

mini

Ancillary Proxmox box for running VMs accessible via a KVM switch

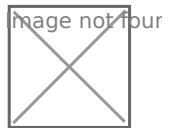
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Physical Hardware

Basic Components

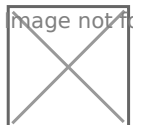
Compute

Processor



[AMD Ryzen 3 3200G](#) - Economical CPU that has 4 cores and integrated graphics so a PCIe slot can be saved since a GPU isn't necessary.

Cores / Threads	4 / 4
Base Frequency	3.6 GHz
Burst Frequency	4.0 GHz
Cache	4MB L3 Cache
TDP	65W







Motherboard

[Asrock B450M Steel Legend](#) - Small form factor mATX board that is being reused from a prototyping project. Being an mATX board it is very limited in expansion.

Manufacturer	Asrock
Model	B450M Steel Legend
CPU	AMD AM4 Socket
Chipset	AMD Promontory B450
Memory	<ul style="list-style-type: none">• 4x DDR4 DIMM supporting up to 64GB• Dual channel memory architecture

Display	<ul style="list-style-type: none">• 1x HDMI 1.4• 1x DisplayPort 1.2
Networking	<ul style="list-style-type: none">• 1x Realtek RTL8111H 1GbE LAN
Expansion	<ul style="list-style-type: none">• 1x PCIe 3.0 x16• 1x PCIe 2.0 x16• 1x PCIe 2.0 x1
Storage	<ul style="list-style-type: none">• 1x M.2 PCIe x4/x2• 1x M.2 SATA x4/x2• 4x SATA3
USB	<ul style="list-style-type: none">• 1x USB 3.1 Gen 2 (Type-C)• 1x USB 3.1 Gen 2 (Type-A)• 4x USB 3.1 Gen 1 (Type-A)• 2x USB 2.0

Memory

Slot 1	 <p>image not found or type unknown</p>	<p>Corsair Vengeance LPX 8GB DDR4 2666MHz (1x8GB)</p> <ul style="list-style-type: none">• 2Rx8 Dual Rank• CAS Latency 16• timing 16-18-18-35• 1.2V
Slot 2	 <p>image not found or type unknown</p>	<p>Corsair Vengeance LPX 8GB DDR4 2666MHz (1x8GB)</p> <ul style="list-style-type: none">• 2Rx8 Dual Rank• CAS Latency 16• timing 16-18-18-35• 1.2V
Slot 3	 <p>image not found or type unknown</p>	<p>Corsair Vengeance LPX 8GB DDR4 2666MHz (1x8GB)</p> <ul style="list-style-type: none">• 2Rx8 Dual Rank• CAS Latency 16• timing 16-18-18-35• 1.2V
Slot 4	 <p>image not found or type unknown</p>	<p>Corsair Vengeance LPX 8GB DDR4 2666MHz (1x8GB)</p> <ul style="list-style-type: none">• 2Rx8 Dual Rank• CAS Latency 16• timing 16-18-18-35• 1.2V







Case

Fractal Design - Define Mini C (Blackout) - A fantastic case with an attractive minimalistic design that in a mATX form factor.

Manufacturer	Fractal Design
Model	Define Mini C (Blackout)
Features	<ul style="list-style-type: none">• Sound dampening panels• Excellent build quality• 2x 3.5" Drive Bays• 2x 2.5" Drive Bays

Storage

#	Capacity	Interface	Type	Manufacturer & Model	Speed
1x 	256GB or type unknown	NVMe	SSD	Western Digital Black WDS256G1X0C	PCIe 3.0 x2
2x 	512GB or type unknown	SATA	SDD	Crucial MX100	SATA3 6.0Gb/s
1x 	1TB or type unknown	SATA	HDD	Western Digital WD10EZEX	SATA3 6.0Gb/s
1x 	1TB or type unknown	SATA	HDD	Seagate ST1000DM003	SATA3 6.0Gb/s

Cooling

CPU 	AMD Wraith Spire
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<div> <div>image not found or type unknown</div> <div>Case (Front)</div> </div>	Noctua NF-A14 PWM 140mm
<div> <div>image not found or type unknown</div> <div>Case (front)</div> </div>	Noctua NF-F12 PWM 120mm
<div> <div>image not found or type unknown</div> <div>Case (rear)</div> </div>	Noctua NF-F12 PWM 120mm

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Power Supply

Manufacturer	EVGA
Model	SuperNOVA 550 G2
Features	<ul style="list-style-type: none"> 550W fully module

