

datto

Building your own file server

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Disclaimer

- I will present a solution that worked for me. Your mileage may vary.
- I will give the reference of the parts that I purchased. I am not getting any commission.
- All parts can be replaced with equivalents.

Why a file server?

- The average household produces more data than ever
- Some of that data is pictures or movies thanks to omnipresent cell phone cams
- Other data is purchased:
 - Music
 - Movies
 - Ebooks
- A growing data flux is received data:
 - Electronic bills
 - Important docs (bank statements, insurance policies, paystubs, etc.) emailed to us as PDFs
- Finally, more and more people scan their paperwork instead of archiving paper
- So... Where do we keep all that data?

Desirable features of a personal file server

- **Reliable:** We want your data to be safe.
- **Durable:** The hardware and software should be supported for years.
- **Affordable**
- **Easy to use**
- **Expensible:** When denser storage comes along, we want to adopt it easily

A Linux solution

- There are several possible solutions, for example:
 - FreeNAS: Based on FreeBSD + ZFS
 - Many commercial NAS solutions
- But suppose we are cheap. We don't want a dedicated server.
- We want a file server within our main home PC.
- So it has to run whatever distro we use.
- Limitation: We want a distro that runs ZFS
- Most of them do nowadays!

Hardware requirements

- Cost: We want spinners (less \$ per TB than SSDs)
- Cost: We want a standard PC...
- ... Suitable for a home office (so no rack mount)
- Hard disks fail.
- So we want hot-swappable disk bays
- Don't skimp on cooling.

The case: Antec Performance One Series P183 V3

- Allow multiple motherboard form factors
- The model isn't really important, provided that it allows:
 - Easy access
 - Extra cooling
 - Removable bay mounting



Hotswap bay: iStarUSA BPN-DE340SS-BLUE 4 x 3.5" SAS/SATA Trayless Hot-Swap Cage

- Trayless mounts: Just slide the drives in
- The bay routes the power and signal to/from the motherboard
- Fan at the back insures cooling



CPU and Motherboard

- The mobo I picked has been retired...
- The processor was very modest: i5-3230M CPU @ 2.60GHz
- Use <https://www.cpubenchmark.net> to select a decent CPU, AMD or Intel
- Don't buy the very recent top of the line – They'll be 30% cheaper next year
- Motherboard: Pick one that supports your CPU
- Must-have features:
 - USB 3
 - 6 SATA ports
 - DDR4 RAM – 16 GB or more
 - Onboard sound
 - Onboard graphics unless you're a gamer (then buy a graphic card)

Hard disks

- I am partial to Western Digital because that's what we use
- Recommended:
 - WD Re series (for datacenter use)
 - WD Black series (desktop, 5-yr warranty)
- Sweet spot is the 4 TB drives currently (around \$170 as of Nov. 2017)
- We want:
 - Four storage drives (4TB) for data
 - 1 or 2 OS drives (for OS and home dir)
 - Two OS drives if you want RAIDed OS partitions
 - These are by far the most expensive components.

Power supply: EVGA 750 GQ 210-GQ-0750-V1 80+ GOLD 750W

- Get a reputable brand
- You want to oversize the PSU a bit
- Each disk adds 10 to 15 W
- Beware of power-hungry graphics cards!
- Add a UPS (Uninterruptible Power Supply)
- I use the APC Back-UPS line – Good service, can find batteries for old units
- Make sure to cat-proof the power switch...



Cooling: COUGAR CF-V12HB Vortex Hydro-Dynamic-Bearing

- A colleague built an oil cooled PC
- It was actually parts in a fish tank full of mineral oil with a circulation pump
- Very messy, oil somehow always spreaded to the surrounding area
- Stick to air cooling unless you really are good with plumbing
- If your case comes with a cheap fan, replace it with a good, silent one
- Mount the fan with rubber fasteners
- You want an airflow of at least 10 cubic feet per minute
- Quietness is important for home offices



Document scanner: Brother ImageCenter ADS-2000 High Speed Document Scanner

- Lots of problems with Linux-hostile brands
- Brother USB-connected document scanners work out of the box
- The model I bought is superseded by cheaper ones
- At \$250, it's a bit pricy, BUT...
- How much time and space do you devote to paperwork?
- Scan your invoices, contracts, etc. to PDF and file by vendor and date.
- Software: NAPS2 or gscan2pdf. Produce multi-page PDFs.



Software

- After assembling the machine, time to install the OS
- I recommend Fedora Workstation or Ubuntu with the Gnome or MATE desktop
- I wanted a RAIDed root partition so:
 - With the live CD, create an MD RAID 1 with 2 drives
 - Then run the installer and pick the MD partitions
- The four data drives are used for a ZFS pool
- The pool is a RAIDZ2 with 2 spares
- 8 TB useable
- Create ZFS pool by ID
- Maintenance: Back up home every day, create a new snapshot
- ZFS pool is extensible – I'll put in bigger replacement drives.
- If there is interest, I will go into details

Questions?