

SWAP

What is SWAP?

Swap memory is space that is reserved via the hard disk and should only be utilized when necessary and in cases where the servers dedicated memory has been mostly used up.

The swappiness value is actually a kernel tunable - [see here for more information](#)

How does a system decide how often to use SWAP over physical memory?

In Linux, the `/proc/sys/vm/swappiness` file is a kernel parameter that controls the swappiness behavior of the virtual memory system. Swappiness is a setting that determines how aggressively the kernel will use swap space.

Understanding Swappiness

Swappiness Value: The value of swappiness can range from 0 to 100.

0: The kernel will avoid swapping out processes as much as possible, preferring to keep data in RAM.

100: The kernel will aggressively swap processes out of physical memory and move them to swap space, keeping more RAM free.

Swappiness at 0:

The kernel will prioritize keeping processes in RAM, only swapping out data when absolutely necessary.

This setting is useful for systems where you want to minimize latency and keep performance high for active applications, such as on a desktop or server where response time is critical.

Swappiness at 100:

The kernel will swap out data more readily, even if there is still available RAM.

This setting can be useful in certain scenarios where you want to maximize the use of RAM for disk caches and reduce the amount of cached data being cleared to make room for process memory.

Managing swappiness configuration

Check swappiness value

```
cat /proc/sys/vm/swappiness
```

Changing swappiness

Since swappiness is a kernel tunable, the only method to make a swappiness value change persist a reboot is to [create a custom configuration in /etc/sysctl.d](#). I'll also detail the steps below:

Change swappiness value (persistent)

Create a new custom configuration file in /etc/sysctl.d

```
vim 00-custom-swap.conf
```

Within this file, place the following string (with your desired value added)

```
vm.swappiness=10
```

Once created, apply the settings using the below command:

```
sysctl -p
```

Change swappiness value (not persistent)

To change the swappiness value on a machine for the current session (doesn't persist reboot), we need to manually update the swappiness file:

```
vim /proc/sys/vm/swappiness
```

The file should contain only a number - this being the swappiness value. Change this number to your desired value. For example, to set a swap value of 60:

```
root@test:~# cat /proc/sys/vm/swappiness  
60
```

Once the swappiness value has been changed, we then need to switch off/switch on swap to pull in the new value:

```
swapoff -a
```

```
swapon -a
```

SWAP storage types

For SWAP to work in Linux, there has to be sections of a disk partitioned specifically for this purpose.

There are 2 types of disk allocation that we can use to define swap storage:

1. swap file
2. swap partition

A swap file and a swap partition both serve the same fundamental purpose in Linux: to provide additional virtual memory by swapping out inactive pages from the RAM to disk. However, they differ in their implementation, flexibility, and some performance aspects. Here's a detailed comparison between the two:

Swap Partition

- A swap partition is a dedicated section of the disk specifically set aside for swap space.
- It does not reside within any filesystem and is recognized by its partition type (typically "Linux swap").
- Swap partitions can offer slightly better performance because they avoid the overhead of filesystem management.
- The dedicated nature of swap partitions can make disk I/O more predictable and efficient for swapping purposes.

Swap File

- A swap file is a regular file within an existing filesystem, such as ext4, XFS, etc.
- It is easier to resize a swap file compared to a swap partition. You can simply create a larger or smaller file and configure it without repartitioning the disk.
- Swap files can be created, resized, and managed without needing to repartition the disk, making them more convenient for adding or adjusting swap space on the fly.
- Swap files may have slightly lower performance compared to swap partitions due to filesystem overhead.

Configuring SWAP storage

Check the current swap partition configuration

```
swapon --show
```

SWAP Partition

Create and enable a swap partition:

```
mkswap /dev/devicename  
swapon /dev/devicename
```

The above will create a SWAP partition and enable it until reboot. If we want to create a persistently enabled swap partition, then we'll need to add an entry in `/etc/fstab` to specify this:

```
vim /etc/fstab
```

Add an entry like the following, ensuring to change the `/dev/devicename` path:

```
/dev/devicename none swap sw 0 0
```

SWAP File

Creating a SWAP file:

```
fallocate -l 1G /swapfile
```

The above creates an empty 1GB file.

Set the correct permissions:

```
chmod 600 /swapfile
```

Initialise the SWAP file:

```
mkswap /swapfile
```

The above formats the file into SWAP format.

Enable the SWAP file (not persistent):

```
swapon /swapfile
```

Persistently enable the SWAP file:

```
vim /etc/fstab
```

Add the following contents:

```
/swapfile none swap sw 0 0
```

```
=====
```

Revision #5

Created 2024-01-26 11:43:32 UTC by Daniel

Updated 2024-06-09 15:07:22 UTC by Daniel