

IBM 3995 Migration to POWER7® (Virtual Optical Media Library)



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Session Preview


- Audience – users of IBM i direct attached (SCSI) optical libraries
- Context - optical library enabled applications/solutions for archive, imaging, and document storage.
- Problem – optical library data migration to POWER7
- Solution Concept – virtual optical library and data migration
- Solution Detail – “how to”
- Solution Availability – IBM Lab Services offerings
- Examples of actual customer migration scenarios
- Questions




IBM i optical library enabled applications/solutions




Government




Insurance




Services




Legal




Education



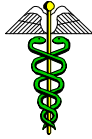
Financial Services




Transportation




Natural Resources



Medical



Manufacturing



Telecommunications

- ✓ Imaging and Workflow
- ✓ Large File Serving
- ✓ Document Warehouse
- ✓ Database Archive
- ✓ Regulatory Compliance

History of Optical Library Attachment for the IBM i

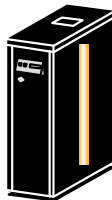
- IBM 3995 – the backbone of optical library enabled archive applications for the IBM i operating system family since 1992.
 - Permanent optical storage was IBM's premier archive storage offering
- Support for the Plasmon G-series and IBM 3996 optical libraries was introduced in 2004 and 2005. These libraries feature Ultra Density Optical (UDO) drives with 30GB and 60GB media capacities and the next generation in optical media technology.
- The IBM 3995 and IBM 3996 have been withdrawn from marketing.
- Thousands of these devices remain installed on pre-POWER7 servers with IBM i installed.



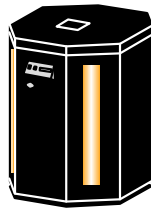
IBM 3995 Cxx Optical Library



3995-Cx0
104 GB
20 cartridges
1 or 2 drives



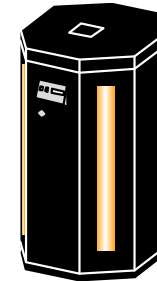
3995-Cx2
270 GB
52 cartridges
2 drives



3995-Cx4
540 GB
104 cartridges
2 or 4 drives



3995-Cx6
810 GB
156 cartridges
4 or 6 drives



3995-Cx8
1.34 TB
258 cartridges
4 or 6 drives

- LAN Libraries - Token ring or Ethernet attachment (3995 C2X)
- IBM i supported direct attach libraries - HVD SCSI attachment (3995 C4X)

LAN attached libraries were withdrawn from marketing in 2003
Direct attached models were withdrawn from marketing in 2004

Plasmon G-series Optical Library (399F)



399F-G104
6.2 TB
104 cartridges
2 or 4 drives

399F-G164
9.8 TB
164 cartridges
2, 4, 6, 8, 10, or
12 drives

399F-G238
14.2 TB
238 cartridges
2, 4, 6, 8, 10, or
12 drives

399F-G438
26.2 TB
438 cartridges
2, 4, 6, 8, 10, or
12 drives

399F-G638
38.2 TB
638 cartridges
2, 4, 6, 8, 10, or
12 drives

- IBM i supported SCSI direct attach libraries
- Barcode reader and bulk load magazine
- Enterprise models

IBM 3996 Optical Library



Model	Number of Slots	Number of UDO Drives	Maximum Library Capacity (TB)
32	32	1, 2	1.92
80	72, 80	4, 2	4.32, 4.8
174	166, 174	4, 2	9.96, 10.44

Single UDO optical cartridge capacities: 30GB and 60GB

- Standard Features
 - 30GB UDO Drives
 - Dual Picker
 - Single Import/Export I/O Station
 - SCSI LVD Interface
 - Panel Window and Lights
 - WORM & Rewritable Media Support

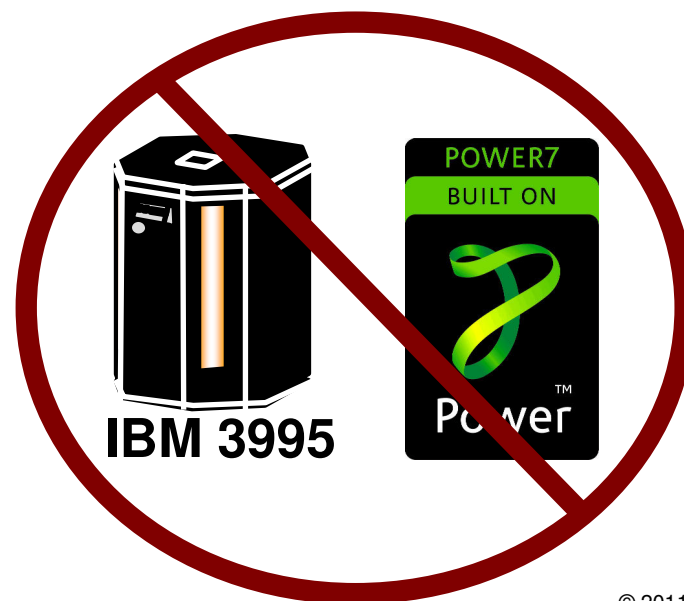
- Optional Features
 - Barcode Reader
 - Number of UDO drives
 - 60GB UDO drives

Withdrawn from marketing 2009

Problem: Can I Move My Optical Library to POWER7?

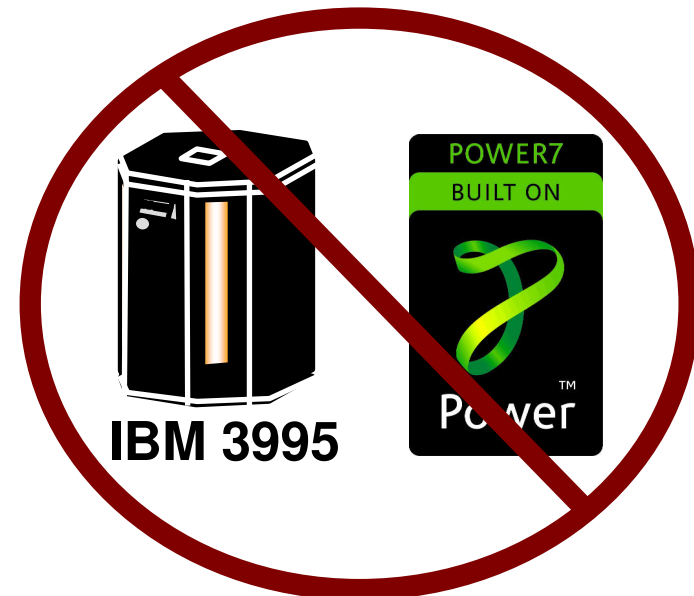
- **IBM 3995** library attachment requires an IOP based adapter and an IOP
- POWER7 servers do not support IOP and IOP based adapters
 - www.ibm.com/systems/power/hardware/sod2.html
 - SCSI HVD IOA is not supported for IOP-less attachment
 - SCSI HVD-LVD converters are also not supported for the 3995
 - IOA for LAN attached 3995 C2X models also is not supported
- **The IBM 3995 is an inhibitor for POWER7 migrations**

- **IBM 3996 and Plasmon** libraries will attach to POWER7 server via SCSI LVD IOP-less IOA
- SCSI LVD adapter is supported on some POWER7 server models




The IBM 3995 is an inhibitor for POWER7 migrations

- How do I get my data from my 3995 to POWER7 server?
- Current solution/application investment
- Older applications that can't change
- Data indexes
- **Requirement: Unchanged access through /QOPT and IFS/HFS APIs**



Alternatives to the IBM 3995 optical library

- IBM 3996 and Plasmon optical libraries
 - Data migration to UDO
 - Media migration to Plasmon libraries with MO drives (for some 3995 media types)
- Data migration to an IFS directory
- Network attached options (e.g. NFS, TSM...)
 - IBM DR550, IBM Information Archive
 - Non-IBM appliances
 - Separate server (not IBM i) with self contained compliance function
 - Support is application dependent
- **Image Catalog Virtual Optical Media Library** 
 - **IBM Lab Services offering**
 - **Focus of this session**

Solution Concept – Virtual Optical Library and Data Migration

Image Catalog Virtual Optical Media Library

- **Virtualization of optical library access and behavior for transparency to client applications.**
 - Preserves existing optical library based archive application investments when moving to POWER7
 - Eases the transition from IBM 3995, IBM 3996, and Plasmon G-series optical libraries
- Image catalog and virtual optical device enhancements available in IBM i 7.1 with PTFs and IBM Lab Services license.
- Image catalog is loaded to 632B virtual optical device in “library mode”
- All volume images in the image catalog are visible and concurrently accessible under the /QOPT file system (as for any other optical library) with existing APIs.
- Optical library media types WORM and ERASE are supported for compliance with government and industry data retention requirements
 - WORM emulation at the device driver level and WORM file system
 - New virtual optical media of type WORM or ERASE can be created for ongoing production usage.

