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<th>Description</th>
<th>Revision Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.0</td>
<td>Initial Release</td>
<td>Sep 15, 2016</td>
</tr>
<tr>
<td>1.1</td>
<td>Add sub options for ND and NC</td>
<td>Jan 1, 2017</td>
</tr>
<tr>
<td>1.2</td>
<td>Change Manual Format</td>
<td>Feb 15, 2017</td>
</tr>
</tbody>
</table>
Introduction

Samsung SSD DC Toolkit is designed to help users with easy-to-use disk management and diagnostic features for server and data center usage. In addition to providing vital SSD status information, SSD DC Toolkit will assist users in updating firmware, initializing drives, and - etc.

This document is intended as a guide for how to use Samsung SSD DC Toolkit under the Linux-based server/data center environments. It provides a command line interface to interact with the Samsung SSD Drives.
Cautions

1. Samsung SSD DC Toolkit is only for Samsung SSD products and is not recommended for use with other products.

2. Samsung Electronics is not liable for any data loss or other damages that occur while using the software.

3. Samsung is not able to provide any data restoration service in the event of data loss.

For more information, please refer to Samsung SSD DC Toolkit’s End User License Agreement (EULA) at the end of this document.
This document describes how to use the Samsung SSD DC Toolkit software.

**Who should read this manual?**

This manual is intended for Samsung SSD DC Toolkit users. Software users. This manual assumes that the user is familiar with Linux operating systems.

**What does this manual cover?**

This manual contains the following chapters and appendix:

- Chapter 1, Preface
- Chapter 2, Abbreviations, gives the description of various abbreviations.
- Chapter 3, Introduction, describes Samsung SSD DC Toolkit.
- Chapter 4, Command Line Options, describes the command line options for different features.
- Chapter 5, Examples, describes the features of the Samsung SSD DC Toolkit.
# Abbreviations

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ATA</td>
<td>Advanced Technology Attachment</td>
</tr>
<tr>
<td>HDD</td>
<td>Hard Disk Drive</td>
</tr>
<tr>
<td>CLI</td>
<td>Command Line Interface</td>
</tr>
<tr>
<td>IO</td>
<td>Input Output</td>
</tr>
<tr>
<td>PATA</td>
<td>Parallel ATA</td>
</tr>
<tr>
<td>SATA</td>
<td>Serial ATA</td>
</tr>
<tr>
<td>SSD</td>
<td>Solid State Drive</td>
</tr>
<tr>
<td>S.M.A.R.T.</td>
<td>Self-Monitoring, Analysis, and Reporting Technology</td>
</tr>
<tr>
<td>NVMe</td>
<td>Non-Volatile Memory Express</td>
</tr>
</tbody>
</table>
This user guide describes the commands necessary to interact with Samsung SSD drives. The functionality includes:

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>List</td>
<td>Detect list of attached Samsung SSD Drives in the system</td>
</tr>
<tr>
<td>Firmware Update</td>
<td>Update the old firmware of the SSD to the new version</td>
</tr>
<tr>
<td>Erase</td>
<td>Erase data on the SSD by issuing an ATA Format Unit command</td>
</tr>
<tr>
<td>S.M.A.R.T</td>
<td>Display smart information and log temperature of the connected Samsung SSD</td>
</tr>
<tr>
<td>Set Max</td>
<td>Set the maximum address of the Samsung SSD to change its user capacity</td>
</tr>
<tr>
<td>Disk Info</td>
<td>Display current overprovisioning value; max address value; state of write cache; WWN; phy speed; power mode of the Samsung SSD</td>
</tr>
<tr>
<td>Vendor Utility</td>
<td>Collect and display Failure Analysis log or Power Loss Protection log from the Samsung SSD</td>
</tr>
<tr>
<td>Help</td>
<td>Show detailed help</td>
</tr>
</tbody>
</table>
System Requirements

Hardware Requirements

1. SSD
   - The following Samsung SSDs are supported
     - Samsung SSD PM863*
     - Samsung SSD PM863a*
     - Samsung SSD SM863*
     - Samsung SSD SM863a*
     - Samsung SSD PM963*
     *Only for non-customized product

2. Others
   - On Marvell controller, the DC Toolkit feature may not work properly after hot plugging.

Software Requirements

The tool is supported on the following environments.

Linux system requirements

<table>
<thead>
<tr>
<th>OS</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>RHEL 5.7 and later</td>
<td>Refer to the C600 chipset table below</td>
</tr>
<tr>
<td>RHEL 6.1 and later</td>
<td>Refer to the C600 chipset table below</td>
</tr>
<tr>
<td>CentOS</td>
<td>Follows the same limitations as RHEL above</td>
</tr>
<tr>
<td>Ubuntu 12.04 LTS and later</td>
<td>Full support</td>
</tr>
</tbody>
</table>
System Requirements

- The table below lists the limited support for the Intel C600 chipset families due to the well-known ISCI (Intel SAS Driver) driver issue on Linux platform.


<table>
<thead>
<tr>
<th>OS</th>
<th>Feature support</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>RHEL 5.7 and later</td>
<td>Limited support for some ATA commands including Secure Erase, Set Max Address, and FW Update</td>
<td></td>
</tr>
<tr>
<td>RHEL 6.1 and 6.2</td>
<td>Limited support for some ATA commands including Secure Erase, Set Max Address, and FW Update</td>
<td></td>
</tr>
<tr>
<td>RHEL 6.3</td>
<td>Limited support for some ATA commands including Secure Erase, Set Max Address, and FW Update. But it can be fully supported when patched with ISCI 1.4 for RHEL 6.3 (refer to comments on the right)</td>
<td><a href="http://sourceforge.net/projects/intel-sas/files/RHEL6.3%20Driver%20Update%20v1.4.1/">http://sourceforge.net/projects/intel-sas/files/RHEL6.3%20Driver%20Update%20v1.4.1/</a></td>
</tr>
<tr>
<td>RHEL 6.4 and later</td>
<td>Full support</td>
<td></td>
</tr>
</tbody>
</table>

* Support for C600 chipsets has been determined by evaluations and tests in the major part, and the ISCI driver code analysis. On Linux systems, the tool must run with root privileges. This can be done through either sudo or su commands. On Marvell controller, the features of Samsung SSD DC Toolkit may not work properly after hot plugging. Samsung SSD DC Toolkit must be run with administrator privilege.

Known Issues specific to Linux

- Set Max Address and Secure Erase require a power cycle of SSD
- Set Max Address may not work on some Ubuntu distributions due to libATA restrictions
- The following operations are supported for SSDs when connected through the LSI HBA cards. LSI HBA latest bios using is recommended for proper operation:
  - List, Firmware Update, Secure Erase, SMART, Set Max, Disk Information, Command History, and help features only.
  - SMART Self-Test may not work for SSDs when connected through the LSI MegaRAID cards because of MegaRAID time out issue.
  - The following operations are strongly recommended for RAID reconfiguration after command sending because of RAID information broken.
    - Firmware Update, Secure Erase, Set Max
  - In case of NVME device, Vendor unique (such as FA log) features may not work for SSDs in Linux kernel 4.2 or later.
The Samsung SSD SSD DC Toolkit uses Command Line Interface (CLI)

The table given below briefly explains the available command line options. The detailed description of each feature is provided in the next sections of this chapter. For the purpose of illustration, the name of the tool for all examples will be “DCToolkit” to simplify documentation.

