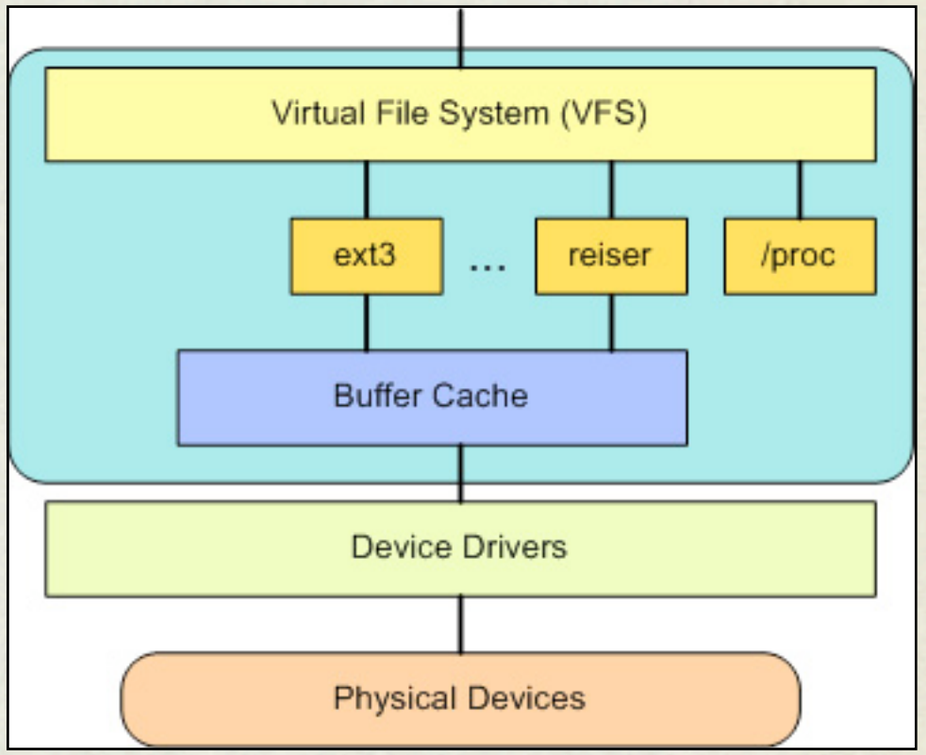
FILESYSTEM ADMINISTRATION

mount? umount? mkfs? fsck?

KERNEL VFS LAYER

- VFS: Virtual File System
- One layer of the kernel is the VFS Abstraction layer. This layer defines a basic interface that all filesystem drivers at minimum must implement.



http://www.ibm.com/developerworks/linux/library/l-linux-kernel/

VFS

- From the user's perspective, the filesystem is simply a hierarchy of directories and files.
- But in reality, some branches might reside on a networked file server, some might be on an optical disc, some on internal drives..
- VFS allows the kernel to stitch all of these disparate storage systems into one cohesive interface!

/ AGAIN

- / is the root of the filesystem, forming the foundation upon which all access is provided.
- When additional filesystems need to be accessible, all that needs to be decided is the pathname to a directory where users can see the filesystem.
- This is known as the mount point.
- The mount point is how the kernel tracks thresholds between filesystems.

LET'S SEE THIS ON THE WHITEBOARD

Mount points:

MOUNT

- `mount`: Attach a filesystem to a given mount point
  - Creates the “detour” sign
  - Linux supports dozens of different filesystem types, available by the simple `-t` option to the mount command:
  - `mount -t smbfs //windoze/share /windoze-share`

UMOUNT

- `umount`: detach mounted filesystem
  - Simply removes the “detour” sign
  - Mount point becomes a simple directory again
  - Generally only need to pass mount point as argument:
  - `umount /windoze-share`

MOUNT/UMOUNT EXAMPLES

PARTITIONING

- What is partitioning?
  - Splitting up a hard drive into organizable chunks
- Why?
  - Isolates filesystem corruption
  - Simplifies/speeds backups
  - Allows optimizing filesystems to tasks

FDISK

- `fdisk`: partitioning tool
- Works on one disk at a time, allows for viewing and manipulating partition table.
- Fairly complex tool, so live example will be best

MKFS

- `mkfs`: format a device to create a new filesystem
  - “Paints the parking stripes” for the filesystem structure
  - Creates superblock, block groups, superblock copies, bitmaps and inode tables and creates basic structure on disk
  - Through `-t` option, mkfs can create different types of filesystems
  - Live Example…

FILESYSTEM INTEGRITY CHECKS

- `fsck`: Filesystem Check
  - Generally only run when a filesystem needs it:
    - Mount count
    - Last check
    - Dirty
- Checks all of the filesystem structures for accuracy and completeness

EXERCISES

- Un-mount the /lab filesystem.

- Rebuild the /lab filesystem (better figure out the right device name!) using ext3, a blocksize of 1k, and a reserve space of 2%. Confirm settings with tune2fs. Mount the /lab filesystem when complete.

- Un-mount the /lab filesystem and force an integrity check. Re-mount the /lab filesystem. Use e2label to set the filesystem label on /lab to '/lab'.

LVM

- The Logical Volume Manager
  - Abstracts the physical hardware into logical drive spaces which can be dynamically grown/shrunk and span disparate physical devices
  - Simplifies hard drive management as it abstracts away the details of the underlying storage devices.
  - Adds a small amount of overhead to the VFS layer, slightly reducing performance.

LVM BASIC IDEA

- To create a space suitable for `mkfs`, three steps must occur:
  - `pvcreate`: Create a physical volume
  - `vgcreate`: Create a volume group on PV
  - `lvcreate`: Create a logical volume on VG
- See also `pvdisplay`, `vgdisplay`, `lvdisplay`

```
slideshow.end();
```