Proxmox VE 8: Advanced Administration and Optimization

Installation and Configuration Guide For Proxmox VE

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Proxmox VE 8: Advanced Administration and Optimization on *PROXMOX VE* requires **NETLAB+ VE 25.0.0** or greater.

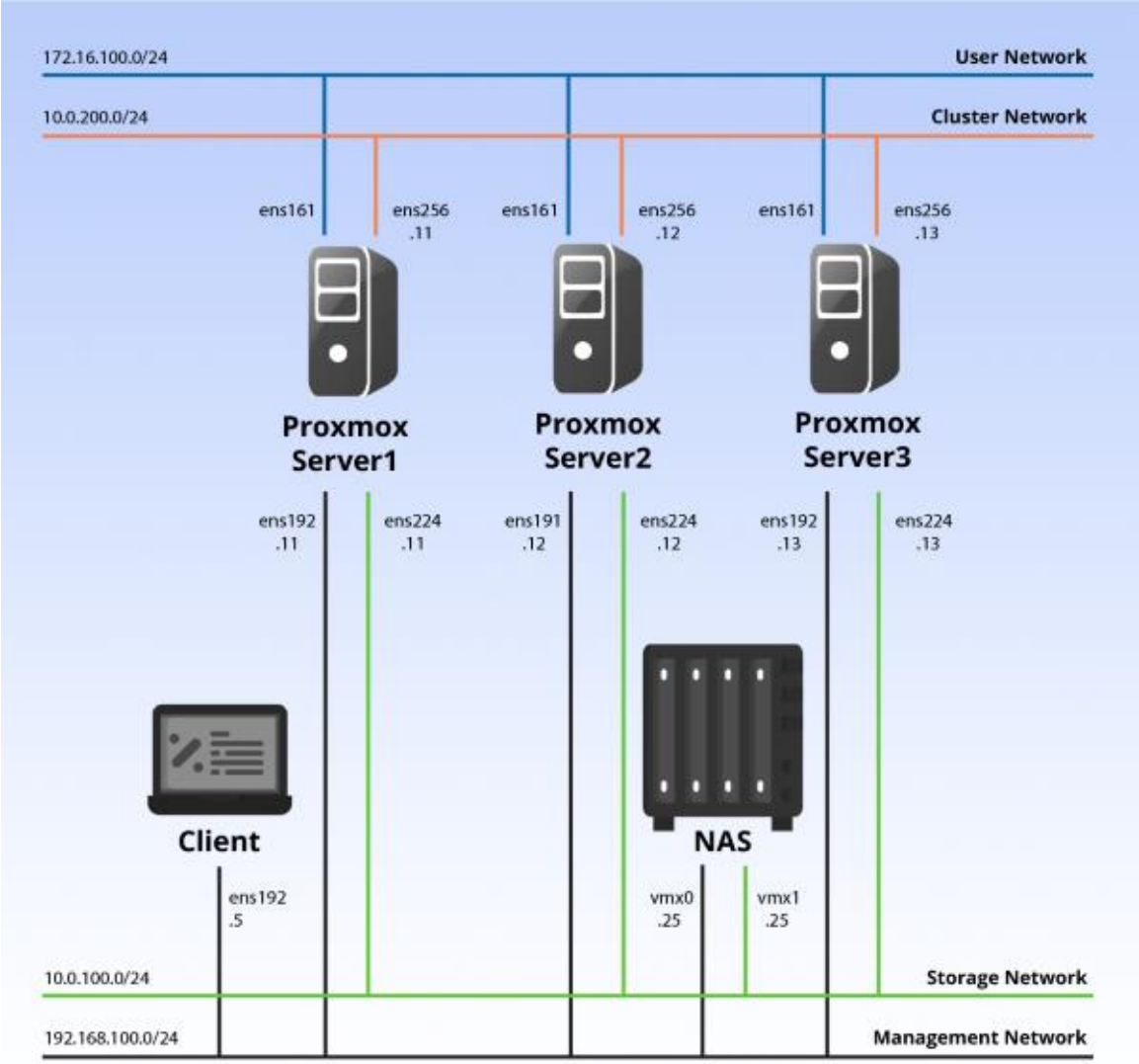
Contents

1 Introduction

This document provides detailed guidance on performing the installation and configuration of the *Proxmox VE 8: Advanced Administration and Optimization* pod on the *NETLAB+ VE* system.

