-service directory that simplifies, automates, and protects information while taking full advantage of emerging information and technologies.

Note: If you've been burned by a .0 release in the past and vowed never to install the first release of a product again, you'll be happy to hear that Novell has just released the NDS v8 NetWare Update (a fancy name for Support Pack 1). Now, you can join in the NDS fun without all the worry. See http://www.novell.com/download/#NDS.

Now…on with the tips!

We've gathered a bunch of tips from Compaq and Novell engineers, blatantly copied text from *Novell AppNotes* and *Developer Notes*, and lifted (stole) information from Compaq and Novell websites. There's no excuse for what we're doing, except to get more information to more people in the fastest way we know. So, enjoy.

Migrating from NetWare 4.1x to NetWare 5 and an Upgraded NDS

Before you jump into NetWare 5 (or any new upgrade) and an updated NDS, plan ahead. You might not know, for example, that to install NDS, as well as NetWare 5 itself, you must have a Network Interface Controller (NIC) already installed with the proper driver. Without a functional NIC, your NDS installation is doomed for failure. Here are a few more tips in this area:

- Verify the requirements of your applications. If you still use some NetWare 3 applications, they may not be compatible with NDS and, therefore, still require bindery emulation.
- Bindery services are automatically enabled when you install NetWare 5, however, if the network includes Macintosh network nodes, you must either leave bindery services enabled or install the MAC OS Client, which is NDS-aware.
- Verify the ability of your backup software to backup and restore NDS.
- Verify your bandwidth, as increased bandwidth is necessary for NetWare 5.
- Verify your memory, as NDS and time synchronization create overhead.

Next, you must update the NDS on all NetWare 4.1x servers in the tree to ensure reliability of the NDS tree and compatibility between servers. You will need to download the latest NetWare Support Pack from the website http://support.novell.com and the latest Novell Support Connection Minimum Patch List at http://support.novell.com/misc/patlst.htm.

Proper, prior planning prevents poor performance.

Are you migrating from NetWare 4.11? You'll also need *DS.NLM* v6.02 and *DSREPAIR.NLM* v4.62. Are you migrating from NetWare 4.10? Use *DS.NLM* v5.15 and *DSREPAIR.NLM* v4.59. By the way, these files not only contain NetWare 5 compatibility fixes, but you receive a free gift just for downloading the software: a Year 2000 fix.

One last tip in this area: To start NetWare 5 without running NDS, type SERVER –ND. Why would you want to do this? It's useful when debugging an NDS issue.

For more information on migrating from NetWare 4.x to NetWare 5, as well as updating your NDS, read through the white papers from our website at www.Compaq.com. You can also find some great information on the Compaq ActiveAnswers Resource Paq for Novell. See the partnership website www.compaq.com/partners/novell.

Planning and Designing Your NDS

All networks need solid NDS tree design in order to ensure easy access to the services and applications that rely on the directory. The NDS tree structure also affects network security and ease of management. So keep a few things in mind:

- Keep the design as simple as possible. Novell recommends that you use no more than five levels because flat trees are more stable and easier to troubleshoot.
- A good design provides NDS fault tolerance while reducing synchronization traffic, especially across a WAN. (If this traffic crosses WAN links unmanaged, it needlessly increases costs and overloads slow WAN links during high-usage periods.
- To minimize traffic between remote sites, keep network services; such as NDS, login, authentication, time, file, and print services, local to the remote user.
- In general, do not include dial-up sites in a corporate tree. Create a separate tree for each site.
- Standardize naming conventions for all objects and enforce the convention.
- Naming conventions for non-NetWare environments, such as ActiveX, are different.
- Avoid duplicate Server Names, Internal IPX Numbers, or Tree Names.
- Remember, the first NDS server installed on the network holds the master replica by default.
- Do not install the same server in more than one NDS tree.
- In order to communicate properly within a mixed-protocol environment running the Migration Agent, the agent must be loaded on the server with the NDS master replica. Otherwise, an IPX server will not be able to connect.

