Homelabbing

Running connected services at home

Overview of Topics

- Data Storage
- Hosting Content
- Networking
- Cloud Services
- Management
- Popular Services
- Online Resources

File Storage

- Why you might need it:
  - Backups
  - Storing hosted content
  - Hoarding

File Storage: Why Homelab it?

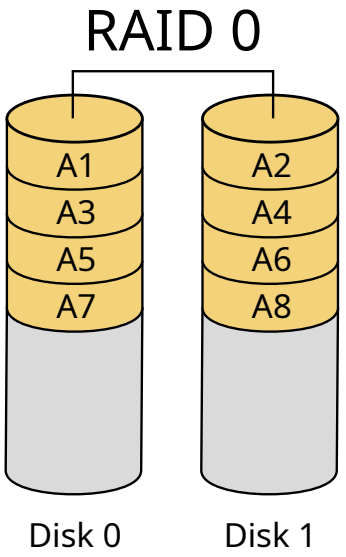
- “Why can’t I use a bunch of external drives?“
- “I just use Google drive.“
- “I have enough storage on my laptop.“

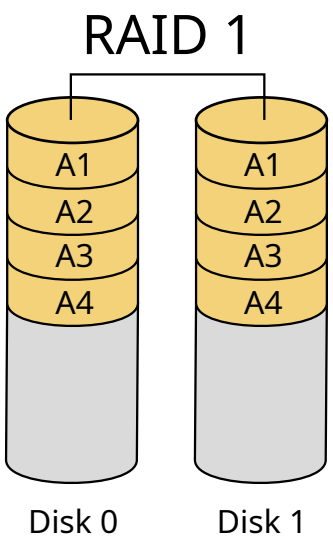
File Storage: The Fundamentals

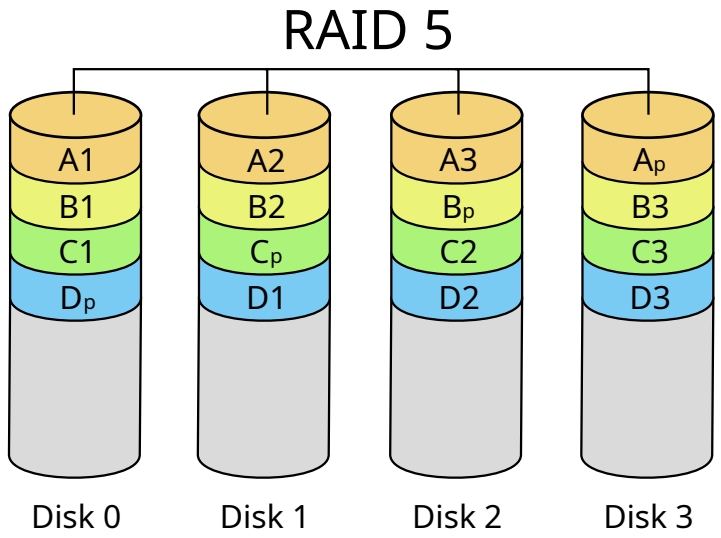
- The acronyms: NAS, DAS, SAN, and RAID
  - Network Attached Storage
  - Direct Attached Storage
  - Storage Area Network
  - Redundant Array of Inexpensive Disks

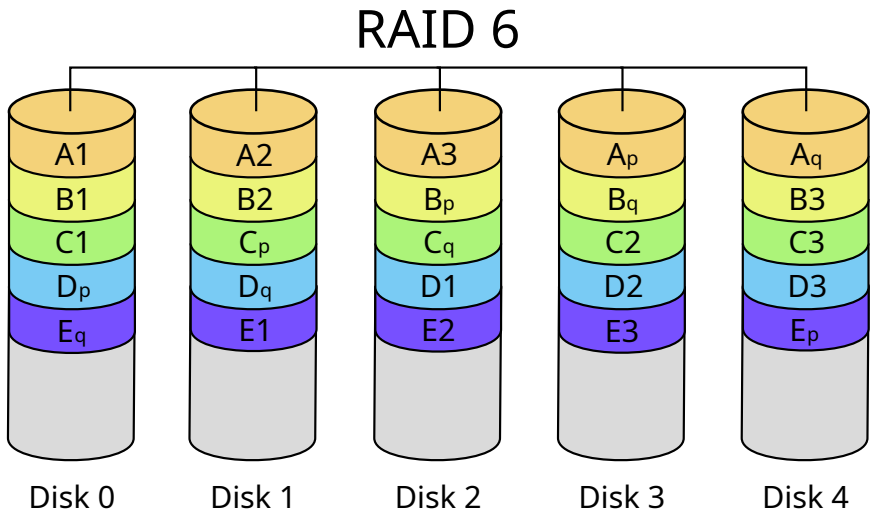
File Storage: RAID

- Common levels:









File Storage: The Software

- OS
  - There are storage centered ones, but just about anything works
  - FreeNAS, UnRAID,
- Filesystem and drive configuration
  - So many choices, but most popular is probably ZFS

File Storage: ZFS

- Some madlads at Sun Microsystems wrote it in the early 2000s
- It is specifically designed to maintain data integrity and access reliability
- Some features:
  - Copy on Write (CoW)
  - Snapshotting and incremental sends
  - Data checksumming on read
  - Encryption at rest w/ incremental backups
  - Multiplatform

File Storage: The Hardware

- Prebuilt Options:
  - Synology
  - TrueNAS
- DIY:
  - Just about anything with a CPU and expansion slots

DIY Storage: The Hardware

- Better to use multiple drives in RAID
- I recommend avoiding hardware RAID, particularly with Linux
- A rule of thumb for read cache is 1GB of RAM per 1TB of space.
- For arrays with over a few TB per drive, use RAID 6
- LSI HBA Card, IT Flashed ->

Storage: Backups

- Literally the most important part
- The Cloud route
  - I recommend Backblaze B2, they have good integrations and $/GB
- The DIY route
  - Storage offsite at either a parent or friend’s house.
- 3-2-1 Rule
- Programs like Restic, Borg, ZFS snapshots, rclone, or simple rsync.

Hosting Online Content

- Webservers
  - The most common and established way
- Other software
  - Nextcloud
  - Videogame servers

Hosting Online Content: Webservers

- Nginx
  - Load balancer and proxy server that can also host content
- Apache
  - Most popular, somewhat more annoying to configure
- Securing your site with SSL:
  - Use Let’s Encrypt certbot
  - Free and easy if you have a domain name

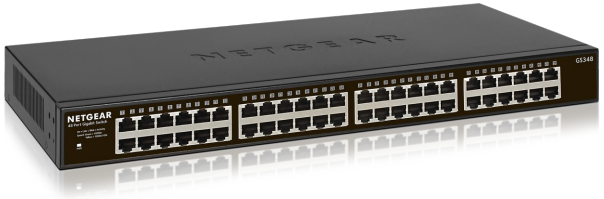
Networking

- One of the most common tasks in homelabbing
- Firewalls
- Proxying
- VPNs

Networking: Routers

- Fundamentally these facillitate communication between networks
- They tend to also include firewalls
- Some options:
  - OpenWRT (Linux)
  - OPNSense (BSD)
  - pfSense (BSD)
  - VyOS (Linux)

Networking: Switches



- These can do more than just breakout an ethernet port
  - Managed vs Unmanaged
- PoE
- VLANs
- Speeds
  - RJ-45 = Ethernet
  - SFP/SFP+

Networking: Wifi

- Enterprise routers almost always don’t handle wifi, Wireless Access Points (WAP) do.
- Often use PoE
- Run a controller on your server to manage them
- Best Wifi performance with many ethernet wired WAPs

Networking: VPNs

- These aren’t just for privacy
- Virtual Private Networks let two computers securly talk to eachother as if they are on the same network
- Options
  - Wireguard (PiVPN)
  - OpenVPN
  - Proprietary such as ZeroTier

Networking: Security

- Keep your stuff updated
- Don’t open everything to the internet, use a VPN server if only you use it
- Maybe proxy indexable services (websites, posted game servers)

Cloud Services

- Has its place in homelabbing
- Useful for proxies
- Have very fast networks for serving content
- Very useful if your ISP has problems with what you run

Management

- Keep your stuff updated
  - Ansible is a tool for automation of updates and management
- Monitoring notifications
  - Gmail relays are easy
- Think before you run production
  - Do your roomates appreciate you hacking about with the router a few times a week?

Popular Services to Run

- Game servers (Minecraft, etc.)
- Webservers, personal/resume websites
- Fileserver (Samba, NFS, sshfs, backups)
- Calendar / ToDo lists (radicale)
- Transmission, Sonarr (Torrenting)
- Personal VPN
- PiHole
- Nextcloud
- Docker
- Jellyfin, Plex (Streaming hosted video)
- Homeassistant
- Syncthing (File sync)

Places to learn

- r/homelab
- r/selfhosted
- r/datahoarder
- https://www.servethehome.com/
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