

RAIDCOM MASTERCLASS

HDS GLOBAL ACCOUNT TEAM



- Introducing raidcom
- Basics
- Building from basics: security and improving reliability
- Provisioning tasks in bulk: DP-VOLs
- Performance comparisons of techniques
- A few illustrations: query
- Scripting challenges and workarounds
- Sample addserver.sh
- Horcm files
- Error analysis
- Summary

- **raidcom** is the new feature in Raid Manager to permit easy automation of management tasks on the VSP
 - Uses a command device with additional features optionally enabled
 - The new IP command device is also supported so Fibre not required*
 - Virtually everything that Storage Navigator can do, raidcom can do
 - Uses same security login
- Basic raidcom is easy:
 - **raidcom add lun –port CL1-A-6 –ldev_id 1253**
 - the manuals are well written and largely complete
 - horcm files are simpler
- If interested, you've probably got this far already
- But quality solutions require a bit of effort and knowledge
- Nothing unusual or too complex – scripting best practices

- Raid Manager does not go away, there is more reason to use it.
- HORCM files don't go away
 - But they are a bit better
 - And if you change the way you manage replication you can make then much simpler
- Improvements requested have been added:
 - Persistent central (on storage) metadata (naming and grouping)
 - Simpler HORCM files, more consistent rules
 - Out of band CCI (no command device)
 - Features similar to other storage platforms

- The extra privileges can be set by SN2 or raidcom

Edit Command Devices

1. Edit Command Devices | 2. Confirm

This wizard lets you edit one or more properties. Select the new value and click Finish to confirm.

Command Device : ☐ Enable ☒ Disable

Command Device Attributes :

Command Device Security :	☐ Enable	☒ Disable
User Authentication :	☐ Enable	☒ Disable
Device Group Definition :	☐ Enable	☒ Disable

◀ Back Next ▶ Finish Cancel Help

- For provisioning you need a Storage Manager login with:
storage modify rights.
- **raidcom get port**
- User for Serial#[53004] : sburr
- Password: **#login required**
- **raidcom -login user pass [-s 53086]**
- **raidcom -logout**

- Rights are stored for user and serial in files in: /HORCM/usr/bin
- One login works for all RM instances and all serial (if login the same)
- Uses SVP/SN to authenticate
- If SVP/SN is configured to use external authentication can use group authentication through: LDAP, RADIUS, Active Directory
- References to individual access rights are misleading (internal or future)

COMMAND INTRODUCTION

SUBTITLE PLACEHOLDER



YES:

```
raidcom add lun -port CL3-A-4 -ldev_id 42
```

```
raidcom add lun -port CL3-A-4 -ldev_id 43
```

NO:

```
raidcom add lun -port CL3-A-4 -ldev_id 42 43
```

```
raidcom add lun -port CL3-A-4 -ldev_id 42 -cnt 2
```

- Do not use -cnt or multiple ldevs – these create LUSE.
- BUT OK for: pool and journal.

CAN Use Device group:

```
raidcom add device_grp -device_grp_name TEST -ldev_id 48413 -cnt 6
```

```
raidcom add lun -port CL3-A SWB_BC-014 -grp_opt ldev -device_grp_name TEST
```

```
raidcom add host_grp -port CL3-A-1 -host_grp_name SWB_D_2850_4 -s 53004
```

```
raidcom add host_grp -port CL4-A-1 -host_grp_name SWB_D_2850_4 -s 53004
```

```
raidcom modify host_grp -port CL3-A-1 -s 53004 -host_mode 0 -host_mode_opt 40
```

```
raidcom modify host_grp -port CL4-A-1 -s 53004 -host_mode 0 -host_mode_opt 40
```

```
raidcom add hba_wwn -port CL3-A-1 -s 53004 -hba_wwn 10000000c9537bb2
```

```
raidcom add hba_wwn -port CL4-A-1 -s 53004 -hba_wwn 10000000c9537d06
```

- **raidcom add ldev -pool_id 0 -ldev_id 0xBD02 - capacity 960000K**
- **raidcom modify ldev -ldev_id 0xBD02 -ldev_name SWB_H0A**
- **Very fast but async**

- **Also:**
- **raidcom extend ldev -ldev_id 42 -capacity 100G**

- **raidcom modify ldev -ldev_id 42 -status discard_zero_page**

- **raidcom modify ldev -ldev_id 42 -status disable_reallocation**

- Adding Command Devices:

`raidcom modify ldev -ldev_id <ldev#> -command_device {y | n} [Security value]`

- Mainframe capabilities added in V02 and will become more complete...

- Create Pool-VOL

- `raidcom add ldev -parity_grp_id 2-10 -capacity 960000K -ldev_id 0:02`

- Create V-VOL

- `raidcom add ldev -pool 0 -capacity 960000K -ldev_id 0xBD01`

- Create or Expand Pool:

- `raidcom add dp_pool -pool_id 5 -ldev_id 23`

- Zero Page Reclaim
 - raidcom modify ldev –ldev_id 42 -status discard_zero_page
- V-VOL Expansion
 - raidcom extend ldev –ldev_id 42 –capacity 100G
- Pool management
 - raidcom modify pool -pool 6 -pool_attribute [dt_manual|dp]
 - raidcom monitor pool –pool 0 –operation [start|stop]
 - raidcom reallocate pool –pool 0 –operation [start|stop]
 - ...

```
raidcom add dp_pool -pool_id 5 -ldev_id 19 -cnt 4
raidcom modify pool -pool 5 -pool_attribute dt_manual
raidcom get dp_pool -key opt
```

PID	POLS	MODE	STS	DAT	TNO	TL_RANGE	TD_RANGE	TU_CAP(MB)	TT_CAP(MB)	T(%)	P(%)	R(%)
000	POLN	AUT	RLM	VAL	1	00000bf6	000002ae	134946	563388	0	58	0
000	POLN	AUT	RLM	VAL	2	00000021	0000000c	384258	822612	8	60	0
000	POLN	AUT	RLM	VAL	3	00000000	00000000	1224174	3293808	8	8	0
005	POLN	DEF	STP	INV	1	-	-	0	8064	8	0	100

Commands for controlling monitoring are:

- **raidcom monitor pool -pool {pool# | pool name} –operation start**
- **raidcom monitor pool -pool {pool# | pool name} –operation stop**

Commands for controlling relocation are:

- **raidcom reallocate pool -pool {pool# | pool name} –operation start**
- **raidcom reallocate pool -pool {pool# | pool name} –operation stop**

Ports, HSDs, WWNs LUNs

raidcom get port
raidcom modify port

raidcom get host_grp
raidcom add host_grp
raidcom modify host_grp
raidcom delete host_grp

raidcom get hba_wwn
raidcom add hba_wwn
raidcom set hba_wwn
raidcom reset hba_wwn
raidcom delete hba_wwn

raidcom add lun
raidcom delete lun
raidcom get lun

Array Groups, LDEVs, Pools

raidcom get parity_grp

raidcom add ldev
raidcom delete ldev
raidcom extend ldev
raidcom get ldev
raidcom initialize ldev
raidcom modify ldev

raidcom get pool
raidcom get dp_pool
raidcom add dp_pool
raidcom get snap_pool
raidcom add snap_pool
raidcom modify pool
raidcom delete pool
raidcom monitor pool
raidcom reallocate pool

Replication

raidcom get rcu
raidcom add rcu
raidcom add rcu_path
raidcom modify rcu
raidcom delete rcu
raidcom delete rcu_path

raidcom get journal
raidcom add journal
raidcom modify journal
raidcom delete journal

Naming

raidcom add device_grp
raidcom delete device_grp
raidcom get device_grp

raidcom add copy_grp
raidcom delete copy_grp
raidcom get copy_grp
... modify ...
... add ...

