Preparing for the CDE Practicum Exam and the Real World

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advanced

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The CDE is Novell's Premiere certification. While there are three exams in the CDE track, the Practicum is the one with which most people have problems.

What Is the Practicum Exam?

- 2nd hardest certification in the IT industry (CDE)?
  - ‣ Yes

- A real test of your eDirectory™ knowledge?
  - ‣ Yes

- 2 hours of confusion and torture?
  - ‣ Only if you are not prepared

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To pass the Practicum you must know what you are doing. There are no "paper" CDEs.

How Does the Practicum Compare to the Real World?

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- Fix eDirectory problems in a mixed NOS version environment

- Live pressure to get it fixed

- Not a simulation

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The Practicum exam is just like the real world. Something's broken and you are under pressure to fix it. The existing exam server farm has both NetWare 4.x and 5.x servers in it. There are several problems in your scenario and you are dialing in live to fix them.

What Is the Practicum Exam?

- You are given a sheet of tasks to perform
  - ‣ Don't start with the tasks

- You are connected to a live set of 5 servers
  - ‣ PCAnywhere

- There are multiple problems with eDirectory

- You have 2 hours to fix the Directory

- At the end, either you are DONE or you ARE done!

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You take the role of the tech or consultant that has been brought in to clean up the tree. All the scenarios start with a list of tasks that the "client" was attempting to perform and could not accomplish. Just like real life, at the end of the job, it is either fixed or you are out of there — and out the money/time it took to work on it.

Preparing for the Practicum

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- Learn how eDirectory works

- Learn how to check on eDirectory health

- Learn how to fix the problems

- Take Novell course 991
  ‣ Advanced NDS Tools and Diagnostics

- Take the Practicum right away

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Why is the Practicum so tough? Most people who take the Practicum exam have little experience with eDirectory beyond creating and modifying a few containers, users and partitions. eDirectory is a robust Directory. A lot can happen to it and people can still login, print, and have the rights to do what the want. You have to understand how it functions, how to check on its health and how fix it when it is broken.

To get the basics of eDirectory, take NDS Design and Implementation. Once you have your background information firmly in hand, take course 991 (Advanced NDS Tools and Diagnostics). You will work with a 3-server farm and insert problems into eDirectory and learn to resolve them. If possible, take one of the CDE "boot camps" Novell sometimes puts on at NAECs. When it is taught correctly, It is a "Practicum Prep" course. All the skills you will need to fix eDirectory on the Practicum — and in the Real World are taught in 991.

After you have completed 991, take the Practicum right away. Most people who fail the Practicum (63% on the first take) do so because they thought they would go home and study. In a recent boot camp, we had a 80% success rate on the Practicum when the students took the test on the Friday afternoon.

Partitions and Replicas—Short Course

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- Tree
- Partition
  - ‣ Portions of the tree
- Replica
  - ‣ Copy of a partition stored on a server
- Replica Ring
  - ‣ List of all servers holding a Replica of a partition

- All changes are time-stamped

- Servers communicate periodically sharing eDirectory changes

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The first step in passing the Practicum is to understand eDirectory. We don't have time to cover all 10 days of course material in this presentation so, here are the bare bones of eDirectory.

Check List for Fixing eDirectory

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1. Time synchronization
2. Connectivity
3. Directory Service version
4. Partition continuity

6. External References
7. Obituaries
7. Remote server IDs
8. Unknown objects
9. Schema

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Like most things, there is no "voodoo" in fixing eDirectory problem. Here is the check list I put on the board in every 991 class I teach. Students who follow this simple list (and a few other pointers we will go into) pass the Practicum. We will go into each of these items in the following slides.

1—Time Synchronization

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- Do the servers agree on the time?

