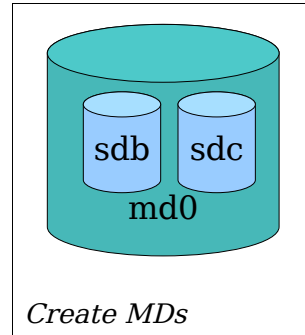


```
# Requirements
# Prepare six 512MB SCSI HDs and four 512MB IDE HD for testing dd command on vmware.
# Ten HDs are used to build five 1GB HDs striped with MD.
# I know I can create a Physical Volume from a partition.
# But I avoid that it becomes complicated to manage disks :)
```

How to create a LVM2-mirrored Logical Disk with MDeD Physical Drive

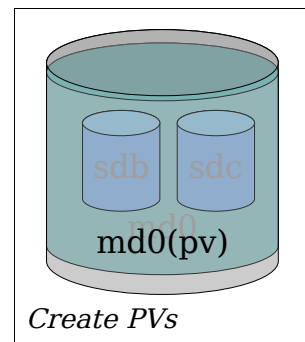
1.Create MDs

```
[root@host ~]# mdadm --create /dev/md0 --level=0 --raid-devices=2 /dev/sdb /dev/sdc
mdadm: array /dev/md0 started.
[root@host ~]# mdadm --create /dev/md1 --level=0 --raid-devices=2 /dev/sdd
/dev/sde
mdadm: array /dev/md1 started.
[root@host ~]# mdadm --create /dev/md2 --level=0 --raid-devices=2 /dev/sdf
/dev/sdg
mdadm: array /dev/md2 started.
[root@host ~]# mdadm --create /dev/md3 --level=0 --raid-devices=2 /dev/hda
/dev/hdb
mdadm: array /dev/md3 started.
[root@host ~]# mdadm --create /dev/md4 --level=0 --raid-devices=2 /dev/hdc
/dev/hdd
mdadm: array /dev/md4 started.
```



2.Create PVs

```
[root@host ~]# pvcreate /dev/md0
Physical volume "/dev/md0" successfully created
[root@host ~]# pvcreate /dev/md1
Physical volume "/dev/md1" successfully created
[root@host ~]# pvcreate /dev/md2
Physical volume "/dev/md2" successfully created
[root@host ~]# pvcreate /dev/md3
Physical volume "/dev/md3" successfully created
[root@host ~]# pvcreate /dev/md4
Physical volume "/dev/md4" successfully created
```



3.Check PVs

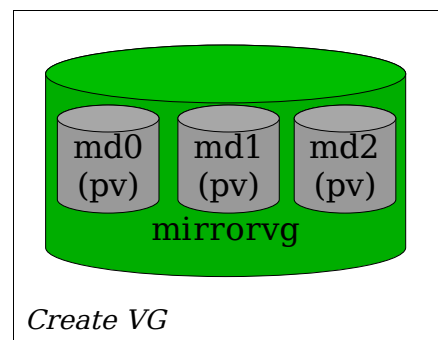
```
[root@host backup]# pvs -v
Scanning for physical volume names
Wiping cache of LVM-capable devices
PV          VG          Fmt Attr PSize   PFree   DevSize PV UUID
/dev/md0    mirrorvg    lvm2 a-   1020.00M 20.00M 1023.88M 0pOgXK-Kmd8-fDRT-HhKC-I2U1-WMCU-ahgy3f
/dev/md1    mirrorvg    lvm2 a-   1020.00M 20.00M 1023.88M yUZp2F-TNXS-TPTo-agfT-pAp2-fYwP-CRefNl
/dev/md2    mirrorvg    lvm2 a-   1020.00M 1016.00M 1023.88M rE52kh-1BKx-Q2AI-AbQm-kacl-STsK-9VYRIu
/dev/md3    mirrorvg    lvm2 --   1023.69M 1023.69M 1023.88M Ue95Yr-43gw-AF5U-iORH-2f81-WDxm-qAzjGI
/dev/md4    mirrorvg    lvm2 --   1023.69M 1023.69M 1023.88M LWOZP7-iTDs-tBS1-VxkA-Tmcv-Culf-rsirNl
/dev/sda2   VolGroup00 lvm2 a-     9.88G    32.00M   9.90G    TzVhSi-250e-4tG7-dU5c-OElc-Pvzm-5fiuyP
```

