Data and Media Migration
from the IBM 3995 Optical Library Dataserver
to 30GB Ultra Density Optical (UDO^TM) Media
in an i5/OS Environment

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Introduction

In October 2005, IBM introduced the 3996 Optical Library for attachment to the IBM System i platform using i5/OS. The 3996 features the latest 5.25 inch optical technology 30GB Ultra Density Optical (UDO^{TM}) drives and media. These new optical libraries replace the existing IBM 3995 optical library dataservers, and provide up to 5.2 terabytes of archive storage capacities.

IBM has also enhanced i5/OS to support and has tested interoperability with the Plasmon *G-Series for IBM OS/400* optical library line on the System i platform. These optical libraries also feature the new UDO drives and media, and provide archive storage capacities of up to 19.1 terabytes, with additional features. The Plasmon library models are configured in the i5/OS environment as device type 399F.

See http://www.ibm.com/servers/eserver/iseries/optical/ for reference material on optical library support in an OS/400 and i5/OS environment. The link includes additional details on host system adapters, cables, media, and host software requirements for attachment of the above optical libraries to System i models. The current version of this document can be found there also, in the *3996 Optical Library > Data Migration* link.

This document addresses migration options for moving from 3995 optical media to the new UDO media. The new UDO drives and media are not physically compatible with the older technology 3995 optical library dataserver drives and media. If replacement of the 3995 device is desired, data should be migrated from all media created by that device to UDO media within the IBM 3996 or Plasmon *G-Series for IBM OS/400* (399F) optical libraries.

Overview

There are several approaches available for moving data from the older 3995 to newer optical libraries with UDO drives.

Media Migration is the process of removing the optical cartridges from the 3995 and adding them to the new optical library, if possible. Media Migration is only possible in a subset of conditions when the new optical library is a Plasmon *G-Series for IBM OS/400* optical library that has at least one 9.1 GB drive installed.

Data Migration is the process of reading data from 3995 media, and then writing it to UDO media in the new optical library. Data Migration is the only option when migrating directly from 3995 media to UDO media.

This document will briefly describe *Media Migration*, but will mostly focus on options for performing *Data Migration* when moving directly from 3995 media to UDO media.

Media Migration

Media Migration is the process of removing the optical cartridges from the 3995 and adding them to the new optical library, if possible. This operation is performed using i5/OS operating system commands, not from the application. The export and import (RMVOPTCTG and ADDOPTCTG) commands can be used to physically move the media between libraries. The application indexes do not need to be updated or notified of the media relocation. The volume name and characteristics remain the same in the new library and the migration is transparent to the application.

Media Migration is possible when migrating Rewritable media (with one exception, noted in the next paragraph) or CCW WORM media from a 3995 optical library to a Plasmon *G-Series for IBM OS/400* optical library that has at least one 9.1GB drive installed. These media are compatible with the 9.1GB drives, and can be imported into a library with those drives installed. Plasmon's optical libraries support mixed mode 9.1GB drives and UDO drives, so media types compatible with those two drives can co-exist in the library.

Some 3995 media can not be migrated to the Plasmon libraries with 9.1GB drives. Data on these media must be migrated using *Data Migration* methods. They include the IBM Permanent (not CCW) WORM media, which are not physically compatible with the 9.1GB drives or UDO drives. Also included are any Rewritable media that were written with IBM's HPOFS (High Performance Optical File System) Rewritable format in an IBM LAN attached 3995 optical library[1].   The table below describes 3995 media type and format compatibility with the new optical libraries.

