

# Proxmox Lab: Game of Active Directory - Environment Setup

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 [benheater.com/proxmox-lab-goad-environment-setup](https://benheater.com/proxmox-lab-goad-environment-setup)

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August 26, 2024

In this module, we'll be taking steps to set up the initial environment and prepare to deploy Game of Active Directory (GOAD) v3 in our existing Proxmox environment.

Aug 26, 2024 6 min read

## About this Project

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This module is part of a larger project on setting up **Game of Active Directory (GOAD) v3** on Proxmox alongside our existing lab infrastructure. [Click here to be taken back to the project landing page.](#)



This project also assumes that you've already built out [the original Proxmox lab environment](#), as you'll need to lay some foundational network topologies before configuring GOAD here

## Objectives for this Step

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- Add the VLAN to our existing Proxmox and pfSense Setup
- Add DHCP scopes and add or update firewall rules
- Create a Linux Container and install tools that will be used to automate provisioning and configuration of resources

## Updating the Network

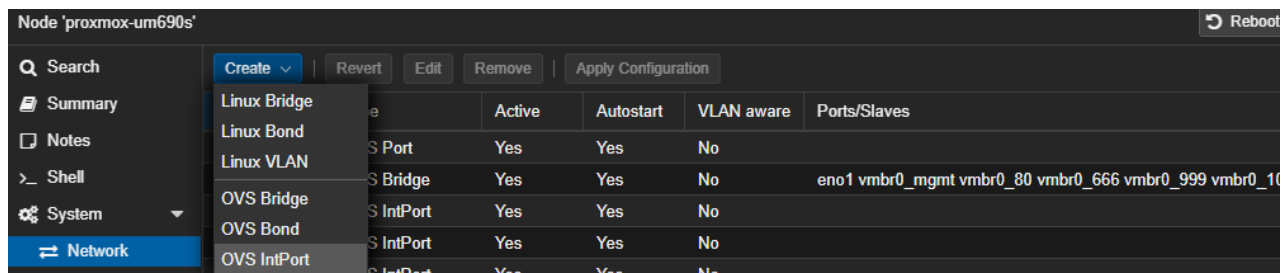
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### Add the GOAD VLAN

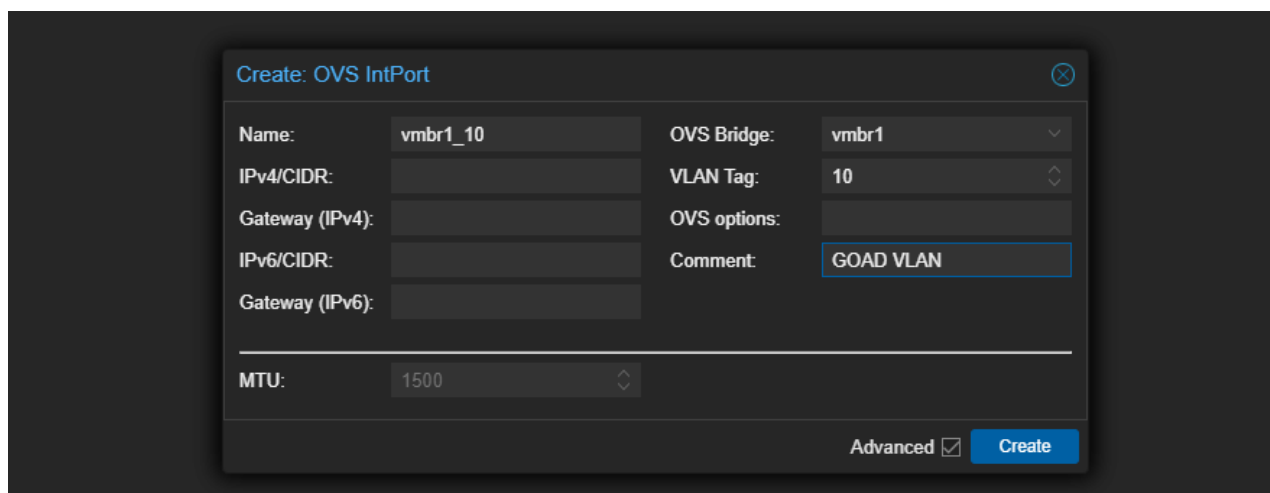
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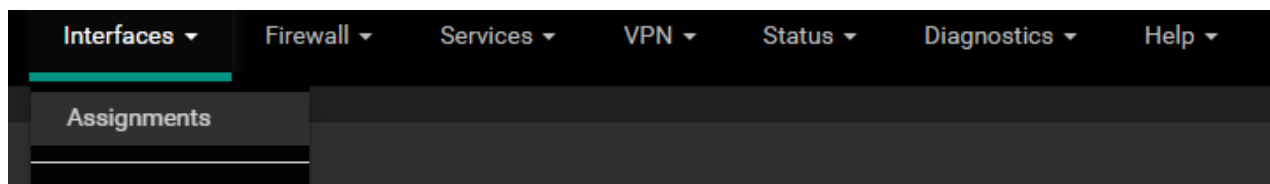
I'm going to keep things brief here, because [I've already demonstrated multiple times](#) in the main lab guide how to add / remove VLANs to / from the lab configuration.



