New Features of VM 3.1.1

Scope:
The intent of this document is to discuss the New Features of the Volume Manager 3.1.1 and to highlight changes from an end user perspective.
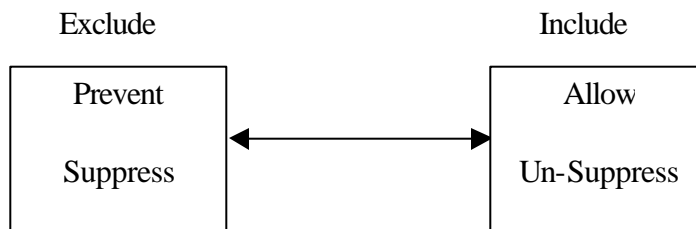
Introduction:
The release notes for VM 3.1.1 list two "New" features under the title called "DMP". These features impact the ability of the DMP to co-exist with other vendors' multiple pathing software. The features are as follows:

1) Co-existence of Alternate Pathing Driver with VERITAS Volume Manager
   The coexistence of the DMP Module with Sun's AP software (Version 2.3.1 with patch 110722-01 only – See Installation Guide)

2) SENA Device Support
   The A5x00 disk arrays will be claimed by VxVM (DMP) under the SENA (Sun Enterprise Network Array) category only if the requisite libraries are present on the system at the time of installation/upgrade of VxVM. These libraries are present by default on Solaris 8.
   For Solaris 2.6 and Solaris 7, the patches 107473-03 (Solaris 7) & 105375-20 (Solaris 2.6) must be installed before the VxVM package is installed/upgraded.

Starting with 3.1.1 and going forward DMP should no longer be completely removed from a system. The new design of the Volume Manager DMP module allows the end user to selectively choose the devices, paths or enclosures for multipathing. Along with this ability to disable DMP on a per device basis, the user has the ability to hide devices, paths & enclosures from Volume Manager's view. This prevents the user from seeing multiple images of the same device or "hides" devices that the user does not want Volume Manager to see or use.
To support this there has been changes in some of the commands. These include the **"vxdiskadm"** interface and the **"vxinstall"** program. Both **"vxinstall"** and **"vxdiskadm"** now have options to allow the user to include/exclude devices from Volume Manager interaction.

The "**vxinstall**" and "**vxdiskadm**" menus use the following six terms, Prevent, Suppress, Allow, Un-suppress, Exclude and Include. The diagram below outlines the relationship of these terms:

Exclude   Include

```
 ┌──────────────┐                    ┌──────────────┐
 │   Prevent    │                    │    Allow     │
 │              │ ◄────────────────► │              │
 │   Suppress   │                    │  Un-Suppress │
 └──────────────┘                    └──────────────┘
```

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Installation:

During the Volume Manager installation process, the software is going to install the DMP module. This is not an option starting with VXVM 3.1.1.

If you are performing an upgrade and the DMP driver was disabled on the system prior to this upgrade, then during the installation of VM 3.1.1 the following message will display:

```
DMP driver was previously disabled, but as this version of VxVM
requires DMP to be enabled, it will be enabled. If you wish to exclude
certain or all devices from being multipathed by DMP, you can use
vxinstall or vxdiskadm utilities to do so after the upgrade is
complete. Please refer to documentation on these utilities for more
details.
Continue installation? [y,n,?] (default: n):
```

- If you enter "**y**", DMP will be enabled and installation will proceed.
- If you enter "**n**", installation will abort.

If there are arrays that are using other vendors Alternate or Multi Pathing software, and you do not want them to be included under VERITAS DMP, then you will use menu items from **vxinstall** or **vxdiskadm** to suppress the device path from DMP.

The following is a description of the ".exclude" files that you can modify before install to automatically exclude controllers or disks from volume manager control.

cntlrs.exclude & disks.exclude files

The vxinstall and vxdiskadm utilities use the files /etc/vx/cntrls.exclude and /etc/vx/disks.exclude to automatically exclude controllers or disks so that they are not configured as VxVM devices during install. These files do not exclude controllers and disks from use by any other VxVM commands. See the vxinstall(1M) and vxdiskadm(1M) manual pages for more information.

a.   To exclude one or more disks from VxVM control, create the /etc/vx/disks.exclude file and add the names of those disks to the file. The vxinstall program ignores any disks listed in this file and leaves them untouched.

