Disk Speed Test (Read/Write): HDD, SSD Performance in Linux

Posted on Tuesday December 27th, 2016 (/disk-speed-test-read-write-hdd-ssd-perfomance-linux/) by admin (/author/admin/)

(/disk-speed-test-read-write-hdd-ssd-perfomance-linux/)

From this article you'll learn how to measure an input/output performance of a file system on such devices as **HDD, SSD, USB Flash Drive** etc.

I'll show how to test the read/write speed of a disk from the Linux command line using `dd` command.

I'll also show how to install and use `hdparm` utility for measuring read speed of a disk on Linux Mint, Ubuntu, Debian, CentOS, RHEL.

To get the accurate read/write speed, you should repeat the below tests several times (usually 3-5) and take the average result.

> **Cool Tip:** How to choose SSD with the best quality/price relation! Read more → (https://pc4u.org/best-ssd/)

dd: TEST Disk WRITE Speed

Run the following command to test the **WRITE speed** of a disk:

```
$ sync; dd if=/dev/zero of=tempfile bs=1M count=1024; sync
1024+0 records in
1024+0 records out
1073741824 bytes (1.1 GB) copied, 3.28696 s, 327 MB/s
```

dd: TEST Disk READ Speed

The file `tempfile`, that has just been created by the previous command, was **cached in a buffer** and its read speed is much higher then the real read speed directly from the disk.

To get the real speed, we have to clear cache.

Run the following command to find out the **READ speed from buffer**:

```
$ dd if=tempfile of=/dev/null bs=1M count=1024
1024+0 records in
1024+0 records out
1073741824 bytes (1.1 GB) copied, 0.159273 s, 6.7 GB/s
```

Clear the cache and accurately measure the **real READ speed** directly from the disk:

```
$ sudo /sbin/sysctl -w vm.drop_caches=3
vm.drop_caches = 3
$ dd if=tempfile of=/dev/null bs=1M count=1024
1024+0 records in
1024+0 records out
1073741824 bytes (1.1 GB) copied, 2.27431 s, 472 MB/s
```

dd: TEST Read/Write Speed of an External Drive

> **Cool Tip:** Have added a new drive to `/etc/fstab` ? No need to reboot! Mount it with one command! Read more → (/remount-etc-fstab-without-reboot-linux/)

To check the performance of some External **HDD**, **SSD**, **USB Flash Drive** or any other removable device or remote file-system, simply access the mount point and repeat the above commands.

Or you can replace `tempfile` with the path to your mount point e.g.:

```
$ sync; dd if=/dev/zero of=/media/user/MyUSB/tempfile bs=1M count=1024; sync
```

> **Reminder:** All the above commands use the temporary file `tempfile` . Don't forget to delete it when you complete the tests.

hdparm: Test HDD, SSD, USB Flash Drive's Performance

`hdparm` is a Linux command line utility that allows to set and view hardware parameters of hard disk drives.

And it can also be used as a simple benchmarking tool that allows to quickly find out the **READ speed** of a disk.

`hdparm` is available from standard repositories on the most Linux distributions.

Install `hdparm` depending on your Linux distribution.

> **Cool Tip:** Troubleshooting an issue with a hard drive performance? It will be a good idea also to test download/upload Internet speed. It can be easily done from the Linux command line! Read more → (/test-internet-speed-linux-command-line/)

On **Linux Mint**, **Ubuntu**, **Debian**:

```
$ sudo apt-get install hdparm
```

On **CentOS**, **RHEL**:

```
$ sudo yum install hdparm
```

Run `hdparm` as follows, to measure the **READ speed** of a storage drive device `/dev/sda` :

```
$ sudo hdparm -Tt /dev/sda
/dev/sda:
 Timing cached reads:   16924 MB in  2.00 seconds = 8469.95 MB/sec
 Timing buffered disk reads: 1386 MB in  3.00 seconds = 461.50 MB/sec
```

Comments (17) (/disk-speed-test-read-write-hdd-ssd-perfomance-linux/#comments)

PERFOMANCE (/TAG/PERFOMANCE/)