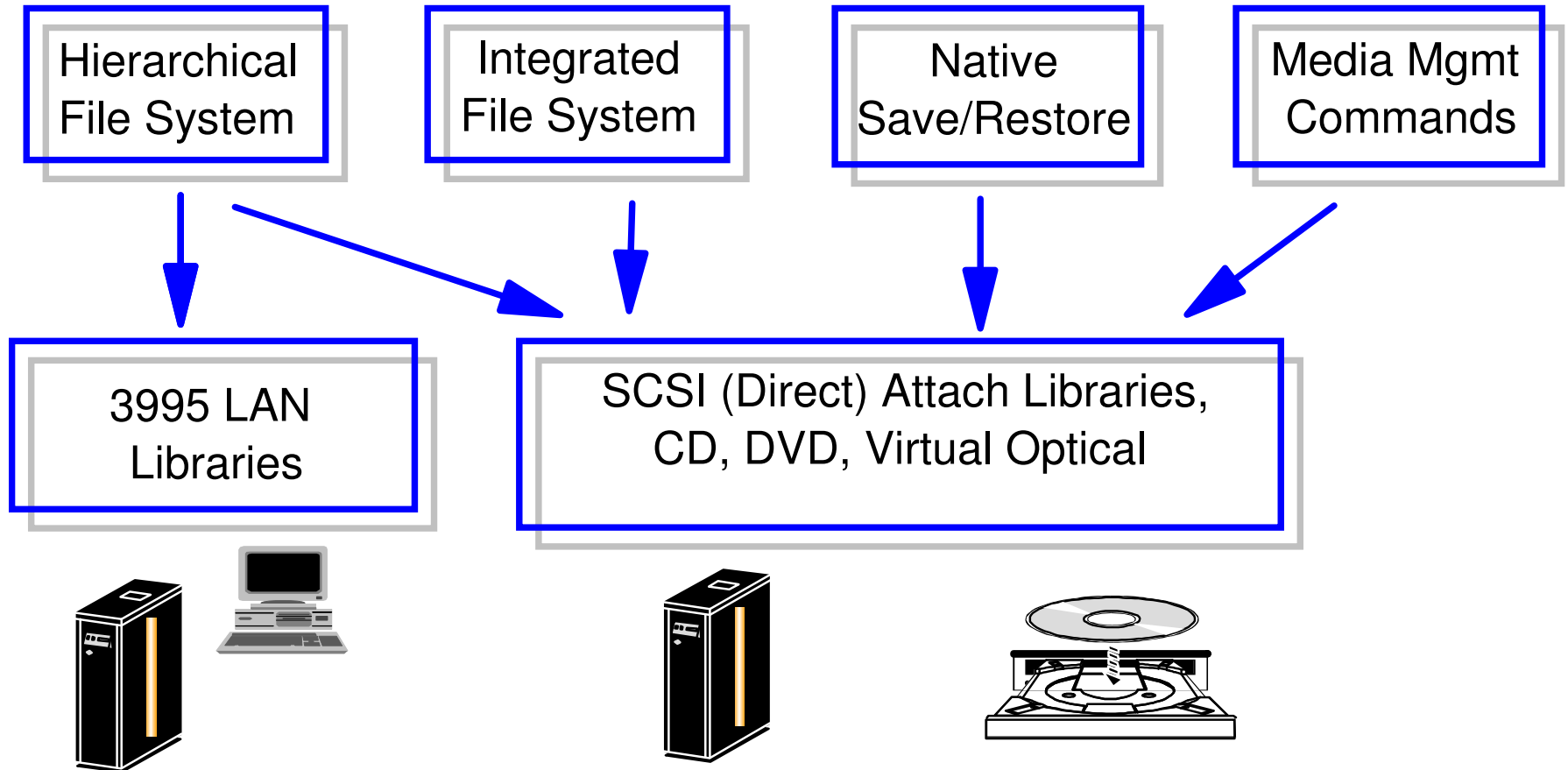
Image Catalog Virtual Optical Media Library - more

- No dependencies on optical library and system adapter hardware that can no longer be purchased
- Continued integrated solution – no additional archive device required
- Fast **migration of existing optical library volumes** directly to the image catalog is supported.
- Archive and retrieval **performance** of disk instead of optical device.
- Image catalogs and/or individual volume images can be part of a regular backup strategy.
- Disk storage backing options for virtual library image catalog

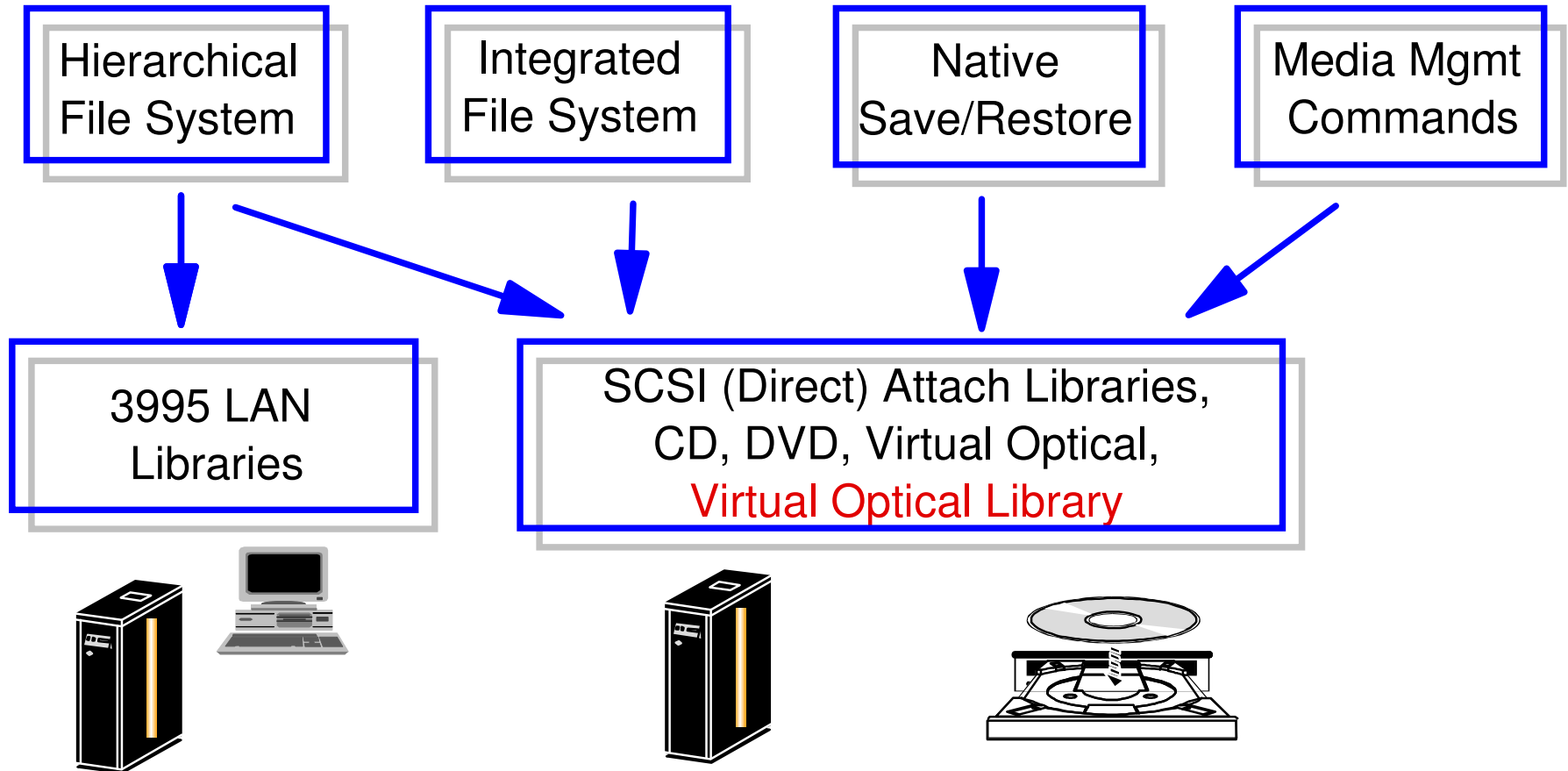
Data Migration Using Image Catalog

- Originally developed for data migration from 3995 to UDO
- Optimize performance
 - Improvement (5-10x) over traditional migration methods
- Create an image of the 3995 optical volume
 - Allows file system accesses without physical optical media
- Data movement beyond the image catalog is optional
 - File system accesses at virtual volume (disk) performance
- Migrate directly to image catalog for virtual optical library
- Migration can occur to a loaded (online) image catalog

IBM i Interfaces to Optical Storage (Historical)