3995 Media Type/Format	Plasmon library with 9.1GB drive installed	3996 UDO library or Plasmon UDO-only library
IBM Permanent WORM	*Data Migration* only, media is not compatible.	*Data Migration* only, all 3995 media types are not compatible with UDO drives.
CCW WORM	***Media Migration***	
Rewritable written with HPOFS-Rewritable format	*Data Migration* only, format is not compatible.	
Rewritable written with HPOFS-WORM format	***Media Migration***	
Rewritable written with UDF (Universal Disk Format)	***Media Migration***	

Table 1: Compatible 3995 media types and formats where *Media Migration* is possible

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[1] When using IBM LAN attached 3995 libraries, HPOFS-Rewritable or HPOFS-WORM media formats are determined by the LAN attached OS/2 optical library management utility, not by i5/OS commands. To determine which media format is written, use the OS/2 library management utility "Services" pull-down, select "Volume Operations", then select the volume name and issue "Volume Information command. The format type field under the volume information header will display REWRITABLE or WRITE-ONCE. If WRITE-ONCE is displayed, the media format will be recognized by direct attached optical libraries in an i5/OS environment.

When compatible 3995 media have been moved to Plasmon optical libraries with 9.1 GB drives, they can then be migrated to UDO media (as desired) within the new optical library using some *Data Migration* methods.

Data Migration

Data Migration is the process of reading data from 3995 media, and writing it to UDO media in the new optical library. *Data Migration* is the only option when migrating from 3995 to 3996 optical libraries.

There are multiple data migration options to consider when moving your data from the 3995 optical library to UDO media in the new 3996 or Plasmon optical library.

1. Use **utilities and procedures associated with the archive software application** to migrate the data. This includes using utilities provided by the primary archive application or services/utilities that may be provided by third parties.
2. Copy the data from media in a direct attached 3995 optical library to UDO media in the new library using the i5/OS **CPYOPT command**[2]. This option may be useful if you want to move the data to the new optical library as quickly as possible so that the older IBM 3995 optical library and host adapter can be removed. You then have the option to later consolidate the moved data on the new higher capacity UDO volumes, using available utilities/procedures as in option 1 above. *Note that the DUPOPT command can not be used to duplicate/copy media in this context, since the source (3995) and target (UDO) media are a different media technology, capacity, and physical sector size.*
3. Use **IBM services offerings** that will assist in the data migration process.

Application Utilities and/or Procedures

The archive software application must be aware of any data relocation (e.g. change of volume name, directory name, or file name) that occurs during the data migration. Many application providers will supply the utility needed to do the data migration from one device and media to another.

IBM DB2 Content Manager

See the *Optical Platter Considerations* section of the IBM DB2 Content Manager document "**Moving Content Manager for iSeries from one i5/OS system to another"**

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[2] The CPYOPT command can only be used when copying between or within direct attached optical devices. If using *Data Migration* methods to migrate data from a LAN attached 3995, archive software application utilities or third party migration utilities must be used.

for details on using Content Manager utilities and APIs for data migration. This document is found at the following link: http://www.ibm.com/support/docview.wss?uid=swg27006141.

Additional information can be found in the *Database Utilities* chapter of the Content Manager System Administrator's Guide. A link to this document is in the *Software > Reference Materials* section of the System i Optical Storage web site at http://www.ibm.com/servers/eserver/iseries/optical/.

For information about product support, PTFs, FAQs, and other topics, consult the IBM DB2 Content Manager support site at http://www.ibm.com/software/data/cm/cmgr/400/support.html.

There are also third party providers of software utilities and services that support data migration in a Content Manager environment. A list of these providers is found in the **Appendix**.

IBM DB2 Content Manager OnDemand

See the IBM DB2 Content Manager OnDemand document "**Spool File Archive Media Migration Facility (MMF)"** for details about migration of Spool File Archive data. This document is found at the following link: http://www.ibm.com/support/docview.wss?uid=swg27008380.

MMF provides a tool to move Spool File Archive data from one media type to another in an easy, recoverable way that can be stopped and restarted as needed. It also makes it possible to consolidate data on multiple 3995 optical volumes onto a single UDO volume.

For additional information about product support, PTFs, FAQs, and other topics, consult the IBM DB2 Content Manager OnDemand support site at http://www.ibm.com/software/data/ondemand/400/support.html.