-       If a disks.exclude file is not created, then the vxinstall program will prompt you about each disk.
-       In prior releases of VxVM, one or more disks could be added to /etc/vx/disks.exclude in order to make vxinstall and vxdiskadm ignore those disks. You could also make vxinstall and vxdiskadm ignore all disks on an entire controller by adding the device names of the controllers in /etc/vx/cntrls.exclude.

The following is an example of the contents of a disks.exclude file:
c0t1d0

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b.   Create a cntrls.exclude file if you want to exclude all disks on a controller from VxVM control. Place this file in: /etc/vx/cntrls.exclude. Add the name of that controller to the /etc/vx/cntrls.exclude file.

The following is an example of the contents of a cntrls.exclude file:

```
c0
c1
```

1)   The "vxinstall" program

The "vxinstall" program has been modified to accomplish the DMP disk handling tasks during the installation of the volume manager software. The addition of a new menu item allows for preventing multipathing to specified devices and allows the suppress function to hide selected paths from being available in Volume Manager.
NOTE: It is recommended that you only use vxinstall on a new installation of Volume Manager

The **"vxinstall"** program displays a brief introduction to the installation process, as follows:

```
Volume Manager Installation
Menu: VolumeManager/Install

You will now be asked if you wish to use Quick Installation or Custom
Installation. Custom Installation allows you to select how the Volume
Manager will handle the installation of each disk attached to your
system.

Quick Installation examines each disk attached to your system and
attempts to create volumes to cover all disk partitions that might be
used for file systems or for other similar purposes.

If you want to exclude any devices from being seen by VxVM or not be
multipathed by VxDMP then use the Prevent multipathing/Suppress
devices from VxVM's view option, before you choose Custom Installation
or Quick Installation.

If you do not wish to use some disks with the Volume Manager, or if
you wish to reinitialize some disks, use the Custom Installation
option. Otherwise, we suggest that you use the Quick Installation
option.
Hit RETURN to continue.
```

The **"vxinstall"** program then displays a menu with the following options:

```
1 Quick Installation
2 Custom Installation
3 Prevent multipathing/Suppress devices from VxVM's view
? Display help about menu
?? Display help about menuing system
q Exit from menus

Select an operation to perform:
```

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The options are defined as follows:

1	(Quick Installation) - Uses default options for installation. (**Not recommended**)
2	(Custom Installation) - Allows you to control whether and how each disk will be brought under VxVM control. (**Recommended**)
3	(Prevent multipathing/Suppress devices from VxVM's view) - Excludes devices from VxVM or prevents them from being multipathed by DMP.
?	Displays a help file describing the current operation or menu choices.
??	Displays general information about using the vxinstall program.
q	Exits from the current operation, or from the vxinstall program.

The following sections describe the new menu item added to the "**vxinstall**" program and details how to exclude a device under VxVM or Dynamic Multipathing control. Use these steps to disable multipathing during the install process. This can be done after install as well using the "**vxdiskadm**" menu.

Select menu item 3 (Prevent Multipathing/Suppress devices from VxVM's view) from the **"vxinstall"** main menu.

The following message displays:

```
Volume Manager Installation
Menu: VolumeManager/Install/Exclude Devices

This operation might lead to some devices being suppressed from VxVM's view
or prevent them from being multipathed by VxDMP. (This operation can be
reversed using the vxdiskadm command).

Do you want to continue? [y,n,q,?] (default: n)
```

Select "**y**", the following message displays. Select an operation.

```
Volume Manager Device Operations
Menu: VolumeManager/Install/Exclude Devices
1 Suppress all paths through a controller from VxVM's view
2 Suppress a path from VxVM's view
3 Suppress disks from VxVM's view by specifying a VID:PID combination
4 Suppress all but one path to a disk
5 Prevent multipathing of all disks on a controller by VxVM
6 Prevent multipathing of a disk by VxVM
7 Prevent multipathing of disks by specifying a VID:PID combination
8 List currently suppressed/non-multipathed devices
? Display help about menu
??Display help about the menuing system
q Exit from menus

Select an operation to perform:
```

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Menu items **5,6, and 7** from the above menu provide the function to prevent the DMP from interacting with the selected devices by:

- Controller
- Path (Disk)
- VID:PID combination (Vendor ID:Product ID – Example: EMC:SYMMETRIX)

NOTE: Use the "Prevent" function prior to using the "Suppress" function.

