

# How To Enable Nested Virtualization In Proxmox VE

 [ostechnix.com/enable-nested-virtualization-in-proxmox](https://ostechnix.com/enable-nested-virtualization-in-proxmox)

July 13, 2022

Proxmox is my preferred hypervisor to deploy various containers and VMs. Sometimes, I want to create a VM inside another VM. Meaning - I just want to host a guest hypervisor(i.e VM) in my physical Proxmox hypervisor. Have you ever wondered how to setup a guest hypervisor in a host hypervisor? In this guide, I will show you how to **enable nested virtualization in Proxmox VE** and then **enable VT-X in the guest hypervisor**.

## What Is Nested Virtualization?

**Nested virtualization** is a feature that allows you to run a virtual machine inside another virtual machine while still using the hardware acceleration from the host system.

To put this in other words, nested virtualization is a mechanism of running a hypervisor inside of a virtual machine (VM), which itself runs on a hypervisor.

## Enable Nested Virtualization In Proxmox

The following steps must be performed in the physical Proxmox host.

First, let us make sure the nested virtualization feature is enabled in the physical Proxmox hypervisor.

If your Proxmox hypervisor is **Intel CPU**, run the following command to check if nested virtualization is enabled in it.

```
# cat /sys/module/kvm_intel/parameters/nested
N
```

If it is AMD CPU, run:

```
# cat /sys/module/kvm_amd/parameters/nested
N
```

You may get **"N"** or **"0"** and **"Y"** or **"1"** as output. If the output is **"N"** or **"0"**, it means that the nested virtualization feature is **not enabled**. If the output is **"Y"** or **"1"**, the nested feature is **enabled**.

In my Proxmox host, the nested virtualization is not yet enabled. So I am going to enable it using the following command as **root** user:

```
# echo "options kvm-intel nested=Y" > /etc/modprobe.d/kvm-intel.conf
```

On AMD Proxmox host, run this command:

```
# echo "options kvm-amd nested=1" > /etc/modprobe.d/kvm-amd.conf
```

**Please note** - We append **Y** for **INTEL CPUs** and **1** for **AMD CPUs** to enable nested feature.

Now, reboot the system or reload the kernel modules to take effect the changes:

```
# modprobe -r kvm_intel
```

```
# modprobe kvm_intel
```

On AMD Proxmox host, run:

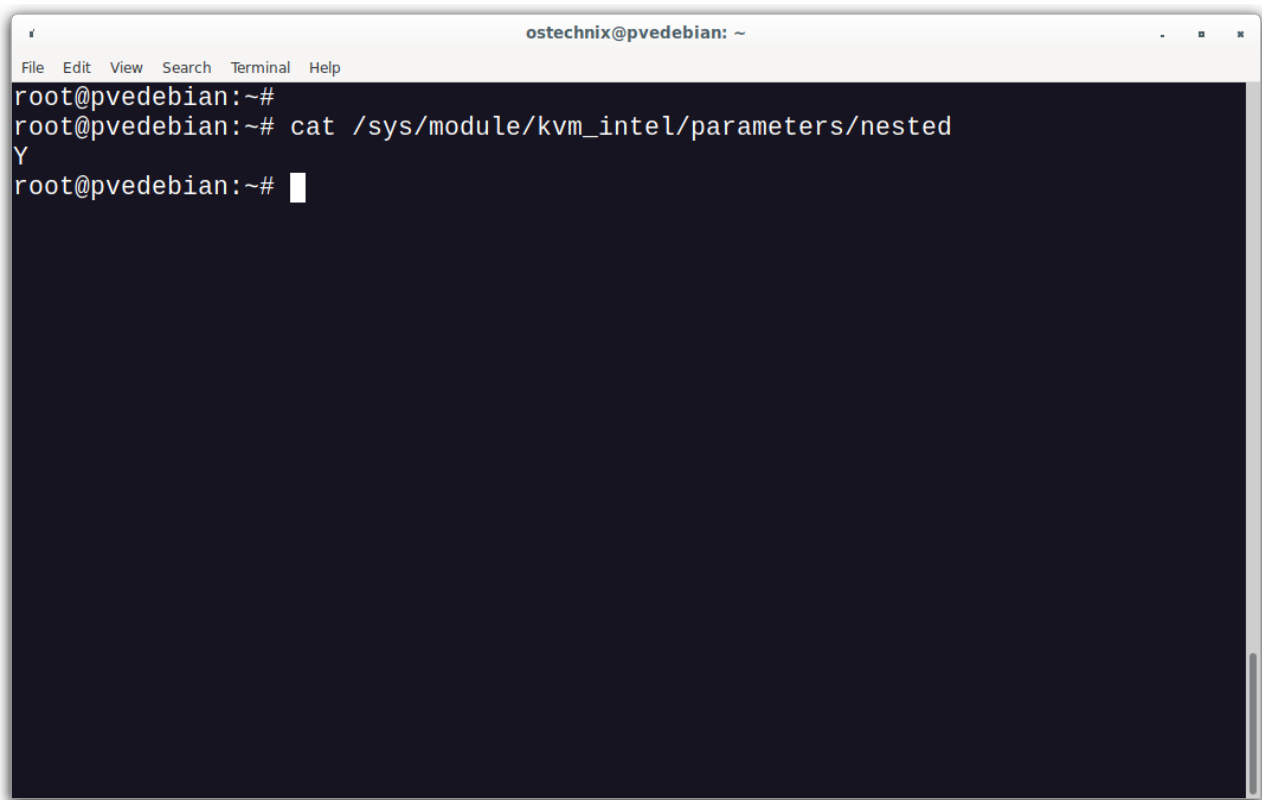
```
# modprobe -r kvm_amd
```

```
# modprobe kvm_amd
```