Do you think you'll ever move your servers to another floor or another building? With reorganizations a common occurrence in enterprise operations, steer away from tying server names to a specific department. You'll eliminate the need to continually rename servers.

Simple is better.

And, mind your *P*s and *Q*s. For NDS, we'll add "and your periods." Generally, periods in NDS names separate objects, similar to a slash in a file directory name. However, in NDS, we have two periods: *leading* and *trailing*. Here are two tips about when and where to place those dots.

- Distinguished (or Complete Names) and Relative Names don't use a *leading* period; Fully Distinguished Names do. Why? Because a leading period means that NDS will resolve the name from [Root], regardless of the object's current context.

- Only use *trailing* periods in relative naming. For each trailing period in a Relative Name, NDS resolves the name from one container closer to [Root]. Each trailing dot removes one naming component from the default context. That means two trailing periods remove two name components from the default content.

Got all that? Great! Now look at Table 1, which summarizes some additional NDS design guidelines for partitions and replicas shared at BrainShare 99.

Table 1. NDS design rules from BrainShare 99

NDS Design Rules		
	For NetWare 5 and NDS v8	**For NetWare 4.x**
Tree size	Unlimited (tested to 1 billion objects)	Unlimited number of objects
Partition size	Unlimited (tested to 100 million objects)	10,000 + objects
Subordinate partitions	Unlimited (tested to 75 partitions)	30-40 partitions
Replicas per partition	Unlimited (always have 2 or 3)	10 replicas
Non-dedicated replica server	50 replicas	20 replicas
Dedicated replica server	150-200 replicas	

And here are four tips from a Compaq engineer ….

- Create groups for anything that two or more persons share in common. Assign the Group the rights that it needs and assign users to those rights.
- Create another emergency Admin account just in case the Admin account gets corrupted. Protect the password and audit the account for usage.
- Backup your NDS by using *NWCONFIG.NLM*, particularly after doing any large NDS changes.
- If you have a medium-to-large network and you want to be sure that your master replica is protected, you may want to establish a dedicated NDS server. Its sole purpose? Be a dedicated master replica. The probability of the server crashing is minimal. Think about it! Since the master replica is not busy with file serving processes, running databases, or performing web functions, your NDS activities will run faster.

  A good server example: a 4-GB Compaq ProLiant 1850R—moderate power, moderate disk capacity, SYS: volume protection (RAID 1 or 5), and inexpensive. Of course, you'll only reap the benefits if you stand firm and allow no one to store data on this server. And, remember, this server must have an NDS Tree Name and be the first server installed on the network.

Replicating Your NDS

Do not copy individual .NDS files from one server to another. If your network has more than one NDS server, you can replicate the NDS Directory. Replication simply means that your network has more than one copy of the Directory, and NDS automatically keeps all the copies up-to-date, or synchronized. Keeping multiple copies of the directory lets users continue to log into the network and use the remaining resources if servers or network links fail.

Beware: NDS replication is not a back-up solution. The replication and synchronization process only replicates information about NDS objects, not files and documents.

Extending an NDS Schema

Use Schema Manager—if you have Supervisor rights to the [Root] of the tree—to view and customize all aspects of the schema. Of course, you can cause a lot of damage if you don't know what you're doing, so not many people have Supervisor rights at the [Root]. You can find Schema Manager on the Object menu in NDS Manager (*NDSMGR32.EXE*). Once you're in Schema

Manager, there's a handy wizard that will take you through the process step-by-step. The wizard even includes a Help function to answer any questions you have during the process.

You can also find a discussion of the process in the NetWare 5 documentation. And, if you're not using NetWare 5 yet, there is a DOS utility called *NDSSCH.EXE* that will read a file in the .SCH format (like you'll find in *SYS:SYSTEM\SCHEMA* today) and can extend the schema. Another and perhaps more common option to extend the schema is to write to the NDS API set directly from your application.