<table>
<thead>
<tr>
<th>Option</th>
<th>Arguments</th>
<th>Description</th>
<th>Used With</th>
</tr>
</thead>
<tbody>
<tr>
<td>-H [--help]</td>
<td>N/A</td>
<td>Used to display the command line options</td>
<td>N/A</td>
</tr>
<tr>
<td>-C [--command-history]</td>
<td>N/A</td>
<td>Used to display the history of the previously executed commands.</td>
<td>N/A</td>
</tr>
<tr>
<td>[--force]</td>
<td>N/A</td>
<td>Used to bypass the user prompt.</td>
<td>[--erase] [--firmware-update]</td>
</tr>
</tbody>
</table>
# Command Line Options

<table>
<thead>
<tr>
<th>Option</th>
<th>Arguments</th>
<th>Description</th>
<th>Used With</th>
</tr>
</thead>
<tbody>
<tr>
<td>[--force]</td>
<td>N/A</td>
<td>Used to bypass the user prompt.</td>
<td>-E [--erase]</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>-F [--firmware-update]</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>-NF [--nvme-format-namespace]</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>-NM [--nvme-management-namespace]</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>-ND [--nvme-firmware-download]</td>
</tr>
<tr>
<td>-d [--disk]</td>
<td>Disk Number</td>
<td>Used to input the physical disk index listed in the --list command. Note: For --firmware-update, to select all disks -d [--disk] option should be followed by keyword “A”</td>
<td>-E [--erase]</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>-F [--firmware-update]</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>-S [--smart]</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>-I [--info]</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>-V [--vendor-utility]</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>-NG [--nvme-get-log-pages]</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>-NF [--nvme-format-namespace]</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>-NM [--nvme-management-namespace]</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>-ND [--nvme-firmware-download]</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>-NC [--nvme-firmware-commit]</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>-NV [--nvme-vendor-utility]</td>
</tr>
<tr>
<td>-L [--list]</td>
<td>N/A</td>
<td>Used to display a list of attached Samsung SSD Drives.</td>
<td>N/A</td>
</tr>
<tr>
<td>-S [--smart]</td>
<td>-d [--disk]</td>
<td>Used to select a specific drive connected to the system and get the SMART Value.</td>
<td>N/A</td>
</tr>
<tr>
<td>-q [--query]</td>
<td>N/A</td>
<td>Displays the available LBA percentage</td>
<td>-S [--smart]</td>
</tr>
<tr>
<td>-t [--temperature]</td>
<td>Optional file path or no argument.</td>
<td>Logs the temperature of the SSD in the file path provided or if no argument is given, then temperature will be logged into file in default folder, refer to Smart temperature logging file location</td>
<td>-S [--smart]</td>
</tr>
</tbody>
</table>
# Command Line Options

<table>
<thead>
<tr>
<th>Option</th>
<th>Arguments</th>
<th>Description</th>
<th>Used With</th>
</tr>
</thead>
<tbody>
<tr>
<td>-a [ --analyzer]</td>
<td>--start, --stop</td>
<td>“--start” records the data needed to estimate lifetime of the SSD. “--stop” calculates the lifetime of the SSD from the recorded data.</td>
<td>-S [ --smart]</td>
</tr>
<tr>
<td>-M [ --setmax]</td>
<td>-d [ --disk ], -s [ --set ]</td>
<td>Performs SETMAX related operations on specified SSD.</td>
<td>N/A</td>
</tr>
<tr>
<td>-s [ --set ]</td>
<td>LBA address</td>
<td>Set Max address value with the given number.</td>
<td>-M [ --setmax]</td>
</tr>
<tr>
<td>-r [ --read-native-max]</td>
<td>N/A</td>
<td>Retrieve Native Max Address of the specified disk.</td>
<td>-M [ --setmax]</td>
</tr>
<tr>
<td>-F [ --firmware-update]</td>
<td>-d [ --disk ]</td>
<td>Used to update the firmware of the selected disk connected to HOST system.</td>
<td>N/A</td>
</tr>
<tr>
<td>-E [ --erase]</td>
<td>-d [ --disk ]</td>
<td>Used to erase all the data on the drive by issuing an ATA Format Unit command.</td>
<td>N/A</td>
</tr>
<tr>
<td>-I [ --info]</td>
<td>-d [ --disk ]</td>
<td>Used to display details of the selected disk.</td>
<td>N/A</td>
</tr>
<tr>
<td>-NG [ --nvme-get-log-pages]</td>
<td>-d [ --disk ], -e [ --error ]</td>
<td>Display Log Pages on specified NVMe disk</td>
<td></td>
</tr>
</tbody>
</table>
## Command Line Options

<table>
<thead>
<tr>
<th>Option</th>
<th>Arguments</th>
<th>Description</th>
<th>Used With</th>
</tr>
</thead>
<tbody>
<tr>
<td>-e [ --error ]</td>
<td>count</td>
<td>Display the Error Information.</td>
<td>-NG [--nvme-get-log-pages]</td>
</tr>
<tr>
<td>-s [ --smart ]</td>
<td>N/A</td>
<td>Display the SMART/Health information.</td>
<td>-NG [--nvme-get-log-pages]</td>
</tr>
<tr>
<td>-f [ --firmware ]</td>
<td>N/A</td>
<td>Display the firmware slot information</td>
<td>-NG [--nvme-get-log-pages]</td>
</tr>
<tr>
<td>-t [ --temperature ]</td>
<td>N/A</td>
<td>Display the temperature of selected device.</td>
<td>-NG [--nvme-get-log-pages]</td>
</tr>
<tr>
<td>-l [ --lifetime ]</td>
<td>N/A</td>
<td>Display the remained life time of the selected device (%)</td>
<td>-NG [--nvme-get-log-pages]</td>
</tr>
<tr>
<td>-ue [ --user-data-erase ]</td>
<td>N/A</td>
<td>Erase the all user data on selected device.</td>
<td>-NF [--nvme-format-namespace]</td>
</tr>
<tr>
<td>-ce [ --cryptographic-erase ]</td>
<td>N/A</td>
<td>All user data shall be erased cryptographically.</td>
<td>-NF [--nvme-format-namespace]</td>
</tr>
</tbody>
</table>
How to Use DC Tool Kit

Starting SSD DC Toolkit software

Find a DCToolkit file and execute.

```
[root@localhost /]# ./DCToolkit
```

Usage: ./DCToolkit [operation] ...

Allowed Operations:

- **-L** [ --list ] Shows disks attached to the system
- **-I** [ --info ] Displays the disk details
- **-F** [ --firmware-update ] Updates firmware to specified disk
- **-E** [ --erase ] Securely Erases all data from specified disk
- **-S** [ --smart ] Shows SMART values of specified disk
- **-M** [ --setmax ] Perform SetMax related operations on specified disk
- **-V** [ --vendor-utility ] Execute Vendor Unique command on specified disk
- **-NG** [ --nvme-get-log-pages ] Display Log Pages on specified NVMe disk
- **-NF** [ --nvme-format ] Execute format command on specified NVMe disk
- **-NM** [ --nvme-management-namespace ] Execute management command on specified NVMe disk
- **-ND** [ --nvme-firmware-download ] Updates firmware to specified NVMe disk
- **-NC** [ --nvme-firmware-commit ] Commit the firmware image on specified NVMe disk
- **-NV** [ --nvme-vendor-utility ] Execute Vendor Unique command on specified NVMe disk
- **-C** [ --command-history ] Shows history of the previously executed commands
- **-H** [ --help ] Shows detailed help
- **-license** [ --license ] Shows the End User License Agreement

**-H [ --help ]**

Display the command line options which are supported by DCToolkit application.
How to Use DC Tool Kit

```
[root@localhost /]# ./DCToolkit -H
```

<table>
<thead>
<tr>
<th>Argument</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>-L [ --list ]</td>
<td>Shows disks attached to the system</td>
</tr>
<tr>
<td>-I [ --info ]</td>
<td>Displays the disk details</td>
</tr>
<tr>
<td>-d [ --disk ]</td>
<td>Disk-Number of the disk whose details has to be displayed.</td>
</tr>
<tr>
<td>-F [ --firmware-update ]</td>
<td>Updates firmware to specified disk</td>
</tr>
<tr>
<td>-d [ --disk ]</td>
<td>Disk-Number of the disk or A to select all supported disks to update firmware on.</td>
</tr>
<tr>
<td>-p [ --fwpackage-path ]</td>
<td>Path to the directory containing firmware files.</td>
</tr>
<tr>
<td>--force [ --force ]</td>
<td>Enables the user to perform Firmware Download without prompting for any confirmations.</td>
</tr>
<tr>
<td>-E [ --erase ]</td>
<td>Securely Erases all data from specified disk</td>
</tr>
<tr>
<td>-d [ --disk ]</td>
<td>Disk-Number of the disk to be securely erased.</td>
</tr>
<tr>
<td>--force [ --force ]</td>
<td>Enables the user to perform Secure Erase without prompting for any confirmations.</td>
</tr>
</tbody>
</table>

```
[root@localhost /]# ./DCToolkit -H
```

