



r/linux • 1 mo. ago
[deleted]

...

TIL you don't need to partition a block device if you just want one partition

Tips and Tricks

I was just making a USB stick for my files backup.

What I've previously done in this case is make a new table (GPT) with one partition, then LUKS format that one partition with cryptsetup, then open it, format to ext.4 from the mapper and then mount.

However today I was thinking, no, it makes more sense to LUKS format the USB first so it's all hidden, then make the table and format the partition.

But once I opened it in the mapper my brain stopped working and I didn't know how to make the table, I did make the table on the device in /dev/mapper with one partition but then no subpartitions showed, I don't know how to access a subpartition from a device in the mapper. So I thought, screw it, let's just mkfs ext.4 on the device itself (the one in the mapper directory) and it worked.

Then I thought, okay it worked but I probably messed it up and it shouldn't work after this step. Well, I mounted it successfully, copied my files, unmounted, closed, opened again and mounted again to see if it's there and if looks good and it does look good.

I discovered that just because I learned to install Linux by making a partition table I just did it to other devices thinking that it's necessary but it turns out it's not.

IF YOU JUST WANT ONE PARTITION YOU DON'T NEED A TABLE, JUST FORMAT THE BLOCK DEVICE DIRECTLY ITS FINE.

I still don't understand why though, my brain is confused, someone care to explain?



24



54



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quadralien • 1mo ago

Partitions are virtual block devices which are slices of the block device, described by the partition table in the first blocks of the outer device. You could probably put another partition table inside a partition, for extra confusion!



48



Reply



[deleted] OP • 1mo ago

Thank you! I always thought that Linux/whatever program you're using in the shell or otherwise wouldn't be able to read a "raw" USB/file never thought "what if" before and now it all seems more

wouldn't be able to read a raw device, never thought that it before and now it all seems more obvious and simple and I learned something, things are more simple than I thought.

Nested partitions sounds cool haha.

8 Reply

HomicidalTeddybear • 28d ago

Note that there are OSes for which this is totally true, but linux and most other unix-esque OSes just see any block device as a file, and really couldn't care less. To the OS a mounted partition is no different to a mounted raw block device is no different to a loopback mounted file.

12 Reply

hitsujiTMO • 27d ago

Nested partitions is what we used for "extended partitions" with MBR partition tables.

MBR can only support 4 partitions, so if you needed more than 4 partitions you had to nest the partitions.

By not adding a partition table, you can potentially be preventing the drive from being bootable if it's not a fat32 drive or you have UEFI boot disabled. MBR stored the boot record in the first 512 bytes of the partition table.

2 Reply



turtle_mekb • 1mo ago

yep, then you can use `losetup --show -fP /dev/sdXpN` so you can access the partitions on the partition at `/dev/loopNpN`

partition-ception

4 Reply

quadralien • 28d ago

Thanks for the confirmation. I am glad that I have never actually had to do that.

3 Reply

NicholasAakre • 27d ago

Partitions all the way down?

1 Reply

tinycrazyfish • 1mo ago

Because like many others you have been brainwashed that a block device requires a partition table.

Many others also include developers. There will be tools that won't work correctly if there is no partition table.

However today I was thinking, no, it makes more sense to LUKS format the USB first so it's all hidden

hidden

Luks by default creates metadata and keyslots. So it is not hidden. Do you mean hiding your partition table? There is usually no interesting info given away in a partition table

22 Reply



MatchingTurret • 1mo ago • Edited 1mo ago

Top 1% Commenter

Do you mean hiding your partition table? There is usually no interesting info given away in a partition table

The very existence of these partitions is valuable information. If an adversary can show that the partitions exist, [he might be able to compel you to unlock them](#). That's why plausible deniability is an important concept in cryptography, see [Shufflecake: Plausible Deniability for Multiple Hidden Filesystems on Linux](#) or [VeraCrypt: Plausible Deniability](#)

9 Reply

tinycrazyfish • 28d ago

A partition table gives no information. Keeping the luks header does. Using the full disk does not hide anything. An incorrect/incomplete partition table can hide a filesystem, but having a disk with no partition table all filled with data that looks random will also giveaway that there is likely encryption going on.

