raid 卡测试流程

1. 工具 storcli64_ls

1.1 获取控制器号

storcli64_ls /call show all

```
Capabilities :
============
Supported Drives = SAS, SATA
RAID Level Supported = RAID0, RAID1(2 or more drives), RAID5, RAID6, RAID00, RAID10(2 or more drives per span), RAID50, RAID60
```

在上图（部分截图）打印信息中可以查看到当前控制器支持的 raid 阵列等级，该控制器支持 raid0，5，6，10，00，50，60 阵列

1.2 查看磁盘状态

storcli64_ls /c0/eall/sall show

```
PD LIST :
=======

-------------------------------------------------------------------------------
EID:Slt DID State DG       Size Intf Med SED PI SeSz Model               Sp Type
-------------------------------------------------------------------------------
252:4    23 UGood -  237.968 GB SATA SSD N   N  512B INTEL SSDSC2KW256G8 U  -
252:5    21 UGood -  237.968 GB SATA SSD N   N  512B TS256GSSD450K       U  -
252:6    24 UGood -  118.718 GB SATA SSD N   N  512B SATA SSD            U  -
252:7    26 UGood -  237.968 GB SATA SSD N   N  512B INTEL SSDSC2KW256G8 U  -
-------------------------------------------------------------------------------
```

通过打印的信息，可以看到磁盘在 252 号背板上，槽位号为 5-7。

若磁盘的状态显示为 jbod，则需要把 jbod 状态取消掉：

storcli64_ls /c0/e252/sall set good force

1.3 新建 raid5 阵列

storcli64_ls /c0 add vd r5 size=all name=raid5 drives=252:5-7 spares=252:4

```
[root@localhost ~]# storcli64_ls /c0 add vd r5 size=all name=raid5 drives=252:5-7 spares=252:4
CLI Version = 007.1804.0000.0000 Apr 09, 2021
Operating system = Linux 4.19.190-3.lns8.loongarch64
Controller = 0
Status = Success
Description = Add VD Succeeded.
```

将槽位号为 5-7 的磁盘做成名为 raid5 的 raid5 阵列，其中 4 号槽为的盘为热备盘。

若不需要指定热备盘，则可使用以下命令

storcli64_ls /c0 add vd r5 size=all name=raid5 drives=252:4-7

后续可以将某一个槽位的磁盘设置为热备盘，如：

storli64_ls /c0/e252/s4 add hotsparedrive dgs=0

1.4 查看阵列

storcli64_ls /c0/vall show

```
Virtual Drives :
==============

---------------------------------------------------------------
DG/VD TYPE  State Access Consist Cache Cac sCC       Size Name
---------------------------------------------------------------
0/0   RAID5 Optl  RW     No      RWTD  -   ON  237.437 GB raid5
---------------------------------------------------------------

VD=Virtual Drive| DG=Drive Group|Rec=Recovery
Cac=CacheCade|OfLn=OffLine|Pdgd=Partially Degraded|Dgrd=Degraded
Optl=Optimal|dflt=Default|RO=Read Only|RW=Read Write|HD=Hidden|TRANS=TransportReady
B=Blocked|Consist=Consistent|R=Read Ahead Always|NR=No Read Ahead|WB=WriteBack
AWB=Always WriteBack|WT=WriteThrough|C=Cached IO|D=Direct IO|sCC=Scheduled
Check Consistency
```

可以看到当前 raid5 阵列的信息。

再次查看磁盘状态，显示 5-7 号磁盘的状态应该都是 online，4 号盘为 DHS 状态

```
Drive Information :
=================

-------------------------------------------------------------------------------
EID:Slt DID State DG       Size Intf Med SED PI SeSz Model               Sp Type
-------------------------------------------------------------------------------
252:4    23 DHS   0  237.968 GB SATA SSD N   N  512B INTEL SSDSC2KW256G8 U  -
252:5    21 Onln  0  237.968 GB SATA SSD N   N  512B TS256GSSD450K       U  -
252:6    24 Onln  0  118.718 GB SATA SSD N   N  512B SATA SSD            U  -
252:7    26 Onln  0  237.968 GB SATA SSD N   N  512B INTEL SSDSC2KW256G8 U  -
-------------------------------------------------------------------------------
```