4.Create VG

```
[root@host ~]# vgcreate mirrorvg /dev/md[012]
Volume group "mirrorvg" successfully created
```

5.Check VG

```
[root@host ~]# vgs
VG          #PV #LV #SN Attr   VSize VFree
VolGroup00  1   2   0 wz--n 9.88G 32.00M
mirrorvg    3   4   0 wz--n 2.99G 1.23G
```



6.Create LVs

```
[root@host ~]# lvcreate -n mirrorlv -L 1000m -ml mirrorvg
```

7.Check LVs

```
[root@host ~]# lvs
```

LV	VG	Attr	LSize	Origin	Snap%	Move	Log	Copy%
LogVol100	VolGroup00	-wi-ao	9.34G					
LogVol101	VolGroup00	-wi-ao	512.00M					
mirrorlv	mirrorvg	mwi-a-	1000.00M				mirrorlv_mlog	95.56

```
[root@host ~]# lvs
```

LV	VG	Attr	LSize	Origin	Snap%	Move	Log	Copy%
LogVol100	VolGroup00	-wi-ao	9.34G					
LogVol101	VolGroup00	-wi-ao	512.00M					
mirrorlv	mirrorvg	mwi-a-	1000.00M				mirrorlv_mlog	100.00

```
[root@host ~]# lvdisplay -m /dev/mirrorvg/mirrorlv
```

```
--- Logical volume ---
```

```
LV Name                /dev/mirrorvg/mirrorlv
VG Name                mirrorvg
LV UUID                YiQ0Hx-G1SF-VKmZ-krBp-aEIm-2kpJ-jCBwRX
LV Write Access        read/write
LV Status               available
# open                 0
LV Size                1000.00 MB
Current LE             250
Segments               1
Allocation              inherit
Read ahead sectors     0
Block device           253:5
```

```
--- Segments ---
```

```
Logical extent 0 to 249:
```

```
Type                mirror
Mirrors              2
Mirror size          250
Mirror log volume    mirrorlv_mlog
Mirror region size   512.00 KB
Mirror original:
  Logical volume     mirrorlv_mimage_0
  Logical extents    0 to 249
Mirror destination:
  Logical volume     mirrorlv_mimage_1
  Logical extents    0 to 249
```

8.Show /dev/mapper/

```
[root@host ~]# ll /dev/mapper/
```

```
total 0
brw-rw---- 1 root disk 253, 0 Nov 9 2005 VolGroup00-LogVol100
brw-rw---- 1 root disk 253, 1 Nov 9 2005 VolGroup00-LogVol101
crw----- 1 root root 10, 63 Nov 9 2005 control
brw-rw---- 1 root disk 253, 5 Nov 8 15:34 mirrorvg-mirrorlv
brw-rw---- 1 root disk 253, 3 Nov 8 15:34 mirrorvg-mirrorlv_mimage_0
brw-rw---- 1 root disk 253, 4 Nov 8 15:34 mirrorvg-mirrorlv_mimage_1
brw-rw---- 1 root disk 253, 2 Nov 8 15:34 mirrorvg-mirrorlv_mlog
```