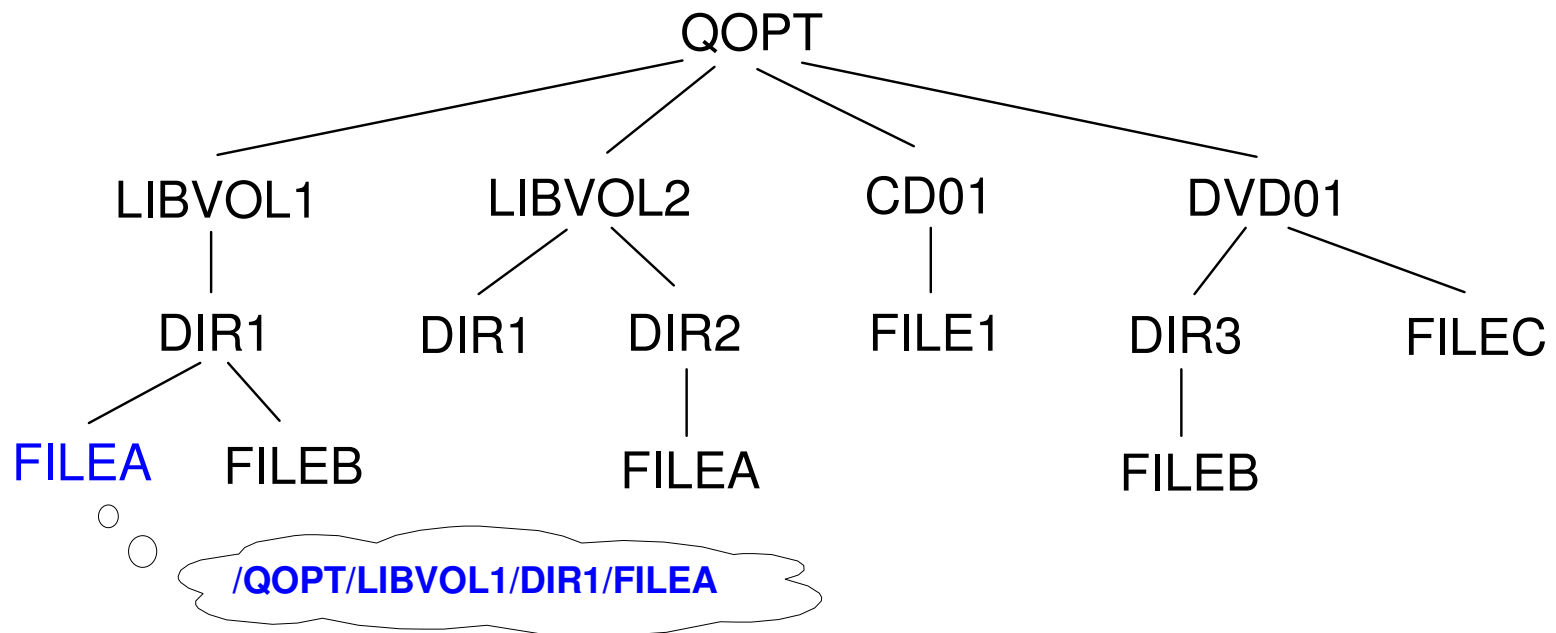


IBM i Interfaces to Optical Storage



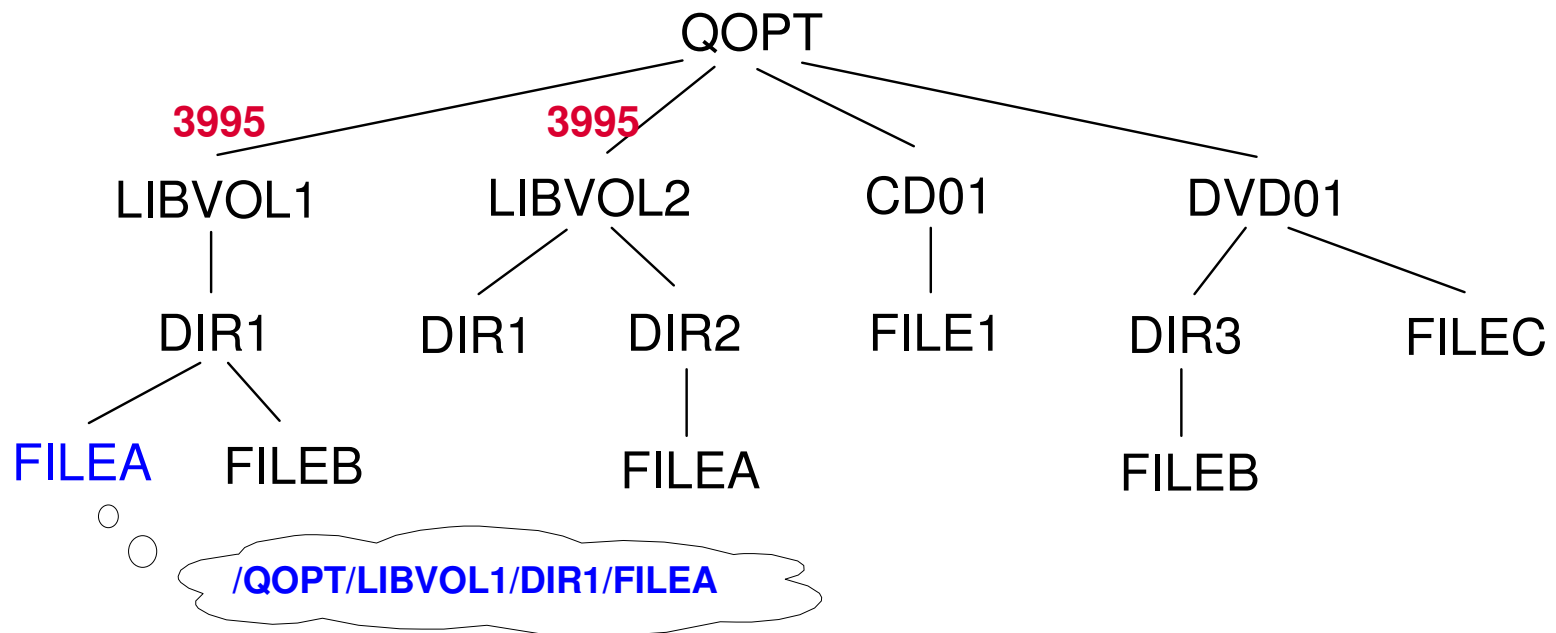
Programming Interface - /QOPT File System

Data is organized in hierarchical structure by volume, directory, file within QOPT file system.



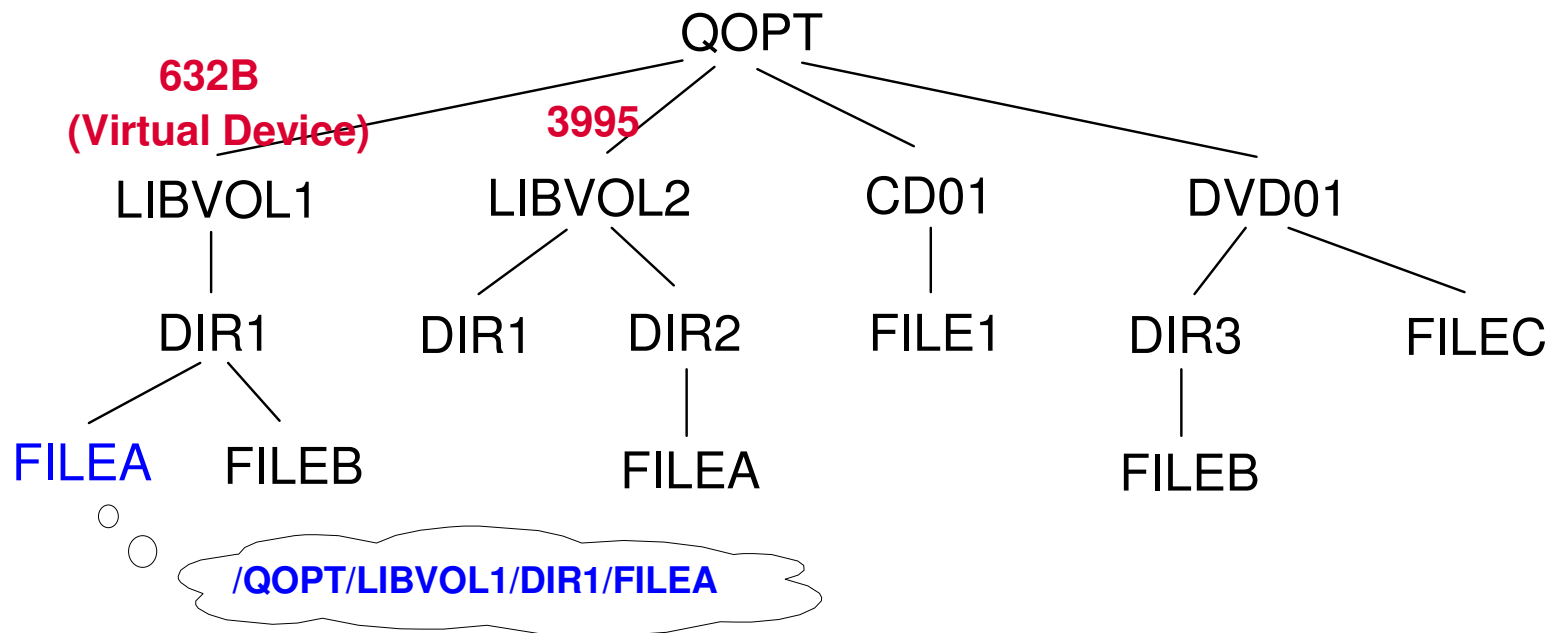
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Programming Interface - /QOPT File System

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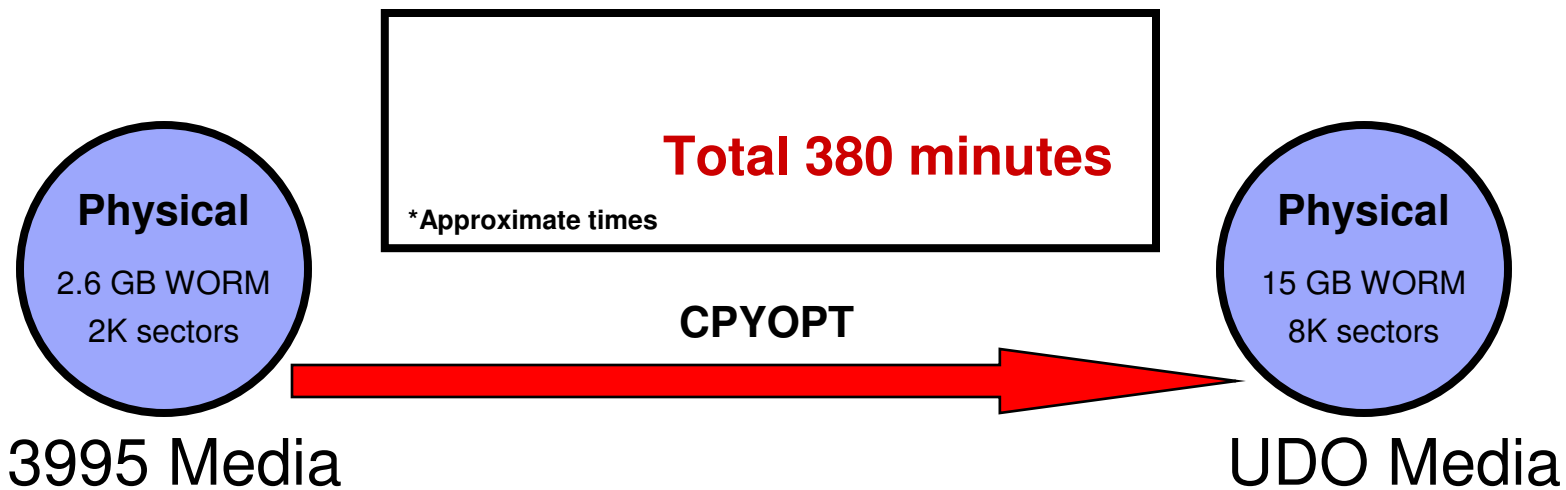


