**Storage Information**

Introduction

Our storage devices on both Agora and RADON are simple Penguin Computing storage servers. They have LSI RAID Cards (LSI 9266-8i) as shown below:



Figure - LSI 9266-8i RAID Card

The underlying RAID software is MegaCLI. MegaCLI takes the physical disks, puts them in a RAID 6 group and present the operating system with two virtual drives per RAID card. Each storage server has three RAID cards, thus each storage server has six virtual drives.

Storage Server Architecture

## Network Connection

The storage servers connect to the ESXi hosts via an Infiniband switch. These storage

Physically Replacing a Bad Drive Using MegaCli  
  
The steps are as follows: (Performed in MegaCli directory /opt/MegaRAID/MegaCli)

1. Locate the bad drive and get the enclosure and slot number. (**Note:** -a means adapter, so you need to run this command against all adapters 0,1,2,3,4)
   1. **#./MegaCli64 -PDList -a1 | grep -B 20 -i Unconfigured |more**
   2. **#.**/**MegaCli64 -PDList -a1 | grep -B 20 -i Offline |more (also used ??)**
   3. Sample Output:

Enclosure Device ID: 8  
Slot Number: 2  
Drive's position: DiskGroup: 0, Span: 0, Arm: 1  
Enclosure position: 1  
Device Id: 10  
WWN: 50014ee0ae4463c7  
Sequence Number: 2  
Media Error Count: 0  
Other Error Count: 0  
Predictive Failure Count: 0  
Last Predictive Failure Event Seq Number: 0  
PD Type: SATA  
Raw Size: 3.638 TB [0x1d1c0beb0 Sectors]  
Non Coerced Size: 3.637 TB [0x1d1b0beb0 Sectors]  
Coerced Size: 3.637 TB [0x1d1b00000 Sectors]  
Sector Size: 512  
Logical Sector Size: 512  
Physical Sector Size: 512  
Firmware state: **Offline**, Spun Up

1. If the drive is not already offline, make it offline.
   1. **#./MegaCli64 –PDOffline –PhysDrv [8:2] –a1**
2. If it’s not already showing as missing, mark as missing
   1. **#./MegaCli64 –PDMarkMissing –PhysDrv [8:2] –a1**
3. Prepare the drive for removal
   1. **#./MegaCli64 –PDPrpRmv –PhysDrv [8:2] –a1**
4. Physically replace the failed drive. If you have a problem finding it, you can turn the light on to blink
   1. **#./MegaCli64 –PdLocate –start –PhysDrv [8:2] –a1** (-stop to stop)
5. If the drive is marked as “*Foreign*” or “Unconfirmed Bad” you need to mark as “*Good*”
   1. **#./MegaCli64 –PDMakeGood –PhysDrv [8:2] –a1** (or –aALL)
   2. **#./MegaCli64 –CfgForeign –Clear –a1** (to clear the foreign if not done)
6. Re-add the new drive to your Virtual Drive
   1. **#./ MegaCli64 -PDgetmissing -a1** (to get array and row info)
      1. Sample Output:

Adapter 1 - Missing Physical drives   
  
No.   Array   Row   Size Expected

0      1        8      3814912 MB

* 1. **#./MegaCli64 –PdReplaceMissing –PhysDrv [8:2] –Array1 –row8 –a1**
  2. **#./MegaCli64 –PDRbld –Start –PhysDrv [8:2] –a1** (to start the rebuild)

# Misc Notes

## Virtual Drive Information

**#./MegaCli64  -LDInfo -Lall -a1** (a = adapter ie adapter 1) **or -aALL**

Sample output:

Adapter 0 -- Virtual Drive Information:

Virtual Drive: 0 (Target Id: 0)

Name                :

RAID Level          : Primary-5, Secondary-0, RAID Level Qualifier-3

Size                : 3.636 TB

Sector Size         : 512

Is VD emulated      : No

Parity Size         : 931.0 GB

State               : Optimal

Strip Size          : 256 KB

Number Of Drives    : 5

Span Depth          : 1

Default Cache Policy: WriteBack, ReadAhead, Direct, No Write Cache if Bad BBU

Current Cache Policy: WriteBack, ReadAhead, Direct, No Write Cache if Bad BBU

Default Access Policy: Read/Write

Current Access Policy: Read/Write

Disk Cache Policy   : Enabled

Encryption Type     : None

PI type: No PI

Is VD Cached: No

*\* Physical drive information*

**$./MegaCli64 -PDList -aALL**

**$./MegaCli64-PDInfo -PhysDrv [E:S] -aALL**

# Find the Bad Drives

**$.**/**MegaCli64 -PDList -a1 | grep -B 20 -i Unconfigured |more** (to find the bad disk) \*\*May be able to search for offline also??

# Change the Bad Disk To Good

**$ ./MegaCli64 -PDMakeGood -PhysDrv[8:17] –a1** (remember a= adapter so could be 0 or 2)

sample output:

Adapter: 1: EnclId-8 SlotId-17 state changed to Unconfigured-Good.

# Get the Array and Row Information

$**./MegaCli64 -PDgetmissing -a1**

sample output:

# Replace The Disk In Virtual Disk Pool

> **./MegaCli -PdReplaceMissing -PhysDrv [8:17] -Array1 -row8 -a1**

output:

Adapter: 1: Missing PD at Array 1, Row 8 is replaced.

# Start the rebuild

**./MegaCli64 –PDRbld –Start –PhysDrv [8:12] –a1**

MegaCli -PDRbld -Start -PhysDrv [E:S] -aN

# 

# Misc. Commands

/opt/MegaRAID/MegaCli/MegaCli64 -PDList -aALL -NoLog | grep -E 'Inquiry Data:|Drive Temperature'

**$./MegaCli64 -PDInfo -PhysDrv [8:17] -a1** \*display the details regarding the specified disk

Sample output:

Enclosure Device ID: 8

Slot Number: 17

Drive's position: DiskGroup: 1, Span: 0, Arm: 8

Enclosure position: 1

Device Id: 30

WWN: 50014ee0ae43d558

Sequence Number: 10

Media Error Count: 0

Other Error Count: 0

Predictive Failure Count: 0

Last Predictive Failure Event Seq Number: 0

PD Type: SATA

Raw Size: 3.638 TB [0x1d1c0beb0 Sectors]

Non Coerced Size: 3.637 TB [0x1d1b0beb0 Sectors]

Coerced Size: 3.637 TB [0x1d1b00000 Sectors]

Sector Size:  512

Logical Sector Size:  512

Physical Sector Size:  512

Firmware state: Unconfigured-Bad

Commissioned Spare : No

Emergency Spare : No

Device Firmware Level: 1K01

Shield Counter: 0

Successful diagnostics completion on :  N/A

SAS Address(0): 0x500304800088c719

Connected Port Number: 0(path0)

Inquiry Data:      WD-WMC130203014WDC WD4000FYYZ-01UL1B0                  01.01K01

FDE Capable: Not Capable

FDE Enable: Disable

Secured: Unsecured

Locked: Unlocked

Needs EKM Attention: No

Foreign State: None

Device Speed: 6.0Gb/s

Link Speed: 6.0Gb/s

Media Type: Hard Disk Device

Drive:  Not Certified

Drive Temperature :34C (93.20 F)

PI Eligibility:  No

Drive is formatted for PI information:  No

PI: No PI

Drive's NCQ setting : N/A

Port-0 :

Port status: Active

Port's Linkspeed: 6.0Gb/s

Drive has flagged a S.M.A.R.T alert : No

References:

- https://things.maths.cam.ac.uk/computing/docs/public/megacli\_raid\_lsi.html