Unit 12
Paging space

Unit objectives

After completing this unit, you should be able to:
- Define why paging space is required in AIX
- List and monitor the paging space utilization of the system
- Perform corrective actions to rectify too little or too much paging space scenarios
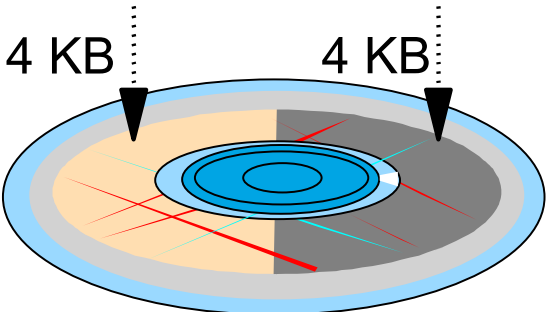
What is paging space?

RAM = 256 MB

RAM Usage

Operating System	Database	TCP/IP	8 MB FREE

Current applications
Total = 248 MB

RAM Usage

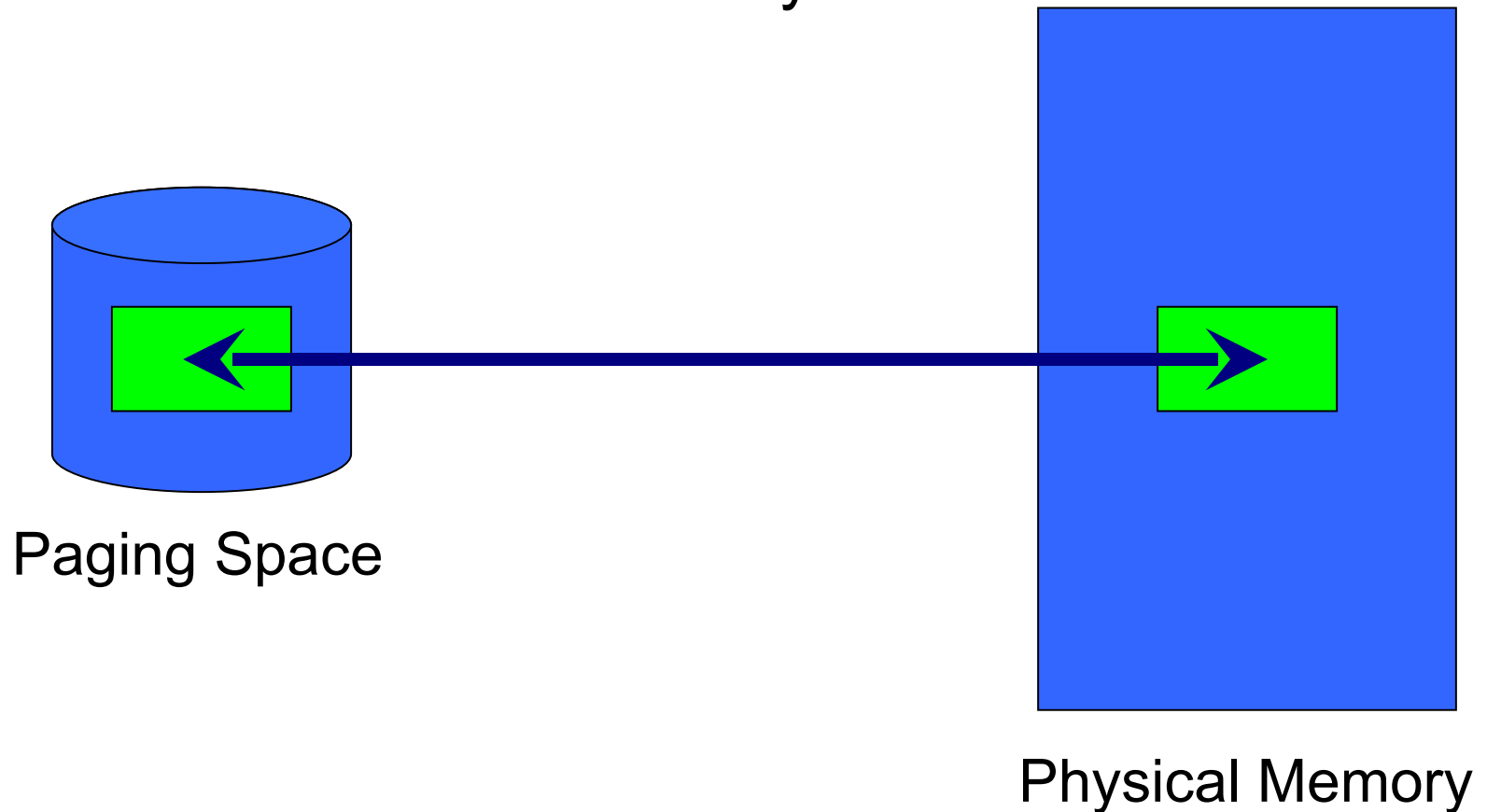| Operating System	Database	TCP/IP	Application