Managing Your NDS

You probably know that understanding the nuts and bolts of your NDS tree is vital to successful and proactive directory management. You probably also know that to reduce unnecessary traffic overhead, enhance NDS performance, and reduce costs, you need network traffic baseline documentation that will help you understand what objects and processes are generating the traffic. Right? But, did you know about DSAnalyzer, DSREPAIR, and DSTRACE? These are true jewels.

NetPro DSAnalyzer 1.0

DSAnalyzer collects and displays data all the way down to the object level, making it possible for you to establish baselines for network traffic with a few simple steps. You can view such potential NDS issues as excessive tree walking, backlinking, replication storms, and extreme hop counts. And, armed with this data, you can make decisions that reduce unnecessary traffic overhead and reduce costs.

Let’s look at how you could baseline the performance of your network without DS Analyzer.

✍ You RCONSOLE into each server that you want to monitor and write down specific measurements for each respective server on your tree. This task might take one hour to several hours, depending on the number of servers you want to monitor and the time required to gather the required statistics using existing Novell tools. (These tools might include *MONITOR.NLM*, *DSTRACE.NLM*, NDS Manager and *DSREPAIR.NLM*.)

✍ Next, you take measurements and manually enter them into a spreadsheet (Excel, Lotus, and so forth). Again, this task may require several hours of time.

✍ Finally, you use the statistics in the spreadsheet to create a graph to represent the network’s health.

Yet, even if these tasks are important, it’s likely that the tasks would remain at the bottom of your list because of competing priorities and problems. Now, be honest.

Ok, now let’s look at baselining performance with DS Analyzer. Just do these three things.

- Load DS Analyzer on your server.
- Plan for an optimal baseline by evaluating the start and end points for existing data (representing optimal state) to be used for comparison. Then schedule the interval of time when you would like to take your measurements. (When a graph reflects a healthy NDS tree,

it's an excellent time to establish a baseline to measure the effects of growth and changes on your network. In the future, when you suspect a problem, you can use the baseline to measure progress against optimization or problem resolution.)

- Click DS Analyzer's Tools → Baseline Information → Establish Baseline. Simply enter the start and end points that will serve as the baseline.

Voila! Magic! DS Analyzer instantly creates an easy-to-read graph or pie chart from the traffic information it gathers. The data can also be exported to a log file to save a record of the information. This process takes minutes rather than hours.

DSREPAIR.NLM

The DSREPAIR utility (*DSREPAIR.NLM*), run from the server console or via the RCONSOLE utility, is another important management tool that performs three basic functions:

- Corrects or repairs inconsistencies in the NDS database
- Checks NDS partition and replica information and makes changes where necessary
- Initiates replica synchronization

In fact, the Unattended Full Repair Option automatically performs **ALL** possible repair operations that do not require operator assistance. Now, that's good to have!

DSTRACE.NLM

Moving on up to the big time….

In previous versions of NetWare 4.x, DSTRACE referred to a group of **SET** commands available at the server console. DSTRACE was often referred to as a utility, however it was really just a group of server **SET** commands monitoring how NDS was functioning—and dreaming of better things to come. Its big day came with the release of NetWare 5. *DSTRACE.NLM* (also called the NDS Trace Event Monitor) became a real utility and expanded monitoring capabilities. Now DSTRACE commands do the following:

- Monitor the status of NDS synchronization process
- View errors that occur during NDS synchronization

Read more about *DSREPAIR.NLM* and *DSTRACE.NLM* in the next section.

Weekly Health Checklist

Experience has shown that if the status of NDS is properly verified before and after operations are initiated, NDS management can be virtually error free. One of the most popular NDS tips comes from the Novell Support Knowledgebase (TID 2913292): complete a weekly NDS health check. So, we've included the following checklist (Table 2) that outlines ten basic NDS maintenance and prevention checks to do each week for every NetWare 4.1x and NetWare 5 file server. Like taking out the trash and washing clothes, make this health check part of your weekly routine.

