XMig, A Luminex Server Based Migration Tool

(Version 1.0.0.2b)

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1 XMig - Luminex Migration Tool

The XMig is a set of scripts, programs and configuration files that enable a server to server migration of Channel Gateway (CGW or CGX) virtual tape files. The XMig package is in the form of a typical cgx server package. It is distributed as an install executable. When executed it will install in the /opt/luminex/XMig/<version> directory, with subdirectories etc (for configuration), bin (for executables), and var (for logs and lists). A service daemon (XMigd) is installed by the package and is the engine for the Tool.

1.1 Migration Project List

A user supplied list is typically used to specify the volumes to be migrated. If desired the CreateList command can be used on an input SP (usually pointing to a CGW server directory) and generates a list of VOLSERs to be migrated. The list with one VOLSER per line is used as input to XMig to perform the Migration.

1.2 CGX Volume Input and Output Compatible

With the XMig Tool, CGX SP configuration files are used as input and output, allowing the input to be migrated to a different form (e.g. compressed input to compressed/encrypted output)

1.3 Volume Locking

While the volume is being converted and migrated the volcopy program will use locking at critical times. CGX style locking and DWexpress style locking will be used as necessary. The locks shall be used while gathering info about what files the tvf points too and getting a date timestamp of the tvf at the start of the migration. When using MVT storage the lock files are associated with the source (input) SP and the destination (output) SP. When using STM storage the lock files are associated with the directory specified in the source (input) SP and the destination (output) SP. An additional lock file can be configured to be used to allow mainframe usage of VOLSERs throughout the course of the migration.

1.4 Copy, Rename Source and Copy, Copy and Rename Destination

Three copy methods are used while migrating the VOLSER files. The first is copy, which migrates the source files to the destination files keeping the same names. These copy methods are implemented in the volcopy program. The second copy method is to rename the source files and then migrate to the destination. The last copy method migrates the source files to the destination files and renames the destination files.

1.5 Read Back Compare

Migrated volume files can be read back and verified in two manners. After the migration is complete a compare list can be generated and then comparetasks are started and run similar to the copytasks for the migration. A second manner for the read back compare is to perform a read back compare after every N migration copies complete. The N is set in the variable countCopiesBetweenVolcmp in the XMIG.config file and read compares are performed during the active migration.

1.6 Throttling

Multiple threads are utilized for the migration and adjustments may be made by an operator without stopping the migration. These threads may exist on local or remote servers. There is a default thread level and a maximum thread level specified in the configuration.

1.7 Operator Commands to Start or Drain

An operator command to drain the migration copytasks and a corresponding operator command to start the migration again. When the drain command is issued, the volume migrations in process will be allowed to complete. When a Start command is issued the migration will resume issuing copytasks.

1.8 Comprehensive Logging and Email Notification Messages

The XMig Tool uses the list to keep tract of the state/progress of the migration. The status (metrics) of bytes/volumes moved is kept. Emails can be enabled to send a message when the migration starts or stops, has an error, and for periodic status. The periodic status contains info about volume completion, volume migrations in progress and volume migration errors. The period is configurable in numbers of hours. Program logs are kept in /opt/luminex/XMig/<version>/var/XMig.log. Additional logs of migration copy completion and errors are in the same directory with the ending cmplog and cmplog.error.

1.9 Status Report Generation

The Migration Tool is able to generate a number of reports detailing the status of the ongoing migration. The types of reports are ALL, INPROCESS, COMPLETED, LOCKED, ERROR, EXISTING, MISSING, RATESERVER, RATESYSTEM, RATERECENT, QUEUED, SKIPPED, MISCOMPARE, ABORTCOMPARE, and VOLCMP. The All report gives a report for all VOLSERs in the list that are not in the Queued status. The Inprocess, Completed, Locked, Error, Existing, Missing, Skipped, Queued, Miscompare, AbortCompare reports give a list of the VOLSERs in the migration list that have the specified status. The RateServer, RateSystem, and RateRecent reports use only Complete status VOLSERs from the list and calculate the transfer rate and the elapsed time of the migration copy. RateRecent reports only perform the calculations on the specified number of lines from the end of the Completed report. The VolCmp report gives the status of all VOLSERs in the volume compare list.