- All objects and property changes are time-stamped

- If servers do not agree on time, items added to one Replica may be deleted by a server in the same Replica Ring with a later time stamp

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Time synchronization is critical. If servers cannot agree on time, your eDirectory tree will probably fail. Fortunately, time problems are easily solved as long as the servers can talk to each other. Many scenarios have time sync problems. Sometimes are the servers are Secondary time sources. Sometimes the Secondary time sources cannot communicate to the Single Reference and the problem becomes a Connectivity first then a Time Synchronization problem. Just like life.

2—Connectivity

- Can the servers communicate?

- All changes are time-stamped

- If servers can't communicate, changes "stack up"

- Partitions get out of synchronization

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If the servers cannot communicate, how are they going to exchange object and property information among the replicas? Guaranteed, your eDirectory tree is broken if the servers cannot communicate.

3—Directory Service Version

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- Do all servers in the Replica Ring have compatible DS versions?

- All servers must be able to perform all the DS actions in the same manner

- All servers should have the highest version of eDirectory for their NOS version

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Each version of DS has added capabilities. If you do not have the most current DS version on all your servers, those with the different Network Operating System versions may not be able to share data correctly. As long as your servers can communicate, fixing DS Version problems is pretty easy. We will discuss how to fix it in a bit.

4—Partition Continuity

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- Are all the Replicas of each partition current in their changes?

- Do different servers have different views of the same objects?

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eDirectory is "loosely-consistent." That is, each replica server has a view of the data stored in it's Directory Information Base (DIB) based on when it got the last data update. If you leave eDirectory alone, eventually all the data will be passed to all the replica servers. If something interrupts the replication of data among the servers, they will have different views of the data.
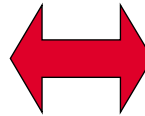
5—External References

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- If a server needs information about an object it does not hold in a Replica, it creates an external reference on the server

- For each external reference there is a BackLink stored on a Replica server

- Are all the external references correctly connected to the proper BackLink, up-to-date and still needed?

External Reference ← → BackLink

Replica requesting data

Replica with data

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Each replica server has an "external reference" partition. This is a repository of pointers to objects something requested but isn't in the server's database. The "other end" of the pointer is called a BackLink. The BackLink is created on a server that provided the information to the server with the External Reference.

The Backlinker also validates trustee assignments in NetWare 6.

6—Obituaries

- Are deleted objects correctly going through the 4-stage delete/purge cycle?

- If a deleted object gets "stuck" in the cycle, the object may appear as real in some Replicas and deleted in others

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To ensure that each replica knows that an item is to be deleted, there is a 4-stage system. Each object is flagged 0, 1, 2 or 4(binary). All notification and deletion commands (0 & 2) are sent by the Master Replica. Each server in the ring reply with stages 1 & 4. The 4 stages are: 0 –- notification that an object is to be deleted, 1— notification received, 2 — delete the object, 4 –- deleted. The Master Replica will not move to the next stage if it has not gotten the appropriate reply from all the replicas that they have flagged the object with the previous stage. The Flatcleaner actually purges the objects that are flagged stage 4.

You can view obits on a server with the Check External Reference function in DSREPAIR. How you fix them depends on where they are stuck. The 991 course covers the process and problem resolutions quite well.

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- Do the servers know where all the other servers are?

- If the servers do not have the correct address list, they cannot send their changes

- The partitions get out of synchronization

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NetWare 4 identifies servers with their "Internal IPX Number". Since NetWare 5 does not require IPX, these servers identify other servers in the replica ring with their "Server IDs." Each server holding a replica of a partition needs to know how to address all the servers in the ring. If an address has been changed, the other servers in the ring may send changes to an incorrect address and wait for a Acknowledgment that will never come.

8—Unknown Objects

- Do you have unknown objects? Why?

⊘ Unknown object has a missing required property

? Unmanageable objects are not a problem

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Unknown objects can come from a corrupted DIB, because a server has not received a schema update or because a Partition Join or Split has not finished.

9—Schema

- Does each server hold the correct object and property rules?

- If servers disagree on the schema, valid objects on one server will be unknown on another or will cause a partition synchronization problem

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The Schema is the set of rules about classes of objects and their properties. Whenever you extend the schema, all servers must receive the extension.