-1 Reply



MatchingTurret • 28d ago

Top 1% Commenter

I'm just pointing out that the partition table discloses the existence of one or more partitions. That's an information you might want to hide from an adversary.

7 Reply

[deleted] **OP** • 1mo ago

Yes, I just learned to do it like that last year when I decided to try Linux and started as Arch as my first distro because I wanted to install everything from scratch (but couldn't bother to compile the kernel myself) to gain a better understanding. I don't use Arch anymore though, I've found other distros more convenient.

I use Fedora, btw.

1 Reply



psyblade42 • 1mo ago

While this works it is a bad idea. Software will consider it empty and ask you to format it (e.g. Windows) or even create a partition table automatically (e.g. Windows Setup).

(Not sure if my examples are up to date but I am sure there is still more than enough bad software around)

24 Reply



dst1980 • 28d ago

Windows would ask to format unrecognized partitions as well. Probably similar on Mac.

For an external drive that will be fully utilized as a single block device, the partition table is optional. Many flash drives used to be formatted this way. This is how floppy disks were used, and often also Zip disks.

2 Reply



psyblade42 • 28d ago

Not sure about Mac but for setting it to recognised Linux partition types (such as Linux swap or Linux filesystem) worked well for keeping my Windows installs from bugging me about them.

4 Reply



Crafty-Sand2518 • 28d ago

That used to be the case, but from my experience, at least in the past 5 or so years, as long as the device has a valid partition table (and possibly, a protective MBR), Windows will show in the partition manager that there is *something* there it doesn't recognize but unless you're explicit about it, it will be ignored and won't pester you to format it.

3 Reply

2 more replies

fellipec • 1mo ago

To Linux everything is a file.

When you run `mkfs.ext4 /dev/sdx` or `mkfs.ext4 /dev/sdx1` or even `mkfs.ext4 /tmp/dummyfile` it doesn't care where it is creating your filesystem, it just does.

Let's demonstrate:

1. First, let's create a 1GB file in my home dir:

```
dd if=/dev/zero of=testfile bs=1G count=1 oflag=direct status=progress
1+0 records in
1+0 records out
1073741824 bytes (1,1 GB, 1,0 GiB) copied, 0,914921 s, 1,2 GB/s
```

2. Now let's format it with ext4

```
mkfs.ext4 testfile
mke2fs 1.47.0 (5-Feb-2023)
A descartar blocos de dispositivo: pronto
A criar sistema de ficheiros com 262144 4k blocos e 65536 inodes
UUID do sistema de ficheiros: bd296faa-d9b2-46e4-9729-3a264f1e48de
Cópias de segurança de superblocos gravadas em blocos:
    32768, 98304, 163840, 229376
```

```
A alocar tabelas de grupo: pronto
Gravando tabelas inode: pronto
A criar diário (8192 blocos): concluído
Escrevendo superblocos e informações de contabilidade de sistema de arquivos: con
```

3. Now lets create a mountpoint and mount it

```
mkdir testmountpoint
sudo mount testfile testmountpoint
```

4. Let's check how it looks now:

<https://postimg.cc/4n4ftNxP>

```
df -h
Sist. Arq.      Tam. Usado Disp. Uso% Montado em
[...]
/dev/loop0      974M   24K   907M   1% /home/fellipec/testmountpoint
```

5. Now lets copy some files inside this "drive"

```
sudo cp -r /usr/share/wallpapers testmountpoint
ls testmountpoint
lost+found  wallpapers
```

<https://postimg.cc/2qfbfRFt>

6. Now if testfile is an entire ext4 filesystem, let's insert a USB drive here and try this:

```
sudo umount testmountpoint
sudo cp testfile /dev/sdd
sync
```