UPS

n/a

Add-On Cards

<div> <div>  </div> <div>PCI 3.0 x16</div> </div>	<div> <div>Radeon RX 560 Gaming OC 4G (rev. 1.0)</div> <ul style="list-style-type: none"> PCIe Gen3 x8 </div>
<div> <div>  </div> <div>PCI 3.0 x1</div> </div>	<div> <div>Inateck 4 Ports PCIe to USB 3.0</div> <ul style="list-style-type: none"> PCIe Gen3 x1 </div>

PCI 2.0 x16



10Gtek Intel 82599ES SFP+ PCIe x8

- PCIe Gen3 x8
- SFP+ 10GbE port
- SR-IOV

Host Configuration

Base Install

Operating System

Proxmox Virtual Environment 6.x

Configuration

Proxmox configuration has been transitioned to being automated by an [Ansible Role](#)

Networking (out-of-date)

Configuration

Because I don't want my main management interface to ever change names, I explicitly give it a name based on its MAC address.

```
# /etc/systemd/network/10-management-net.link
+ [Match]
+ MACAddress=70:85:c2:fe:4c:b7
+
+ [Link]
+ Name=man0
```

Bridges

Master	Bridge	IP Address	Gateway	Description
man0	vmbr0	10.0.2.5/21	10.0.2.1	Main Interface (slower Realtek NIC)
enp6s0	--	--	--	Intel 10GbE SFP+ (used for PCI passthrough)

Common Software

Install fail2ban

This blocks connections that make repeated failed attempts to authenticate. SSH is covered by default which is what I am interested in, and I'll add additional config to similarly block too many repeated auth failures against the Proxmox web interface.

```
apt install fail2ban
```

```
# /etc/fail2ban/jail.local
+ [proxmox]
+ enabled = true
+ port = https,http,8006
+ filter = proxmox
+ logpath = /var/log/daemon.log
+ maxretry = 3
+ # 1 hour
+ bantime = 3600
```

Install sysfsutils

Sysfs is a virtual file system in Linux kernel 2.5+ that provides a tree of system devices. This package provides the program 'systool' to query it: it can list devices by bus, class, and topology.

In addition this package ships a configuration file /etc/sysfs.conf which allows one to conveniently set sysfs attributes at system bootup (in the init script etc/init.d/sysfsutils).

```
apt install sysfsutils
```

Install Netdata Monitoring

Install [Netadata](#) so that I can get a detailed view of system metrics. It will also be used as a datasource for [LXC / Conception / Prometheus](#) so I can look at metrics over a larger timeframe.

```
apt update
```

```
apt install curl
```

```
bash <(curl -Ss https://my-netdata.io/kickstart.sh)
```

Setup PCI Passthrough

See [PCI Passthrough](#) for more detail as to why I am doing these things.

Proxmox doesn't need a GPU, so blacklist the GPU and prepare it to be passed for a guest machine.

Enable Kernel Modules

```
# /etc/modules
# /etc/modules: kernel modules to load at boot time.
#
# This file contains the names of kernel modules that should be loaded
# at boot time, one per line. Lines beginning with "#" are ignored.
+ vfio_pci
+ vfio
+ vfio_iommu_type1
+ vfio_virqfd
```

Bind `vfio-pci` Driver to Devices

```
# /etc/modprobe.d/vfio.conf
+ # AMD Radeon RX 560 [1002:67ff,1002:aae0]
+ alias pci:v00001002d000067FFsv00001458sd000022FFbc03sc00i00 vfio-pci
+ alias pci:v00001002d0000AAE0sv00001458sd0000AAE0bc04sc03i00 vfio-pci
+
+ options vfio-pci ids=1002:aae0,1002:67ff disable_vga=1
```

Rebuild `initramfs`

The `initramfs` needs to be rebuilt to reflect the changes I just did.

```
update-initramfs -u
```

Update Bootloader

Proxmox uses `systemd-boot` as the bootloader so I have to make sure to update the boot entries

Update Kernel Parameters

```
# /etc/kernel/cmdline  
- root=ZFS=rpool/ROOT/pve-1 boot=zfs  
+ root=ZFS=rpool/ROOT/pve-1 boot=zfs amd_iommu=on iommu=on video=efifb:off  
pcie_acs_override=multifunction
```

Rebuild Bootloader Options

```
pve-efiboot-tool refresh
```

Storage & Backups (out-of-date)

Setup ZFS Scrub (Data Integrity)

Automate [ZFS scrubbing](#) so the data integrity on disks is actively monitored, repaired if necessary, and I'm alerted if there is a problem with my disks.