1.1 Introducing the Proxmox VE 8: Advanced Administration and Optimization Pod

The *Proxmox VE 8: Advanced Administration and Optimization* pod is a 100% virtual machine pod consisting of five virtual machines. Linked together through virtual networking, these five virtual machines provide the environment for a student or a team to perform the *Proxmox VE 8: Advanced Administration and Optimization* labs.



2 Planning

This guide provides specific information pertinent to delivering the *Proxmox VE 8: Advanced Administration and Optimization* pod. The *NETLAB+ Virtual Machine Infrastructure* provides the prerequisite guidance for setting up your Proxmox VE infrastructure, including:

- An introduction to virtualization using *NETLAB+*
- Detailed setup instructions for standing up *Proxmox VE*
- Virtual machine and virtual pod management concepts using *NETLAB+*

This document assumes that you have set up virtual machine infrastructure in accordance with the *NETLAB+ Virtual Machine Infrastructure*.

2.1 Pod Creation Workflow

The following list is an overview of the pod setup process.

1. Restore virtual machine images required from the NDG VM Distribution System.
2. Make necessary adjustments to each virtual machine in the environment.
    a. Insert/Verify manual **MAC** addresses.
    b. Change the default network to **SAFETY_NET**.
    c. Any other configuration changes mentioned in this guide.
3. Import the deployed virtual machines to the *NETLAB+* **Virtual Machine Inventory**.
4. Create a master pod from the master virtual machines.
5. Activate or license the required software on each virtual machine when prompted.
6. Take a snapshot of each virtual machine deployed labeled **GOLDEN** after all configurations and licensing have taken effect. The *GOLDEN* snapshot is used to clone virtual machine images for host templates.
7. Use the *NETLAB+* **Pod Cloning** feature to create template pod on each host used in the *NETLAB+* environment.
8. Use the *NETLAB+* **Pod Cloning** feature to create student pods from the template pod.

2.2 Pod Resource Requirements

The *Proxmox VE 8: Advanced Administration and Optimization* course will consume 127.8 GB of storage per template pod instance.

The following table provides details of the storage requirements for each of the virtual machines in the pod.

Virtual Machine	Initial Master Pod (Thin Provisioned)	Maximum Allocated Memory
Client	16.3 GB	2 GB
NAS	86.9 GB	4 GB
Server1	25.4 GB	8 GB
Server2	25.0 GB	4 GB
Server3	22.4 GB	4 GB
Total	**176.0 GB**	**22.0 GB**

2.3 Proxmox VE Host Server Requirements

Please refer to the *NDG* website for specific *Proxmox VE* host requirements to support virtual machine delivery: https://www.netdevgroup.com/products/requirements/

The deployment of the *Proxmox VE 8: Advanced Administration and Optimization* pod requires *Proxmox VE* version of **8.4** or greater.

The number of **active** pods that can be used simultaneously depends on the *NETLAB+* product license and the number of *Proxmox VE* host servers meeting the hardware requirements specifications.

2.4 NETLAB+ Requirements

Installation of *Proxmox VE 8: Advanced Administration and Optimization* pods, as described in this guide, requires that you are running *NETLAB+ VE* **25.0.0 or greater**.

Previous versions of *NETLAB+* do not support the requirements for the *Proxmox VE 8: Advanced Administration and Optimization* course on the physical host servers.

Please refer to the *NETLAB+ Virtual Machine Infrastructure*.

2.5 NETLAB+ Virtual Machine Infrastructure Setup

The *NETLAB+ Virtual Machine Infrastructure* setup is described in the following sections of the *NETLAB+ Virtual Machine Infrastructure*:

- *Registering a Virtual Datacenter in NETLAB+*
- *Adding hosts in NETLAB+*
- *Proactive Resource Awareness*

It is important to configure *Proactive Resource Awareness* to maximize the number of active pods per physical *Proxmox VE* host.