In some cases, a server will reject information about unknown objects from servers with updated schemas. For example, when you put a NetWare 6 server in a tree with NetWare 5 and 4 servers, the NetWare 4 servers must be patched or else they will see some of the NetWare 6 objects as unknown and refuse their synchronization. That will block later valid synchronization requests.

Make sure you have the proper DS version on each of your servers.

Mnemonic

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- Basic Health Check
  - ‣ T – Time sync
  - ‣ C – Connectivity
  - ‣ V – DS versions
  - ‣ S – Sync status

- Advanced Health Check
  - ‣ X – External references
  - ‣ O – Obituaries
  - ‣ R – Replica lists
  - ‣ N – Unknown objects
  - ‣ S – Schema

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The Courageous Victor Sent Extra Oreos to the Remaining Nine Soldiers

Directory Service Tools

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- Entire tree

  ‣ NDSMGR32
    - See, modify, and repair information among all servers

  ‣ NWADMIN32 and ConsoleOne®
    - See and administer information in the database on the server to which you are connected

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There are two sets of tools available to you. One set allows you to see and work on the entire tree and it's partitions, replicas and objects at one time. Using these tools gives you a good overview. However, you must remember that you are always looking at the tree from the point of view of the server to which you are actually connected.

Use these tools to update DS Versions, perform Partition and Replica operations and tree-wide operations.

Directory Service Tools

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- Specific server
  - ‣ SET DSTRACE=
    - See and initiate data flow between servers
  - ‣ DSREPAIR (-A, -XK3,…)
    - See and repair database information on a server
  - ‣ DSVIEW (NetWare® 4.x)
    - View database information on a NetWare 4.x server
  - ‣ DSBROWSE (NetWare 5.x)
    - View database information on a NetWare 5.x server
  - ‣ DSDIAG (Both NetWare 4.x and 5.x, download for 4.x)
    - Generate diagnostic reports on Novell Directory Services® (NDS®) from the tree

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This second set are server specific. You are directly reading the DIB on the server. Use these tools to see what is actually happening on a server or to initiate operations from that server.

Novell has some additional tools that do additional functions such as directly edit the DIB. They don't let us "mere mortals" play with these more dangerous tools. That's probably a good thing.

DSTRACE

- Set TTF = ON
  - ‣ Trace to file
  - ‣ Writes results to a file
    - DSTRACE.DBG
  - ‣ Set DSTRACE= *R
    - Refresh (start new file)
  - ‣ Set to OFF when done

- SET DSTRACE =
  - ‣ ON
  - ‣ NODEBUG
  - ‣ OFF

- View flag – +x
  - ‣ E.g., Set DSTRACE= +SYNC
  - ‣ View synchronization traffic

- Action – *x
  - ‣ E.g., Set DSTRACE= *H
  - ‣ Force synchronization

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SET DSTRACE is one of the most basic tools. With it, you can view synchronization traffic or initiate an action out of its default cycle. You will use the SET DSTRACE command frequently during the Practicum.

Each view flag allows you to see a different action on the Directory Services screen. If you don't have the correct view flag on, you may initiate the correct action but not see its result.

Using DSTRACE

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- SET DSTRACE = ON

- Turn on View flags before Action flag

- Switch to the "Directory Services" screen

- Wait for "green across the board"
  ‣ "All processed = YES"

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When you initiate an action, go to the Directory Services screen and watch the flow of information. When the action has completed its process, it will report back either All processed = Yes (in Green) or No (in Red). If you get "All processed = No", you need to figure out why the process did not complete successfully. Sometimes running the action again will resolve the problem. Other times, some other problem is preventing the completion of your action.

Important DS Trace Pairs

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- Partition synchronization

    ‣ + S (sync)
        • View NDS synchronization traffic

    ‣ *H (heartbeat)
        • Force NDS synchronization

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This is the standard eDirectory synchronization traffic. Running the heartbeat sends eDirectory changes from this server to all other servers.