Management

raidcom get resource
raidcom lock resource
raidcom unlock resource
raidcom get command_status
raidcom reset command_status

External

raidcom get external_grp
raidcom add external_grp
raidcom check_ext_storage external_grp
raidcom disconnect external_grp
raidcom delete external_grp
raidcom modify external_grp
raidcom get path
raidcom add path
raidcom check_ext_storage path
raidcom disconnect path
raidcom delete path
raidcom discover external_storage
raidcom discover lun

RAIDCOM QUERY

SUBTITLE PLACEHOLDER



BASIC RAIDCOM: QUERY

raidcom get port

PORT	TYPE	ATTR	SPD	ALPA	FAB	CONN	SSW	SL	Serial#	WWN
CL1-A	FIBRE	TAR	AUT	EF	N	FCAL	N	0	53004	50060e8006cf0c00
CL1-B	FIBRE	TAR	AUT	E1	N	FCAL	N	0	53004	50060e8006cf0c01
CL2-A	FIBRE	TAR	AUT	D9	N	FCAL	N	0	53004	50060e8006cf0c10
CL2-B	FIBRE	TAR	AUT	D3	N	FCAL	N	0	53004	50060e8006cf0c11
CL3-A	FIBRE	TAR	AUT	E8	N	FCAL	N	0	53004	50060e8006cf0c20
CL3-B	FIBRE	TAR	AUT	E0	N	FCAL	N	0	53004	50060e8006cf0c21
CL4-A	FIBRE	TAR	AUT	D6	N	FCAL	N	0	53004	50060e8006cf0c30
CL4-B	FIBRE	TAR	AUT	D2	N	FCAL	N	0	53004	50060e8006cf0c31
CL5-A	FIBRE	TAR	AUT	E4	N	FCAL	N	0	53004	50060e8006cf0c40
CL5-B	FIBRE	TAR	AUT	DC	N	FCAL	N	0	53004	50060e8006cf0c41
CL6-A	FIBRE	TAR	AUT	D5	N	FCAL	N	0	53004	50060e8006cf0c50
CL6-B	FIBRE	TAR	AUT	D1	N	FCAL	N	0	53004	50060e8006cf0c51
CL7-A	FIBRE	TAR	AUT	E2	N	FCAL	N	0	53004	50060e8006cf0c60
CL7-B	FIBRE	TAR	AUT	DA	N	FCAL	N	0	53004	50060e8006cf0c61
CL8-A	FIBRE	TAR	AUT	D4	N	FCAL	N	0	53004	50060e8006cf0c70
CL8-B	FIBRE	TAR	AUT	CE	N	FCAL	N	0	53004	50060e8006cf0c71

```
raidcom get port -port CL1-A
```

PORT	LOGIN_WWN	Serial#	-
CL1-A	10000000c9407116	53086	-
CL1-A	10000000c943463f	53086	-
CL1-A	10000000c948508d	53086	-

RAIDCOM GET PARITY_GRP EXAMPLE

raidcom get parity_grp

T	GROUP	Num_LDEV	U (%)	AV_CAP (GB)	R_LVL	R_TYPE	SL	CL	DRIVE_TYPE
R	1-1	1	99	0	RAID5	3D+1P	0	0	DKS5B-J300SS
R	1-2	1	99	0	RAID5	3D+1P	0	0	DKS5B-J300SS
R	1-3	1	99	0	RAID5	3D+1P	0	0	DKS5B-J300SS
R	1-4	1	99	0	RAID5	3D+1P	0	0	DKS5B-J300SS
R	1-5	1	99	0	RAID5	3D+1P	0	0	DKS5B-J300SS
R	1-10	1	99	0	RAID5	3D+1P	0	0	DKS5B-J300SS
R	1-11	1	99	0	RAID5	3D+1P	0	0	DKS5B-J300SS
R	1-12	1	99	0	RAID5	3D+1P	0	0	DKS5B-J300SS
R	2-16	96	99	5	RAID5	3D+1P	0	0	DKS5B-J300SS
R	5-1	1	99	0	RAID1	2D+2D	0	0	DKS5B-J300SS
R	5-2	1	99	0	RAID1	2D+2D	0	0	DKS5B-J300SS
R	5-3	1	99	0	RAID1	2D+2D	0	0	DKS5B-J300SS
R	5-4	1	99	0	RAID1	2D+2D	0	0	DKS5B-J300SS
R	5-5	1	99	0	RAID1	2D+2D	0	0	DKS5B-J300SS
R	5-6	0	0	536	RAID1	2D+2D	0	0	DKS5B-J300SS
R	5-7	1	100	0	RAID5	3D+1P	0	0	DKS5B-K146SS
R	5-8	1	100	0	RAID5	3D+1P	0	0	DKS5B-K146SS
R	5-9	1	99	0	RAID5	3D+1P	0	0	SDT5A-S200SS
R	6-1	0	0	536	RAID1	2D+2D	0	0	DKS5B-J300SS

```
raidcom get ldev -ldev_id 0xbd00 -cnt 4 -key frnt
```

Serial#	LDEV#	SL	CL	VOL_TYPE	VOL_Cap(BLK)	PID	ATTRIBUTE	Ports	PORT_No:LU#:GRPNAME	...
53086	48384	0	0	OPEN-V-CVS	1920000	0	CVS HORC HDP	1	CL3-A-3:1:SWB_BC-008	
53086	48385	0	0	OPEN-V-CVS	1920000	0	CVS HDP	1	CL3-A-3:2:SWB_BC-008	
53086	48386	0	0	OPEN-V-CVS	1920000	0	CVS HDP	1	CL3-A-3:3:SWB_BC-008	
53086	48387	0	0	OPEN-V-CVS	1920000	0	CVS HDP	1	CL3-A-3:4:SWB_BC-008	

```
raidcom get ldev -ldev_id 0 -key rgrp
```

Serial#	LDEV#	SL	CL	PID	ATTRIBUTE	R_LVL	RAID_TYPE	DRV_TYPE	DRV_Cap	GRPs	RAID_GRP	...
53086	0	0	0	4	POOL	RAID5	7D+1P	DKS5B-J300SS	571679368	1	01-01	

```
raidcom get ldev -ldev_id 0 -key elun -cnt 1000
```

```

Serial# LDEV#  SL  CL  PID  ATTRIBUTE      E_VendorID E_ProductID  E_VOLID
"E_VOLID_C"                E_PORTS  PORT_NO:LU#:WWN ...
53086   768    0   0   1  ELUN|POOL    HITACHI     DF600F
48495441434849203835303131303134303132370000000000000000000000000000 "HITACHI
850110140127....."          2  CL1-B-0:0:50060e8010252160  CL2-B-0:0:50060e8010252164
53086   769    0   0   1  ELUN|POOL    HITACHI     DF600F
48495441434849203835303131303134303132380000000000000000000000000000 "HITACHI
850110140128....."          2  CL4-B-0:1:50060e8010252165  CL3-B-0:1:50060e8010252161

```

- To get all ldevs either use `raidcom get ldev` or `frnt rgrp` and `elun` (`rgrp` and `elun` have POOL and JNL devices that `frnt` does not list).

BASIC RAIDCOM: QUERY GET LDEV : SHORT

raidcom get ldev -ldev_id 0xbd00 -cnt 4 -key frnt

Serial#	LDEV#	SL	CL	VOL_TYPE	VOL_Cap(BLK)	PID	ATTRIBUTE	Ports	PORT_No:LU#:GRPNAME	...
53086	48384	0	0	OPEN-V-CVS	1920000	0	CVS HORC AOU	1	CL3-A-3:1:SWB_BC-008	
53086	48385	0	0	OPEN-V-CVS	1920000	0	CVS AOU	1	CL3-A-3:2:SWB_BC-008	
53086	48386	0	0	OPEN-V-CVS	1920000	0	CVS AOU	1	CL3-A-3:3:SWB_BC-008	
53086	48387	0	0	OPEN-V-CVS	1920000	0	CVS AOU	1	CL3-A-3:4:SWB_BC-008	

raidcom get ldev -ldev_id 0 -key rgrp

Serial#	LDEV#	SL	CL	PID	ATTRIBUTE	R_LVL	RAID_TYPE	DRV_TYPE	DRV_Cap	GRPs	RAID_GRP	...
53086	0	0	0	4	POOL	RAID5	7D+1P	DKS5B-J300SS	571679368	1	01-01	

raidcom get ldev -ldev_id 0 -key elun -cnt 1000

Serial#	LDEV#	SL	CL	PID	ATTRIBUTE	E_VendorID	E_ProductID	E_VOLID	E_PORTS	PORT_NO:LU#:WWN	...
"E_VOLID_C"											
53086	768	0	0	1	ELUN POOL	HITACHI	DF600F				
						48495441434849203835303131303134303132370000000000000000000000000000 "HITACHI					
						850110140127....." 2 CL1-B-0:0:50060e8010252160 CL2-B-0:0:50060e8010252164					
53086	769	0	0	1	ELUN POOL	HITACHI	DF600F				
						48495441434849203835303131303134303132380000000000000000000000000000 "HITACHI					
						850110140128....." 2 CL4-B-0:1:50060e8010252165 CL3-B-0:1:50060e8010252161					