2.6 Software Requirements

For the purpose of software licensing, each virtual machine is treated as an individual machine, PC, or server. Please refer to the specific vendor license agreements (and educational discount programs, if applicable) to determine licensing requirements for your virtual machines' software, operating system, and applications.

The minimum virtual infrastructure software required for standing up this pod is in the following table.

Virtual Infrastructure Requirements	
Software	**Version**
Proxmox VE	8.4

Please refer to the *Software and Licenses* section regarding the software requirements for virtual machines in the pod.

2.7 Networking Requirements

To accommodate the movement of large *VMs* and *ISO* disk images from one host to another, gigabit Ethernet or better connectivity is recommended to interconnect your *NETLAB+* and *Proxmox VE* host systems.

The two standard networking models recommended to interconnect your servers are described in detail in the *Networking Models* section of the *NETLAB+ Designated Operating Environment*.

3 Software and Licenses

3.1 Setup NDG VM Distribution System

The virtual machines are made available from the NDG VM Distribution System. Please follow the guide at *NDG VM Distribution System*.

This pod requires you are connected to the **vmdist.ndg_genit** storage.

To request access to the preconfigured virtual machine templates from *CSSIA* and *NDG*:

1. Go to *the CSSIA VM Image Sharing Agreement* page: CSSIA VM Image Sharing Agreement
2. Complete and submit your access request by following the instructions on the request form.
3. *CSSIA* will confirm your access and notify *NDG Support*.
4. NDG Support will authorize your access to the NDG VM Distribution System.
5. Contact NDG Support if you need your username and password credentials.

4 Master Pod Configuration

A master pod is set up on the management server. This master pod will contain the VMs deployed from the NDG VM Distribution System. This will later be cloned to template pods on each host.

4.1 Associated NDG VM Distribution System Storages

vmdist.ndg_genit

VM Name	VM OS	VM ID	Virtual Machine OVA Name
Client	Ubuntu	4201021	PVE8_AAO_FM.Client
NAS	TruesNAS Core	4201022	PVE8_AAO_FM.NAS
Server1	Proxmox VE 8	4201023	PVE8_AAO_FM.Server1
Server2	Proxmox VE 8	4201024	PVE8_AAO_FM.Server2
Server3	Proxmox VE 8	4201025	PVE8_AAO_FM.Server3

4.2 Deploying from NDG VM Distribution System

Deploy on your management server the pod virtual machine files from the NDG VM Distribution System.

1. Navigate to your **Proxmox VE Management Server** using your management workstation in a web browser.
2. Using your navigation panels, in the **Resource Tree**, navigate to **Datacenter** > *your_management_server* > **vmdist.ndg_genit.**
3. In the **Content Panel**, select **Backups**.
4. In the Notes column, select the name **PVE8-AAO.Client** *(build).*

> **Please Note** These build numbers may vary. Please refer to the Release Notes of the content to determine the latest version.

5. Click the **Restore** button.
6. In the **Restore: VM** popup window, select your **Storage** (generally NETLAB1).
7. Set the **VM** field to *4201021.*
8. Click the **Restore** button.
9. *Proxmox VE* will begin deploying the virtual machine. This may take some time, depending on the speed of your connection, HDDs, etc. Repeat the previous steps for each remaining virtual machine in the pod.

4.2.1 Modify Virtual Machines

Once the virtual machines are imported onto the host, verify the configurations. The following steps will guide you through the process.

1. Navigate to your **Proxmox VE cluster** using your management workstation, and login.
2. Using your navigation panels, in the *Resource Tree*, navigate to *Datacenter*, your management server and expand its view to see the virtual machines deployed in *Section 4.2*.
3. Locate the **Client** virtual machine. In the *Content Panel*, select **Hardware**.
4. Select *Network Device (net0)* and click the **Edit** button.
5. Confirm the *MAC address* field matches the table below.

