



Introduction to SWAP



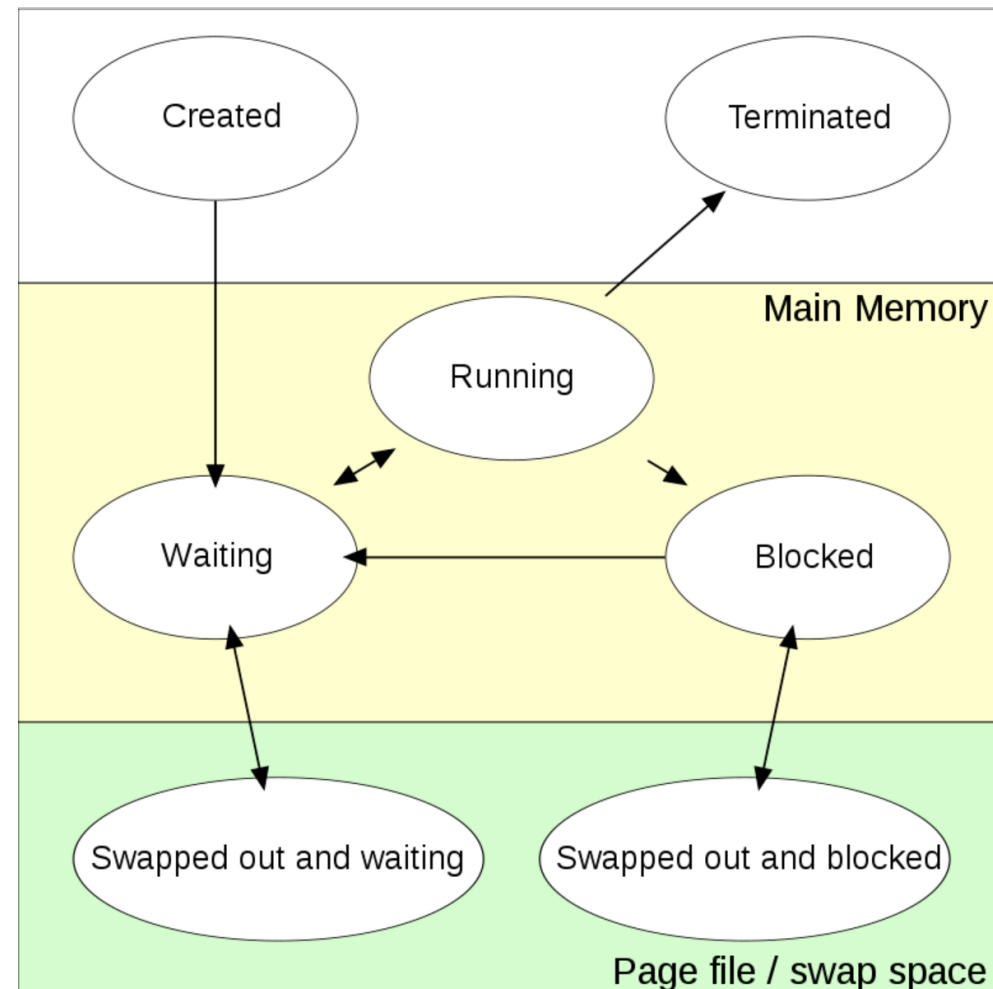
Unit objectives

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

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Unit summary

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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