There are also third party providers of utilities and services that support data migration in a Content Manager OnDemand environment. Please refer to the list of these providers in the **Appendix**

Other Archive Software Applications

There are a number of other archive software application providers that provide solutions for archive storage on the i5/OS platform using the IBM 3995, 3996, and Plasmon optical library hardware. These applications also have utilities, procedures, and services defined for data migration. Contact your application provider directly for additional information on pricing and availability for these options.

Third Party Migration Utilities

If the application provider itself does not offer a migration utility, there may be other third party providers of software utilities and services that support data migration compatible with your archive software application.

See the **Appendix** for a list of third party utilities that support data migration in an i5/OS environment. IBM does not evaluate or compare these utilities, and the list may not be a complete list of all available services and utilities for a specific archive software application environment. It is provided to assist you in determining your data migration options. It would be best to contact your application provider directly for additional details and recommendations.

CPYOPT Command

The i5/OS CPYOPT command can be used to copy all of the files and directories between media in the direct attached 3995 library and UDO media in the new optical library. This must be managed carefully, because the archive application software must be aware of any data relocation that occurs using this method[3].

Here is an example of how migration could be done using CPYOPT:

Copy (using CPYOPT) your 3995 media to corresponding UDO media in the 3996 or Plasmon optical library. There will be one UDO target media required for each 3995 media to be copied. All of the files and directory names will be the same on both media. i5/OS requires that the source and target volume names be different initially. Once the copy is completed (both sides of media), the 3995 media can be exported from the 3995 device, and the UDO volumes in the 3996 can be renamed to be the same as the 3995 volume names were. Some additional considerations:

- Volume, directory, and filenames on the target UDO volume are the same as they were on the source 3995 media; therefore the migration is transparent to the application.
- The target UDO volume will have unused space, since the source 3995 volume is lower capacity than the corresponding UDO volume.
- Once all data is migrated from the 3995, the unused space on the target UDO volumes is now available for your application (for new file creates), or data/files can be

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[3] The archive application must view movement of the data between optical volumes that preserves volume, directory, and file names as transparent. This is the case for most archive applications, and in particular is true for IBM DB2 Content Manager and Content Manger OnDemand. If the application has additional requirements for data relocation, using CPYOPT alone is not sufficient for migration. Additional modification of application metadata may be necessary. Contact your archive software application provider if you have any questions about its requirements. You may also want to experiment with migration of a single media with the CPYOPT command to verify transparency before copying all of your 3995 media.

consolidated as desired within the new library so that the unused space is used up. A utility could be written using software application APIs to do the consolidation in the background or during off-shift hours. Again, the application software must be aware of any relocation of directories and/or files from one volume to another.

- All data being migrated is fully on-line for file retrievals during the migration. Any file retrievals by the application during migration will continue to be from 3995 media. Once the 3995 media is removed and UDO volumes are renamed, the file retrievals will go to the new UDO media.

- The 3995 media being migrated should not be updated during the migration process. Once the source 3995 media has been removed and the target UDO volume renamed, normal activity can resume on the UDO volume.

- Any new file creates should be directed to UDO volumes in the new optical library that are not target volumes in the migration.

- Optical volumes that have been previously removed from the 3995 optical library but still contain valid data should be included in the migration.

To summarize an implementation of this approach: An i5/OS CL program could be written to copy all of the volumes in the 3995 to UDO volumes in the new optical library. After all data is copied, the 3995 library can be removed, and target UDO volumes renamed as applicable to the old 3995 volume names. At this point, all of the data is in the new optical library, and the relocation is transparent to the application because of the identical volume, directory and file names. Any desired consolidation on the higher capacity UDO media can occur as desired within the new library using the archive software application or other third party utilities, or the unused space can be used for new files if the application allows it.

IBM Services Offerings for Migration Assistance

Send 3995 Media to IBM Lab for Conversion to UDO Media

IBM provides an offsite migration offering to convert 3995 media to UDO media. 3995 media (*BACKUP or *PRIMARY) are sent to IBM, and they will be converted to UDO media. Both 3995 media and UDO media will be returned to you when the migration is complete. Some considerations with this option:

- Volume, directory, and file names on the target UDO volume are the same as they were on the source 3995 media, so the migration is transparent to the application[4].