BASIC RAIDCOM: QUERY : GET LDEV: FULL

raidcom get ldev -dev_id 0

Serial# : 53086
LDEV : 0
SL : 0
CL : 0
VOL_TYPE : OPEN-V
VOL_Capacity(BLK) : 3940185088
NUM_LDEV : 1
LDEVs : 0
NUM_PORT : 0
PORTs :
F_POOLID : 4
VOL_ATTR : POOL
RAID_LEVEL : RAID5
RAID_TYPE : 7D+1P
NUM_GROUP : 1
RAID_GROUPS : 01-01
DRIVE_TYPE : DKS5B-J300SS
DRIVE_Capa : 571679368
LDEV_NAMING :
STS : NML
OPE_TYPE : NONE
OPE_RATE : 100
MP# : 0

- `raidcom get ldev -ldev_list`
- `<dp_volume | external_volume | journal | pool | parity_grp | mp_blade | defined | undefined | mapped | unmapped>`
- `[-journal_id <journal ID#> | -pool_id <pool ID#> | -parity_grp_id <gno-sgno> | -mp_blade_id <mp#>]`
- `[-key {front_end | parity_grp | external}]`

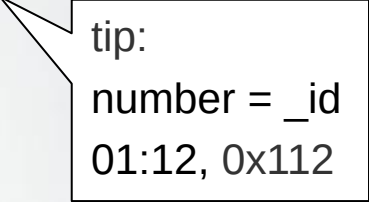
- `raidcom get ldev -ldev_list pool -pool_id 0 -key rgrp`

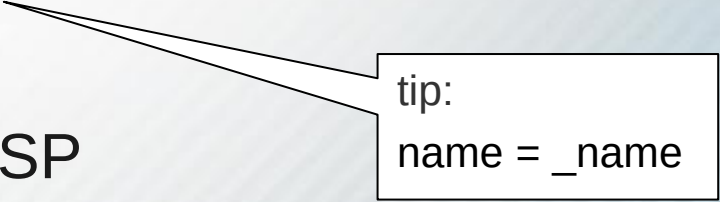
Serial#	LDEV#	SL	CL	PID	ATTRIBUTE	R_LVL	RAID_TYPE	DRV_TYPE	DRV_Cap	GRPs	RAID_GRP
...											
53086	8	0	0	0	POOL	RAID5	3D+1P	DKS5B-J300SS	571679368	1	01-09
53086	9	0	0	0	POOL	RAID5	3D+1P	DKS5B-J300SS	571679368	1	01-10
53086	10	0	0	0	POOL	RAID5	3D+1P	DKS5B-J300SS	571679368	1	01-11
53086	11	0	0	0	POOL	RAID5	3D+1P	DKS5B-J300SS	571679368	1	01-12
53086	26	0	0	0	POOL	RAID5	3D+1P	DKS5B-K146SS	285177528	1	05-07
53086	27	0	0	0	POOL	RAID5	3D+1P	DKS5B-K146SS	285177528	1	05-08
53086	128	0	0	0	POOL	RAID5	3D+1P	SDT5A-S200SS	390625002	1	05-09

ADDING ROBUSTNESS

SUBTITLE PLACEHOLDER



- **raidcom add ldev -pool 0 -capacity 3840000 -ldev_id 9201**


tip:
number = _id
01:12, 0x112
- **raidcom –login sburr password**
raidcom add ldev -pool 0 -capacity 3840000 -ldev_id 9201
- **raidcom –login sburr password**
raidcom lock resource –resource_name meta_resource
raidcom add ldev -pool 0 -capacity 3840000 -ldev_id 9201
raidcom unlock resource –resource_name meta_resource


tip:
name = _name
- **meta_resource** is part of the new VSP resource feature. It is the top resource. Use a resource tree you are authorized to use.

```
■ raidcom -login sburr password
raidcom lock resource -resource_name meta_resource
raidcom add ldev -pool 0 -capacity 3840000 -ldev_id 9201
r=$?
if [ $r -ne 0];then
    raidcom unlock resource -resource_name
meta_resource
    echo command failed with r=$r
    exit 43
fi
raidcom unlock resource -resource_name meta_resource
```

```
controlc() {  
  raidcom unlock resource -resource_name meta_resource  
  exit 43  
}
```

trap controlc SIGINT

```
raidcom -login sburr password  
raidcom lock resource -resource_name meta_resource  
raidcom add ldev -pool 0 -capacity 3840000 -ldev_id 9201  
r=$?  
if [ $r -ne 0 ];then  
    raidcom unlock resource -resource_name meta_resource  
    echo command failed with r=$r  
    exit 43  
fi  
raidcom unlock resource -resource_name meta_resource
```

ADDING ASYNCHRONOUS CHECKS TO RAIDCOM

```
raidcom -login sburr password
raidcom lock resource -resource_name meta_resource
raidcom reset command_status
raidcom add ldev -pool 0 -capacity 3840000 -ldev_id 9201
r=$?
if [ $r -ne 0 ];then
    raidcom unlock resource -resource_name meta_resource
    echo command failed with r=$r
    exit 43
fi
if raidcom get command_status |sed 1d| grep -v -- '-      -      0' > /tmp/errs$PID
then
    raidcom unlock resource -resource_name meta_resource
    echo command failed with $(</tmp/errs$PID)
    exit 43
fi
raidcom unlock resource -resource_name meta_resource
```

- Storage navigator and raidcom both use asynchronous tasks:
 - Starts a task but not wait until it is complete
 - Some logical errors are trapped initially, but not all.
- Storage Navigator
 - Almost everything is asynchronous (E.G. add user login)
- Raidcom
 - Fewer tasks are fully asynchronous
 - **raidcom get command_status**
 - **raidcom reset command_status**
 - **raidcom get ldev**
- Raid Manager for replication:
 - You should already know that **all RM replication commands are asynchronous**
 - And that you follow **all** replication commands with a **pairevtwait**

- blocking|add|delete|format|restore **LDEV**
- add|delete **DP_VOL**
- add|delete|unblock **POOL**
- add|delete **RCU|RCU Path**
- create|delete **Journal**
- restore|set|delete|disconnect|check **Epath**
- map|unmap **ELUN**

See User reference manual

LUN, HSD and Port: OK

Extend LDEV

Everything else check.

BATCH, TEST MODE AND PRECHECK

SUBTITLE PLACEHOLDER



- “check mode” a sequence of command with interdependencies.

You want them all to work or all fail.

```
raidcom get ldev -ldev_id 9999 |grep VOL_TYPE
VOL_TYPE : NOT DEFINED
raidcom add lun -port CL3-A SWB_BC-008 -ldev_id 9999 -lun_id 2
raidcom: [EX_CMDRJE] An order to the control/command device was rejected
It was rejected due to SKEY=0x05, ASC=0x26, SSB=0xB958,0x095D on Serial#(53086)
```

- Could script on return code

RAIDCOM BATCH FACILITY:

```
echo raidcom add lun -port CL3-A SWB_BC-008 -lun_id 2 -ldev_id 9999 > bad.bat
echo raidcom add lun -port CL4-A SWB_BC-008 -lun_id 2 -ldev_id 9999 >> bad.bat
echo raidcom modify ldev -ldev_id 0xbd00 -ldev_name "works" >> bad.bat
raidcom -zt bad.bat
raidcom: [EX_CMDRJE] An order to the control/command device was rejected...
raidcom: [EX_CMDRJE] An order to the control/command device was rejected...
```

Notes:

- Windows: must be “bad.bat”, not “bad”
- Unix: must be “./bad or ./bad.bat” even if . is in path, needs +x

Obtain precheck file for ldevs:

```
raidcom get ldev -ldev_id 0 -cnt 65280 -store ldevconf > ldevconf.txt #all ldevs takes a while
```

Precheck:

```
raidcom -zt bad.bat -load ldevconf -checkmode precheck
raidcom add lun -port CL3-A SWB_BC-008 -lun_id 2 -ldev_id 9999
raidcom: LDEV(9999) does not exist as status is [2] on UnitID# 0.
raidcom_#6 : [EX_CTXCHK] Context Check error
raidcom add lun -port CL4-A SWB_BC-008 -lun_id 2 -ldev_id 9999
raidcom: LDEV(9999) does not exist as status is [2] on UnitID# 0.
raidcom_#7 : [EX_CTXCHK] Context Check error
raidcom modify ldev -ldev_id 0xbd00 -ldev_name "works"
echo %errorlevel%
199
```

