



Data Path Optimizer

IBM Subsystem Device Driver / Data Path Optimizer on an ESS

Installation Procedures/Potential Gotchas

Table of Contents

Section 1: Installation Procedures	1
1.1 Additional Documentation & Business Reasons for Data Path Optimizer™	1
1.2 Install ESS (IBM2105) Software	2
1.3 Run <code>cfgmgr -v</code>	3
1.4 Verify IBM Disk Drive Connectivity.....	3
1.5 Install Data Path Optimizer Code	4
1.6 Run <code>cfgmgr -v</code>	5
1.7 Check the status of your disk drives	8
Section 2: Possible Gotcha.....	11
2.1 How to Dig Yourself into a Hole	11
2.2 Why You are in this Hole	11
Section 3: DPO Recovery from PVID Issues.....	13
3.1 Get a list of volume groups on your vpath devices.....	13
3.2 Run “ <code>vp2hd</code> ” on Each Volume Group	15
3.3 Varyoff the Volume Groups.....	17
3.4 OPTIONAL STEP - Add or Remove Hardware or Software	17
3.5 OPTIONAL STEP - Remove all hdisk and vpath devices.	19
3.6 Run <code>cfgmgr “N”</code> times (“N” is the number of paths of a DPO device)	20
3.7 Unconfigure all DPO Devices.....	26
3.8 Configure all DPO Devices.....	26
3.9 Run “ <code>lsvpcfg</code> ” to Check the Status.....	27
3.10 Varyon the Volume Groups	29
3.11 Run “ <code>hd2vp</code> ” on Each Volume Group	29
3.12 Verification	31
Section 4: Items of Interest.....	35
4.1 Making Volume Groups – Special Command	35
4.2 Making Volume Groups – Again!	35
4.3 Extending Volume Groups – Special Command	36
4.4 Extending Volume Groups – <code>smit</code> BUG	36
4.5 <code>dpovgfix</code> – Special Circumstances.....	37
4.6 Upgrading from DPO V 1.1.2.....	38
4.7 Equating LUNs back to Hdisks.....	38
4.8 Alternative Method to Find Hdisks	41

Section 1: Installation Procedures

1.1 Additional Documentation & Business Reasons for Data Path Optimizer

This document is current as of 5/4/2000. Future revisions may work differently. (Note that this document was implemented in a SP environment. If you do not have a SP environment, obviously you do not want to use the “dsh” command. For those not familiar with a SP environment, the “dsh -av” means to execute the distributed shell command to all available nodes in the SP environment. This is a quick way to run a single command on many machines at one time. The “pcp -av -p command will implement a parallel copy to all available nodes and preserve the permission bits of the original copy.)

Note that this document is based on SSD / DPO V1.1.4. V1.2.0 is due out very soon. V1.2.0 should fix one smit related bug and offer some enhanced error recovery. I will discuss the smit bug in a later section - ” Extending Volume Groups – smit BUG”. V1.2.0 should also offer Fiber support for the soon to be released native Fiber connections to the ESS.

The major two reasons to install Subsystem Device Driver / Data Path Optimizer on your machines are:

1. Load balancing – Data Path Optimizer automatically adjusts data routing for optimum performance.
2. Path failover and online recovery – Data Path Optimizer automatically and nondisruptively redirects data to an alternate data path.

1.2 Install ESS (IBM2105) Software

Install the fileset “ibm2105.aix.support.rte”. In a SP environment, you may want to do the following:

```
dsh -av mount cws:/spdata/sys1/install/aix433/lppsource /mnt

vi /tmp/install.ibm2105 # Put in the few lines below.
chmod 700 /tmp/install.ibm2105
pcp -av -p /tmp/install.ibm2105
dsh -av /tmp/install.ibm2105
```

```
#!/bin/ksh
#####
# First, mount the lppsource to /mnt
# mount wcws:/spdata/sys1/install/aix433/lppsource /mnt
# You may want to "dsh" the mount command.
#####

JOB="{0##*/}"
mkdir /tmp/joblog 2>/dev/null
JOBLOG=/tmp/joblog/${JOB}.joblog
{
    InputDir="/mnt"
    #FileSet="dpo.ibmssd.rte.432"
    FileSet="ibm2105.rte"
    /usr/sbin/installp -acgNqQwXd ${InputDir} ${FileSet}
} 2>&1 | tee ${JOBLOG} #Review the output and save it for
later review
```

Sample lspp output:

```
lspp -l ibm2105.rte
```

Fileset	Level	State	Description

Path: /usr/lib/objrepos			
ibm2105.rte	32.6.100.3	COMMITTED	IBM 2105 runtime for AIX
Path: /etc/objrepos			
ibm2105.rte	32.6.100.3	COMMITTED	IBM 2105 runtime for AIX

1.3 Run `cfgmgr -v`

Now, you are ready to configure them:

```
dsh -av cfgmgr -v
```

NOTE: There is an undocumented option on `cfgmgr` in AIX 4.3.3 (At least it's not in the man pages). The `-S` option will run `cfgmgr` serially! Although you would not want to twin-tail and use DPO, since that is not supported at the time of this document's creating, you should know that `cfgmgr` in AIX 4.3.3 runs in parallel down each SCSI adapter. Therefore, since the second SCSI adapter could finish earlier than your first SCSI adapter, your disk drives may be in a weird order. This is usually not a big deal, unless you are doing a rollout of lots of machines that should look exactly alike, or UNLESS you are twin tailing and you want the `hdisk` numbers to be in the same order on each machine. In order to force the disk drives to be configured in the order of the `scsi` adapters, you can remove all of the disk drives and run "`cfgmgr -S`".

1.4 Verify IBM Disk Drive Connectivity

Run the following command:

```
dsh -av lsdev -Ccdisk
```

```
hdisk2 Available 30-70-00-5,0 IBM 2105E20
hdisk3 Available 30-70-00-5,1 IBM 2105E20
hdisk4 Available 30-70-00-5,2 IBM 2105E20
hdisk5 Available 30-70-00-5,3 IBM 2105E20
hdisk6 Available 30-70-00-5,4 IBM 2105E20
hdisk7 Available 30-70-00-5,5 IBM 2105E20
hdisk8 Available 30-70-00-5,6 IBM 2105E20
hdisk9 Available 30-70-00-5,7 IBM 2105E20
hdisk10 Available 30-70-00-6,0 IBM 2105E20
hdisk11 Available 30-70-00-6,1 IBM 2105E20
hdisk12 Available 30-70-00-6,2 IBM 2105E20
hdisk13 Available 30-70-00-6,3 IBM 2105E20
hdisk14 Available 30-70-00-6,4 IBM 2105E20
hdisk15 Available 30-70-00-6,5 IBM 2105E20
hdisk16 Available 30-70-00-6,6 IBM 2105E20
```

```

hdisk27 Available 30-68-00-6,1 IBM 2105E20
hdisk28 Available 30-68-00-6,2 IBM 2105E20
hdisk29 Available 30-68-00-6,3 IBM 2105E20
hdisk30 Available 30-68-00-6,4 IBM 2105E20
hdisk31 Available 30-68-00-6,5 IBM 2105E20
hdisk32 Available 30-68-00-6,6 IBM 2105E20
hdisk33 Available 30-68-00-6,7 IBM 2105E20

```

If your output says “Other SCSI disk” (similar to the following),

```

hdisk26 Available 30-68-00-6,0 Other SCSI Disk Drive
hdisk27 Available 30-68-00-6,1 Other SCSI Disk Drive
hdisk28 Available 30-68-00-6,2 Other SCSI Disk Drive
hdisk29 Available 30-68-00-6,3 Other SCSI Disk Drive
hdisk30 Available 30-68-00-6,4 Other SCSI Disk Drive

```

instead of “IBM 2105E20” (or something similar), then you have not successfully completed the installation of the IBM 2105 software and/or your disk connectivity needs more work.

1.5 Install Data Path Optimizer Code

Install the fileset “dpo.ibmssd.rte.432”. In a SP environment, you may want to do the following:

```

dsh -av mount cws:/spdata/sys1/install/aix433/lppsource /mnt
vi /tmp/install.dpo # Put in the few lines below.
chmod 700 /tmp/install.dpo
pcp -av -p /tmp/install.dpo
dsh -av /tmp/install.dpo

```

```

#!/bin/ksh
#####
# First, mount the lppsource to /mnt
# mount wcws:/spdata/sys1/install/aix433/lppsource /mnt
# You may want to "dsh" the mount command.
#####

JOB="{0##*/}"
mkdir /tmp/joblog 2>/dev/null
JOBLOG=/tmp/joblog/${JOB}.joblog
{
    InputDir="/mnt"
    #FileSet="ibm2105.rte"
    FileSet="dpo.ibmssd.rte.432"
}

```

Sample lspp output:

lspp -l dpo.ibmssd.rte.432

Fileset	Level	State	Description
Path: /usr/lib/objrepos dpo.ibmssd.rte.432	1.1.4.0	COMMITTED	IBM Subsystem Device Driver runtime for AIX V432
Path: /etc/objrepos dpo.ibmssd.rte.432	1.1.4.0	COMMITTED	IBM Subsystem Device Driver runtime for AIX V432

NOTE: The new “IBM Subsystem Device Driver (SDD)” code is the old DPO with the same fileset name, but with a new revision. If you were familiar with the old DPO, then most things should look familiar to you!

1.6 Run `cfgmgr -v`

Your disk drives should be recognized as ESS disk drives at this point. Now, you will configure your DPO devices (vpath devices) to take advantage of Data Path Optimizer.

dsh -av cfgmgr -v

In case you missed this note above, I am repeating it!

