The Linux I/O Stack Diagram

version 0.1, 2012-03-06
outlines the Linux I/O stack as of Kernel version 3.3

Applications (Processes)

read(2) write(2) open(2) stat(2) chmod(2) ...

anonymous pages (malloc)

VFS

direct I/O (O_DIRECT)

block based FS
ext2 ext3 ext4
xfs btrfs ifs
iso9660 ...

Network FS
NFS coda
gfs ocfs
smbfs ...

pseudo FS
proc sysfs
pipefs futexfs
usbfs ...

special purpose FS
tmpfs ramfs
devtmpfs

Page Cache

network

Block I/O Layer

optional stackable devices on top of "normal" block devices – work on bios

mdraid device mapper drbd lvm ...

BIOs (Block I/O)

I/O Scheduler

maps bios to requests

cfq deadline noop

hooked in Device Drivers
(hook in similar like stacked devices like mdraid/device mapper do)

/dev/fio*
iomemory-vsl
with module option

/dev/rssd*
mtip32xx

/dev/nvme#n#
nvme

request-based device mapper targets
dm-multipath

SCSI upper layer
/dev/sda /dev/sdb ...

/dev/vd*

/dev/fio*

sysfs (transport attributes)

SCSI mid layer

virtio_blk

iomemory-vsl

Transport Classes
scsi_transport_fc
scsi_transport_sas
scsi_transport_...

SCSI low layer
libata megaraid sas aacraid qla2xxx lpfc ...
ahci ata_piix ...

Physical devices
HDD SSD DVD drive LSI RAID Adaptec RAID Qlogic HBA Emulex HBA ... Fusion-io PCIe Card nvme device Micron PCIe Card