1.5 raid 初始化

storcli64_ls /c0/v0 start init

```
[root@localhost ~]# storcli64_ls /c0/v0 start init
CLI Version = 007.1804.0000.0000 Apr 09, 2021
Operating system = Linux 4.19.190-3.lns8.loongarch64
Controller = 0
Status = Success
Description = Start INIT Operation Success
```

初始化是为了将硬盘上原有的数据清除。

1.6 往阵列中写入数据

用 lsblk 可以看到 sdb 设备节点为 raid5 阵列的设备节点。首先格式化

mkfs.ext2 /dev/sdb

测试读速率

```
[root@localhost ~]# dd if=test.dd of=/dev/null bs=1024
记录了995517+1 的读入
记录了995517+1 的写出
1019409994 bytes (1.0 GB, 972 MiB) copied, 1.07592 s, 947 MB/s
```

测试写速率

```
[root@localhost ~]# time dd if=/dev/zero bs=1024 count=1000000 of=/1Gb.file
记录了1000000+0 的读入
记录了1000000+0 的写出
1024000000 bytes (1.0 GB, 977 MiB) copied, 3.22151 s, 318 MB/s
```

1.7 去除磁盘

手动拔下一块磁盘，查看阵列信息会提示阵列处在 Dgrd 状态（降级状态），并且峰鸣器会发出报警，直到阵列重新回到正常状态（Optl）。

storcli64_ls /c0/all show

```
Virtual Drives :
==============

---------------------------------------------------------------
DG/VD TYPE  State Access Consist Cache Cac sCC       Size Name
---------------------------------------------------------------
0/0   RAID5 Dgrd  RW     No      RWTD  -   ON  237.437 GB raid5
---------------------------------------------------------------

VD=Virtual Drive| DG=Drive Group|Rec=Recovery
Cac=CacheCade|OfLn=OffLine|Pdgd=Partially Degraded|Dgrd=Degraded
Optl=Optimal|dflt=Default|RO=Read Only|RW=Read Write|HD=Hidden|TRANS=TransportReady
B=Blocked|Consist=Consistent|R=Read Ahead Always|NR=No Read Ahead|WB=WriteBack
AWB=Always WriteBack|WT=WriteThrough|C=Cached IO|D=Direct IO|sCC=Scheduled
Check Consistency
```

可使用下面命令关闭峰鸣器

storcli64_ls /c0 set alarm=off

查看磁盘状态

storcli64_ls /c0/e252/sall show

```
Drive Information :
=================

-------------------------------------------------------------------------------
EID:Slt DID State DG       Size Intf Med SED PI SeSz Model               Sp Type
-------------------------------------------------------------------------------
252:4    23 Rbld   0 237.968 GB SATA SSD N   N  512B INTEL SSDSC2KW256G8 U  -
252:5    21 Onln   0 237.968 GB SATA SSD N   N  512B TS256GSSD450K       U  -
252:6    24 Onln   0 118.718 GB SATA SSD N   N  512B SATA SSD            U  -
-------------------------------------------------------------------------------
```

可以看到 7 号槽位的磁盘已经不见了，4 号槽位的热备盘状态变成了 rebuild。是因为热备盘会在磁盘损坏后第一时间重建数据顶替上去，等待新的磁盘重新连接后，数据会进行回拷，回拷完成后，4 号槽位会重新变成热备盘状态。

查看 rebuild 进度

storcli64_ls /c0/eall/sall show rebuild

```
[root@localhost ~]# storcli64_ls /c0/eall/sall show rebuild
CLI Version = 007.1804.0000.0000 Apr 09, 2021
Operating system = Linux 4.19.190-3.lns8.loongarch64
Controller = 0
Status = Success
Description = Show Drive Rebuild Status Succeeded.


------------------------------------------------------------
Drive-ID    Progress% Status          Estimated Time Left
------------------------------------------------------------
/c0/e252/s4         9 In progress     6 Minutes
/c0/e252/s5         - Not in progress -
/c0/e252/s6         - Not in progress -
------------------------------------------------------------
```