Solution Concept “Checkpoint”

- Data Migration Using Image Catalog
- Virtual Optical Library

- Both are based on image catalog enhancements
- Data movement is transparent to application using /QOPT file system and HFS/IFS APIs
- Together the offerings provide a solution for the 3995 optical library and POWER7 problem

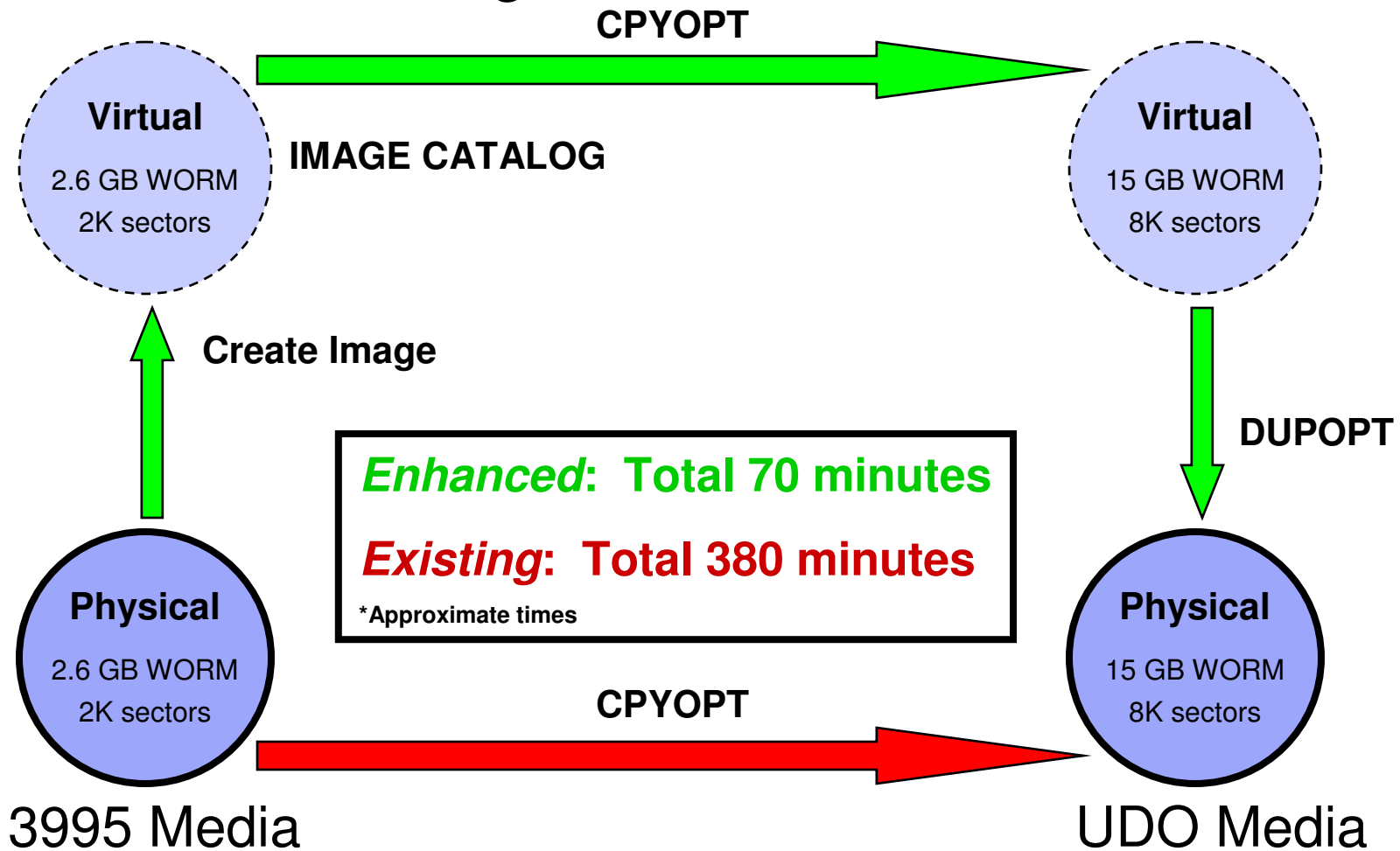
Data Migration Path - 3995 to UDO



Sample volume: 60,088 files -- 68 directories – 100% full – 35 Kbytes average file size

**Actual performance depends on system resources, number of files and directories, average file size*

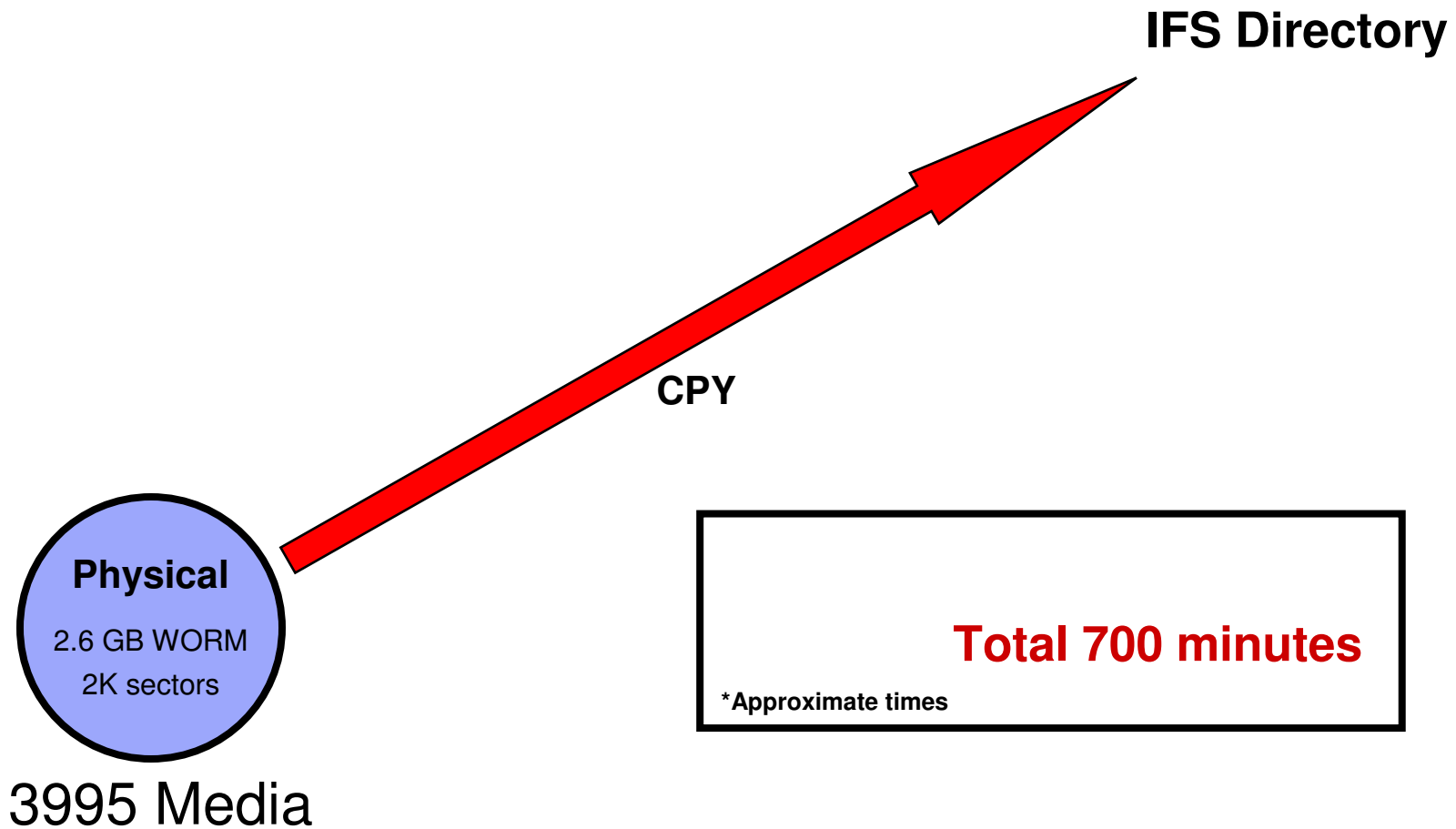
Enhanced Data Migration Path - 3995 to UDO



Sample volume: 60,088 files -- 68 directories – 100% full – 35 Kbytes average file size

*Actual performance depends on system resources, number of files and directories, average file size