NOTE: There is an undocumented option on `cfgmgr` in AIX 4.3.3 (At least it’s not in the man pages). The `-S` option will run `cfgmgr` serially! Although you would not want to twin-tail and use DPO, since that is not supported at the time of this document’s creating, you should know that `cfgmgr` in AIX 4.3.3 runs in parallel down each SCSI adapter. Therefore, since the second SCSI adapter could finish earlier than your first SCSI adapter, your disk drives may be in a weird order. This is usually not a big deal, unless you are doing a rollout of lots of machines that should look exactly alike, or UNLESS you are twin tailing and you want the hdisk numbers to be in the same order on each machine. In order to force the disk drives to be configured in the order of the scsi adapters, you can remove all of the disk drives and run “`cfgmgr -S`”

Afterwards, run the following command:

lsdev -Ccdisk

```

hdisk0 Available 10-68-00-8,0 16 Bit SCSI Disk Drive
hdisk1 Available 10-68-00-9,0 16 Bit SCSI Disk Drive
hdisk2 Available 30-70-00-5,0 IBM 2105E20
hdisk3 Available 30-70-00-5,1 IBM 2105E20
hdisk4 Available 30-70-00-5,2 IBM 2105E20
hdisk5 Available 30-70-00-5,3 IBM 2105E20
hdisk6 Available 30-70-00-5,4 IBM 2105E20
hdisk7 Available 30-70-00-5,5 IBM 2105E20
hdisk8 Available 30-70-00-5,6 IBM 2105E20
hdisk9 Available 30-70-00-5,7 IBM 2105E20
hdisk10 Available 30-70-00-6,0 IBM 2105E20
hdisk11 Available 30-70-00-6,1 IBM 2105E20
hdisk12 Available 30-70-00-6,2 IBM 2105E20
hdisk13 Available 30-70-00-6,3 IBM 2105E20
hdisk14 Available 30-70-00-6,4 IBM 2105E20
hdisk15 Available 30-70-00-6,5 IBM 2105E20
hdisk16 Available 30-70-00-6,6 IBM 2105E20
hdisk17 Available 30-70-00-6,7 IBM 2105E20
hdisk18 Available 30-68-00-5,0 IBM 2105E20
hdisk19 Available 30-68-00-5,1 IBM 2105E20
hdisk20 Available 30-68-00-5,2 IBM 2105E20
hdisk21 Available 30-68-00-5,3 IBM 2105E20
hdisk22 Available 30-68-00-5,4 IBM 2105E20
hdisk23 Available 30-68-00-5,5 IBM 2105E20
hdisk24 Available 30-68-00-5,6 IBM 2105E20
hdisk25 Available 30-68-00-5,7 IBM 2105E20
hdisk26 Available 30-68-00-6,0 IBM 2105E20
hdisk27 Available 30-68-00-6,1 IBM 2105E20
hdisk28 Available 30-68-00-6,2 IBM 2105E20
hdisk29 Available 30-68-00-6,3 IBM 2105E20
hdisk30 Available 30-68-00-6,4 IBM 2105E20
hdisk31 Available 30-68-00-6,5 IBM 2105E20
hdisk32 Available 30-68-00-6,6 IBM 2105E20
hdisk33 Available 30-68-00-6,7 IBM 2105E20
vpath0 Available Data Path Optimizer Pseudo Device Driver
vpath1 Available Data Path Optimizer Pseudo Device Driver
vpath2 Available Data Path Optimizer Pseudo Device Driver
vpath3 Available Data Path Optimizer Pseudo Device Driver
vpath4 Available Data Path Optimizer Pseudo Device Driver
vpath5 Available Data Path Optimizer Pseudo Device Driver
vpath6 Available Data Path Optimizer Pseudo Device Driver
vpath7 Available Data Path Optimizer Pseudo Device Driver
vpath8 Available Data Path Optimizer Pseudo Device Driver
vpath9 Available Data Path Optimizer Pseudo Device Driver
vpath10 Available Data Path Optimizer Pseudo Device Driver
vpath11 Available Data Path Optimizer Pseudo Device Driver
vpath12 Available Data Path Optimizer Pseudo Device Driver
vpath13 Available Data Path Optimizer Pseudo Device Driver
vpath14 Available Data Path Optimizer Pseudo Device Driver
vpath15 Available Data Path Optimizer Pseudo Device Driver

```


For this particular machine, I had 2 internal SCSI drives, and 16 usable external IBM SCSI drives. You will notice that each of those 16 drives is visible down the 30-70 SCSI path and down the 30-68 path.

lsdev -Cadapter

scsi0	Available	10-60	Wide SCSI I/O Controller
scsi1	Available	10-68	Wide/Fast-20 SCSI I/O Controller
scsi3	Available	30-58	Wide SCSI I/O Controller
scsi6	Available	30-70	Wide/Fast-20 SCSI I/O Controller
scsi5	Available	10-70	Wide/Fast-20 SCSI I/O Controller
scsi7	Available	30-68	Wide SCSI I/O Controller

The “vpath” devices can see the disk drives down both interfaces. In this case, I will use vpath0 through vpath15 for volume group creation.

NOTE: To just see the vpath devices, run the command “lsdev -Ctvp”.

lsdev -Ctvp

vpath0	Available	Data Path Optimizer	Pseudo Device Driver
vpath1	Available	Data Path Optimizer	Pseudo Device Driver
vpath2	Available	Data Path Optimizer	Pseudo Device Driver
vpath3	Available	Data Path Optimizer	Pseudo Device Driver
vpath4	Available	Data Path Optimizer	Pseudo Device Driver
vpath5	Available	Data Path Optimizer	Pseudo Device Driver
vpath6	Available	Data Path Optimizer	Pseudo Device Driver
vpath7	Available	Data Path Optimizer	Pseudo Device Driver
vpath8	Available	Data Path Optimizer	Pseudo Device Driver
vpath9	Available	Data Path Optimizer	Pseudo Device Driver
vpath10	Available	Data Path Optimizer	Pseudo Device Driver
vpath11	Available	Data Path Optimizer	Pseudo Device Driver
vpath12	Available	Data Path Optimizer	Pseudo Device Driver
vpath13	Available	Data Path Optimizer	Pseudo Device Driver
vpath14	Available	Data Path Optimizer	Pseudo Device Driver
vpath15	Available	Data Path Optimizer	Pseudo Device Driver

1.7 Check the status of your disk drives

In order to check on your disk drives, log into a node and run the following command:

datapath query device

```

Total Devices : 16
DEV#: 0  DEVICE NAME: vpath0  TYPE: 2105E20  SERIAL: 60012028
=====
Path#      Adapter/Hard Disk  State  Mode  Select  Errors
  0          scsi6/hdisk2  OPEN  NORMAL  412    0
  1          scsi7/hdisk18  OPEN  NORMAL  414    0

DEV#: 1  DEVICE NAME: vpath1  TYPE: 2105E20  SERIAL: 60112028
=====
Path#      Adapter/Hard Disk  State  Mode  Select  Errors
  0          scsi6/hdisk3  OPEN  NORMAL  196    0
  1          scsi7/hdisk24  OPEN  NORMAL  173    0

DEV#: 2  DEVICE NAME: vpath2  TYPE: 2105E20  SERIAL: 60212028
=====
Path#      Adapter/Hard Disk  State  Mode  Select  Errors
  0          scsi6/hdisk4  OPEN  NORMAL  164    0
  1          scsi7/hdisk22  OPEN  NORMAL  166    0

DEV#: 3  DEVICE NAME: vpath3  TYPE: 2105E20  SERIAL: 60312028
=====
Path#      Adapter/Hard Disk  State  Mode  Select  Errors
  0          scsi6/hdisk5  CLOSE  NORMAL  53     0
  1          scsi7/hdisk19  CLOSE  NORMAL  59     0

DEV#: 4  DEVICE NAME: vpath4  TYPE: 2105E20  SERIAL: 60412028
=====
Path#      Adapter/Hard Disk  State  Mode  Select  Errors
  0          scsi6/hdisk6  CLOSE  NORMAL  48     0
  1          scsi7/hdisk21  CLOSE  NORMAL  54     0

DEV#: 5  DEVICE NAME: vpath5  TYPE: 2105E20  SERIAL: 60512028
=====
Path#      Adapter/Hard Disk  State  Mode  Select  Errors
  0          scsi6/hdisk7  CLOSE  NORMAL  51     0
  1          scsi7/hdisk23  CLOSE  NORMAL  41     0

DEV#: 6  DEVICE NAME: vpath6  TYPE: 2105E20  SERIAL: 60612028
=====
Path#      Adapter/Hard Disk  State  Mode  Select  Errors
  0          scsi6/hdisk8  CLOSE  NORMAL  119    0
  1          scsi7/hdisk25  CLOSE  NORMAL  128    0

DEV#: 7  DEVICE NAME: vpath7  TYPE: 2105E20  SERIAL: 60712028
=====

```

DEV#:	9	DEVICE NAME:	vpath9	TYPE:	2105E20	SERIAL:	10112028		
=====									
Path#		Adapter/Hard Disk		State		Mode		Select	Errors
0		scsi6/hdisk11		CLOSE		NORMAL		36	0
1		scsi7/hdisk27		CLOSE		NORMAL		22	0
DEV#:	10	DEVICE NAME:	vpath10	TYPE:	2105E20	SERIAL:	10212028		
=====									
Path#		Adapter/Hard Disk		State		Mode		Select	Errors
0		scsi6/hdisk12		CLOSE		NORMAL		10	0
1		scsi7/hdisk28		CLOSE		NORMAL		18	0
DEV#:	11	DEVICE NAME:	vpath11	TYPE:	2105E20	SERIAL:	10312028		
=====									
Path#		Adapter/Hard Disk		State		Mode		Select	Errors
0		scsi6/hdisk13		CLOSE		NORMAL		12	0
1		scsi7/hdisk29		CLOSE		NORMAL		14	0
DEV#:	12	DEVICE NAME:	vpath12	TYPE:	2105E20	SERIAL:	10412028		
=====									
Path#		Adapter/Hard Disk		State		Mode		Select	Errors
0		scsi6/hdisk14		CLOSE		NORMAL		14	0
1		scsi7/hdisk30		CLOSE		NORMAL		12	0
DEV#:	13	DEVICE NAME:	vpath13	TYPE:	2105E20	SERIAL:	10512028		
=====									
Path#		Adapter/Hard Disk		State		Mode		Select	Errors
0		scsi6/hdisk15		CLOSE		NORMAL		12	0
1		scsi7/hdisk31		CLOSE		NORMAL		14	0
DEV#:	14	DEVICE NAME:	vpath14	TYPE:	2105E20	SERIAL:	10612028		
=====									
Path#		Adapter/Hard Disk		State		Mode		Select	Errors
0		scsi6/hdisk16		CLOSE		NORMAL		15	0
1		scsi7/hdisk32		CLOSE		NORMAL		11	0
DEV#:	15	DEVICE NAME:	vpath15	TYPE:	2105E20	SERIAL:	10712028		
=====									
Path#		Adapter/Hard Disk		State		Mode		Select	Errors
0		scsi6/hdisk17		CLOSE		NORMAL		9	0
1		scsi7/hdisk33		CLOSE		NORMAL		17	0

The following command will show what hdisk devices can be seen down the vpath devices.

lsvpcfg

```
vpath0 (Available pv) 60012028 = hdisk2 (Available ) hdisk18 (Available )
vpath1 (Available pv) 60112028 = hdisk3 (Available ) hdisk24 (Available )
vpath2 (Available pv) 60212028 = hdisk4 (Available ) hdisk22 (Available )
vpath3 (Available pv) 60312028 = hdisk5 (Available ) hdisk19 (Available )
vpath4 (Available pv) 60412028 = hdisk6 (Available ) hdisk21 (Available )
vpath5 (Available pv) 60512028 = hdisk7 (Available ) hdisk23 (Available )
vpath6 (Available pv) 60612028 = hdisk8 (Available ) hdisk25 (Available )
vpath7 (Available pv) 60712028 = hdisk9 (Available ) hdisk20 (Available )
vpath8 (Available pv) 10012028 = hdisk10 (Available ) hdisk26 (Available )
vpath9 (Available pv) 10112028 = hdisk11 (Available ) hdisk27 (Available )
vpath10 (Available pv) 10212028 = hdisk12 (Available ) hdisk28 (Available )
vpath11 (Available pv) 10312028 = hdisk13 (Available ) hdisk29 (Available )
vpath12 (Available pv) 10412028 = hdisk14 (Available ) hdisk30 (Available )
vpath13 (Available pv) 10512028 = hdisk15 (Available ) hdisk31 (Available )
vpath14 (Available pv) 10612028 = hdisk16 (Available ) hdisk32 (Available )
vpath15 (Available pv) 10712028 = hdisk17 (Available ) hdisk33 (Available )
```

Section 2: Possible Gotcha

At this installation, we installed three IBM 2105 ESS machines. Although we did not run into any hardware problems, you may. When debugging, you may want to delete all of your ESS disk drives and vpath devices. Be careful.