Guarded run:

```
raidcom -zt bad.bat -load ldevconf
raidcom add lun -port CL3-A SWB_BC-008 -lun_id 2 -ldev_id 9999
raidcom: LDEV(9999) does not exist as status is [2] on UnitID# 0.
raidcom_#6 : [EX_CTXCHK] Context Check error
raidcom add lun -port CL4-A SWB_BC-008 -lun_id 2 -ldev_id 9999
raidcom: LDEV(9999) does not exist as status is [2] on UnitID# 0.
raidcom_#7 : [EX_CTXCHK] Context Check error
raidcom modify ldev -ldev_id 0xbd00 -ldev_name "works"
raidcom get ldev -ldev_id 0xbd00 | grep NAM
LDEV_NAMING : oldname
```

- User Reference Manual has information. It helps to reverse these:

add lun	ldev	attribute
add lun	hgrp	attribute
delete lun	ldev	attribute
delete lun	hgrp	attribute
add device_grp	ldev	attribute
add external_grp	port	attribute
add hba_wwn	hgrp	attribute
add journal	ldev	attribute
add ldev	ldev	add
add path	port	attribute
add rcu	port	attribute
add snap_pool	ldev	attribute
add thp_pool	ldev	attribute
check_ext_storage	ldev	attribute
check_ext_storage	path	port
delete device_grp	ldev	attribute
delete hba_wwn	hgrp	attribute
delete host_grp	hgrp	delete
delete journal	ldev	attribute
delete ldev	ldev	delete
delete path	port	attribute
disconnect path	port	attribute
extend ldev	ldev	attribute
initialize ldev	ldev	attribute
modify host_grp	hgrp	attribute
modify ldev	ldev	attribute
modify port	port	attribute
reset hba_wwn	hgrp	attribute
set hba_wwn	hgrp	attribute

Can check: ldev, port **or** host group (specific):

```
raidcom get host_grp -port CL3-A -store hsd3Aconf  
raidcom -zt bad.bat -load hsd3Aconf -checkmode precheck
```

This passes

Script with everything?:

```
echo raidcom add lun -port CL3-A SWB_BC-008 -lun_id 2 -ldev_id 9999 > bad.bat  
echo raidcom add lun -port CL4-A SWB_BC-008 -lun_id 2 -ldev_id 9999 >> bad.bat  
echo raidcom modify ldev -ldev_id 0xbd00 -ldev_name "works" >> bad.bat  
raidcom lock resource -resource_name meta_resource  
raidcom get ldev -ldev_id 9999 -store ldevconf9999 > ldevconf9999.txt  
raidcom get host_grp -port CL3-A -store hsd3Aconf  
raidcom get host_grp -port CL4-A -store hsd4Aconf  
raidcom -zt bad.bat -load ldevconf9999 -checkmode precheck  
if [ $? < 0 ];exit  
raidcom -zt bad.bat -load hsd3Aconf -checkmode precheck  
if [ $? < 0 ];exit  
raidcom -zt bad.bat -load hsd4Aconf -checkmode precheck  
if [ $? < 0 ];exit  
raidcom -zt bad.bat  
raidcom unlock resource -resource_name meta_resource
```

Perfect?

Not yet. Fix the ldev error and rerun

Passes precheck and context check then:

```
raidcom add lun -port CL3-A SWB_BC-008 -lun_id 2 -ldev_id 0xbd05
raidcom: [EX_CMDRJE] An order to the control/command device was rejected
It was rejected due to SKEY=0x05, ASC=0x26, SSB=0xB958,0x0947 on Serial#(53086)
```

Two more issues:

```
raidcom get lun -port CL3-A SWB_BC-008 -fx | awk '$4==2 {print}'
CL3-A      3  WIN                2      1      bd01      -      53086 40
raidcom get lun -port CL3-A SWB_BC-008 -fx | awk '$4==6 {print}'
CL3-A      3  WIN                5      1      bd05      -      53086 40
```

BULK ACTIVITIES PERFORMANCE

SUBTITLE PLACEHOLDER



```
export LDEV1=9040
export LDEV2=9240
raidcom reset command_status
for ((ldev=$LDEV1;ldev<$LDEV2;ldev++));do

    raidcom add ldev -pool 0 -capacity 3840000 -ldev_id $ldev
    r=$?
    if [ $r -ne 0];then
        raidcom unlock resource -resource_name meta_resource
        echo command failed at ldev=$ldev with r=$r
        exit 43
    fi
    if raidcom get command_status |sed 1d| grep -v -- '-      0' > /tmp/errs$PID; then
        raidcom unlock resource -resource_name meta_resource
        echo command failed at ldev=$ldev with $(</tmp/errs$PID)
        exit 43
    fi
done

raidcom unlock resource -resource_name meta_resource
```

This is
asynchronous

This is
synchronous
and repeated

BULK ACTIVITIES: ASYNCHRONOUS

```
export LDEV1=9040
export LDEV2=9240
raidcom reset command_status
for ((ldev=$LDEV1;ldev<$LDEV2;ldev++));do

    raidcom add ldev -pool 0 -capacity 3840000 -ldev_id $ldev
    r=$?
    if [ $r -ne 0];then
        raidcom unlock resource -resource_name meta_resource
        echo command failed at ldev=$ldev with r=$r
        exit 43
    fi
done

if raidcom get command_status |sed 1d| grep -v -- '-      -      0' > /tmp/errs$PID; then
    raidcom unlock resource -resource_name meta_resource
    echo command failed with $(</tmp/errs$PID)
    exit 43
fi

raidcom unlock resource -resource_name meta_resource
```

**This is
asynchronous**

**This is
asynchronous
and done once**

- Some really long execution commands have special handling:
- format ldev, discard_zero_page, reallocate(sic) have additional status
- use command_status for setup errors but not for progress.
- use **get ldev ...**

STS : NML

OPE_TYPE : QFMT

OPE_RATE : 100

to:

OPE_TYPE : NONE

OPE_RATE : 100

- But not all are visible, see TFM and test it out.
- Use Example: to format 100 real ldevs you must monitor them to keep the number of format commands below 35.

- Modularize standard patterns:
 - Error checking
 - Error alerting
 - Asynchronous
 - Logging
- Combined requests: server+storage
- Check mode or extensive pre-checking
- Rules Of Thumb (N paths odd, N paths !=2)

- Most errors are:
 - Security – which is obvious
 - The infamous “CMD Reject”: use the SSB
 - SSB codes
 - Replication: each manual (TC, SI, COW etc.)
 - Provisioning: CCI User Manual
 - Provisioning: Provisioning Manual
 - Replaces: HDT, HDP, LUSE, VLL, DRU, LUNM

NEW FEATURE

Method	One	Few (200)	Many (2000)
HiCommandCLI addvirtualvolume	180	1.1	
Raidcom add ldev sync	15.6	15.6	(15.6)
Raidcom add ldev async	15.6	0.48	0.34

Add virtual volume

- Size does not affect results

But:

- **hicommandcli addvirtualvolume** only supports one pool and one size if you need **numoflvs=**

BUILDING SOLUTIONS

SUBTITLE PLACEHOLDER



- Most parsing is easy
- Windows shell is hard: **for /f**
- UNIX tools: sort grep cut awk (and PD versions on Windows) good for basics
- Capture all config to file(s) is viable (all ldevs c. 1 minute)
- Some basic scripts:
 - find X with characteristics Y
 - Especially LDEV
 - For each: serial, pool, ldev, hgrp etc.
- Richer tools better: Perl and Python
- One key question: who changes and when.
- Batch mechanism? Loop, Group.
- Interlock
- Parallelism

leveraging sort, cut, awk and grep

Scripts frequently start with data capture,

to answer “which: pool? port? lun#? etc etc”

```
raidcom get ldev -ldev_id 0-65279 -key frnt | grep -v "NOT DEF" > frnt.txt
```

```
raidcom get ldev -ldev_list defined -key rgrp > rgrp.txt
```

Report Pool-vols in pool 0:

```
gawk "/Serial/ || $6~/POOL/ && $5==0" < rgrp.txt
```

Serial#	LDEV#	SL	CL	PID	ATTRIBUTE	R_LVL	RAID_TYPE	DRV_TYPE	DRV_Cap	GRPs	RAID_GRP
...											
53086	8	0	0	0	POOL	RAID5	3D+1P	DKS5B-J300SS	571679368	1	01-09
53086	9	0	0	0	POOL	RAID5	3D+1P	DKS5B-J300SS	571679368	1	01-10
53086	10	0	0	0	POOL	RAID5	3D+1P	DKS5B-J300SS	571679368	1	01-11
53086	11	0	0	0	POOL	RAID5	3D+1P	DKS5B-J300SS	571679368	1	01-12
53086	26	0	0	0	POOL	RAID5	3D+1P	DKS5B-K146SS	285177528	1	05-07
53086	27	0	0	0	POOL	RAID5	3D+1P	DKS5B-K146SS	285177528	1	05-08
53086	128	0	0	0	POOL	RAID5	3D+1P	SDT5A-S200SS	390625002	1	05-09

Report pool-vols for all pools (in order):

```
gawk "/Serial/ || $6~/POOL/" < rgrp.txt | sort -k1,1r -k5
```

Serial#	LDEV#	SL	CL	PID	ATTRIBUTE	R_LVL	RAID_TYPE	DRV_TYPE	DRV_Cap	GRPs	RAID_GRP	...
53086	8	0	0	0	POOL	RAID5	3D+1P	DKS5B-J300SS	571679368	1	01-09	
...												