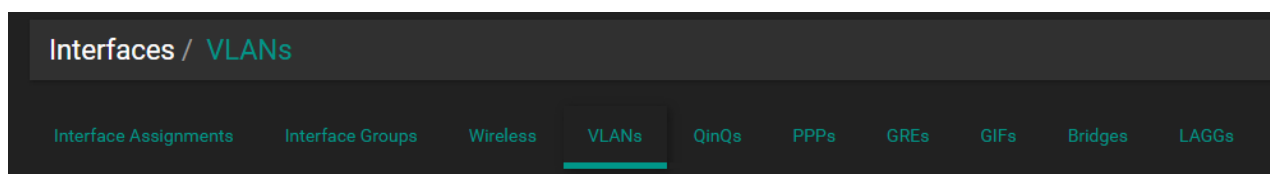
Create OVS IntPort



Click **Create**



Log into pfSense and go to **Interfaces > Assignments**



Click on VLANs > Click + **Add**

Interfaces / VLANs / Edit


**VLAN Configuration**

**Parent Interface** igb1 (00:90:0b:58:7e:9f) - lan  
Only VLAN capable interfaces will be shown.

**VLAN Tag** 10  
802.1Q VLAN tag (between 1 and 4094).

**VLAN Priority** 0  
802.1Q VLAN Priority (between 0 and 7).

**Description** GOAD VLAN  
A group description may be entered here for administrative reference (not parsed).


 Save


Fill out and click **Save**

Interfaces / Interface Assignments

Interface Assignments   Interface Groups   Wireless   VLANs   QinQs   PPPs   GREs   GIFs

Click **Interface Assignments**

Available network ports: VLAN 10 on igb1 - lan (GOAD VLAN)  Add

 Save

Choose the VLAN, click **Add**, and click **Save**

## Configure the pfSense Interface

OPT9 VLAN 10 on igb1 - lan (GOAD VLAN)

Click on your new interface -- **OPT9** in my case

Interfaces / OPT9 (igb1.10)

**General Configuration**

**Enable** ☒ Enable interface

**Description** GOAD  
Enter a description (name) for the interface here.

**IPv4 Configuration Type** Static IPv4

**IPv6 Configuration Type** None

**Static IPv4 Configuration**

**IPv4 Address** 192.168.10.1 / 24

**IPv4 Upstream gateway** None [+ Add a new gateway](#)

If this interface is an Internet connection, select an existing Gateway from the list or add a new one using the "Add" button.  
On local area network interfaces the upstream gateway should be "none".  
Selecting an upstream gateway causes the firewall to treat this interface as a [WAN type interface](#).  
Gateways can be managed by [clicking here](#).