Table 2. Weekly Health Checklist for NDS

Weekly Health Check for NDS	
Operation	**Explanation**
DS versions (DSREPAIR)	The *DS.NLM* should be the same version on each NetWare file server in the tree. That is, all 4.10 servers should be the same version; all 4.11 servers should be the same version, and all NetWare 5 servers should be the same version. Performing a time synchronization check within DSREPAIR will report the *DS.NLM* version for each NetWare file server in the tree. Also see the section "Migrating from NetWare 4.1x to NetWare 5 and an upgraded NDS."
Time synchronization (DSREPAIR)	Time synchronization is critical for directory services functions. This operation can be performed from the Available Options menu of DSREPAIR.
Server-to-server synchronization (DSTRACE)	A server must have a replica to display any directory services trace information. From the file server console, perform the following routine: • Type **SET DSTRACE=ON** (this activates the DSTRACE screen for directory services transactions). • Type **SET DSTRACE=*H** (this initiates synchronization between file servers). • Press **Ctrl** + **Esc.** • Select Directory Services Trace screen. If there are no errors, you will see the message: "All processed = YES." This message will be displayed for each partition contained on this server. If the information is more than can fit on a single screen, use these commands: • **SET TTF=ON** (sends DSTRACE screen to *SYS:SYSTEM\DSTRACE.DBG)*. • **SET DSTRACE=*R** (resets the file to 0 bytes). • **SET TTF=OFF** (once NDS has completed synchronizing all partitions). Then, continue with these actions: • Map a drive to your server's *SYS:SYSTEM* directory. • Run a text editor and open the *DSTRACE.DBG* file. • Search for "-6" (this will show any NDS errors during synchronization, such as -625). • Search for "YES" (this will show successful synchronization for a partition).
Replica synchronization (DSRESPAIR)	A server must have a replica for this operation to display replica synchronization status. In DSREPAIR from the Available Options menu, select *Report synchronization status.*
External references (DSREPAIR)	In DSREPAIR from the Available Options menu, select *Advanced options*. Then select *Check external references*. This option will display external references and obituaries and will show you the states of all servers in the back link list for the obits.
Remote server IDs (DSREPAIR)	For NetWare 4.x servers only: In DSREPAIR from the Available Options menu, select *Advanced options*; then select *View remote server ID list*. Press **Enter** and this should bring up the Remote Server ID Options menu; select *Verify all remote server IDs*. This option executes authentication from server to server using the remote server's ID. This option verifies this server's ID on the other servers. **Note**: NetWare 5 servers do not use Remote ID to synchronize, so this is not applicable to them.

Table 2. Weekly Health Checklist for NDS

Weekly Health Check for NDS	
Operation	**Explanation**
Replica state (DSREPAIR)	In DSREPAIR from the Available Options menu, select *Advanced options*, then select *Replica and partition operations* and verify that the replica state is ON.
Replica ring (DSREPAIR)	Run DSREPAIR on the server holding the master replica of each partition and also on one of the servers holding a read/write replica to check for replica ring mismatches. From the Available Options menu, select *Advanced options,* then *Replica and partition operations*, then Vie*w replica ring.* Verify that the servers holding replicas of that partition are correct.
Schema (DSTRACE)	A server must have a replica to display any directory services trace information. From the file server console, perform the following: • Type **SET DSTRACE=ON** (this activates the trace screen for directory services transactions). • Type **SET DSTRACE=+SCHEMA** (this will display schema information). • Type **SET DSTRACE=*SS** (this initiates schema synchronization). • Press **Ctrl** + **ESC**. • Select *Directory services.* • Check for the message "SCHEMA: All Processed = YES."
Repair local database (DSREPAIR)— **IMPORTANT**: This step should be performed after business hours and only when errors occur during checks.	This option will lock the directory services database. Authentication cannot occur on this server with directory services locked. That is, users will not be able to login to this server during this operation. **Note:** In some cases, if left operating, DSTRACE will increase utilization. After completion of all DSTRACE checks, type the following DSTRACE commands: • Set DSTRACE=NODEBUG. • Set DSTRACE=+MIN. • Set DSTRACE=OFF. This will minimize filters and turn DSTRACE off.

