

FreeBSD startup and repair

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What happens at startup?

- The BIOS loads and runs the MBR
- A series of "bootstrap" programs are loaded
 - see `man boot`
- Kernel is loaded, and perhaps some modules
 - controlled by `/boot/loader.conf`
- The root filesystem is mounted

Then...

- `/sbin/init` is run
- This is always the first process, so has `pid=1`
- In normal operation it executes the main startup script `/etc/rc`
- This in turn runs other scripts `/etc/rc.d/*`
 - The order is determined by dependency information within the scripts
 - Each script reads `/etc/rc.conf` to decide whether a service is wanted or not and to get options
- `init` also controls console logins

How login shells are started

- console
 - `init` → `getty` → `login` → `<shell>`
 - controlled by `/etc/tty`
- ssh
 - `sshd` started by `/etc/rc.d/sshd`
 - `sshd` → `login` → `<shell>`
- telnet (*avoid*)
 - `inetd` started by `/etc/rc.d/inetd`
 - `inetd` → `telnetd` → `login` → `<shell>`
 - controlled by `/etc/inetd.conf`
 - `inetd` doesn't run unless you explicitly enable it

Single-user mode

- If "single user mode" is chosen at startup, `init` just runs a single root shell
- No startup scripts are run, meaning:
 - filesystems are not mounted
 - daemons are not started
 - no remote logins
- Safest state for repairing the system
- You will see this in the exercise

/boot/loader.conf

- Controls the kernel loader
- Examples:

```
snd_driver_load="YES"
  • load all possible sound modules
snd_ich_load="YES"
  • load just the "ich" sound module
if_wi_load="YES"
  • load the "wi" network interface module
hint.acpi.0.disabled="1"
  • Disable ACPI power management
kern.maxproc=5000
  • Set size of kernel process table
```

What to put in /boot/loader.conf?

- Look in /boot/defaults/loader.conf
 - copy entries from here, but don't change this file
- Look in /usr/src/sys/i386/conf/GENERIC.hints
- Look in the handbook
- You don't have to load all modules at bootup
 - you can load them later with kldload
 - `kldload snd_driver`
 - show loaded modules with kldstat

/etc/rc.conf

- Controls behaviour of startup scripts
- Examples:

```
sshd_enable="YES"
ntpdate_enable="YES"
ntpdate_flags="-b ntp-1.example.net"
ifconfig_fxp0="192.0.2.1/24"
```

 - **DQ** start the ssh daemon
 - synchronise clock at bootup
 - which time server(s) to synchronise to
 - configure network interface(s)

What to put in /etc/rc.conf?

- Look in /etc/defaults/rc.conf
 - copy entries from here, but don't change this file
- The /etc/rc.d/* scripts are just plain old shell scripts
 - With experience you can read them, work out what they are doing, and what settings they use

Plain old shell scripts

- Most system settings have a command-line tool to set them
 - e.g. "ifconfig" configures a network interface
- The system forgets state when you reboot
- All that the startup scripts do is to run the correct commands for you, using information taken from /etc/rc.conf

You can write your own startup scripts

- /etc/rc.local
- Or put scripts in /usr/local/etc/rc.d/
 - Better, as you can have one script per service