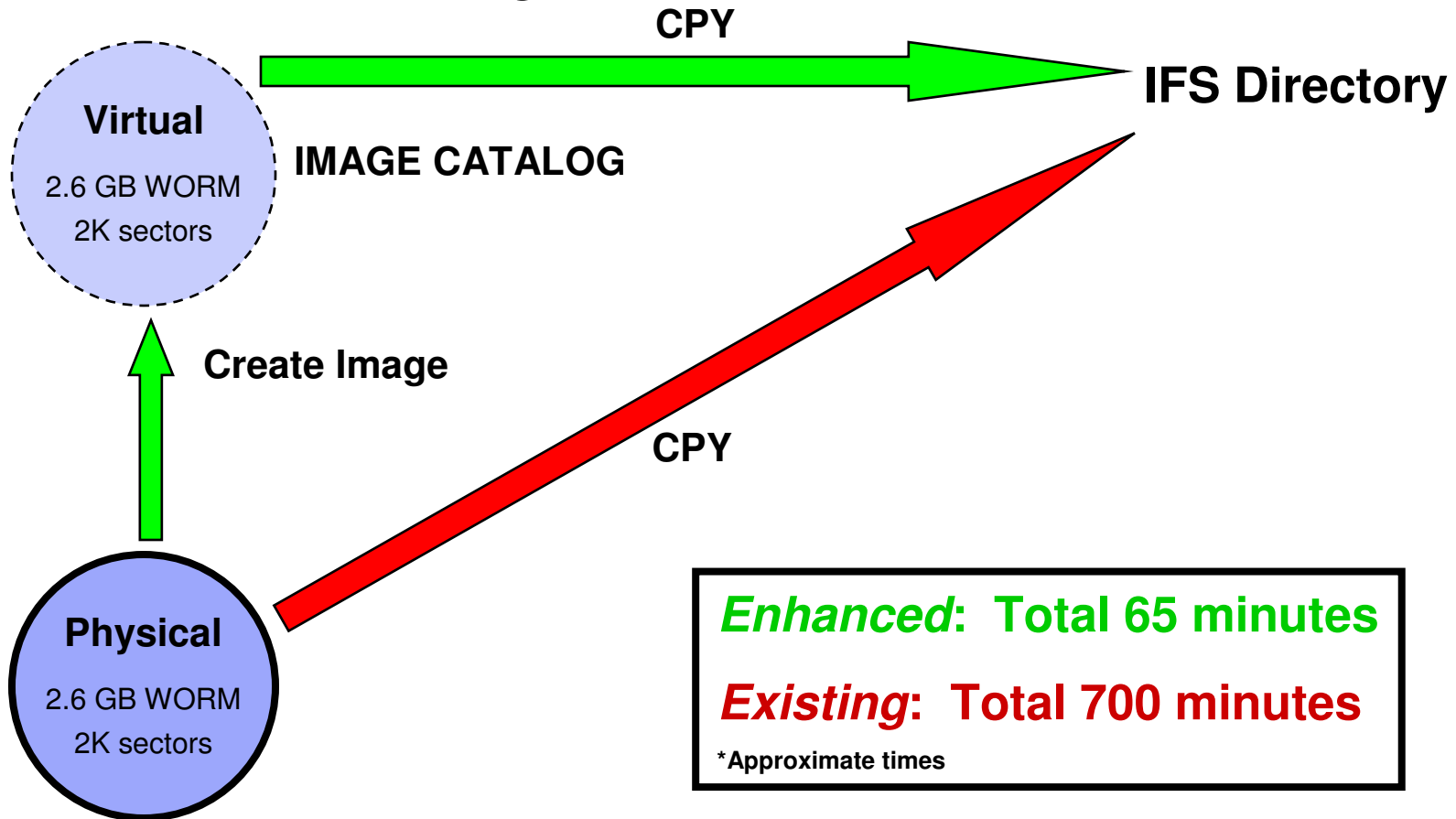
Data Migration Path – 3995 to IFS



Sample volume: 60,088 files -- 68 directories – 100% full – 35 Kbytes average file size

***Actual performance depends on system resources, number of files and directories, average file size**

Enhanced Data Migration Path – 3995 to IFS



3995 Media

Sample volume: 60,088 files -- 68 directories – 100% full – 35 Kbytes average file size

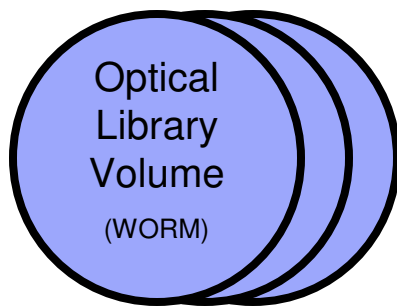
***Actual performance depends on system resources, number of files and directories, average file size**

Optical Library migration to i 7.1 Virtual Optical Library

/QOPT

i 5.4, i 6.1
or i 7.1

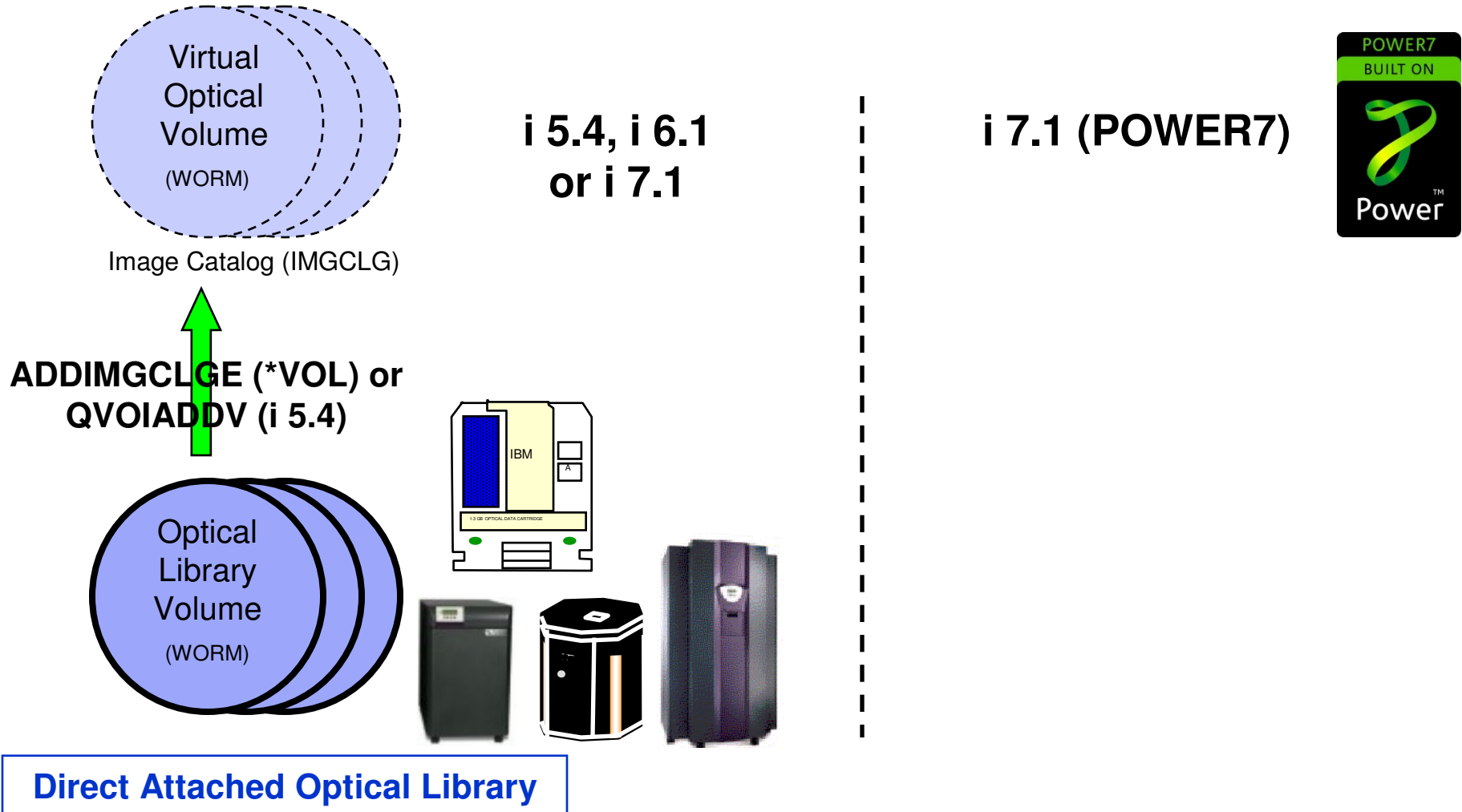
i 7.1 (POWER7)