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[4] The archive application must view movement of the data between optical volumes that preserves volume, directory, and file names as transparent. This is the case for most archive applications, and in particular is true for IBM DB2 Content Manager and Content Manger OnDemand. If the application has additional requirements for data relocation, this option will not alone be sufficient for migration. Additional modification of application metadata may be necessary when you receive the new UDO media back from IBM. Contact your archive software application provider if you have any questions about its requirements.

- UDO volume names will be the same as the corresponding 3995 volumes when returned to you from IBM.
- Each 3995 media that you send to IBM will require a corresponding UDO media.
- The target UDO volume will have unused space, since the source 3995 volume was a lower capacity than the corresponding UDO volume.
- Once the returned UDO volumes have been added to the new optical library, the unused space is now available for your application (for new file creates), or the data/files can be consolidated (if desired) in the new library so that the unused space on the UDO volumes is used up. A utility could be written using software application APIs to do this in the background or during off-shift hours. The application software must be aware of any relocation of directories and/or files from one volume to another.
- The source 3995 media that you sent to IBM may be *PRIMARY or *BACKUP. However, the resulting UDO target volume will be *PRIMARY. Optionally, you can request that a new *BACKUP or duplicate volume be created on UDO from the new *PRIMARY volume, or you can do it yourself from the UDO volume that is returned to you.
- Optical volumes that have been previously removed from the 3995 optical library but still contain valid data should be included in the media sent to IBM for migration.

To inquire about pricing and availability of this migration service in the United States, contact Dan Heithoff, IBM Global Services, heithoff@us.ibm.com, 507-286-6846. This migration service is not available in other geographies at this time.

Performance

Data Migration performance is determined by a number of factors. Server performance, file size, number of drives, migration utility performance, and other optical library activity all influence the performance of the migration process. Consult your archive software application utility provider for specific performance details.

Appendix

Third Party Data Migration Utilities

The following is a list of third party utilities that support data migration in an i5/OS environment. IBM does not evaluate, endorse, or compare these utilities, and this list may or may not be a complete list of available services and utilities. It is provided to assist you in determining your options for data migration. Contact your archive software application provider for additional details and recommendations.

Company[5] providing optical migration utilities and/or services	Company contact information	
Aureus Solutions (http://www.aureussolutions.com)	Carol Parks	carol@aureussolutions.com (301) 607-6856
DyComp, Inc. (http://www.dycomp.com)	Jim Dyson	jdyson@dycomp.com (336) 778-2092, Ext. 12
Image Technology Corp. (http://www.image-technology.net)	Don Byers	dbyers@image-technology.net (317) 244-8772
MBS Technologies, Inc. (http://www.mbstechnologies.com)	Matt Pannier	Matt_Pannier@mbstechnologies.com (952) 844-2635
OAS Corp. (http://www.oascorp.com)	Joe Wolken	wolkenj@oascorp.com (512) 402-1123
Trillicom (http://www.trillicom.com)	Dean Larsen	Dean_Larsen@trillicom.com (248) 348-0618
Twinstar, Inc. (http://www.twinstarinc.net)	Steve Gaumond	Stevegaumond@twinstarinc.net (303) 430-7101

Comments and Feedback

If you have comments, corrections, or other feedback related to this document, please contact Armin Christofferson (armin@us.ibm.com) or Mark Bofferding (boffer@us.ibm.com), IBM System i Optical Storage Solutions.

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Assistance on compiling the list of third party data migration utilities above was provided by Leigh Wolfinger of Plasmon Corporation (Leigh.Wolfinger@plasmon.com).

In addition, Plasmon published a white paper in July of 2005 that describes migration from the 3995 optical library to the Plasmon *G-Series for IBM OS/400* optical libraries. This document expands on that paper in greater detail with additional options for the i5/OS environment, and includes the new IBM 3996 optical library as a migration target.

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[5] Company names and associated contact information in this list are used by permission.

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DB2	iSeries	System i

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