<table>
<thead>
<tr>
<th>Argument</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>-L [ --list ]</td>
<td>Shows disks attached to the system</td>
</tr>
<tr>
<td>-I [ --info ]</td>
<td>Displays the disk details</td>
</tr>
<tr>
<td>-d [ --disk ]</td>
<td>Disk-Number of the disk whose details has to be displayed.</td>
</tr>
<tr>
<td>-F [ --firmware-update ]</td>
<td>Updates firmware to specified disk</td>
</tr>
<tr>
<td>-d [ --disk ]</td>
<td>Disk-Number of the disk or A to select all supported disks to update firmware on.</td>
</tr>
<tr>
<td>-p [ --fwpackage-path ]</td>
<td>Path to the directory containing firmware files.</td>
</tr>
<tr>
<td>--force [ --force ]</td>
<td>Enables the user to perform Firmware Download without prompting for any confirmations.</td>
</tr>
<tr>
<td>-E [ --erase ]</td>
<td>Securely Erases all data from specified disk</td>
</tr>
<tr>
<td>-d [ --disk ]</td>
<td>Disk-Number of the disk to be securely erased.</td>
</tr>
<tr>
<td>--force [ --force ]</td>
<td>Enables the user to perform Secure Erase without prompting for any confirmations.</td>
</tr>
<tr>
<td>-S [ --smart ]</td>
<td>Shows SMART values of specified disk</td>
</tr>
<tr>
<td>-d [ --disk ]</td>
<td>Disk-Number of the disk to show S M A R T values of</td>
</tr>
</tbody>
</table>
How to Use DC Tool Kit

-C [--command-history]

Display the list of CLI commands executed previously by the user.

Arguments: None

Used with: None

Usage: DCToolkit -- command-history
[or]
DCToolkit -C

[root@localhost /]# ./DCToolkit -C

<table>
<thead>
<tr>
<th>S.No</th>
<th>Start Time</th>
<th>End Time</th>
<th>Command</th>
<th>Result</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>18-Sep-2016 18:07:58</td>
<td>18-Sep-2016 18:08:01</td>
<td>-d 2:0 -V -fa</td>
<td>FAIL</td>
<td>FALog dump is failed</td>
</tr>
<tr>
<td>2</td>
<td>18-Sep-2016 18:08:59</td>
<td>18-Sep-2016 18:09:53</td>
<td>-d 2:0 -V -fa</td>
<td>FAIL</td>
<td>FALog dump is failed</td>
</tr>
<tr>
<td>3</td>
<td>18-Sep-2016 18:10:36</td>
<td>18-Sep-2016 18:10:39</td>
<td>-d 2:0 -V -fa</td>
<td>FAIL</td>
<td>FALog dump is failed</td>
</tr>
<tr>
<td>4</td>
<td>18-Sep-2016 18:10:42</td>
<td>18-Sep-2016 18:10:45</td>
<td>-d 2:0 -V -fa</td>
<td>FAIL</td>
<td>FALog dump is failed</td>
</tr>
<tr>
<td>5</td>
<td>18-Sep-2016 18:10:49</td>
<td>18-Sep-2016 18:10:52</td>
<td>-d 2:0 -V -fa</td>
<td>FAIL</td>
<td>FALog dump is failed</td>
</tr>
<tr>
<td>6</td>
<td>18-Sep-2016 18:32:02</td>
<td>18-Sep-2016 18:32:03</td>
<td>-L</td>
<td>SUCCESS</td>
<td>List completed.</td>
</tr>
</tbody>
</table>
How to Use DC Tool Kit

[--force]

--force is used to bypass all the acknowledgements displayed by the tool and intimates the tool to complete the operation specified without any further user inputs. This option must be used cautiously as it will not prompt the user for the confirmation, which may result in severe data loss.

Arguments: None

Used with: -E [--erase], -T [--trim], -F [--firmware-update]

- NF [--nvme-format-namespace], -NM [ --nvme-management-namespace],
- ND [--nvme-firmware-download]

Usage:

DCToolkit – disk 1 -- erase -- force
DCToolkit – disk 1 -- firmware-update -- p < fwpackage-path > -- force
DCToolkit – disk 1: c -- nvme-format-namespace -- user-data-erase -- force
DCToolkit – disk 1: c -- nvme-management-namespace -- set-lba 9000000000 -- force
DCToolkit – disk 1: c -- nvme-firmware-download -- path { path } -- action 1
-- slot 0 -- force

[or]

DCToolkit – d 1 – E -- force
DCToolkit – d 1 – F -- p < fwpackage-path > -- force
DCToolkit – d 1: c -- NF -- ue -- force
DCToolkit – d 1: c -- NM -- sl 9000000000 -- force
DCToolkit – d 1: c -- ND -- p { path } -- a 1 -- s 0 -- force

[root@localhost ] # ./DCToolkit -d 1 -E --force

---------------------------------------------------------------------------------------------
Samsung SSD DC Tool Kit RC3 Version 1.0.0
Copyright (C) 2016 SAMSUNG Electronics Co. Ltd. All rights reserved.
---------------------------------------------------------------------------------------------
Disk Number: 1 | Model Name: NOHBPMM863a | Firmware Version: GXT50M30
WARNING: Disk Index 1 is connected using Marvell HBA. So Magician features may not work properly.
---------------------------------------------------------------------------------------------
Completed [ 100 %]
[ Erase] Secure Erase completed successfully
How to Use DC Tool Kit

-d [--disk]

--disk is used to input the physical disk index listed in the --list command.

<table>
<thead>
<tr>
<th>Arguments:</th>
<th>None</th>
</tr>
</thead>
<tbody>
<tr>
<td>Used with:</td>
<td>-E [--erase], -F [--firmware-update], S [--smart], -I [--info], -M [--setmax] -NG [--nvme-get-log-pages], -NF [--nvme-format-namespace], -NM [--nvme-management-namespace], -ND [--nvme-firmware-download], -NC [--nvme-firmware-commit]</td>
</tr>
</tbody>
</table>

Usage:

DCToolkit --disk 1 --erase
DCToolkit --disk 1 --firmware-update --path <filepath>
DCToolkit --disk 1 --smart
DCToolkit --disk 1 --setmax --set 123456
DCToolkit --disk 1 --info
DCToolkit --disk 1:c --nvme-format-namespace --user-data-erase
DCToolkit --disk 1:c --nvme-management-namespace --set-lba 900000000
DCToolkit --disk 1:c --nvme-firmware-download --path {path} --action 1 -slot 0
DCToolkit --disk 1:c --nvme-firmware-commit --action 1 --slot 0 [or]
DCToolkit -d 1 -E
DCToolkit -d 1 -F -p <fwpackage-path>
DCToolkit -d 1 -S
DCToolkit -d 1 -M -s 123456
DCToolkit -d 1 -I
DCToolkit -d 1:c --NF --ue
DCToolkit -d 1:c --NM --sl 900000000
DCToolkit -d 1:c --ND --p {path} --a 1 --s 0
DCToolkit -d 1:c --NC --a 1 --s 0

※ Note: Arguments provided above are only for illustration purpose.

For SSDs directly connected to the system, the disk number should be inputted as “-d 0” and for RAID configuration “-d 2:0:1”, where 2 -Library type, 0 -Controller number, and 1 -disk number.
How to Use DC Tool Kit

-L [--list]

Display a list of attached Samsung SSDs.

Arguments: None
Used with: None
Usage: DCToolkit –list [or] DCToolkit –L

[root@localhost /]# ./DCToolkit -L

For normal SSDs connected directly to the system, the “Disk Number” is displayed as a single or natural number (0 or 1 or 2 etc.), but under RAID configuration, the “Disk Number” will be shown in libtype:ctrlid:diskid format (eg: 2:0:1), where 2 – Library type, 0 – Controller Number and 1 – Disk Number. Refer to 4.3 Display Disk List.

In case of NVME device, the Disk Number is displayed as duel number (0:c or 1:c or 2:c etc).

-S [--smart]

Used to select a specific drive connected to the system and get the SMART Value.

For example, if --disk X is specified, where X is the physical disk index, it lists down the SMART attributes of the disk X connected to HOST system.

Also used to log temperature of the disk and estimate its life time and the percentage of the available LBA to replace.

Also used to execute SMART Self-Test.
# How to Use DC Tool Kit

## Arguments:

- `-t [--temperature]` Enables the user to log the temperature of the disk.
- `-q [--query]` Displays the percentage of the available LBA to replace.
- `-a [--analyzer]` Displays the lifetime estimation of the disk by SMART value.
- `--analyzer` should be followed by either `--start` or `--stop` subcommands.
- `-e [--execute]` Execute SMART Self-Test.
- `--execute` should be followed by `--offlineshort`, `--offlineextended`, `--offlineselective`, `--captiveshort`, `--captiveextended`, `--captiveselective`, `--abort`, `--checkstatus` subcommands.