Virtual Machine	NIC	MAC
Client	0	00:50:56:b3:02:c0
NAS	0	00:50:56:b3:e0:bc
	1	00:50:56:b3:b8:27
Server1	0	00:50:56:b3:21:f3
	1	00:50:56:b3:fa:92
	2	00:50:56:b3:20:cc
	3	00:50:56:b3:22:fb
Server2	0	00:50:56:b3:c7:b6
	1	00:50:56:b3:28:53
	2	00:50:56:b3:c4:a6
	3	00:50:56:b3:93:6c
Server3	0	00:50:56:b3:2a:ef
	1	00:50:56:b3:d7:d7
	2	00:50:56:b3:64:e3
	3	00:50:56:b3:8a:10

6. Repeat the previous steps for each network adapter of the remaining virtual machines you deployed.

4.2.2 Create a Snapshot on the Virtual Machines

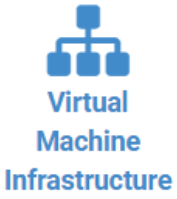
1. Locate the **Backup** virtual machine. In the *Content Panel*, select **Snapshots**.
2. Click the **Take Snapshot** button.
3. In the *Create Snapshot* window, type **GOLDEN** or whatever prior snapshot name the virtual machine had. Click **Take Snapshot** to take a snapshot.
4. Repeat these steps for each virtual machine.

4.3 NETLAB+ Virtual Machine Inventory Setup

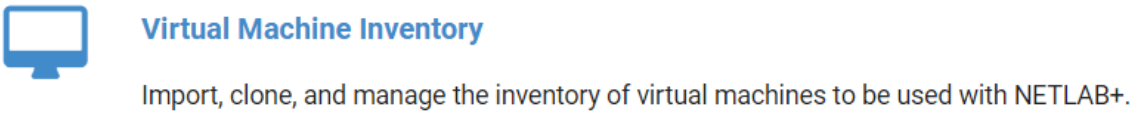
This section will guide you in adding your templates to the *Virtual Machine Inventory* of your *NETLAB+ VE* system.

4.3.1 Add Master Virtual Machines to NETLAB+ Virtual Machine Inventory

1. Log in to your *NETLAB+ VE* system using the administrator account.
2. Select the **Virtual Machine Infrastructure** icon.



3. Click the **Virtual Machine Inventory** icon.



4. Click the **Import Virtual Machines** button located at the bottom of the list.

5. Select the appropriate datacenter from the list where your master VMs reside.
6. Select the checkbox next to the virtual machines you have just deployed and click **Import Selected Virtual Machines**.

7. When the *Configure VMs* window loads, you can set your virtual machine parameters.
    a. Check the dropdown box for the correct operating system for each imported virtual machine.
    b. Change *Role* to **Master** for each VM.
    c. Add any comments for each virtual machine in the last column.

It is advised to leave the *Version* and *Build* numbers for reference when requesting *NDG* support.

d. Verify your settings and click **Import (X) Virtual Machines** (notice the number in parenthesis is dynamic, depending on the amount of VMs selected).

e. Verify all *Import Statuses* report back with *OK* and then click on the **Dismiss** button.
f. Verify that your virtual machines show up in the inventory.

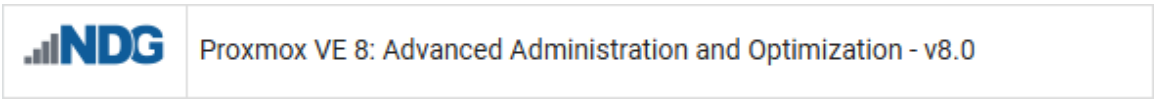
For additional information, please refer to the *NETLAB+ VE Administrator Guide*.

4.4 Building the Master Proxmox VE 8: Advanced Administration and Optimization Pod

This section will assist you in adding the *Proxmox VE 8: Advanced Administration and Optimization* pod to your *NETLAB+* system.

4.4.1 Enabling Labs in Course Manager

Please refer to the *Course Manager* section *of the NETLAB+ VE Administrator Guide* on how to enable content. Please install the **Proxmox VE 8: Advanced Administration and Optimization – v8.0** course.

