HPE Storage Controller Management (ssacli)

31ST JANUARY 2019

This time I decided to do a blog post about the HPE (https://www.hpe.com/nl/en/home.html) Smart Array RAID controllers with their wonderful ssacli tool. The tooling of HPE is very powerful because you can online manage a VMware (https://www.vmware.com/) ESXi host and migrate for example from a RAID 1 volume to a RAID 10 without downtime or change the read and write cache ratio.

So far as I know I haven't seen an identical tool yet from the other server hardware vendors like Cisco, Dell EMC, IBM, and Supermicro. The main difference has always been that the HPE tool can perform the operation live without downtime.

So far as I can remember it has been there for ages. It was already available for VMware ESX 4.0 and is still available in VMware ESXi 6.7. So thumbs-up for HPE :).

Let's talk about controller support. The tool supports the most HPE SmartArray controllers over the last 10 to 15 years, for example, the Smart Array P400 was released in 2005 and is still working fine today.

Here is an overview of supported controllers:

- HPE Smart Array P2XX
- HPE Smart Array P4XX
- HPE Smart Array P7XX
- HPE Smart Array P8XX

HPE SSACLI – Location

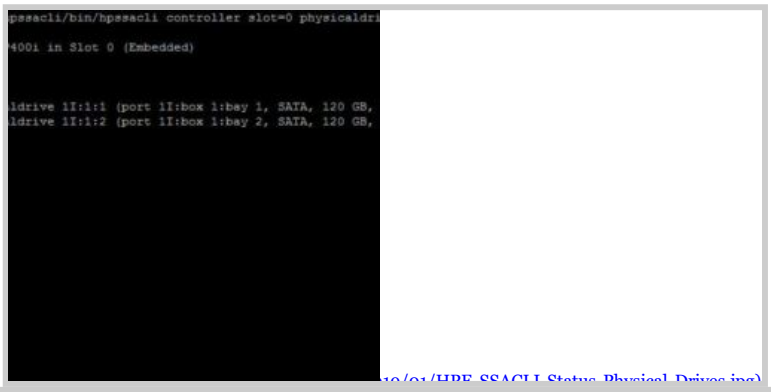
In case you are using the HPE VMware ESXi custom images. The tool is already pre-installed when installing ESXi. The tool is installed as a VIB (vSphere Installable Bundle). This means it can also be updated with vSphere Update Manager.

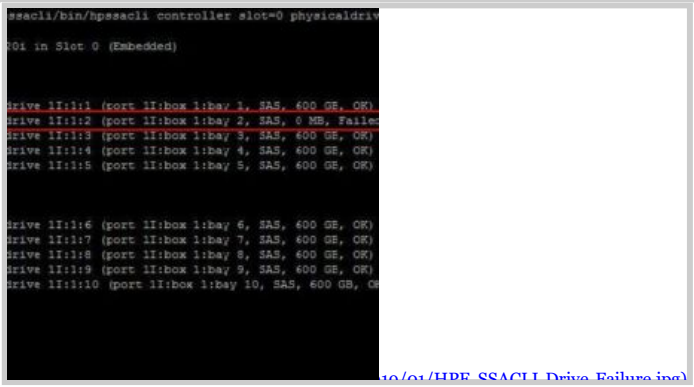
Over the years the name of the HPE Storage Controller Tool has been changed and so has the location. Here is a list of locations that have been used for the last ten years for VMware ESXi:

```
# Location VMware ESXi 4.0/4.1/5.0
/opt/hp/hpacucli/bin/hpacucli

# Location VMware ESXi 5.1/5.5/6.0
/opt/hp/hpssacli/bin/hpssacli

# Location VMware ESXi 6.5/6.7
/opt/smartstorageadmin/ssacli/bin/ssacli
```

HPE SSACLI – Examples

I have collected some screenshots over the years. Screenshots were taken by doing maintenance on VMware ESXi servers. The give you an idea what valuable information can be shown.





