



Linux Testing of NVMe SSDs with Python and SPDK

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Overview

- What is the problem?
 - Developers require cost-effective software solutions for bench-testing SSD firmware
- Why is it important?
 - Hardware-based solutions are typically not available to satisfy all developer needs
- How did we solve it?
 - Leverage industry standard DOS-based programs available from ATA-ATAPI.COM
 - Convert them to Linux, then use SPDK user I/O functions to access raw hardware



Team

- Who are we?

- Burt Wagner President
- Hale Landis Chief Technical Officer
- Mike McKean VP Sales
- Don Matthews VP Engineering



Abstract

- SPDK allows direct access to hardware
 - PCIe Config Space
 - NVMe Controller Registers (pointed to by BAR 0)
- This makes it possible to control one or more NVMe SSDs
- Sophisticated tests may then be constructed

Scope

- Product is aimed at NVMe SSD development engineers
- Support is provided for Engineering Design Verification Testing
- Not intended for manufacturing floor, but it can be used there

NVMEQRWT

- Data integrity test
- Does reads and write, both random and sequential
- Discovers data buffering issues
- Discovers devices returning stale data
- Sequential writes and reads
- Measures performance
- Configurable for number of queues and transfer sizes



NVME TEST

- Supports all valid NVMe commands
- Supports all vendor-unique commands
- Can create any sort of malformed command
- Does not use any in-box device drivers
- Submission queues / Completion queues / PRP lists / SGL lists
- Decodes Identify data inline
- Driven by keyboard input or scripts

Scripting

- Custom scripting language developed over decades
- Context-sensitive help, decodes and displays IDENTIFY data
- Supports:
 - C-style expressions
 - if-else statements
 - while loops
 - subroutines



EDVT Test Suite

- Canned suite of tests
- Set of tests to verify proper function of standard commands
- Set of tests to verify malformed commands

Pipes and High-Level Languages

- Supports communicating with NVMETEST via other languages:
 - C/C++
 - Python
 - Tcl
 - Java
- Currently have a C interface, with Python support coming soon



Licensing

- Anyone can download the free demo versions
- Licensing is yearly, tied to computer (one license per machine)
- License is required for scripts to work

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