2018/11/27 v1.0

Advantech TIPD product FAQ

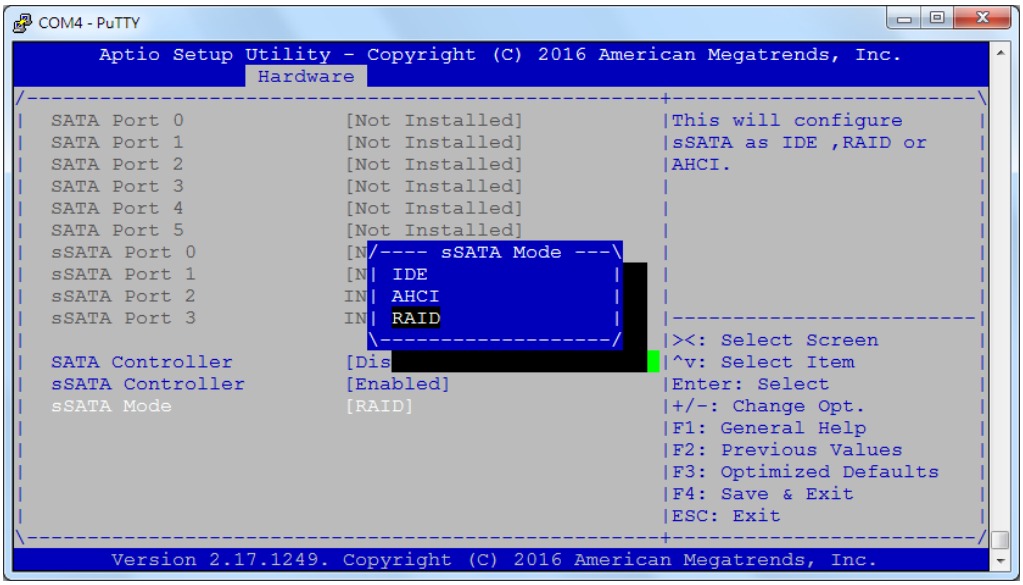
Build PCH Firmware (RSTe) RAID on MIC-5345S

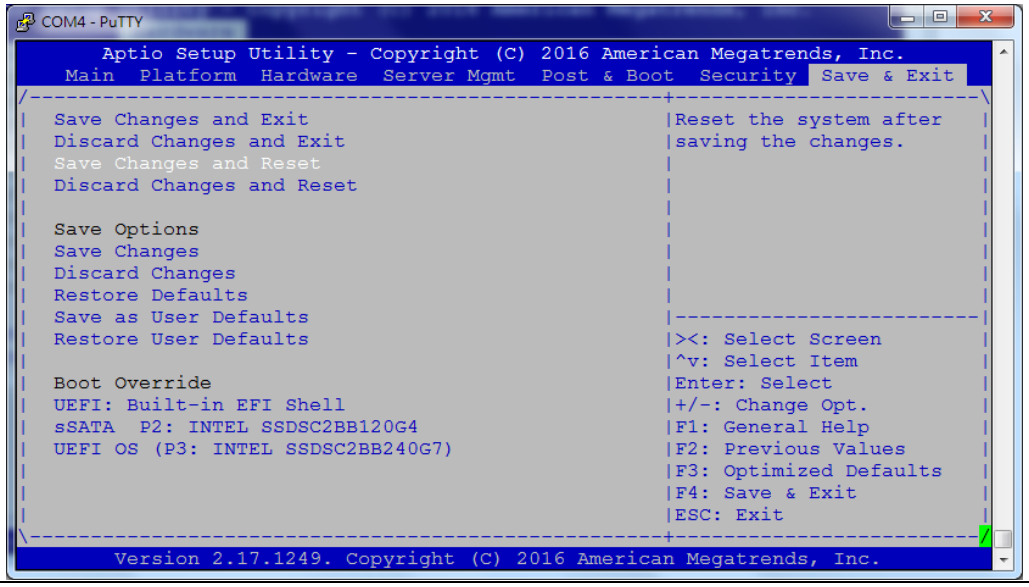
Applicable model list	MIC-5345S
Model name version	N/A
BIOS Version	N/A