Important DS Trace Pairs

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- Schema synchronization

  ‣ +Schema
    - View schema synchronization traffic

  ‣ *SS (Schema sync)
    - Force schema synchronization among servers

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Each server in the tree hold information about the schema. If a server has not received updated schema information it may view some objects as unknown and reject synchronization from servers having the extended schema.

Important DS Trace Pairs

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- BackLink/external reference connections

  ‣ +Blink (BackLink)
    - View backlink traffic

  ‣ *B
    - Force backlink process

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Checks External References and the states of all servers in the BackLink list for obituaries. Backlink does not actually clear deleted objects. It checks all the external references and their corresponding backlink to see if each is correctly pointed and necessary. It also tracks the progression of the 4-stage obituary (deletion) process.

Important DS Trace Pairs

- Purge stage 4 obituaries

  ‣ +J (Janitor)
    - View clean up

  ‣ *F (Flatcleaner)
    - Actually does the purge

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The Flatcleaner does the actual purging of objects that are in the last of the 4 stages of the deletion process. Flatcleaner also verifies and updates the hidden Public/Private keys for each object in the tree.

Important DS Trace Commands

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- +AGENT
  - ‣ Views traffic for
    - BACKLINK
    - DSAGENT
    - JANITOR
    - RESNAME
      - – Resolve Name
    - VCLIENT
      - – Virtual Client

- +MISC
  - ‣ Views all other NDS background processes
- +Limber
  - ‣ View verification of
    - Server names
    - Internal server IDs
    - Connectivity to other servers in Replica Ring
- +MIN
  - ‣ Sets DSTRACE to Minimum Settings

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These commands are useful since they combine the views or actions of several other commands. MIN is especially useful to reset the DS commands back to their default (minimum) cycle times and settings.

Shortcut—NetWare Alias Command

- ALIAS <number(s) or letter(s)> Command
  - ‣ ALIAS S SET DSTRACE=
  - ‣ S NODEBUG
- Examples
  - ‣ ALIAS S SET DSTRACE=
    - • Usage: S +S (instead of SET DSTRACE = +S)
  - ‣ ALIAS V LOAD DSVIEW
  - ‣ ALIAS B LOAD DSBROWSE
  - ‣ ALIAS DA LOAD DSREPAIR –A
  - ‣ ALIAS DX3 LOAD DSREPAIR –xk3

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This little known command is useful not just for people taking the Practicum but for real life. Take caution however. It is easy to forget that you have set the alias command after you have used it. A slip of the finger could activate a wrong action (E.g., DSREPAIR –U). These Alias commands stay in memory until the server is restarted.

Shortcut—Multiple DS Trace Commands

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- It takes time to type the View commands

- Separate View commands with at least one space
  - ‣ Set DSTRACE = +SYNC +JANITOR +BLINK

- Caution!
  - ‣ Does not work with action (*X) commands
  - ‣ Only works with "SET DSTRACE =" command
    - • Will **not** work with Alias

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If there is a sequence of view commands you wish to perform repeatedly, you can gang the them together. Of course, creating NCF files for sets of view and action commands works quite well also. NCF files are actually better in the real world than in the Practicum. You don't want to run out of time because you were writing "cool" NCF files on each of your server!

Shortcut− ↑ ↓ on Command Prompt

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- Repeats the last/previous command

- Stores the last 12 commands

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You probably remember this capability from your real world experience. However, don't forget to use it in the Practicum! It is a time saver.

Taking the Practicum

- Write down any mnemonics BEFORE you start the test

- Open RConsole screen to ALL servers
  ‣ Minimize or arrange on screen

- Open NDSMGR32 and NWADMIN

- LogicSource does **not** have an icon on the desktop
  ‣ Start | Programs | LogicSource

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Just like taking any test. Cram all your cribs and mnemonics into your head before you sit down. Write them down before you hit that start button. Then you can spend your time working on the problems rather than trying to remember memory devices.