1.10 Headless Operation

The migration tool daemon does not generate any output to the console (no stderr, stdout, etc) and contains a signal handler to allow graceful stop of the volume migrations in process. Since the XMigd runs as a daemon, closing the console will not cause it to terminate. The XMig client is used to deliver the commands to the XMigd daemon for action.

1.11 Command Processing Concurrent with Migration in Process

Commands from the operator are able to be processed while the Migration Tool is running a Migration. These commands can be used to update the number of active copytasks, generate reports, or drain the migration.

2 XMig Input Parameters

The XMig Parameters reside in the /opt/luminex/XMig/current/etc/XMIG.config configuration file. There are parameters that name the project and the list file. There are also parameters that name the host (and site) servers that are to participate in the Migration. The maximum and default number of copy tasks settings are also parameters. LumAlert email messages can be enabled or disabled and their frequency configured by using the parameters in the configuration. There is also a Trace Mask setting for logging control and some xmig_job/volcopy specific parameters.

The configuration files are read at the time the XMigd daemon is started, so when any changes are made the migration in process should be drained and the XMigd daemon unloaded and reloaded (using /etc/init.d/XMig.server stop then /etc/init.d/XMig.server start).

2.1 XMig Parameter Modification

The XMig configuration can be displayed and modified in a similar manner to the cgx luc configuration files. The luc cfgtool is used with the current directory pointing at /opt/luminex/luc/current and the directory path passed to the cfgtool needs to be specified relative to the /opt/luminex/luc/current directory. For example to display all the parameters in the XMIG.config:

cd /opt/luminex/luc/current
bin/cfgtool -d ../../XMig/current/etc show XMIG

for a specific parameter just add the parameter:

cd /opt/luminex/luc/current
bin/cfgtool -d ../../XMig/current/etc show XMIG hoursBetweenStatusEmail

to edit a parameter change show to edit and add the value for the parameter:

cd /opt/luminex/luc/current
bin/cfgtool -d ../../XMig/current/etc edit XMIG hoursBetweenStatusEmail 12

2.2 XMig Configuration

The XMIG.config resides in the /opt/luminex/XMig/<version>/etc directory. The configuration file from the etc/sample directory follows:

```
<projectName type="String">LuminexMigrationProject1</projectName>
<volumeMigrationList type="String">var/LuminexMigrationProject1.lst</volumeMigrationList>
<workHostAndSite type="Array" elType="String">
        <i0 type="String">hostName0:siteName0</i0>
        <i1 type="String">hostName1:siteName0</i1>
        <i2 type="String">hostName2:siteName1</i2>
        <i3 type="String">hostName3:siteName1</i3>
  </workHostAndSite>
<inputDevice type="String">etc/SPin.config</inputDevice>
```

<outputDevice type="String">etc/SPout.config</outputDevice>
<subMigrationMethod type="String">bin/xmig_job</subMigrationMethod>
<subCreateListMethod type="String">bin/createlist.sh</subCreateListMethod>
<activeThreadsMAX type="Int32">9</activeThreadsMAX>
<activeThreadsDefault type="Int32">2</activeThreadsDefault>
<traceLevel type="String">0x1c00000000000000</traceLevel>
<useAlert type="String">FALSE</useAlert>
<consecutiveErrorCountForDrain type="Int32">20</consecutiveErrorCountForDrain>
<hoursBetweenStatusEmail type="Int32">24</hoursBetweenStatusEmail>
<xmig_jobLockSP type="String">etc/SPlock.config</xmig_jobLockSP>
<xmig_jobRenameSrcVol type="String">FALSE</xmig_jobRenameSrcVol>
<xmig_jobRenameDstVol type="String">FALSE</xmig_jobRenameDstVol>
<xmig_jobAdditionalOptions type="String">-1 -x -y -z</xmig_jobAdditionalOptions>
<migrationRestartOnBoot type="String">TRUE</migrationRestartOnBoot>
<volcmpMethod type="String">bin/xmig_job</volcmpMethod>
<countCopiesBetweenVolcmp type="Int32">200</countCopiesBetweenVolcmp>
<volcmpListFile type="String">var/LuminexMigrationProject1.volcmplst</volcmpListFile>

3 XMig Client Commands

XMig client commands are all issued from the /opt/luminex/XMig/<version> directory. The command line is bin/XMig –c <Command> where Command comes from the XMig Commands below.