New application
needs RAM > 8 MB

4 KB   4 KB

Paging Space

Paging space

- Is a secondary storage area for over-committed memory

- Holds inactive 4 KB pages on disk

- Is not a substitute for real memory
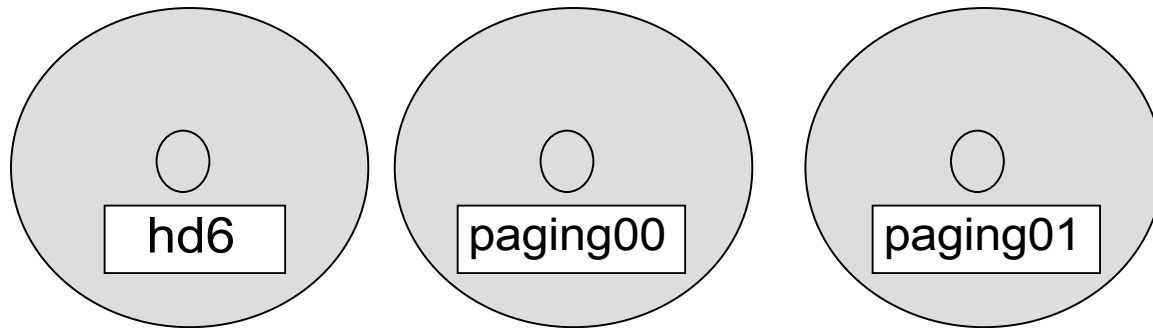
Paging Space

Physical Memory

Sizing paging space

- Created at installation up to twice the size of real memory

- Amount needed is dependent on applications

- Monitor paging space: `lsps -a`

- Running low on paging space is bad

```
#
ksh: cannot fork no swap space
```

Paging space placement

- Only one paging space per disk

- Use disks with the least activity

- Paging spaces roughly the same size

- Do not extend paging space to multiple physical volumes

- Use multiple disk controllers

hd6   paging00   paging01

Checking paging space

- Check paging activity:

```
# lsps -a
Page Space      Physical Volume  Volume Group   Size   %Used  Active  Auto  Type  chksum
hd6             hdisk0           rootvg         64MB   43     yes     yes   lv    0
paging00        hdisk2           rootvg         64MB   20     yes     yes   lv    0
```

- Check total RAM:

```
# lsattr -El sys0 -a realmem
realmem 262144 Amount of usable physical memory in KB False
```

- Check paging space activated at startup:

```
# cat /etc/swapspaces
...
hd6:
    dev=/dev/hd6
...
paging00:
    dev=/dev/paging00
```