Get connected to all your servers. Either minimize them, or miniaturize them on your screen. Also open NDSMGR32 and NWADMN32. We all know how long these programs take to open. Getting them open now will prevent you from pulling your hair out when you are under the time gun and need them.

You will probably use LogicSource often to lookup error codes and get their suggested resolutions. While there is no shortcut on the desktop, it is available on the Start menu.

Basic Health Check

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- Run DSREPAIR on each server
- Perform a time synchronization
  - ‣ DSREPAIR | Time Synchronization
  - ‣ Shows
    - Time sync
    - Connectivity
    - DS versions
  - ‣ **Fix these first**
- Perform a partition synchronization check
  - ‣ DSREPAIR | Report Synchronization Status

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Go to each server and see if they agree on Time Synchronization, Connectivity and DS Version. Those are the 1st three items on your checklist. If these top 3 are not fixed, all your additional work will be in vain.

Do a Partition Continuity Check. See what you are faced with. Look up any errors you see and evaluate the possible courses of actions.

Advanced Health Checks

- DSREPAIR on each server
  - ‣ Advanced settings

- DSREPAIR command line options
  - ‣ USE WITH CARE
    - -A — Advanced
      - – Adds additional functionality
    - -XK3 — Kill switch 3
      - – Can be used to convert external references to new objects for synchronization

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Most of the rest of the checklist is found in either the DSREPAIR Advanced Settings or in NDSMGR32. Be careful with the Advanced settings! There is a reason most of the advanced settings are hidden!

Fixing Time

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- Practicum
  - ‣ Select a server as single reference
  - ‣ Force all other servers to use it as their time source
- Real world
  - ‣ Have one server with Internet connectivity be a reference server
    - Select Primary Time servers
    - All the rest are Secondary Time servers
  - ‣ Use Configured Time Sources
  - ‣ Reset time

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Time must be in sync. Every object and property is time-stamped. Later timestamps overwrite earlier ones. If the servers cannot agree on time. You will never get it working properly.

Fortunately, time sync is easy to fix (if the servers can communicate.)

Fixing Connectivity

- Practicum
  - ‣ Is the SYS volume mounted on all servers?
  - ‣ Is DS loaded on all servers?
  - ‣ Is TTS loaded on all servers?
  - ‣ Are the Replica Ring lists correct?
- Real world
  - ‣ Why can't the servers talk to each other?
  - ‣ Fix it

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During the Practicum, there is a limited amount of things you can do to fix connectivity. This limits the kinds of errors the test creators can insert into the scenarios. You can't go check cables, reset routers, etc. so the scenario creators have to create problems you can fix remotely.

DS Versions

- Practicum
  - Use NDSMGR32 to push DS versions from server with highest version to all appropriate servers

- Real world
  - Download appropriate patches
  - Use NDSMGR32 to push patches

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Each DS version has specific capabilities. Each server must have the most recent version for it's NOS version. Here again, there is only so much the scenario creators can demand of you. You won't need to download a patch. Just make sure each server has the same highest DS version as all the others with the same NOS version.

Reality is much the same. However, there may be a need to download a patch for a NOS class of servers.

Fixing Partition Continuity

- SET DSTRACE = +SYNC
- SET DSTRACE = *H

- Which server has the correct information?
  - ‣ If Master is correct and other Replicas are flawed
    - "Send All" from server holding master Replica OR
    - "Receive from Master" on incorrect Replicas

  - ‣ If one Replica is correct and others are flawed
    - "Send All" from correct Replica

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If the servers can communicate, are in time sync and have the same DS versions, the best thing to do is to LEAVE THEM ALONE! That's nice in the real world. In the Practicum, that little clock in the upper right corner keeps on ticking. In both cases, the heartbeat can only send what is in the change cache of the server. If the cache is in error, more corrective actions are necessary.

