



# Understanding the Load Average on Linux and Other Unix-like Systems

by Chris Hoffman on August 15th, 2014

```
chris@ubuntu1404vbox: ~  
chris@ubuntu1404vbox:~$ uptime  
12:35:25 up 5 min,  2 users,  load average: 0.29, 0.21, 0.11  
chris@ubuntu1404vbox:~$
```

Linux, Mac, and other Unix-like systems display “load average” numbers. These numbers tell you how busy your system’s CPU, disk, and other resources are. They’re not self-explanatory at first, but it’s easy to become familiar with them.

Whether you’re using a Linux desktop or server, a Linux-based router firmware, a NAS system based on Linux or BSD, or even Mac OS X, you’ve probably seen a “load average” measurement somewhere.

## Load vs. Load Average

On [Unix-like systems](#),

including Linux, the system load is a

measurement of

the computational work the system is performing. This measurement is displayed as a number. A completely idle computer has a load average of 0. Each running process either using or waiting for CPU resources adds 1 to the load average. So, if your system has a load of 5, five processes are either using or waiting for the CPU.



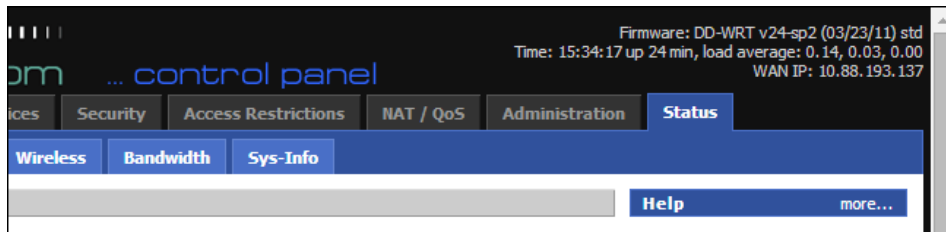
### RELATED ARTICLE

[What Is Unix, and Why Does It Matter?](#)

Unix systems traditionally just counted processes waiting for the CPU, but Linux also counts processes waiting for other resources — for example, processes waiting to read from or write to the disk.

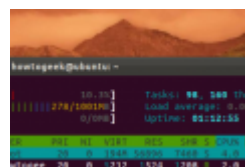
On its own, the load number doesn't mean too much. A computer might have a load of 0 one split-second, and a load of 5 the next split-second as several processes use the CPU. Even if you could see the load at any given time, that number would be basically meaningless.

That's why Unix-like systems don't display the current load. They display the load average — an average of the computer's load over several periods of time. This allows you to see how much work your computer has been performing.



## Finding the Load Average

The load average is shown in many different graphical and terminal utilities, including in [the top command](#)



### RELATED ARTICLE

[How to Manage Processes from the Linux Terminal: 10](#)

[Commands You Need to Know](#)

and in the graphical GNOME System Monitor tool. However, the easiest, most standardized way to see your load average is to [run the uptime command](#) in a terminal. This command shows your computer's load average as well as how long it's been powered on.

The uptime command works on Linux, Mac OS X, and other Unix-like systems. If you're using a Linux or BSD-based device with a web interface — such as the DD-WRT router firmware or [FreeNAS NAS system](#) — you'll probably see the load average somewhere in its status page.

```

chris@ubuntu1404vbox: ~
top - 12:36:18 up 5 min,  2 users,  load average: 0.29, 0.23, 0.12
Tasks: 166 total,  2 running, 164 sleeping,  0 stopped,  0 zombie
%Cpu(s):  2.3 us,  1.3 sy,  0.0 ni, 96.0 id,  0.0 wa,  0.3 hi,  0.0 si
KiB Mem:  2050104 total, 1124432 used,  925672 free,  71692 buffe
KiB Swap: 2095100 total,  0 used,  2095100 free.  379472 cache

  PID USER      PR  NI   VIRT   RES   SHR  S  %CPU  %MEM     TIME+
 885  root        20   0 292264  48372 13952 S   1.0   2.4   0:03.70
2121 chris        20   0 1319728 202272 42728 S   1.0   9.9   0:26.39
2955 chris        20   0  29136   1668  1180 R   0.7   0.1   0:00.02

