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/ttys
- 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"`
    - DO start the ssh daemon

  `ntpdate_enable="YES"`
    - synchronise clock at bootup

  `ntpdate_flags="-b ntp-1.example.net"`
    - which time server(s) to synchronise to

  `ifconfig_fxp0="192.0.2.1/24"`
    - 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