9.Dump current VG config

```
[root@host backup]# vgcfgbackup mirrorvg
```

10.Show VG config

```
[root@host backup]# cat /etc/lvm/backup/mirrorvg
# Generated by LVM2: Tue Nov 8 16:39:56 2005
```

```

contents = "Text Format Volume Group"
version = 1

description = "Created *after* executing 'vgcfgbackup'"

creation_host = "host.hogehoge.com"          # Linux host.hogehoge.com 2.6.9-22.0.1.EL #1 Tue Oct 18
18:29:40 EDT 2005 i686
creation_time = 1131435596                   # Tue Nov 8 16:39:56 2005

mirrorvg {
  id = "L5PWbd-jlUW-Tf3P-ofEw-p3vw-sHLC-0QQ0LJ"
  seqno = 3
  status = ["RESIZEABLE", "READ", "WRITE"]
  extent_size = 8192                         # 4 Megabytes
  max_lv = 0
  max_pv = 0

  physical_volumes {

    pv0 {
      id = "0pOgXK-Kmd8-fDRT-HhKC-I2U1-WMCU-ahgy3F"
      device = "/dev/md0"                    # Hint only

      status = ["ALLOCATABLE"]
      pe_start = 384
      pe_count = 255 # 1020 Megabytes
    }

    pv1 {
      id = "yUZp2F-TNXS-TPTo-agfT-pAp2-fYwP-CRefN1"
      device = "/dev/md1"                    # Hint only

      status = ["ALLOCATABLE"]
      pe_start = 384
      pe_count = 255 # 1020 Megabytes
    }

    pv2 {
      id = "rE52kh-1BKx-Q2AI-AbQm-kacl-STsK-9VYRIu"
      device = "/dev/md2"                    # Hint only

      status = ["ALLOCATABLE"]
      pe_start = 384
      pe_count = 255 # 1020 Megabytes
    }
  }

  logical_volumes {

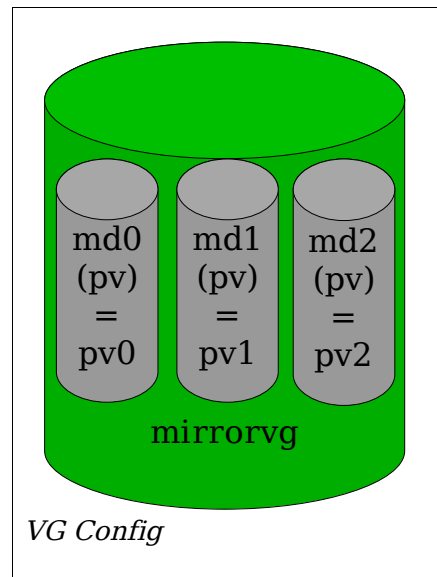
    mirrorlv {
      id = "YiQ0Hx-G1SF-VKmZ-krBp-aEIm-2kpJ-jCBwRX"
      status = ["READ", "WRITE", "VISIBLE"]
      segment_count = 1

      segment1 {
        start_extent = 0
        extent_count = 250                   # 1000 Megabytes

        type = "mirror"
        mirror_count = 2
        mirror_log = "mirrorlv_mlog"
        region_size = 1024

        mirrors = [
          "mirrorlv_mimage_0", 0,

```



```

        "mirrorlv_mimage_1", 0
    ]
}
}

mirrorlv_mlog {
    id = "RCWgyc-i2AN-WlSy-Wyaw-Er4Z-D7LH-0m5zGB"
    status = ["READ", "WRITE"]
    segment_count = 1

    segment1 {
        start_extent = 0
        extent_count = 1          # 4 Megabytes

        type = "striped"
        stripe_count = 1         # linear

        stripes = [
            "pv2", 0
        ]
    }
}

mirrorlv_mimage_0 {
    id = "HRk9g8-CXXx-ikv3-59h0-4ju4-w0jr-g7RUyb"
    status = ["READ", "WRITE"]
    segment_count = 1

    segment1 {
        start_extent = 0
        extent_count = 250       # 1000 Megabytes

        type = "striped"
        stripe_count = 1         # linear

        stripes = [
            "pv0", 0
        ]
    }
}

mirrorlv_mimage_1 {
    id = "FWQc7j-250Z-2Awi-cWRV-Dc1M-HMb6-qhzX2v"
    status = ["READ", "WRITE"]
    segment_count = 1

    segment1 {
        start_extent = 0
        extent_count = 250       # 1000 Megabytes

        type = "striped"
        stripe_count = 1         # linear

        stripes = [
            "pv1", 0
        ]
    }
}
}
}

```

11.Edit VG config as follows

Add PVs and edit 'segment1' section of mirrorlv_mimage_[01].

