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Memory Load Diagnostics

Linux Essentials

TRAINING

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How to Find Out Memory Load?

Linux Terminal

```
$ free -h
              total        used        free      shared  buff/cache   available
Mem:          7,5G        304M        133M        6,5M        7,1G        6,9G
Swap:         8,0G        178M        7,8G
```

What does the **free** command show?

- Current RAM load in **Mem** row.
- Current Swap space utilization in **Swap** row.

Memory Areas in Linux

Column	Description
total	**The total amount of memory**.
used	The amount of **memory used by applications**. This memory cannot be freed without closing applications. The used memory is calculated using the formula **total - free - buff/cache**.
free	The amount of free memory, i.e. **memory not occupied by anything**.
shared	The amount of **RAM shared between processes**.
buff/cache	The total amount of **RAM used by buffers, cache and slab memory.** These areas of memory can be freed at any time if applications need it.
available	The amount of **RAM available for use by applications**.

Reclaimable RAM Areas

Cache is a page cache of data that is placed by the kernel in the computer's RAM to speed up I/O operations and, as a result, speed up applications.

Buffers are part of the page cache **used by block devices**.

Slab is an area of memory allocated by the kernel to ensure the operation of the mechanism for optimizing the allocation of space in RAM for new objects and reducing its fragmentation.

Swap Memory

Swap memory is virtual memory on an HDD or SSD device, which is **an addition to the RAM installed in the system**.

This is usually a dedicated swap partition, or a swap file. **Swap memory is much slower than RAM.**

Even with a light RAM load, **kernel can swap rarely used pages**. **The less space remains in RAM, the more actively swap memory is used**, which greatly affects the overall performance of the system.

Conclusions

When assessing the total RAM load, one should consider the **available value**, since it **shows how much memory can be reclaimed** if needed.

Buffers, Cache and Slab areas can be freed at any time if applications need it.

High Swap memory usage indicates a shortage of RAM and can seriously affect the overall system performance.

Further reading:

- Free Command in Linux
  https://linuxize.com/post/free-command-in-linux/
- Linux swap: what it is and how to use it
  https://averagelinuxuser.com/linux-swap/