

Uniquely FreeBSD

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This is YOUR Workshop

- Stop us if we're speaking too fast
- Stop us if you don't understand anything
- Please ask lots of questions – you might wake up your neighbor!

Why Did we Choose FreeBSD?

Our survey shows you are using Solaris and Linux. FreeBSD is an excellent option as well. If we teach Solaris or Linux we'll pick the wrong option.

So, is it any good?

Yes. Here's a bunch of reasons why we believe this to be true:

Is FreeBSD Any Good?

Check out <http://www.netcraft.com/>. Four of the top five most stable web sites run FreeBSD.

- Very stable under heavy load, particularly under heavy TCP/IP traffic loads.
- A very mature and copied TCP/IP stack.
- FreeBSD is a UNIX variant and has been around since 1993.
- Community supported project that is not going commercial.
- Software distribution is under the BSD license, which is less strict than GPL.

Is FreeBSD Any Good?

- Excellent packaging system.
- Multiple firewall packages built-in (PF, IPF, IPFW).
- Single source tree with kernel and base system.
- Scalability features are standard, such as indexed pwd.db.
- Debugging and tracing tools.
- Ability to gather fine-grained statistics inherently supported:
 - systat, gstat, iostat, di, swapinfo, disklabel.
- Many root servers run/ran FreeBSD.

Much of this is available in Linux, but only recently.

Is FreeBSD Any Good?

Heavy emphasis on Enterprise Level functionality, such as:

- New file system support, such as **zfs**.
- **GEOM**: Modular Disk Transformation Framework.
- **iSCSI** support.
- **ARM** support coming.
- **DTrace** coming to FreeBSD soon (Solaris debugging tool)
- General **multiprocessors support** improvements.
FreeBSD 7 now exceeds current Linux DB performance.
<http://people.freebsd.org/~kris/scaling/7.0%20Preview.pdf>
- FreeBSD **Discretionary Access Control** for security auditing (Handbook chapter 17).

Just How Different is it?

If you use Linux or any Unix flavor, then using FreeBSD should not be hard.

Releases are labeled as:

- *Production* (6.2 and 5.5)
- *Stable* (already tested, but not committed)
- *Current* (“work-in-progress” or “bleeding edge”)

See <http://www.freebsd.org/releases/>

Some Differences

- Installation
- Booting
- Configuring the kernel
- OS upgrades
- Packaging system
- Configuration of services, devices and system
- Naming conventions for devices
- Services (separated, must be enabled to start)
- Unified source tree
- Only two run-levels
- Disk divisioning

Some Differences Cont.

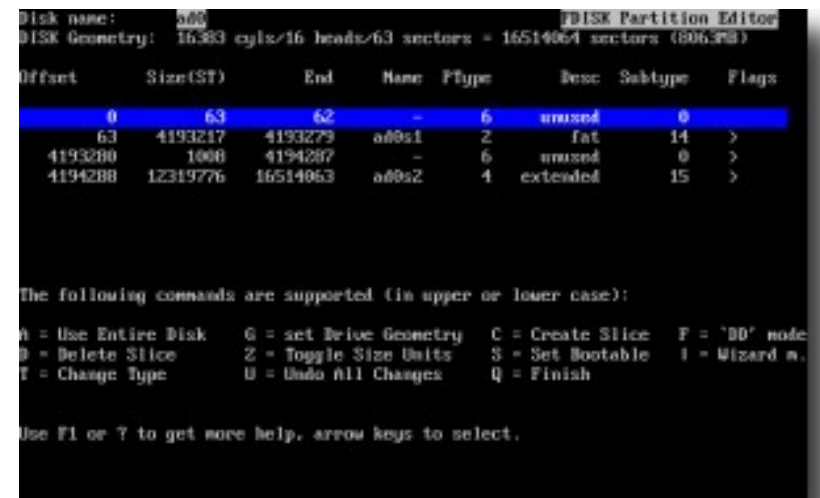
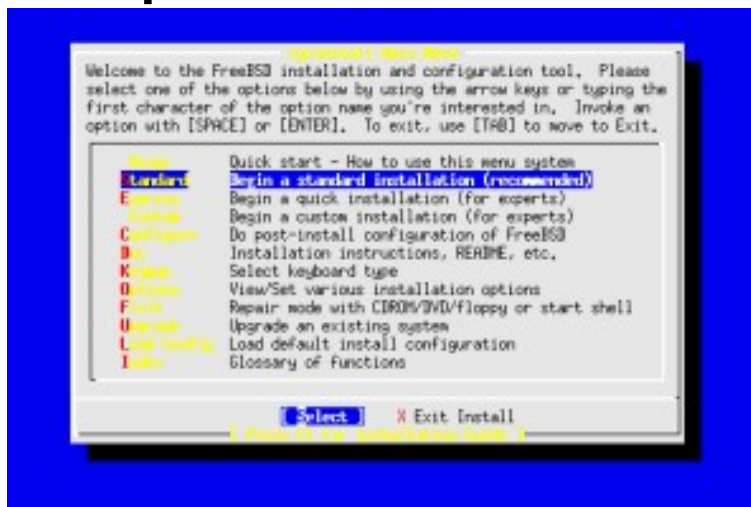
- Multiple firewall utilities built in to kernel
- 17,500+ packages & can run Linux software
- The BSD License
- Different file system
- Directory paths may differ
- Bash not available by default
- Runs on *lots* of hardware
- The FreeBSD “pedigree”
- “Sparky” vs. “Tux”