Increase extent_count to 500 and add stripe_size = 8 line in 'segment1' section.

```
# Generated by LVM2: Tue Nov  8 17:09:31 2005

contents = "Text Format Volume Group"
version = 1

description = "Created *after* executing 'vgcfgbackup'"

creation_host = "host.hogehoge.com"      # Linux host.hogehoge.com 2.6.9-22.0.1.EL #1 Tue Oct 18
18:29:40 EDT 2005 i686
creation_time = 1131437371              # Tue Nov  8 17:09:31 2005

mirrorvg {
  id = "L5PWbd-j1UW-Tf3P-ofEw-p3vw-sHLC-0QQ0LJ"
  seqno = 5
  status = ["RESIZEABLE", "READ", "WRITE"]
  extent_size = 8192                    # 4 Megabytes
  max_lv = 0
  max_pv = 0

  physical_volumes {

    pv0 {
      id = "0pOgXK-Kmd8-fDRT-HhKC-I2U1-WMCU-ahgy3f"
      device = "/dev/md0"                # Hint only

      status = ["ALLOCATABLE"]
      pe_start = 384
      pe_count = 255 # 1020 Megabytes
    }

    pv1 {
      id = "yUZp2F-TNXS-TPTo-agfT-pAp2-fYwP-CRefN1"
      device = "/dev/md1"                # Hint only

      status = ["ALLOCATABLE"]
      pe_start = 384
      pe_count = 255 # 1020 Megabytes
    }

    pv2 {
      id = "rE52kh-1BKx-Q2AI-AbQm-kacl-STsK-9VYRIu"
      device = "/dev/md2"                # Hint only

      status = ["ALLOCATABLE"]
      pe_start = 384
      pe_count = 255 # 1020 Megabytes
    }

    pv3 {
      id = "Ue95Yr-43gw-AF5U-iORH-2f81-WDxm-qAzjGI"
      device = "/dev/md3"                # Hint only

      status = ["ALLOCATABLE"]
      pe_start = 384
      pe_count = 255 # 1020 Megabytes
    }

    pv4 {
      id = "LWOZP7-iTDs-tBSl-VxkA-Tmcv-Culf-rsirN1"
      device = "/dev/md4"                # Hint only

      status = ["ALLOCATABLE"]
      pe_start = 384
      pe_count = 255 # 1020 Megabytes
    }
  }
}
```

```

    }
}

logical_volumes {

    mirrorlv {
        id = "YiQ0Hx-G1SF-VKmZ-krBp-aEIm-2kpJ-jCBwRX"
        status = ["READ", "WRITE", "VISIBLE"]
        segment_count = 1

        segment1 {
            start_extent = 0
            extent_count = 500      # 1.95312 Gigabytes

            type = "mirror"
            mirror_count = 2
            mirror_log = "mirrorlv_mlog"
            region_size = 2048

            mirrors = [
                "mirrorlv_mimage_0", 0,
                "mirrorlv_mimage_1", 0
            ]
        }
    }

    mirrorlv_mlog {
        id = "RCwgyC-i2AN-W1Sy-Wyaw-Er4Z-D7LH-0m5zGB"
        status = ["READ", "WRITE"]
        segment_count = 1

        segment1 {
            start_extent = 0
            extent_count = 1        # 4 Megabytes

            type = "striped"
            stripe_count = 1       # linear

            stripes = [
                "pv2", 0
            ]
        }
    }

    mirrorlv_mimage_0 {
        id = "HRk9g8-CXXx-ikv3-59h0-4ju4-w0jr-g7RUyb"
        status = ["READ", "WRITE"]
        segment_count = 1

        segment1 {
            start_extent = 0
            extent_count = 500      # 2000 Megabytes

            type = "striped"
            stripe_count = 2
            stripe_size = 8 # 4 Kilobytes

            stripes = [
                "pv0", 0,
                "pv3", 0
            ]
        }
    }
}