2.1 How to Dig Yourself into a Hole

After you have successfully installed Data Path Optimizer and created a volume group (or anything else that creates PVIDs), you may fall into a trap. Suppose that you do the following:

Let's say that for some reason you are doing some testing and you discover that you need to remove all of your external disk devices. First, you umount all of your filesystems and varyoff all of your volume groups. Then, you run "rmdev -dl devicename" on all of your external hdisk devices and your vpath devices.

When you finish your testing, you run "cfgmgr" to get your disk drives back.

With many disk configurations, this will get you back to your original disk configuration. Oops, you are not running those configurations.

2.2 Why You are in this Hole

- 1) When you first created your vpath devices, "*datapath query device*" should show two paths (or more) to each of your vpath devices.

lspv

hdisk2	none	None
hdisk18	none	None
vpath0	00607388eed135f8	udbvg

The above just shows the drives of interest!

A couple of things to note! One, hdisk2 and hdisk18 both show "none" in the PVID field. The PVIDs for these hdisks are deleted from the QDM database when the

2) Then, you remove all of the hdisk and vpath devices.
(You may do this if you are doing some troubleshooting.)

3) Then you run cfgmgr (this is usually the most sensible way to get your drives back.)

First, you walk scsi6, and you find hdisk2 as PVID 00607388eed135f8. I believe that cfgmgr defaults to “pvid=yes” for all new hdisks. Then, you walk scsi7, and you find PVID 00607388eed135f8. Well, the “cfgmgr” program is smart enough to know that the original PVID belongs to hdisk2, so the program will NOT configure hdisk18. In my case, it updated the path to PVID 00607388eed135f8 to scsi6.

After “cfgmgr” configures the hdisks, it will then configure the vpath devices, with only one path to the disk, since there is NOT an hdisk18 to provide an alternate path to the disk drive.

If this happens, then you will still see the vpath devices, but you will not be protected against a scsi failure and you will not get any load balancing, since Data Path Optimizer will only know about the path via scsi6.

Section 3: DPO Recovery from PVID Issues

If you find that “*datapath query device*” only shows one path to your vpath device, or you have PVIDs on the hdisk devices that are associated with your vpath devices, then you need to be here. Although other combinations may work, this is the combination of commands that I have found to clear up any PVID confusion and get DPO back on track.

Also, if you want to add paths to your DPO devices, then you should follow the steps in this chapter. For example, you currently have two SCSI adapters going to the ESS, and you wish to add a third SCSI adapter for greater redundancy or greater throughput, then you can follow the steps in this chapter.

NOTE: The key to this magic is to get AIX to recognize that there is an hdisk on each of the SCSI paths. If AIX cannot determine the true identity (PVID) of this drive, then AIX thinks that the drive on the 30-70 path and the drive on the 30-68 path are different drives. IBM Data Path Optimizer is counting on this behavior. IBM Data Path Optimizer looks at the SCSI LUNS and who knows what else to determine that the drives are really the same drives, and then configures a logical device (vpath#) on top of the two hdisks to provide load balancing and an alternate path to the single disk drive.

NOTE THAT THE FOLLOWING STEPS REQUIRE DOWN TIME! ALSO NOTE THAT YOU SHOULD BE PROFICIENT IN AIX BEFORE USING THE FOLLOWING PROCEDURES.

Back to the meat of the matter. In order to recover from wherever you are in SSD/DPO land, try the following steps:

3.1 Get a list of volume groups on your vpath devices

You may already know what volume groups are on the vpath disk drives, or you can try the `lspv` command. The following is an example of `lspv` output when the drives are OK. If you do not have any hdisks or vpath devices, and you do not know the volume groups that were on the disk drives, then skip this step, and hopefully you can figure this out

lspv

hdisk0	00607388f5d0c666	rootvg
hdisk1	00607388ee09cb4c	rootvg
hdisk2	none	None
hdisk3	none	None
hdisk4	none	None
hdisk5	none	None
hdisk6	none	None
hdisk7	none	None
hdisk8	none	None
hdisk9	none	None
hdisk10	none	None
hdisk11	none	None
hdisk12	none	None
hdisk13	none	None
hdisk14	none	None
hdisk15	none	None
hdisk16	none	None
hdisk17	none	None
hdisk18	none	None
hdisk19	none	None
hdisk20	none	None
hdisk21	none	None
hdisk22	none	None
hdisk23	none	None
hdisk24	none	None
hdisk25	none	None
hdisk26	none	None
hdisk27	none	None
hdisk28	none	None
hdisk29	none	None
hdisk30	none	None
hdisk31	none	None
hdisk32	none	None
hdisk33	none	None
vpath0	00607388eed135f8	udbvg
vpath1	00607388eed138a0	udbvg
vpath2	00607388eed13b55	udbvg
vpath3	00607388eed13dfd	testvg
vpath4	00607388eed140c0	testvg
vpath5	00607388eed14363	testvg
vpath6	00607388eed1460f	testvg
vpath7	00607388eed148c4	testvg
vpath8	00607388eed14b6d	testvg
vpath9	00607388eed14e3a	testvg
vpath10	00607388eed150f9	testvg
vpath11	00607388eed153b5	testvg
vpath12	00607388eed15688	testvg
vpath13	00607388eed15936	testvg
vpath14	00607388eed15bf2	testvg
vpath15	00607388eed15eb8	testvg

3.2 Run “vp2hd” on Each Volume Group

NOTE: For each volume group, the filesystems have to be unmounted (and all raw logical volumes need to be closed) before running vp2hd. If not, you will get a message similar to the following:

/usr/sbin/vp2hd udbvg

```
udbvg
Please unmount following filesystems from udbvg before run this program.
/air/load_03 /air/work_03 /air/log_03 /air/temp_03 /air/sdgbatch /air/db2
```

In order to unmount the filesystems, I have written a short script, named “fsoff.vg”. It looks as follows:

```
#!/bin/ksh
lsvg -l ${1} | tail +3 | awk '{print $7}'|grep -v "N/A" | xargs -i umount {}
```

/home/sysadm/ESS/fsoff.vg udbvg

Then, you can run the vp2hd for each volume group.

/usr/sbin/vp2hd udbvg

```
udbvg
udbvg contains these vpaths and pvids
 00607388eed135f8 vpath0
00607388eed138a0 vpath1
00607388eed13b55 vpath2

hdisk2 is part of vpath0.
hdisk18 is part of vpath0.
hdisk3 is part of vpath1.
hdisk24 is part of vpath1.
hdisk4 is part of vpath2.
hdisk22 is part of vpath2.
udbvg
Deleting pvid of vpath0 from ODM database
Create hdisk2 pvid of 00607388eed135f8 in ODM database.
lname=hdisk2, pvid=00607388eed135f8
Create hdisk18 pvid of 00607388eed135f8 in ODM database.
lname=hdisk18, pvid=00607388eed135f8
Deleting pvid of vpath1 from ODM database
Create hdisk3 pvid of 00607388eed138a0 in ODM database.
lname=hdisk3, pvid=00607388eed138a0
```

/usr/sbin/vp2hd testvg

```
testvg
testvg contains these vpaths and pvids
  00607388eed13dfd vpath3
00607388eed140c0 vpath4
00607388eed14363 vpath5
00607388eed1460f vpath6
00607388eed148c4 vpath7
00607388eed14b6d vpath8
00607388eed14e3a vpath9
00607388eed150f9 vpath10
00607388eed153b5 vpath11
00607388eed15688 vpath12
00607388eed15936 vpath13
00607388eed15bf2 vpath14
00607388eed15eb8 vpath15

hdisk5 is part of vpath3.
hdisk19 is part of vpath3.
hdisk6 is part of vpath4.
hdisk21 is part of vpath4.
hdisk7 is part of vpath5.
hdisk23 is part of vpath5.
hdisk8 is part of vpath6.
hdisk25 is part of vpath6.
hdisk9 is part of vpath7.
hdisk20 is part of vpath7.
hdisk10 is part of vpath8.
hdisk26 is part of vpath8.
hdisk11 is part of vpath9.
hdisk27 is part of vpath9.
hdisk12 is part of vpath10.
hdisk28 is part of vpath10.
hdisk13 is part of vpath11.
hdisk29 is part of vpath11.
hdisk14 is part of vpath12.
hdisk30 is part of vpath12.
hdisk15 is part of vpath13.
hdisk31 is part of vpath13.
hdisk16 is part of vpath14.
hdisk32 is part of vpath14.
hdisk17 is part of vpath15.
hdisk33 is part of vpath15.
testvg
Deleting pvid of vpath3 from ODM database
Create hdisk5 pvid of 00607388eed13dfd in ODM database.
lname=hdisk5, pvid=00607388eed13dfd
Create hdisk19 pvid of 00607388eed13dfd in ODM database.
lname=hdisk19, pvid=00607388eed13dfd
Deleting pvid of vpath4 from ODM database
Create hdisk6 pvid of 00607388eed140c0 in ODM database.
lname=hdisk6, pvid=00607388eed140c0
Create hdisk21 pvid of 00607388eed140c0 in ODM database.
lname=hdisk21, pvid=00607388eed140c0
Deleting pvid of vpath5 from ODM database
```

```

Create hdisk9 pvid of 00607388eed148c4 in ODM database.
lname=hdisk9, pvid=00607388eed148c4
Create hdisk20 pvid of 00607388eed148c4 in ODM database.
lname=hdisk20, pvid=00607388eed148c4
Deleting pvid of vpath8 from ODM database
Create hdisk10 pvid of 00607388eed14b6d in ODM database.
lname=hdisk10, pvid=00607388eed14b6d
Create hdisk26 pvid of 00607388eed14b6d in ODM database.
lname=hdisk26, pvid=00607388eed14b6d
Deleting pvid of vpath9 from ODM database
Create hdisk11 pvid of 00607388eed14e3a in ODM database.
lname=hdisk11, pvid=00607388eed14e3a
Create hdisk27 pvid of 00607388eed14e3a in ODM database.
lname=hdisk27, pvid=00607388eed14e3a
Deleting pvid of vpath10 from ODM database
Create hdisk12 pvid of 00607388eed150f9 in ODM database.
lname=hdisk12, pvid=00607388eed150f9
Create hdisk28 pvid of 00607388eed150f9 in ODM database.
lname=hdisk28, pvid=00607388eed150f9
Deleting pvid of vpath11 from ODM database
Create hdisk13 pvid of 00607388eed153b5 in ODM database.
lname=hdisk13, pvid=00607388eed153b5
Create hdisk29 pvid of 00607388eed153b5 in ODM database.
lname=hdisk29, pvid=00607388eed153b5
Deleting pvid of vpath12 from ODM database
Create hdisk14 pvid of 00607388eed15688 in ODM database.
lname=hdisk14, pvid=00607388eed15688
Create hdisk30 pvid of 00607388eed15688 in ODM database.
lname=hdisk30, pvid=00607388eed15688
Deleting pvid of vpath13 from ODM database
Create hdisk15 pvid of 00607388eed15936 in ODM database.
lname=hdisk15, pvid=00607388eed15936
Create hdisk31 pvid of 00607388eed15936 in ODM database.
lname=hdisk31, pvid=00607388eed15936
Deleting pvid of vpath14 from ODM database
Create hdisk16 pvid of 00607388eed15bf2 in ODM database.
lname=hdisk16, pvid=00607388eed15bf2
Create hdisk32 pvid of 00607388eed15bf2 in ODM database.
lname=hdisk32, pvid=00607388eed15bf2
Deleting pvid of vpath15 from ODM database
Create hdisk17 pvid of 00607388eed15eb8 in ODM database.
lname=hdisk17, pvid=00607388eed15eb8
Create hdisk33 pvid of 00607388eed15eb8 in ODM database.
lname=hdisk33, pvid=00607388eed15eb8
varyon testvg was successful.
testvg is converted to hdisks successfully!