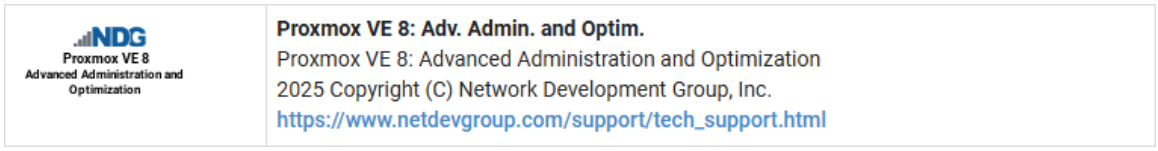


4.4.2 Create the Master Pod

1. Log into **NETLAB+ VE** with the *administrator* account.
2. Select the **Pods** icon.

3. Create a new pod by scrolling to the bottom and clicking the **Create New Pod** button.

4. Then, click on the **Proxmox VE 8: Advanced Administration and Optimization** pod entry from the list of installed pod types.



5. On the *New Pod* window, input a value into the **Pod ID** and **Pod Name** fields. Click **Next**.

The ***Pod ID*** determines the order in which the pods will appear in the scheduler. It is best practice to use a block of sequential ID numbers for the *Pod Id* that allows for the number of pods you are going to install.

The ***Pod Name*** identifies the pod and is unique per pod. Here we used the name of the lab set or course in a shortened form.

6. To finalize the wizard, click **OK**.

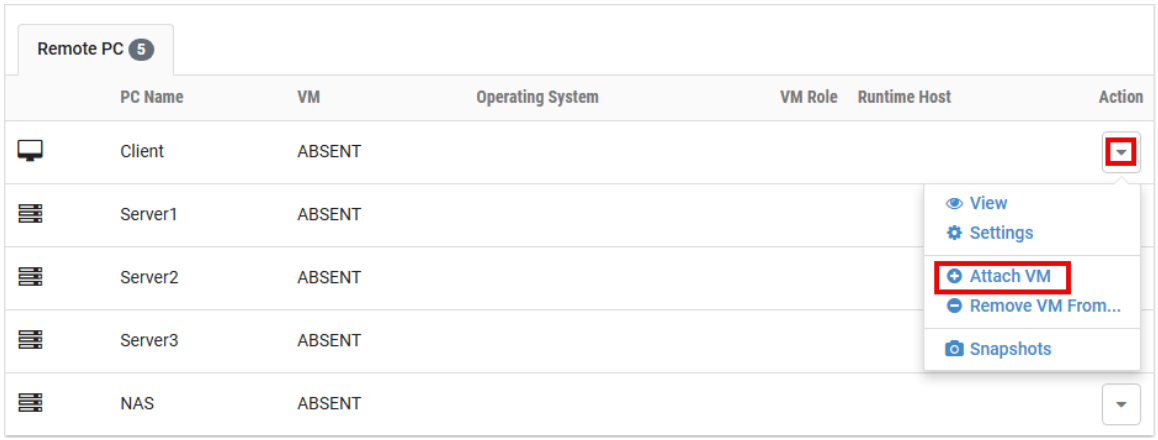
For additional information, please refer to the *NETLAB+ VE Administrator Guide*.

4.4.3 Attach Virtual Machines to the Master Pod

Update the master pod to associate the virtual machines with the newly created pod.

