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Loppuraportti

Virtualisointi

2025



**Kaakkois-Suomen
ammattikorkeakoulu**

SISÄLLYS

| | | |
|------|---|----|
| 1 | JOHDANTO..... | 3 |
| 2 | ADDITIONAL SETTINGS AFTER WINDOWS 24H2. DG_READINESS.PS1 | 3 |
| 3 | ESXI ASENNUS | 3 |
| 4 | WINDOWS JA CENTOS VIRTUAALIKONEIDEN ASENNUS | 4 |
| 5 | VCENTERIN ASENNUS JA KÄYTTÖÖNOTTO | 5 |
| 5.1 | SSO konfigurointi..... | 6 |
| 5.2 | Fully qualified domainname | 7 |
| 6 | ESX2 JA EX3 DATASTORE LUONTI..... | 10 |
| 6.1 | VMware vmnic virtuaalikytkimen luonti | 14 |
| 7 | PFSENSE ASENNUS..... | 17 |
| 8 | TRUE NAS ASENNUS | 19 |
| 8.1 | Storage create pool | 23 |
| 8.2 | Lisätään iscsi adapteri vcenteriin..... | 26 |
| 9 | YHDISTETÄÄN FREENAS DATASTORE VSPHERE HOSTEIHIN | 27 |
| 9.1 | Luodaan uusi virtuaalikone ja käytetään jaettua datastorea | 28 |
| 9.2 | Kopioidaan asennettu virtuaalikone toiseen datastoreen..... | 29 |
| 9.3 | Luodaan klusteri ja liitetään vSphere hostit klusteriin | 30 |
| 10 | CHANGE YOUR NETWORK ISOLATION ADDRESS TO YOUR VCENTER ADDRESS | 32 |
| 11 | HEARTBEAT KONFFAUS..... | 32 |
| 11.1 | Lisätään kolmas interface pfSenseen..... | 35 |
| 12 | VMWARE VSPHERE PROACTIVE HA..... | 37 |
| 13 | DAS. ISOLATIONADDRESS0. V-CENTER IP-OSOITE 10.70.66.160..... | 43 |
| 14 | PÄIVITETÄÄN VSPHERE-SERVERIT LIFECYCLE MANAGER HYÖDYNTÄEN..... | 44 |
| 14.1 | Päivitetään vCenter-server vCenter Server Appliance Management..... | 45 |

1 JOHDANTO

Raportti dokumentoi virtualisointi kurssin lopputyönä toteutetun virtualisointi ympäristön rakentamisen. Tehtävässä asennetaan vCenter hallintapaneeli, useita ESXI koneita sekä TrueNAS pohjainen jaettu tallennusratkaisu. Tehtävässä käytettiin klusteria ja sen eri ominaisuuksia osana ympäristöä.