HPE SSACLI – Abréviation

All commands have a short name to reduce the length of the total input provided to the ssacli tool:

Shortnames:
- chassisname = ch
- controller = ctrl
- logicaldrive = ld
- physicaldrive = pd
- drivewritecache = dwc
- licensekey = lk

Specify drives:
- A range of drives (one to three): 1E:1:1-1E:1:3
- Drives that are unassigned: allunassigned

HPE SSACLI – Status

To view the status of the controller, disks or volumes you can run all sorts of commands to get information about what is going on in your VMware ESXi server. The extensive detail is very useful for troubleshooting and gathering information about the system.

```
# Show - Controller Slot 1 Controller configuration basic
./ssacli ctrl slot=1 show config

# Show - Controller Slot 1 Controller configuration detailed
./ssacli ctrl slot=1 show detail

# Show - Controller Slot 1 full configuration
./ssacli ctrl slot=1 show config detail

# Show - Controller Slot 1 Status
./ssacli ctrl slot=1 show status

# Show - All Controllers Configuration
./ssacli ctrl all show config

# Show - Controller slot 1 logical drive 1 status
./ssacli ctrl slot=1 ld 1 show status

# Show - Physical Disks status basic
./ssacli ctrl slot=1 pd all show status

# Show - Physical Disk status detailed
./ssacli ctrl slot=1 pd all show status

# Show - Logical Disk status basic
./ssacli ctrl slot=1 ld all show status

# Show - Logical Disk status detailed
./ssacli ctrl slot=1 ld all show detail
```

HPE SSACLI – Creating

Creating a new logical drive can be done online with the HPE Smart Array controllers. I have displayed some basic examples.

```
# Create - New single disk volume
./ssacli ctrl slot=1 create type=ld drives=2I:0:8 raid=0 forced

# Create - New spare disk (two defined)
./ssacli ctrl slot=1 array all add spares=2I:1:6,2I:1:7

# Create - New RAID 1 volume
./ssacli ctrl slot=1 create type=ld drives=1I:0:1,1I:0:2 raid=1 forced

# Create - New RAID 5 volume
./ssacli ctrl slot=1 create type=ld drives=1I:0:1,1I:0:2,1I:0:3 raid=5 forced
```

HPE SSACLI – Adding drives to logical drive

Adding drives to an already created logical drive is possible with the following commands. You need to perform two actions: adding the drive(s) and expanding the logical drive. **Keep in mind:** make a backup before performing the procedure.

```
# Add - All unassigned drives to logical drive 1
./ssacli ctrl slot=1 ld 1 add drives=allunassigned

# Modify - Extend logical drive 2 size to maximum (must be run with the "forced" flag)
./ssacli ctrl slot=1 ld 2 modify size=max forced
```

HPE SSACLI – Rescan controller

To issue a controller rescan, you can run the following command. This can be interesting for when you add new drives in hot swap bays.

```
### Rescan all controllers
./ssacli rescan
```

HPE SSACLI – Drive Led Status

The LED status of the drives can also be controlled by the ssacli utility. An example is displayed below how to enable and disable a LED.

```
# Led - Activate LEDs on logical drive 2 disks
./ssacli ctrl slot=1 ld 2 modify led=on

# Led - Deactivate LEDs on logical drive 2 disks
./ssacli ctrl slot=1 ld 2 modify led=off

# Led - Activate LED on physical drive
./ssacli ctrl slot=0 pd 1I:0:1 modify led=on

# Led - Deactivate LED on physical drive
./ssacli ctrl slot=0 pd 1I:0:1 modify led=off
```

HPE SSACLI – Modify Cache Ratio

Modify the cache ratio on a running system can be interesting for troubleshooting and performance beanchmarking.

```
# Show - Cache Ratio Status
./ssacli ctrl slot=1 modify cacheratio=?

# Modify - Cache Ratio read: 25% / write: 75%
./ssacli ctrl slot=1 modify cacheratio=25/75

# Modify - Cache Ratio read: 50% / write: 50%
./ssacli ctrl slot=1 modify cacheratio=50/50

# Modify - Cache Ratio read: 0% / Write: 100%
./ssacli ctrl slot=1 modify cacheratio=0/100
```

HPE SSACLI – Modify Write Cache

Changing the write cache settings on the storage controller can be done with the following commands:

```
# Show - Write Cache Status
./ssacli ctrl slot=1 modify dwc=?

# Modify - Enable Write Cache on controller
./ssacli ctrl slot=1 modify dwc=enable forced

# Modify - Disable Write Cache on controller
./ssacli ctrl slot=1 modify dwc=disable forced

# Show - Write Cache Logicaldrive Status
./ssacli ctrl slot=1 logicaldrive 1 modify aa=?
```

```
# Modify - Enable Write Cache on Logicaldrive 1
./ssacli ctrl slot=1 logicaldrive 1 modify aa=enable

# Modify - Disable Write Cache on Logicaldrive 1
./ssacli ctrl slot=1 logicaldrive 1 modify aa=disable
```