Adding paging space

`# smit mkps`

```
                          Add Another Paging Space

Type or select values in entry fields.
Press Enter AFTER making all desired changes.


                                                      [Entry Fields]
  Volume group name                                     rootvg
  SIZE of paging space (in logical partitions)       [4]
#
  PHYSICAL VOLUME name                                  hdisk2      +
  Start using this paging space NOW?                    no          +
  Use this paging space each time the system is         no          +
           RESTARTED?



  F1=Help            F2=Refresh          F3=Cancel          F4=List
  F5=Reset           F6=Command          F7=Edit            F8=Image
  F9=Shell           F10=Exit            Enter=Do
```

Change paging space

smit chps

```
              Change / Show Characteristics of a Paging Space

Type or select values in entry fields.
Press Enter AFTER making all desired changes.


                                                  [Entry Fields]
    Paging space name                              paging00
    Volume group name                              rootvg
    Physical volume name                           hdisk2
    NUMBER of additional logical partitions      []            #
    Or NUMBER of logical partitions to remove    []            #
    Use this paging space each time the system is   yes         +
         RESTARTED?




F1=Help            F2=Refresh          F3=Cancel          F4=List
F5=Reset           F6=Command          F7=Edit            F8=Image
F9=Shell           F10=Exit            Enter=Do
```

Remove paging space

To remove an active paging space:

Make inactive

swapoff /dev/paging00

Remove inactive paging space

rmps paging00

NOTE: **/dev/hd6** cannot be removed using this process
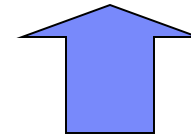
Problems with paging space

- Paging space too small:
  Dynamically increase the size by allocating more partitions

  chps -s *LogicalPartitions PagingSpace*
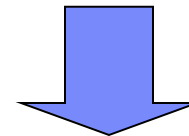
  Example:
  # chps -s 1 paging00

- Paging space too large:
  Dynamically decrease the size by deallocating partitions

  chps -d *LogicalPartitions PagingSpace*

  Example:
  # chps -d 1 paging00

Documenting paging space setup

- Run the `lsps` command

- Have a hardcopy of the **/etc/swapspaces** file

Paging Space Records

Checkpoint

1. What conclusions regarding potential paging space problems can you reach based on the following listing?

```
Page         Physical Volume Size %Used Active Auto Type chksum
Space        Volume    Group

hd6          hdisk0    rootvg 64 MB 43%  yes    yes   lv    0
paging00 hdisk1        rootvg 64 MB  7%  yes    yes   lv    0
paging01 hdisk1        rootvg 16 MB 89%  yes    yes   lv    0
```

_____

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- True or False? The size of **paging00** (in the above example) can be dynamically decreased.

Checkpoint solutions

1. What conclusions regarding potential paging space problems can you reach based on the following listing?

```
Page        Physical Volume Size %Used Active Auto Type chksum
Space       Volume   Group

hd6         hdisk0   rootvg 64 MB 43% yes     yes   lv   0
paging00 hdisk1      rootvg 64 MB  7% yes     yes   lv   0
paging01 hdisk1      rootvg 16 MB 89% yes     yes   lv   0
```

Obviously, it is difficult to come to any conclusions regarding the state of this system just by looking at a snapshot picture like the one above. However, at first glance, the following potential problems can be noticed:
- **paging00 is underutilized, and it is too large. It needs to be reduced in size.**
- **paging01 is over utilized, and the size seems to be too small. It needs to be increased in size.**
- **Both user-defined paging spaces are on the same disk. It would be better if one of them were moved onto a disk which is less utilized.**

- **True** or False? The size of **paging00** (in the above example) can be dynamically decreased.
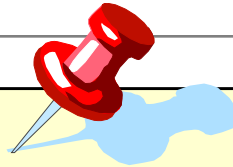
Exercise 12: Paging space

- List paging space

- Add another paging space

- Change the characteristics of a paging space

- Remove paging space

Unit summary

- Paging space is a **requirement** in AIX for the system to boot up. The default paging space is **/dev/hd6**.

- The percent utilization of all the paging spaces should be regularly **monitored** to ensure that the system has the correct amount of page space defined. The `lsps` `command` can be used to do this.

- Paging space can be **inactivated** and the **size** can be increased or decreased dynamically.