## Used with:

- `--disk` [or] `-d`

## Usage:

**DCToolkit**

- `--disk 1 --smart`
- `--disk 1 --smart --temperature`
- : Use default folder location
- `--disk 1 --smart --temperature /home/`
- : Use `/home/` folder location
- `--disk 1 --smart --query`
- `--analyzer --start`
- : Record the data needed to estimate the life time of SSD.
- `--analyzer --stop`
- : Analyze the lifetime of the SSD using recorded data.
- `--execute --offlineshort`
- `--execute --offlineextended`
- `--execute --offlineselective`
- `--execute --captiveshort`
- `--execute --captiveextended`
- `--execute --captiveselective`
- `--execute --abort`
- `--execute --checkstatus`
- 
- `DCToolkit -d 1 -S`
- `DCToolkit -d 1 -S -t`
- : Uses default folder location
- `DCToolkit -d 1 -S -t /home/`
- : Uses `/home/` folder location
- `DCToolkit -d 1 -S -q`
- `DCToolkit -d 1 -S -a --start`
- : Records the data needed to estimate the life time of SSD.
- `DCToolkit -d 1 -S -a --stop`
- : Analyze the lifetime of the SSD using recorded data.
- `DCToolkit -d 1 -S -e --offlineshort`
- `DCToolkit -d 1 -S -e --offlineextended`
- `DCToolkit -d 1 -S -e --offlineselective`
- `DCToolkit -d 1 -S -e --captiveshort`
- `DCToolkit -d 1 -S -e --captiveextended`
- `DCToolkit -d 1 -S -e --captiveselective`
- `DCToolkit -d 1 -S -e --abort`
- `DCToolkit -d 1 -S -e --checkstatus`
How to Use DC Tool Kit

※ Note:

Default folder location is /usr/local/Magician/SMARTFiles/. Temperature will be logged into a file “Log_Temperature.txt” in default location if no valid file path is provided.

To estimate the lifetime of the SSD, first --analyzer should be run with --start and then with --stop subcommand. If “Wear Leveling Count” of the SSD is same when executing “--start” and “--stop” subcommands, then lifetime is displayed as infinite.

To check the current progress of SMART OFF-LINE SelfTest, “--checkstatus” subcommand should be used.

To stop the execution of SMART OFF-LINE SelfTest, “--abort” subcommand should be used.

Smart temperature logging file location

The default location for Smart temperature logging file is:

Linux: /usr/local/Magician/SMARTFiles/Log_Temperature.txt

[SMART Information]

data@hostname ]# ./DCToolkit -d 1 -s

Samsung SSD DC ToolKit RC3 Version 1.0.0
Copyright (C) 2016 SAMSUNG Electronics Co. Ltd. All rights reserved.

WARNING: Disk Index 1 is connected using Marvell HBA. So Magician features may not work properly.

Disk Number: 1 | Model Name: NOH8APM863a | Firmware Version: GXT50M30

<table>
<thead>
<tr>
<th>ID</th>
<th>Description</th>
<th>Raw</th>
<th>Normalized</th>
<th>Worst</th>
<th>Threshold</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>Reallocated Sector Count</td>
<td>0</td>
<td>100</td>
<td>100</td>
<td>10</td>
<td>OK</td>
</tr>
<tr>
<td>9</td>
<td>Power-on Hours</td>
<td>22</td>
<td>99</td>
<td>99</td>
<td>0</td>
<td>OK</td>
</tr>
<tr>
<td>12</td>
<td>Power-on Count</td>
<td>15</td>
<td>99</td>
<td>99</td>
<td>0</td>
<td>OK</td>
</tr>
<tr>
<td>177</td>
<td>Wear Leveling Count</td>
<td>94</td>
<td>99</td>
<td>99</td>
<td>5</td>
<td>OK</td>
</tr>
<tr>
<td>179</td>
<td>Unused Reserved Block Count (total)</td>
<td>0</td>
<td>100</td>
<td>100</td>
<td>10</td>
<td>OK</td>
</tr>
<tr>
<td>186</td>
<td>Unused Reserved Block Count (total) - Warranty</td>
<td>784</td>
<td>100</td>
<td>100</td>
<td>10</td>
<td>OK</td>
</tr>
<tr>
<td>181</td>
<td>Program Fail Count (total)</td>
<td>0</td>
<td>100</td>
<td>100</td>
<td>10</td>
<td>OK</td>
</tr>
<tr>
<td>182</td>
<td>Erase Fail Count (total)</td>
<td>0</td>
<td>100</td>
<td>100</td>
<td>10</td>
<td>OK</td>
</tr>
<tr>
<td>183</td>
<td>Runtime Bad Count (total)</td>
<td>0</td>
<td>100</td>
<td>100</td>
<td>10</td>
<td>OK</td>
</tr>
<tr>
<td>184</td>
<td>Error Detection</td>
<td>0</td>
<td>100</td>
<td>100</td>
<td>97</td>
<td>OK</td>
</tr>
<tr>
<td>187</td>
<td>Uncorrectable Error Count</td>
<td>0</td>
<td>100</td>
<td>100</td>
<td>0</td>
<td>OK</td>
</tr>
<tr>
<td>190</td>
<td>Airflow Temperature</td>
<td>36</td>
<td>64</td>
<td>60</td>
<td>0</td>
<td>OK</td>
</tr>
<tr>
<td>194</td>
<td>HDD Temperature</td>
<td>1638436</td>
<td>64</td>
<td>60</td>
<td>0</td>
<td>OK</td>
</tr>
<tr>
<td>195</td>
<td>ECC Error Rate</td>
<td>0</td>
<td>200</td>
<td>200</td>
<td>0</td>
<td>OK</td>
</tr>
<tr>
<td>197</td>
<td>Current Pending Sector Count</td>
<td>0</td>
<td>100</td>
<td>100</td>
<td>0</td>
<td>OK</td>
</tr>
<tr>
<td>199</td>
<td>CRC Error Count</td>
<td>0</td>
<td>100</td>
<td>100</td>
<td>0</td>
<td>OK</td>
</tr>
<tr>
<td>202</td>
<td>SSD Mode Status</td>
<td>0</td>
<td>100</td>
<td>100</td>
<td>10</td>
<td>OK</td>
</tr>
<tr>
<td>205</td>
<td>PDR Recovery Count</td>
<td>8</td>
<td>99</td>
<td>99</td>
<td>6</td>
<td>OK</td>
</tr>
<tr>
<td>241</td>
<td>Total LBAs Written</td>
<td>1</td>
<td>99</td>
<td>99</td>
<td>6</td>
<td>OK</td>
</tr>
<tr>
<td>242</td>
<td>Total LBAs Read</td>
<td>24385</td>
<td>99</td>
<td>99</td>
<td>6</td>
<td>OK</td>
</tr>
<tr>
<td>243</td>
<td>SATA Interface Downsifts (total)</td>
<td>1790976</td>
<td>100</td>
<td>100</td>
<td>0</td>
<td>OK</td>
</tr>
<tr>
<td>244</td>
<td>Thermal Throttle Status</td>
<td>0</td>
<td>100</td>
<td>100</td>
<td>0</td>
<td>OK</td>
</tr>
<tr>
<td>245</td>
<td>Taped Workload Media Wear</td>
<td>65535</td>
<td>100</td>
<td>100</td>
<td>0</td>
<td>OK</td>
</tr>
<tr>
<td>246</td>
<td>Taped Workload Host Read/Write Ratio</td>
<td>65535</td>
<td>100</td>
<td>100</td>
<td>0</td>
<td>OK</td>
</tr>
<tr>
<td>247</td>
<td>Taped Workload Timer</td>
<td>65535</td>
<td>100</td>
<td>100</td>
<td>0</td>
<td>OK</td>
</tr>
<tr>
<td>251</td>
<td>NAND Writes</td>
<td>0</td>
<td>100</td>
<td>100</td>
<td>0</td>
<td>OK</td>
</tr>
</tbody>
</table>

WAI(Wear Acceleration Index): 44073040632.00

SUCCESS] Smart feature completed successfully.

