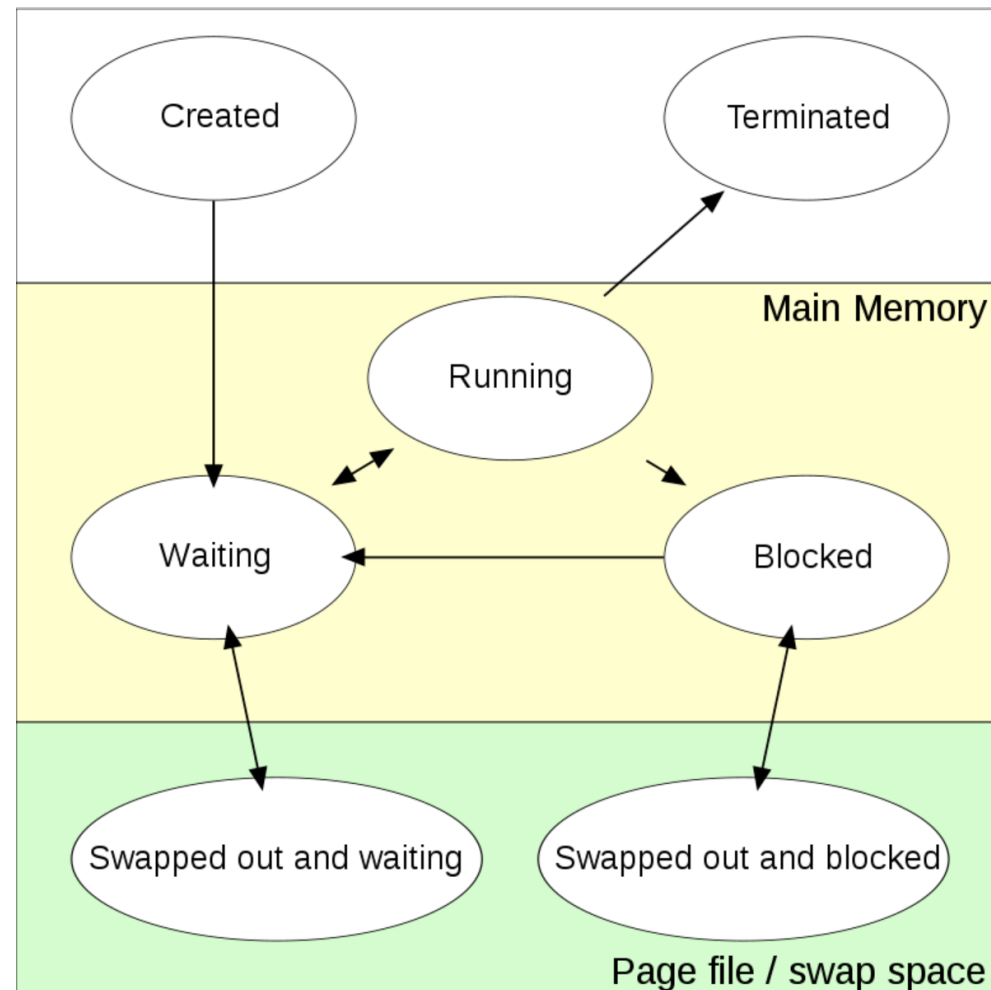# Managing SWAP Space

Unit objectives

After completing this unit, you should be able to:

- Understand Swap Space

- Sizing Swap Space

- Use of following commands to manage swap:

  – mkswap

  – swapon / swapoff

  – systemctl

- Manage swap's priority

- Permanently activate swap at boot time

Understand Swap Space

- is area of disk under kernel : virtual memory management
- Supplement RAM by holding inactive page of memory
- Virtual memory = RAM + SWAP
- Swap device
  - a file
  - a disk / partition
  - logical volume
- Is not a substitute for real memory

Sizing Swap Space

RAM	Swap Space	Swap Space if Allowing for Hibernation
2 GiB or less	Twice the RAM	Three times the RAM
Between 2 GiB and 8 GiB	Same as RAM	Twice the RAM
Between 8 GiB and 64 GiB	At least 4 GiB	1.5 times the RAM
More than 64 GiB	At least 4 GiB	Hibernation is not recommended

Commands and files

- mkswap
- swapon [-a]
- swapoff [-a]
- /etc/fstab
- systemctl

Creating a Swap space using regular file – 1/2

- For testing

- Raw devices not readily available

- Create the file

mkdir /swapdir

dd if=/dev/zero of=/swapdir/swapfile1 bs=1m count=100

dd if=/dev/zero of=/swapdir/swapfile2 bs=1m count=100

- Format the file with swap signature

mkswap /swapdir/swapfile1

mkswap /swapdir/swapfile2

- Activate the swapfile1 now

swapon /swapdir/swapfile1

Creating a Swap space using regular file – 2/2

- Activate the swapfile2 at boot

vi /etc/fstab

/swapdir/swapfile2 swap swap defaults 0 0

- After reboot , verify

swapon

- Activate the swapfile2 using systemd

systemctl daemon-reload

systemctl -at swap

systemctl start swapdir-swapfile2.swap

swapon

free -m

Remove Swap space using regular file

systemctl stop swapdir-swapfile2.swap

swapon

vi /etc/fstab

< Remove /swapdir/swapfile2 entry from file >

swapoff /swapdir/swapfile1

swapoff /swapdir/swapfile2

rm –f /swapdir/swapfile?