```

3.3 Varyoff the Volume Groups

For each volume group that you listed in step 1, you need to run “varyoffvg vgroup”.

If you want to add additional SCSI adapters to your RS/6000 or SP system, I would do that in this step.

1. Shut the system down.
2. Add the adapters.
3. Boot your system.
4. Do the next step – Remove all hdisk and vpath devices.
5. Continue with the rest of this section.

Also, if you need to install/de-install any SSD/DPO/2105 software, I would do that in this step.

3.5 OPTIONAL STEP - Remove all hdisk and vpath devices.

Although you do not have to remove all hdisk and vpath devices, you may find an occasion that you need to or just want to do so. In that case, this is the step where you should do it.

First, remove the vpath devices as follows:

```
rmdev -dl dpo -R
```

```
vpath0  deleted
vpath1  deleted
vpath2  deleted
vpath3  deleted
vpath4  deleted
vpath5  deleted
vpath6  deleted
vpath7  deleted
vpath8  deleted
vpath9  deleted
vpath10 deleted
vpath11 deleted
vpath12 deleted
vpath13 deleted
vpath14 deleted
vpath15 deleted
dpo     deleted
```

Then, remove all of the 2105 disk drives. I have written a short script, named “rmdev.2105”. It looks as follows:

hdisk2	deleted
hdisk3	deleted
hdisk4	deleted
hdisk5	deleted
hdisk6	deleted
hdisk7	deleted
hdisk8	deleted
hdisk9	deleted
hdisk10	deleted
hdisk11	deleted
hdisk12	deleted
hdisk13	deleted
hdisk14	deleted
hdisk15	deleted
hdisk16	deleted
hdisk17	deleted
hdisk18	deleted
hdisk19	deleted
hdisk20	deleted
hdisk21	deleted
hdisk22	deleted
hdisk23	deleted
hdisk24	deleted
hdisk25	deleted
hdisk26	deleted
hdisk27	deleted
hdisk28	deleted
hdisk29	deleted
hdisk30	deleted

3.6 Run `cfgmgr` “N” times (“N” is the number of paths of a DPO device)

For this step, you need to run `cfgmgr` (with the `-S` option or the `-v` option or without any options) “N” times, where “N” is the maximum number of SCSI paths that you have to a DPO device. For example, if you have 2 paths to your DPO devices (or ESS) from your RS/6000 or SP node, then you should run `cfgmgr` twice. If you have 4 paths, you should run `cfgmgr` four times. In the example, I will show some preliminary output between times. Note that I chose the optional step to remove all of my vpath devices and 2105 hdisk devices also.

cfgmgr # The first time.

```
Method error (/etc/methods/cfglft -l lft0 ):
0514-032 Cannot perform the requested function because the
          specified device is dependent on another device which does
          not exist.
```

Note that the above method error is fairly common in a SP environment, but will not impact your running system. Your output may be different.

lspv

```
hdisk0      00607388f5d0c666   rootvg
hdisk1      00607388ee09cb4c   rootvg
hdisk2      00607388eed135f8   udbvg
hdisk3      00607388eed138a0   udbvg
hdisk4      00607388eed13b55   udbvg
hdisk5      00607388eed13dfd   testvg
hdisk6      00607388eed140c0   testvg
hdisk7      00607388eed14363   testvg
hdisk8      00607388eed1460f   testvg
hdisk9      00607388eed148c4   testvg
hdisk10     00607388eed14b6d   testvg
hdisk11     00607388eed14e3a   testvg
hdisk12     00607388eed150f9   testvg
hdisk13     00607388eed153b5   testvg
hdisk14     00607388eed15688   testvg
hdisk15     00607388eed15936   testvg
hdisk16     00607388eed15bf2   testvg
hdisk17     00607388eed15eb8   testvg
vpath0      none                    None
vpath1      none                    None
vpath2      none                    None
vpath3      none                    None
vpath4      none                    None
vpath5      none                    None
vpath6      none                    None
vpath7      none                    None
vpath8      none                    None
```

lsvpcfg

```

vpath0 (Available ) 60012028 = hdisk2 (Available pv)
vpath1 (Available ) 60112028 = hdisk3 (Available pv)
vpath2 (Available ) 60212028 = hdisk4 (Available pv)
vpath3 (Available ) 60312028 = hdisk5 (Available pv)
vpath4 (Available ) 60412028 = hdisk6 (Available pv)
vpath5 (Available ) 60512028 = hdisk7 (Available pv)
vpath6 (Available ) 60612028 = hdisk8 (Available pv)
vpath7 (Available ) 60712028 = hdisk9 (Available pv)
vpath8 (Available ) 10012028 = hdisk10 (Available pv)
vpath9 (Available ) 10112028 = hdisk11 (Available pv)
vpath10 (Available ) 10212028 = hdisk12 (Available pv)
vpath11 (Available ) 10312028 = hdisk13 (Available pv)
vpath12 (Available ) 10412028 = hdisk14 (Available pv)
vpath13 (Available ) 10512028 = hdisk15 (Available pv)
vpath14 (Available ) 10612028 = hdisk16 (Available pv)
vpath15 (Available ) 10712028 = hdisk17 (Available pv)

```

datapath query device

```

Total Devices : 16

DEV#: 0  DEVICE NAME: vpath0  TYPE: 2105E20  SERIAL: 60012028
=====
Path#          Adapter/Hard Disk      State   Mode     Select  Errors
  0              scsi7/hdisk2         CLOSE  NORMAL     0         0

DEV#: 1  DEVICE NAME: vpath1  TYPE: 2105E20  SERIAL: 60112028
=====
Path#          Adapter/Hard Disk      State   Mode     Select  Errors
  0              scsi7/hdisk3         CLOSE  NORMAL     0         0

DEV#: 2  DEVICE NAME: vpath2  TYPE: 2105E20  SERIAL: 60212028
=====
Path#          Adapter/Hard Disk      State   Mode     Select  Errors
  0              scsi7/hdisk4         CLOSE  NORMAL     0         0

DEV#: 3  DEVICE NAME: vpath3  TYPE: 2105E20  SERIAL: 60312028
=====
Path#          Adapter/Hard Disk      State   Mode     Select  Errors
  0              scsi7/hdisk5         CLOSE  NORMAL     0         0

DEV#: 4  DEVICE NAME: vpath4  TYPE: 2105E20  SERIAL: 60412028
=====
Path#          Adapter/Hard Disk      State   Mode     Select  Errors
  0              scsi7/hdisk6         CLOSE  NORMAL     0         0

DEV#: 5  DEVICE NAME: vpath5  TYPE: 2105E20  SERIAL: 60512028
=====
Path#          Adapter/Hard Disk      State   Mode     Select  Errors
  0              scsi7/hdisk7         CLOSE  NORMAL     0         0

DEV#: 6  DEVICE NAME: vpath6  TYPE: 2105E20  SERIAL: 60612028

```


DEV#:	8	DEVICE NAME:	vpath8	TYPE:	2105E20	SERIAL:	10012028		
=====									
Path#		Adapter/Hard Disk		State		Mode		Select	Errors
0		scsi7/hdisk10		CLOSE		NORMAL		0	0
DEV#:	9	DEVICE NAME:	vpath9	TYPE:	2105E20	SERIAL:	10112028		
=====									
Path#		Adapter/Hard Disk		State		Mode		Select	Errors
0		scsi7/hdisk11		CLOSE		NORMAL		0	0
DEV#:	10	DEVICE NAME:	vpath10	TYPE:	2105E20	SERIAL:	10212028		
=====									
Path#		Adapter/Hard Disk		State		Mode		Select	Errors
0		scsi7/hdisk12		CLOSE		NORMAL		0	0
DEV#:	11	DEVICE NAME:	vpath11	TYPE:	2105E20	SERIAL:	10312028		
=====									
Path#		Adapter/Hard Disk		State		Mode		Select	Errors
0		scsi7/hdisk13		CLOSE		NORMAL		0	0
DEV#:	12	DEVICE NAME:	vpath12	TYPE:	2105E20	SERIAL:	10412028		
=====									
Path#		Adapter/Hard Disk		State		Mode		Select	Errors
0		scsi7/hdisk14		CLOSE		NORMAL		0	0
DEV#:	13	DEVICE NAME:	vpath13	TYPE:	2105E20	SERIAL:	10512028		
=====									
Path#		Adapter/Hard Disk		State		Mode		Select	Errors
0		scsi7/hdisk15		CLOSE		NORMAL		0	0
DEV#:	14	DEVICE NAME:	vpath14	TYPE:	2105E20	SERIAL:	10612028		
=====									
Path#		Adapter/Hard Disk		State		Mode		Select	Errors
0		scsi7/hdisk16		CLOSE		NORMAL		0	0
DEV#:	15	DEVICE NAME:	vpath15	TYPE:	2105E20	SERIAL:	10712028		
=====									
Path#		Adapter/Hard Disk		State		Mode		Select	Errors
0		scsi7/hdisk17		CLOSE		NORMAL		0	0