Now check again if nested virtualization is enabled in the physical Proxmox host:

```
# cat /sys/module/kvm_intel/parameters/nested
```

**Y**

A screenshot of a terminal window titled 'ostechnix@pvedebian: ~'. The terminal shows the command 'cat /sys/module/kvm\_intel/parameters/nested' being executed, with the output 'Y' displayed on the next line. The terminal has a dark background and a light-colored cursor.

Check If Nested Virtualization Is Enabled In Proxmox

If it is AMD CPU, run:

```
# cat /sys/module/kvm_amd/parameters/nested
```

**Y**

As you see in the above output, nested virtualization feature is enabled in the Proxmox host.

## Check If VT-X Is Enabled In Virtual Machines

---

As you may already know, in order to host guest machines in any system, the CPU should support virtualization technology(VT-X) and the VT-X should be enabled.

There are several ways to check if a CPU supports VT-X. The following tutorial lists a few methods to find if VT-X feature is enabled in a system.

### How To Find If A CPU Supports Virtualization Technology (VT)

For the purpose of this guide, I will be using Debian 11 desktop. Let us check if VT-X is enabled in one of our virtual machine.

```
# egrep --color -i "svm|vmx" /proc/cpuinfo
```

If you don't see any output, it means that the VT-X is not yet enabled. Let us enable it now.

## Enable VT-X In Virtual Machines

---

After enabling the nested virtualization feature in the Proxmox host, you must enable Virtualization technology(VT-X) in the virtual(guest) machines to make it as a hypervisor.

You can enable VT-x from CLI or Proxmox web UI.

### Enable VT-X For Proxmox Guest Machines From Command Line

---

**Turn off the virtual machine** in which you want to enable the nested virtualization feature.

To enable virtualization technology in a virtual machine, simply set the CPU type of the VM to **"host"** using command:

```
# qm set <VMID> --cpu host
```