7. Remove the USB drive and insert it back...

Notice that it is mounted in a directory that matches the UUID mkfs.ext created when I ran it in the testfile

```
df -h
Sist. Arq.      Tam. Usado Disp. Uso% Montado em
[...]
/dev/sdd        974M   2,5M   904M   1% /media/fellipec/bd296faa-d9b2-46e4-9729-3a26f1e48de/

ls -la /media/fellipec/bd296faa-d9b2-46e4-9729-3a26f1e48de/
total 28
drwxr-xr-x  4 root root  4096 jan 25 08:56 .
```

```
drwxr-x---+  4 root root  4096 jan 25 09:04 ..
drwx-----  2 root root 16384 jan 25 08:49 lost+found
drwxr-xr-x  70 root root  4096 jan 25 08:56 wallpapers
```

Notice that it shows "16GB Volume" but the free space is just 947MB, because when we created the filesystem it was on a 1GB file.

<https://postimg.cc/xX415rq7>

gparted even tell us about the unused space:

<https://postimg.cc/N9wDKz89>

With this demo I hope to have illustrated that concept of everything being a file, and that you can run mkfs on a regular file and mount it, and you can copy this file to the physical device with regular cp command (no need dd, balena, whatever) and the computer will happily mount the result of this.

22 Reply

FranticBronchitis • 28d ago

O português está vazando no seu post

This post is leaking Portuguese

7 Reply

fellipec • 28d ago

Muita preguiça de subir uma máquina virtual em inglês só para esse tipo de demonstração. Foi no meu computador de verdade mesmo.

2 Reply

[deleted] **OP** • 1mo ago

Yes, I was long aware that everything is a file to Linux. Also I've previously done various files like in your example where I make, say, a 64 MB file and make it into a block device with LUKS and mounting it.

But for some reason I just thought the USB would break without a partition table lol.

2 Reply

fellipec • 1mo ago

Isn't this great?

Give a lot of flexibility, is one of the things I most like about Linux

3 Reply

1 more reply

techm00 • 28d ago

We all know everything is a file, but I'm still often surprised as to the depth of what that statement

actually means, as you just illustrated. thank you :)

2 Reply

 **fellipec** • 28d ago

My pleasure! One day I was surprised by a very similar demonstration and learned a lot. If someone learned from this post I'll consider it successful.

3 Reply

1 more reply



Try-Another-Username • 27d ago

that was a great reply, thank you brazuca

1 Reply

 **fellipec** • 27d ago

You're welcome, meu consagrado

1 Reply



caa_admin • 26d ago

Love the explanation. Just letting you know the image site you're using loads but [does not load the images](#) in question.

1 Reply

 **fellipec** • 26d ago

Thanks so much, appreciate!

Curious, the link you put loaded to me fine. Maybe some glitch on their CDN or something like that.

But don't worry, the screenshots I post are from the GUI equivalents of what I had from console, so you don't lost anything much important.

2 Reply

2 more replies



sniff122 • 1mo ago

While you can, doesn't mean it's a good idea or best practice. Some applications that deal with drives may act strangely, for example if you connect the drive to a windows machine it will have no idea what to do with it and prompt for initialisation

11 Reply



e_t_ • 28d ago

But Windows just reports any Linux filesystem as "unformatted space" even if it's on a partition. Is Windows being stupid a good reason to do things Windows' way in Linux?

2 Reply



sniff122 • 28d ago

I was just using it as an example, I've seen other weirdness with other applications too.

Also partitioning a drive, even just for a single partition, isn't the "windows way", it's just standard practice for any system

2

[Reply](#)



phagofu • 28d ago

This is called a superfloppy, because the old floppy disks used to also just have a raw filesystem without partitioning. I believe nowadays some usb flash drives are formatted that way, but uncommon.

5

[Reply](#)



wintrmt3 • 28d ago

Without a partition table you don't have a partition type and it's just a guess what's on it.