XMig Commands include:
MAXCOPYTASKS, START, DRAIN, HALT, STATUS, REPORT
CONGO, CONRESULT, DUMPTODOLIST, REMOVETODOLISTID,
VOLSTAT, CLEARLOCK, CLEARSKIP, CLEAR, GUICOPYTASKS,
SNAPLOGS, DUMPSETTINGS, TMASKON, TMASKOFF,
CREATELIST, HOSTACCESSIBILITYREPORT, HOSTACCESSRESULT
VOLCMPLIST, VOLCMPREPORT, VOLCMPGO

REPORT takes a type argument:
ALL, INPROCESS, COMPLETED, LOCKED, ERROR,MISSING, RATESERVER, RATESYSTEM, RATERECENT, QUEUED, SKIPPED, VOLCMP.
REMOVETODOLISTID takes a ToDoList ID arg.
MAXCOPYTASKS takes a Number of CopyTasks arg.
TMASKON and TMASKOFF take comma delimited bit args T,I,W,E,C,P,1,2,3,4
HALT takes a VOLSER or 'ALL' or 'CONCHECK'
CLEARSKIP, CLEARLOCK take a VOLSER or 'ALL'
CLEAR VOLSER STATUS either VOLSER can be ALL or STATUS can be ANY
Other Commands have no args

3.1 Migration and List Commands

3.1.1 START

The command bin/XMig –c Start is used to start or restart the XMig Migration.

3.1.2 CREATELIST

The command bin/XMig –c CreateList is used to generate a VOLSER list for an input SP. The SP pointing to the directory name for the source VOLSERs is put in the inputDevice in the XMIG.config. This command generates all VOLSERs present, including VOLSERs that are expired or scratched, so a list from the mainframe should typically be used instead. Note the volumeMigrationList from the XMIG.config with .clist appended will be used for the output from the createlist command.

3.1.3 HOSTACCESSIBILITYREPORT

The command bin/XMig –c HostAccessibilityReport will try to access all Hosts in the workHostAndSite array of the XMIG.config. If the hosts are not available readily this can take a while to timeout, so the command does not wait and the result is to be obtained by entering the HostAccessResult command in the reports section below.

3.1.4 CONGO

The command bin/XMig –c ConGo will begin a modification check for all VOLSERs in the migration list. This check takes a long time, so the result is obtained later using the CONRESULT command. If a check has been started, and it is necessary to abort it use the halt command with the parameter “CONCHECK”.

3.2 VOLCMPLIST

The command bin/XMig –c VolCmpList generates a list to be used to compare completed migrations. The VolCmpList command uses some settings from the XMIG.config configuration file. The volcmpListFile entry specifies the file name of the created list. The volumeMigrationList entry is the migration list used as input. The countCopiesBetweenVolcmp entry gives the count for the Completed entries on the input list to skip before adding the next to the VolCmpList.

3.3 VOLCMPGO

The command bin/XMig –c VolCmpGo starts the Volume Compare processing. The start, drain, maxcopytasks commands are used to control the compare jobs.

3.3.1 REPORT VOLCMP

The command bin/XMig –c Report VolCmp generates the report for the status of the Volume Compare jobs.

3.4 Migration Job Control Commands

3.4.1 MAXCOPYTASKS

The command bin/XMig –c MaxCopyTasks <val> will set <val> as the number of VOLSER copy tasks for each host being used in the migration. This command is also used to set the compare tasks when a Volume Compare has been started.

3.4.2 DRAIN

The command bin/XMig –c Drain will prevent the migration from issuing any new copy (or compare) tasks. The copy (or compare) task previously started will continue to run to completion.

3.4.3 HALT

The command bin/Halt <Parm> is used to abort a specific copy task (<Parm> set to a VOLSER), or abort all the copy tasks (<Parm> set to All), or abort a concheck (<Parm> set to CONCHECK). The status of VOLSERs for which a copy task was aborted will be set to “Skipped”.

3.4.4 STATUS

The command bin/XMig –c Status gives a short status of the migration in progress. Counts are given for the number of VOLSERs in given states.

3.4.5 VOLSTAT

The command bin/XMig –c VolStat <Parm> will give back the status for the VOLSER that <Parm> is set to.

3.4.6 CLEARLOCK

The command bin/XMig –c ClearLock <Parm> is used to clear the status of Locked from a specific VOLSER (<Parm> set to the VOLSER) or all in the migration list (<Parm> set to All).