All V-VOLs in Pool 0 with paths (I.E. are used) and are not command devices:

```
gawk "/Serial/ || $8~/AOU/ && $8!~/CMD/ && $9>0 && $7==0" < frnt.txt
```

Serial#	LDEV#	SL	CL	VOL_TYPE	VOL_Cap(BLK)	PID	ATTRIBUTE	Ports	PORT_No:LU#:GRPNAME ...
53086	1538	0	0	OPEN-V-CVS	209715840	0	CVS AOU	1	CL1-A-1:1:JoeCarlisle_bc00
53086	1539	0	0	OPEN-V-CVS	209715840	0	CVS AOU	1	CL1-A-1:2:JoeCarlisle_bc00
53086	1540	0	0	OPEN-V-CVS	209715840	0	CVS AOU	1	CL1-A-1:3:JoeCarlisle_bc00
53086	1541	0	0	OPEN-V-CVS	209715840	0	CVS AOU	1	CL1-A-1:4:JoeCarlisle_bc00
53086	8228	0	0	OPEN-V-CVS	10487040	0	CVS AOU	2	CL3-A-3:19:SWB_BC-008 CL4-A-3:1:SWB_BC-008
53086	8229	0	0	OPEN-V-CVS	10487040	0	CVS AOU	2	CL3-A-3:20:SWB_BC-008 CL4-A-3:2:SWB_BC-008
53086	48384	0	0	OPEN-V-CVS	1920000	0	CVS HORC AOU	1	CL3-A-3:1:SWB_BC-008
53086	48385	0	0	OPEN-V-CVS	192000000	0	CVS AOU	1	CL3-A-3:2:SWB_BC-008
53086	48386	0	0	OPEN-V-CVS	192000000	0	CVS AOU	1	CL3-A-3:3:SWB_BC-008
53086	48387	0	0	OPEN-V-CVS	192000000	0	CVS AOU	1	CL3-A-3:4:SWB_BC-008
53086	48388	0	0	OPEN-V-CVS	192000000	0	CVS AOU	1	CL3-A-3:5:SWB_BC-008
53086	48389	0	0	OPEN-V-CVS	192000000	0	CVS AOU	1	CL3-A-3:6:SWB_BC-008

Better:

```
raidcom get ldev -ldev_list mapped | gawk "/Serial/ || $8~/AOU/ && $8!~/CMD/ && $7==0"
```

Free LUNs in Pool 0, not command devices and an exact size:

raidcom get ldev -ldev_list unmapped > unmapped.txt

gawk "/Serial/ || \$6==1920000 && \$8~/AOU/ && \$8!~/CMD/ && \$9==0 && \$7==0" < unmapped.txt

Serial#	LDEV#	SL	CL	VOL_TYPE	VOL_Cap(BLK)	PID	ATTRIBUTE	Ports	PORT_No:LU#:GRPNAME
...									
53086	1099	0	0	OPEN-V-CVS	1920000	0	CVS AOU	0	
53086	48427	0	0	OPEN-V-CVS	1920000	0	CVS AOU	0	
53086	48428	0	0	OPEN-V-CVS	1920000	0	CVS AOU	0	

- **raidcom get**, especially **raidcom get ldev** is very powerful
- using these are pretty much essential for a quality solution
- Solution outline:
 - lock
 - get relevant data
 - use this to decide on complete plan
 - execute plan
 - unlock
- raidcom is so fast you often won't consider saving “relevant data” from one run to another (depends on average size and frequency of transactions)
- Example: the longest command is **raidcom get ldev -ldev_id 0-65279**
 - 48 seconds (fibre channel)
- **-ldev_id 0-65279** is no longer required with **-ldev_list mapped** etc. on VSP

- Three key challenge areas:
 - **raidcom get host_grp**
 - **raidcom get hba_wwn**
 - **raidcom get ldev (full)**

raidcom get host_grp -port CL1-A

CL1-A	0	1A-G00	53086	WIN	40
CL1-A	1	JoeCarlisle_bc001	53086	WIN_EX	
CL1-A	3	SWB_BC-013	53086	LINUX/IRIX	40
CL1-A	5	guys_sas_workstation	53086	WIN_EX	
CL1-A	6	test gp	53086	WIN_EX	
CL1-A	7	EJG_HUR_TEST	53086	LINUX/IRIX	
CL1-A	10	JAC_s5JTRLesxc2n1_HSCS_cmddevs_H1	53086	WIN_EX	
CL1-C	0	1C-G00	53086	LINUX/IRIX	
CL1-D	0	1D-G00	53086	LINUX/IRIX	
CL2-A	0	2A-G00	53086	WIN	40

raidcom get hba_grp -port CL1-A

CL1-A	5	guys_sas_workstation	210000e08b1c3c50	53086	scr42u29s23227s_169.254.138.144
CL1-A	10	JAC_s5JTRLesxc2n1_HSCS_cmddevs_H1	10000000c997b13d	53086	GSSESXHOST_h1

CHALLENGE AREAS:

```
raidcom get ldev -ldev_id 9000 -s 53086
Serial# : 53086
LDEV : 9000
VOL_TYPE : OPEN-V-CVS
VOL_Capacity(BLK) : 3840000
NUM_PORT : 0
PORTs :
F_POOLID : NONE
VOL_ATTR : CVS : HDP : HDT
B_POOLID : 0
LDEV_NAMING :
STS : NML
OPE_TYPE : NONE
OPE_RATE : 100
MP# : 2
Used_Block(BLK) : 0
TIER_Relocation : Enable
TIER#1(MB) : 0
TIER#2(MB) : 0
TIER#3(MB) : 0
```

Not impossible to parse, just challenging in bash. I have some examples in `nawk` using state variables.

I'd hate to do it in BAT.

- LDEV name lengths: longer in Snav – changed in latest release
- Character set?
- Size expansion:
 - raidcom extend –capacity 100G - **by 100G**
 - Storage Navigator – **to 100G**
- Copy group and device group not visible or used in storage navigator, or HDvM. Some HRpM support

- Raidcom cannot update HDvM server, if both are used then refreshes are required

- Use a rich language like Python or PERL with full regular expressions and state:

```
'^(CL[0-9A-Z]-[A-HJ-NP-Z])[1-9]*\s+([0-9]+)\s+(.*)\s+([0-9a-f]{16})\s+([0-9]{5})\s+(.*)$'
```

```
'^(CL[0-9A-Z]-[A-HJ-NP-Z])[1-9]*\s+([0-9]+)\s+(.+)\s+([0-9]{5})\s+(.+)$'
```

- Hide the hard parts:
 - Encode single “get data”
 - original data, csv (clean), html

- “scripting” is OK in bash etc.
 - one off, human initiated, human validated, human “workarounds”
- “Solutions” need a more advanced language: Python, PERL etc.
 - continuous use, completely reliable, no gotchas

BUILDING SOLUTIONS

SUBTITLE PLACEHOLDER



```
raidcom get ldev -ldev_id 0-65279 [-key frnt|rgrp|elun]
```

For VSP and USP V, USP fewer

```
raidcom get ldev -ldev_id 0-65279 -key frnt | grep -v "NOT DEF" > frnt.txt
```

```
raidcom get ldev -ldev_id 0-65279 -key rgrp > rgrp.txt
```

All Pool-vols in pool 0:

```
gawk " /Serial/ || $6~/POOL/ && $5==0" < rgrp.txt
```