Improving NDS Operations

Here are six operational areas that often cause headaches if not handled properly.

Performing Partition Operations

When performing partition operations, remember these tips:

- Centralize the partition operation administration**.**
- Consider how a partition operation will affect the NDS tree.

- Check replica ring synchronization before performing a partition operation.
- If you suspect errors, verify the partition operation on the back end from the master replica.
- Do not change read/write to master under partition error conditions.

For more details, see *Novell AppNotes*, January 1999.

Changing Server Names

Think ahead!

NDS contains information about server objects, based upon the server name and object ID. Other servers in the NDS tree use the server internal IPX address as an external reference. If you change the server name, object ID, or internal address, you can create problems in the NDS environment. You could also lose user rights. So avoid changing the internal IPX or File Server Name.

If you must change a server name, delete the first server name. NDS will take care of the details for you and replicate this information to all the other replicas in the ring. Of course, the larger your tree and the more partitions you have, the longer you'll need to wait after deleting the old server name.

Do a **SET DSTRACE=*L** to start the limber process, which verifies the IPX addresses and server names. If you get an "All Processed = Yes" response, you can (with confidence) rename the server in your *AUTOEXEC.NCF* file. Don't forget to rename the volumes using NWAdmin. Lastly, down the server and bring it back up.

Backing Up and Restoring NDS for Planned Hardware Upgrades

Before you begin the backup and restore process, be aware of the dependencies that other servers currently have on the server you are upgrading. Take into consideration processes such as NDS time synchronization. If the server plays a crucial part in the time synchronization of the NDS tree—let's say a reference-time provider—you need to reassign the time server functions and responsibilities to another server before you run *INSTALL.NLM*. Also see the Novell Technical Information Document (TID) *2908156 Time Synchronization Issues and Definitions* and TID 2911661 *Changing Time Source Type* for additional information. Both documents are available at http://support.novell.com.

Let's continue*….*

Use NDS Manager to verify the integrity of the tree and the synchronization status of the partitions/replicas that the candidate server contains. Resolve any errors before continuing. It is important that NDS partition and replica information remain consistent during the entire upgrade process.

IMPORTANT: Do not add or remove any replica/partition types during this time; do not uninstall or reinstall any existing servers; and do not install any new servers until the Save and Restore procedure is complete.

If you do not maintain consistency of the tree (including partitions, replicas, and placement of replicas, and servers), the INSTALL verification process will return a –601 error during the Restore phase, and the process will not be completed.

Make sure you also have a current tape backup of the entire server. If the server to be upgraded contains the master replica of your NDS tree, you will need to move the master replica to another server using *DSREPAIR.NLM*.

Because other servers in the tree are expecting the server to come back online quickly, you should not plan to take several days to upgrade the server. Complete the upgrade promptly and restore NDS information on the server as soon as possible.

Use *INSTALL.NLM* to (1) save NDS information a hardware upgrade and (2) restore NDS information after an upgrade.

The **Save Local DS Information Prior to Hardware Upgrade** option prepares the NDS information on the server prior to the upgrade and creates a *BACKUP.NDS* file in the *SYS:SYSTEM* directory. *BACKUP.NDS* stores all the NDS information for this server, including replica information. This option also locks and disables the NDS database on this server, preventing certain NDS operations on this server from taking place. To other servers that normally communicate with this server, the server appears to be down. Any NDS information that normally is sent to the locked server is held by other servers in the tree; when the server comes back online, this stored information is used to synchronize the NDS database on this server to the other servers in the tree.

Tip: When backing up your NDS database, the default is A: for copying to a diskette. However, in most cases, the NDS database will not fit on a floppy. So, press **F3** to specify a different path. You might want to specify a temporary directory on the local hard drive of your workstation. If you are copying the file to another server, type the second server name and path, and authenticate to the remote server as prompted.