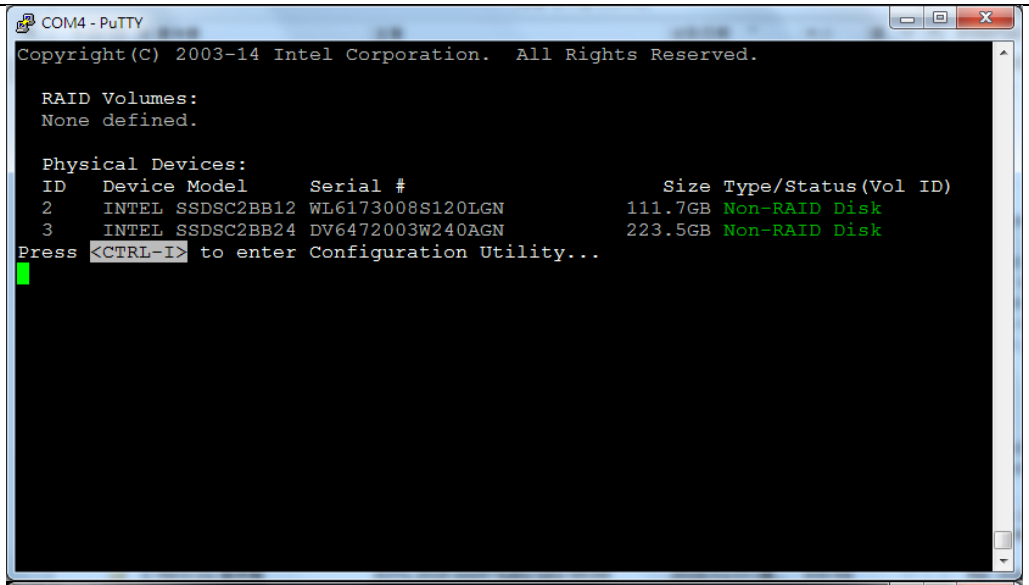
Description:

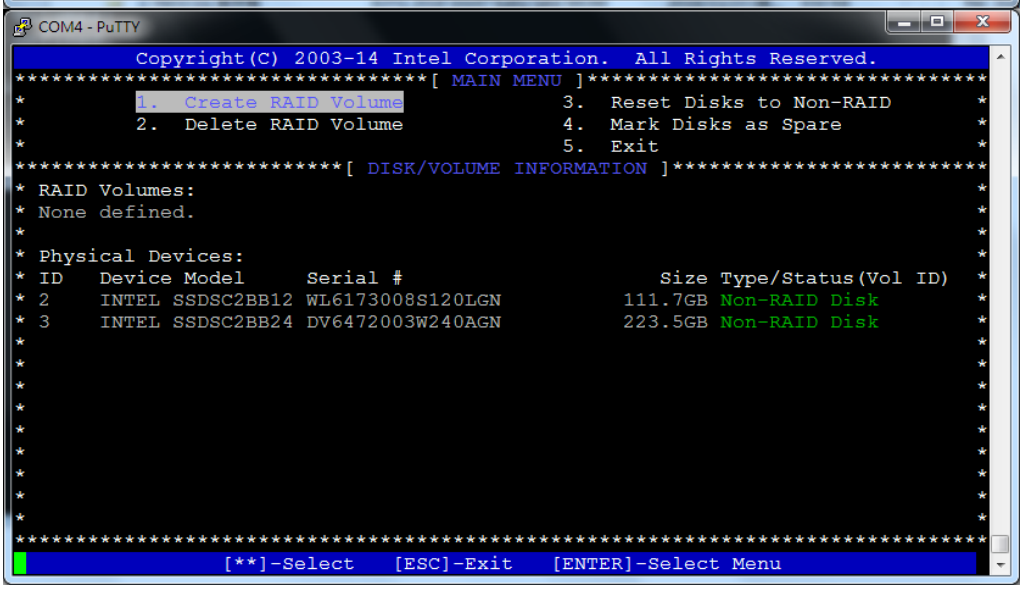
This document will guide user how to create PCH f/w RAID and rebuild (manual & auto rebuild) the degraded RAID1 device.