Serial#	LDEV#	SL	CL	PID	ATTRIBUTE	R_LVL	RAID_TYPE	DRV_TYPE	DRV_Cap	GRPs
RAID_GRP ...										
53086	8	0	0	0	POOL	RAID5	3D+1P	DKS5B-J300SS	571679368	1 01-09
53086	9	0	0	0	POOL	RAID5	3D+1P	DKS5B-J300SS	571679368	1 01-10
53086	10	0	0	0	POOL	RAID5	3D+1P	DKS5B-J300SS	571679368	1 01-11
53086	11	0	0	0	POOL	RAID5	3D+1P	DKS5B-J300SS	571679368	1 01-12
53086	26	0	0	0	POOL	RAID5	3D+1P	DKS5B-K146SS	285177528	1 05-07
53086	27	0	0	0	POOL	RAID5	3D+1P	DKS5B-K146SS	285177528	1 05-08
53086	128	0	0	0	POOL	RAID5	3D+1P	SDT5A-S200SS	390625002	1 05-09

pool-vols for all pools (in order):

```
gawk "/Serial/ || $6~/POOL/" < rgrp.txt | sort -k1,1r -k5
```

Serial#	LDEV#	SL	CL	PID	ATTRIBUTE	R_LVL	RAID_TYPE	DRV_TYPE	DRV_Cap	GRPs
RAID_GRP ...										
53086	8	0	0	0	POOL	RAID5	3D+1P	DKS5B-J300SS	571679368	1 01-09
...										

Serial#	LDEV#	SL	CL	VOL_TYPE	VOL_Cap(BLK)	PID	ATTRIBUTE	Ports	PORT_No:LU#:GRPNAME
---------	-------	----	----	----------	--------------	-----	-----------	-------	---------------------

Serial#	LDEV#	SL	CL	VOL_TYPE	VOL_Cap(BLK)	PID	ATTRIBUTE	Ports
PORT_No:LU#:GRPNAME				...				
53086	1099	0	0	OPEN-V-CVS	1920000	0	CVS HDP	0
53086	48427	0	0	OPEN-V-CVS	1920000	0	CVS HDP	0
53086	48428	0	0	OPEN-V-CVS	1920000	0	CVS HDP	0

- not production code, just an illustration

```
#set up environment
if [[ $1 = "-t" ]];then export T=echo;fi
#hard code into script in this example (would use shell parameters)
export HORCMINST=0
export SERIAL=53086
export PID=$$
export SNUSER=sburr
#actual "change request" parameters
export LDEV1=9000
export CNT=20
SERVERS="oracleA oracleB"
HMODE=WIN
HOPT=40
PORTS="CL1-A CL2-A"
WWNoracleA1="10000000c9434675"
WWNoracleA2="10000000c93fe19a"
WWNoracleB1="10000000c9407116"
WWNoracleA2="10000000c93fae5d"
NAME=ORACLE
```

ADDSERVER.SH EXAMPLE 2

```
export LDEV2=$((LDEV1+CNT))
. ./pre.sh
for server in $SERVERS; do
  for port in $PORTS; do
    export W=WWN$server${port:2:1}
    eval export WWLIST=\${$W}
    rcexec raidcom add host_grp -port $port -host_grp_name $server -s $SERIAL
    rcexec raidcom modify host_grp -s $SERIAL -port $port $server \
      -host_mode $HMODE -host_mode_opt $HOPT
    for WWN in $WWLIST; do
      rcexec raidcom add hba_wwn -s $SERIAL -port $port $server -hba_wwn $WWN
    done
    for ((ldev=LDEV1;ldev<LDEV2;ldev++)); do
      rcexec raidcom add lun -port $port $server -ldev_id $ldev -s $SERIAL
      rcexec raidcom modify ldev -ldev_id $ldev -ldev_name $NAME
    done
  done
done
. ./post.sh
```

```
for ((ldev=$LDEV1;ldev<$LDEV2;ldev++)); do
    rcexec raidcom add lun -port $port $server -ldev_id $ldev -s $SERIAL
done
or
adddevgrp.sh $1 -s $SERIAL addgrp$PID dev $LDEV1 $CNT
rcexec raidcom add lun -s $SERIAL -port $port $server -grp_opt ldev -
    device_grp_name addgrp$PID
...
deldevgrp.sh $1 -s $SERIAL addgrp$PID $LDEV1 $CNT
```

a little better but complexity not worth it unless creating groups anyway.
nohup deldevgrp.sh \$1 -s \$SERIAL addgrp\$PID \$LDEV1 \$CNT &

Secs/LUN	20*2*2	200*2*2
Addserver	0.89	0.8
Addservergrp	0.8	0.68

HORCM FILES

SUBTITLE PLACEHOLDER



- Port # 31001
- raidcom – new CCI command
 - Supports IPCMD and CMD (security?) Devices
- Example horcm99.conf file

```
HORCM_CMD
```

```
#dev_name
```

```
dev_name
```

```
dev_name
```

```
\\.\IPCMD-172.17.45.35-31001
```

The HORCM file starts:

```
HORCM_MON
#ip_address      service      poll(10ms)      timeout(10ms)
NONE      31001      1000      3000
```

NONE binds to all HBA including localhost, not new but good practice

31001 is the new convention for port numbers, migrate over to it:

```
31000    - horcm.conf
31001    - horcm0.conf
31001+N  - horcmN.conf
```

OR HAVE NO HORCM_MON SECTION AT ALL!

OR ANY OTHER HORCM_ SECTION

...LATER

HORCM_CMD

#dev_name	dev_name	dev_name	
\\.\CMD-53086-1024-CL3	\\.\CMD-53086-1024-CL4		Windows
\\.\CMD-53086-1025-CL3:/dev/sd	\\.\CMD-53086-1025-CL4		Linux

- If you follow the syntax above exactly it will be resilient.
The next are single points of failure, they use only one command device :

```
\\.\CMD-53086-1024-CL3  
\\.\CMD-53086-1024  
\\.\CMD-53086
```

:/dev/sd **:/dev/rdisk** etc. once is recommended.

**BEST
PRACTICE**

\\.\IPCMD-172.17.45.35-31001 **Out-of-band** – no command device

172.17.45.35 is IP of SVP, always 31001

With just the **HORCM_CMD** section you can use: raidscan (to write HORCM files) or raidcom (to provision storage and report on configuration).

- HORCM_DEV as before
- HORCM_LDEV as before
- HORCM_DEVG new: uses dkc copy groups and dev groups
- we will using discuss this later

NAMING

SUBTITLE PLACEHOLDER



- **In Storage metadata**
- Objects that can now be named:
 - Host Groups
 - WWN
 - LDEVs
 - Device Groups
 - Copy Groups
 - Pools
- This is persistent and stored in the DKC: can't be lost
- Can be set, viewed and used for management
- You may have to develop and management naming standards.
 - Creator/user name.
 - Lots to learn on this. E.g. initially I included HDP/Real, Size/Pool VP0100G but we can easily report on this now. Business tags may be best
 - Strategic

- Without naming we only have a bunch of decimal/hex numbers to manage
- For better management we need to attach more information (metadata) to storage objects.
- We have had Host Storage Domain and WWN naming for a while and that helps, especially in server identification.
- Everything else was normally spreadsheets or similar outside of the storage. [Which results in accuracy and changer control issues]
- With larger storage teams and higher frequency of changes then metadata becomes more important
- HDvM 6 added LDEV naming but that has limitations
- Raid Manager has naming but that is distributed in HORCM files
- Project, application, owner, customer, LOB, budget....

- Project, application, owner, customer, LOB, budget, tier, class
- When I first started I included: pool, ldev#, size
- But there are better ways of doing things like this, all these are in get ldev etc.
- Even tier/class can be inferred
- What are you likely to group/search on?
- The resource mechanism will evolve more “needed fields” will disappear.

