




How To: HOMELAB

“It’s what you need
Not what you want... mostly...”



Getting started is easy

01

This session is designed to give you the entry point on building a Homelab WITHOUT going overboard.

02

They are fantastic tools you can easily use to automate your life at home or help upskill for better jobs (self-directed learning).

03

We will touch predominantly on what is **ABSOLUTELY NESSECARY** to start. We will cover some nice to haves to enable some extra learning.



So where do we begin? What's needed?

First things we need are:

- A computer of some kind.
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So where do we begin? What's needed?

First things we need are:

- **A computer of some kind.**
 - Well, OK. Not just ANY computer. You won't have much luck doing this with an old beige Macintosh.
 - Raspberry Pi is good for learning but not for deployment. More on that later.
 - For deployment, any computer with an x86_64 compatible CPU that supports Virtualisation extensions, a good chunk of RAM, some storage, and a network interface or two. More elaboration to come.
- A wired network. Don't use wireless.
- A good internet connection is helpful for remote stuff. But it can't be any old internet connection.
- An operating system that allows you to do the things you want to learn how to do.

About that computer ...

- It doesn't need to be some old enterprise machine that screams like a jet engine or dims the lights when you switch it on. We're learning. We can learn without getting terminal tinnitus or having to fork our life savings over to the local energy concern!
- Just make sure it supports virtualisation extensions at CPU level. Intel calls this VT-X, AMD calls it AMD-V.
 - Intel side note: Support for VT-D is only necessary if you want to do things like PCI-E card passthrough to a virtual machine.

About that computer ...

- RAM: 16GB is a good start point. Gives ample memory for a couple of virtual machines, and running some Docker containers.
- Storage: SSDs for your VMs, Docker containers and main OS. HDDs are OK for storage of sequential data like videos.
- When it comes to your SSD choice, prioritise IOPS performance over actual data throughput performance. SATA is absolutely fine if you don't have NVME at your disposal. Personally I'm a fan of Crucial's MX500 SATA drives for starting off @ \$95NZ/TB as of writing this.

About that computer ...

- Raspberry Pi uses a MicroSD card as its primary storage. While fine for learning and having a play around, if you go to deploy one as a used storage server, be prepared to be swapping out SD cards a lot.
- Network interfaces: The onboard gigabit NIC in most computers are well supported as a minimum.
 - Consider throwing in a 2 – 4 port addon NIC. This gives you a playground to virtualise different Router operating systems and learn them (such as Mikrotik RouterOS or OpnSense).

Networking and Internet

- Don't use wireless cards. Wireless will bog down as more people at home use it and is generally not reliable enough yet for this kind of thing.
- Get a home fibre connection if you can with a GOOD ISP. If it's just for you and your own things and being able to access them remotely, honestly the base 300/100 plan from most ISPs in New Zealand is absolutely adequate.

On ISPs and CG-NAT (Carrier Grade NAT)

- **You need a real world IPv4 address to access things remotely. CG-NAT will not work**
 - IPv6 is nice, but a lot of ISPs still need to pull finger and get it deployed. And you won't get it over 4G/5G mobile hotspotting (Yet. Really hoping this will change.)
- CG-NAT addresses are a specified private block – 100.64.0.0/10
 - In English, if your router has a WAN IP between 100.64.0.0 and 100.127.255.255, you have a CG-NAT address.
- There are ways around this. However, these are outside the scope of this session.
(Session 2 is being cooked up!)

On ISPs and CG-NAT (Carrier Grade NAT)

ISP's in New Zealand that use CG-NAT by default are:

- 2degrees (Can opt out by purchasing a “Static IP”)
- Contact Energy (No opt out)
- Nova (No opt out)
- NOW (Can opt out by purchasing a “Static IP”)
- Starlink (No opt out)
- Trustpower (Will provision a real world IP if asked)
- All 4G wireless broadband providers (Will provision real world IP if asked ... usually)

The operating system

- Linux. It's obvious, right? RIGHT?!
 - Eehh, maybe. What if you're wanting to learn how to better support Windows based desktops in a business environment? Windows Server Core is probably a better choice here.
- Regardless, you could either go with a Linux VM centric OS like Proxmox, NCP-XG or even VMWare ESXi and virtualise Windows Server Core; or go with Windows Server Core and install HyperV to virtualise Linux BSD and so on. The choice is yours. Either way is a valid choice – pick what will work best for you.

Docker/Podman and other container systems

- What will help dictate your choice is how many things you may wish to run under Docker, Podman, Kubernetes or any other containerising system.
- Which brings us to one key question. Where do you use a VM and where should you use a container?
 - Containers are better for a single application running on top of the bare host (for example a website running on Apache with a particular version of PHP that cannot change for some reason or another).
 - Virtual Machines are better for spinning up a whole new OS with it's own Kernel and features. Often hardware will be emulated as well if it cannot be directly be passed through, but even then, some features will NOT be passed through.

Q&A time

Now is the time for your questions. I can't have covered all the bases here!

SESSION 2!

This will come at some stage soon.

Aiming to cover:

- CG-NAT workarounds
- Exposing services for yourself (and only yourself) securely
- Virtual Networks/SoftSwitches
- Whatever else you brought up in Q&A!