The **Restore Local DS Information after Hardware Upgrade** option uses *BACKUP.NDS* to restore NDS information on the server. Before the NDS information is restored, INSTALL verifies that the server is in the same relative state as before the upgrade. INSTALL verifies that the server object and authentication keys still exist and that the server still exists in all the replica rings for replicas that were on this server before the upgrade.

Tip: If you copied *BACKUP.NDS* to a second server, you might need to re-authenticate as prompted.

IMPORTANT: Remember that these backup and restore tips do not consider the PCI Hot Plug feature on Compaq ProLiant Servers. With this feature, drives and other hardware can be added, removed, or replaced while the server remains up and running.

Removing an NDS Tree

To remove a corrupted NDS tree from a server, type LOAD INSTALL /DSREMOVE to avoid authenticating to NDS. Then you can remove the tree, without the password (it may prompt you, but it won't verify for password).

Removing a Server

Do not just pull out the power plug. Repetition might be appropriate here. Do not just pull the plug on a network server. A server that is abruptly removed from the NDS tree can generate NDS and time synchronization problems. Heed these warnings:

- IIf the server has replicas of distributed partitions and participates in time synchronization activities, you must remove the replicas and remove the server from a replica list **BEFORE** downing the server.
- If the server that you are removing has the master replica, you must change the replica type and assign a new master replica.
- If the server is a single-reference-time server, designate one of the secondary-time servers as a temporary single-reference-time server until it is connected.

Also see the next section.

Recovering From a System Crash

When a server crashes, fails, or is taken out of an NDS tree without properly removing NDS from that server, you need to take several steps to ensure that the remaining network servers can synchronize correctly

WARNING: Deleting a server object for a failed server will cause loss of server references for that server unless proper steps have been taken.

Tip: If a server fails and this server will be replaced, follow TID # 2920601.The DSMAINT -PSE procedure will retain links to home directories, directory map objects, and NDS-aware printing that will be otherwise lost if the server object is just deleted.

Tip: If time is not synchronized, changes cannot properly be made to the directory services tree. See TID 2908867 for time synchronization help.

Tip: If a server goes down permanently or is replaced without removing NDS, the replicas it contained will have incorrect replica ring information. You must clean the replica rings, otherwise each server in each of the replica rings will still think the downed server should be contacted with updates whenever they occur.

Tip: Verify that a master replica exists for each partition. Run DSREPAIR.

Tip: Clean up the NDS Tree. (server objects). Run PARTMGR or NDS Manager in Windows.

Note: You might need to bring the server DOWN before you can delete the server object.

NDS v8 and LDAP

NDS v8 is the next generation of Novell Directory services that focus on scalability, performance, LDAP v3, and management. Based upon NetWare 5 code, NDS v8 will be available only for NetWare 5 servers with Support Pack 1 already installed.

At this time, NDS v8 is available free from Novell's product download site at http://www.novell.com/download, along with the NetWare 5 Support Pack 1 and the new DSREPAIR and BULKLOAD utilities.

Now, are you ready for the big event? LDAP has arrived!

No, LDAP is not a directory; it's a client-server access protocol. This Lightweight Directory Access Protocol (LDAP) is rapidly becoming a standard, and anyone who is serious about developing a directory or directory-based application will have to provide support for LDAP.

Finally the scoop on LDAP….

It actually started out as a means to simplify access to x.500 compliant directories and is now controlled by the Internet Engineering Task Force (IETF). Some analysts speculate LDAP client software will soon become a standard feature of Internet browsers and the standard protocol for accessing directory information over the Internet.

Because your NDS search application is built to use LDAP, and so are each of the three directories you have on your network, it can search all user objects in each directory and easily find the required information. This means you don't need a separate directory-specific search application for each of the three directories on your network. LDAP not only saves you time, but saves you money as well.

