

Session on Kernel

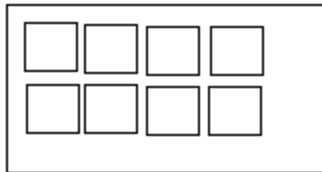
- Structure of the kernel
- Kernel modules
- Add and remove kernel modules
- Module dependencies
- Upgrade your kernels

Kernel is the base/core part of the operating system that takes care off all the work. When you read or write on the hard drive the kernel is taking care of that low level staff, it is interfacing with the disk controls and sending the data to this control. When reading a data off the disk there is file system drivers that are located on the kernel that understand how to interface with the format that the disk giving it. Based on it is EXT2 file system so that kernel taking care off all the work. That is all common to all the distribution of Linux.

The version number will describe as **Major. Minor. Path** (if the minor version represents even number meaning it is stable)

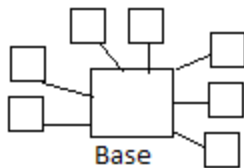
Monolithic Vs modular kernels

Monolithic kernel all the possible functionality built into the kernel, it's a large in size. It will make it slow and consume a lot of memory. If the kernel is very slow the reset of the operating system will be very slow. Version 1 of Linux has monolithic module



Modular kernel

Plug the different modules of the kernel



Modules will be used for device drivers (such as ext2, ext3), file system drivers, system calls (disk read, disk write)

Managing loadable kernel modules

the module files are located in : /lib/modules/6.4.20/diver sub directories .../

tools to load modules, upload, display info...

- insmod - inserting module
- rmmod - removing module
- lsmod - list all the installed modules
- modinfo - module information
- modprobe – smart way of doing an insert (u can't load a module that will depend another module)
- depmod - module dependencies

```
[root@hilserver root]# cd lib/modules/6.4.0/
```

```
[root@hilserver root]# ls
```

```
build  modules.dep          modules.isapnpmap    modules.pnpbiosmap
kernel modules.generic_string modules.parportmap   modules.usbmap
misc   modules.ieee1394map   modules.pcimap
```

```
[root@nugget-redhat 2.4.20-6]# cd kernel
```

```
[root@nugget-redhat kernel]# ls
```

```
arch  crypto  drivers  fs  lib  net
```

N.B the module Msdos depends on fat module

```
[root@nugget-redhat kernel]# insmod fat
Using /lib/modules/2.4.20-6/kernel/fs/fat/fat.o
```

```
[root@nugget-redhat kernel]# insmod msdos
Using /lib/modules/2.4.20-6/kernel/fs/msdos/msdos.o
```

```
[root@nugget-redhat kernel]# cat /proc/modules
```

```
[root@nugget-redhat kernel]# lsmod
```

Module	Size	Used by	Not tainted
fat	38328	0	[
ide-cd	35196	0	(autoclean)
cdrom	33472	0	(autoclean) [ide-cd]
parport_pc	18756	1	(autoclean)
lp	8868	0	(autoclean)
parport	36480	1	(autoclean) [parport_pc lp]
autofs	12948	0	(autoclean) (unused)
pcnet32	18016	1	
mii	3944	0	[pcnet32]
ipt_REJECT	3896	6	(autoclean)
iptable_filter	2380	1	(autoclean)
ip_tables	14648	2	[ipt_REJECT iptable_filter]
keybdev	2880	0	(unused)
mousedev	5428	0	(unused)

msdos	8044	0	(unused)
fat	38328	0	[msdos]
ide-cd	35196	0	(autoclean)
cdrom	33472	0	(autoclean) [ide-cd]
parport_pc	18756	1	(autoclean)
lp	8868	0	(autoclean)
parport	36480	1	(autoclean) [parport_pc lp]
autofs	12948	0	(autoclean) (unused)
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ipt_REJECT	3896	6	(autoclean)
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```
[root@nugget-redhat kernel]# lsmod
```

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cdrom	33472	0	(autoclean) [ide-cd]
parport_pc	18756	1	(autoclean)
lp	8868	0	(autoclean)
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ip_tables	14648	2	[ipt_REJECT iptable_filter]
keybdev	2880	0	(unused)
mousedev	5428	0	(unused)

