

THE KERNEL

<insert funny joke>

OVERVIEW

- The kernel represents the core of the operating system. Major components include:
 - Scheduler
 - Memory manager
 - Device drivers
 - Filesystems
 - Networking

MODULAR

- The Linux kernel is modular, allowing functional blocks of software to be added and removed on the fly via the modules mechanism.
- Modules encompass functions such as:
 - Device drivers
 - Kernel features - firewalls, RAID, LVM
 - Filesystems

LSMOD

- `lsmod`: Prints all of the currently loaded modules

```
[root@dev1 ~]# lsmod
Module                Size  Used by
ipv6                  264608  20
binfmt_misc           14096   1
dm_multipath          21136   0
parport_pc            31724   0
lp                    16576   0
parport                42252   2 parport_pc,lp
usbcore               129724   1
ext3                  125968   1
jbd                    61928   1 ext3
raid10                 23808   0
raid456               119840   0
xor                    10512   1 raid456
raid1                  24064   0
raid0                  10752   0
multipath             11776   0
linear                 9088   0
dm_mirror              23016   0
dm_snapshot           18872   0
dm_mod                55752   3 dm_multipath,dm_mirror,dm_snapshot
processor              26412   0
fuse                  42160   1
[root@dev1 ~]#
```

RMMOD

- `rmmod`: Removes (unloads) a loaded modules
 - Can not unload a module that is a dependency of another module
 - Can not unload in-use modules

INSMOD

- `insmod`: Loads a module into the kernel.
 - Full pathname required
 - Does not handle dependencies automatically

MODPROBE

- `modprobe`: Intelligent module handler
 - Can load/unload modules
 - Automatically handles dependencies
 - Only need to specify name of module, not full path, when loading
- `depmod`: Rebuilds module dependency lists

KERNEL BOOT PARAMETERS

- Hundreds of parameters can be passed to the kernel at boot time. Some of the most common include:
 - `root=/dev/sda3` *Set the root device*
 - `quiet` *Reduce informational messages at startup*
 - `rhgb` *Red Hat Graphical Boot*
 - `console=ttyS0` *Specify console device*
- See <http://www.kernel.org/doc/Documentation/kernel-parameters.txt>

KERNEL RUNTIME PARAMETERS

- Recall from performance tuning lecture that there are numerous kernel parameters which can be adjusted at runtime, including:
 - `net.ipv4.*`
 - `vm.*`
 - `kernel.*`
 - `fs.*`

SYSCTL

- `sysctl`: Get/set kernel parameters
 - `sysctl -w kernel.pid_max=65535`
 - `sysctl -a`
 - `sysctl -w vm.swappiness=100`

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