Click **Save**

## Configure the DHCP Server



Typically, I'd have the DHCP server running on the Domain Controller, alongside DNS, but due to the size of the GOAD project and all of the various pieces, I'm going to stick with the creator's original design

System ▾ Interfaces ▾ Firewall ▾ Services ▾ VPN ▾ Status ▾ Diagnostics ▾ Help ▾

Go to [Services](#) > [DHCP Server](#) > [GOAD](#)

**Primary Address Pool**

**Subnet** 192.168.10.0/24

**Subnet Range** 192.168.10.1 - 192.168.10.254

**Address Pool Range** 192.168.10.100 192.168.10.254

From To

The specified range for this pool must not be within the range configured on any other address pool for this interface.

**Additional Pools** [+ Add Address Pool](#)

If additional pools of addresses are needed inside of this subnet outside the above range, they may be specified here.

Click **Save**

## Configure the Firewall Rules











### Floating Rule Updates



Note, that in the original lab guide, we've created various aliases and firewall rules that will be referenced here, so refer back to [the original pfSense setup](#) for more information

System ▾ Interfaces ▾ Firewall ▾ Services ▾ VPN ▾ Status ▾ Diagnostics ▾ Help ▾

Go [Firewall](#) > [Rules](#) > [Floating](#)

Block Firewall Login Ports											
<div><div></div><div></div><div></div></div>	0/95 KiB	GUEST_WIFI, IOT_DEVICES, WEB_SERVERS, SEC_EGRESS, SEC_ISOLATED, AD_LAB	IPv4+6 TCP	! WHITELIST_ FIREWALL_ MGMT	*	This Firewall (self)	FIREWALL_ MGMT	*	none	Block access to firewall login ports	<div></div>
Block Firewall Login Ports											

Edit on the original floating rule here we created to block firewall management access

Interface

GOAD  
SEC\_EGRESS  
SEC\_ISOLATED  
AD\_LAB

Choose the interface(s) for this rule.

Add GOAD to the list of interfaces and click **Save**

GOAD Rules



We're going to take a little bit of a shortcut here and borrow the rules that already exist for the **AD\_LAB** interface

Rules (Drag to Change Order)											
<input checked="" type="checkbox"/>	States	Protocol	Source	Port	Destination	Port	Gateway	Queue	Schedule	Description	Actions
<input checked="" type="checkbox"/>	0/46.07 MiB	IPv4 *	AD_LAB subnets	*	AD_LAB address	*	*	none		Allow packets to own gateway	
<input checked="" type="checkbox"/>	0/2 KiB	IPv4 *	AD_LAB subnets	*	Kali_Cyber_Range	*	*	none		Allow traffic to Kali VMs / CTs	
<input checked="" type="checkbox"/>	0/0 B	IPv4 TCP/UDP	*	*	Wazuh_Servers	1514-1515	*	none		Allow Wazuh Agent traffic to Wazuh Manger	
<input checked="" type="checkbox"/>	0/4.33 GiB	IPv4 *	*	*	! RFC1918	*	*	none		Allow packets to Internet	
<input checked="" type="checkbox"/>	0/401 KiB	IPv6 *	*	*	! RFC4193	*	*	none		Allow packets to Internet	
<input checked="" type="checkbox"/>	0/28.68 MiB	IPv4+6 *	*	*	*	*	*	none		Block everything else	

Select all the rules and click **"Copy"**



Disregard the **wazuh\_Servers** rule in the screenshot, as that is out of the scope of the original lab guide and this lab guide

Copy selected rules

Destination Interface

GOAD

Select the destination interface where the rules should be copied. Rules will be added after existing rules on that interface.

Convert interface definitions

☒ Enable Interface Address/Net conversion  
 Convert source Interface Address/Net definitions to the destination Interface Address/Net.  
 For example: LAN Address -> OPT1 Address, or LAN net -> OPT1 net.  
 Interface groups and some special interfaces (IPsec, OpenVPN), do not support this feature.