3.4.7 CLEARSKIP

The command bin/XMig –c ClearSkip <Parm> is used to clear the status of Skipped from a specific VOLSER (<Parm> set to the VOLSER) or all in the migration list (<Parm> set to All).

3.4.8 CLEAR

The command bin/XMig –c Clear <VOLSER Parm> <Status Parm> is used to clear the status in the list. Either the <VOLSER Parm> can be ALL or <Status Parm> can be ANY. To clear the status in the list of a specific VOLSER and with a specific status the <VOLSER Parm> and <Status Parm> would be set to the specific values. For Example to clear VOLSER TEST00 Error status in the list the command would be bin/XMig –c clear TEST00 Error.

3.5 Migration Report Commands

These commands give reports that are one line per VOLSER.

3.5.1 REPORT ALL

The command bin/XMig –c Report All gives a one line status for each VOLSER in the migration list.

3.5.2 REPORT INPROCESS

The command bin/XMig –c Report InProcess gives a list of the VOLSERs that have a copy task active.

3.5.3 REPORT COMPLETED

The command bin/XMig –c Report Completed gives a list of the VOLSERs in the migration list that completed the migration copy.

3.5.4 REPORT LOCKED

The command bin/XMig –c Report Locked gives a list of the VOLSERs that did not perform the migration copy due to a lock contention.

3.5.5 REPORT ERROR

The command bin/XMig –c Report Error gives a list of the VOLSERs that received an error during the migration copy attempt. Further information can be found in var/XMig.log and var/…cmplog.error.

3.5.6 REPORT RATESERVER

The command bin/XMig –c Report RateServer gives a report by server (host) about times elapsed for copy tasks.

3.5.7 REPORT RATESYSTEM

The command bin/XMig –c Report RateSystem gives a report about times elapsed for copy tasks.

3.5.8 REPORT RATERECENT

The command bin/XMig –c Report RateRecent <val> gives a report for the last <val> number of VOLSERs in the migration list with Complete status. The report contains info about times elapsed and bytes transferred for copy tasks. This command is used by the GUI for the Recent Report selection.

3.5.9 REPORT QUEUED

The command bin/XMig –c Report Queued gives a list of VOLSERs that are waiting to be migrated.

3.5.10 REPORT SKIPPED

The command bin/XMig –c Report Skipped gives a list of the VOLSERs in Skipped state. These were aborted with a halt command. To make them eligible for migration again the clearskip should be used.

3.5.11 CONRESULT

The command bin/XMig –c ConResult gives a message that the prior concheck is in process or provides the result of the concheck.

3.5.12 HOSTACCESSRESULT

The command bin/XMig –c HostAccessResult gives a message that the prior HostAccessibilityReport is still in process or gives the result of the uname command on each host. If the command is still in process, typos in hostnames, network connectivity, and ssh logins should be checked for the hosts not responding.

3.6 Misc Commands

These commands are not typically used by the user. Luminex may use these commands to get further information about the XMigd state.

3.6.1 DUMPTODOLIST

The command bin/XMig –c DumpToDoList dumps the list of Commands the XMigd daemon has in the queue.

3.6.2 REMOVETODOLISTID

The command bin/XMig –c RemoveToDoListID <Parm> will remove the command entry with the ID number <Parm> from the XMigd queue.

3.6.3 SNAPLOGS

The command bin/XMig –c SnapLogs will rename the var/XMig.log to var/XMig.log.snap. This is useful to save a XMig log for future analysis.

3.6.4 DUMPSETTINGS

The command bin/XMig –c DumpSettings dumps the internal state of the XMig CopyTask structures.

3.6.5 TMASKON

The command bin/XMig –c TMaskOn <Parm> turns on the bit in the trace mask for each level in the <Parm>. The Parm is a comma delimited character list (T,I,W,E,C,P,1,2,3,4).
T is Trace, I is Info, W is Warning, E is Error, C is Config, P is Performance, 1 is Debug1, 2 is Debug2, 3 is Debug3 and 4 is Debug4.

3.6.6 TMASKOFF

The command bin/XMig –c TMaskOff turns off the bit in the trace mask for each level in the <Parm>. The Parm is a comma delimited character list (T,I,W,E,C,P,1,2,3,4).
T is Trace, I is Info, W is Warning, E is Error, C is Config, P is Performance, 1 is Debug1, 2 is Debug2, 3 is Debug3 and 4 is Debug4.