1. Select the **Proxmox VE 8: Advanced Administration and Optimization** master pod from the pod list.

2. Click on the **Action** dropdown next to the virtual machine you are about to assign and select **Attach VM**.

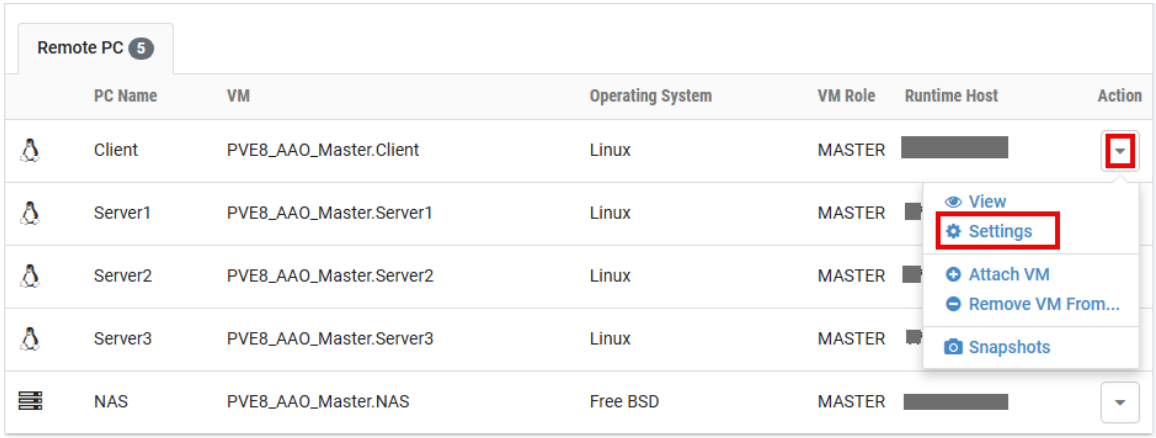


3. Select the corresponding virtual machine from the inventory list.

4. Click **OK** to confirm the VM attachment and repeat the previous steps for the remaining virtual machines.

4.4.4 Set the Revert to Snapshot

1. Make sure to view the **Proxmox VE 8: Advanced Administration and Optimization** master pod you just created snapshots for. In the pod view, click on the dropdown menu option underneath the *Action* column and select **Settings**.



2. In the virtual machine's *Settings* window, click on the *Revert to Snapshot* dropdown and select **GOLDEN** and then click the **Submit** button.

This sets the snapshot on the virtual machine that will get reverted to each time the pod is scheduled.

3. Click **OK** to confirm.
4. Return to the pod view page and repeat the previous steps for the remaining virtual machines.

5 Pod Cloning

This section will help you create multiple student pods. The following sections describe the *NETLAB+* pod cloning feature used to create student pods on one or two host systems.

5.1 Pod Categories

NETLAB+ has three pod categories:

A **master** pod refers to the main staging pod on the *management server*. This pod consists of the master virtual machines that were deployed from the NDG VM Distribution System. This is where you would license any software in the pod and configure any virtual machines as indicated in this guide.

A **template** pod refers to a pod on a *host server* that is a *full clone* copy of a master pod with virtual machines that are set to templates. This pod and virtual machines cannot be modified. This pod category cannot be turned online as templates cannot be powered on. There should be a template pod on each host server you plan to run user pods on.

A **user (student)** pod refers to a pod on a *host server* that is a *link clone* copy of the template pod with virtual machines ready for student reservations.

5.2 Linked Clones and Full Clones

NETLAB+ can create *linked clones* or *full clones*.

A **linked clone** (or linked virtual machine) is a virtual machine that shares virtual disks with the parent (or master) virtual machine in an ongoing manner. This conserves disk space and allows multiple virtual machines to use the same software installation. Linked clones can be created very quickly because most of the disk is shared with the parent VM.

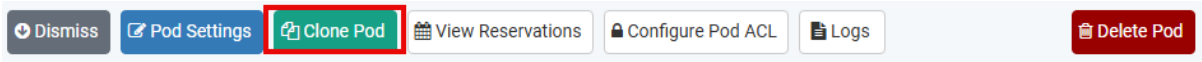
A **full clone** is an independent copy of a virtual machine that shares nothing with the parent virtual machine after the cloning operation. The ongoing operation of a full clone is entirely separate from the parent virtual machine.

5.3 Creating Template Pods

The following section describes how to create template pods on the same *Proxmox VE Host* system that holds your master pod's virtual machines. In this scenario, we will create linked virtual machines using the *NETLAB+* pod cloning utility.

1. Log in to **NETLAB+ VE** with the *administrator* account.
2. Select the **Pods** icon.

3. Click on your master pod.
4. Make sure the pod is offline by selecting **Take Pod Offline**.
5. Click the **Clone Pod** button to create a new pod, based on the settings and snapshots of this pod.



6. Input a new ID value into the **New Pod ID** field. It is advised to keep the pods in numerical order. If the pod IDs are not in numerical order, they will not show up in the scheduler in numerical order. Click **Next**.
7. Enter a name for the cloned pod into the **New Pod Name** field. For example, **PVE8_AAO_H120_T1001**. Click **Next**.

The ***Pod Name*** identifies the pod and is unique per pod. Here we used the name of the lab set or course in a shortened form along with a host identifier (H120), the type and number of the pod (T1001).