Direct Attached Optical Library

Optical Library migration to i 7.1 Virtual Optical Library

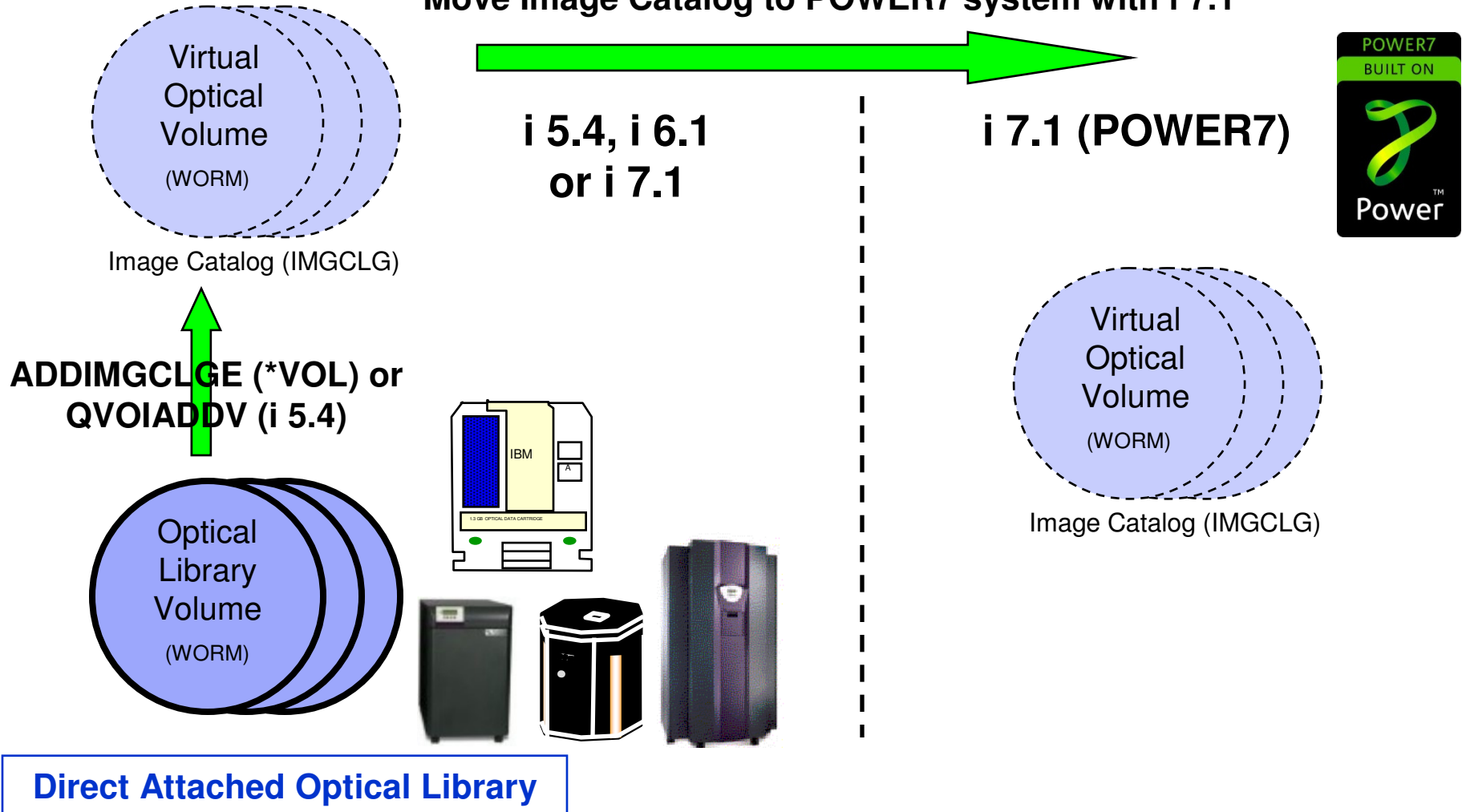
/QOPT



Optical Library migration to i 7.1 Virtual Optical Library

/QOPT

Move Image Catalog to POWER7 system with i 7.1



Direct Attached Optical Library

Optical Library migration to i 7.1 Virtual Optical Library

/QOPT

/QOPT

Move Image Catalog to POWER7 system with i 7.1



**i 5.4, i 6.1
or i 7.1**

i 7.1 (POWER7)

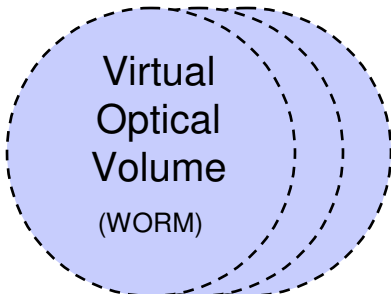


Image Catalog (IMGCLG)

**ADDIMGCLGE (*VOL) or
QVOIADDV (i 5.4)**

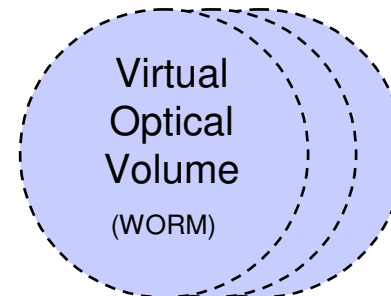
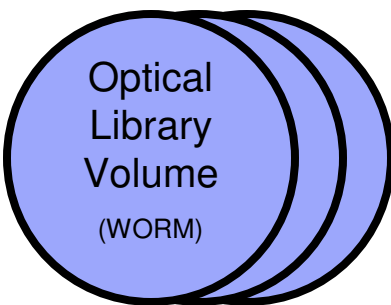


Image Catalog (IMGCLG)

Loaded in "Library Mode"

Virtual Optical Library

Direct Attached Optical Library



Additional Concept: Difference between Catalog Directory and /QOPT Directory

- Image Catalog directory contains volume images
 - No knowledge of volume contents
- /QOPT directory is path to optical volume contents (directories and files)
 - Catalog must be loaded to virtual optical device

Image Catalog – IFS Directory

The Image Catalog (MyImageCatalog) is defined over an IFS directory (MyImageCatalogDir). All volume images are files within that directory.

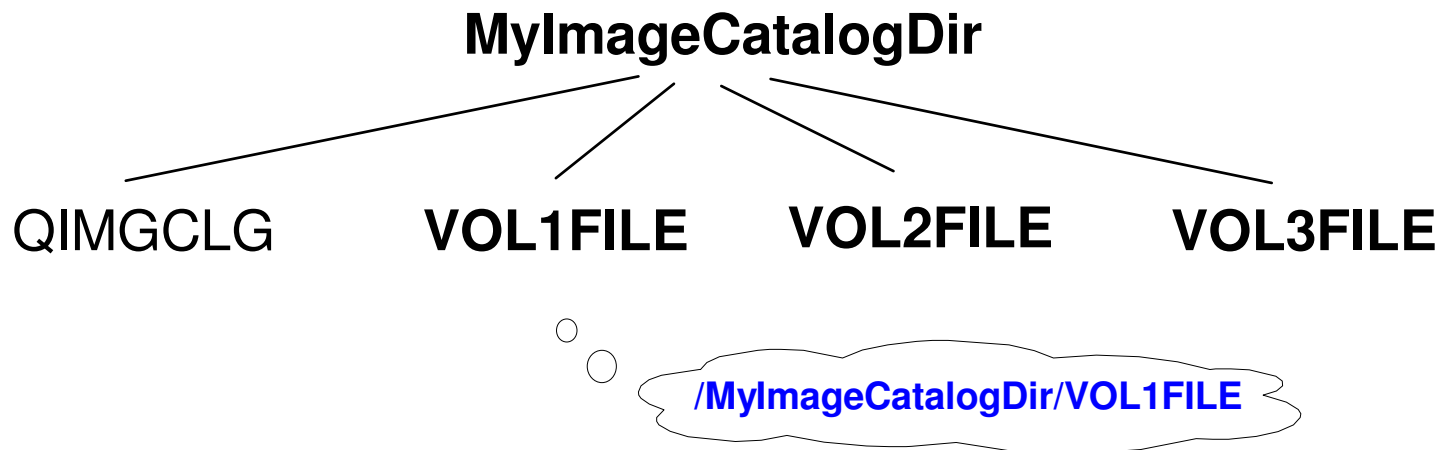
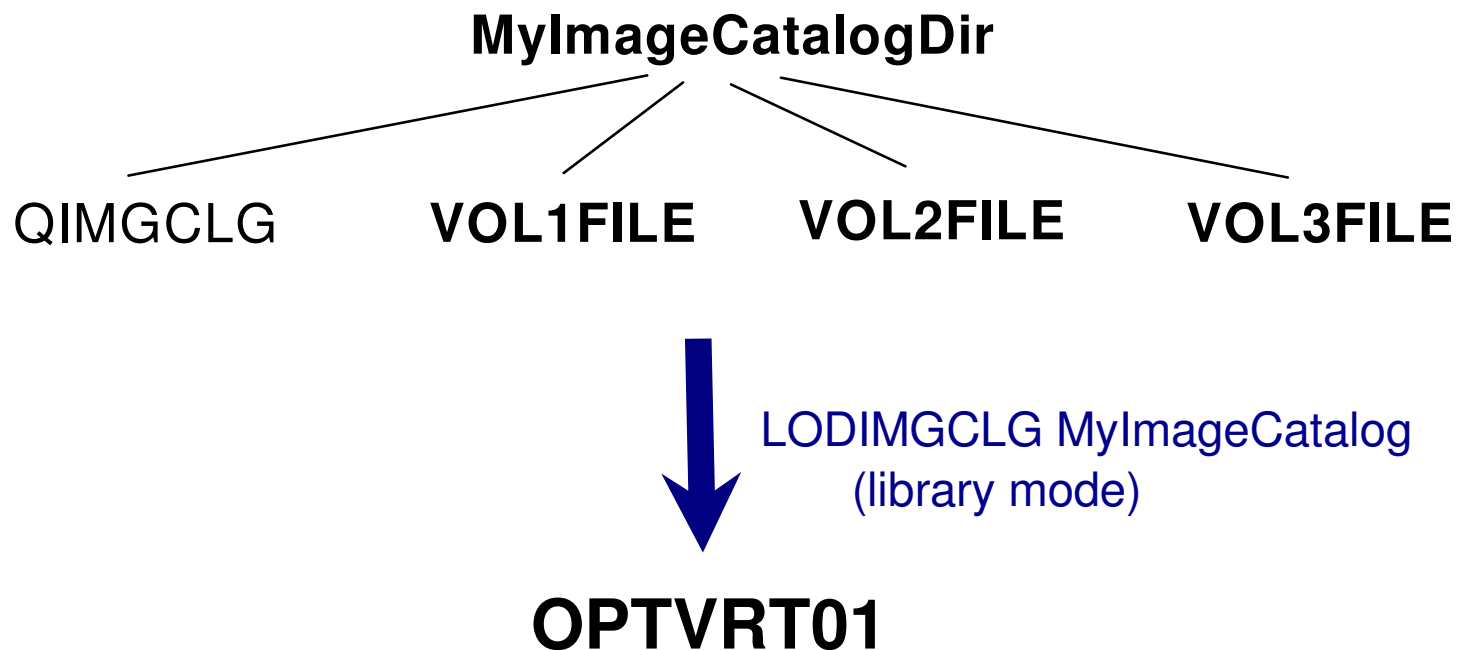
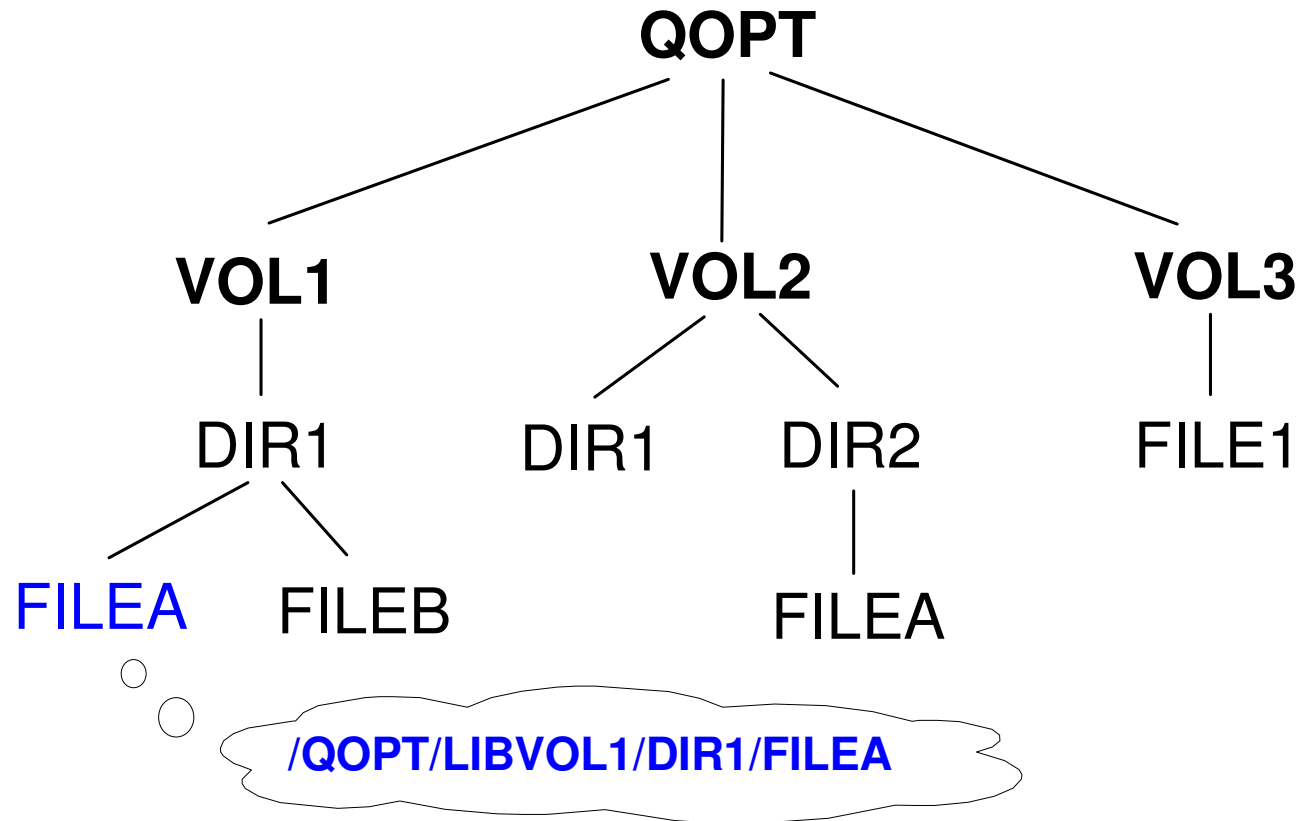