Menu items **1-4** from the above menu provide the function to suppress device paths from VxVM's view by:

- Controller
- Path
- VID:PID combination
- All but one path of a path group

Note: If you select any of the options 1 through 7, you must **reboot** the system for the selected device changes to take effect.

Option 5 – Prevents all disks on the selected controller from multipathing in Volume Manager.

```
Exclude controllers from VxDMP
Menu: VolumeManager/Install/ExcludeDevices/CTLR-DMP

Use this operation to exclude all disks on a controller from being
multipathed by vxdmp.

As a result of this operation, all disks having a path through the
specified controller will be claimed in the OTHER_DISKS category
and hence, not multipathed by vxdmp. This operation can be reversed
using the vxdiskadm command.

You can specify a controller name at the prompt. A controller name
is of the form c#, example c3, c11 etc. Enter 'all' to exclude all
paths on all the controllers on the host. To see the list of
controllers on the system, type 'list'.
Enter a controller name:[<ctlr-name>,all,list,list-exclude,q,?]
```

The controller (and all attached disks) entered here is excluded from DMP control.

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Option 6 - Excludes the specified path from multipathing. Enter the path name at the prompt after this screen:

```
Exclude paths from VxDMP
Menu: VolumeManager/Install/ExcludeDevices/PATH-DMP

Use this operation to exclude one or more disks from vxdmp.

As a result of this operation, the disks corresponding to the
specified paths will not be multipathed by VxDMP. This operation
can be reversed using the vxdiskadm command.

You can specify a pathname or a pattern at the prompt. Here are
some path selection examples:
all:all paths
c4t2:all paths on controller 4, target 2
c3t4d2:a single path
list:list all paths on the system
Enter a pathname or pattern:[<pattern>,all,list,list-exclude,q,?]
```

For the path that is specified here, the corresponding disks will be claimed in the OTHER_DISKS category and will not be multipathed.

Option 7 - Prevents the disk corresponding to the VID:PID specified. Enter the VID:PID combination at the prompt that follows this screen.

```
Exclude VID:PID from DMP
Menu: VolumeManager/Install/ExcludeDevices/VIDPID-DMP

Use this operation to prevent VxDMP from multipathing devices
returning a specific VID:PID combination.

As a result of this operation, all disks that return VID:PID
matching the specified combination will be claimed in the
OTHER_DISKS category(i.e. they will not be multipathed by VxDMP).
This operation can be reversed using the vxdiskadm command.

You can specify a VendorID:ProductID combination at the prompt. The
specification can be as follows:
VID:PID          where VID stands for Vendor ID
                       PID stands for Product ID

Both VID and PID can have an optional '*' (asterisk) following
them.
If a '*' follows VID, it will result in the exclusion of all disks
returning Vendor ID starting with VID. The same is true for Product
ID as well. Both VID and PID should be non NULL.

Some examples of VID:PID specification are:
```

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```
all- Exclude all disks
aaa:123- Exclude all disks having VID 'aaa' and PID '123'
aaa*:123- Exclude all disks having VID starting with 'aaa' and
PID '123'
aaa:123*- Exclude all disks having VID 'aaa' and PID starting
with '123'
aaa:* - Exclude all disks having VID 'aaa' and any PID
Enter a VID:PID combination:[<pattern>,all,list,list-exclude,q,?]
```

The disks that match the VID:PID combination will be excluded from VxVM. The Vendor ID (VID) and Product ID (PID) can be obtained from the Standard SCSI inquiry data returned by the disk. For example, the VID:PID combination for Sun's T3 disk array can be specified as SUN:T3. The Vendor ID and Product ID of the disk can be obtained by the command:

> /usr/lib/vxvm/diag.d/vxdmpinq <path_to_device>
> (Where <path_to_device> = /dev/rdsk/c#t#d#s2)

This can also be obtained from the inquiry command in "format" as in the following example:

```
format> inquiry
Vendor:   IBM
Product:  DNES-309170W
Revision: SAH0
format>
```

From the above example, the VID:PID combination that is presented to the system by this device is IBM:DNES-309170W. If you specify this VID:PID combination, then all disks returning a Vendor ID, Product ID combination matching this VID:PID will be claimed in the OTHER_DISKS category and hence not multipathed.

Option 1 – This option suppresses all the paths on a specified controller as seen by the user under Volume Manager.

```
Exclude controllers from VxVM
Menu: VolumeManager/Install/ExcludeDevices/CTLR-VXVM

Use this operation to exclude all paths through a controller from VxVM.

This operation can be reversed using the vxdiskadm command.

You can specify a controller name at the prompt. A controller name is of the
form c#, example c3, c11 etc. Enter 'all' to exclude all paths on all the
controllers on the host. To see the list of controllers on the system, type
'list'.

Enter a controller name:[ctlr_name,all,list,list-exclude,q,?]
```

Enter the controller name. The operation completes and the controller (and all disks attached) is suppressed from view.

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Option 2 – This option suppresses just the specified path from Volume Manager's view.

```
Exclude paths from VxVM
Menu: VolumeManager/Install/ExcludeDevices/PATH-VXVM

Use this operation to exclude one or more paths from VxVM.

As a result of this operation, the specified paths will be excluded
from the view of VxVM. This operation can be reversed using the
vxdiskadm command.
You can specify a pathname or a pattern at the prompt. Here are some path
selection examples:
all:all paths
c4t2:all paths on controller 4, target 2
c3t4d2:a single path
list:list all paths on the system
Enter a pathname or pattern:[<Pattern>,all,list,list-exclude,q?]
```

The path specified here will be suppressed from view in Volume Manager.

Option 3 – This option requires you to enter the VID:PID combination of the device(s) to be suppressed from view in Volume Manager. (See the explanation for Option 7)

```
Exclude VID:PID from VxVM
Menu: VolumeManager/Install/ExcludeDevices/VIDPID-VXVM

Use this operation to exclude disks returning a specified VendorID:ProductID
combination from VxVM.

As a result of this operation, all disks that return VendorID:ProductID
matching the specified combination will be excluded from the view of VxVM.
This operation can be reversed using the vxdiskadm command.

You can specify a VendorID:ProductID pattern at the prompt. The
specification can be as follows :
VID:PID          where VID stands for Vendor ID
                       PID stands for Product ID
                 (The command vxdmpinq in /etc/vx/diag.d can be
                 used to obtain the Vendor ID and Product ID.)

Both VID and PID can have an optional '*' (asterisk) following them.

If a '*' follows VID, it will result in the exclusion of all disks returning
Vendor ID starting with VID. The same is true for Product ID as well. Both
VID and PID should be non NULL. The maximum allowed length for VendorID and
ProductID are 8 and 16 characters respectively.

Some examples of VID:PID specification are:

all- Exclude all disks
aaa:123- Exclude all disks having VID 'aaa' and PID '123'
aaa*:123- Exclude all disks having VID starting with 'aaa' and
PID '123'
aaa:123*- Exclude all disks having VID 'aaa' and PID starting
with '123'
aaa:*- Exclude all disks having VID 'aaa' and any PID
Enter a VID:PID combination:[<Pattern>,all,list,exclude,q,?]
```

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Option 4 – Defines a pathgroup in the case of disks that are not multipathed by VxVM. Only one path is made visible from the group. Specify the paths to be included in the pathgroup.

Exclude all but one paths to a disk
Menu: VolumeManager/Install/ExcludeDevices/PATHGROUP-VXVM

Use this operation to exclude all but one path to a disk. In case of disks that are not multipathed by VxDMP, VxVM will see each path as a disk. In such cases, creating a pathgroup of all paths to the disk will ensure only one of the paths from the group is made visible to VxVM. The pathgroup can be removed using the vxdiskadm
command.