```

```

mirrorlv_mimage_1 {
    id = "FWQc7j-250Z-2Awi-cWRV-Dc1M-HMb6-qhzX2v"
    status = ["READ", "WRITE"]
    segment_count = 1

    segment1 {
        start_extent = 0
        extent_count = 500      # 2000 Megabytes

        type = "striped"
        stripe_count = 2
        stripe_size = 8 # 4 Kilobytes

        stripes = [
            "pv1", 0,
            "pv4", 0
        ]
    }
}
}
}

```

12.Restore configuration

```

[root@host proc]# vgcfgrestore mirrorvg
Restored volume group mirrorvg

```

13.Show PVs

```

[root@host proc]# pvs
PV          VG          Fmt Attr PSize   PFree
/dev/md0    mirrorvg    lvm2 a-   1020.00M 20.00M
/dev/md1    mirrorvg    lvm2 a-   1020.00M 20.00M
/dev/md2    mirrorvg    lvm2 a-   1020.00M 1016.00M
/dev/md3    mirrorvg    lvm2 a-   1020.00M 20.00M
/dev/md4    mirrorvg    lvm2 a-   1020.00M 20.00M
/dev/sda2   VolGroup00 lvm2 a-     9.88G   32.00M

```

Conclusion

We can create a LVM mirrored Logical Volume with MDed Phisical Volume. And maybe, we can create a LVM Lineared(Striped) + Mirrored Logical Volume. However, I think there are no commands to add a Phisical Volume to Stripe group of Segment.

Following is for dump test to understand a Phisical Volume

1.Dump /dev/md1 to /dev/hdb

```

[root@host ~]# dd if=/dev/md1 of=/dev/hdb
2096640+0 records in
2096640+0 records out

```

2.Try to create PV on /dev/hdb

```

[root@host ~]# pvcreate /dev/hdb
Can't initialize physical volume "/dev/hdb" of volume group "mirrorvg" without -ff

```

3.Erase the first 512 Bytes of /dev/hdb

```

[root@host ~]# dd if=/dev/zero of=/dev/hdb bs=512 count=1

```

```
1+0 records in
1+0 records out
```

4. Try to create PV on /dev/hdb again

```
[root@host ~]# pvcreate /dev/hdb
Can't initialize physical volume "/dev/hdb" of volume group "mirrorvg" without -ff
```

5. Erase the first 1024 Bytes of /dev/hdb

```
[root@host ~]# dd if=/dev/zero of=/dev/hdb bs=1024 count=1
1+0 records in
1+0 records out
```

6. Try to create PV on /dev/hdb again

```
[root@host ~]# pvcreate /dev/hdb
Physical volume "/dev/hdb" successfully created
```

Conclusion

There is the meta data for LVM2 on the first blocks of Physical Volume.

How to back mirrored lvm up.

1. Create FS

```
[root@host ~]# mke2fs -j /dev/mirrorvg/mirrorlv
mke2fs 1.35 (28-Feb-2004)
Filesystem label=
OS type: Linux
Block size=4096 (log=2)
Fragment size=4096 (log=2)
128000 inodes, 256000 blocks
12800 blocks (5.00%) reserved for the super user
First data block=0
Maximum filesystem blocks=264241152
8 block groups
32768 blocks per group, 32768 fragments per group
16000 inodes per group
Superblock backups stored on blocks:
    32768, 98304, 163840, 229376

Writing inode tables: done
Creating journal (4096 blocks): done
Writing superblocks and filesystem accounting information: done

This filesystem will be automatically checked every 38 mounts or
180 days, whichever comes first.  Use tune2fs -c or -i to override.
```

2. Create mount point and mount /dev/mirrorvg/mirrorlv

```
[root@host ~]# mkdir /mirror
[root@host ~]# mount /dev/mirrorvg/mirrorlv /mirror/
```

3. Copy some files

```
[root@host ~]# cp anaconda-ks.cfg /mirror/
```

4. Dump /dev/md1(pv1) to /dev/md3

```
[root@host mirror]# dd if=/dev/md1 of=/dev/md3
2096896+0 records in
2096896+0 records out
```