User can find RSTe driver (include user guide) from link in below
https://downloadcenter.intel.com/download/28016/Intel-Enterprise-Intel-RSTe-AHCI-SCU-RAID-Windows-

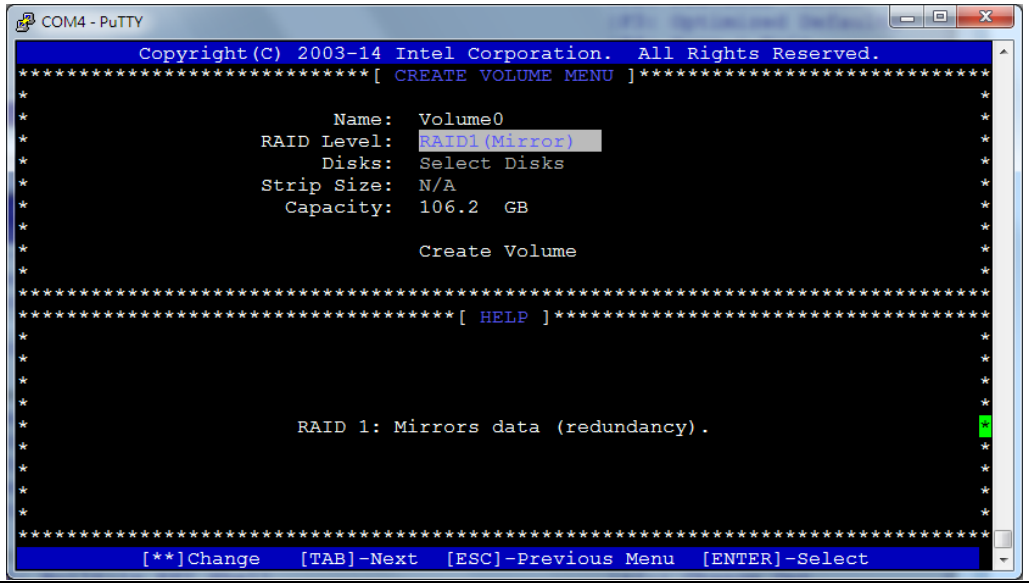


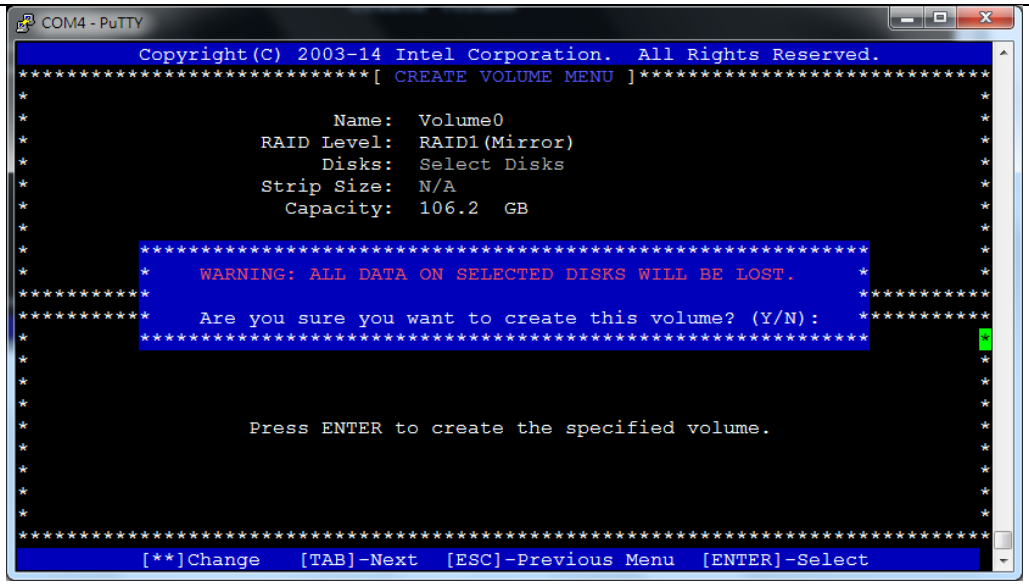


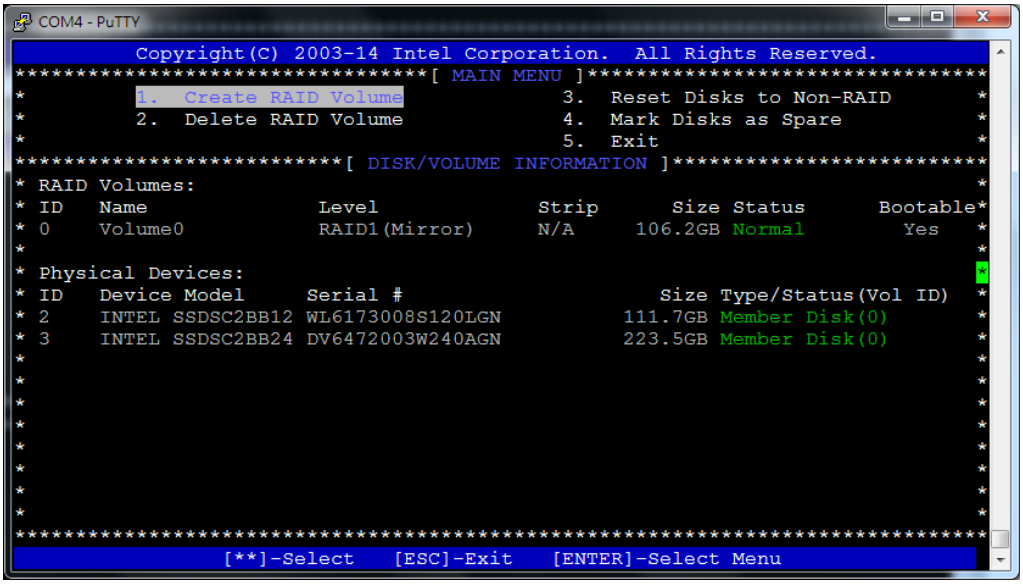


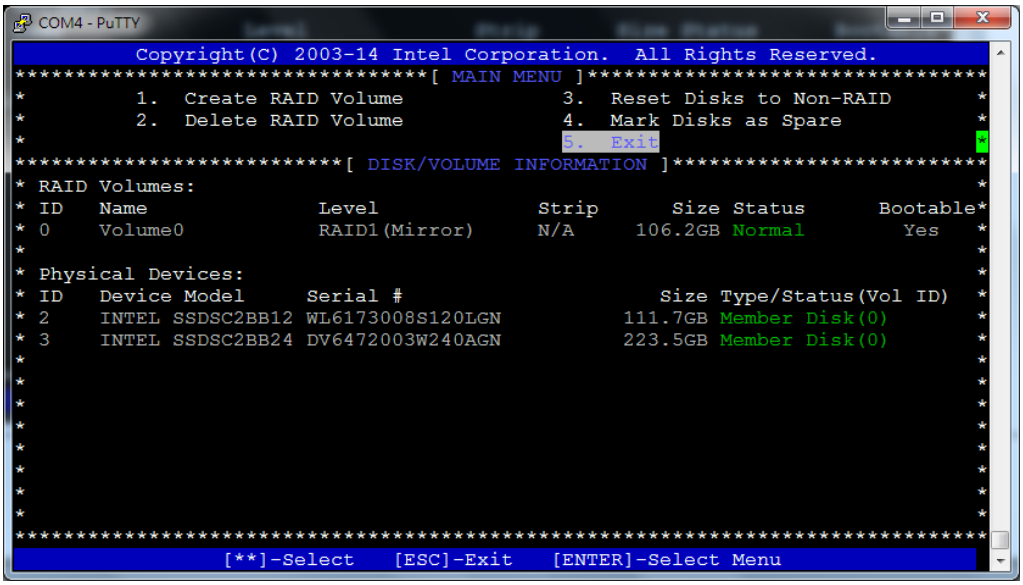


✧ Build RAID 1 for reference




COM4 - PuTTY
Copyright(C) 2003-14 Intel Corporation. All Rights Reserved.
[CREATE VOLUME MENU]
Name: Volume0
RAID Level: RAID1(Mirror)
Disks: Select Disks
Strip Size: N/A
Capacity: 106.2 GB
WARNING: ALL DATA ON SELECTED DISKS WILL BE LOST.
Are you sure you want to create this volume? (Y/N):
Press ENTER to create the specified volume.
[**]Change [TAB]-Next [ESC]-Previous Menu [ENTER]-Select


COM4 - PuTTY
Copyright(C) 2003-14 Intel Corporation. All Rights Reserved.
[MAIN MENU]
1. Create RAID Volume
2. Delete RAID Volume
3. Reset Disks to Non-RAID
4. Mark Disks as Spare
5. Exit
[DISK/VOLUME INFORMATION]
RAID Volumes:
ID Name Level Strip Size Status Bootable
0 Volume0 RAID1(Mirror) N/A 106.2GB Normal Yes
Physical Devices:
ID Device Model Serial # Size Type/Status(Vol ID)
2 INTEL SSDSC2BB12 WL6173008S120LGN 111.7GB Member Disk(0)
3 INTEL SSDSC2BB24 DV6472003W240AGN 223.5GB Member Disk(0)
[**]-Select [ESC]-Exit [ENTER]-Select Menu