#### **Example:**

```
# qm set 105 --cpu host
```

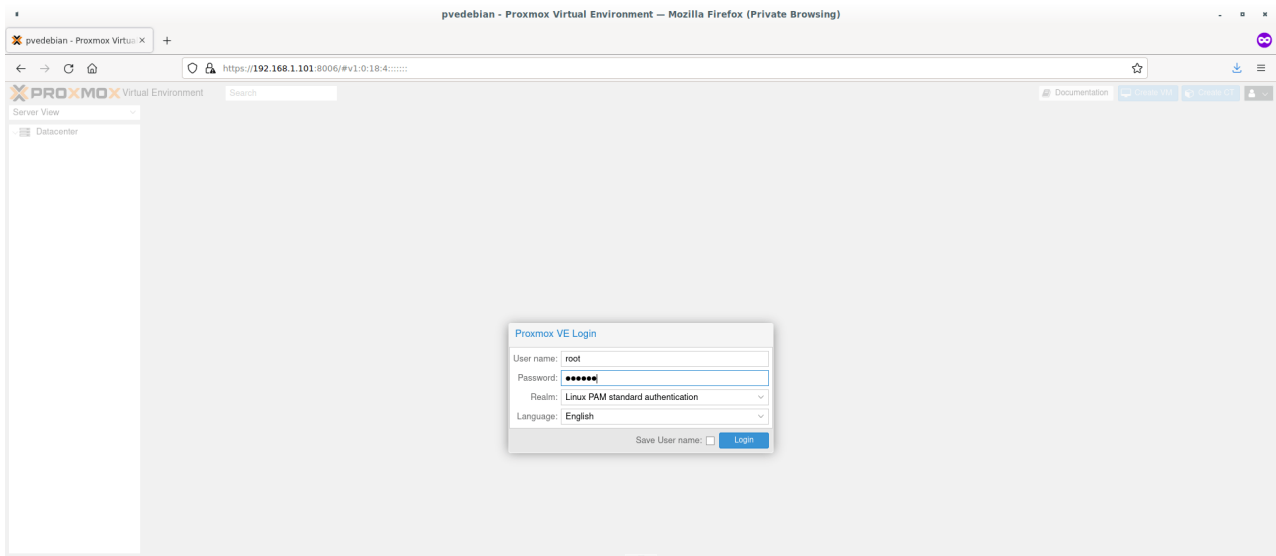
Replace "105" with your virtual machine's ID. Now the Virtual machine has become hypervisor, so you can now create containers and virtual machines inside this VM.

### Enable VT-X For Guest Machines From Proxmox Web UI

---

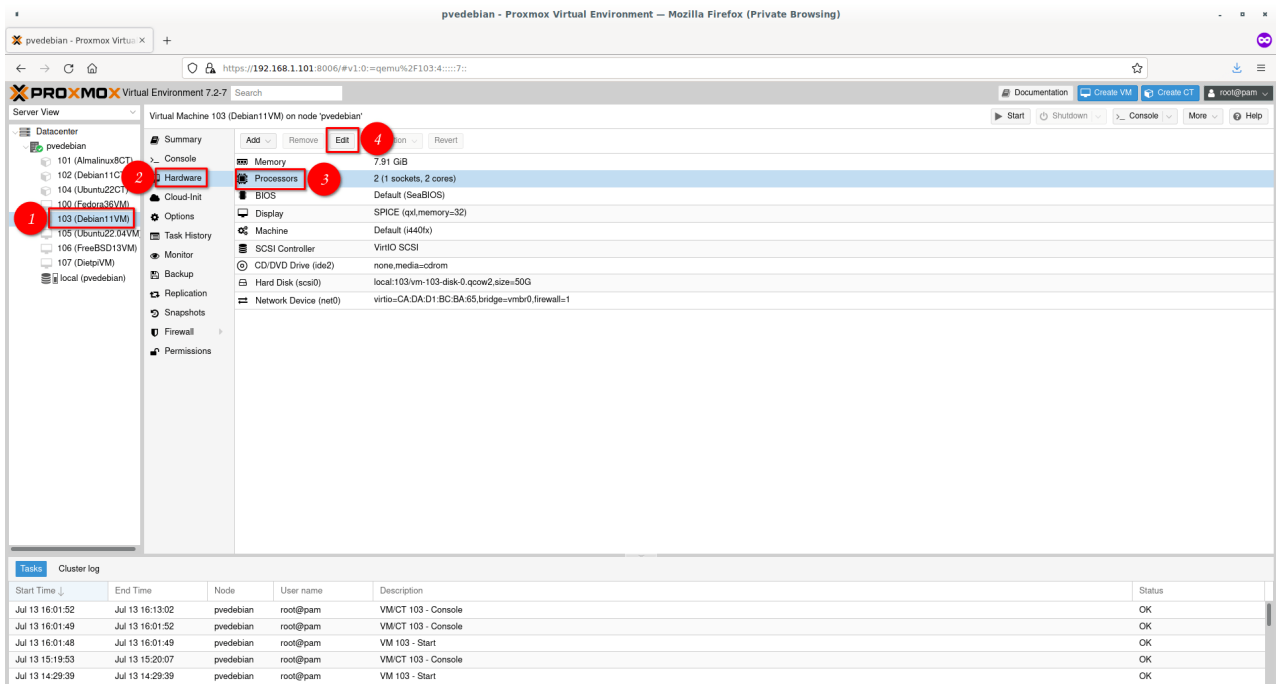
Make sure the VM is turned off.

Open your Proxmox web UI by visiting to **https://proxmox-ip:8006**. Enter the user name and password to login to Proxmox web dashboard.