重建完成之后，再次查看 raid5 阵列状态，会回到正常状态。

```
Virtual Drives :
==============


---------------------------------------------------------------------
DG/VD TYPE  State Access Consist Cache Cac sCC       Size Name
---------------------------------------------------------------------
0/0   RAID5 Optl  RW     Yes     RWTD  -   ON  237.437 GB raid5
---------------------------------------------------------------------
```

1.7 插回磁盘

等待热备盘重建数据完成后，插回磁盘后，查看磁盘状态

storcli64_ls /c0/e252/sall show

```
-------------------------------------------------------------------------------
EID:Slt DID State DG       Size Intf Med SED PI SeSz Model               Sp Type
-------------------------------------------------------------------------------
252:4    23 Onln   0 237.968 GB SATA SSD N   N  512B INTEL SSDSC2KW256G8 U  -
252:5    21 Onln   0 237.968 GB SATA SSD N   N  512B TS256GSSD450K       U  -
252:6    24 UBad   - 237.968 GB SATA SSD N   N  512B INTEL SSDSC2KW25    U  -
252:7    26 Onln   0 232.375 GB SATA SSD N   N  512B LHC-S25MCN-25650    U  -
-------------------------------------------------------------------------------
```

重新插上的磁盘状态显示为 ubad。

此时无法自动进行数据回拷，需要手动设置磁盘状态为 ugood

storcli64_ls /c0/e252/s7 set good

```
Drive Information :
=================

-------------------------------------------------------------------------------
EID:Slt DID State DG       Size Intf Med SED PI SeSz Model               Sp Type
-------------------------------------------------------------------------------
252:4    23 Onln   0 237.968 GB SATA SSD N   N  512B INTEL SSDSC2KW256G8 U  -
252:5    21 Onln   0 237.968 GB SATA SSD N   N  512B TS256GSSD450K       U  -
252:6    24 Onln   0 118.718 GB SATA SSD N   N  512B SATA SSD            U  -
252:7    26 UGood  F 237.968 GB SATA SSD N   N  512B INTEL SSDSC2KW256G8 U  -
-------------------------------------------------------------------------------
```

然后导入磁盘

storcli64_ls /c0/fall import

如果导入后磁盘状态依然没有变化，则需要重新拔插该磁盘

重新拔插之后，磁盘会变成数据回拷的状态。

```
Drive Information :
=================

-------------------------------------------------------------------------------
EID:Slt DID State  DG       Size Intf Med SED PI SeSz Model               Sp Type
-------------------------------------------------------------------------------
252:4    23 Onln    0 237.968 GB SATA SSD N   N  512B INTEL SSDSC2KW256G8 U  -
252:5    21 Onln    0 237.968 GB SATA SSD N   N  512B TS256GSSD450K       U  -
252:6    24 Onln    0 118.718 GB SATA SSD N   N  512B SATA SSD            U  -
252:7    26 Cpybck  - 237.968 GB SATA SSD N   N  512B INTEL SSDSC2KW256G8 U  -
-------------------------------------------------------------------------------
```

可以使用命令查看回拷进度

```
[root@localhost ~]# storcli64_ls /c0/eall/sall show copyback
CLI Version = 007.1804.0000.0000 Apr 09, 2021
Operating system = Linux 4.19.190-3.lns8.loongarch64
Controller = 0
Status = Success
Description = Show Drive Copyback Status Succeeded.


------------------------------------------------------------
Drive-ID    Progress% Status          Estimated Time Left
------------------------------------------------------------
/c0/e252/s4 -         Not in progress -
/c0/e252/s5 -         Not in progress -
/c0/e252/s6 -         Not in progress -
/c0/e252/s7 7         In progress     6 Minutes
------------------------------------------------------------
```

回拷完成后，4 号盘重新变为热备盘。

在 raid5 阵列中，只允许损坏一个盘，当有两个或以上的盘损坏时，raid5 阵列就无法使用。