```

## Understanding the Load Average Output

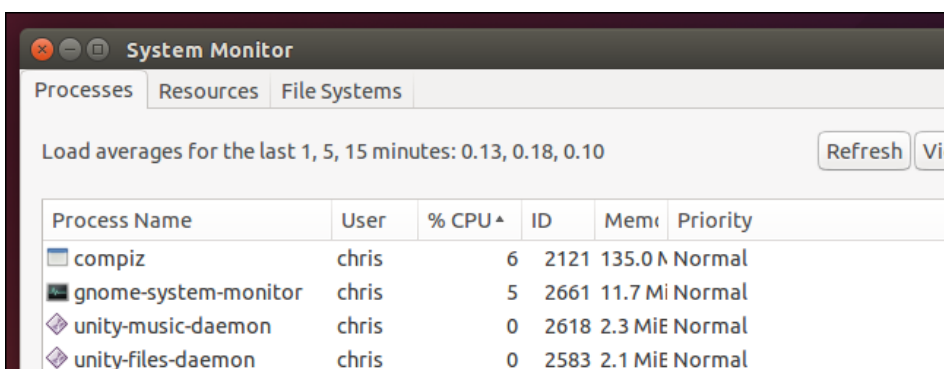
The first time you see a load average, the numbers look fairly meaningless. Here's an example load average readout:

```
load average: 1.05, 0.70, 5.09
```

From left to right, these numbers show you the average load over the last one minute, the last five minutes, and the last fifteen minutes. In other words, the above output means:

```
load average over the last 1 minute: 1.05
load average over the last 5 minutes: 0.70
load average over the last 15 minutes: 5.09
```

The time periods are omitted to save space. Once you're familiar with the time periods, you can quickly glance at the load average numbers and understand what they mean.



## What Do the Numbers Mean, Exactly?

Let's use the above numbers to understand what the load average actually means. Assuming you're using a single-CPU system, the numbers tell us that:

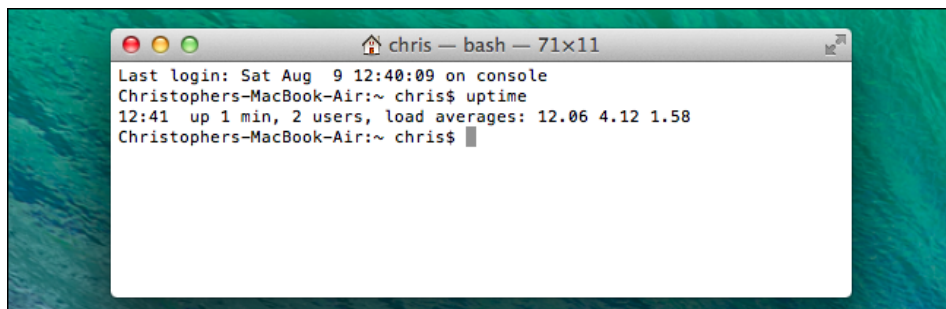
```
over the last 1 minute: The computer was overloaded by 5%
on average. On average, .05 processes were waiting for
the CPU. (1.05)

over the last 5 minutes: The CPU idled for 30% of the
time. (0.70)

over the last 15 minutes: The computer was overloaded by
409% on average. On average, 4.09 processes were waiting
for the CPU. (5.09)
```

You probably have a system with multiple CPUs or a multi-core CPU. The load average numbers work a bit differently on such a system. For example, if you have a load average of 2 on a single-CPU system, this means your system was overloaded by 100 percent — the entire period of time, one process was using the CPU while one other process was waiting. On a system with two CPUs, this would be complete usage — two different processes were using two different CPUs the entire time. On a system with four CPUs, this would be half usage — two processes were using two CPUs, while two CPUs were sitting idle.

To understand the load average number, you need to know how many CPUs your system has. A load average of 6.03 would indicate a system with a single CPU was massively overloaded, but it would be fine on a computer with 8 CPUs.



```
chris — bash — 71x11
Last login: Sat Aug  9 12:40:09 on console
Christophers-MacBook-Air:~ chris$ uptime
12:41  up 1 min, 2 users, load averages: 12.06 4.12 1.58
Christophers-MacBook-Air:~ chris$
```

The load average is especially useful on servers and embedded systems. You can glance at it to understand how your system is performing. If it's overloaded, you may need to deal with a process that's wasting resources, provide more hardware resources, or move some of the workload to another system.