- `raidcom modify ldev -ldev_id 1033 -device_naming SWB_H0A`
- Not the HDvM LDEV name.

```
for ((a=0,d=48407;a<=5;a++,d++));  
do raidcom modify ldev -ldev_id $d -ldev_name SWBDEVGL$a ;  
done
```

```
for /L %i in (0,1,5) do yaddah; done
```

```
raidcom modify ldev -ldev_id 1033 -device_naming SWB_H0A
```

```
for ((a=0,d=48407;a<=5;a++,d++));
```

```
do raidcom modify ldev -ldev_id $d -ldev_name SWBDEVGL$a ;
```

```
done
```

```
for /L %i in (0,1,5) do yaddah; done
```

I recommend label everything

NOT THE SAME AS HCS Labels ☹

REPORTING LDEV NAMES: INQRAID -FN

```
inqraid -fg -CLI -fn $Phys -sort
```

DEVICE_FILE	PORT	SERIAL	LDEV	CTG	H/M/12	SSID	R:Group	LDEV_NIC_NAME
Harddisk1	CL4-A-4	10033	48389	-	-	A8BD	5:03-04	-
Harddisk36	CL8-A-4	10044	112	-	-	A700	5:03-01	-
Harddisk0	CL1-A-4	10044	112	-	-	A700	5:03-01	-
Harddisk21	CL3-A-3	53004	1024	-	-	3504	A:00000	-
Harddisk38	CL4-A-3	53004	1024	-	-	3504	A:00000	-
Harddisk22	CL3-A-3	53004	48384	-	s/s/ss	35BD	A:00000	SWB_H0A
Harddisk23	CL3-A-3	53004	48385	-	s/s/ss	35BD	A:00000	SWB_H0A
Harddisk24	CL3-A-3	53004	48386	-	s/s/ss	35BD	A:00000	SWB_H0A
Harddisk25	CL3-A-3	53004	48387	-	s/s/ss	35BD	A:00000	SWB_H0A
Harddisk26	CL3-A-3	53004	48388	-	s/s/ss	35BD	A:00000	SWB_H0A
Harddisk27	CL3-A-3	53004	48389	-	s/s/ss	35BD	A:00000	SWB_H0A
Harddisk28	CL3-A-3	53004	48390	-	s/s/ss	35BD	A:00000	SWB_H0A
Harddisk37	CL4-A-3	53086	1024	-	-	3004	A:00002	-
Harddisk2	CL3-A-3	53086	1024	-	-	3004	A:00002	-
Harddisk3	CL3-A-3	53086	48384	-	P/s/ss	30BD	A:00000	SWB_H0A
Harddisk4	CL3-A-3	53086	48385	-	s/s/ss	30BD	A:00000	SWB_H0A
Harddisk5	CL3-A-3	53086	48386	-	s/s/ss	30BD	A:00000	SWB_H0A
Harddisk6	CL3-A-3	53086	48387	-	s/s/ss	30BD	A:00000	SWB_H0A

We've had both of these for since 9960 but they have much more use now.
Are synchronized with HDvM names.

- `raidcom add host_grp -port CL3-A -host_grp_name SWB_BC-008`
- `raidcom: Host group ID 3(0x3) will be used for adding.`
- `raidcom modify host_grp -port CL3-A -host_grp_name SWB_BC-008`
 `-host_mode WIN -host_mode_opt 40`
- `raidcom add hba_wwn -port CL3-A-3 -hba_wwn 10000000c948516a`
- `raidcom set hba_wwn -port CL3-A SWB_BC-008 -hba_wwn 10000000c948516a -`
 `wwn_nickname SWB_BC-008A`
- `raidcom add lun -s 53086 -port CL3-A SWB_BC-008 -ldev_id 1024`

- `raidcom get lun -port CL3-A SWB_BC-008`

PORT	GID	HMD	LUN	NUM	LDEV	CM	Serial#	HMO_BITS
CL3-A	3	WIN	0	1	1024	CM	53086	40
CL3-A	3	WIN	1	1	48384	-	53086	40
CL3-A	3	WIN	2	1	48385	-	53086	40

- `raidcom add hba_wwn -port CL3-A -host_grp_name SWB_BC-008`
 `-hba_wwn 10000000c948516a`
- `raidcom get hba_wwn -port CL3-A SWB_BC-008`
- | PORT | GID | GROUP_NAME | WWN | Serial# | NICK_NAME |
|-------|-----|------------|------------------|---------|-------------|
| CL3-A | 3 | SWB_BC-008 | 10000000c948516a | 53086 | SWB_BC-008A |

- `raidcom add host_grp -port CL3-A -host_grp_name SWB_BC-008`
- `raidcom: Host group ID 3(0x3) will be used for adding.`
- `raidcom modify host_grp -port CL3-A -host_grp_name SWB_BC-008`
`-host_mode WIN -host_mode_opt 40`
- `raidcom add hba_wwn -port CL3-A-3 -hba_wwn 10000000c948516a`
- `raidcom set hba_wwn -port CL3-A SWB_BC-008 -hba_wwn 10000000c948516a -`
`wwn_nickname SWB_BC-008A`
- `raidcom add lun -s 53086 -port CL3-A SWB_BC-008 -ldev_id 1024`

- `raidcom get lun -port CL3-A SWB_BC-008`
-

PORT	GID	HMD	LUN	NUM	LDEV	CM	Serial#	HMO_BITS
CL3-A	3	WIN	0	1	1024	CM	53086	40
CL3-A	3	WIN	1	1	48384	-	53086	40
CL3-A	3	WIN	2	1	48385	-	53086	40

- `raidcom get hba_wwn -port CL3-A SWB_BC-008`
-

PORT	GID	GROUP_NAME	WWN	Serial#	NICK_NAME
CL3-A	3	SWB_BC-008	10000000c948516a	53086	SWB_BC-008A

raidcom get pool -key opt

PID	POLS	U(%)	POOL_NAME	Seq#	Num	LDEV#	H(%)	VCAP(%)
000	POLN	7	GSS_Test_HDT	53086	4	8	80	-
001	POLN	0	GSS DMtest AMS-SATA	53086	2	768	80	-
002	POLN	0	GSStest_Shared_R5	53086	4	12	85	100
003	POLN	2	GSStest_Shared_R10	53086	4	20	85	100
004	POLN	0	GSStest_Shared_R5-7+1	53086	4	0	80	100
101	POLN	0	gsstestpool101	53086	1	5	80	100
102	POLN	0	gsstestpool_HDT102	53086	3	4	80	100

```
raidcom add device_grp -device_grp_name SWBDEVG1 DEV1 -ldev_id 0xbd17 -cnt 2
raidcom add device_grp -device_grp_name SWBDEVG1 DEV2 -ldev_id 0xbd19 -cnt 2
raidcom add device_grp -device_grp_name SWBDEVG1 DEV3 -ldev_id 0xbd1b -cnt 2
raidcom get device_grp -device_grp_name SWBDEVG1
```

LDEV_GROUP	LDEV_NAME	LDEV#	Serial#
DEVG1	DEV1	48407	53086
DEVG1	DEV1	48408	53086
DEVG1	DEV2	48409	53086
DEVG1	DEV2	48410	53086
DEVG1	DEV3	48411	53086
DEVG1	DEV3	48412	53086

Management by device group:

```
raidcom delete lun -port CL3-A SWB_BC-014 -grp_opt ldev -device_grp_name SWBDEVG1
raidcom add lun -port CL3-A SWB_BC-014 -grp_opt ldev -device_grp_name SWBDEVG1 DEV1
raidcom add lun -port CL3-A SWB_BC-014 -grp_opt ldev -device_grp_name SWBDEVG1 [DEV2]
raidcom add lun -port CL3-A SWB_BC-014 -grp_opt ldev -device_grp_name SWBDEVG1 DEV3
```

```
raidcom get device_grp -s 10044
```

raidcom command should not be used on this RAID(type = 0,mver = 15).

raidcom: [EX_UNWCOD] unknown function code

raidcom get device_grp

LDEV_GROUP	Serial#
SWB_DG_2850_TEST	53086
SWB_DG_2850_TESTP	53086
GRP1	53086
GRP2	53086

raidcom get device_grp -device_grp_name GRP1

LDEV_GROUP	LDEV_NAME	LDEV#	Serial#
GRP1	DEV1	48384	53086
GRP1	DEV2	48385	53086

raidcom get device_grp -device_grp_name GRP2

LDEV_GROUP	LDEV_NAME	LDEV#	Serial#
GRP2	DEV1	48386	53086
GRP2	DEV2	48387	53086

FIND FREE LUNS

```
raidcom get ldev -ldev_id 0xbd00 -key frnt -cnt 40 | awk '$6==1920000 && $9==0 {print}'
53086 48413 0 0 OPEN-V-CVS 1920000 0 CVS|AOU 0
53086 48414 0 0 OPEN-V-CVS 1920000 0 CVS|AOU 0
53086 48415 0 0 OPEN-V-CVS 1920000 0 CVS|AOU 0
53086 48416 0 0 OPEN-V-CVS 1920000 0 CVS|AOU 0
53086 48417 0 0 OPEN-V-CVS 1920000 0 CVS|AOU 0
```

```
raidcom add device_grp -device_grp_name TEST DEV -ldev_id 48413 -cnt 5
```

```
raidcom get device_grp -device_grp_name TEST DEV
```