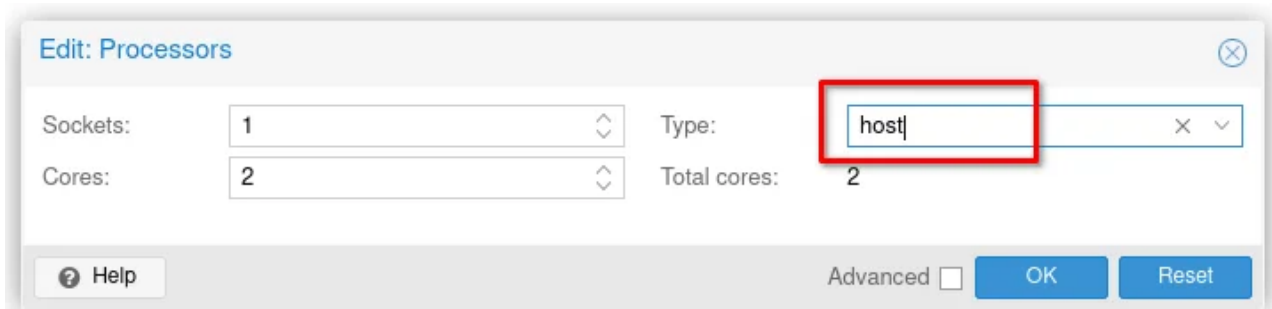
Login To Proxmox Web UI

Go to **Virtual machine(i.e. Debian 11) -> Hardware**. Select **"Processors"** and click **Edit** or Double click Processors option.



Edit Processor Settings

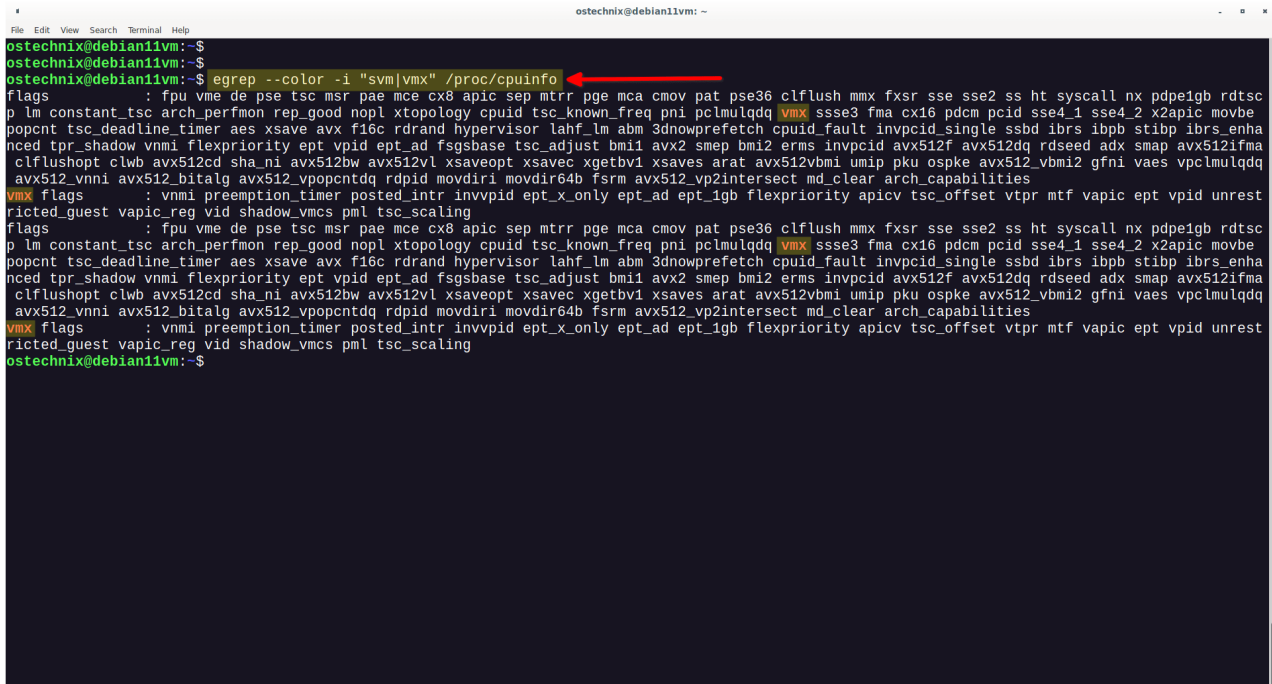
Choose CPU type as "host".



