

What Goes Where?

An introduction to the
Filesystem Hierarchy Standard.

Adam John Trickett

www.iredale.net
adam.trickett@iredale.net
PGP Key: 0x166C4BF0

Filesystem Hierarchy Standard

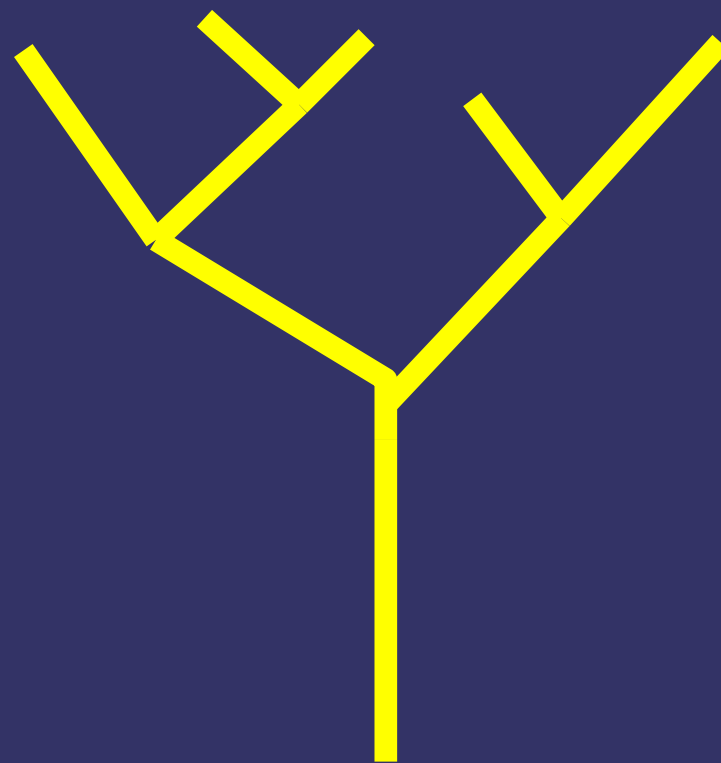
- The Filesystem Hierarchy Standard (FHS) was designed as a standard filesystem layout for any Unix, Linux or POSIX like operating system
- Current version 2.3, released January 2004
- <http://www.pathname.com/fhs/>
- Not every distribution complies totally – there will be differences

Filesystem Types

- Shareability
 - Generic: filesystem can be used on several different computers
 - Unique: filesystem needs to be specific to only one computer
- Variability
 - Static: filesystem does not change and may be mounted read-only
 - Dynamic: filesystem changes and must be mounted read-write

The Root Filesystem

- The base of the filesystem
- Everything hangs off the root
- May be tiny
- Should not have anything in it other than the specified files in the FHS



/

- bin
- boot
- dev
- etc
- home
- lib
- libXXX
- media
- mnt
- opt
- root
- sbin
- srv
- tmp
- usr
- var

`/bin` and `/sbin`

- The basic binaries must be stored on the “root” filesystem
- Contains **ONLY** the binaries to run the system in single user mode with no other filesystems mounted
- `/bin` contains binaries for users and the root user
- `/sbin` contains binaries intended for only root
- The FHS lists exactly which binaries **MUST** be present

/dev

- For special or “device” files
- Must contain a command called MAKEDEV
- Structure depends on device method
 - udev, devfs or manual
- SCSI, USB and SATA
 - sd<letter> + <number> e.g. /dev/sda1
- ATA (may be sd)
 - hd<letter> + <number> e.g. /dev/hda2
- BSDs and other Unix use different scheme

/etc

- Host-specific configuration files
- Most modern programs have a configuration file or directory in this tree:
 - foo => /etc/foo.conf
 - bar => /etc/bar/config
- init.d (not FHS)
 - Most Linux and BSDs keep their initiation scripts in /etc/init.d and have links to them in the runlevel rcX.d directories – distro specific

/boot

- Must be accessible by the boot loader
- Sometimes on it's own filesystem
 - Disk geometry restrictions
 - LVM or RAID reasons
 - Easy configuration for multi-boot
- Normally contains your boot system images: `/boot/vmlinuz-foo`
- GRUB is installed here `/boot/grub/`

/mnt and /media

- These are mount points for other filesystems
- Removable media should be mounted in `media`
 - `/media/usb-key` `/media/zip` `/media/cdrom`
- Other temporary filesystems go in `/mnt`
 - `/mnt/tmp-iso` `/mnt/lappy` `/mnt/hd7`
- Links in `/` to `/mnt` and `/media` permitted but discouraged

/opt, /etc/opt & /var/opt

- For “Add-on Application Packages”
- Self contained hierarchies
- Common in Unix less common in Linux, except for large commercial packages
- Static applications:
 - /opt/<package>/bin or /opt/<provider>
- Dynamic applications:
 - /var/opt

/usr

- Shareable and read-only, may be mounted from a remote system
- bin
- include
- lib
- local
- sbin
- share
- X11R6
- games
- libXXX
- libYYY -> lib
- src
- spool -> /var/spool
- spool/locks -> /var/spool/locks
- tmp -> /var/tmp

/home and /root

- Optional but common
- /home/userXXX
 - Home directory hierarchy for users
 - Often on own filesystem or remotely mounted
- /root
 - Home directory hierarchy for “root” user
- User specific configuration data usually stored in “dot” files in the users home directory: .bashrc and .kde/

/var

- Variable content
 - Not found on older Unix and Linux distros
- cache
- lib
- local
- log
- opt
- run
- spool
- tmp
- account
- crash
- games
- mail
- yp

`/usr/local` and `/var/local`

- System Local applications and data – should be safe from distro automated tools
- `bin`
- `etc`
- `games`
- `include`
- `lib`
- `man`
- `sbin`
- `share`
- `src`

/tmp and /var/tmp

- Temporary data, usually world write and readable
- Volatile – assume it will be purged automatically
 - /tmp
- Persistent – will not be automatically purged
 - /var/tmp

`/lib`, `/libXXX`, `/usr/lib`,
`/usr/libXXX`, `/usr/local/lib`
and `/usr/local/libXXX`

- Shared libraries
 - `/lib` for binaries in `/bin` and `/sbin` only
 - `/usr/lib` for binaries in `/usr/bin` and `/usr/sbin`
 - `/usr/local/lib` for binaries in `/usr/local/bin`
- If dual architecture, then `lib<arch>` must exist in each version

/srv

- For things that are served or shared out over the network, e.g.
- /srv/www
- /srv/nfs
- /srv/ftp
- /srv/samba

Non-FHS bits...

- `lost+found`
 - Created by ext2 and ext3 filesystems
- `/proc`
 - Virtual filesystem containing processes data
- `/sys`
 - Virtual filesystem containing hardware data

Q&A

Any
Questions?