LDEV_GROUP	LDEV_NAME	LDEV#	Serial#
TEST	DEV	48413	53086
TEST	DEV	48414	53086
TEST	DEV	48415	53086
TEST	DEV	48416	53086
TEST	DEV	48417	53086

```
raidcom add lun -port CL3-A SWB_BC-014 -grp_opt ldev -device_grp_name TEST
```

**THIS IS OK FOR ADD LUN, DELETE ETC. BUT NOT SUITABLE FOR REPLICATION
AS LDEV_NAME IS NOT UNIQUE**

CREATE UNIQUE NAMES AND COPY GROUP PRIMARY:

- raidcom add device_grp -device_grp_name P0 D1 -ldev_id 48413
- raidcom add device_grp -device_grp_name P0 D2 -ldev_id 48414
- raidcom add device_grp -device_grp_name S0 D1 -ldev_id 48415
- raidcom add device_grp -device_grp_name S0 D2 -ldev_id 48416
- raidcom add copy_grp -copy_grp_name CGTEST0 P0 S0

COPY MU 1:

- raidcom add device_grp -device_grp_name P1 D11 -ldev_id 48413
- raidcom add device_grp -device_grp_name P1 D12 -ldev_id 48414
- raidcom add device_grp -device_grp_name S1 D11 -ldev_id 48417
- raidcom add device_grp -device_grp_name S1 D12 -ldev_id 48418
- raidcom add copy_grp -copy_grp_name CGTEST1 P1 S1 -mirror_id 1

- raidcom get device_grp -device_grp_name P0

LDEV_GROUP	LDEV_NAME	LDEV#	Serial#
P0	D1	48413	53086
P0	D2	48414	53086

TIP: read this for validity like a HORCM_LDEV SECTION except LDEV_GROUP CAN (SHOULD) CHANGE

DO NOT USE:

raidcom add device_grp -device_grp_name SWBDEVG1 DEV1 -ldev_id 0xbd17 -cnt 2
FORMAT FOR REPLICATION

Minimalist HORCM File:

- `more /etc/horcm4.conf`
- `HORCM_CMD`
- `\\.\CMD-53086:/dev/sd`

We restart HORCM to see changes

- `export HORCMINST=4`
- `export HORCC_MRCF=1`
- `horcmshutdown.sh 4`
- `horcmstart.sh 4`

- `raidqry -g`

GNo	Group	RAID_type	IV/H	IV/M	MUN/H	MUN/M
...						
5	CGTEST0	HTC_RAID	18	13	4	64
6	CGTEST1	HTC_RAID	18	13	4	64

pairdisplay -g CGTEST0

Group	PairVol(L/R)	(Port#,TID, LU-M)	,Seq#,LDEV#.P/S,Status,	Seq#,P-LDEV#	M
CGTEST	D1(L)	(CL3-A-6, 0, 12-0)	)53086 48413.SMPL ----,-----	-----	-
CGTEST	D1(R)	(CL3-A-6, 0, 14-0)	)53086 48415.SMPL ----,-----	-----	-
CGTEST	D2(L)	(CL3-A-6, 0, 13-0)	)53086 48414.SMPL ----,-----	-----	-
CGTEST	D2(R)	(CL3-A-6, 0, 15-0)	)53086 48416.SMPL ----,-----	-----	-

paircreate -g CGTEST0 -pvol P0

pairdisplay -g CGTEST0

Group	PairVol(L/R)	(Port#,TID, LU-M)	,Seq#,LDEV#.P/S,Status,	Seq#,P-LDEV#	M
CGTEST	D1(L)	(CL3-A-6, 0, 12-0)	)53086 48413.P-VOL PAIR,53086	48415	-
CGTEST	D1(R)	(CL3-A-6, 0, 14-0)	)53086 48415.S-VOL PAIR,-----	48413	-
CGTEST	D2(L)	(CL3-A-6, 0, 13-0)	)53086 48414.P-VOL PAIR,53086	48416	-
CGTEST	D2(R)	(CL3-A-6, 0, 15-0)	)53086 48416.S-VOL PAIR,-----	48414	-

paircreate -g CGTEST1 -pvol P1

pairdisplay -g CGTEST1

Group	PairVol(L/R)	(Port#,TID, LU-M)	,Seq#,LDEV#.P/S,Status,	Seq#,P-LDEV#	M
CGTEST1	D11(L)	(CL3-A-6, 0, 12-1)	)53086 48413.P-VOL PAIR,53086	48417	-
CGTEST1	D11(R)	(CL3-A-6, 0, 16-0)	)53086 48417.S-VOL PAIR,-----	48413	-
CGTEST1	D12(L)	(CL3-A-6, 0, 13-1)	)53086 48414.P-VOL PAIR,53086	48418	-
CGTEST1	D12(R)	(CL3-A-6, 0, 17-0)	)53086 48418.S-VOL PAIR,-----	48414	-

NOTE: new **-pvol** syntax. Very like **-vl** but directional if you've done the naming right.
Also **-svol**

- Not checked until used (more robust but defer errors)
 - like HORCM files
 - in fact later as duplicate names are not detected
- Treat the DKC as a huge horcm file
 - With the same rules
 - So break it and everyone gets broken?
 - Only one HORCM with group privilege?
- GROUP NAMES globally unique
- DEVICE NAMES globally unique
- “designed to support dynamic change” – but must restart HORCM
- Delete a device group and the dependant copy group goes
- Delete a device and it is removed from all Device Groups

COPY GROUPS: HITACHI TRUECOPY

```
raidcom add device_grp -s 53086 -device_grp_name GRP3P DEV3-1 -ldev_id 48394
raidcom add device_grp -s 53086 -device_grp_name GRP3P DEV3-2 -ldev_id 48395
raidcom add device_grp -s 53086 -device_grp_name GRP3P DEV3-3 -ldev_id 48396
raidcom add device_grp -s 53086 -device_grp_name GRP3P DEV3-4 -ldev_id 48397
```

```
raidcom add device_grp -s 53004 -device_grp_name GRP3S DEV3-1 -ldev_id 48394
raidcom add device_grp -s 53004 -device_grp_name GRP3S DEV3-2 -ldev_id 48395
raidcom add device_grp -s 53004 -device_grp_name GRP3S DEV3-3 -ldev_id 48396
raidcom add device_grp -s 53004 -device_grp_name GRP3S DEV3-4 -ldev_id 48397
```

```
raidcom get device_grp -s 53086 -device_grp_name GRP3
```

LDEV_GROUP	LDEV_NAME	LDEV#	Serial#
GRP3P	DEV3-1	48394	53086
GRP3P	DEV3-2	48395	53086
GRP3P	DEV3-3	48396	53086
GRP3P	DEV3-4	48397	53086

```
raidcom get device_grp -s 53004 -device_grp_name GRP3
```

LDEV_GROUP	LDEV_NAME	LDEV#	Serial#
GRP3S	DEV3-1	48394	53004
GRP3S	DEV3-2	48395	53004
GRP3S	DEV3-3	48396	53004
GRP3S	DEV3-4	48397	53004

```
raidcom add copy_grp -copy_grp_name CG3TC GRP3 -s 53086
raidcom add copy_grp -copy_grp_name CG3TC GRP3 -s 53004
```

```
HORCM_CMD  
\\.\CMD-53086-1024-CL3 \\. \CMD-53086-1024-CL4
```

```
HORCM_LDEVG  
CG3TC          GRP3P      53086
```

```
HORCM_INST  
CG3TC          localhost    31007
```

```
HORCM_CMD  
\\.\CMD-53004-1024-CL3 \\. \CMD-53004-1024-CL4
```

```
HORCM_LDEVG  
CG3TC          GRP3S      53004
```

```
HORCM_INST  
CG3TC          localhost    31008
```

- `paircreate -g CG3TC -ITC6 -f never -v1`
- `paircreate -g CG3TC -ITC6 -f never -pvol GRP3P`
- ...

- raidcom is turning into a robust set of capabilities for customers who want automation of their provisioning
- a few limitations or gotchas but none are huge or unusual
- solid solutions can be constructed but they need the usual attention to detail
- GSS happy to work with you to meet your business goals

QUESTIONS AND DISCUSSION

THANK YOU