4 XMig Typical Install and Setup

4.1 XMig Software Package

The XMig software package is installed by obtaining and running the XMig_1.0.0.2b.sh appropriate for the server OS (Centos or Solaris). This needs to be done on all servers participating in the migration.

4.2 Volcopy Migration Method Software

The volcopy executable appropriate for the luc version and server OS needs to be placed in the /opt/luminex/luc/<version>/bin directory on all servers used as hosts during the migration.

4.3 XMIG Configuration

The XMIG.config should be updated or the sample taken as a template and updated.
Choose String values for the projectName and volumeMigrationList and put them in the XMIG.config file.
Choose a short string value for the SiteNames to which the host servers belong. Using the IP or the hostname that will work for a ssh login as the Host, fill in the XMIG.config file's workHostAndSite array with string entries of the the form Host:Site.
Enter the cgx format SP file that is the source of the migration volumes into the XMig.config inputDevice.
Enter the cgxformat SP file that is the destination for the migration volumes into the XMig.config outputDevice.
Specific migrations need additional xmig_job/volcopy parameters. Refer to separate xmig_job/volcopy documentation for details.
If the –L volcopy option is needed enter the cgx format SP file that is the mainframe lock file into the XMIG.config xmig_jobLockSP.
If the –r volcopy option is needed set the xmig_jobRenameSrcVol to TRUE in the XMIG.config.
If the –R volcopy option is needed set the xmig_jobRenameDstVol to TRUE.

4.4 SSH Host Keys

The XMig migration uses ssh logins to perform the migration. For each host being used in the migration the public key of the server managing the migration needs to be added to the authorized_keys.

4.5 Migration VOLSER List

Obtain the list of VOLSERs to migrate, verify it is of the form one VOLSER per line and its name matches the setting in the XMig config.

4.6 Mainframe AdminPlus and LTMon Configuration

The AdminPlus and LTMon commands go through the bin/xmigr script, which requires the hostname of the migration management host to be put in a configuration file. In /opt/luminex/XMig/<version>/etc/xmigr.config put in the line MHOST=<hostname>. The <hostname> is the DNS hostname or the IP address of the server managing the migration.

The XMig Commands can be set from the mainframe using AdminPlus or LTMon. The syntax is dependent on the mainframe interface chosen, see the sections below for examples.

4.6.1 AdminPlus XMig Commands:

All of the XMig commands are allowed from AdminPlus. The commands may be issued via JCL with the command in the input parameters. The possible XMig Commands are given in the XMig Client Commands section of this document. The XMig client form of the command (bin/XMig –c <Command> <Parms>) can be mapped to the AdminPlus form (GO XMIGCMD,<HostName>,<Command>,<Parms>) by adding commas and switching the "bin/XMig –c" for "GO XMIGCMD,<Hostname>,". The AdminPlus Command goes in the SYSIN in the JCL.
An example is to set the MaxCopyTasks to 7 the command for the XMig Client would be :
bin/XMig –c MaxCopyTasks 7
For AdminPlus, assuming the XMig host is cga1 the command in SYSIN would be:
GO XMIGCMD,CGA1,MAXCOPYTASKS,7

4.6.2 LTMon XMig Commands:

The report commands are not to be issued from LTMon since it is not practical to have that much output going into the syslog. The LTMON uses a modify type command from the TSO command line. The non-report XMig commands can be mapped from the XMig Client Commands by replacing the "bin/XMig –c" with /F LTMON,VOL <HostName>". An example is to set the MaxCopyTasks to 7 the command for the XMig Client would be : bin/XMig –c MaxCopyTasks 7
For LTMON, assuming the XMig host is cga1 the modify command would be:
/F LTMON,VOL CGA1 MAXCOPYTASKS 7

5 XMig List and Log Files

The XMig Migration list is usually kept in the var directory along with the log files. There a number of files that are used to retain VOLSERs progress through the migration and volume compare process. The .lst, .que, .inp, .dne, are extensions of files for the migration. While .qa, .ipa, .dna extentions are used by the volume compare audit process.

The XMig daemon logs to XMig.log. The script (xmig_job) used for performing the volume copies logs to thread specific logs with names of the form xmig_job_*.log, where the * is the thread id (0 to 64). Note the xmig_job log files will reside in the XMig var directory on the server to which the volume copy was dispatched. The XMig client program logs to the XMig_Client.log file.