```
[root@nugget-redhat kernel]# rmmod fat
fat: Device or resource busy
```

```
[root@nugget-redhat kernel]# rmmod msdos
```

```
[root@nugget-redhat kernel]# rmmod fat
[root@nugget-redhat kernel]# lsmod
```

Module	Size	Used by	Not tainted
ide-cd	35196	0 (autoclean)	
cdrom	33472	0 (autoclean)	[ide-cd]
parport_pc	18756	1 (autoclean)	
lp	8868	0 (autoclean)	
parport	36480	1 (autoclean)	[parport_pc lp]
autofs	12948	0 (autoclean)	(unused)
pcnet32	18016	1	
mii	3944	0 [pcnet32]	
ipt_REJECT	3896	6 (autoclean)	
iptables_filter	2380	1 (autoclean)	
ip_tables	14648	2 [ipt_REJECT iptables_filter]	
keybdev	2880	0 (unused)	
mousedev	5428	0 (unused)	

```
[root@nugget-redhat kernel]# modprobe msdos
[root@nugget-redhat kernel]# cat /proc/modules
```

msdos	8044	0 (unused)
fat	38328	0 [msdos]
ide-cd	35196	0 (autoclean)
cdrom	33472	0 (autoclean) [ide-cd]
parport_pc	18756	1 (autoclean)
lp	8868	0 (autoclean)
parport	36480	1 (autoclean) [parport_pc lp]
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NB - what happen is modprobe looks that the file called modules.dep file is created by the dep command, so dep mod will go through all of your modules systems and create this dependency

file so that modprobe can look the necessary file and load the files. When I execute msdos it will automatically goes and load fat modules.

```
[root@nugget-redhat kernel]# cd ..
[root@nugget-redhat 2.4.20-6]# ls
build    modules.dep          modules.isapnpmap    modules.pnpbiosmap
kernel   modules.generic_string modules.parportmap    modules.usbmap
misc     modules.ieee1394map  modules.pcimap

[root@nugget-redhat 2.4.20-6]# cat modules.dep | more
/lib/modules/2.4.20-6/kernel/arch/i386/kernel/cpuid.o:

/lib/modules/2.4.20-6/kernel/arch/i386/kernel/edd.o:

/lib/modules/2.4.20-6/kernel/arch/i386/kernel/microcode.o:

/lib/modules/2.4.20-6/kernel/arch/i386/kernel/msr.o:

/lib/modules/2.4.20-6/kernel/crypto/ciphers/cipher-aes.o:      /lib/modules/
2.4.20-6/kernel/crypto/cryptoapi.o

/lib/modules/2.4.20-6/kernel/crypto/ciphers/cipher-identity.o: /lib/modules/
2.4.20-6/kernel/crypto/cryptoapi.o

/lib/modules/2.4.20-6/kernel/crypto/cryptoapi.o:

/lib/modules/2.4.20-6/kernel/crypto/cryptoloop/cryptoloop.o:  /lib/modules/

[root@nugget-redhat 2.4.20-6]# modinfo msdos
filename:      /lib/modules/2.4.20-6/kernel/fs/msdos/msdos.o
description:   <none>
author:        <none>
license:       "GPL"
```

Upgrade the kernel

In order to path a kernel <http://www.linuxhq.com> www.kernel.org

- Migrating to linux kernel 2.6

Diff utility is a unix utility that finds difference between text files

First Create the two files

sports1.txt football baseball soccer basketball cheerleading wrestling field hockey softball	sports2.txt football baseball soccer basketball hockey wrestling field hockey softball gymnastics
---	---

```
perry@nugget-suse: > diff sports1.txt sports2
```

```
-  
5c5  
< cheerleading  
---  
> hockey  
8a9  
> gymnastics
```