cfgmgr # Second time.

```
Method error (/etc/methods/cfglft -l lft0 ):
0514-032 Cannot perform the requested function because the
specified device is dependent on another device which does
not exist.
```

lspv

```
hdisk0      00607388f5d0c666   rootvg
hdisk1      00607388ee09cb4c   rootvg
hdisk2      00607388e1125500   "
```

hdisk13	00607388eed153b5	testvg
hdisk14	00607388eed15688	testvg
hdisk15	00607388eed15936	testvg
hdisk16	00607388eed15bf2	testvg
hdisk17	00607388eed15eb8	testvg
vpath0	none	None
vpath1	none	None
vpath2	none	None
vpath3	none	None
vpath4	none	None
vpath5	none	None
vpath6	none	None
vpath7	none	None
vpath8	none	None
vpath9	none	None
vpath10	none	None
vpath11	none	None
vpath12	none	None
vpath13	none	None
vpath14	none	None
vpath15	none	None
hdisk18	00607388eed135f8	udbvg
hdisk19	00607388eed138a0	udbvg
hdisk20	00607388eed13b55	udbvg
hdisk21	00607388eed13dfd	testvg
hdisk22	00607388eed140c0	testvg
hdisk23	00607388eed14363	testvg
hdisk24	00607388eed1460f	testvg
hdisk25	00607388eed148c4	testvg
hdisk26	00607388eed14b6d	testvg
hdisk27	00607388eed14e3a	testvg
hdisk28	00607388eed150f9	testvg
hdisk29	00607388eed153b5	testvg
hdisk30	00607388eed15688	testvg
hdisk31	00607388eed15936	testvg
hdisk32	00607388eed15bf2	testvg
hdisk33	00607388eed15eb8	testvg

lsvpcfg

vpath0 (Available)	60012028 = hdisk2 (Available pv)
vpath1 (Available)	60112028 = hdisk3 (Available pv)
vpath2 (Available)	60212028 = hdisk4 (Available pv)
vpath3 (Available)	60312028 = hdisk5 (Available pv)
vpath4 (Available)	60412028 = hdisk6 (Available pv)
vpath5 (Available)	60512028 = hdisk7 (Available pv)
vpath6 (Available)	60612028 = hdisk8 (Available pv)
vpath7 (Available)	60712028 = hdisk9 (Available pv)
vpath8 (Available)	10012028 = hdisk10 (Available pv)
vpath9 (Available)	10112028 = hdisk11 (Available pv)
vpath10 (Available)	10212028 = hdisk12 (Available pv)
vpath11 (Available)	10312028 = hdisk13 (Available pv)
vpath12 (Available)	10412028 = hdisk14 (Available pv)
vpath13 (Available)	10512028 = hdisk15 (Available pv)
vpath14 (Available)	10612028 = hdisk16 (Available pv)
vpath15 (Available)	10712028 = hdisk17 (Available pv)

datapath query device

Total Devices : 16							
DEV#:	0	DEVICE NAME:	vpath0	TYPE:	2105E20	SERIAL:	60012028
=====							
Path#		Adapter/Hard Disk	State	Mode	Select	Errors	
0		scsi7/hdisk2	CLOSE	NORMAL	0	0	
DEV#:	1	DEVICE NAME:	vpath1	TYPE:	2105E20	SERIAL:	60112028
=====							
Path#		Adapter/Hard Disk	State	Mode	Select	Errors	
0		scsi7/hdisk3	CLOSE	NORMAL	0	0	
DEV#:	2	DEVICE NAME:	vpath2	TYPE:	2105E20	SERIAL:	60212028
=====							
Path#		Adapter/Hard Disk	State	Mode	Select	Errors	
0		scsi7/hdisk4	CLOSE	NORMAL	0	0	
DEV#:	3	DEVICE NAME:	vpath3	TYPE:	2105E20	SERIAL:	60312028
=====							
Path#		Adapter/Hard Disk	State	Mode	Select	Errors	
0		scsi7/hdisk5	CLOSE	NORMAL	0	0	
DEV#:	4	DEVICE NAME:	vpath4	TYPE:	2105E20	SERIAL:	60412028
=====							
Path#		Adapter/Hard Disk	State	Mode	Select	Errors	
0		scsi7/hdisk6	CLOSE	NORMAL	0	0	
DEV#:	5	DEVICE NAME:	vpath5	TYPE:	2105E20	SERIAL:	60512028
=====							
Path#		Adapter/Hard Disk	State	Mode	Select	Errors	
0		scsi7/hdisk7	CLOSE	NORMAL	0	0	
DEV#:	6	DEVICE NAME:	vpath6	TYPE:	2105E20	SERIAL:	60612028
=====							
Path#		Adapter/Hard Disk	State	Mode	Select	Errors	
0		scsi7/hdisk8	CLOSE	NORMAL	0	0	
DEV#:	7	DEVICE NAME:	vpath7	TYPE:	2105E20	SERIAL:	60712028
=====							
Path#		Adapter/Hard Disk	State	Mode	Select	Errors	
0		scsi7/hdisk9	CLOSE	NORMAL	0	0	
DEV#:	8	DEVICE NAME:	vpath8	TYPE:	2105E20	SERIAL:	10012028
=====							
Path#		Adapter/Hard Disk	State	Mode	Select	Errors	
0		scsi7/hdisk10	CLOSE	NORMAL	0	0	
DEV#:	9	DEVICE NAME:	vpath9	TYPE:	2105E20	SERIAL:	10112028
=====							
Path#		Adapter/Hard Disk	State	Mode	Select	Errors	
0		scsi7/hdisk11	CLOSE	NORMAL	0	0	

DEV#:	12	DEVICE NAME:	vpath12	TYPE:	2105E20	SERIAL:	10412028
=====							
Path#		Adapter/Hard Disk		State	Mode	Select	Errors
0		scsi7/hdisk14		CLOSE	NORMAL	0	0
DEV#:	13	DEVICE NAME:	vpath13	TYPE:	2105E20	SERIAL:	10512028
=====							
Path#		Adapter/Hard Disk		State	Mode	Select	Errors
0		scsi7/hdisk15		CLOSE	NORMAL	0	0
DEV#:	14	DEVICE NAME:	vpath14	TYPE:	2105E20	SERIAL:	10612028
=====							
Path#		Adapter/Hard Disk		State	Mode	Select	Errors
0		scsi7/hdisk16		CLOSE	NORMAL	0	0
DEV#:	15	DEVICE NAME:	vpath15	TYPE:	2105E20	SERIAL:	10712028
=====							
Path#		Adapter/Hard Disk		State	Mode	Select	Errors
0		scsi7/hdisk17		CLOSE	NORMAL	0	0

3.7 Unconfigure all DPO Devices

For this step, we need to take all DPO devices (vpath devices) to a “Defined” state.

rmdev -l dpo -R

```
vpath0 Defined
vpath1 Defined
vpath2 Defined
vpath3 Defined
vpath4 Defined
vpath5 Defined
vpath6 Defined
vpath7 Defined
vpath8 Defined
vpath9 Defined
vpath10 Defined
vpath11 Defined
vpath12 Defined
vpath13 Defined
vpath14 Defined
vpath15 Defined
dpo Defined
```

3.8 Configure all DPO Devices

smit

```

COMMAND STATUS

Command: OK          stdout: yes          stderr: no

Before command completion, additional instructions may appear below.

vpath0 Available Data Path Optimizer Pseudo Device Driver
vpath1 Available Data Path Optimizer Pseudo Device Driver
vpath2 Available Data Path Optimizer Pseudo Device Driver
vpath3 Available Data Path Optimizer Pseudo Device Driver
vpath4 Available Data Path Optimizer Pseudo Device Driver
vpath5 Available Data Path Optimizer Pseudo Device Driver
vpath6 Available Data Path Optimizer Pseudo Device Driver
vpath7 Available Data Path Optimizer Pseudo Device Driver
vpath8 Available Data Path Optimizer Pseudo Device Driver
vpath9 Available Data Path Optimizer Pseudo Device Driver
vpath10 Available Data Path Optimizer Pseudo Device Driver
vpath11 Available Data Path Optimizer Pseudo Device Driver
vpath12 Available Data Path Optimizer Pseudo Device Driver
vpath13 Available Data Path Optimizer Pseudo Device Driver
vpath14 Available Data Path Optimizer Pseudo Device Driver
vpath15 Available Data Path Optimizer Pseudo Device Driver

F1=Help          F2=Refresh          F3=Cancel          Esc+6=Command
Esc+8=Image      Esc+9=Shell         Esc+0=Exit        /=Find
n=Find Next

```

(NOTE: The best I can tell, this is running a “`cfgmgr -l dpo`” and an `lsdev` command to show the results.)

3.9 Run “`lsvpcfg`” to Check the Status

lsvpcfg

```

vpath0 (Available ) 60012028 = hdisk2 (Available pv) hdisk18 (Available pv)
vpath1 (Available ) 60112028 = hdisk3 (Available pv) hdisk19 (Available pv)
vpath2 (Available ) 60212028 = hdisk4 (Available pv) hdisk20 (Available pv)
vpath3 (Available ) 60312028 = hdisk5 (Available pv) hdisk21 (Available pv)
vpath4 (Available ) 60412028 = hdisk6 (Available pv) hdisk22 (Available pv)
vpath5 (Available ) 60512028 = hdisk7 (Available pv) hdisk23 (Available pv)
vpath6 (Available ) 60612028 = hdisk8 (Available pv) hdisk24 (Available pv)
vpath7 (Available ) 60712028 = hdisk9 (Available pv) hdisk25 (Available pv)
vpath8 (Available ) 10012028 = hdisk10 (Available pv) hdisk26 (Available pv)
vpath9 (Available ) 10112028 = hdisk11 (Available pv) hdisk27 (Available pv)
vpath10 (Available ) 10212028 = hdisk12 (Available pv) hdisk28 (Available pv)
vpath11 (Available ) 10312028 = hdisk13 (Available pv) hdisk29 (Available pv)
vpath12 (Available ) 10412028 = hdisk14 (Available pv) hdisk30 (Available pv)
vpath13 (Available ) 10512028 = hdisk15 (Available pv) hdisk31 (Available pv)
vpath14 (Available ) 10612028 = hdisk16 (Available pv) hdisk32 (Available pv)
vpath15 (Available ) 10712028 = hdisk17 (Available pv) hdisk33 (Available pv)

