



Red Hat System Administration II

Course Outlines

- Filesystem Management
- Adding Additional SWAP Type Disk Space
- Tape Devices/Drives
- Full and Incremental Backups
- The Linux Quota System



Filesystem Management



Adding a new disk

- If you added a new disk the system should detect its presence after reboot.
- You would be able to see this discovery in the `/var/log/dmesg` log file.
- The tool that partitions disks is called `fdisk`.
- You use the device name of the disk as the argument.
- Only the root account can adjust disk partition settings.



Starting the fdisk Utility

fdisk /dev/hda

- To show the menu of command options, type m.
- Delete a partition -> d
- Lists known partition types -> l
- Adds a new partition -> n
- Prints the partition table -> p
- Quits without saving changes -> q
- Writes table to disk and exit -> w



Did Kernel Feel The Changes ?

If you cat /proc/partitions

- The new partition is not available
- So for the kernel to feel the changes use partprobe command.



Formatting a partition

- The format utility is generally known as mkfs

```
# mkfs -t ext2 /dev/hda5
```

```
# mkfs -t ext3 /dev/hda5
```



Create a mount point

- Create a mount point for this partition

```
# mkdir /rdbm
```

- Mount a partition to a directory

```
# mount -t ext2 /dev/hda5 /rdbm
```

- Disconnect a filesystem from mount point with umount

```
# umount /dev/hda5
```

```
# umount /rdbm
```



Adding Additional Partitions to /etc/fstab

- At boot-up time, the rc.sysinit command reads the fstab file to determine which filesystems should be mounted.

more /etc/fstab

DEV LOCAL-ACCESS FILE-TYPE OPTIONS DUMP FSCK-ORDER

/dev/hda2	/	ext3	defaults	1	1
-----------	---	------	----------	---	---

/dev/hda1	/boot	ext3	defaults	1	2
-----------	-------	------	----------	---	---

/dev/hda3	swap	swap	defaults	0	0
-----------	------	------	----------	---	---



Filesystem Labels

```
# e2label /dev/hda8 mydisk
```

```
# mount LABEL=mydisk /data1
```

```
# mount -L mydisk # in case it is present in /etc/fstab
```

```
# e2label /dev/hda8
```

```
mydisk
```

- Using labels in /etc/fstab

```
LABEL=mydisk /data1 ext3 defaults 1 1
```



ADDING ADDITIONAL SWAP TYPE DISK SPACE



Introduction

- Swap space allows processes to use more memory than actually exists on the system
- If the amount of memory requested by the process running on the system exceeds the amount of available RAM, the Linux kernel can swap some of the pages of memory being used by sleeping or idle processes to disk to make room for the additional memory needed by running processes or new processes.



Swap summary usage with the swap command

- You can display your current swap usage using the `-s` option to the `swapon` command

```
# swapon -s
```

Filename	Type	size	Used	Priority
/dev/hda2	partition	2040244	0	-1



Adding a new swap type partition

- Add a new swap partition
 - Using the fdisk utility to create a partition
 - Set the system ID to the value hex 82
 - Use the t command within fdisk to change a partition's system ID to Linux swap
 - Save the changes
 - Use partprobe to force the system to recognize the changes.



Format swap partition

```
# mkswap /dev/hda6
```

Implement and Display swap Partition Usage Information

- Use the swapon utility
 - To begin using the device as swap space.
- Use the -s option
 - To display the swap usage summary information
- Add the new swap partition to the /etc/fstab file



Example

fdisk /dev/hda

Command (m to help): n

First cylinder (3001-4864, default 3001):

Using default value 3001

Last cylinder or +size or +sizeM or +sizeK(3001-4864,
default 4864): +199

Command (m to help): t

Partition number (1-6): 6

Hex code (type L to list codes): 82

Changed system type of partition 6 to 82 (Linux swap)



Example cont'd

Command (m to help): w

The partition table has been altered!

Calling ioctl() to re-read partition table.

WARNING: Re-reading the partition table failed with error
16: Device or resource busy.

The kernel still uses the old table.

The new table will be used at the next reboot.

Syncing disks

partprobe



Example cont'd

```
# mkswap /dev/hda6
```

Setting up swapspace version 1, size = 1645019 KB

```
# swapon /dev/hda6
```

```
# swapon -s
```

Filename	Type	Size	Used	Priority
/dev/hda2	partition	2040244	0	-1
/dev/hda6	partition	1606460	0	-2

```
# grep swap /etc/fstab
```

```
/dev/hda2 swap swap defaults 0 0
```

```
# vi /etc/fstab
```

```
/dev/hda6 swap swap defaults 0 0
```



Adding Temporary File Space as swap

- Create a local file of the required size using the dd command.
- Format this file just as if it were a partition device file.



