

# VFIO "GPU Passthrough"

## Guide for Proxmox

### BIOS Settings:

- Disable Above 4G
- Disable ReBAR
- Disable SR-IOV (Leave this enabled if using a Quadro or other SR-IOV enabled graphics accelerator)
- Enable IOMMU Support
- Enable VT-d
- Ensure primary output in BIOS is set to iGPU (NOT AUTO)

### Proxmox Kernel Version:

- Ensure Proxmox is running on kernel version 6.0.2 or later -

```
pveversion -v
```

- Update Proxmox -

- ```
apt update
apt dist-upgrade
reboot
```

### Proxmox Config:

```
nano /etc/kernel/cmdline
root=ZFS=rpool/ROOT/pve-1 boot=zfs
Change to:
For Intel:
root=ZFS=rpool/ROOT/pve-1 boot=zfs quiet intel_iommu=on
For AMD:
root=ZFS=rpool/ROOT/pve-1 boot=zfs quiet amd_iommu=on
```

- Update the Proxmox Kernel Commandline to boot with IOMMU Support
- Enable IOMMU in Proxmox

- `nano /etc/default/grub`  
 Comment out `#GRUB_CMDLINE_LINUX_DEFAULT="quiet"`  
 Replace with  
`GRUB_CMDLINE_LINUX_DEFAULT="quiet intel_iommu=on"` - For Intel  
`GRUB_CMDLINE_LINUX_DEFAULT="quiet AMD_iommu=on"` - For AMD  
 Save  
`update-grub`

- Add Kernel Modules

- `nano /etc/modules`  
`vfio`  
`vfio_iommu_type1`  
`vfio_pci`  
`vfio_virqfd`

- Blacklist GPU drivers from loading on root Proxmox (may be needed)

- `nano /etc/modprobe.d/blacklist.conf`  
`blacklist nvidia`  
`blacklist nouveau`  
`blacklist radeon`  
`blacklist amd`

- Ensure your GPU is in a SEPARATE IOMMU GROUP

- `lspci -v`  
 - Find the group number with your GPU  
`find /sys/kernel/iommu_groups/ -type l`  
 If you do notice that the GPU you're using is in the same group as another device, run the command below to attempt to isolate the device then reboot Proxmox and run the steps above again to verify.  
`echo "options vfio_iommu_type1 allow_unsafe_interrupts=1" >`  
`/etc/modprobe.d/iommu_unsafe_interrupts.conf`

- Reboot

## Virtual Machine Configuration:

- Boot VM normally and setup Remote Desktop
- Shutdown VM
- Ensure BIOS Type is set to OVMF (UEFI)
- Ensure Memory does not have Ballooning Device enabled
- Add the GPU by selecting Add > PCI Device > Select your GPU (Ensure it is the proper IOMMU group as discovered with `lspci -v`)
- Ensure that All functions, ROM-bar, Primary GPU, and PCI-Express are all enabled.

- Change Display Type to NONE
  - Log in via Remote Desktop
  - Install Graphics Card Drivers
  - Reboot.
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- Enjoy.

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