```

datapath query device

Total Devices : 16

```

DEV#: 0  DEVICE NAME: vpath0  TYPE: 2105E20  SERIAL: 60012028
=====
Path#          Adapter/Hard Disk  State   Mode    Select  Errors
  0              scsi7/hdisk2  CLOSE  NORMAL    0        0
  1              scsi6/hdisk18  CLOSE  NORMAL    0        0

DEV#: 1  DEVICE NAME: vpath1  TYPE: 2105E20  SERIAL: 60112028
=====
Path#          Adapter/Hard Disk  State   Mode    Select  Errors
  0              scsi7/hdisk3  CLOSE  NORMAL    0        0
  1              scsi6/hdisk19  CLOSE  NORMAL    0        0

DEV#: 2  DEVICE NAME: vpath2  TYPE: 2105E20  SERIAL: 60212028
=====
Path#          Adapter/Hard Disk  State   Mode    Select  Errors
  0              scsi7/hdisk4  CLOSE  NORMAL    0        0
  1              scsi6/hdisk20  CLOSE  NORMAL    0        0

DEV#: 3  DEVICE NAME: vpath3  TYPE: 2105E20  SERIAL: 60312028
=====
Path#          Adapter/Hard Disk  State   Mode    Select  Errors
  0              scsi7/hdisk5  CLOSE  NORMAL    0        0
  1              scsi6/hdisk21  CLOSE  NORMAL    0        0

DEV#: 4  DEVICE NAME: vpath4  TYPE: 2105E20  SERIAL: 60412028
=====
Path#          Adapter/Hard Disk  State   Mode    Select  Errors
  0              scsi7/hdisk6  CLOSE  NORMAL    0        0
  1              scsi6/hdisk22  CLOSE  NORMAL    0        0

DEV#: 5  DEVICE NAME: vpath5  TYPE: 2105E20  SERIAL: 60512028
=====
Path#          Adapter/Hard Disk  State   Mode    Select  Errors
  0              scsi7/hdisk7  CLOSE  NORMAL    0        0
  1              scsi6/hdisk23  CLOSE  NORMAL    0        0

DEV#: 6  DEVICE NAME: vpath6  TYPE: 2105E20  SERIAL: 60612028
=====
Path#          Adapter/Hard Disk  State   Mode    Select  Errors
  0              scsi7/hdisk8  CLOSE  NORMAL    0        0
  1              scsi6/hdisk24  CLOSE  NORMAL    0        0

DEV#: 7  DEVICE NAME: vpath7  TYPE: 2105E20  SERIAL: 60712028
=====
Path#          Adapter/Hard Disk  State   Mode    Select  Errors
  0              scsi7/hdisk9  CLOSE  NORMAL    0        0
  1              scsi6/hdisk25  CLOSE  NORMAL    0        0

DEV#: 8  DEVICE NAME: vpath8  TYPE: 2105E20  SERIAL: 10012028
=====

```

DEV#:	10	DEVICE NAME:	vpath10	TYPE:	2105E20	SERIAL:	10212028		
=====									
Path#		Adapter/Hard Disk		State		Mode		Select	Errors
0		scsi7/hdisk12		CLOSE		NORMAL		0	0
1		scsi6/hdisk28		CLOSE		NORMAL		0	0
DEV#:	11	DEVICE NAME:	vpath11	TYPE:	2105E20	SERIAL:	10312028		
=====									
Path#		Adapter/Hard Disk		State		Mode		Select	Errors
0		scsi7/hdisk13		CLOSE		NORMAL		0	0
1		scsi6/hdisk29		CLOSE		NORMAL		0	0
DEV#:	12	DEVICE NAME:	vpath12	TYPE:	2105E20	SERIAL:	10412028		
=====									
Path#		Adapter/Hard Disk		State		Mode		Select	Errors
0		scsi7/hdisk14		CLOSE		NORMAL		0	0
1		scsi6/hdisk30		CLOSE		NORMAL		0	0
DEV#:	13	DEVICE NAME:	vpath13	TYPE:	2105E20	SERIAL:	10512028		
=====									
Path#		Adapter/Hard Disk		State		Mode		Select	Errors
0		scsi7/hdisk15		CLOSE		NORMAL		0	0
1		scsi6/hdisk31		CLOSE		NORMAL		0	0
DEV#:	14	DEVICE NAME:	vpath14	TYPE:	2105E20	SERIAL:	10612028		
=====									
Path#		Adapter/Hard Disk		State		Mode		Select	Errors
0		scsi7/hdisk16		CLOSE		NORMAL		0	0
1		scsi6/hdisk32		CLOSE		NORMAL		0	0
DEV#:	15	DEVICE NAME:	vpath15	TYPE:	2105E20	SERIAL:	10712028		
=====									
Path#		Adapter/Hard Disk		State		Mode		Select	Errors
0		scsi7/hdisk17		CLOSE		NORMAL		0	0
1		scsi6/hdisk33		CLOSE		NORMAL		0	0

3.10 Varyon the Volume Groups

For each volume group that you listed in step 1, you need to run “varyonvg vname”.

```
varyonvg testvg
```

```
varyonvg udbvg
```

3.11 Run “hd2vp” on Each Volume Group

```
hd2vp testvg
```

```
00607388eed153b5 hdisk13
00607388eed15688 hdisk14
00607388eed15936 hdisk15
00607388eed15bf2 hdisk16
00607388eed15eb8 hdisk17

hdisk5 is part of vpath3.
hdisk6 is part of vpath4.
hdisk7 is part of vpath5.
hdisk8 is part of vpath6.
hdisk9 is part of vpath7.
hdisk10 is part of vpath8.
hdisk11 is part of vpath9.
hdisk12 is part of vpath10.
hdisk13 is part of vpath11.
hdisk14 is part of vpath12.
hdisk15 is part of vpath13.
hdisk16 is part of vpath14.
hdisk17 is part of vpath15.
testvg
Deleting pvid of hdisk17 from ODM database
Deleting pvid of hdisk33 from ODM database
Create vpath15 pvid of 00607388eed15eb8 in ODM database.
lname=vpath15, pvid=00607388eed15eb8
Deleting pvid of hdisk16 from ODM database
Deleting pvid of hdisk32 from ODM database
Create vpath14 pvid of 00607388eed15bf2 in ODM database.
lname=vpath14, pvid=00607388eed15bf2
Deleting pvid of hdisk15 from ODM database
Deleting pvid of hdisk31 from ODM database
Create vpath13 pvid of 00607388eed15936 in ODM database.
lname=vpath13, pvid=00607388eed15936
Deleting pvid of hdisk14 from ODM database
Deleting pvid of hdisk30 from ODM database
Create vpath12 pvid of 00607388eed15688 in ODM database.
lname=vpath12, pvid=00607388eed15688
Deleting pvid of hdisk13 from ODM database
Deleting pvid of hdisk29 from ODM database
Create vpath11 pvid of 00607388eed153b5 in ODM database.
lname=vpath11, pvid=00607388eed153b5
Deleting pvid of hdisk12 from ODM database
Deleting pvid of hdisk28 from ODM database
Create vpath10 pvid of 00607388eed150f9 in ODM database.
lname=vpath10, pvid=00607388eed150f9
Deleting pvid of hdisk11 from ODM database
Deleting pvid of hdisk27 from ODM database
Create vpath9 pvid of 00607388eed14e3a in ODM database.
lname=vpath9, pvid=00607388eed14e3a
Deleting pvid of hdisk10 from ODM database
Deleting pvid of hdisk26 from ODM database
Create vpath8 pvid of 00607388eed14b6d in ODM database.
lname=vpath8, pvid=00607388eed14b6d
Deleting pvid of hdisk9 from ODM database
Deleting pvid of hdisk25 from ODM database
Create vpath7 pvid of 00607388eed148c4 in ODM database.
lname=vpath7, pvid=00607388eed148c4
Deleting pvid of hdisk8 from ODM database
```



```

Deleting pvid of hdisk5 from ODM database
Deleting pvid of hdisk21 from ODM database
Create vpath3 pvid of 00607388eed13dfd in ODM database.
lname=vpath3, pvid=00607388eed13dfd
varyon testvg was successful.
testvg is converted to dpo device vpathes successfully!

```

hd2vp udbvg

```

udbvg
udbvg contains these hdisks and pvids
00607388eed135f8 hdisk2
00607388eed138a0 hdisk3
00607388eed13b55 hdisk4

hdisk2 is part of vpath0.
hdisk3 is part of vpath1.
hdisk4 is part of vpath2.
udbvg
Deleting pvid of hdisk4 from ODM database
Deleting pvid of hdisk20 from ODM database
Create vpath2 pvid of 00607388eed13b55 in ODM database.
lname=vpath2, pvid=00607388eed13b55
Deleting pvid of hdisk3 from ODM database
Deleting pvid of hdisk19 from ODM database
Create vpath1 pvid of 00607388eed138a0 in ODM database.
lname=vpath1, pvid=00607388eed138a0
Deleting pvid of hdisk2 from ODM database
Deleting pvid of hdisk18 from ODM database
Create vpath0 pvid of 00607388eed135f8 in ODM database.
lname=vpath0, pvid=00607388eed135f8
varyon udbvg was successful.
udbvg is converted to dpo device vpathes successfully!

```

3.12 Verification

Now, you should be OK! Let's run some commands to verify this.

lspv

```

hdisk0      00607388f5d0c666    rootvg
hdisk1      00607388ee09cb4c    rootvg
hdisk2      none                    None
hdisk3      none                    None
hdisk4      none                    None
hdisk5      none                    None
hdisk6      none                    None
hdisk7      none                    None
hdisk8      none                    None
hdisk9      none                    None

```

vpath2	00607388eed13b55	udbvg
vpath3	00607388eed13dfd	testvg
vpath4	00607388eed140c0	testvg
vpath5	00607388eed14363	testvg
vpath6	00607388eed1460f	testvg
vpath7	00607388eed148c4	testvg
vpath8	00607388eed14b6d	testvg
vpath9	00607388eed14e3a	testvg
vpath10	00607388eed150f9	testvg
vpath11	00607388eed153b5	testvg
vpath12	00607388eed15688	testvg
vpath13	00607388eed15936	testvg
vpath14	00607388eed15bf2	testvg
vpath15	00607388eed15eb8	testvg
hdisk18	none	None
hdisk19	none	None
hdisk20	none	None
hdisk21	none	None
hdisk22	none	None
hdisk23	none	None
hdisk24	none	None
hdisk25	none	None
hdisk26	none	None
hdisk27	none	None
hdisk28	none	None
hdisk29	none	None
hdisk30	none	None
hdisk31	none	None
hdisk32	none	None
hdisk33	none	None

Note that you do not have PVIDs on your ESS disk drives. Also, note that your vpath devices DO have pvids and volume group definitions. Finally, note that all of your hdisk definitions are there.