Image Catalog – Load to virtual optical device

The Image Catalog (MyImageCatalog) is defined over an IFS directory (MyImageCatalogDir). All volume images are files within that directory.



Loaded Image Catalog – Library mode



Solution Detail – “how to” Data Migration and Virtual Optical Library

Document References

- Enhanced Optical Data Migration Using Image Catalog, Version 2.0, June 10, 2011
- Image Catalog Virtual Optical Media Library for Archive, Version 2.0, May 25, 2011
- Both of these documents are available for download on the IBM i Optical Storage Support Website

www.ibm.com/systems/i/hardware/storage/optical/

Migration – ADDIMGCLGE (from 3995 volume)

```

Add Image Catalog Entry (ADDIMGCLGE)

Type choices, press Enter.

Image catalog . . . . . > MYIMAGECAT      Name
From optical device, or . . . . . > *VOL      Name, *VOL
Volume identifier . . . . . VOL003
From image file . . . . . _____

_____
To image file . . . . . VOL003_____

_____
Image catalog index . . . . . *AVAIL      1-256, *AVAIL
Replace catalog entry . . . . . *NO      *NO, *YES, *INSERT

Bottom

F3=Exit   F4=Prompt   F5=Refresh   F10=Additional parameters   F12=Cancel
F13=How to use this display   F24=More keys

```

Migration – “M_” rename in source device

```

Work with Optical Volumes
System: Y0645P2
Device . . . . . *ALL
Side information . . . . . : *ALL
Type options, press Enter.
  1=Add  2=Change  3=Copy  4=Remove  5=Display  8=Work with directories
 10=Initialize  11=Work with object links  12=Duplicate ...

Opt  Volume      Device      Volume      Media      Authorization
  [ ] _____  OPTMLB06   *PRIMARY   *ERASE     QOPTSEC
  [ ] M_VOL003    OPTVRT04   *PRIMARY   *ERASE     QOPTSEC
  [ ] VOL003

Parameters or command
===>
F3=Exit  F4=Prompt  F5=Refresh  F6=Print list  F9=Retrieve  F11=View 2
F12=Cancel  F14=Show extended information  F24=More keys
    
```

Bottom

Virtual Library – Create new WORM volume

```

Add Image Catalog Entry (ADDIMGCLGE)

Type choices, press Enter.

Image catalog . . . . . > MYIMAGECAT      Name
From optical device, or . . . . .           Name, *VOL
From image file . . . . . > *NEW
-----
To image file . . . . . > VOLUMENAME
-----
Image catalog index . . . . . *AVAIL      1-256, *AVAIL
Replace catalog entry . . . . . *NO       *NO, *YES, *INSERT
Media type . . . . . *WORM         *RAM, *WORM, *ERASE
Image size . . . . . *DVD2600      Megabytes, *CD650, *DVD2600...
Text 'description' . . . . . New WORM volume for archive
-----

F3=Exit  F4=Prompt  F5=Refresh  F10=Additional parameters  F12=Cancel
F13=How to use this display  F24=More keys

Bottom
  
```

Virtual Library – Unloaded Image Catalog

```

Work with Image Catalog Entries

                                System:  Y0645P2
Catalog . . . :  MYIMAGECAT      Status . . . :  Not ready
Type . . . . :  Optical          Device . . . . :
Directory . . :  /MYIMAGECAT

Type options, press Enter.
  1=Add   2=Change   4=Remove   6=Mount   8=Load   9=Unload
 10=Initialize volume  12=Work with volume

Opt  Index  Status      Image File Name
  [ ]  *AVAIL
  ___   1  Mounted    VOL001
  ___   2  Loaded    VOL005
  ___   3  Loaded    VOL003
  ___   4  Loaded    VOL007
  ___   5  Loaded    VOL008

                                Bottom
F3=Exit   F5=Refresh   F6=Load/Unload image catalog   F7=Verify image catalog
F8=Reorder by index   F12=Cancel   F24=More keys

```

Virtual Library – Load Image Catalog in Lib Mode

```

Load or Unload Image Catalog (LODIMGCLG)

Type choices, press Enter.

Image catalog . . . . . > MYIMAGECAT      Name
Option . . . . . > *LOAD                 *LOAD, *UNLOAD
Virtual device . . . . . OPTVRT04      Name
Write protect . . . . . *DFT           *DFT, *ALL, *NONE
Library mode . . . . . *YES           *NO, *YES

Bottom

F3=Exit  F4=Prompt  F5=Refresh  F12=Cancel  F13=How to use this display
F24=More keys

```

Virtual Library – Catalog loaded in Library Mode

```

Work with Image Catalog Entries

                                System:  Y0645P2
Catalog . . . :  MYIMAGECAT      Status . . . :  Ready
Type . . . . :  Optical          Device . . . . :  OPTVRT04
Directory . . :  /MYIMAGECAT

Type options, press Enter.
  1=Add   2=Change   4=Remove   6=Mount   8=Load   9=Unload
 10=Initialize volume  12=Work with volume

Opt  Index  Status      Image File Name
  [ ]  *AVAIL
  —   1  Mounted    VOL001
  —   2  Available  VOL005
  —   3  Available  VOL003
  —   4  Available  VOL007
  —   5  Available  VOL008

                                Bottom
F3=Exit   F5=Refresh   F6=Load/Unload image catalog   F7=Verify image catalog
F8=Reorder by index   F12=Cancel   F24=More keys

```

Virtual Library – WRKOPTVOL

```

Work with Optical Volumes
System: Y0645P2
Device . . . . . OPTVRT04
Side information . . . . . : *ALL
Type options, press Enter.
  1=Add   2=Change  3=Copy   4=Remove  5=Display  8=Work with directories
 10=Initialize  11=Work with object links  12=Duplicate ...

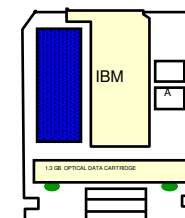
Opt  Volume          Device          Volume          Media          Authorization
  [  ] _____  OPTVRT04      *PRIMARY       *WORM          QOPTSEC
  [  ] VOL001
  [  ] _____  OPTVRT04      *PRIMARY       *WORM          QOPTSEC
  [  ] VOL003
  [  ] _____  OPTVRT04      *PRIMARY       *WORM          QOPTSEC
  [  ] VOL005
  [  ] _____  OPTVRT04      *PRIMARY       *WORM          QOPTSEC
  [  ] VOL007
  [  ] _____  OPTVRT04      *UNFORMATTED  *WORM          QOPTSEC
  [  ] 1104191718 >

Bottom

Parameters or command
===>
F3=Exit   F4=Prompt   F5=Refresh   F6=Print list  F9=Retrieve   F11=View 2
F12=Cancel  F14=Show extended information  F24=More keys
    
```

“Look and Feel” changes

- Optical Media
 - Single/double sided – virtual media always single sided
 - “Write protect” state managed by Image Catalog
- Adding and removing media from virtual library
 - Use Image Catalog to work with contents of library (catalog)
 - ADDOPTCTG and RMVOPTCTG do not change catalog contents
- Library capacity and “full library” behavior
 - Virtual library size is the current number of images defined in catalog
 - OPT1505 (Optical device is full) received if using ADDOPTCTG
 - No OPT1740 (Optical Library at or nearing capacity) message
- Media backup
 - Backup strategy for image catalog.
 - Was DUPOPT or CPYOPT.