5. Edit VG config as follows

Fix device line in pv2 section from 'md1' to 'md3'.


```

[root@host mirror]# cat /etc/lvm/backup/mirrorvg
# Generated by LVM2: Tue Nov  8 17:09:31 2005

contents = "Text Format Volume Group"
version = 1

description = "Created *after* executing 'vgcfgbackup'"

creation_host = "host.hogehoge.com"          # Linux host.hogehoge.com 2.6.9-22.0.1.EL #1 Tue Oct 18
18:29:40 EDT 2005 i686
creation_time = 1131437371                  # Tue Nov  8 17:09:31 2005

mirrorvg {
    id = "L5PWbd-jlUW-Tf3P-ofEw-p3vw-sHLC-0QQ0LJ"
    seqno = 5
    status = ["RESIZEABLE", "READ", "WRITE"]
    extent_size = 8192                      # 4 Megabytes
    max_lv = 0
    max_pv = 0

    physical_volumes {

        pv0 {
            id = "0pOgXK-Kmd8-fDRT-HhKC-I2U1-WMCU-ahgy3F"
            device = "/dev/md0"              # Hint only

            status = ["ALLOCATABLE"]
            pe_start = 384
            pe_count = 255 # 1020 Megabytes
        }

        pv1 {
            id = "yUZp2F-TNXS-TPTo-agfT-pAp2-fYwP-CRefN1"
            device = "/dev/md1"              # Hint only

            status = ["ALLOCATABLE"]
            pe_start = 384
            pe_count = 255 # 1020 Megabytes
        }

        pv2 {
            id = "rE52kh-1BKx-Q2AI-AbQm-kacl-STsK-9VYRIu"
            device = "/dev/md3"              # Hint only

            status = ["ALLOCATABLE"]
            pe_start = 384
            pe_count = 255 # 1020 Megabytes
        }
    }
}
.....

```

6. Break PV metadata on /dev/md1

```

[root@host mirror]# dd if=/dev/zero of=/dev/md1 bs=1024 count=1
1+0 records in
1+0 records out

```

7. Restore VG config

```

[root@host backup]# vgcfgrestore mirrorvg
Restored volume group mirrorvg

```

8. Check PVs

```

[root@host mirror]# pvs -v
Scanning for physical volume names
Wiping cache of LVM-capable devices

```

```

Couldn't find device with uuid 'Ue95Yr-43gw-AF5U-iORH-2f81-WDxm-qAzjGI'.
Couldn't find device with uuid 'Ue95Yr-43gw-AF5U-iORH-2f81-WDxm-qAzjGI'.
Couldn't find all physical volumes for volume group mirrorvg.
Couldn't find device with uuid 'Ue95Yr-43gw-AF5U-iORH-2f81-WDxm-qAzjGI'.
Couldn't find all physical volumes for volume group mirrorvg.
Couldn't find device with uuid 'Ue95Yr-43gw-AF5U-iORH-2f81-WDxm-qAzjGI'.
Couldn't find all physical volumes for volume group mirrorvg.
PV          VG          Fmt Attr PSize   PFree   DevSize PV UUID
/dev/md0    mirrorvg    lvm2 a-   1020.00M 20.00M 1023.88M 0pOgXK-Kmd8-fDRT-HhKC-I2U1-WMCU-ahgy3f
/dev/md2    mirrorvg    lvm2 a-   1020.00M 1016.00M 1023.88M rE52kh-1BKx-Q2AI-AbQm-kacl-STsK-9VYRIu
/dev/md3    mirrorvg    lvm2 a-   1020.00M 20.00M 1023.88M yUZp2F-TNXS-TPTo-agfT-pAp2-fYwP-CRefNl
/dev/sda2   VolGroup00 lvm2 a-     9.88G   32.00M   9.90G TzVhSi-250e-4tG7-dU5c-OElc-Pvzm-5fiuyP

```

9. Check the files

```

[root@host mirror]# cat /mirror/anaconda-ks.cfg
# Kickstart file automatically generated by anaconda.

```

```

install
cdrom
lang ja_JP.UTF-8
langsupport --default=ja_JP.UTF-8 ja_JP.UTF-8
keyboard jp106
.....

```

Conclusion

We should resolve the problem relevant to uuid. I think it's better to use file-system-level backup method.