datapath query device

Total Devices : 16

```

DEV#: 0  DEVICE NAME: vpath0  TYPE: 2105E20  SERIAL: 60012028
=====
Path#      Adapter/Hard Disk  State  Mode  Select  Errors
  0          scsi7/hdisk2  OPEN  NORMAL  22      0
  1          scsi6/hdisk18  OPEN  NORMAL  26      0

DEV#: 1  DEVICE NAME: vpath1  TYPE: 2105E20  SERIAL: 60112028
=====
Path#      Adapter/Hard Disk  State  Mode  Select  Errors
  0          scsi7/hdisk3  OPEN  NORMAL  10      0
  1          scsi6/hdisk19  OPEN  NORMAL  10      0

DEV#: 2  DEVICE NAME: vpath2  TYPE: 2105E20  SERIAL: 60212028
=====
Path#      Adapter/Hard Disk  State  Mode  Select  Errors
  0          scsi7/hdisk4  OPEN  NORMAL  8       0
  1          scsi6/hdisk20  OPEN  NORMAL  12      0

DEV#: 3  DEVICE NAME: vpath3  TYPE: 2105E20  SERIAL: 60312028
=====
Path#      Adapter/Hard Disk  State  Mode  Select  Errors
  0          scsi7/hdisk5  OPEN  NORMAL  27      0
  1          scsi6/hdisk21  OPEN  NORMAL  21      0

DEV#: 4  DEVICE NAME: vpath4  TYPE: 2105E20  SERIAL: 60412028
=====
Path#      Adapter/Hard Disk  State  Mode  Select  Errors
  0          scsi7/hdisk6  OPEN  NORMAL  10      0
  1          scsi6/hdisk22  OPEN  NORMAL  10      0

DEV#: 5  DEVICE NAME: vpath5  TYPE: 2105E20  SERIAL: 60512028
=====
Path#      Adapter/Hard Disk  State  Mode  Select  Errors
  0          scsi7/hdisk7  OPEN  NORMAL  10      0
  1          scsi6/hdisk23  OPEN  NORMAL  10      0

DEV#: 6  DEVICE NAME: vpath6  TYPE: 2105E20  SERIAL: 60612028
=====
Path#      Adapter/Hard Disk  State  Mode  Select  Errors
  0          scsi7/hdisk8  OPEN  NORMAL  7       0
  1          scsi6/hdisk24  OPEN  NORMAL  13      0

DEV#: 7  DEVICE NAME: vpath7  TYPE: 2105E20  SERIAL: 60712028
=====
Path#      Adapter/Hard Disk  State  Mode  Select  Errors
  0          scsi7/hdisk9  OPEN  NORMAL  11      0
  1          scsi6/hdisk25  OPEN  NORMAL  9       0

DEV#: 8  DEVICE NAME: vpath8  TYPE: 2105E20  SERIAL: 10012028
=====
Path#      Adapter/Hard Disk  State  Mode  Select  Errors

```

```

DEV#: 10  DEVICE NAME: vpath10  TYPE: 2105E20  SERIAL: 10212028
=====
Path#      Adapter/Hard Disk  State  Mode  Select  Errors
  0          scsi7/hdisk12  OPEN  NORMAL  9        0
  1          scsi6/hdisk28  OPEN  NORMAL  11       0

DEV#: 11  DEVICE NAME: vpath11  TYPE: 2105E20  SERIAL: 10312028
=====
Path#      Adapter/Hard Disk  State  Mode  Select  Errors
  0          scsi7/hdisk13  OPEN  NORMAL  12        0
  1          scsi6/hdisk29  OPEN  NORMAL  8         0

DEV#: 12  DEVICE NAME: vpath12  TYPE: 2105E20  SERIAL: 10412028
=====
Path#      Adapter/Hard Disk  State  Mode  Select  Errors
  0          scsi7/hdisk14  OPEN  NORMAL  14        0
  1          scsi6/hdisk30  OPEN  NORMAL  6         0

DEV#: 13  DEVICE NAME: vpath13  TYPE: 2105E20  SERIAL: 10512028
=====
Path#      Adapter/Hard Disk  State  Mode  Select  Errors
  0          scsi7/hdisk15  OPEN  NORMAL  9         0
  1          scsi6/hdisk31  OPEN  NORMAL  11        0

DEV#: 14  DEVICE NAME: vpath14  TYPE: 2105E20  SERIAL: 10612028
=====
Path#      Adapter/Hard Disk  State  Mode  Select  Errors
  0          scsi7/hdisk16  OPEN  NORMAL  7         0
  1          scsi6/hdisk32  OPEN  NORMAL  13        0

DEV#: 15  DEVICE NAME: vpath15  TYPE: 2105E20  SERIAL: 10712028
=====
Path#      Adapter/Hard Disk  State  Mode  Select  Errors
  0          scsi7/hdisk17  OPEN  NORMAL  9         0
  1          scsi6/hdisk33  OPEN  NORMAL  11        0

```

Note that each vpath device has two paths to access the device.

lsvpcfg

```

vpath0 (Available pv) 60012028 = hdisk2 (Available ) hdisk18 (Available )
vpath1 (Available pv) 60112028 = hdisk3 (Available ) hdisk19 (Available )
vpath2 (Available pv) 60212028 = hdisk4 (Available ) hdisk20 (Available )
vpath3 (Available pv) 60312028 = hdisk5 (Available ) hdisk21 (Available )
vpath4 (Available pv) 60412028 = hdisk6 (Available ) hdisk22 (Available )
vpath5 (Available pv) 60512028 = hdisk7 (Available ) hdisk23 (Available )
vpath6 (Available pv) 60612028 = hdisk8 (Available ) hdisk24 (Available )
vpath7 (Available pv) 60712028 = hdisk9 (Available ) hdisk25 (Available )
vpath8 (Available pv) 10012028 = hdisk10 (Available ) hdisk26 (Available )
vpath9 (Available pv) 10112028 = hdisk11 (Available ) hdisk27 (Available )
vpath10 (Available pv) 10212028 = hdisk12 (Available ) hdisk28 (Available )
vpath11 (Available pv) 10312028 = hdisk13 (Available ) hdisk29 (Available )
vpath12 (Available pv) 10412028 = hdisk14 (Available ) hdisk30 (Available )
vpath13 (Available pv) 10512028 = hdisk15 (Available ) hdisk31 (Available )

```

Section 4: Items of Interest

At this installation, we installed three IBM 2105 ESS machines. Although we did not run into any hardware problems, you may. When debugging, you may want to delete all of your ESS disk drives and vpath devices. Be careful.

4.1 Making Volume Groups – Special Command

If you are used to scripting your volume group creation, please use the `/usr/sbin/mkvg4vp` command instead of the `/usr/sbin/mkvg` command. You will be much more satisfied with the results.

You can do this from smit via the following panels:

smit

Select “System Storage Management (Physical & Logical Storage)”

Select “Logical Volume Manager”

Select “Volume Groups”

Select “Add a Volume Group with Data Path Devices”

4.2 Making Volume Groups – Again!

Suppose that you have already made a volume group on some vpath devices. Then, suppose you wanted to export the volume group, and create a NEW volume group. You may run into a slight challenge. The command that smit uses to create this volume group looks similar to the following:

```
VGNAME=`/usr/sbin/mkvg4vp -y'udbvg' -s'256' -V'80' vpath0 vpath1 vpath2`
```

```
0516-014 lcreatevg: The physical volume appears to belong to another
volume group.
00607388ef28df09
0516-631 mkvg: Warning, all data belonging to physical
volume vpath0 will be destroyed.
mkvg: Do you wish to continue? y(es) n(o)? y
0516-014 linstallpv: The physical volume appears to belong to another
volume group.
```

If you notice above, the output asked me if I wanted to continue on the first disk, but I had to know the answer to the question for disks 2 and so on. Just keep answering “y” for yes!

BETTER YET! If you are scripting the VG creation, just add a “-f” option (after the command but before the -y option) as follows:

```
VGNAME=`/usr/sbin/mkvg4vp -f -y'udbvg' -s'256' -V'80' vpath0 vpath1 vpath2`
```

4.3 Extending Volume Groups – Special Command

If you are used to scripting your volume group extensions, please use the `/usr/sbin/extendvg4vp` command instead of the `/usr/sbin/extendvg` command. You will be much more satisfied with the results.

4.4 Extending Volume Groups – smit BUG

You really do need to script your DPO volume group extensions, because the smit menu tries to use the `/usr/sbin/extendvg` command. You may not be happy with the results. You would get to this menu via the following:

smit

Select “System Storage Management (Physical & Logical Storage)”

Select “Logical Volume Manager”

Select “Volume Groups”

Select “Add a Data Path Volume to a Volume Group”

```
Add a Datapath Physical Volume to a Volume Group
```

```
Type or select values in entry fields.
Press Enter AFTER making all desired changes.
```

```

                                     [Entry Fields]
* VOLUME GROUP name                    [ ]          +
* PHYSICAL VOLUME names                 [ ]          +
```

4.5 dpovgfix – Special Circumstances

It is possible for certain AIX commands to cause an hdisk to register its PVID. Scenarios that will cause this exist as follows:

1. `chdev -l hdisk2 -a q_depth=20`
This command will change the attributes of the hdisk, which causes AIX to unconfigure and then reconfigure the hdisk. This in turn creates the hdisk's PVID in the ODM.
2. restoring from a `mksysb`
After restoring a `mksysb`, the physical volumes of the DPO volume group are switched back to the hdisks.

The basic idea is that the hdisks that exist under the vpath devices should not reflect the hdisks PVID. If they do, then you should “fix” the offending hdisks that are in the DPO volume group.

To determine if you have this problem, you can run the following command (on your DPO volume group):

lsvg -p udbvg

udbvg:				
PV_NAME	PV STATE	TOTAL PPs	FREE PPs	FREE DISTRIBUTION
hdisk2	active	518	518	104..104..103..103..104
hdisk3	active	518	518	104..104..103..103..104
vpath2	active	518	518	104..104..103..103..104

If you see some hdisk devices mixed in with your vpath devices (or all hdisk devices), then you are not utilizing DPO for those disk drives, i. e. you are not load balancing for the offending disk drives and you are not protected from the failure of the single scsi adapter that is servicing those hdisk devices.

NOTE: You could also use the “*lspv*” command. If you see PVIDs next to your hdisks instead of the vpath devices, or volume group names associated with hdisks instead of vpath devices, then keep reading!

Sample output (not all of the lspv output) from the lspv command follows:

lspv

hdisk2	00607388eed135f8	udbvg
hdisk3	00607388eed138a0	udbvg
hdisk4	none	None
vpath0	none	None
vpath1	none	None
vpath2	00607388eed13b55	udbvg

In order to “fix” the above problem, you will need to run the “*dpovgfix*” command on the dpo volume group in question:

dpovgfix udbvg

```
udbvg
udbvg contains following devices and pvids
  00607388eed13b55 hdisk2
00607388eed138a0 hdisk3
00607388eed13b55 hdisk4

Create vpath0 pvid of 00607388eed13b55 in ODM database.
lname=vpath0, pvid=00607388eed13b55
Create vpath1 pvid of 00607388eed138a0 in ODM database.
lname=vpath1, pvid=00607388eed138a0
Create vpath2 pvid of 00607388eed13b55 in ODM database.
lname=vpath2, pvid=00607388eed13b55
varyon udbvg was successful.
Volume Group udbvg is cleaned up to dpo devices successfully.
```

The bad news is that you will need to umount all filesystems and close all raw logical volumes before running *dpovgfix*. This will require a scheduled outage. “*dpovgfix*” will varyon your volume group for you, so you will need to mount all filesystems and restart your applications when it has completed running. Just for good measure, I suggest that you re-run your “*lsvg -p dpo_vgname*” or the “*lspv*” command to verify that you configuration is good. Note that the *lspv* output should show pvids associated with vpath devices and not with hdisk that are being utilized for DPO. Also, vg names should be associated with vpath devices and not with hdisk that are being utilized for DPO.