Revision 1.2
How to Use DC Tool Kit

[Temperature log]

[root@localhost /]# ./DCoolkit -d 1 -S -t

----------------------------------------------------------------------------
Samsung SSD DC Tool Kit RC3 Version 1.0.0
Copyright (C) 2016 SAMSUNG Electronics Co. Ltd. All rights reserved.
----------------------------------------------------------------------------
WARNING: Disk Index 1 is connected using Marvell HBA. So Magician features may not work properly.
----------------------------------------------------------------------------
Disk Number: 1 | Model Name: NOHBAPO863a | Firmware Version: GXT50M30
----------------------------------------------------------------------------
Serial Number: 1111111111111111 25-01-2017(17:50:46) 36 deg C
----------------------------------------------------------------------------
SMART: Temperature Logging: Successfully logged the temperature.
File: /usr/local/Magician/SMARTFiles/Log_Temperature.txt
----------------------------------------------------------------------------
[SUCCESS] Smart feature completed successfully.

[SSD Lifetime Analyzer]

[root@localhost /]# ./DCoolkit -d 1 -S -a --start

----------------------------------------------------------------------------
Samsung SSD DC Tool Kit RC3 Version 1.0.0
Copyright (C) 2016 SAMSUNG Electronics Co. Ltd. All rights reserved.
----------------------------------------------------------------------------
WARNING: Disk Index 1 is connected using Marvell HBA. So Magician features may not work properly.
----------------------------------------------------------------------------
Disk Number: 1 | Model Name: NOHBAPO863a | Firmware Version: GXT50M30
----------------------------------------------------------------------------
Analyzer: [INFO] Started the analyzer to get the lifetime estimation of disk.
----------------------------------------------------------------------------
[SUCCESS] Smart feature completed successfully.
[root@localhost /]# ./DCoolkit -d 1 -S -a --stop

----------------------------------------------------------------------------
Samsung SSD DC Tool Kit RC3 Version 1.0.0
Copyright (C) 2016 SAMSUNG Electronics Co. Ltd. All rights reserved.
----------------------------------------------------------------------------
WARNING: Disk Index 1 is connected using Marvell HBA. So Magician features may not work properly.
----------------------------------------------------------------------------
Disk Number: 1 | Model Name: NOHBAPO863a | Firmware Version: GXT50M30
----------------------------------------------------------------------------
Analyzer:
Start Time : 2017:01:25 17:51:09
Increase in P/E cycle : 0 (Ave. value)
Increase in Workload : 0 GB
WAI(Wear Acceleration Index) : Calculation Failed because TBW is 0
Lifetime(Estimation) : Infinite Days
----------------------------------------------------------------------------
[SUCCESS] Smart feature completed successfully.
How to Use DC Tool Kit

-F [--firmware-update]

Update the firmware of the selected Samsung SSD connected to the Host system.
If --force is not used then the user will be prompted whether or not to continue the command.

Arguments: <fwpackage-path> [This argument provides the path to the directory containing firmware files and it should be given just after the switch]

Used with: --disk [or] -d

Usage:

DCToolkit --disk 1 --firmware-update --path <fwpackage-path>
DCToolkit --disk A --firmware-update -p <fwpackage-path>
[or]
DCToolkit -d 1 -F -p <fwpackage-path>
DCToolkit -d A -F -p <fwpackage-path>

./DCToolkit -d 1 -F -p ./EXT03X3Q.bin

WARNING: Please note that Firmware Upgrade may format the disk and you will lose your data. Please ensure that data backup is taken before proceeding to Firmware Upgrade. If you are sure then only proceed, otherwise restart the application after taking a backup. Continue Firmware Upgrade? [yes]: yes

Disk Number: 1 | Model Name: Samsung SSD 845DC EVO 960GB | Firmware Version: EXT05W30

/FW Update: Disk is Updated with the New Firmware.

[100%]

[root@localhost 64bin] # /magician -L

Copyright (c) 2014 Samsung Corporation

<table>
<thead>
<tr>
<th>Disk</th>
<th>Model</th>
<th>Serial</th>
<th>Capacity</th>
<th>Drive</th>
<th>Total Bytes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Samsung SSD 845DC EVO 960GB</td>
<td>S1R1NYAF500216A</td>
<td>964GB</td>
<td>GOOD</td>
<td>0.00TB</td>
</tr>
</tbody>
</table>
-e [--erase]

Erase all the data on the drive by using an ATA Format Unit command.

If --force is not used then the user will be prompted whether or not to continue the command. --force option must be used cautiously as it will not prompt the user for the confirmation, which may result in severe data loss.

| Arguments: | None |
| Used with: | --disk [or] -d |
| Usage: | DCToolkit --disk 1 --erase [or] DCToolkit -d 1 -E |

[root@localhost /]# ./DCToolkit -d 1 -E

===========================================================================
> Samsung SSD DC Toolkit RC3 Version 1.0.0
> Copyright (C) 2016 SAMSUNG Electronics Co. Ltd. All rights reserved.
>===========================================================================
> Disk Number: 1 | Model Name: NVMBAPM863a | Firmware Version: GXT58MD0
> WARNING: Disk Index 1 is connected using Marvell HBA. So Magician features may not work properly.
> [[[ WARNING ]]]
> All data on disk will be erased and cannot be recovered, Please take a back up of any data if necessary. Continue Secure Erase ? [ yes ]: yes
>===========================================================================
> Completed [ 100% ]
> [Erase] Secure Erase completed successfully
>===========================================================================

Revision 1.2
# How to Use DC Tool Kit

## -I [--info]

Display the details of the selected Samsung SSD.

### Arguments:

None

### Used with:

--disk [or] -d

### Usage:

DCToolkit --disk 1 --info

[or]

DCToolkit -d 1 -I

```
[root@localhost /]# ./DCToolkit -L

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WARNING: 1 Disks has LDM partition. This tool may not work properly.
WARNING: Disk Index 1 is connected using Marvell HBA. So Magician features may not work properly.

<table>
<thead>
<tr>
<th>Disk</th>
<th>Path</th>
<th>Model</th>
<th>Serial</th>
<th>Firmware</th>
<th>Optionrom</th>
<th>Capacity</th>
<th>Drive</th>
<th>Total Bytes</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>/dev/sda</td>
<td></td>
<td></td>
<td>EXM0286Q</td>
<td>N/A</td>
<td>238 GB</td>
<td>GOOD</td>
<td>0.37 TB</td>
</tr>
<tr>
<td>1</td>
<td>/dev/sdb</td>
<td>NOHEAPMB63a</td>
<td>111111111111111111</td>
<td>GXT50M30</td>
<td>N/A</td>
<td>223 GB</td>
<td>GOOD</td>
<td>0.00 TB</td>
</tr>
<tr>
<td>0:c</td>
<td>/dev/mme0</td>
<td>SAMSUNGMZLW1T9HML5-000FB</td>
<td>S3KHNXOH96730</td>
<td>CKV82710</td>
<td>PNU5R011</td>
<td>218 GB</td>
<td>GOOD</td>
<td>0.00 TB</td>
</tr>
</tbody>
</table>

[root@localhost /]# ./DCToolkit -d 1 -I

Samsung SSD DC Tool Kit R3 Version 1.0.0
Copyright (C) 2016 SAMSUNG Electronics Co. Ltd. All rights reserved.

Disk Number: 1 | Model Name: NOHEAPMB63a | Firmware Version: GXT50M30

WARNING: Disk Index 1 is connected using Marvell HBA, So Magician features may not work properly.

Over Provision | Write Cache | Max address | SCT Write Cache
---------------|-------------|-------------|----------------|
No Partitions  | Enabled     | 460802128   | Not in effect |
SATA Phy Speed | MMN         | Power Status |
6.0Gb/s        | 5602538cfffffff | Active or Idle |
```
# How to Use DC Tool Kit

## -M [--setmax]

Perform SETMAX related operations on specified disk, which will decrease or increase the capacity of the SSD. (Can increase up to maximum capacity supported by the SSD).

### Arguments:
- `-s [--set]`: Set the disk's capacity by taking value in number of sectors in decimal.
- `-r [--read-native-max]`: Display the native max address of the disk in the form of LBA.