8. When the action has finished processing, you are presented with a settings screen. Notice each VM has its own tab. Go through each tab and verify the following:

Source Virtual Machine:

a. *From Snapshot* should be set to the **GOLDEN** snapshot you created previously.

Target Virtual Machine:

a. For *Type*, verify that **Full** is selected.
b. For *Role*, verify that the **Template** role is selected.
c. For *Runtime Host*, set this to your host server (not your management server).
d. For Datastore, verify you selected the correct one. **NETLAB1** by default.
e. For *Take Snapshot*, verify that **GOLDEN** is inputted.

f. For *Copy BIOS UUID,* only choose this option if you wish to preserve the sources VM's BIOS UUID for the targeted clone VM (when this option is checked, it can help with keeping licensing intact such as *Microsoft Windows Licensing/Activation*).

9. When you are done changing settings, click **Clone Pod**. This should complete within a minute as we are creating linked virtual machines.

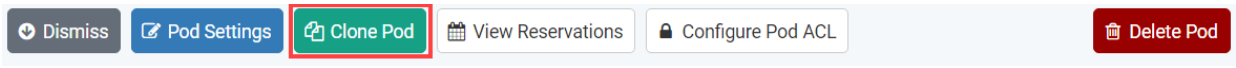
10. When the pod clone process is finished, click **OK**.
11. If you want to dedicate this pod to a particular class, team, or student, use the *Pod ACLs* feature. For details, see the *NETLAB+ VE Instructor Guide*.
12. Repeat these steps for each host server you will have user pods on.

5.4 Creating User Pods

The following section describes how to create user pods on the same *Proxmox VE Host* system that holds your master pod's virtual machines. In this scenario, we will create linked virtual machines using the *NETLAB+* pod cloning utility.

13. Log in to **NETLAB+ VE** with the *administrator* account.
14. Select the **Pods** icon.

15. Click on your template pod.
16. Click the **Clone Pod** button to create a new pod, based on the settings and snapshots of this pod.



17. Input a new ID value into the **New Pod ID** field. It is advised to keep the pods in numerical order. If the pod IDs are not in numerical order, they will not show up in the scheduler in numerical order. Click **Next**.
18. Enter a name for the cloned pod into the **New Pod Name** field. For example, **PVE8_AAO_H120_S1001**. Click **Next**.

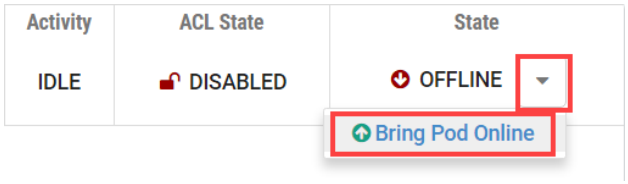
The ***Pod Name*** identifies the pod and is unique per pod. Here we used the name of the lab set or course in a shortened form along with a host identifier (H120), the type and number of the pod (S1001).

19. When the action has finished processing, you are presented with a settings screen. Notice each VM has its own tab. Go through each tab and verify the following:

    Target Virtual Machine:
    g. For *Type*, verify that **Linked** is selected.
    h. For *Role*, verify that the **Normal** role is selected.
    i. For *Take Snapshot*, verify that **GOLDEN** is inputted.
    j. For *Copy BIOS UUID,* only choose this option if you wish to preserve the sources VM's BIOS UUID for the targeted clone VM (when this option is checked, it can help with keeping licensing intact such as *Microsoft Windows Licensing/Activation*).

20. When you are done changing settings, click **Clone Pod**. This should complete within a minute as we are creating linked virtual machines.

21. When the pod clone process is finished, click **OK**.
22. If you want to dedicate this pod to a particular class, team, or student, use the *Pod ACLs* feature. For details, see the *NETLAB+ VE Instructor Guide*.
23. Click the **Online** Button on the *Pod Management* page to make the pod available.



The user pod can now be reserved. When the reservation becomes active, *NETLAB+* will automatically configure virtual machines and virtual networking for your new pod.

5.5 Assigning Pods to Students, Teams, or Classes

Please refer to the *NETLAB+ VE Instructor Guide* for details on using the *Pod ACLs* feature.