Homemade NAS

📝 Project Overview

I'm going to start this with very quickly explaining what a NAS is. A Network Attached Storage (NAS) device can probably most easily be thought of as a dedicated computer/device (doesn't need to be a full blown computer) that provides you a safe and reliable storage system that can be accessed over a network (either public or private), effectively functioning as your own private and secure cloud storage system. If you don't like that explanation here's a more generic one from said internet:

- A **Network Attached Storage (NAS)** is a device that connects to a home or office network to provide shared storage for multiple users and devices. It acts like a personal cloud, allowing files to be stored, accessed, and backed up from anywhere on the network. NAS is commonly used for file sharing, media streaming, and data backup.

With that boring bit out of the way, the NAS in question...

This project was largely a product of both boredom and curiosity. It started when I began exploring the world of home servers and heard NAS for the first time. Since I currently really don't have any dedicated storage, and despise proprietary cloud infrastructures (its a personal thing, there's nothing functionally wrong with them - except for SharePoint), after a quick YouTube search I was pretty set on throwing a janky homemade NAS together.

The planning stages for this project were extensive to say the least. In part because I enjoy planning and optimising, there's something satisfying about being absolutely certain of your choice, and in part because one of the main goals was to use as many scrap/spare and cheap/free second hand parts as possible to effectively make the cheapest - high functioning - NAS system that I could.

I'm gonna touch on some of the build ideas I'd initially had and briefly touch on why I decided not to.

1. Facebook Marketplace - I started off looking for old second hand pre-built PCs, old servers, etc and actually found some very cheap options (~$20 AUD) however, the reoccurring problem was, these old pre-builts draw more power than Pikachu. Funny enough power efficiency ended up being one of the biggest obstacles throughout this entire project. You could say the simple solution is to switch out the power supply, I considered it. The next issue becomes, with old second hand pre-builts there's no guarantee other parts won't need replacement and compatibility checks and checking power usage by component can

become a headache very quickly. Ultimately this just didn't fit exactly what I was looking to do.

2. Lenovo ThinkCentre M70q - This is a mini Lenovo workstation that I happened to get given for free and it's currently been collecting dust so I figured why not repurpose it. I will also note and link a custom NAS build video relevant to ThinkCentre builds. This approach seemed pretty perfect until I opened up the ThinkCentre and started to map out how I would connect the drives. The plan was to use (or at least account for) four 3.5" drives. I felt like this was a good starting point and middle ground between saleability and functionality. I researched HDD storage options (an enormous headache in itself) and potential adapters to convert the M2 port to a SATA connection but ultimately it was too many backflips to get something simple to work. Again, not quite the solution I was looking for.
3. I had recently rebuilt my personal computer and happened to have a somewhat old but viable CPU and MOBO laying around. These parts would do just fine, next hurdle become housing, where am I gonna store all these parts. I had an old ATX case laying around but it had really seen better days and I wanted to avoid using it at all costs (I also plan to use for a future project). Started looking for a cheap second hand case and for the prices in my ~area I wasn't sold on anything, so it was back to the drawing board.

When I was looking for RAM I was certain I wanted second hand RAM but it had to be DDR4 for MOBO compatibility which was a little unfortunate but fine. I was only looking for 8GB RAM to cut costs wherever I could but ended up with 16GB since the price difference between 8GB and 16GB in my area was about $5. The more the merrier right.

Finally, I found exactly what I wanted. Is it practical? Some may say no (it's not), but is it fun? That's what matters. I found a second hand crypto GPU mining RIG on marketplace for $20 AUD and it was just enough to solve my issue of boredom. The practical justification to myself was that an open build is going to help with airflow and heat dissipation with the machine being constantly running (I chose to ignore the fact that the core component of this project are multiple vulnerable magnetic spinning disks). I also used the justification that one day I can mount the whole rig straight to the wall like that somehow makes it okay. Nevertheless with a $20 mining rig, a $27 5 x 3.5" SATA HDD Cage and a (I couldn't take PSU shopping any longer) $70 550w Thermaltake 80 Gold + PSU, I had everything I needed to get the build started.

✅ Steps

Assembly stages where nothing exciting, typical PC assembly although I'd never used a GPU rig before and naturally the parts didn't fit exactly right but there were just enough holes to make it work, just don't shake it. In hindsight, I could've planned out where everything was gonna go a

lot better and I do plan to make some adjustments when I can bothered but it works fine for now.

1. Motherboard went in first. Like I said, the parts didn't exactly line up but a screw (approximately) in each corner and I doubt it's going anywhere.
2. Next in was the HDD bay. Same thing, it may be missing a few screws but it's got enough to keep it where it is. I've made the mistake in the past of not managing cables as I go, spending hours troubleshooting in BIOS and then when it finally works never having the energy to go back and make the cables look nice. This time I've tried to keep things as neat as possible as I go so I ideally never have to think about it again.
3. Motherboard components went in next. Both RAM sticks then some new thermal paste for the ancient CPU. Lastly was the obnoxiously large Noctua CPU cooler that went on next because it's just what I happened to have laying around at the time.
4. Similarly, I had an old PC case with some case fans still inside, those got thrown onto the rig half for airflow and half because why not.
5. Lastly the PSU went in. Naturally your PSU doesn't come with a bracket to mount it to a flat surface nor is it intended to have screws put in it. At one point I'd genuinely considered super gluing it. In the end I just stuck a small screw in it anyway and now it doesn't move.
6. Before I could turn it on and test I had to get the OS ready. Despite all documentation strongly advising against it, the internet convinced to run the OS from the USB. 1) I had a few USBs specifically used for operating systems laying around so it was convenient 2) I planned on having this running effectively at all times so I wasn't concerned with painful boot times.
    - Originally, I was up until 3am fighting with the OpenMediaVault installer. I would've done a write-up on it if I'd ever found the fix but I took the cowards way out, went to sleep and installed TrueNas on the first try the next morning.
7. Finally, with everything running, I added the IP to my local DNS server and logged into the Web UI.

🛠 Tools

- 32GB USB 3.0 - Host OS Software
- 16GB RAM ($20 AUD)
- 4 x 4TB 3.5" SATA HDD ($350 AUD)
- GPU Mining Rig ($20 AUD)
- Intel Core i5 8600k CPU
- Prime Z370-A Motherboard
- 5 x 3.5" SATA HDD Cage ($27 AUD)

- 550w Thermaltake 80 Gold + PSU ($70)

🔗 References

YouTube

- Custom NAS Build - Lenovo ThinkCentre Repurposing
- TrueNas Web UI Tutorial
- OpenMediaVault - Blue Screen Install Troubleshooting