### Used with:
- `--disk [or] -d`

### Usage:
- `DCToolkit --disk 1 --setmax --set 1234566`
- `DCToolkit --disk 1 --setmax --read-native-max`

[or]
- `DCToolkit -d 1 -M -s 1234566`
- `DCToolkit -d 1 -M -r`

---

### Setmax --set

```
[root@localhost /]# ./DCToolkit -d 1 -M -s 180080000
```

---

**WARNING:** Disk Index 1 is connected using Marvell HBA. So Magician features may not work properly.

Disk Capacity updated to 85GB.
SET MAX Operation Completed. PowerCycle the disk.

---

```
[root@localhost /]# ./DCToolkit -d 1 -I
```

---

**WARNING:** Disk Index 1 is connected using Marvell HBA. So Magician features may not work properly.

```
No Partitions | Enabled | 1800800001 | Not in effect
SATA Phy Speed | WWN | Power Status | 6.0Gbps | 5802538cfffffff | Active or Idle |
```

---
# How to Use DC Tool Kit

## [Setmax --read-native-max]

```
[root@localhost /]# ./DCToolkit -d 1 -M -r
```

---

**SAMSUNG SSD DC Toolkit RC3 Version 1.0.0**

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---

**Disk Number: 1 | Model Name: NOHBAPM863a | Firmware Version: GXT50M30**

**WARNING:** Disk Index 1 is connected using Marvell HBA. So Magician features may not work properly.

Native SET MAX value of the disk is 468862127 LBAs.

---

## -V [--vendor-utility]

Used to execute Vendor Utility Commands

<table>
<thead>
<tr>
<th>Arguments:</th>
<th>fa [ --FLog-dump ] Enables the user to extract the log data from a coreview block of the SSD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Used with:</td>
<td>--disk</td>
</tr>
<tr>
<td>Usage:</td>
<td>DCToolkit --disk 1 --vendor-utility --FLog-dump [or] DCToolkit -d 1 -V -fa</td>
</tr>
</tbody>
</table>

```
[root@localhost /]# ./DCToolkit -d 1 -V -fa
```

---

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---

**Disk Number: 1 | Model Name: NOHBAPM863a | Firmware Version: GXT50M30**

**MODE #1: SATA_EXCEPTION_LOG**

Created the log dump successfully

Path: /usr/local/Magician/VendorUtility/20170125_17h56m35s_GXT50M30_11111111111111111111FALogDump.enc
## How to Use DC Tool Kit

### - NG [--nvme-get-log-pages]
Display Log Pages on specified NVMe disk

<table>
<thead>
<tr>
<th>Arguments:</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>-l [ --lifetime ]</td>
<td>Display Log Pages on specified NVMe disk</td>
</tr>
<tr>
<td>-e [ --error ]</td>
<td>Display the Error Information.</td>
</tr>
<tr>
<td>-s [ --smart ]</td>
<td>Display the SMART/Health information.</td>
</tr>
<tr>
<td>-f [ --firmware ]</td>
<td>Display the firmware slot information.</td>
</tr>
<tr>
<td>-t [ --temperature ]</td>
<td>Display the temperature of selected device.</td>
</tr>
<tr>
<td>-l [ --lifetime ]</td>
<td>Display the remained life time of the selected device (%)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Used with:</th>
<th>--disk</th>
</tr>
</thead>
<tbody>
<tr>
<td>[or]</td>
<td>-d</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Usage:</th>
<th>DCToolkitD --disk 1:c --nvme-get-log-pages --error {count}</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>DCToolkitD --disk 1:c --nvme-get-log-pages --smart</td>
</tr>
<tr>
<td></td>
<td>DCToolkitD --disk 1:c --nvme-get-log-pages --firmware</td>
</tr>
<tr>
<td></td>
<td>DCToolkitD --disk 1:c --nvme-get-log-pages --temperature</td>
</tr>
<tr>
<td></td>
<td>DCToolkitD --disk 1:c --nvme-get-log-pages --lifetimeor</td>
</tr>
<tr>
<td>[or]</td>
<td>DCToolkitD -d 1:c -NG -e {count}</td>
</tr>
<tr>
<td></td>
<td>DCToolkitD -d 1:c -NG -s</td>
</tr>
<tr>
<td></td>
<td>DCToolkitD -d 1:c -NG -f</td>
</tr>
<tr>
<td></td>
<td>DCToolkitD -d 1:c -NG -t</td>
</tr>
<tr>
<td></td>
<td>DCToolkitD -d 1:c -NG -l</td>
</tr>
</tbody>
</table>
How to Use DC Tool Kit

[root@localhost ]# ./DCToolkit -d 0:c -NG -s

---

Disk Number: 0:c | Model Name: SAMSUNGMZILW1T9HMLS-000FB | Firmware Version: CXV82F1Q

<table>
<thead>
<tr>
<th>Bytes</th>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Critical Warning</td>
<td>8x00</td>
</tr>
<tr>
<td>2:1</td>
<td>Composite Temperature</td>
<td>8x013E</td>
</tr>
<tr>
<td>3</td>
<td>Available Spare</td>
<td>8x64</td>
</tr>
<tr>
<td>4</td>
<td>Available Spare Threshold</td>
<td>8x64A</td>
</tr>
<tr>
<td>5</td>
<td>Percentage Used</td>
<td>8x01</td>
</tr>
<tr>
<td>47:32</td>
<td>Data Units Read</td>
<td>8x00000000000000000000000000000002</td>
</tr>
<tr>
<td>63:48</td>
<td>Data Units Written</td>
<td>8x00000000000000000000000000000000</td>
</tr>
<tr>
<td>79:64</td>
<td>Host Read Commands</td>
<td>8x00000000000000000000000000000000</td>
</tr>
<tr>
<td>95:80</td>
<td>Host Write Commands</td>
<td>8x00000000000000000000000000000000</td>
</tr>
<tr>
<td>111:96</td>
<td>Controller Busy Time</td>
<td>8x00000000000000000000000000000000</td>
</tr>
<tr>
<td>127:112</td>
<td>Power Cycle</td>
<td>8x00000000000000000000000000000001</td>
</tr>
<tr>
<td>143:128</td>
<td>Power On Hours</td>
<td>8x00000000000000000000000000000002</td>
</tr>
<tr>
<td>150:144</td>
<td>Unsafe Shutdowns</td>
<td>8x00000000000000000000000000000000</td>
</tr>
<tr>
<td>175:168</td>
<td>Media and Data Integrity Errors</td>
<td>8x00000000000000000000000000000000</td>
</tr>
<tr>
<td>191:176</td>
<td>Number of Error Information Log Entries</td>
<td>8x00000000000000000000000000000000</td>
</tr>
<tr>
<td>195:192</td>
<td>Warning Composite Temperature Time</td>
<td>8x00000000</td>
</tr>
<tr>
<td>199:196</td>
<td>Critical Composite Temperature Time</td>
<td>8x00000000</td>
</tr>
<tr>
<td>201:200</td>
<td>Temperature Sensor 1</td>
<td>8x013E</td>
</tr>
<tr>
<td>203:202</td>
<td>Temperature Sensor 2</td>
<td>8x0151</td>
</tr>
<tr>
<td>205:204</td>
<td>Temperature Sensor 3</td>
<td>8x0000</td>
</tr>
<tr>
<td>207:206</td>
<td>Temperature Sensor 4</td>
<td>8x0000</td>
</tr>
<tr>
<td>209:208</td>
<td>Temperature Sensor 5</td>
<td>8x0000</td>
</tr>
<tr>
<td>211:210</td>
<td>Temperature Sensor 6</td>
<td>8x0000</td>
</tr>
<tr>
<td>213:212</td>
<td>Temperature Sensor 7</td>
<td>8x0000</td>
</tr>
<tr>
<td>215:214</td>
<td>Temperature Sensor 8</td>
<td>8x0000</td>
</tr>
</tbody>
</table>

---

[Success] Get Log Page Feature completed successfully
How to Use DC Tool Kit

- **NF [--nvme-format-namespace]**

Execute format command on specified NVMe disk

| Arguments: | -ue [--user-data-erase]  
|           | Erase the all user data on selected device.  
|           | -ce [--cryptographic-erase]  
|           | All user data shall be erased cryptographically.  
| Used with: | --disk [or] -d  
| Usage: | DCToolkit --disk 1:c --user-data-erase --user-data-erase  
| | DCToolkitD --disk 1:c --nvme-format-namespace --cryptographic-erase  
| | [or]  
| | DCToolkit -d 1:c -NF -ue  
| | DCToolkit -d 1:c -NF -ce  