```
Example: If c1t30d0 and c2t30d0 are paths to the same disk and both
are seen by VxVM as separate disks, c1t30d0 and c2t30d0 can be put
in a pathgroup that only one of these paths is visible to VxVM.

The pathgroup can be specified as a list of blank separated paths,
for example, c1t30d0 c2t30d0.

Enter pathgroup: [<pattern>,list,list-exclude,q,?]
```

Note: If you selected option 1 through 7, you must reboot the system for device exclusion to take effect.

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Configuration after Installation:

To make changes to the DMP status of an array after installation or add a new array to Volume Manager control, new options were added to **vxdiskadm** to accomplish this task. The system menus use the following six terms, Prevent, Suppress, Allow, Un-Suppress, Exclude and Include. The diagram below outlines the relationship of these terms:

Exclude   Include

```
Prevent          Allow

Suppress         Un-Suppress
```
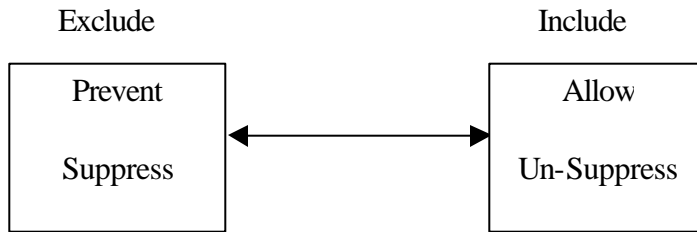

The "vxdiskadm" command

The vxdiskadm menu remains the same for the functions previous to VM 3.1.1, however below is an example of the new menu and a description of the new menu items.

```
Volume Manager Support Operations
Menu: VolumeManager/Disk

     1     Add or initialize one or more disks
     2     Encapsulate one or more disks
     3     Remove a disk
     4     Remove a disk for replacement
     5     Replace a failed or removed disk
     6     Mirror volumes on a disk
     7     Move volumes from a disk
     8     Enable access to (import) a disk group
     9     Remove access to (deport) a disk group
     10    Enable (online) a disk device
     11    Disable (offline) a disk device
     12    Mark a disk as a spare for a disk group
     13    Turn off the spare flag on a disk
     14    Unrelocate subdisks back to a disk
     15    Exclude a disk from hot-relocation use
     16    Make a disk available for hot-relocation use
     17    Prevent multipathing/Suppress devices from VxVM's view
     18    Allow multipathing/Unsuppress devices from VxVM's view
     19    List currently suppressed/non-multipathed devices
     list  List disk information
```

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There are 3 new selections in this menu that deal with DMP support, they are:

```
17      Prevent multipathing/Suppress devices from VxVM's view
18      Allow multipathing/Unsuppress devices from VxVM's view
19      List currently suppressed/non-multipathed devices
```

The following paragraphs will cover these 3 new selections. If you require more detail, please see the Release Notes for the Volume Manager 3.1.1.

Selection #17

After selecting this option, you will see the following message and prompt. This will hopefully make you aware that you will be disabling the DMP function for the devices that you select under this function.

```
Exclude Devices
Menu: VolumeManager/Disk/ExcludeDevices

This operation might lead to some devices being suppressed from VxVM's view
or prevent them from being multipathed by vxdmp (This operation can be
reversed using the vxdiskadm command).

Do you want to continue ? [y,n,q,?] (default: y)
```

If you select "n" or "q" the software will put you back to the main menu. If you select "y", you will see the following menu:

```
Volume Manager Device Operations
Menu: VolumeManager/Disk/ExcludeDevices

1       Suppress all paths through a controller from VxVM's view
2       Suppress a path from VxVM's view
3       Suppress disks from VxVM's view by specifying a VID:PID combination
4       Suppress all but one paths to a disk
5       Prevent multipathing of all disks on a controller by VxVM
6       Prevent multipathing of a disk by VxVM
7       Prevent multipathing of disks by specifying a VID:PID combination
8       List currently suppressed/non-multipathed devices

?       Display help about menu
??      Display help about the menuing system
q       Exit from menus

Select an operation to perform:
```

At this point you can see that the above menu is the same as the one in the **"vxinstall"** program. Please use the descriptions of the selections in the previous vxinstall section.

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Selection #18

- Reverse what the menus in Selection 17 allowed the user to configure. (Allow & Un-Suppress)

After selecting this option, you will see the following message and prompt.