HPE SSACLI – Modify Rebuild Priority

Viewing or changing the rebuild priority can be done on the fly. Even when the rebuild is already active. Used it myself a couple of times to lower the impact on production.

```
# Show - Rebuild Priority Status
./ssacli ctrl slot=1 modify rp=?

# Modify - Set rebuildpriority to Low
./ssacli ctrl slot=1 modify rebuildpriority=low

# Modify - Set rebuildpriority to Medium
./ssacli ctrl slot=1 modify rebuildpriority=medium

# Modify - Set rebuildpriority to High
./ssacli ctrl slot=1 modify rebuildpriority=high
```

HPE SSACLI – Modify SSD Smart Path

You can modify the HPE SDD Smart Path feature by disabling or enabling. To make clear what the HPE SDD Smart Path includes, here is a official statement by HPE: (https://support.hpe.com/hpsc/doc/public/display?docId=emr_na-a00044117en_us&docLocale=en_US)

“HP SmartCache feature is a controller-based read and write caching solution that caches the most frequently accessed data (“hot” data) onto lower latency SSDs to dynamically accelerate application workloads. This can be implemented on direct-attached storage and SAN storage.”

For example, when running VMware vSAN SSD Smart Path must be disabled for better performance. In some cases worse the entire vSAN disk group fails (https://kb.vmware.com/s/article/2092190).

```
# Note: This command requires the array naming type like A/B/C/D/E

# Modify - Enable SSD Smart Path
./ssacli ctrl slot=1 array a modify ssdsmartpath=enable

# Modify - Disable SSD Smart Path
./ssacli ctrl slot=1 array a modify ssdsmartpath=disable
```

HPE SSACLI – Delete Logical Drive

Deleting a logical drive on the HPE Smart Array controller can be done with the following commands.

```
# Delete - Logical Drive 1
./ssacli ctrl slot=1 ld 1 delete

# Delete - Logical Drive 2
./ssacli ctrl slot=1 ld 2 delete
```

HPE SSACLI – Erasing Physical Drives

In some cases, you need to erase a physical drive. This can be performed with multiple erasing options. Also, you can stop the process.

Erase patterns available:

- Default
- Zero
- Random_zero
- Random_random_zero

```
# Erase physical drive with default erasepattern
./ssacli ctrl slot=1 pd 2I:1:1 modify erase

# Erase physical drive with zero erasepattern
./ssacli ctrl slot=1 pd 2I:1:1 modify erase erasepattern=zero

# Erase physical drive with random zero erasepattern
./ssacli ctrl slot=1 pd 1E:1:1-1E:1:3 modify erase erasepattern=random_zero

# Erase physical drive with random random zero erasepattern
./ssacli ctrl slot=1 pd 1E:1:1-1E:1:3 modify erase erasepattern=random_random_zero

# Stop the erasing process on phsyical drive 1E:1:1
./ssacli ctrl slot=1 pd 1E:1:1 modify stoperase
```

HPE SSACLI – License key

In some cases a licence key needs to be installed on the SmartArray storage controller to enable the advanced features. This can be done with the following command:

```
# License key installation
./ssacli ctrl slot=1 licensekey XXXXX-XXXXX-XXXXX-XXXXX-XXXXX

# License key removal
./ssacli ctrl slot=5 lk XXXXXXXXXXXXXXXXXXXXXXXXXX delete
```

Related sources

A couple of interesting links related to the HPE Storage Controller tool for VMware ESXi:

- SSACLI – Download Page
- VMware ESXi HPE Custom Images

Related Posts:

(https://be-virtual.net/changing-vmware-storage-controller-to-paravirtual-for-centos-7/)

Changing VMware Storage Controller to Paravirtual for CentOS 7 (https://be-virtual.net/changing-vmware-storage-controller-to-paravirtual-for-centos-7/)

In this post, we are going to change the Virtual Storage Controller from LSI Logic...

(https://be-virtual.net/flashing-a-hpe-msa-1040-via-ftp/)

Flashing a HPE MSA 1040 via FTP (https://be-virtual.net/flashing-a-hpe-msa-1040-via-ftp/)

In this article, we are going to flash an HPE MSA 1040 via FTP. At...