17 REPLIES TO “DISK SPEED TEST (READ/WRITE): HDD, SSD PERFORMANCE IN LINUX”

WILLIAMJEREMIAH REPLY

Monday April 24th, 2017 at 11:42 AM (/disk-speed-test-read-write-hdd-ssd-perfomance-linux/#comment-385)

Awesome. Thanks.

```
williamj@SilverK:~$ sync; dd if=/dev/zero of=tempfile bs=1M count=1024; sync
1024+0 records in
1024+0 records out
1073741824 bytes (1.1 GB, 1.0 GiB) copied, 0.313688 s, 3.4 GB/s
williamj@SilverK:~$ dd if=tempfile of=/dev/null bs=1M count=1024
1024+0 records in
1024+0 records out
1073741824 bytes (1.1 GB, 1.0 GiB) copied, 0.093416 s, 11.5 GB/s
williamj@SilverK:~$ sudo /sbin/sysctl -w vm.drop_caches=3
[sudo] password for williamj:
vm.drop_caches = 3
williamj@SilverK:~$ dd if=tempfile of=/dev/null bs=1M count=1024
1024+0 records in
1024+0 records out
1073741824 bytes (1.1 GB, 1.0 GiB) copied, 0.7639 s, 1.4 GB/s
```

SUSHEEL RONGE REPLY

Thursday October 26th, 2017 at 05:47 PM (/disk-speed-test-read-write-hdd-ssd-perfomance-linux/#comment-2861)

Good Information!

KOSTAS REPLY

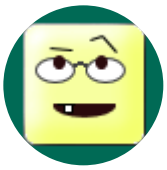
Wednesday November 22nd, 2017 at 07:44 PM (/disk-speed-test-read-write-hdd-ssd-perfomance-linux/#comment-3129)

soooooooooo simple!!!!!.....

SAMEER REPLY

Thursday November 30th, 2017 at 11:22 AM (/disk-speed-test-read-write-hdd-ssd-perfomance-linux/#comment-3264)

Anyone has hdparm version for Android?



BACHELOR4 REPLY

Wednesday January 31st, 2018 at 11:54 AM (/disk-speed-test-read-write-hdd-ssd-perfomance-linux/#comment-3755)

"Reminder: All the above commands use the temporary file tempfile. Don't forget to delete it when you complete the tests."

I can not find any place where you instruct as to how to delete the tempfile. How is this done safely?

SAM REPLY

Thursday May 28th, 2020 at 07:19 PM (/disk-speed-test-read-write-hdd-ssd-perfomance-linux/#comment-15013)

go to directory where you executed the command, in terminal:

""rm tempfile""

or in a gui select the file and delete it.

MILAN REPLY

Tuesday February 20th, 2018 at 03:57 AM (/disk-speed-test-read-write-hdd-ssd-perfomance-linux/#comment-3942)

rm tempfile

JON REPLY

Friday March 9th, 2018 at 07:06 PM (/disk-speed-test-read-write-hdd-ssd-perfomance-linux/#comment-4208)

I must have done something wrong. I tested first with bs=4k and count=256k.

It finished quickly.

Afterwards I decided myself to alter the parameters like so: bs=1M and count=256k

I didn't know exactly what I was doing. I left it running not having slightest hunch if it's wrong to interrupt it via Ctrl-C. It run approximately 1000 seconds having written almost 100GB of all 150GB free on the SSD. Only then I've read the man pages searching for clues but still didn't found. So I have a couple of questions if

kindly allowed. That 'k' at the end of count I am not sure of it's meaning or even if it makes sense. I have to also ask what would have happened if the command filled the whole free space? Would it have stopped by itself with message/error? Was it dangereous for an ssd doing this. The fact I performed it from sysresccd on ssd with Windows installed has any effect on outcome?
I mean the if = is it from the RAM memory? I specified an of= on the ssd after mounting it like /mnt/windows/some.output.file. Is the way I did it significant for the results?