Disk Storage Backing Options and Considerations

- Any disk storage that an IFS directory can be defined on
 - Internal Disk
 - Native attached external disk (e.g. DS8000, DS6000, DS5000)
 - Virtual attached disk (e.g. XIV, SVC, Storwize V7000)
- Use of IASP for virtual optical library backing storage if tiered storage topology
 - Varied on separately
 - Doesn't slow the system/partition IPL
 - Reclaim storage or ASP balance separately
 - Not part of system pool
- Could be excluded from System Backup
- IBM Lab Services consulting skills to help optimize to requirements



Other Considerations

- Best Practices
 - Organization of image catalogs
 - Size of image catalogs
- 1 loaded catalog = 1 virtual optical library
- 35 virtual optical devices maximum
- 255 images per catalog maximum, but less is recommended
- Volume images can be duplicated to recordable DVD
- Backup strategy
- See reference documents for additional information

Virtual Optical Media Library

An IBM Systems Lab Services and Training offering with enhancements to the IBM i operating system that will provide an Image Catalog based virtual optical library.

Features

- All applications dependent on optical library hardware can continue to exist without modifications.
- New media images can be created for ongoing archive production usage.
- Virtual optical media types WORM and ERASE are supported for compliance with data retention requirements.
- Existing optical library media can be easily migrated to the virtual optical library.
- The Image Catalog serves as a library of virtual optical volumes that are concurrently visible and accessible under the /QOPT filesystem.

Audience

- IBM i customers who currently use IBM 3995, IBM 3996 or Plasmon G-series optical library devices
- Business partners with IBM i Optical Library enabled archive applications
- IBM advanced sales, marketing and technical support

Typical Benefits

- Preservation of existing optical library based archive application investments when moving to POWER7
- No dependency on optical library hardware and associated host system adapters
- Easier systems operations and management with reduction of hardware device and integration on system
- Customers can migrate to supported newer release

Why IBM?

- Deep skills in IBM i implementation and integration.
- Experience in application architecture and design gained from thousands of engagements across many industries.
- Ability to deliver skills transfer as part of service engagement

For additional product information, pricing and qualified business partners to assist with implementation contact Mark Even, even@us.ibm.com

www.ibm.com/systems/services/labservices stgls@us.ibm.com

Enhanced Performance for Optical Library Data Migration on IBM i

Take advantage of fast copy and transfer capabilities for migration of optical media data to new optical or other archive technologies.

Features

- Custom enhancement to IBM i Version 6.1 and 7.1
- Enables new image catalog support
 - Moves data from optical library media to a virtual optical
 - Data can be migrated from virtual volume to target destination at faster rates than previously possible

Audience

- IBM i customers who currently use IBM 3995, IBM 3996 or Plasmon G-series optical library devices
- Business partners with IBM i Optical Library enabled archive applications
- IBM advanced sales, marketing and technical support

www.ibm.com/systems/services/labservices stgls@us.ibm.com

Typical Benefits

- Reduces migration time from a typical 6-7 hours per optical volume*
- Helps achieve application and information infrastructure management performance benefits of new storage technology sooner
- Reduced transfer times can shorten migration project times and risks

Why IBM?

- Deep skills in IBM i implementation and integration.
- Experience in application architecture and design gained from thousands of engagements across many industries.
- Ability to deliver skills transfer as part of service engagement

For additional product information, pricing and qualified business partners to assist with implementation contact Mark Even, even@us.ibm.com

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Revised September 26, 2006

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IBM benchmark results can be found in the IBM Power Systems Performance Report at http://www.ibm.com/systems/p/hardware/system_perf.html.

All performance measurements were made with AIX or AIX 5L operating systems unless otherwise indicated to have used Linux. For new and upgraded systems, the latest versions of AIX were used. All other systems used previous versions of AIX. The SPEC CPU2006, LINPACK, and Technical Computing benchmarks were compiled using IBM's high performance C, C++, and FORTRAN compilers for AIX 5L and Linux. For new and upgraded systems, the latest versions of these compilers were used: XL C for AIX v11.1, XL C/C++ for AIX v11.1, XL FORTRAN for AIX v13.1, XL C/C++ for Linux v11.1, and XL FORTRAN for Linux v13.1.

For a definition/explanation of each benchmark and the full list of detailed results, visit the Web site of the benchmark consortium or benchmark vendor.

TPC	http://www.tpc.org
SPEC	http://www.spec.org
LINPACK	http://www.netlib.org/benchmark/performance.pdf
Pro/E	http://www.proe.com
GPC	http://www.spec.org/gpc
VolanoMark	http://www.volano.com
STREAM	http://www.cs.virginia.edu/stream/
SAP	http://www.sap.com/benchmark/
Oracle, Siebel, PeopleSoft	http://www.oracle.com/apps_benchmark/
Baan	http://www.ssaglobal.com
Fluent	http://www.fluent.com/software/fluent/index.htm
TOP500 Supercomputers	http://www.top500.org/
Ideas International	http://www.ideasinternational.com/benchmark/bench.html
Storage Performance Council	http://www.storageperformance.org/results

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IBM benchmark results can be found in the IBM Power Systems Performance Report at http://www.ibm.com/systems/p/hardware/system_perf.html.

All performance measurements were made with AIX or AIX 5L operating systems unless otherwise indicated to have used Linux. For new and upgraded systems, the latest versions of AIX were used. All other systems used previous versions of AIX. The SPEC CPU2006, LINPACK, and Technical Computing benchmarks were compiled using IBM's high performance C, C++, and FORTRAN compilers for AIX 5L and Linux. For new and upgraded systems, the latest versions of these compilers were used: XL C for AIX v11.1, XL C/C++ for AIX v11.1, XL FORTRAN for AIX v13.1, XL C/C++ for Linux v11.1, and XL FORTRAN for Linux v13.1. Linpack HPC (Highly Parallel Computing) used the current versions of the IBM Engineering and Scientific Subroutine Library (ESSL). For Power7 systems, IBM Engineering and Scientific Subroutine Library (ESSL) for AIX Version 5.1 and IBM Engineering and Scientific Subroutine Library (ESSL) for Linux Version 5.1 were used.

For a definition/explanation of each benchmark and the full list of detailed results, visit the Web site of the benchmark consortium or benchmark vendor.

SPEC	http://www.spec.org
LINPACK	http://www.netlib.org/benchmark/performance.pdf
Pro/E	http://www.proe.com
GPC	http://www.spec.org/gpc
STREAM	http://www.cs.virginia.edu/stream/
Fluent	http://www.fluent.com/software/fluent/index.htm
TOP500 Supercomputers	http://www.top500.org/
AMBER	http://amber.scripps.edu/
FLUENT	http://www.fluent.com/software/fluent/fl5bench/index.htm
GAMESS	http://www.msg.chem.iastate.edu/games
GAUSSIAN	http://www.gaussian.com
ANSYS	http://www.ansys.com/services/hardware-support-db.htm

Click on the "Benchmarks" icon on the left hand side frame to expand. Click on "Benchmark Results in a Table" icon for benchmark results.

ABAQUS	http://www.simulia.com/support/v68/v68_performance.php
ECLIPSE	http://www.sis.slb.com/content/software/simulation/index.asp?seq=geoquest&
MM5	http://www.mmm.ucar.edu/mm5/
MSC.NASTRAN	http://www.mssoftware.com/support/prod%5Fsupport/nastran/performance/v04_sngl.cfm
STAR-CD	www.cd-adapco.com/products/STAR-CD/performance/320/index/html
NAMD	http://www.ks.uiuc.edu/Research/namd
HMMER	http://hmmer.janelia.org/ http://powerdev.osuosl.org/project/hmmerAltivecGen2mod

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Notes on performance estimates

rPerf for AIX

rPerf (Relative Performance) is an estimate of commercial processing performance relative to other IBM UNIX systems. It is derived from an IBM analytical model which uses characteristics from IBM internal workloads, TPC and SPEC benchmarks. The rPerf model is not intended to represent any specific public benchmark results and should not be reasonably used in that way. The model simulates some of the system operations such as CPU, cache and memory. However, the model does not simulate disk or network I/O operations.

- rPerf estimates are calculated based on systems with the latest levels of AIX and other pertinent software at the time of system announcement. Actual performance will vary based on application and configuration specifics. The IBM eServer pSeries 640 is the baseline reference system and has a value of 1.0. Although rPerf may be used to approximate relative IBM UNIX commercial processing performance, actual system performance may vary and is dependent upon many factors including system hardware configuration and software design and configuration. Note that the rPerf methodology used for the POWER6 systems is identical to that used for the POWER5 systems. Variations in incremental system performance may be observed in commercial workloads due to changes in the underlying system architecture.

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CPW for IBM i

Commercial Processing Workload (CPW) is a relative measure of performance of processors running the IBM i operating system. Performance in customer environments may vary. The value is based on maximum configurations. More performance information is available in the Performance Capabilities Reference at: www.ibm.com/systems/i/solutions/perfmgmt/resource.html

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