[root@localhost ~> ]# ./DCToolkit -d 0:c -NF -ue

-------------------------------------------------------------------------------------

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-------------------------------------------------------------------------------------

Disk Number: 0:c | Model Name: SAMSUNGMZ1LW1T9HMLS-000FB | Firmware Version: CXVB2F1Q
-------------------------------------------------------------------------------------

[ [ WARNING ]]

All data on disk will be erased and cannot be recovered.  
Please take a back up of any data if necessary.  
Continue Format Command ? [ yes ]: yes
-------------------------------------------------------------------------------------

[NVMe Format] Format completed successfully
How to Use DC Tool Kit

- NM [--nvme-management-namespace]

Execute management command on specified NVMe disk

<table>
<thead>
<tr>
<th>Arguments:</th>
<th>-sl [--set-lba]</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Sets namespace lba size on selected device by capacity.</td>
</tr>
<tr>
<td>Used with:</td>
<td>--disk [or] -d</td>
</tr>
<tr>
<td>-Usage:</td>
<td>DCToolkit --disk 1:c --nvme-management-namespace --set-lba 900000000 [or]</td>
</tr>
<tr>
<td></td>
<td>DCToolkit -d 1:c -NM -sl 900000000</td>
</tr>
</tbody>
</table>

[root@localhost /]# ./DCToolkit -d 0:c -NM -sl 180000000
-------------------------------------------------------------------------------
Samsung SSD DC Toolkit RC3 Version 1.0.0
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-------------------------------------------------------------------------------

Disk Number: 0:c | Model Name: SAMSUNGMZILW1T9HML5-000FB | Firmware Version: CXVB2FIQ
-------------------------------------------------------------------------------

[[ WARNING ]]
Please Note that Set LBA feature may change the disk information and you will lose your data
Please Ensure that data backup is taken before proceeding to Set LBA feature
If you are sure then only proceed, otherwise restart the application after taking a backup
Continue Set LBA feature ? [ yes ]: yes
-------------------------------------------------------------------------------

[SUCCESS] Namespace Management feature completed successfully
-------------------------------------------------------------------------------
### How to Use DC Tool Kit

#### - ND [--nvme-firmware-download]

Updates firmware to specified NVMe disk

<table>
<thead>
<tr>
<th>Arguments:</th>
<th>Action:</th>
</tr>
</thead>
</table>
| `-p [ --path ]` | 0: Downloaded image replace the image specified by the Firmware Slot  
This image is not activated |
| `-a [ --action ]` | 1: Downloaded image replaces the image specified by the Firmware Slot.  
This image is activated at the next reset |
| `-s [ --slot ]` | |

<table>
<thead>
<tr>
<th>Used with:</th>
<th>Usage:</th>
</tr>
</thead>
</table>
| `--disk [or] -d` | DCToolkit --disk 1 --nvme-firmware-download --path (path) --action 1 -slot 0 [or]  
DCToolkit -d 1:c -ND --p (path) --a 1 --s 0 |

#### [Detail Sub Option]

<table>
<thead>
<tr>
<th>a0</th>
<th>Download fw at slot</th>
<th>FW IMAGE DOWNLOAD COMMAND + FW COMMIT (Commit Action 000b)COMMAND</th>
<th>v1.1 SPEC</th>
</tr>
</thead>
<tbody>
<tr>
<td>a1</td>
<td>Download fw and activation after reset at slot</td>
<td>FW IMAGE DOWNLOAD COMMAND + FW COMMIT (Commit Action 001b)COMMAND</td>
<td>v1.1 SPEC</td>
</tr>
</tbody>
</table>
How to Use DC Tool Kit

[root@localhost /]# ./DCToolKit -d 0:c -ND -a 1 -s 1 -p ./CXV80G1Q.bin

========================================================================================================

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========================================================================================================

Disk Number: 0:c | Model Name: SAMSUNGMZ1LW1T9HMLS-000FB | Firmware Version: CXV82F1Q

[[ WARNING ]]

Please Note that Firmware Update may format the disk and you will lose your data
Please Ensure that data backup is taken before proceeding to Firmware Update
If you are sure then only proceed, otherwise restart the application after taking a backup
Continue Firmware image download ? [ yes ]: yes

[ERROR] Succeed to download the firmware image, but given slot is read only

========================================================================================================
**How to Use DC Tool Kit**

-NC [--nvme-firmware-commit]

Commit the firmware image on specified NVMe disk

Arguments:
- `a [ --action ]`
  Specifies the action that is taken on the image downloaded with the Firmware Download Feature
- `s [ --slot ]`
  Specifies the firmware slot that shall be used for the Commit Action, if applicable

Action:
- `2`: The image specified by the Firmware Slot is activated at the next reset
- `3`: The image specified by the Firmware Slot is requested to be activated immediately without reset

Used with:  
- `--disk [or] -d`

Usage:
- `DCToolkit --disk 1:c --nvme-firmware-commit --action 2 --slot 0 [or]`
- `DCToolkit -d 1:c -NC -a 2 -s 0`

[Detail Sub Option]

<table>
<thead>
<tr>
<th>a2</th>
<th>activation after reset at slot</th>
<th>FW COMMIT (Commit Action 010b) COMMAND</th>
<th>v1.1 SPEC</th>
</tr>
</thead>
<tbody>
<tr>
<td>a3</td>
<td>activation immediately at slot</td>
<td>FW COMMIT (Commit Action 011b) COMMAND</td>
<td>v1.2 SPEC</td>
</tr>
</tbody>
</table>

[root@localhost /]# ./DCToolkit -d 0:c -NC -a 2 -s 1

---

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---

Disk Number: 0:c  | Model Name: SAMSUNGMZILWT9HML5-0800FB  | Firmware Version: CXVB2F1Q

[SUCCESS] Firmware Commit feature completed successfully

---

Revision 1.2
- NV [--nvme-vendor-utility]

Execute Vendor Unique command on specified NVMe disk

```
Arguments:
-fa [--falog-dump]
Extract the log data from a coreview block of the SSD.

Used with:
--disk [or] -d

Usage:
DCToolkit --disk 1:c --nvme-vendor-utility --falog-dump [or]
DCToolkit -d 1:c --NV --fa
```

[root@localhost /]# ./DCToolkit -d 8:c --NV --fa

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Disk Number: 8:c | Model Name: SAMSUNGMZILW1T9HMLS-000FE | Firmware Version: CXV8FQ

MODE #1: PLP_HANG

Created the log dump successfully
Path: /usr/local/Magician/VendorUtility/20170125_17h58m44s_TXV8FQ_S3HKNX0H900730_FaLogDump.xml
Examples

This chapter explains the details of the features along with the Command Terminal Input and screenshots of the respective features.

Display History of Commands

The Command history table can be displayed using the -C or --command-history command line option. Maximum of 500 command history will be displayed:

```
DCToolkit --command-history
or
DCToolkit -C
```

Display Tool Help

The help table can be displayed using the --help command line option:

```
DCToolkit --help
or
DCToolkit -H
```

Display Disk List

The -L or --list option will display a list of Samsung SSDs which shows the Model Name, Firmware version, Capacity, Disk Heath, TBW etc.

```
DCToolkit --list
or
DCToolkit -L
```

Below figures show the console screen example of disk list display on Linux system

A sample snapshot of disk list feature is shown below, where 4:0:1 is displayed as Disk Number for SSD with model “MZ-7WD2400/0H3”.

4 - Library Type, 0 - Controller Number, 1 - Disk Number.

Disk List display on Linux

```
<table>
<thead>
<tr>
<th>Disk Number</th>
<th>Path</th>
<th>Model</th>
<th>Serial Number</th>
<th>Firmware</th>
<th>Optionrom</th>
<th>Capacity</th>
<th>Drive</th>
<th>Total Bytes</th>
</tr>
</thead>
<tbody>
<tr>
<td>-d 0</td>
<td>&quot;SAMSUNG PM663&quot;</td>
<td>&quot;S15YNYAD4133412&quot;</td>
<td>&quot;013F30&quot;</td>
<td>&quot;N/A&quot;</td>
<td>&quot;223 GB&quot;</td>
<td>&quot;GOOD&quot;</td>
<td>&quot;0.26 TB&quot;</td>
<td></td>
</tr>
</tbody>
</table>
```

※ Note: To run any feature, the disk Number should be mentioned as displayed under the column “Disk Number” in the above snapshot ("-d 0" for only SATA Device and "-d 2:0:1" for RAID configuration, -d 0:c for NVME Device.)
Examples

SMART Information of the Disks

This feature is used to select a specific disk connected to the system and get the SMART value of the disk. This feature will also log the temperature of the SSD and display the estimated life time of the SSD and the percentage of the available LBA to replace.