J REPLY

Wednesday March 14th, 2018 at 09:31 PM (/disk-speed-test-read-write-hdd-ssd-perfomance-linux/#comment-4294)

@JON

> bs=4k and count=256k

k means what it always means: about 1,000, but in the case of computers (here), usually 1024. "bs" means block size, "count" means number of blocks. So this means write 4k x 256k bytes. 1k x 1k = 1 megabyte (about 1,000 x about 1,000 = about 1,000,000). How many megabytes? Since we already took care of the 'k's; 4x 256 = 1024 (aka about 1000, or 1k again.) What's 1k x 1k x 1k? 1 gigabyte (about 1,000,000,000.) You wrote 1 gigabyte of zeros.

Therefore,

> bs=1M and count=256k

1M = (1k x 1k)

(1k x 1k) x 1k(the k from "count") = 1 gigabyte

1 gigabyte x 256 = 256 gigabytes.

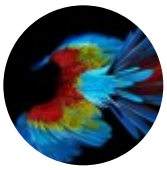
You were writing 256 gigabytes of zeros. Your drive is only 150 gigabytes in size. It won't hurt your drive, it will just delete everything on your drive. When it fills your drive, it will stop.

The "if" is not from ram, it is a program (/dev/zero) in your system disguised as a file but whenever it is read is just endless zeros.

MARIUSZ REPLY

Tuesday August 21st, 2018 at 11:57 AM (/disk-speed-test-read-write-hdd-ssd-perfomance-linux/#comment-6288)

How to check sdb drive?
Should I use /dev/sdb instead of /dev/zero here:
sync; dd if=/dev/zero of=/media/user/MyUSB/tempfile bs=1M count=1024; sync
?



MELROY VAN DEN BERG REPLY

Wednesday October 10th, 2018 at 12:10 AM (/disk-speed-test-read-write-hdd-ssd-perfomance-linux/#comment-6806)

I think you missed the best software package for this kind of tests. It's called fio: https://github.com/axboe/fio/ (https://github.com/axboe/fio/)

ATLETA REPLY

Thursday January 10th, 2019 at 07:12 PM (/disk-speed-test-read-write-hdd-ssd-perfomance-linux/#comment-8449)

It's not accurate. The second sync does not influence the measurement (it's being run after dd reports the results) and thus it's influenced by caching. If you try the same test with 4096 or 8192 megs, you'll have worse results (but closer to the reality).

One way to correct for this is measuring the whole process with the time command and then doing the division manually. E.g.:

time (sync; dd if=/dev/zero of=tempfile bs=1M count=8192; sync)

You'll see that dd will report a higher throughput, but you can then divide 8192 with whatever seconds time comes up with.

KARL REPLY

Tuesday February 12th, 2019 at 07:27 PM (/disk-speed-test-read-write-hdd-ssd-perfomance-linux/#comment-8913)

You need `conv=fdatasync` in your dd commands to include flush and sync time. Otherwise the results will be way too high, as others have mentioned.

SOBARI REPLY

Saturday September 7th, 2019 at 08:03 AM (/disk-speed-test-read-write-hdd-ssd-perfomance-linux/#comment-12375)

Thank You

OMNICRON REPLY

Friday September 13th, 2019 at 08:28 AM (/disk-speed-test-read-write-hdd-ssd-perfomance-linux/#comment-12473)

/dev/sdb2:

Timing cached reads: 16830 MB in 1.99 seconds = 8454.99 MB/sec

Timing buffered disk reads: 434 MB in 3.01 seconds = 144.27 MB/sec

MAYTO REPLY

Saturday November 23rd, 2019 at 10:02 AM (/disk-speed-test-read-write-hdd-ssd-perfomance-linux/#comment-13433)

great post:) keep simple

ADY REPLY

Wednesday August 19th, 2020 at 05:22 PM (/disk-speed-test-read-write-hdd-ssd-perfomance-linux/#comment-16002)

Hello, after doing some tests with different “GB” my storage on NVMe was filled with 7% (56GB), can I delete that storage or stay there permanently?

LEAVE A REPLY

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ONLINE TOOLS

Base64 Decode (https://base64-decode.online/)

Base64 Encode (https://base64-encode.online/)

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