Drive Specs Assignment

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Self-Monitoring, Analysis, and Reporting Technology (SMART) is an essential tool for assessing the health and performance of storage devices. This assignment involved using smartctl, a command-line utility, to retrieve and analyze SMART data from my primary NVMe drive. By executing various smartctl commands, I explored key aspects of a drive's health, performance metrics, and potential failure indicators.

Retrieving Comprehensive Drive Information:

After installing the SMART tool, I began by executing the command smartctl -a C: (see Image 1.1). This command provides a detailed overview of the SMART data for the specified drive, including model and serial number, firmware version, and drive type. In Image 1.2, the **"Drive Information"** section displays fundamental details of my NVMe storage device. Notably, this section includes the temperature threshold, a critical factor in a drive's longevity. While I was aware that storage devices have heat limits, I had not previously known the specific temperature threshold for my drive. This section provides essential details, allowing for better understanding and monitoring of a drive's health.

Examining SMART Data and Drive Health:

Image 1.3 showcases the **"SMART Data Attributes"**, which include recorded temperature, power cycles, power-on hours, unsafe shutdowns, and more. The ability of SMART to capture such comprehensive data is remarkable, as it enables users to track drive usage patterns and predict potential failures. Some attributes, such as the number of unsafe shutdowns, likely originate from the driver's internal logs. This information is invaluable for initiative-taking maintenance and forensic analysis, helping identify drive anomalies before they lead to failure.

To verify the overall health status of the drive, I used the command smartctl -H C: (see Image 1.4). This command provides a simple "PASSED" or "FAILED" result, allowing for a quick assessment of drive reliability. Ensuring the SMART tool itself is functioning correctly is crucial, particularly when investigating potential hardware issues.

Conducting a Drive Self-Test:

Next, I attempted to run a short self-assessment using the command smartctl -t short C: (see Image 1.5). This command initiates a quick scan designed to identify potential drive issues. However, after waiting for 30 minutes with no visible progress, I decided to cancel the scan using smartctl -X C:. A longer assessment could have been conducted using smartctl -t long C:, which performs a more extensive scan of the entire drive (Keller, 2024). The short scan, in contrast, is intended for a faster, more focused evaluation.

This analysis highlights the importance of SMART monitoring for assessing drive performance and predicting failures. By using smartctl, I was able to extract valuable data regarding drive health, temperature thresholds, and power usage statistics. These insights are essential for both initiative-taking system maintenance and forensic investigations, ensuring that storage devices remain dependable and secure.

References

Keller, R. (2024, February 20). *How to Monitor and Check SSD and NVMe Drive Health with Smartctl on Ubuntu 22*. LinuxWizardry. https://linuxwizardry.com/how-to-monitor-and-check-ssd-and-nvme-drive-health-with-smartctl-on-ubuntu-22/

Images

Image 1.1

Used the first command, which was "-a."

```
Windows PowerShell
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Install the latest PowerShell for new features and improvements! https://aka.ms/PSWindows

PS C:\Users\rl126> smartctl -a C:
```

Image 1.2

"Start of the information section."

```
=== START OF INFORMATION SECTION ===
Model Number:                       SAMSUNG MZVL4512HBLU-00BTW
Serial Number:                      S73DNU0W439457
Firmware Version:                   HXC70W1Q
PCI Vendor/Subsystem ID:            0x144d
IEEE OUI Identifier:                0x002538
Controller ID:                      7
NVMe Version:                       1.4
Number of Namespaces:               1
Namespace 1 Size/Capacity:          512,110,190,592 [512 GB]
Namespace 1 Utilization:            61,486,804,992 [61.4 GB]
Namespace 1 Formatted LBA Size:     512
Namespace 1 IEEE EUI-64:            002538 e431a16ca0
Local Time is:                      Thu May 23 12:54:13 2024 USMST
Firmware Updates (0x16):            3 Slots, no Reset required
Optional Admin Commands (0x0017):   Security Format Frmw_DL Self_Test
Optional NVM Commands (0x005e):     Wr_Unc DS_Mngmt Wr_Zero Sav/Sel_Feat Timestmp
Log Page Attributes (0x0f):         S/H_per_NS Cmd_Eff_Lg Ext_Get_Lg Telmtry_Lg
Maximum Data Transfer Size:         32 Pages
Warning  Comp. Temp. Threshold:     81 Celsius
Critical Comp. Temp. Threshold:     85 Celsius

Supported Power States
St Op     Max     Active      Idle    RL RT WL WT   Ent_Lat   Ex_Lat
 0 +     7.00W       -          -      0  0  0  0         0        0
 1 +     7.00W       -          -      1  1  1  1         0        0
 2 +     7.00W       -          -      2  2  2  2         0        0
 3 -    0.0600W      -          -      3  3  3  3       200     2800
 4 -    0.0050W      -          -      4  4  4  4      4000    19000

Supported LBA Sizes (NSID 0x1)
Id Fmt  Data  Metadt  Rel_Perf
 0 -     512       0         0
 1 -    4096       0         0
```

Image 1.3

"Start of the SMART data section."

```
=== START OF SMART DATA SECTION ===
SMART overall-health self-assessment test result: PASSED

SMART/Health Information (NVMe Log 0x02)
Critical Warning:                      0x00
Temperature:                           31 Celsius
Available Spare:                       100%
Available Spare Threshold:             10%
Percentage Used:                       0%
Data Units Read:                       5,795,962 [2.96 TB]
Data Units Written:                    4,941,202 [2.52 TB]
Host Read Commands:                    67,332,602
Host Write Commands:                   87,733,543
Controller Busy Time:                  6
Power Cycles:                          2,427
Power On Hours:                        190
Unsafe Shutdowns:                      2
Media and Data Integrity Errors:       0
Error Information Log Entries:         0
Warning  Comp. Temperature Time:       0
Critical Comp. Temperature Time:       0
Temperature Sensor 1:                  31 Celsius

Error Information (NVMe Log 0x01, 16 of 64 entries)
No Errors Logged

Self-test Log (NVMe Log 0x06)
Self-test status: No self-test in progress
No Self-tests Logged
```

Image 1.4

Used the second command, which was "-H"

```
PS C:\Users\rl126> smartctl -H C:
smartctl 7.4 2023-08-01 r5530 [x86_64-w64-mingw32-w11-b22631] (sf-7.4-1)
Copyright (C) 2002-23, Bruce Allen, Christian Franke, www.smartmontools.org

=== START OF SMART DATA SECTION ===
SMART overall-health self-assessment test result: PASSED
```

Image 1.5

Tried to run the "-t" command, however it was too long.

```
PS C:\Users\rl126> smartctl -t short C:
smartctl 7.4 2023-08-01 r5530 [x86_64-w64-mingw32-w11-b22631] (sf-7.4-1)
Copyright (C) 2002-23, Bruce Allen, Christian Franke, www.smartmontools.org

Self-test has begun
Use smartctl -X to abort test
PS C:\Users\rl126> smartctl -X
```