Create systemd Service/Timer ([source](#))

Create a simple systemd service template for scrubbing ZFS pools.

```
# /etc/systemd/system/zpool-scrub@.service
+ [Unit]
+ Description=Scrub ZFS Pool
+ Requires=zfs.target
+ After=zfs.target
+
+ [Service]
+ Type=oneshot
+ ExecStartPre=-/usr/sbin/zpool scrub -s %I
+ ExecStart=/usr/sbin/zpool scrub %I
```

Then create a systemd timer template for periodically running that service. I am running the scrub weekly, but semi-monthly or monthly would almost certainly be ok too.

```
# /etc/systemd/system/zpool-scrub@.timer
+ [Unit]
+ Description=Scrub ZFS pool weekly
+
+ [Timer]
+ OnCalendar=weekly
+ Persistent=true
```

```
+  
+ [Install]  
+ WantedBy=timers.target
```

Enable ZFS Scrub

```
systemctl daemon-reload  
systemctl enable --now zpool-scrub@rpool.timer
```

Setup Sanoid/Syncoid (Data Backup)

Run [Sanoid](#) for automating snapshots and Syncoid for remote backups. Unfortunately this isn't available in repositories so you have to build it yourself. However the author makes it fairly simple.

Install ([source](#))

```
apt-get install build-essential debhelper dpkg-buildpackage libcapture-tiny-perl libconfig-inifiles-perl pv lzop  
mbuffer  
sudo git clone https://github.com/jimsalterjrs/sanoid.git  
cd sanoid  
ln -s packages/debian .  
dpkg-buildpackage -uc -us  
apt install ../sanoid_*_all.deb
```

Configure Sanoid

I want to take hourly snapshots of both of my ZFS pools because sometimes I am not as careful or thoughtful as I should be about what I am doing at any given moment.

```
# /etc/sanoid/sanoid.conf  
+ [template_proxmox]  
+   frequently = 0  
+   hourly = 24  
+   daily = 7  
+   weekly = 4  
+   monthly = 1  
+   yearly = 0  
+   autosnap = yes  
+   autoprune = yes
```

```
+  
+ [rpool]  
+     use_template = template_proxmox  
+     process_children_only = yes  
+     recursive = yes  
+  
+ [rpool/ROOT]  
+     use_template = rpool  
+     process_children_only = yes  
+     recursive = yes  
+  
+ [rpool/data]  
+     use_template = template_proxmox  
+     weekly = 1  
+     monthly = 1  
+     process_children_only = yes  
+     recursive = yes
```

Maybe this is a sin, but I'd like my snapshots to be in local time so I don't have to do the (admittedly simple) conversion in my head.

```
# /usr/lib/systemd/system/sanoid.service  
[Service]  
- Environment=TZ=UTC  
+ Environment=TZ=EST
```

Configure Syncoid

I haven't decided where I want to replicate to yet so I haven't configured syncoid yet.

VM / macOSAMD

Description

This VM is for running macOS via dedicated hardware so I have something faster than my laptop.

Configuration

Resources

Hostname	CPU	Memory
MiMac	12 vCPU	16GB

Storage

Disk	Controller	Size	Purpose
local-zfs:vm-100-disk-1	ide0	1M	NVRAM
local-zfs:vm-100-disk-0	virtio	200MB	EFI boot loader
local-zfs:vm-100-disk-2	virtio	1TB	boot disk

PCI Passthrough

Name	BDF	Settings
Fresco USB 3.0 Controller	04:00	n/a
AMD RX 560 GPU	08:00	pcie=1,x-vga=1
Intel 10GbE SFP+ NIC	06:00	n/a

Networking

Interfaces

ID	Name	Bridge	IP Address	Comments
eno0	n/a	vmbr0	10.0.2.5/21 (DHCP)	1GbE
eno1	n/a	--	10.0.10.5/24 (manual)	10GbE

Configuration

Because we want macOS to route all traffic destined for [blackbox.hermz](#) over our 10GbE network we need to adjust our routing table to redirect all traffic to [LXC / Routeman](#) first.

Knowing that blackbox.hermz has ip addresses `10.0.2.2`, and `10.0.2.3` and all of its services run with `10.0.4.x` we can easily setup some updated routes.

```
# 10.0.2.2 (main interface) and 10.0.2.3 (admin interface)
ip route add 10.0.2.2/31 dev en1 via 10.0.10.6

# 10.0.4.x (services running on blackbox)
ip route add 10.0.4.0/24 dev en1 via 10.0.10.6
```

This works perfectly except it isn't persistent.