Set CPU Type As Host

Now start the VM. Once the VM is started, check again if VT-X is enabled in the virtual machine.

```
$ egrep --color -i "svm|vmx" /proc/cpuinfo
```



```
ostechnix@debian11vm:~$  
ostechnix@debian11vm:~$  
ostechnix@debian11vm:~$ egrep --color -i "svm|vmx" /proc/cpuinfo  
flags                : fpu vme de pse tsc msr pae mce cx8 apic sep mtrr pge mca cmov pat pse36 clflush mmx fxsr sse sse2 ss ht syscall nx pdpe1gb rdtsc  
p lm constant_tsc arch_perfmon rep_good nopl xtopology cpuid tsc_known_freq pni pclmulqdq vmx ssse3 fma cx16 pdcm pcid sse4_1 sse4_2 x2apic movbe  
popcnt tsc_deadline_timer aes xsave avx f16c rdrand hypervisor lahf_lm abm 3dnowprefetch cpuid_fault invpcid_single ssbd ibrs ibpb stibp ibrs_enh  
anced tpr_shadow vnmi flexpriority ept vpid ept_ad fsgsbase tsc_adjust bmi1 avx2 smep bmi2 erms invpcid avx512f avx512dq rdseed adx smap avx512ifma  
clflushopt clwb avx512cd sha_ni avx512bw avx512vl xsaveopt xsavec xgetbv1 xsaves arat avx512vbmi umip pku ospke avx512_vbmi2 gfni vaes vpclmulqdq  
avx512_vnni avx512_bitalg avx512_vpopcntdq rdpid movdiri movdir64b fsrm avx512_vp2intersect md_clear arch_capabilities  
vmx flags            : vnmi preemption_timer posted_intr invvpid ept_x_only ept_ad ept_1gb flexpriority apicv tsc_offset vtpr mtf vapid ept vpid unres  
tricted_guest vapid_reg vid shadow_vmcs pml tsc_scaling  
flags                : fpu vme de pse tsc msr pae mce cx8 apic sep mtrr pge mca cmov pat pse36 clflush mmx fxsr sse sse2 ss ht syscall nx pdpe1gb rdtsc  
p lm constant_tsc arch_perfmon rep_good nopl xtopology cpuid tsc_known_freq pni pclmulqdq vmx ssse3 fma cx16 pdcm pcid sse4_1 sse4_2 x2apic movbe  
popcnt tsc_deadline_timer aes xsave avx f16c rdrand hypervisor lahf_lm abm 3dnowprefetch cpuid_fault invpcid_single ssbd ibrs ibpb stibp ibrs_enh  
anced tpr_shadow vnmi flexpriority ept vpid ept_ad fsgsbase tsc_adjust bmi1 avx2 smep bmi2 erms invpcid avx512f avx512dq rdseed adx smap avx512ifma  
clflushopt clwb avx512cd sha_ni avx512bw avx512vl xsaveopt xsavec xgetbv1 xsaves arat avx512vbmi umip pku ospke avx512_vbmi2 gfni vaes vpclmulqdq  
avx512_vnni avx512_bitalg avx512_vpopcntdq rdpid movdiri movdir64b fsrm avx512_vp2intersect md_clear arch_capabilities  
vmx flags            : vnmi preemption_timer posted_intr invvpid ept_x_only ept_ad ept_1gb flexpriority apicv tsc_offset vtpr mtf vapid ept vpid unres  
tricted_guest vapid_reg vid shadow_vmcs pml tsc_scaling  
ostechnix@debian11vm:~$
```

Check If VT-X Feature Is Enabled

If you see "**vmx**" (Intel-VT technology) or "**svm**" (AMD-V support) in the output, congratulations! The VT-X feature is enabled.

The virtual machine has now become a hypervisor. You can install any hypervisor application such as KVM, Proxmox, Quickemu, Virtualbox, VMware etc., in the virtual machine and start hosting containers and VMs in it.

## Conclusion

In this guide, we discussed what is nested virtualization and how to enable nested virtualization in Proxmox. We also learned how to enable VT-X feature in a Proxmox virtual machine in order to run containers and virtual machines in it.

### Related Read:

- [How To Enable Nested Virtualization In KVM In Linux](#)
- [How To Enable Nested Virtualization In VirtualBox](#)