Paste

Cancel

Fill out accordingly and click **"Paste"**

Rules (Drag to Change Order)											
	States	Protocol	Source	Port	Destination	Port	Gateway	Queue	Schedule	Description	Actions
<input type="checkbox"/>	✓	0/0 B	IPv4 *	GOAD subnets	*	GOAD address	*	*	none	Allow packets to own gateway	
<input type="checkbox"/>	✓	0/0 B	IPv4 *	GOAD subnets	*	Kali_Cyber_Range	*	*	none	Allow traffic to Kali VMs / CTs	
<input type="checkbox"/>	✓	0/0 B	IPv4 TCP/UDP	*	*	Wazuh_Servers	1514 - 1515	*	none	Allow Wazuh Agent traffic to Wazuh Manger	
<input type="checkbox"/>	✓	0/0 B	IPv4 *	*	*	!RFC1918	*	*	none	Allow packets to Internet	
<input type="checkbox"/>	✓	0/0 B	IPv6 *	*	*	!RFC4193	*	*	none	Allow packets to Internet	
<input type="checkbox"/>	✗	0/0 B	IPv4+6 *	*	*	*	*	*	none	Block everything else	

You should now see your GOAD rules are filled out accordingly. Click **"Apply Changes"** at the top.

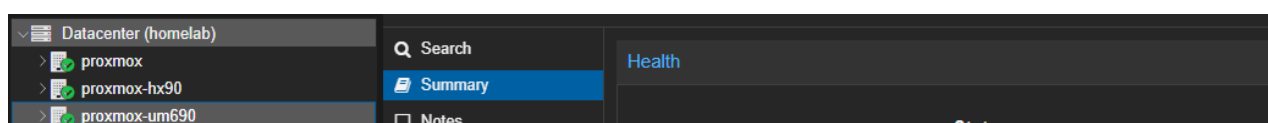
## Stage the Provisioning Host

This is the Linux Container that we'll log into and run Packer, Terraform, and Ansible to build and configure resources for the environment.



Since the environment we've created in this Proxmox lab differs quite a bit from the one the original author, Mayfly created, we'll be making some changes to the Infrastructure-as-Code (IaC). Please be mindful of these changes while reading.