Installation

(The Differences)

- Installer runs from many mediums
- Is console-based (no GUI available)
- Is counter-intuitive (in this author's opinion)
- Is *really fast* once you get used to it
- You won't have to run it, but we'll give you examples...



Configuring the Kernel

(The Differences)

The recipe (included with your materials):

```
# cd /usr/src/sys/i386/conf
# cp GENERIC /root/ccTLD
# ln -s /root/ccTLD ccTLD
# vi ccTLD
```

Make some changes.

Read `/usr/share/doc/handbook/kernelconfig.html`
and `/usr/src/sys/i386/conf/NOTES` for details.

```
# cd /usr/src/sys
# make KERNCONF=ccTLD
# make install KERNCONF=ccTLD
```

Reboot and test.

OS Upgrades

(The Differences)

You can upgrade your OS version several ways:

- 1) Binary upgrade using *sysinstall*.
- 2) Complete re-install.
- 3) Source upgrade using *make world*.

Source upgrade is very cool. See Rebuilding “world” in the Handbook (23.4).

Packaging System

(The Differences)

The FreeBSD package system (*pkg*). A package is built from a *port* (*/usr/ports*). You can install via source or from a package. The end-result is the same.

- Packages & Ports install the same.
- Both methods resolve dependencies.
- You can keep your ports collection “up-to-date” (does not track to your OS version).
 - Good tools for doing this (*portupgrade*)
- *pkg* has man components.
 - *pkg_add*, *pkg_delete*, *pkg_info*, etc...

Ports Collection (17,800+)

(The Differences)

- There are more ports than packages.
- If you keep your local ports collection up-to-date this allows you to obtain the latest versions of software more quickly (in general).
- You can specify configuration parameters when installing via ports vs. packages.
- You can create dependency issues with ports, ports versions, OS version and packages.

Configuration

(The Differences)

Critical difference are:

- `/etc/defaults/rc.conf` has your default system configuration.
- `/etc/rc.conf` is where you override the defaults. Do not change `/etc/defaults/rc.conf`.
- Base service startup scripts are in `/etc/rc.d`.
- They must be enabled in `/etc/rc.conf` to start.
- Third party service startup scripts are in `/usr/local/etc/rc.d`.
- Read the script to see how it starts.

Separation of System & 3rd Party Services

(The Differences)

As noted scripts are separated
between `/etc/rc.d` and `/usr/local/etc/rc.d`.
So are the configuration files.

Example:

- Apache (version 2.2) has configuration files here:
`/usr/local/etc/apache22`

Naming Convention of Devices

(The Differences)

Device names in FreeBSD are based on the device driver name supporting that device.

Examples include:

- `/dev/ad0` (IDE drive 1)
- `/dev/ad0s1` (IDE drive 1, slice 1 – see later)
- `/dev/ad0s1a` (IDE drive 1, slice 1, partition a)
- `/dev/acd0` (IDE CD-ROM drive)
- `/dev/bge0` (Broadcom gigabit ethernet card 1)
- `/dev/da0` (SCSI drive 1)
- USB flash drive, e.g. `da0`, created dynamically

Disk “Partitioning”

(The Differences)

- The MBR contains a table allowing the disk to be divided into (up to) four partitions.
- Beyond that, you can nominate one partition as an "extended partition" and then further subdivide it into "logical partitions".
- FreeBSD has its own partitioning system, because Unix predates the PC.
- FreeBSD recognizes MBR partitions, but calls them "slices" to avoid ambiguity.