To equate LUNs back to hdisks, do the following:

On the Storage Specialist (ESS) side – do the following:

Look for the tabular view under Storage Allocation. Find the machine that you want and the disk you want. Look at its serial number.

On the AIX side, you can either run the command

lsvpcfg

```
vpath0 (Available pv) 60012028 = hdisk2 (Available ) hdisk18 (Available )
vpath1 (Available pv) 60112028 = hdisk3 (Available ) hdisk19 (Available )
vpath2 (Available pv) 60212028 = hdisk4 (Available ) hdisk20 (Available )
vpath3 (Available pv) 60312028 = hdisk5 (Available ) hdisk21 (Available )
vpath4 (Available pv) 60412028 = hdisk6 (Available ) hdisk22 (Available )
vpath5 (Available pv) 60512028 = hdisk7 (Available ) hdisk23 (Available )
vpath6 (Available pv) 60612028 = hdisk8 (Available ) hdisk24 (Available )
vpath7 (Available pv) 60712028 = hdisk9 (Available ) hdisk25 (Available )
vpath8 (Available pv) 10012028 = hdisk10 (Available ) hdisk26 (Available )
vpath9 (Available pv) 10112028 = hdisk11 (Available ) hdisk27 (Available )
vpath10 (Available pv) 10212028 = hdisk12 (Available ) hdisk28 (Available )
vpath11 (Available pv) 10312028 = hdisk13 (Available ) hdisk29 (Available )
vpath12 (Available pv) 10412028 = hdisk14 (Available ) hdisk30 (Available )
vpath13 (Available pv) 10512028 = hdisk15 (Available ) hdisk31 (Available )
vpath14 (Available pv) 10612028 = hdisk16 (Available ) hdisk32 (Available )
vpath15 (Available pv) 10712028 = hdisk17 (Available ) hdisk33 (Available )
```

or, the following command:

lscfg -vl hdisk2

DEVICE	LOCATION	DESCRIPTION
hdisk2	30-68-00-5,0	IBM 2105E20
Manufacturer.....IBM		
Machine Type and Model.....2105E20		
Serial Number.....60012028		
EC Level.....0414		
Device Specific.(Z0).....11		
Device Specific.(Z1).....00A0		
Device Specific.(Z2).....0013		
Device Specific.(Z3).....23299		
Device Specific.(Z4).....05		
Device Specific.(Z5).....00		

Another way to equate the two is to look at the SCSI ID to find the right adapter and then the LUN number to find the right drive down that adapter!

hdisk2	Available	30-70-00-5,0	IBM 2105E20
hdisk3	Available	30-70-00-5,1	IBM 2105E20
hdisk4	Available	30-70-00-5,2	IBM 2105E20
hdisk5	Available	30-70-00-5,3	IBM 2105E20
hdisk6	Available	30-70-00-5,4	IBM 2105E20
hdisk7	Available	30-70-00-5,5	IBM 2105E20
hdisk8	Available	30-70-00-5,6	IBM 2105E20
hdisk9	Available	30-70-00-5,7	IBM 2105E20
hdisk10	Available	30-70-00-6,0	IBM 2105E20
hdisk11	Available	30-70-00-6,1	IBM 2105E20
hdisk12	Available	30-70-00-6,2	IBM 2105E20
hdisk13	Available	30-70-00-6,3	IBM 2105E20
hdisk14	Available	30-70-00-6,4	IBM 2105E20
hdisk15	Available	30-70-00-6,5	IBM 2105E20
hdisk16	Available	30-70-00-6,6	IBM 2105E20
hdisk17	Available	30-70-00-6,7	IBM 2105E20
hdisk18	Available	30-68-00-5,0	IBM 2105E20
hdisk19	Available	30-68-00-5,1	IBM 2105E20
hdisk20	Available	30-68-00-5,2	IBM 2105E20
hdisk21	Available	30-68-00-5,3	IBM 2105E20
hdisk22	Available	30-68-00-5,4	IBM 2105E20
hdisk23	Available	30-68-00-5,5	IBM 2105E20
hdisk24	Available	30-68-00-5,6	IBM 2105E20
hdisk25	Available	30-68-00-5,7	IBM 2105E20
hdisk26	Available	30-68-00-6,0	IBM 2105E20
hdisk27	Available	30-68-00-6,1	IBM 2105E20
hdisk28	Available	30-68-00-6,2	IBM 2105E20
hdisk29	Available	30-68-00-6,3	IBM 2105E20
hdisk30	Available	30-68-00-6,4	IBM 2105E20
hdisk31	Available	30-68-00-6,5	IBM 2105E20
hdisk32	Available	30-68-00-6,6	IBM 2105E20

Again, you can use the following command (which is easier to see for a single disk):

lscfg -vl hdisk2

DEVICE	LOCATION	DESCRIPTION
hdisk2	30-68-00-5,0	IBM 2105E20
Manufacturer.....IBM		
Machine Type and Model.....2105E20		
Serial Number.....60012028		
EC Level.....0414		
Device Specific.(Z0).....11		
Device Specific.(Z1).....00A0		
Device Specific.(Z2).....0013		
Device Specific.(Z3).....23299		
Device Specific.(Z4).....05		
Device Specific.(Z5).....00		

The Location code of 30-68-00-5,0 means to look down the “30-68” adapter and find SCSI 5, LUN 0.

4.8 Alternative Method to Find Hdisks

Another method to find out which hdisks comprise a vpath is as follows:

lsattr -El vpath0

pvid	00607388eed135f80000000000000000	Data Path Optimizer Parent	False
policy	df	Scheduling Policy	True
active_hdisk	hdisk2/60012028	Active hdisk	False
active_hdisk	hdisk18/60012028		

4.9 A Neat Utility - lsshark

If you are wondering where the “lsypcfg” output comes from, or if you want to tweak your own version, take a look at the following utility put together by Jake Kelley, IBM Charlotte! Note that this utility assumes that you have two paths to each of your ESS disk drives.

```

JOBLOG=/tmp/joblog/${JOB}.joblog
{
# -----
# Setup paths in case we get run from cron
# -----

awk=/usr/bin/awk
cat=/usr/bin/cat
cut=/bin/cut
egrep=/bin/egrep
grep=/usr/bin/grep
lsattr=/etc/lsattr
lscfg=/usr/sbin/lscfg
lsdev=/usr/sbin/lsdev
lspv=/usr/sbin/lspv
lsvpcfg=/usr/sbin/lsvpcfg
odmget=/bin/odmget
rm=/usr/bin/rm
sed=/usr/bin/sed
sort=/usr/bin/sort
tail=/usr/bin/tail
touch=/usr/bin/touch

StateGet()
{
State=$((${lsdev} -C -c disk -l $1 -F status)
echo $State
return
}

echo "-----\
-----"
echo "Vpath      State | Hdisk1   Location Cd   State | Hdisk2   Location Cd
State | VG Name"
echo "-----|-----|-----\
-----|"

for VPath in $((${lsdev} -C -c disk -s dpo -t vpath -F name)
do

    VPathState=$(StateGet ${VPath} | ${cut} -c 1-5)
    VPDisks=$((${odmget} -q "name = ${VPath} AND \
attribute=active_hdisk" CuAt | ${egrep} value | ${awk} \
'{print $3}' | ${sed} "s/\"//g")
    VPDisk1=$(echo ${VPDisks} | ${awk} '{print $1}' | ${awk} \
-F/ '{print $1}')
    VPDisk2=$(echo ${VPDisks} | ${awk} '{print $2}' | ${awk} \
-F/ '{print $1}')
    VPDisk1State=$(StateGet ${VPDisk1} | ${cut} -c 1-5)
    VPDisk2State=$(StateGet ${VPDisk2} | ${cut} -c 1-5)

    VPDisk1Loc=$((${lscfg} -l${VPDisk1} | ${tail} -1 | ${awk} \
'{print $2}')
    VPDisk2Loc=$((${lscfg} -l${VPDisk2} | ${tail} -1 | ${awk} \
'{print $2}')

```

After running lsshark, the output should be found in /tmp/joblog/shark.joblog as follows:

Vpath	State	Hdisk1	Location Cd	State	Hdisk2	Location Cd	State	VG Name
vpath0	Avail	hdisk2	30-68-00-5,0	Avail	hdisk18	30-70-00-5,0	Avail	udbvg
vpath1	Avail	hdisk3	30-68-00-5,6	Avail	hdisk19	30-70-00-5,1	Avail	udbvg
vpath2	Avail	hdisk4	30-68-00-5,4	Avail	hdisk20	30-70-00-5,2	Avail	udbvg
vpath3	Avail	hdisk5	30-68-00-5,1	Avail	hdisk21	30-70-00-5,3	Avail	testvg
vpath4	Avail	hdisk6	30-68-00-5,3	Avail	hdisk22	30-70-00-5,4	Avail	testvg
vpath5	Avail	hdisk7	30-68-00-5,5	Avail	hdisk23	30-70-00-5,5	Avail	testvg
vpath6	Avail	hdisk8	30-68-00-5,7	Avail	hdisk24	30-70-00-5,6	Avail	testvg
vpath7	Avail	hdisk9	30-68-00-5,2	Avail	hdisk25	30-70-00-5,7	Avail	testvg
vpath8	Avail	hdisk10	30-68-00-6,0	Avail	hdisk26	30-70-00-6,0	Avail	testvg
vpath9	Avail	hdisk11	30-68-00-6,1	Avail	hdisk27	30-70-00-6,1	Avail	testvg
vpath10	Avail	hdisk12	30-68-00-6,2	Avail	hdisk28	30-70-00-6,2	Avail	testvg
vpath11	Avail	hdisk13	30-68-00-6,3	Avail	hdisk29	30-70-00-6,3	Avail	testvg
vpath12	Avail	hdisk14	30-68-00-6,4	Avail	hdisk30	30-70-00-6,4	Avail	testvg
vpath13	Avail	hdisk15	30-68-00-6,5	Avail	hdisk31	30-70-00-6,5	Avail	testvg
vpath14	Avail	hdisk16	30-68-00-6,6	Avail	hdisk32	30-70-00-6,6	Avail	testvg
vpath15	Avail	hdisk17	30-68-00-6,7	Avail	hdisk33	30-70-00-6,7	Avail	testvg

Hopefully this document was helpful. E-mails are appreciated at jiadams@us.ibm.com.
Good luck and God Bless!