- Verify

swapon

free -m

Creating a Swap space using partition / disk – 1/2

- Create dos partitions

parted –s /dev/vdb mklabel msdos

parted –s /dev/vdb mkpart pri 512b 100m

parted –s /dev/vdb mkpart ext 500m 1000m

parted –s /dev/vdb mkpart log 500m 600m

- Create gpt partitions

parted –s /dev/vdc mklabel gpt

parted –s /dev/vdc mkpart swap1 linux-swap 512b 100m

parted –s /dev/vdc mkpart swap2 linux-swap 101m 200m

parted –s /dev/vdc mkpart swap2 linux-swap 201m 300m

Creating a Swap space using partition / disk – 2/2

- Format those partitions with swap signature

parted /dev/vdb print

mkswap /dev/vdb1; mkswap /dev/vdb5

mkswap /dev/vdc1; mkswap /dev/vdc2

- Active swap on those partitions

swapon /dev/vdb[15]

swapon /dev/vdc[1-2]

or swapon –a

- Verify

swapon; free -m

Make it permanent

- Copy UUID into /etc/fstab

blkid | grep swap | awk '{print $2}' >> /etc/fstab

- Modify /etc/fstab accordingly

vi /etc/fstab

UUID="1..." swap swap defaults 0 0

UUID="2..." swap swap defaults 0 0

- List all swap devices

lsblk --fs | grep swap

or

blkid | grep swap

Setting swap space priority

- Example of /etc/fstab

UUID="1111" swap swap pri=5 0 0

UUID="2222" swap swap pri=10 0 0

UUID="3333" swap swap defaults 0 0

- Kernel will consume swap device with highest priority (biggest number) first which pri=10 until full, then onto the next higher priority which pri=5
- Defaults will be assigned with -2, -3, -4 in sequence top down

Setting swap space priority - DEMO

- swapon --show
- Deactivate all swaps

swapoff –a

vi /etc/fstab

< adjust a swap to pri=5, another to pri=10. Let others to default>

swapon –a

swapon --show

free –m

Remove Swap space using partition/disk

swapoff /dev/vdb[15]

swapoff /dev/vdc[1-2]

vi /etc/fstab

< Remove all swap entries from file >

systemctl daemon-reload

systemctl –at swap

Checkpoint

1. You can create swap using : [Choose all that applies]
   a) Whole disk
   b) Particular partition
   c) /directory/files
   d) Particular file system
   e) Logical volume

2. Which command will create swap signature onto a /dev/sda1?
   a) mkfs.swap /dev/sda1
   b) swapon /dev/sda1
   c) mkswap /dev/sda1
   d) mkswapon /dev/sda1

3. Which statement is true?
   a) Swap device are dynamically added by kernel when more RAM is needed
   b) When RAM is insufficient, kernel will start to page out inactive pages into swap
   c) When RAM is insufficient, kernel will start to page out active pages into swap
   d) Bigger priority swap device will be consumed last

Checkpoint

1. You can create swap using : [Choose all that applies]
   a) Whole disk
   b) Particular partition
   c) /directory/files
   d) Particular file system
   e) Logical volume

2. Which command will create swap signature onto a /dev/sda1?
   a) mkfs.swap /dev/sda1
   b) swapon /dev/sda1
   c) mkswap /dev/sda1
   d) mkswapon /dev/sda1

3. Which statement is true?
   a) Swap device are dynamically added by kernel when more RAM is needed
   b) When RAM is insufficient, kernel will start to page out inactive page into swap
   c) When RAM is insufficient, kernel will start to page out active page into swap
   d) Bigger priority swap device will be consumed last

Unit summary

Having completed this unit, you should be able to:

- Understand Swap Space

- Sizing Swap Space

- Use of following commands to manage swap:

  - mkswap

  - swapon / swapoff

  - systemctl

- Manage swap's priority

- Permanently activate swap at boot time

Guided Exercise

Topic	Page number on student-guide.pdf	Time (min)
Add Partitions, File Systems, and Persistent Mounts	143	10
Manage Swap Space	151	10
Lab: Manage Basic Storage	155	25