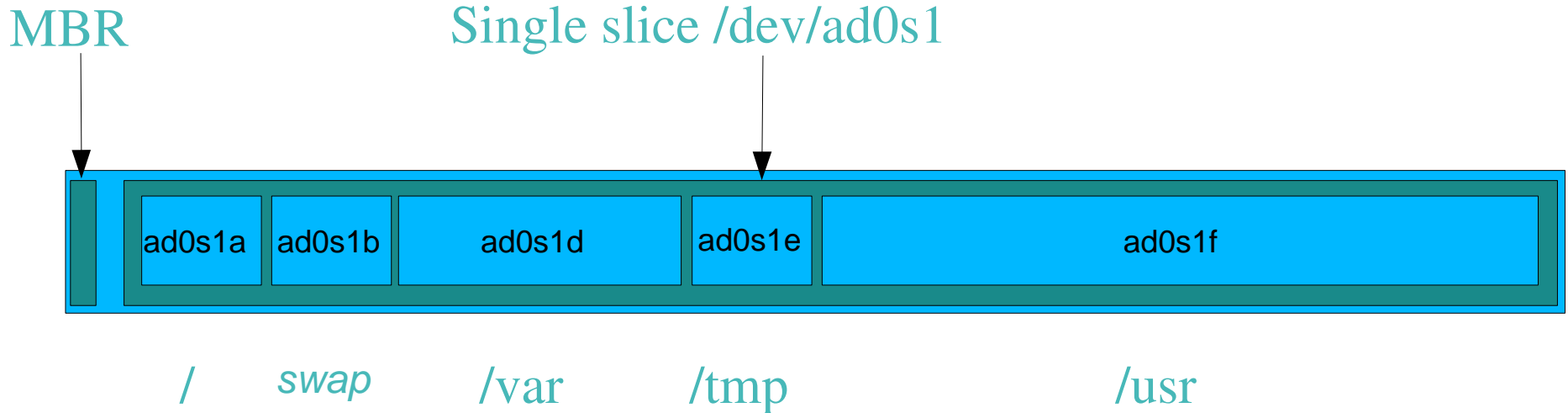
FreeBSD partitions

(The Differences)

- Partitions (usually) sit within a slice
- Partitions called a,b,c,d,e,f,g,h
- CANNOT use 'c'
 - for historical reasons, partition 'c' refers to the entire slice
- By convention, 'a' is root partition and 'b' is swap partition
- 'swap' is optional... if you dare ;-)

Simple partitioning: /dev/ad0

(The Differences)



/	(root partition)	ad0s1a	256MB
	swap partition	ad0s1b	~ 2 x RAM
/var		ad0s1d	256MB (+)
/tmp		ad0s1e	256MB
/usr		ad0s1f	rest of disk

'Auto' partition does this:

(The Differences)

- Small root partition
 - this will contain everything not in another partition
 - /boot for kernel, /bin, /sbin etc.
- A *swap partition* for virtual memory
- Small /tmp partition
 - so users creating temporary files can't fill up your root partition
- Small-ish /var partition
- Rest of disk is /usr
 - Home directories are /usr/home/<username>
- Issues?

Two Run Levels

(The Differences)

- Linux users may be used to run-levels 1-5.
- FreeBSD has single-user mode (1) and multi-user mode.
- `init 1` : takes you to run-level 1.
- `exit` : takes you back to multi-user level.

The BSD License

(The Differences)

GPL: <http://www.gnu.org/copyleft/gpl.html>

“You can copy, change, charge, *but* the code must be made publicly and freely available.”

BSD: http://en.wikipedia.org/wiki/BSD_license

“You can copy, change, charge *and* the code does not need to be made publicly available.”

No Bash by Default

(The Differences)

BASH (the Bourne Again SHell) is governed by the GNU GPL license.

The FreeBSD Base system distributes under the more permissive BSD license.

Thus... BASH is not installed by default. You must add it manually.

The Differences “Sparky” vs. “Tux”



Finding more information

- Our reference handout
- `man` pages
 - esp. when you know the name of the command
- `www.freebsd.org`
 - handbook, searchable website / mail archives
- "The Complete FreeBSD" (O'Reilly)
- `comp.unix.shell` FAQ
 - <http://www.faqs.org/faqs/by-newsgroup/comp/comp.unix.shell.html>
- STFW (Search The Friendly Web)

Any questions?

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