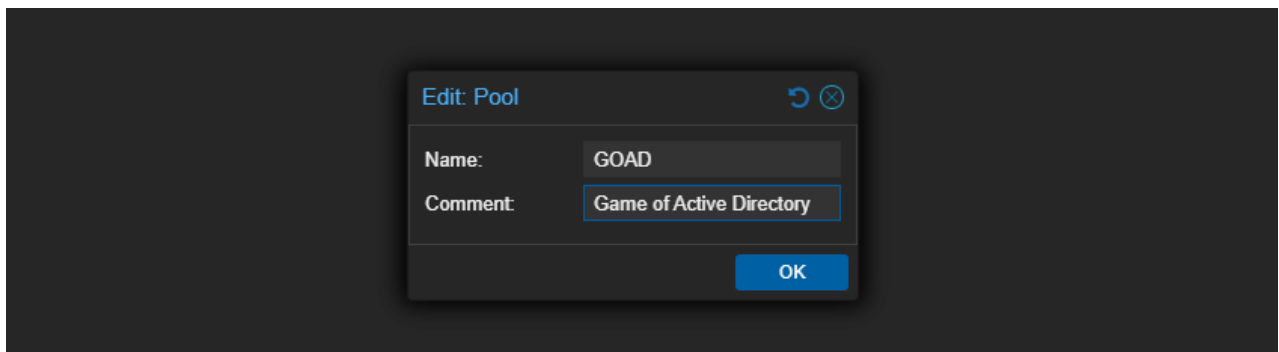
## Create the Container



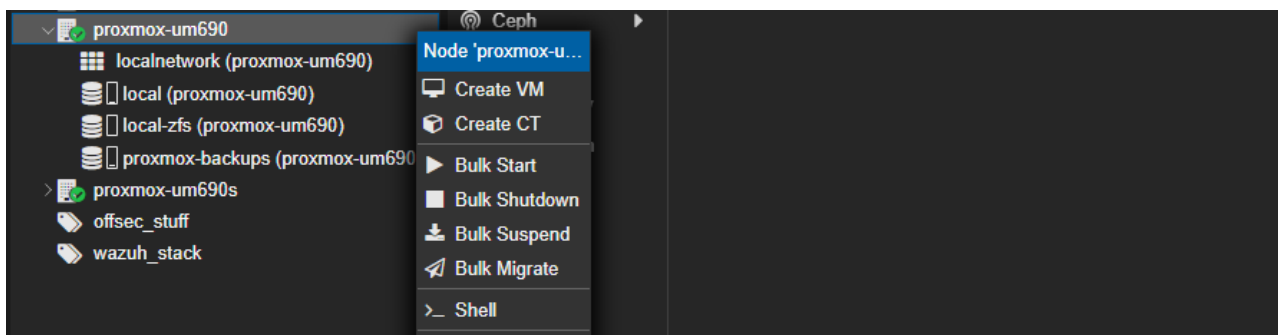
Click on "Datacenter"



Click on "Pools"



Click "Create" and fill out the form to your preference, then click OK

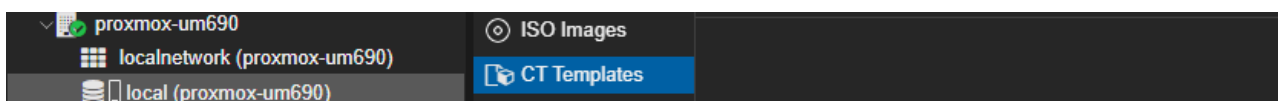


Right-click on your PVE node and choose `>_ Shell`

```
pveam update
```

Bash

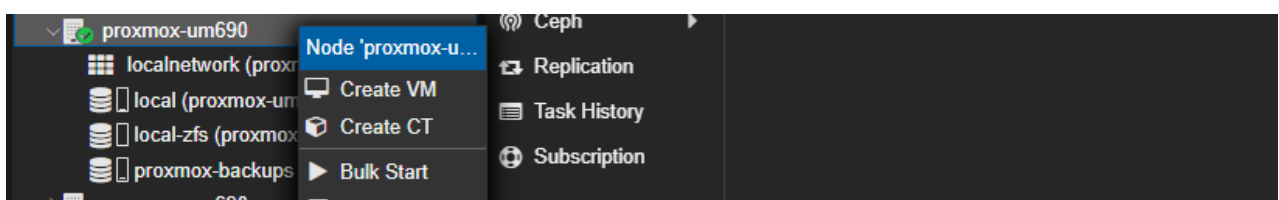
Update the Linux Container template database



Click on your PVE node, click on "CT Templates", click on the "Templates" button



I'm going to use `22.04` version of Ubuntu, click "Download"



Right-click on your PVE node and choose "Create CT"

Create: LXC Container

General Template Disks CPU Memory Network DNS Confirm

Node: proxmox-um690 Resource Pool: GOAD

CT ID: 6040 Password:

Hostname: goad-provision-ct Confirm password:

Unprivileged container: ☒ SSH public key(s): x4PQ5ducJhoi1446Yqo9Inckmm1H5ZxiGLeFerLxfZ0llq7q3lXpGoSQ6XCsjRUE/ffPouzKMKXgekvyQ4Nb+E7fhjkm1N4a4GXzw==

Nesting: ☒ Load SSH Key File

I'm going to authenticate using SSH keys, so my password field is empty

Create: LXC Container

General Template Disks CPU Memory Network DNS Confirm

Storage: local

Template: ubuntu-22.04-standard\_22.04-1\_a

Choose your CT template

Create: LXC Container

General Template Disks CPU Memory Network DNS Confirm

rootfs Storage: local-zfs

Disk size (GiB): 10

I'll start off with a 10 GiB disk, as it's trivial to add more storage later

Create: LXC Container

General Template Disks CPU Memory Network DNS Confirm

Cores: 2

Create: LXC Container

General Template Disks CPU Memory Network DNS Confirm

Memory (MiB): 2048

Swap (MiB): 1024

2048 MiB RAM should be sufficient



Create: LXC Container

General Template Disks CPU Memory **Network** DNS Confirm

Name:  IPv4: ☐ Static ☒ DHCP

MAC address:  IPv4/CIDR:

Bridge:  Gateway (IPv4):

VLAN Tag:  IPv6: ☒ Static ☐ DHCP ☐ SLAAC

Firewall: ☐ IPv6/CIDR:

Gateway (IPv6):

Putting the LXC on **vmbr1** will put the LXC on the pfSense internal LAN (10.0.0.0/24)



If you haven't already done so, you'll want to add a static route on your home router, so that you can SSH into your provisioning LXC from your home network side

Create: LXC Container

General Template Disks CPU Memory Network **DNS** Confirm

DNS domain:

DNS servers:

This will provide DNS settings to the container, so that it uses the pfSense local domain and default gateway as the DNS resolver

Edit: Network Device (veth)

Name:  IPv4: ☐ Static ☒ DHCP

MAC address:  IPv4/CIDR:

Bridge:  Gateway (IPv4):

VLAN Tag:  IPv6: ☒ Static ☐ DHCP ☐ SLAAC

Firewall: ☐ IPv6/CIDR:

Gateway (IPv6):

☐ Advanced



I'm going to take the MAC address from the container's settings, now that it's created, log into my pfSense VM on **vmbr1**, and allocate a DHCP reservation to this container, so that it is always at the same IP address. This is better for crafting firewall rules later.



When ready, you may start the container

## Environment Setup

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### Log into the Provisioning Container

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Log into your provisioning container via SSH key or password to open a terminal.



The `ssh` client application is available on all current versions of Windows and of course, has been available on Linux for ages



If you're trying to SSH into the container, remember that the container is on `vmbr1` behind pfSense on the default LAN -- `10.0.0.0/24` with Kali. If you haven't added a static route into the LAN, please do so in order to reach it via SSH.

```
ssh -i id_rsa root@10.0.0.3
```

Bash

Authenticating via SSH key. I gave my LXC a DHCP reservation of `10.0.0.3` in my pfSense VM.



```
root@goad-provision-ct: ~  
root@goad-provision-ct:~#  
root@goad-provision-ct:~#  
root@goad-provision-ct:~#  
root@goad-provision-ct:~#
```

### Install Dependencies

---

```
apt install python3-venv
```

Bash

```
cd /root
```

Bash

```
git clone https://github.com/Orange-Cyberdefense/GOAD
```

Bash

```
cd GOAD
```

Bash

```
./goad.sh
```

Bash

```

  _____
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| |_) | | |
|  _ \| | |
|_| \_|_|_|
Game Of Active Directory
Pwning is coming

Goad management console type help or ? to list commands

[*] goad config file not found, create file /root/.goad/goad.ini
[*] Start Loading default instance
[*] lab instances :
[-] No instance found, change your config and use install to create a lab instance

GOAD/vmware/local/192.168.56.X > exit
bye
root@goad-provision-ct:~/GOAD#
```

`exit` the interactive menu once the installation is complete

## Prepare for Proxmox Installation

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```
cd /root/GOAD
```

Bash


```
bash -f ./scripts/setup_proxmox.sh
```

Bash

```
Requirement already satisfied: pycparser in ./venv/lib/python3.10/site-packages (from CFFI==1.0.2)
Starting galaxy collection install process
Nothing to do. All requested collections are already installed. If you want to reinstall them
#####
You will need to run: source .venv/bin/activate
to get back in the python virtual environment
#####
root@goad-provision-ct:~/GOAD#
```

## Current State of the Lab

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Type ↑	Description	Disk usage...	Memory us...	CPU usage	Uptime	Host CPU ...	Host Mem...	Tags
 lxc	6040 (goad-provision-ct)	12.9 %	12.4 %	3.0% of 4 ...	6 days 21:27...	0.7% of 16 ...	0.4 %	

VLAN is added, firewall rules created, and the provisioning host is ready to do its job

## Next Step

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## Proxmox Lab: Game of Active Directory - Creating VM Templates

In this module, we'll be taking steps to create some Windows Server 2016 and Windows Server 2019 templates using Packer for use in the Proxmox Game of Active Directory lab