5.1 Migration List File Progression

As the migration process is performed the VOLSER status moves from the Que File (.que), to the In Process File (.inp) to the Done File (.dne).

5.1.1 List File

The project list file (which usually has .lst extension) contains all the VOLSERs that are involved in the migration, one per line. The list file is no longer modified as the migration progresses. When the XMig is started the VOLSERs in the list are queued to be migrated, this is done by reversing the order in the list file and moving the VOLSERs in their new ordering into the Que file with the .que extension.

5.1.2 Que File

The que file has the .que extension and is the input list of VOLSERs to be copied for the migration. The VOLSERs in the que file are in reverse order of the VOLSER in the original list file. Each line in this file is a VOLSER, no other fields are present on the line. The last line in this file contains the next VOLSER to be migrated. When looking for the next VOLSER to copy during the migration, the software will take the VOLSER from the last line of the que file and truncate the file removing the VOLSER from the file.

5.1.3 In Process File

The In Process file with the extension of .inp is a list of the VOLSERs that have started a migration copy and a status for the copy has not been received yet. When the VOLSER was found to be the next in the que it was moved to a line in this In Process File along with the hostname, the status “Processing” and the start time, prior to the copy command being sent to the xmig_job script. When the xmig_job script returns the finishing status the VOLSER will be removed from the In Process file.

5.1.4 Done File

The Done File holds the status of the migration copies that were attempted for the VOLSERs. The xmig_job script returns the finishing status and it is recorded as a status string along with the ending time into the Done file.

5.2 Audit Volume Compare List File Progression

The Audit process uses the Done file from the Migration as input to generate a volume Compare List File (.volcmp). As the audit volume compare process is performed the VOLSER status moves from the Audit Que File (.qa), to the Audit In Process File (.ipa) to the AuditDone File (.dna).

5.2.1 Audit Queue File

The Audit Que File starts as a copy of the volcmp file and has the lines in reverse order. Each line is a Completed line for a VOLSER from the Migration Done File (.dne). The next volume to be compared is taken from the last line in the Audit Que File, the line is put into the Audit in Process File, a compare is launched via the xmig_job script, and the line is removed from the Audit Queue File.

5.2.2 Audit In Process File

The list of VOLSERs being compared is kept in the Audit In Process File (.ipa). The status for the VOLSER is Auditing and the rest of the information on the line came from the Complete line the moved through the Migrations Done file and then to the volcmp file and through the Audit Queue File.

5.2.3 Audit Done File

When the final status for the compare operation is returned from the xmig_job the status will be recorded as Passed or MisCompare in the Audit Done File (.dna).

5.3 XMig Log Files

5.3.1 XMig Client Log File

The XMig client program is the one that the command line commands are entered into. The var/XMig_Client.log is the log file for the client. The log contains some information about each command received and how the arguments were broken up. Also some entries regarding the filenames used to pass back the output for the command from the server. This log is not generally used to debug migration problems.

5.3.2 XMig Server Log File

The XMig server program (XMigd daemon) logs into the file named var/XMig.log. Information logged into this log includes the commands received from the client, the command lines being sent by the migration to the xmig_job script, and the return codes back from the xmig_job script. Troubleshooting a copy for a specific VOLSER copy or compare usually starts by using this log. At a minimum the host the command was sent to and the thread ID is gleaned from the Cmd Line in order to find the cgx and the xmig_job logs.

5.3.3 xmig_job Log Files

The copy and compare function is provided by the cgx package volcopy program in the luc/bin directory which is called via the XMig package bin/xmig_job script. The command line contains the thread id which determines the log file name. The xmig_log script will use a log file var/xmig_job_*.log where the * is the thread id from the XMig server. Find the CmdLine in the server logs to get the thread id. The xmig_job logs collect all the stderr output from the volcopy call

and the last stdout ouput line and return code from the volcopy. Note: remember to look for these logs on the server the ssh shell command was sent to.

5.3.4 cgx xmig Related Log Files

The cgx package, specifically the luc binary volcopy is used to copy and compare the VOLSER for xmig_job commands. In luc/current/var will be logs with names beginning with volcopy_* where the * is the XMig thread id. These logs can be used to help give more clues to the reasons a copy or compare did not complete successfully. Note: remember to look for these logs on the server the ssh shell command was sent to.

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