

# Introduction to btrfs

Augie Schwer, 2025-05-13



## Butter? B-Tree? Better?

/shrug

Btrfs is a Linux file system

# Why btrfs?

- Copy-on-Write (CoW)
- Dynamic inode allocation
- Online defragmentation, resizing
- Built-in RAID
- Built-in compression
  - Ztd, lzo, zlib
- Checksums

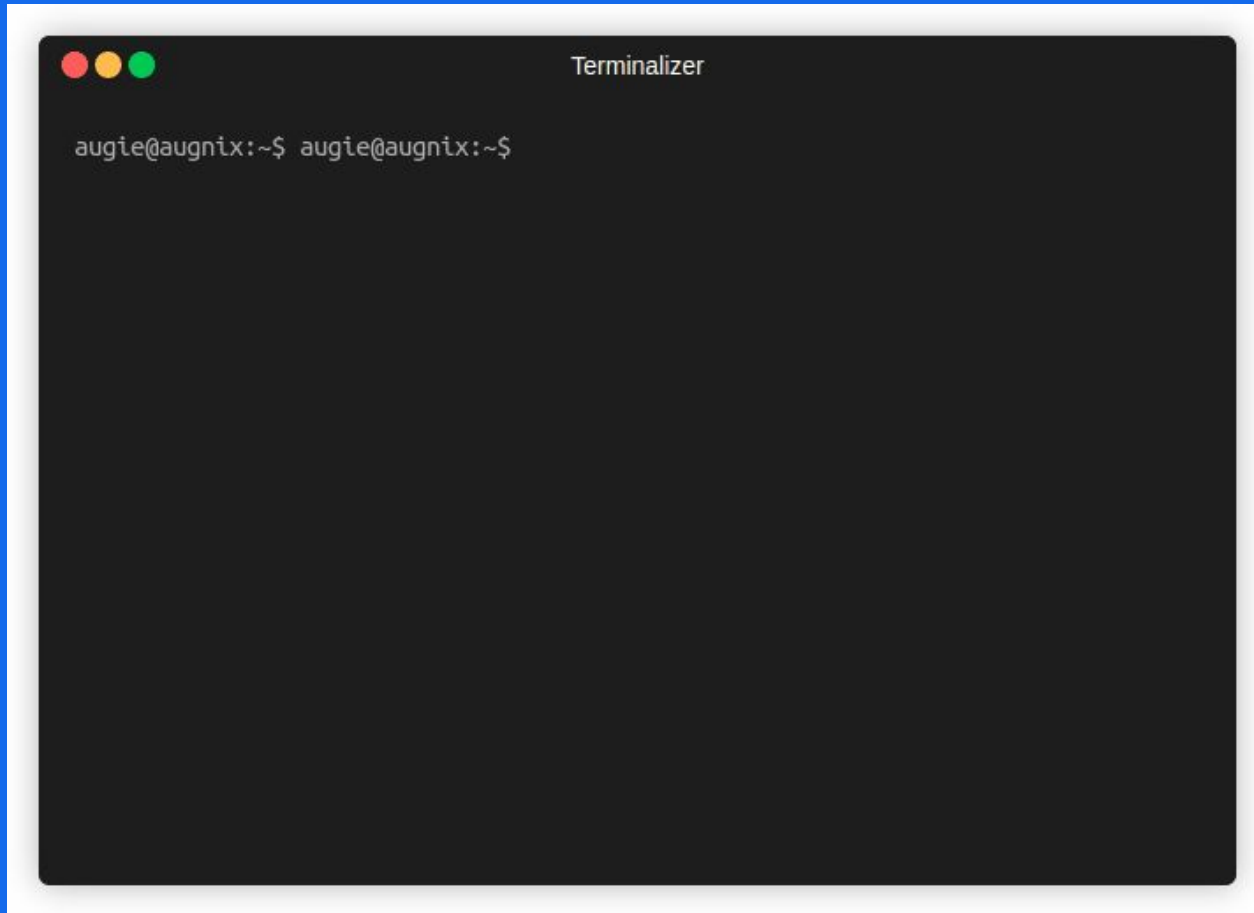
# Snapshots

Snapshots are a reference to a point in time.

Snapshots are subvolumes, cd into, write to them, mount, make read-only, diff, send/receive, etc.

Snapshots are not backups.

```
→ ~ tree -L 1 -d /home/.snapshots
/home/.snapshots
├── home.20250330T0917
├── home.20250406T0917
├── home.20250413T1017
├── home.20250414T0717
├── home.20250415T0717
├── home.20250416T0747
├── home.20250416T0917
├── home.20250416T1017
├── home.20250416T1117
├── home.20250416T1200
├── home.20250416T1317
├── home.20250416T1417
├── home.20250416T1517
└── home.20250416T1605
```



# Subvolumes

/

/opt

/root

/swap

/usr/local

/var

/home

/tmp

# Send/receive

```
btrfs send /home/augie/.snapshots/home-1 | btrfs receive /mnt/backup
```



# Compression

**ZLIB:** slower, higher compression ratio.

**LZO:** faster compression and decompression than ZLIB, worse compression ratio, designed to be fast.

**ZSTD:** compression comparable to ZLIB with higher compression/decompression speeds and different ratio

# Real world use cases

- Simple snapshot based backups
- Snapshot before apt installs
- Incremental snapshots offsite
- Lots of compressible files

# Practical considerations

## RAID 5 or 6

Mostly OK - safe for general use, there are some known problems that do not affect majority of users

## Some standard tools won't work

Df and du and make sure you exclude .snapshots from updatedb

## Run btrfsmaintenance regularly

This will include some tasks you should run monthly or weekly.



# Useful tools

btrfs - handy backup tool and abstraction for taking snapshots

httm - useful for finding files, or performing diffs between snapshots

btrfsmaintenance - automates maintenance tasks

compsize - reports effective compression ratio



**Questions?**



## About me

Engineering leader, Infrastructure, startups for the last six years, almost the whole alphabet in funding rounds.

Looking to join a team again.

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