If only the Master is correct, a "Send All" from the Master will update all the replicas. If only one replica is incorrect, a "Receive from Master" will replace the replica with the data on the Master. If one replica is correct, a "Send All" from it will update all the other servers in the ring. These actions can be found in DSREPAIR and NDSMGR32.

Checking External References

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- Check External References

  ‣ DSREPAIR –A

  ‣ Advanced Options | Check External References

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This action does two things: check the external reference-backlink pointer pairs and shows the status of the obituaries. Both have to be clean before you can proceed. The Backlinker process (SET DSTRACE= +BLINK, *B) will clear the external references but, it will not fix the obituaries shown in the DSREPAIR | Check External Reference screen.

Checking Stuck Obituaries

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- Check obituaries and their type/status flags

  ‣ DSREPAIR –A

  ‣ Advanced Options | Check External References

- If you change server holding Master Replica, put it back before the end of the test

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Performing this check will show you "stuck" obituaries. It shows both the object with the problem and on which server the obit is stuck. There are several actions to clear these. We don't have enough time to go into them all. One of the possible actions is to put the Master of the replica on the server holding the stuck obit. If you do move the Master replica during the Practicum, put it back after it has done it's job. Forgetting to do so is one way to guarantee your failure.

There are other possible actions to clear obits. Unfortunately, we don't have enough time to go into them here. Take the 991 course. We have a whole section on clearing obits.

Checking Replica List

- Check Replica lists (Rings)

  ‣ DSREPAIR
    - On server with Master of each Partition
    - On a server with Read/Write Replica

  ‣ Advanced Options | Replica/Partition Operations | Select Partition | View Replica Ring
    - Check for Replica Ring mismatches

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Check to see if each server agrees as to what servers hold replicas of the partitions it holds. If the servers disagree, the partitions will not synchronize.

Checking for Unknown Objects

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- Check for unknown objects

    ‣ NetWare Administrator

    ‣ File Menu | Search | Unknown Objects and Search from [Root]

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Why are they unknown?

Is there a partition join or split going on? If so, complete it before deleting unknown objects.

Are the servers out of Schema Synchronization? Objects added in an extended schema, will appear as unknown objects to a server that doesn't know about the extension. Check your schema before deleting objects added by new software or new versions.

Never delete a unknown container object! It probably is waiting for synchronization.

Fixing Schema Updates

- Check schema synchronization

    ‣ SET DSTRACE = +SCHEMA
    ‣ SET DSTRACE = *SS

- Observe schema status and look for
  "**All Processed = Yes**" and no errors

- Even servers without Replicas share in schema
  synchronization

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Here is where we can ensure that each server agrees on the object, property and containment rules. If they do not all agree on the rules for valid objects, you will have unknowns.

How to **Ensure Failure** in the Practicum

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- Remove DS from a server
  - While this may be a good idea sometimes in the real world, it will guarantee that you fail the Practicum

- Change the Partitions and Replicas without being asked to make a change
  - Move the Master Replica

- Deleting critical objects
  - Certificate objects
  - License objects

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Compare the initial setup and the tasks. Anything different from the setup and the tasks will cause you to fail.

If you change replica types or move the Master replica without being asked to do so, put it back!

Don't delete Certificate or License objects! Without them, eDirectory stops and you can say, "Goodbye." to a successful Practicum!

Process

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- Do complete health checks <u>first</u>

- Record errors

- Fix the easy errors first

- Repeat above until clean

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It's a simple process. Start with the basic health check. Get the 1st three (Time, Connectivity and Version) items on the check list done. Then work down the list.

For example, fix connectivity before attempting to fix external references or obituaries. If the servers can't talk, the servers can never sync any changes.

Common Errors

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- 625: Communication Problem
  ‣ The DS Agent (DSA) cannot communicate with a server

- 663: DS Locked
  ‣ The Data Information Base (DIB) on a server cannot be modified

- 672: Replica Not On
  ‣ The DSA on a server cannot read a Replica

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These are three common errors that need some extra attention. Sometimes they are a problem and sometimes they are not.