```
Include Devices
Menu: VolumeManager/Disk/IncludeDevices

The devices selected in this operation will become visible to VxVM
and/or will be multipathed by vxdmp again. Only those devices which
were previously excluded can be included again.

Do you want to continue ? [y,n,q,?] (default: y)  y
```

Select "y" to continue then select the function to use. You should reverse the order from the prevent & suppress and should now select "Unsuppress" first then "Allow" multipathing.

- Selections 1-3 are designed to un-suppress the suppressed paths that will be seen with multipathing turned off.
- Selections 4-7 are designed to allow multipathing through Volume Manager.
- Selection 8, will list what devices have been selected for configuration.

```
Volume Manager Device Operations
Menu: VolumeManager/Disk/IncludeDevices

 1      Unsuppress all paths through a controller from VxVM's view
 2      Unsuppress a path from VxVM's view
 3      Unsuppress disks from VxVM's view by specifying a VID:PID
        combination
 4      Remove a pathgroup definition
 5      Allow multipathing of all disks on a controller by VxVM
 6      Allow multipathing of a disk by VxVM
 7      Allow multipathing of disks by specifying a VID:PID
        combination
 8      List currently suppressed/non-multipathed devices

 ?      Display help about menu
 ??     Display help about the menuing system
 q      Exit from menus

Select an operation to perform:
```

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Selection #19

- List what the user has accomplished via menu 17 and/or 18. Complete with what devices have been prevented and suppressed or unsuppressed and allowed. This menu is informational only, to change configuration use menus 17&18.

NOTE: None of the prevent or suppress functions take effect until after a reboot

```
Devices hidden from VxVM / not multipathed by vxdmp
Menu: VolumeManager/Disk/listexclude

  The following is the list of devices currently hidden from VxVM or
  not multipathed by vxdmp:


Devices excluded from VxVM:
--------------------------
Paths : None

Controllers : None

VID:PID : None

Devices excluded from multipathing by vxdmp:
-------------------------------------------
Paths :        c1t11d0        c1t12d0        c1t13d0        c1t14d0


VID:PID : None

Pathgroups : None
----------


Hit RETURN to continue.
```

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Summary:

The method to disable multipathing to devices in VxVM 3.1 and prior releases was to completely remove the VxDMP layer (i.e not load the vxdmp driver on Solaris and not to have the vxdmp module compiled into the kernel for HPUX).
This methodology is no longer supported in VxVM 3.1.1 and later releases of Volume Manager.

The typical scenarios in which the vxdmp module was disabled are:

- existence of certain other multipathing drivers on the system with which VxDMP didn't coexist.
- certain devices are not handled properly by VxDMP.

In these scenarios adopting the current method of removing the VxDMP layer altogether is not flexible. Because, this takes away the multipathing functionality provided by VxDMP for other devices in the system.
Additionally two new features (Co-existence with additional third party multipathing solutions and Platform Independent Device Naming) to be added to the next release of VxVM require that the vxdmp driver should always be present in the system.

This write up outlined a new method, which will give the user ability to do the following without removing the VxDMP layer:

- Mask certain or all devices from being autoconfigured by VxVM.
- Prevent VxVM (VxDMP) from multipathing certain or all devices on the system.

Usage model

The user was presented with interfaces through "vxinstall" and "vxdiskadm" to do the following;

- Suppress devices from VxVM's view.
- Prevent devices from being multipathed by VxDMP.
- Unsuppress devices that were previously suppressed from VxVM's view
- Allow multipathing by VxDMP for devices that were earlier prevented from being multipathed by it.

The user can specify the devices for the above operations using three mechanisms,

a) Using a VendorID:ProductID combination (Example - EMC:SYMMETRIX)
b) Using controller name (Example - c1)
c) Specifying path names (Example - c1t0d9)
d) All devices on the system