The below Command Line option will perform the SMART operation:

```
DCToolkit --disk 1 --smart
DCToolkit --disk 1 --smart --temperature (use default location)
DCToolkit --disk 1 --smart --temperature /home/ (store the file in /home/)
DCToolkit --disk 1 --smart --query
DCToolkit --disk 1 --smart --analyzer --start (record data for Lifetime estimation)
DCToolkit --disk 1 --smart --analyzer --stop (display the estimated Lifetime)
DCToolkit --disk 1 --smart --execute --offlineshort
DCToolkit --disk 1 --smart --execute --offlineshort
DCToolkit --disk 1 --smart --execute --offlineextended
DCToolkit --disk 1 --smart --execute --offlineselective
DCToolkit --disk 1 --smart --execute --captive short
DCToolkit --disk 1 --smart --execute --captive extended
DCToolkit --disk 1 --smart --execute --captive selecti ve
DCToolkit --disk 1 --smart --execute --abort
DCToolkit --disk 1 --smart --execute --checkstatus
DCToolkitD --disk 1:c --nvme-get-log-pages --error {count}
DCToolkitD --disk 1:c --nvme-get-log-pages --smart
DCToolkitD --disk 1:c --nvme-get-log-pages --firmware
DCToolkitD --disk 1:c --nvme-get-log-pages --temperature
DCToolkitD --disk 1:c --nvme-get-log-pages --lifetime or
or
DCToolkit -d 1 -S
DCToolkit -d 1 -S -t (use default location)
DCToolkit -d 1 -S -t /home/ (store the file in /home/)
DCToolkit -d 1 -S -q
DCToolkit -d 1 -S -a --start (record the data for Lifetime estimation)
DCToolkit -d 1 -S -a --stop (display the estimated Lifetime)
DCToolkitD -d 1 -S -e --offlineshort
DCToolkitD -d 1 -S -e --offlineextended
DCToolkitD -d 1 -S -e --offlineselective
DCToolkitD -d 1 -S -e --captive short
DCToolkitD -d 1 -S -e --captive extended
DCToolkitD -d 1 -S -e --captive selecti ve
DCToolkitD -d 1 -S -e --abort
DCToolkitD -d 1 -S -e --checkstatus
DCToolkitD -d 1:c -NG -e (count)
DCToolkitD -d 1:c -NG -s
DCToolkitD -d 1:c -NG -f
DCToolkitD -d 1:c -NG -t
DCToolkitD -d 1:c -NG -l
```

※ Note: If no file path is provided to -t command, temperature is logged in the file located at /usr/local/Magician/SMARTFiles/. Filename would be Log_Temperature.txt.
Examples

The default locations for Smart temperature logging files are:

Linux: /usr/local/Magician/SMARTFiles/Log_Temperature.txt

To estimate the life time of the SSD, run -a command with --start option and then with --stop option. If “ID 177” of SMART information is same during --start and --stop option, then life time is displayed as infinite.

To execute the SMART Self-Test, run -e command with appropriate sub option. If --offlineshort, --offlineextended, --offlineselective option selected, it will be stopped by --abort option. Its progress can be displayed with --checkstatus option. If --captiveshort, --captiveextended, --captiveselective option selected, it is impossible to escape the execution during the estimated time.

Firmware Update

This feature is useful for changing SSD’s firmware from old version to new version.

The below given CLI input will perform the firmware update operation on the selected disk:

```
DCToolkit --disk 1 --firmware-update --path <fw-path>
DCToolkit --disk 1:c --nvme-firmware-download --path <fw-path> --action 1 --slot 0
or
DCToolkit -d 1 -F -p <fw-path>
DCToolkit -d 1:c -ND -p <fw-path> --a 1 --s 0
```
Examples

Erase

Erase feature is designed to remove all user data from a drive permanently. This command will put the drive back to its original out-of-box state. This will initially restore its performance to the highest possible level and the best (lowest number) possible write amplification.

The below given CLI input will perform the erase operation on the selected disk:

```
DCToolkit --disk 1 --erase
DCToolkitD --disk 1:c --nvme-format-namespace --user-data-erase
DCToolkitD --disk 1:c --nvme-format-namespace --cryptographic-erase
or
DCToolkit -d 1 -E
DCToolkitD -d 1:c -NF -ue
DCToolkitD -d 1:c -NF --ce
```

※ Note: When the disk is in frozen state, the user has to unplug and plug-in the power cable and restart the erase operation.

Write amplification is an issue that occurs in SSDs that can decrease the lifespan of the SSD and impact performance. The lower the write amplification, the longer will be the lifespan of SSD.

Set Max Address

This feature is for setting maximum address of the SSD. The user has to input the number of sectors in decimal format. This feature is designed to set the physical capacity of SSD. This feature is only recommended to be used on the device at its initial set-up stage. In contrast to over-provisioning modifying max address may result in data loss, particularly when the max address is reduced.

This feature will update the disks capacity with user input value, only if it is successful in reading the max address value of the disk. After successful execution, the updated value of the disk can be observed in --list command.

```
DCToolkit --disk 1 --setmax --set 12345678
DCToolkit --disk 1 --setmax --read-native-max

DCToolkit --disk 1:c --nvme-management-namespace --set-lba 900000000
or
DCToolkit -d 1:M -s 12345678
DCToolkit -d 1:M -r
DCToolkit -d 1:c -NM -sl 900000000
```
Examples

Disk Info
This feature will display disk details such as Overprovision, Write Cache state, Max address value, SCT Write Cache state, WWN, Phy Speed, current Power Mode, etc. of the specified disk.

DCToolkit --disk 1 --info
or
DCToolkit -d 1 -l

Bypass confirmation prompt (--force)
The --force option is used to bypass the confirmation prompt for --erase, --trim and --firmware-update features.

DCToolkit --disk 1 --erase --force
DCToolkit --disk 1 --firmware-update --path <filepath> --force
DCToolkit --disk 1:c --nvme-format-namespace --user-data-erase --force
DCToolkitD --disk 1:c --nvme-format-namespace --cryptographic-erase --force
DCToolkit --disk 1:c --nvme-management-namespace --set-lba 900000000 --force
DCToolkit --disk 1:c --nvme-firmware-download --path {path} --action 1 --slot 0 --force

Vendor Utility
This feature will perform Vendor Utility features such as:

Get the FA-log-dump data

DCToolkit --disk 1 --vendor-utility --FAlog-dump
DCToolkit --disk 1:c --nvme-vendor-utility --falog-dump
[or]  
DCToolkit -d 1 -V -fa
DCToolkit -d 1:c -NV -fa
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<table>
<thead>
<tr>
<th>Components</th>
<th>License</th>
</tr>
</thead>
<tbody>
<tr>
<td>hdparm</td>
<td>BSD 2.0</td>
</tr>
<tr>
<td>Json-cpp</td>
<td>public domain</td>
</tr>
</tbody>
</table>

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## Supported Commands for LSI RAID

<table>
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<th>Feature</th>
<th>Comments</th>
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<tbody>
<tr>
<td>-L [--list]</td>
<td>Show a disk(s) attached to the system</td>
</tr>
<tr>
<td>-F [--firmware-update]</td>
<td>Update firmware to specified disk</td>
</tr>
<tr>
<td>-E [--erase]</td>
<td>Securely Erase all data from specified disk</td>
</tr>
<tr>
<td>-S [--smart]</td>
<td>Show S.M.A.R.T values of specified disk</td>
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<tr>
<td>-M [--setmax]</td>
<td>Perform SetMax related operations on specified disk</td>
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<tr>
<td>-V [--vendor-utility]</td>
<td>Perform Vendor features specific to Samsung SSD</td>
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<tr>
<td>-C [--command-history]</td>
<td>Show history of the previously executed commands</td>
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<tr>
<td>-I [--info]</td>
<td>Display the disk details to the user</td>
</tr>
<tr>
<td>-H [--help]</td>
<td>Show detailed Help</td>
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