(https://be-virtual.net/photon-controller-1-1-0-is-available/)

Photon Controller 1.1.0 is available (https://be-virtual.net/photon-controller-1-1-0-is-available/)

Photon Controller version 1.1.0 is available for download. For those interested here is the official...

by Mischa Buijs

HPE ProLiant VMware vSphere 5.5 vSphere 6.0 vSphere 6.5 vSphere 6.7

ESXi HPE ITQ VMware

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18 comments

30th August 2019 at 15:06

Peter G says:

Useful article, thank you very much!

Reply

6th November 2019 at 00:26

Ian Salgado says:

you can do this DELL server by installing a small utility that lives on the EXSi host. It works on a single host (so no need for vCENTER) you can change the raid, re-build it, expand it, etc, etc,
This is the CLI version
https://www.virtualizationhowto.com/2017/11/manage-dell-raid-in-vmware-esxi-6-5-with-perccli/

There is also a GUI version which I have used before.

Reply

6th November 2019 at 10:00
Mischa Buijs says:

Hello Ian,

Thanks for reaching out and sharing the information!

It is too bad it is not included out of the box. The hpssacli/ssacli does also not require a vCenter Server.

Best regards,

Mischa Buijs

Reply

20th May 2020 at 08:49
Muhammad DUrrani says:

Can I use this utility offline?

Reply

29th May 2020 at 15:12
Mischa Buijs says:

What do you mean with offline?

Reply

3rd July 2020 at 00:20
wilco says:

Thanks for the commands, How about migration from RAID 1 to RAID 5?

Reply

13th July 2020 at 15:57
Mischa Buijs says:

Depending on the controller and license it could be possible. I have not tested this yet!

Reply

6th July 2020 at 17:55
jetten says:

I think the command to install the license key is not correct, the correct command is:
ssacli ctrl slot=1 add licensekey=XXXXX-XXXXX-XXXXX-XXXXX-XXXXX

The command provided in the article just selects all controllers with the specified license key already installed, it does not add any license key.

Reply

13th July 2020 at 15:56
Mischa Buijs says:

Thanks for responding and improving this blog post. I think you are right :).

Reply

24th August 2020 at 10:33
AdamB says:

One note on these commands

Show – Write Cache Status
./ssacli ctrl slot=1 modify dwc=?

Modify – Enable Write Cache on controller
./ssacli ctrl slot=1 modify dwc=enable forced

Modify – Disable Write Cache on controller
./ssacli ctrl slot=1 modify dwc=disable forced

These are to enable/disable drive write cache on the SSD itself NOT the controller. These should be used with caution. If you are not using Enterprise class SSD with cache backup technology on the drives then setting these options could cause data loss. If you are using consumer grade drives such as in a lab environment I would probably leave drive write cache disabled.

from the manual

Enabling or disabling the drive cache

On controllers and drives that support physical drive write cache, you can use this command to enable or disable the write cache for all drives on the controller.
CAUTION: Because physical drive write cache is not battery-backed, you could lose data if a power failure occurs during a write process.

To minimize this possibility, use a backup power supply.

Syntax: modify drivewritecache=enable|disable|? [forced]

Reply

1st September 2020 at 12:01
Charlie M. Stanley says:

Your article was extremely useful. Gud work! Much valued, continue posting some more.

Reply

9th October 2020 at 10:41
Mike Dixson says:

Absolute god send of a page. Thanks!

Reply

25th October 2020 at 21:49
69.16.224.147 says:

Ion casino is a trusted and best online casino site through 2010 which includes dished up
millions of participants in Asia. Ion casino or also known as Ionclub is typically the
top ranking option site because this provides the best experience for gambling online players in Philippines.
With an recognized license to function, this provider ensures that players
create bets without danger, credibility and may be depended on.

Reply

26th October 2020 at 23:32
Keith says:

Can anyone tell me how to enable a drive that has been set as a spare so that it's space can be used? I've tried the add drives command but no go... 😕

Reply

27th October 2020 at 00:04
Keith says:

ctrl slot=0 array A remove spares=2I:1:8
Figured it out... Shared as example.

Reply

3rd November 2020 at 08:47
Aaron says:

Useful article，thank you very much!

Reply

23rd November 2020 at 11:57
Mischa Buijs says:

Thanks Aaron!

Reply

8th December 2020 at 05:04
Deepak says:

Nice Article.

Reply