COM4 - PuTTY
Copyright(C) 2003-14 Intel Corporation. All Rights Reserved.
[MAIN MENU]
1. Create RAID Volume
2. Delete RAID Volume
3. Reset Disks to Non-RAID
4. Mark Disks as Spare
5. Exit
[DISK/VOLUME INFORMATION]
RAID Volumes:
ID Name Level Strip Size Status Bootable
0 Volume0 RAID1(Mirror) N/A 106.2GB Normal Yes
Physical Devices:
ID Device Model Serial # Size Type/Status(Vol ID)
2 INTEL SSDSC2BB12 WL6173008S120LGN 111.7GB Member Disk(0)
3 INTEL SSDSC2BB24 DV6472003W240AGN 223.5GB Member Disk(0)
[**]-Select [ESC]-Exit [ENTER]-Select Menu

✧ Boot into Linux , you will find our RAID 1 device as mdxxx , original two hard drives has been detected as sdb , sdc

```
[root@5345_n3 ~]# lsblk
NAME    MAJ:MIN RM   SIZE RO TYPE  MOUNTPOINT
sda       8:0    1  29.3G  0 disk
├─sda1    8:1    1   255M  0 part  /boot
└─sda2    8:2    1     7G  0 part  /
sdb       8:16   0 111.8G  0 disk
└─md126   9:126  0 106.2G  0 raid1
sdc       8:32   0 223.6G  0 disk
└─md126   9:126  0 106.2G  0 raid1
```

✧ Partition this RAID device through fdisk, we will have md126p1

```
[root@5345_n3 ~]# lsblk
NAME        MAJ:MIN RM   SIZE RO TYPE  MOUNTPOINT
sda           8:0    1  29.3G  0 disk
├─sda1        8:1    1   255M  0 part  /boot
└─sda2        8:2    1     7G  0 part  /
sdb           8:16   0 111.8G  0 disk
└─md126       9:126  0 106.2G  0 raid1
  └─md126p1 259:1    0 106.2G  0 md
sdc           8:32   0 223.6G  0 disk
└─md126       9:126  0 106.2G  0 raid1
  └─md126p1 259:1    0 106.2G  0 md

[root@5345_n3 ~]# fdisk -l |grep dev
Disk /dev/sda: 31.4 GB, 31406948352 bytes, 61341696 sectors
/dev/sda1   *        2048      524287      261120   83  Linux
/dev/sda2          524288    15122431     7299072   83  Linux
Disk /dev/sdb: 120.0 GB, 120034123776 bytes, 234441648 sectors
Disk /dev/sdc: 240.1 GB, 240057409536 bytes, 468862128 sectors
Disk /dev/md126: 114.0 GB, 114030542848 bytes, 222715904 sectors
/dev/md126p1            2048   222715903   111356928   83  Linux
```

✧ Format /dev/md126p1 through “mkfs /dev/md126p1”

```
....
Allocating group tables: done
Writing inode tables: done
Writing superblocks and filesystem accounting information: done
```

✧ Mount md126p1 and then copy something inside

```
[root@5345_n3 ~]# mount /dev/md126p1 /tmp
[ 1382.088603] EXT4-fs (md126p1): mounting ext2 file system using the ext4 subsystem
[ 1382.098272] EXT4-fs (md126p1): mounted filesystem without journal. Opts: (null)
[root@5345_n3 ~]# ls /tmp/
lost+found
[root@5345_n3 ~]# dd if=/dev/zero of=/tmp/raid1_test.txt bs=2M count=500
500+0 records in
500+0 records out
1048576000 bytes (1.0 GB) copied, 0.88355 s, 1.2 GB/s
[root@5345_n3 ~]# ll -h /tmp/
total 1001M
drwx------ 2 root root   16K Nov 26 14:27 lost+found
-rw-r--r-- 1 root root 1000M Nov 26 14:31 raid1_test.txt
```

✧ Check RAID status

```
[root@5345_n3 ~]# cat /proc/mdstat
Personalities : [raid1]
md126 : active raid1 sdb[1] sdc[0]
      111357952 blocks super external:/md127/0 [2/2] [UU]
md127 : inactive sdb[1](S) sdc[0](S)
      6306 blocks super external:imsm
unused devices: <none>
```