2 ADDITIONAL SETTINGS AFTER WINDOWS 24H2. DG_READINESS.PS1

Työkalulla tarkistetaan, tukeeko laitteisto Windowsin Device Guard- ja Credential Guard turvaominaisuuksia.

```
Administrator: Windows PowerShell
Directory: C:\Users\lauri.partinen\Downloads\dgreadiness_v3.6\dgreadiness_v3.6

Mode                LastWriteTime         Length Name
-----
-a----          9/24/2025   2:10 PM           10949 DefaultWindows_Audit.xml
-a----          9/24/2025   2:10 PM           2312 DefaultWindows_Audit_sipolicy.p7b
-a----          9/24/2025   2:10 PM          10888 DefaultWindows_Enforced.xml
-a----          9/24/2025   2:10 PM           2316 DefaultWindows_Enforced_sipolicy.p7b
-a----          9/24/2025   2:10 PM          77648 DG_Readiness_Tool_v3.6.ps1
-a----          9/24/2025   2:10 PM           6079 ReadMe.txt

PS C:\Users\lauri.partinen\Downloads\dgreadiness_v3.6\dgreadiness_v3.6> .\DG_Readiness_Tool_v3.6.ps1

Do you want to run software from this untrusted publisher?
File C:\Users\lauri.partinen\Downloads\dgreadiness_v3.6\dgreadiness_v3.6\DG_Readiness_Tool_v3.6.ps1 is published by
CN=Microsoft Corporation, O=Microsoft Corporation, L=Redmond, S=Washington, C=US and is not trusted on your system.
Only run scripts from trusted publishers.
[V] Never run [D] Do not run [R] Run once [A] Always run [?] Help (default is "D"): r
#####
Readiness Tool Version 3.4 Release.
Tool to check if your device is capable to run Device Guard and Credential Guard.
#####
How to read the output:
1. Red Errors: Basic things are missing that will prevent enabling and using DG/CG
2. Yellow Warnings: This device can be used to enable and use DG/CG, but additional security benefits will be absent. To
to learn more please go through: https://aka.ms/dgwhcr
3. Green Messages: This device is fully compliant with DG/CG requirements

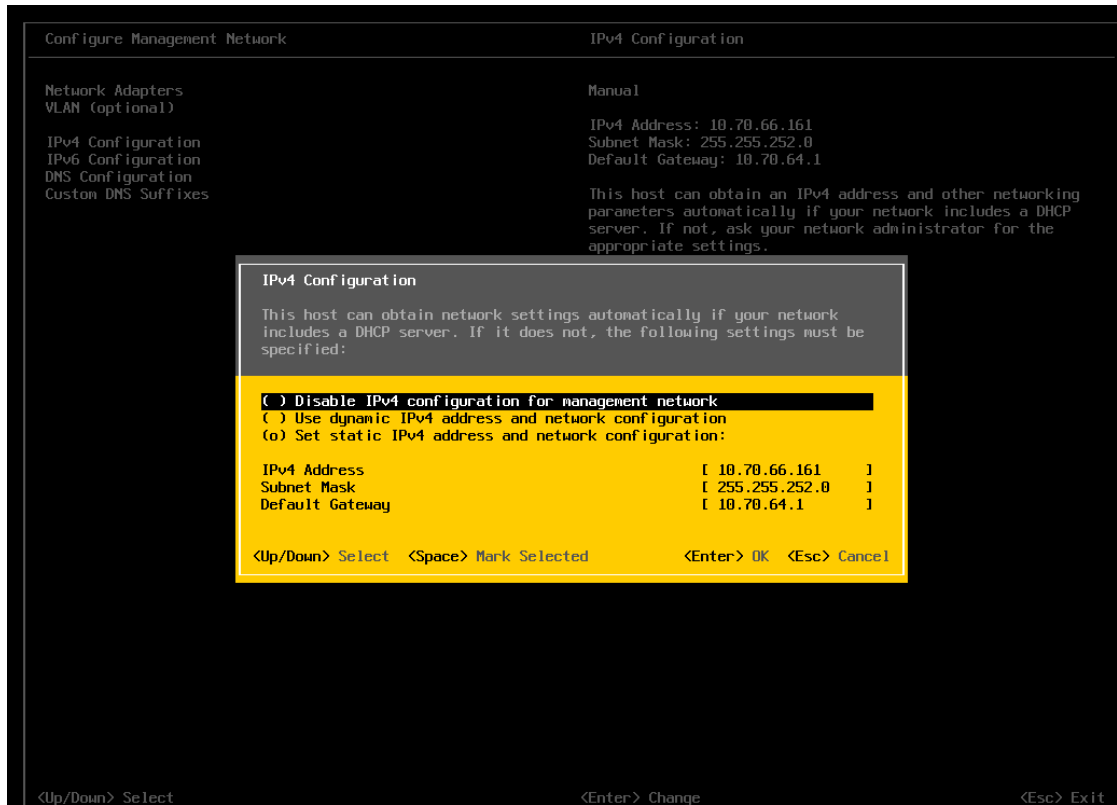
PS C:\Users\lauri.partinen\Downloads\dgreadiness_v3.6\dgreadiness_v3.6> .\DG_Readiness_Tool_v3.6.ps1 -capable

To learn more about required hardware and software please visit: https://aka.ms/dgwhcr
PS C:\Users\lauri.partinen\Downloads\dgreadiness_v3.6\dgreadiness_v3.6> .\DG_Readiness_Tool_v3.6.ps1 -disable
```

3 ESXI ASENNUS

Suoritettiin ESXI asennus. Lisätään ip-osoitteeksi ESXI 1 10.70.66.161.
Default-gateway 10.70.64.1.

| | |
|-------------------------|--|
| F1-VCENTER,10.70.66.160 | |
| F1-ESX1,10.70.66.161 | |
| F1-ESX2,10.70.66.162 | |
| F1-ESX3,10.70.66.163 | |
| F1-NAS,10.70.66.164 | |



4 WINDOWS JA CENTOS VIRTUAALIKONEIDEN ASENNUS

Luodaan Windows ja Centos virtual machine ESXI.

