Linux* NVMe* Driver

Reference Guide for Developers

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Revision 1
Introduction

This guide is intended for system architects and system administrators designing systems using NVM Express* (NVMe*) with PCI Express (PCIe) Solid-State Drive (SSD) interface.

NVM Express*

NVM Express* (NVMe*) is a specification for accessing Solid-State Drives by means of PCI Express* interface. NVMe* specification defines an optimized register interface, command set and feature set for PCIe-based SSDs. The goals of NVMe* is to unlock the potential of PCIe SSDs now and in the future, and to standardize the PCIe interface.

Build Linux* NVMe* Driver

Refer to www.nvme.org for details.

The NVMe* Linux* driver development utilizes the typical open-source process used by kernel.org. The development mailing list is linux-nvme@lists.infradead.org

The NVMe* for Linux* repository can be accessed at:

http://git.infradead.org/users/willy/linux-nvme.git

The Linux* NVMe* driver intercepts kernel 3.10 and integrates to upstream kernel (3.10 and above)

Development Tools Required

The following packages are required to clone, compile and build new kernel/driver:

- ncurses
- build tools
- git

The System Administrator must be logged in as root to install these packages.

a) Ubuntu based

    `apt-get install git core build-essential libncurses5-dev`

b) RHEL based

    `yum install git-core ncurses ncurses-devel`
    `yum install groupinstall “Development Tools”`

c) SLES based

    `zipper install ncurses-devel git-core`
    `Zipper install –type pattern Basis-Devel`
Build New Linux* Kernel with NVMe* Driver

Pick up a starting distribution, it doesn’t matter from driver’s perspective which distribution you use since it is going to put a new kernel on top of it, so use whatever you are most comfortable with and/or has the required tools.

1. Get kernel and driver:

   The url is:

   http://git/infradead.org/willy/linux-nvme.git

   Git’ing it:

   `git clone git://git/infradead.org/users/willy/linux-nvme.git`

   Or you can download “snapshot” from the top commit

2. Build and Install:

   The clone directory is “linux-nvme” configure and make a new kernel:

   `make menuconfig`

   Select:

   Device Drivers-> Block Devices-> NVM Express block device to <M>

   This creates .config file in the same directory, the menconfig needs ncurses.

   Then run as root:

   `make`

   `make modules`

   `make modules_install`

   `make install`

   Depending on distribution you use, you may have to run update-initramfs and update-grub, but this is usually not necessary.

   Running “make” requires build tools

Once installation is successful, reboot the system to load new kernel and drivers. Usually the new kernel becomes default to boot. Verify it with “uname -a” after booting, the running kernel is 3.10.0-rc variant.
NVMe* Driver Basic Tests

Some basic open source NVMe* test programs you can use for checking NVMe* devices are:
http://git/infradead.org/users/kbusch/nvme-user.git

1. Git’ing source codes:
   git clone git://git.infradead.org/users/kbusch/nvme-user.git

2. Making testing programs:
   Add/modify Makefile with proper lib or header links and compile these programs
   Make

3. Example, check nvme device controller “identify”, “namespace” etc.
   >>sudo./nvme_id-ctrl/dev/nvme0n1
   >>sudo./nvme_id-ns/dev/nvme0n1