✧ Power off, remove one HDD from RAID1. And then check status in OS.

```
[root@5345_n3 ~]# lsblk
NAME        MAJ:MIN RM   SIZE RO TYPE  MOUNTPOINT
sda           8:0    1  29.3G  0 disk
├─sda1        8:1    1   255M  0 part  /boot
└─sda2        8:2    1     7G  0 part  /
sdb           8:16   0 111.8G  0 disk
└─md126       9:126  0 106.2G  0 raid1
  └─md126p1 259:0    0 106.2G  0 md

[root@5345_n3 ~]# cat /proc/mdstat
Personalities : [raid1]
md126 : active raid1 sdb[0]
      111357952 blocks super external:/md127/0 [2/1] [U_]
md127 : inactive sdb[0](S)
```

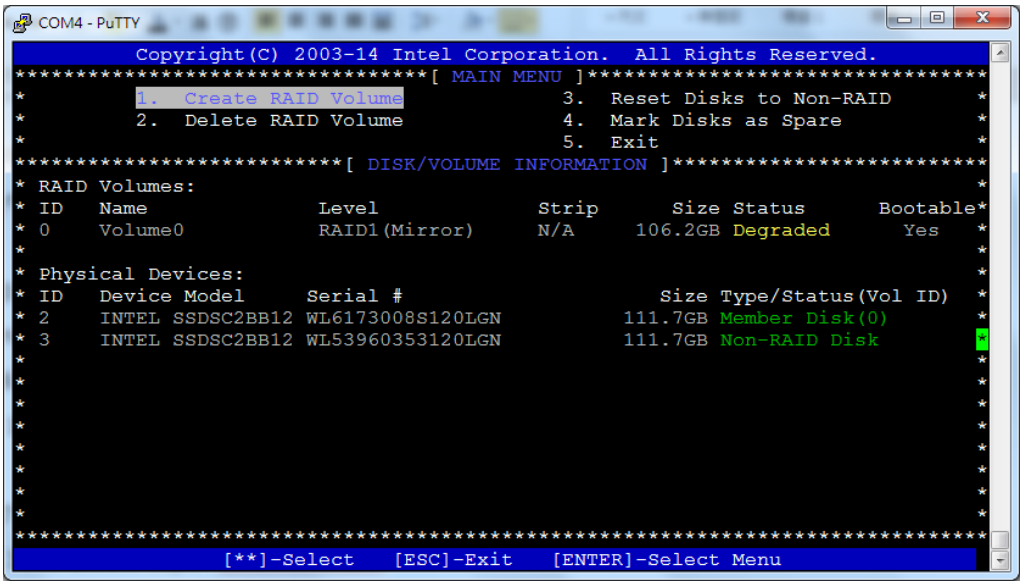
```
      3153 blocks super external:imsm

unused devices: <none>
```