2

[Reply](#)

lazyboy76 • 1mo ago

I have been done this for a while with btrfs and zfs, didn't know this worked with ext4. TIL

1

[Reply](#)



EatMeerkats • 1mo ago

FYI when you do this with ZFS, it automatically creates partitions: <https://github.com/openzfs/zfs/issues/3452>

Historically, this was done because different manufacturers/models may have slightly different capacities, and if your replacement disk is *slightly* smaller than the one it is replacing, the replacement fails. So the developers added a small (8 MB, IIRC) amount of unused space at the end of the disk to avoid such issues.

2

[Reply](#)



kali_tragus • 28d ago

At a previous workplace we set up all (virtual) Linux servers with partition-less disks. Made it easy to expand a disk and filesystem without LVM, if nothing else. Then again, a vm could end up with a lot of small disks. All in all I prefer just using LVM as it brings along other advantages as well.

1

[Reply](#)



Shished • 28d ago

You can use the LVM or BTRFS to have a multiple virtual partitions with such setup and even can make them encrypted.

1

[Reply](#)

 **pincopallinux** • 28d ago

As other mentioned partitions within partitions or any combination of partition inside something is possible. Take a look at kpartx

1 [Reply](#)

sidusnare • 27d ago

I always make a partition table, some tools or operating systems can cause data corruption because they assume disks should be partitioned.

1 [Reply](#)



Try-Another-Username • 27d ago

It's funny you posted this because I also went through the same experience accidentally yesterday. I was formatting a new hard drive. It worked perfectly, but I googled a bit and it was not recommended because of some shit that wouldn't probably affect my use case.

I still reformatted it with a partition... The thing is it was cool that it will let you do that with no judgment. I can't imagine that philosophy in Windows.

1 [Reply](#)

ArrayBolt3 • 27d ago

I do this all the time. I have the blessing to be in an almost entirely Linux-based environment, and so far all of the tools I use handle these kinds of disks without problems. I virtually never need multiple partitions on one drive, so I just `mkfs.ext4` the whole shebang and get on with my life. I'm too busy to fight with `fdisk` if I don't have to :P

1 [Reply](#)



orev • 26d ago

Just because something works doesn't mean it's a good idea. Others have commented about Windows, but that's somewhat irrelevant.

The issue with doing things like this is that you need to remember that special drive is using a special configuration, and that easily leads to mistakes that can cause data loss. When running systems, consistency is key. Doing things the same way is important. It's more work to keep track of every slightly different configuration than you will ever save by skipping a step here and there.

1 [Reply](#)

fetching_agreeable • 25d ago

I highly recommend following the trend of making one big partition instead of formatting the entire block device. Many programs out there fail to understand this and expect partitioning, breaking without one.

1 [Reply](#)

 [deleted] OP • 1mo ago

Thank you all for your responses.

To the guys who mentioned it's not good practice since Windows for example won't recognize it, as far as I know LUKS is not native to Windows and neither is ext4, and I'm not even sure yet how to use my USB with a Windows machine although I've been on duckduckgo-ing it today. But it seems complicated and I don't want a ton of new software, so I'll probably make a separate not encrypted transfer USB for file from Windows machines that will later plug to my Linux and then back up to my main USB, then wipe and overwrite the transfer data, complicated but don't know how to use LUKS and ext4 with Windows.

0 Reply

 draeath • 28d ago

If you need to interact with windows via removable disk, the best path I have found is VeraCrypt. One small partition in FAT32 to stash installers/etc for VeraCrypt, the other you encrypt with it.

Inside the encryption, format as ExFAT, since this works well on both platforms.

1 Reply

 eldoran89 • 28d ago

Dont search for it, there are ways but they are all to complicated. If you need it to be accessible by windows just use ntfs. Ad if it need to be encrypted either use whatever tool works on windows with reasonable encryption that also works on Linux or just put some python code together to do it yourself. Dont use luks nor ext4. I know ways to mount ext4 I wouldn't know how to get links working but veracrypt would work and is good for that purpose but yeah it's easier to not bother trying to get a stick to work on both.

1 Reply



daemonpenguin • 1mo ago

That is one of the nice things about Linux, since it can treat anything as a file, it doesn't care if a filesystem is on a block device, a slice of a block device, a file, or something else. It's very flexible.

0 Reply