625 is a common error to get. It means something is blocking the noted server or the server is not receiving. Is it a send problem or a receive problem? This error is often seen in the Time Synchronization screen. Fix it first!

663 and and 672 errors may only be temporary and may clear on their own. We'll discuss them later.

625: Communication Error
Server IDs are Incorrect

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- Fix
  - ‣ Check/Repair all network addresses

  - ‣ DSREPAIR
    - Advanced Options | Servers Known to this Database |<enter> on one of the servers | Repair All Network Addresses

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This process will query the other servers to attempt to correct the Remote IDs of the servers in the Replica Ring.

625: Communication Error
IP or IPX Configuration Is Wrong

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- Run INETCFG to check configuration

- Type CONFIG on the each console to check network address consistency

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Again, a Remote Server ID problem. If you have renamed a server, this error may appear. Don't rename a server in the Practicum unless you are told to. You have to restart the server to have it take effect.

625: Communication Error
DS Database on a Server Is Locked

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- Make sure DSREPAIR or some other utility or process has not locked the Novell Directory Services® (NDS®) database on a server

- Check that TTS is turned on

- Check that DS.NLM is loaded

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Check the server reporting the error to see if a program is holding the DIB open. Did you leave the DSREPAIR | Repair Local Database or Unattended Full screen open? You must exit out of these screens to unlock the DIB. Otherwise, you will insert problems the scenario does not have and you will be chasing your tail.

663: DS Locked
672: Replica Not On

- Errors may appear during a health check after making changes

- Wait a few moments and try the health check command again

- SET DSTRACE = *H to force a sync process with the server on which the error is occurring

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663 and 672 — These errors may be temporary and due to some other process holding the DIB open.

Missing Server Problem

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- Situation
  - ‣ If a server holds a Replica and is deactivated without removing DS from it, all servers in the Replica Ring will attempt to send DS changes to it

- Resolution
  - ‣ Go to the Master of the Replica and remove the server from the Replica Ring

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Several scenarios have this problem…so does the real world.

If you take a server that holds a replica down without taking it out of the replica ring, synchronization traffic will stack up waiting for acknowledgements from the missing server. If you are going to take it down for a few hours or even a few days, that's probably all right in the real world. In the Practicum, if a server has been removed, take it out of the ring.

When to Do the Practicum Tasks

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- After no errors appear in the DS trace screens
  ‣ "All Processed = **YES**"

- Health checks appear to be clean

- Do the Practicum tasks you've been assigned—
  one at a time
  ‣ Wait for each task to finish before doing the next
  ‣ Watch the DS trace screen for "green across the board"

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It may take half your time or more to get the eDirectory health. Don't panic! The tasks they give you usually take just a few minutes. They may ask you to do a Partition Split or Join, add a replica to a server, or add a container and add a user. Basic things that take little time if the tree is healthy.

Have the Directory Services screen on and view the NDS synchronization traffic (+S). At the end of each task, watch for the "All Process = Yes" on each of the RCONSOLE screens. Then perform the next task.

Do Another Health Check

- Perform DSREPAIR | Unattended Full on each server until no errors appear

- Don't worry about errors on STREAMS files

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The STREAMS files store login scripts and print queue information (among other thing.) If you get errors here, don't worry about it. These are not part of the health of the eDirectory and will not count against you.

When Are You Done?

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- Are all tasks complete?

- Is your Directory free of errors?

- If you are getting "green across the board" on all servers and DSREPAIR | Unattended Full on each server are clean…

  ‣ **STOP!**

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Don't go beyond the task list! There are no bonus points for "extra" things.

I had a student that had a clean tree 20 minutes before the end of the Practicum exam. He began looking for more things to do. He did the "Post-NDS Update Tasks" in DSREPAIR | Advanced. That turned all his certificate and license objects into unknown objects…which he deleted and failed the Practicum!