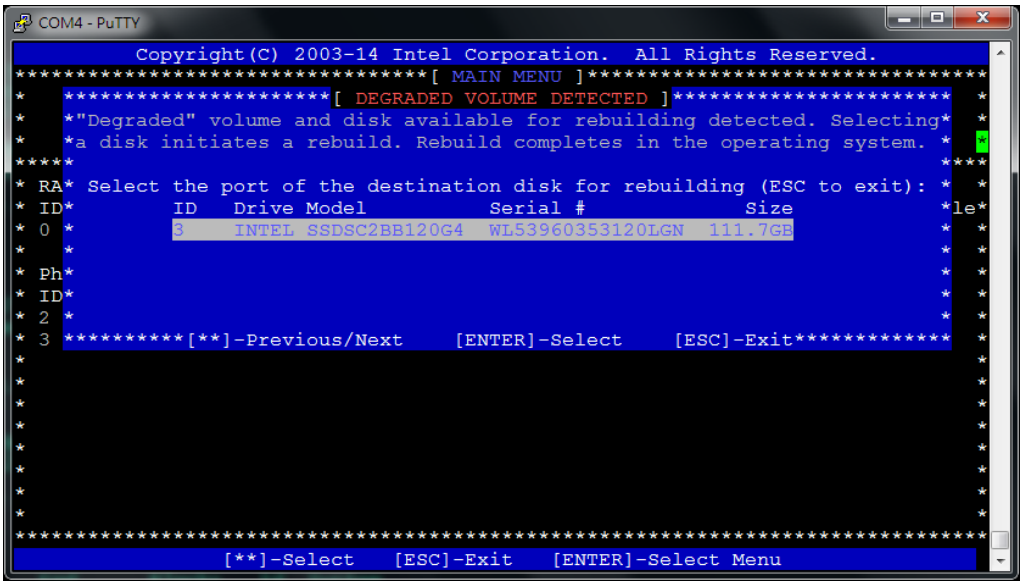
Manual Rebuild in RSTe

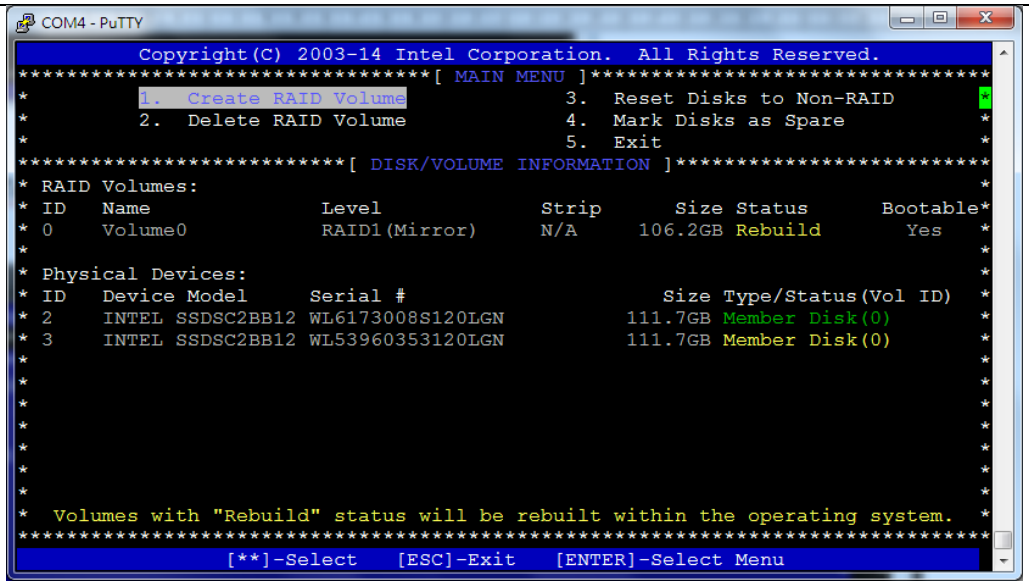
✧ Power off and Add one empty (no existing partitions) HDD for this RAID. And then check status in OS.

- At RAID BIOS, we can find the RAID was degraded already.



- Get in RSTe to select destination disk for rebuilding.





- User can check rebuild status within the operating system

```
[root@5345_n3 ~]# lsblk
NAME        MAJ:MIN RM   SIZE RO TYPE  MOUNTPOINT
sda           8:0    1  29.3G  0 disk
├─sda1        8:1    1   255M  0 part  /boot
└─sda2        8:2    1     7G  0 part  /
sdb           8:16   0 111.8G  0 disk
└─md126       9:126  0 106.2G  0 raid1
  └─md126p1 259:0    0 106.2G  0 md
sdc           8:32   0 111.8G  0 disk
└─md126       9:126  0 106.2G  0 raid1
  └─md126p1 259:0    0 106.2G  0 md

[root@5345_n3 ~]# cat /proc/mdstat
Personalities : [raid1]
md126 : active raid1 sdb[1] sdc[0]
      111357952 blocks super external:/md127/0 [2/1] [U_]
      [===>.................]  recovery = 18.2% (20312384/111358084) finish=10.0min speed=151056K/sec

md127 : inactive sdc[1](S) sdb[0](S)
      6306 blocks super external:imsm

unused devices: <none>
[root@5345_n3 ~]#
```

- Wait for a period to complete RAID rebuild, this time is depending on HDD capacity

```
[root@5345_n3 ~]# [  800.087175] md: md126: recovery done.
[root@5345_n3 ~]# cat /proc/mdstat
Personalities : [raid1]
md126 : active raid1 sdb[1] sdc[0]
      111357952 blocks super external:/md127/0 [2/2] [UU]

md127 : inactive sdc[1](S) sdb[0](S)
      6306 blocks super external:imsm

unused devices: <none>
[root@5345_n3 ~]#

[root@5345_n3 ~]# mount /dev/md126p1 /tmp/
[ 2844.085372] EXT4-fs (md126p1): mounting ext2 file system using the ext4 subsystem
[ 2844.099449] EXT4-fs (md126p1): mounted filesystem without journal. Opts: (null)
[root@5345_n3 ~]# ll -h /tmp
total 1001M
drwx------ 2 root root   16K Nov 26 14:27 lost+found
-rw-r--r-- 1 root root 1000M Nov 26 14:31 raid1_test.txt
```