As you might remember from that class on NDS you took way back when (?), the directory schema is basically a list of object types or classes that are permitted in the directory. Adding to the list of object types permitted in the directory is called extending the schema. Pre-NDS v8 permitted LDAP-enabled applications to look at (read) the schema, but not to write (extend) to it. The current release of NDS (NDS v8 NetWare Update) now allows the NDS schema to be extended through LDAP.

As you might also remember, LDAP support was an option with the NetWare 5 Install, so you had the choice of installing or not installing it. Such is not the case with NDS v8. LDAP support is automatically installed when you install NDS v8. You won't see any LDAP-related screens, but don't worry, once the NDS v8 Install is finished, you can browse your tree and find the new LDAP Server and Group objects created by the install. The LDAP Install also creates a SAS Server object and a Security container object. If you want secure connections through LDAP clients, you'll have to configure Novell Security Services. You can find detailed information on Novell Security Services at http://www.novell.com/corp/security.

Here are a few more tips:

- If you installed LDAP Services for NDS as part of the NetWare 5 Install, an LDAP Catalog object was automatically created. The purpose of the catalog object was to speed up object searches on large NDS directory trees. NDS v8 is now so much faster than the NDS that shipped with NetWare 5, the engineers at Novell no longer deemed the catalog object

necessary. If you already have catalog objects in your tree that were created when you installed NetWare 5, don't worry. Those catalog objects won't be removed from your directory tree.

- LDAP support can be disabled and restarted on any server by unloading and reloading *NLDAP.NLM* on that server.

- If, after installing NDS v8, you have problems performing common LDAP tasks—like class and attribute mappings— it might be because you don't have the LDAP snap-in for ConsoleOne installed. You can install a version of ConsoleOne that already has the LDAP snap-in by running the *SETUP.EXE* that is located in the *SYS:PUBLIC\MGMT\CONSOLEONE\1.2\ INSTALL* directory on your NetWare server.

- You might also want to enable clear text passwords. Clear text passwords are disabled by default, but you can enable them from the General Property page of the LDAP Group object. If you don't allow clear text passwords, LDAP functionality will be equivalent to an anonymous user. For more information of clear text passwords, go to http://developer.novell.com/research/appnotes/1998/december/02/index.htm.

- NDS has a list of names for each NDS object class (type) and attribute it recognizes. Likewise, LDAP has a list of names for the object classes and attributes it recognizes. In most cases, the names are either identical or so similar that you would have no trouble knowing which names go together. However, NDS and LDAP need the names to be exact in order to communicate, or you have to convert or translate LDAP names to NDS names. This conversion process is called *mapping*.

- NDS v8 already has a default Class and Attribute Mapping list that converts most of the LDAP class and attribute names to NDS class and attribute names. But, once in a while, you might find an LDAP attribute or class name that isn't mapped or is mapped to the wrong NDS attribute or class name. This will cause you some problems. In this situation, you first have to figure out what NDS class or attribute the LDAP class or attribute to which you need to map. Then you need to manually reconfigure the mapping for that class or attribute.

- If you have an issue with tree walking in NDS v8, it may be tied to a referral problem seen in the first release of NDS v8. Novell engineers have since fixed this problem; the fix is available in the NDS v8 NetWare Update. So, if you're using the original NDS v8 build, we suggest that you download the NDS v8 update and see if it corrects the tree-walking problem.

If you want more information on LDAP, including the latest versions and features, visit the IETF website at http://www.ietf.orf. For more information on configuring the LDAP Server and Group objects, see *Configuring LDAP Services for NDS* in the December 1998 issue of AppNotes. You can also find LDAP and NDS specific information at http://www.novell.com/products/nds/ldap.html.

NDS for NT v2.0

The work of the network administrator increases with the necessity to manage user accounts. A user account must be created and maintained for each platform. In enterprises with hundreds of users, the task of account management alone could be quite cumbersome.

NDS isn't just for NetWare anymore.

NDS for NT solves the account management problem with a single point of administration. User accounts can be created and managed using either NetWare Administrator (NWAdmin) or Microsoft User Manager (although it doesn't offer all the administration features or the configuration options available in NWAdmin). Regardless of the utility used, user account information is updated in the NDS database, as well as the Windows NT domain. Since only one user account is required for both environments, users can take advantage of a single login to access both NetWare and NT resources.