Example

```
# dd if=/dev/zero of=/myswap bs=1024 count=1024
```

```
1024+0 records in
```

```
1024+0 records out
```

```
# ls -l /myswap
```

```
-rw-r--r-- 1 root root 1048576 Jul 6 06:37 /myswap
```

```
# chmod 600 /myswap
```

```
# mkswap /myswap
```

```
Setting up swapspace version 1, size = 1044 kB
```

```
# swapon /myswap
```

```
# swapon -s
```

Filename	Type	Size	Used	Priority
/dev/hda2	partition	327672	2868	-1
/myswap	file	1016	0	-2

```
# vi /etc/fstab
```

```
/myswap swap swap defaults 0 0
```



Tape Devices/Drives



Controlling Tape Drives

- The mt command is the general-purpose command that manipulates tapes. It is used to assist the backup process.
- Some of the options for mt
 - rewind: Rewinds a tape
 - offline : Prepares the currently loaded tape for ejection and, if possible, ejects it
 - fsf: Moves the currently loaded tape to the specified position
 - erase : Erases the currently loaded tape



Controlling Tape Drives cont'd

- The mt command syntax is:
mt -f device command
- To specify the device, use the -f option followed by the desired target
- The standard SCSI tape devices are named st0, st1, etc., and nst0, nst1, etc
- The standard IDE tape devices are named ht0, ht1, etc., and nrht0, nrht1, etc



Controlling Tape Drives cont'd

- Tape drive normally rewinds the media after the tape operation has completed. If you don't want the tape to rewind, you can access the device by its no rewind name.
- Examples
 - # mt -f /dev/st0 rewind // Rewinds the tape.
 - # mt -f /dev/nst0 fsf 50 // Positions the tape (don't forget to use "n").
 - # mt -f /dev/st0 offline // Ejects the tape (but doesn't rewind it first).
 - # mt -f /dev/st0 erase // Erases the tape.
 - # mt -f /dev/st0 rewoff // Rewinds and ejects the tape.



Using tar/star Commands

- Archive to tapes or other media or files
- star command backups SELinux contexts and ACL attributes.
- Options
 - c: To create new archive
 - t: To list the content of existing archive
 - x: To extract existing archive
 - v: verbose
 - z: gzip compress
 - j: bzip2 compress



Examples

```
# tar cf /dev/st0 fname
```

```
# tar zcf /dev/st0 fname
```

```
# tar zxf /dev/st0
```

* Where does tar extract the files ???



Full and Incremental Backups



Incremental and Full Back Ups

- A full backup is a complete file system backup.
- An incremental backup copies only files in the file system that have been added or modified since a previous lower-level backup.
- Backup increment = dump level

Level

Definition

0

Full backup

1-9

The backup copies new or modified files since the last lower-level backup



Using dump Command

- It can backs up filesystems. By providing the mount point of the filesystem to back up.
- Example

```
# dump -0u -f /dev/nst1 /home
```

```
# dump -4u -f /dev/nst1 /home
```



Recovering dump Data

- To recover an entire filesystem

```
# restore -rf /dev/st0
```

- To restore individual files and directories

```
# restore -xf /dev/st0 file1 file2
```

```
# restore -if /dev/st0
```



The Linux Quota System



The Linux Quota System

- Features of the Linux quota system
 - Implemented within the kernel.
 - Enabled on a per filesystem basis.
 - Individual policies for groups and users
 - Enables limit setting by number of blocks or inodes.
 - Both soft and hard limits can be implemented.
 - Soft limit can be exceeded for a limited period of time. When the grace period is over, the soft limit is converted into a hard limit
 - Hard limit can't be exceeded



The Linux Quota System cont'd

- Steps to set up quotas
 - Edit /etc/fstab and add the usrquota and/or grpquota option to the filesystem.
 - Remount the filesystem with the command `mount -o remount <filesystem>`
 - Use the `quotacheck` command to create the quota-tracking files.
 - Use the `quotaon` command to enable quota tracking by the kernel.
 - Use the `edquota` or `setquota` commands to specify the quotas for each user and/or group.
 - Use the `repquota` command to verify the settings and the current usage.



Example

```
# vi /etc/fstab
LABEL=/home /home ext3 defaults,usrquota,grpquota 1 2
# mount -o remount LABEL=/home
# mount | grep /home
/dev/hda7 on /home type ext3 (rw,usrquota,grpquota)
# quotacheck -vmac
# ls /home
aquota.group aquota.user ...
# quotaon /home
# setquota -u guest 50000 60000 1500 1700 /home
```

Or use

```
# edquota -u guest
```

```
Filesystem blocks soft hard inodes soft hard
```

```
/dev/hda7 16 50000 60000 6 1500 1700
```



Example cont'd

- Another user account quota setting can be used

```
# edquota -a guest guest1
```

```
[guest1@host1 ~] $ quota
```

```
Disk quotas for user guest (uid 501)
```

Filesystem	blocks	quota	limit	grace	files	quota	limit	grace
/dev/hda7	16	50000	60000		6	1500	1700	

```
# repquota /home
```

```
***Report for user quotas on device /dev/hda7
```

```
Block grace time:7days Inode grace time:7 days
```

```
Block Limit File Limit
```

```
USER used soft hard grace used soft hard grace
```

```
root 14491 0 0 11 0 0
```

```
guest1 16 50000 60000 8 1500 1700
```

```
Guest 20 50000 60000 8 1500 1700
```



Thanks ☺

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