Auto-Rebuild in RSTe

- Check RAID Status

```
[root@5345_n3 ~]# mdadm -D /dev/md126
/dev/md126:
      Container : /dev/md/imsm0, member 0
     Raid Level : raid1
     Array Size : 111357952 (106.20 GiB 114.03 GB)
  Used Dev Size : 111358084 (106.20 GiB 114.03 GB)
   Raid Devices : 2
  Total Devices : 2
          State : clean
 Active Devices : 2
Working Devices : 2
 Failed Devices : 0
  Spare Devices : 0
          UUID : 0d2bc566:6afeec0b:907178cb:d4708ce9
    Number   Major   Minor   RaidDevice State
       1       8       16        0      active sync   /dev/sdb
       0       8       32        1      active sync   /dev/sdc
```

- When found RAID was degraded

```
[root@5345_n3 ~]# mdadm -D /dev/md126
/dev/md126:
      Container : /dev/md/imsm0, member 0
     Raid Level : raid1
     Array Size : 111357952 (106.20 GiB 114.03 GB)
  Used Dev Size : 111358084 (106.20 GiB 114.03 GB)
   Raid Devices : 2
  Total Devices : 1
          State : clean, degraded
 Active Devices : 1
Working Devices : 1
 Failed Devices : 0
  Spare Devices : 0
          UUID : 0d2bc566:6afeec0b:907178cb:d4708ce9
    Number   Major   Minor   RaidDevice State
       0       8       16        0      active sync   /dev/sdb
```

- Intentionally Set Faulty Partition

```
[root@5345_n3 ~]# mdadm --manage --set-faulty /dev/md126 /dev/sdc
[   74.045605] md/raid1:md126: Disk failure on sdc, disabling device.
[   74.045605] md/raid1:md126: Operation continuing on 1 devices.
[   74.058464] md: md126: recovery interrupted.
mdadm: set /dev/[   74.063670]  md126: p1
sdc faulty in /dev/md126
[root@5345_n3 ~]# [   74.071438] md: unbind<sdc>
[   74.079399] md: export_rdev(sdc)
```

- Recheck RAID Status

```
[root@5345_n3 ~]# mdadm -D /dev/md126
/dev/md126:
      Container : /dev/md/imsm0, member 0
     Raid Level : raid1
     Array Size : 111357952 (106.20 GiB 114.03 GB)
  Used Dev Size : 111358084 (106.20 GiB 114.03 GB)
   Raid Devices : 2
  Total Devices : 1
          State : clean, degraded
 Active Devices : 1
 Working Devices : 1
 Failed Devices : 0
  Spare Devices : 0
          UUID : 0d2bc566:6afeec0b:907178cb:d4708ce9
    Number   Major   Minor   RaidDevice State
       0       8       16        0      active sync   /dev/sdb
       -       0        0        1      removed
```

- Reboot and you can find RAID status was turned into Rebuild

- Check RAID Status in OS

```
[root@5345_n3 ~]# mdadm -D /dev/md126
/dev/md126:
      Container : /dev/md/imsm0, member 0
     Raid Level : raid1
     Array Size : 111357952 (106.20 GiB 114.03 GB)
  Used Dev Size : 111358084 (106.20 GiB 114.03 GB)
   Raid Devices : 2
  Total Devices : 2
          State : clean, degraded, recovering
 Active Devices : 1
Working Devices : 2
 Failed Devices : 0
  Spare Devices : 1
 Rebuild Status : 10% complete
           UUID : 0d2bc566:6afeec0b:907178cb:d4708ce9
    Number   Major   Minor   RaidDevice State
       1       8       16        0      active sync   /dev/sdb
       0       8       32        1      spare rebuilding   /dev/sdc

[root@5345_n3 ~]# cat /proc/mdstat
Personalities : [raid1]
md126 : active raid1 sdb[1] sdc[0]
      111357952 blocks super external:/md127/0 [2/1] [U_]
      [==================>...]  recovery = 89.0% (99122560/111358084) finish=1.3min speed=148529K/sec
md127 : inactive sdc[1](S) sdb[0](S)
      6306 blocks super external:imsm
unused devices: <none>
```

Reference:

https://www.intel.com/content/dam/www/public/us/en/documents/white-papers/rst-linux-paper.pdf

https://www.intel.com/content/www/us/en/support/articles/000005789/technologies.html#2

https://access.redhat.com/documentation/en-US/Red_Hat_Enterprise_Linux/4/html/Introduction_To_System_Administration/s3-storage-raid-day2day-add.html

https://www.thomas-krenn.com/en/wiki/Mdadm_recovery_and_resync