NDS for NT v2.0 is the second major release of NDS for NT products. Significant enhancements include the following:

- Ability to store an NDS replica on an NT server
- Ability to manage NT files shared through NDS
- Single sign-on for users accessing NetWare and NT servers
- Enhanced scalability

Tip: When installing NDS for NT, always install from the root directory. The unzip file creates sub-folders, and if you install it from another sub-folder, it cannot read the pathway beyond a certain point.

Tip: An undocumented utility that can be useful in managing NDS for NT is the NDSConsole (NDSCONS.EXE) that is copied into the directory that you specified to store NDS information. This utility can be used to shut down NDS or load additional modules.

Tip: NetWare stores NDS database files on Volume SYS: However, in a NT environment, the server stores the NDS database files in an NDS installation directory (which can be replicated on multiple servers).

Tip: You might have a problem with duplicate RIDs and names on an NDS for NT domain, if you're using NetWare Administrator running the NDS for NT Snap-in (IWSAM.DLL) that shipped with NDS for NT 2.0. To avoid this issue, upgrade to NDS for NT v2.01—it's free and now available at http://www.novell.com.download.

Late-Breaking News

September 7, 1999—Novell and Compaq announced that they will collaborate on making an NDS Tru64 port available by early 2000. They are pitching NDS on Tru64 as "the key cross-platform directory for NonStop eBusiness"—the Compaq e-business platform.

"This will be the first 64-bit port for NDS," stated Compaq senior vice president Enrico Pesatori. Pesatori and other Compaq executives emphasized the NDS cross-platform availability as one of its major selling points for customers with heterogeneous environments.

Novell, for its part, is pushing the scalability of Compaq Alpha-based servers as the ideal platform for delivering enterprise-level, NDS-enabled applications.

August 12, 1999—Novell and America Online announced an agreement to further accelerate the deployment of the AOL Instant Messenger (AIM) application within the rapidly growing business and enterprise markets.

Under the agreement, Novell will integrate AIM with its full-service Novell Directory Services (NDS), used to manage and control user access to applications and other resources on business networks. The installed base of 80 million Novell users will gain the ability to establish policies for corporate access controls and encryption of business communications, accelerating efforts to expand AIM's reach into the enterprise market and enhance business productivity for users.

Information-packed Websites

Table 3 contains some great websites where you can go and grab more information on NDS and third-party support products.

Table 3. Best websites for NDS information

Websites with NDS Information	
URL	**Contents**
http://www.directorydesign.com/	There's still a bit of construction on this site, but there's great information about how to design a good directory. Jeff Hughes and Blair Thomas are the brains and experience behind this site, and they have some more valuable tips and tricks for you.
http://www.dreamlan.com/	This is Peter Kuo's stomping ground, and it's the home of the famous NDS Toolkit. You'll find a lot of cool information and resources on this site. Be sure to check the NDS Notes and Tips page for lots of NDS tidbits.
http://www.grouplink-tm.com/products/ntndsi/	If you're looking for an NDS-based workflow solution, check out GroupLink's product. They've got a solution that automates the preparation, routing, and approval of business process workflows.
http://www.netoria.com/	Netoria, recently acquired by Novell, Inc., creates Schemax, a product that provides some pretty slick NDS solutions. Using Schemax, you can quickly view the structure of your schema, and if you know how to drag and drop, you can create your own NWAdmin snapins.
http://www.netpro.com/	NetPro provides solutions that monitor and analyze directory services. They presented at BrainShare 99 and submitted some handy tips and tricks for our "From the Trenches" area.
http://www.netvision.com/	NetVision Synchronicity products make it easy for you to sync your NetWare 3.x, Notes, and NT databases with NDS.
http://www.future-gate.com	Future Gate Software has put together a backup program for backing up and restoring directories.