New virtual machine

1 Select creation type

2 Select a name and guest OS

3 Select storage

4 Customize settings

5 Ready to complete

Select creation type

How would you like to create a Virtual Machine?

Create a new virtual machine

Deploy a virtual machine from an OVF or OVA file

Register an existing virtual machine

This option guides you through creating a new virtual machine. You will be able to customize processors, memory, network connections, and storage. You will need to install a guest operating system after creation.

CANCEL **BACK** **NEXT** **FINISH**

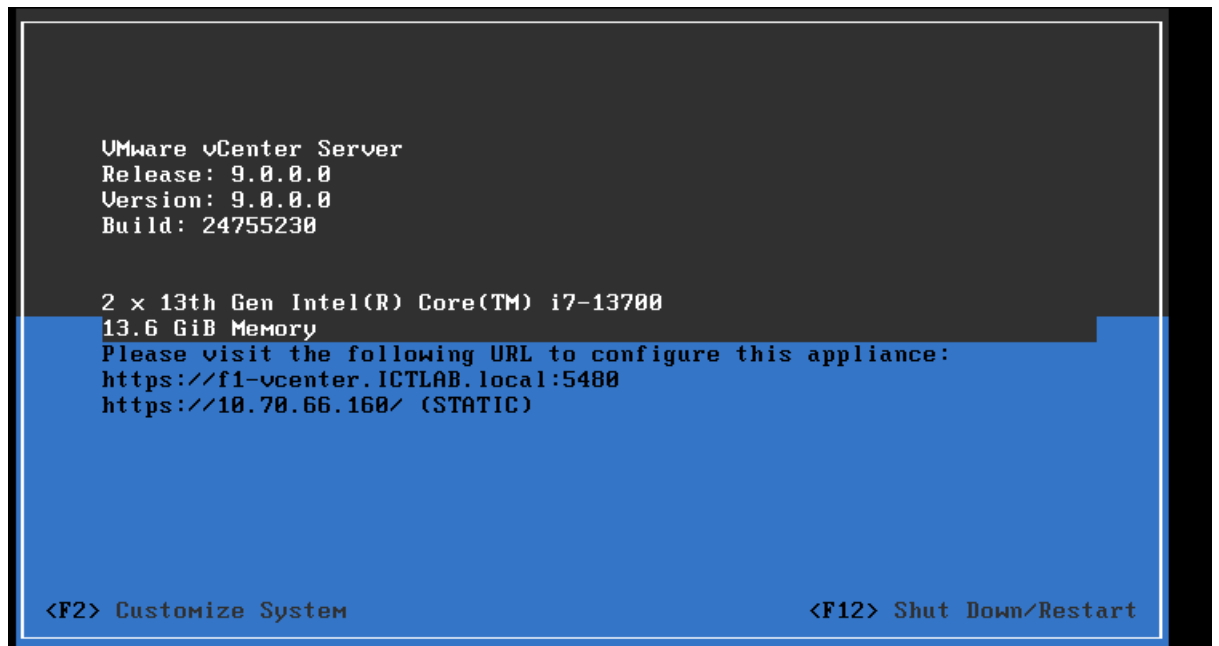
Molemmat virtuaalikoneet toiminnassa.

| | | | | | | | |
|--------------------------|---------|----------|-------|-------------------------------|---------|-------|------|
| <input type="checkbox"/> | Centos | ✓ Normal | 16 GB | CentOS 8 (64-bit) | Unknown | 0 MHz | 0 MB |
| <input type="checkbox"/> | windows | ✓ Normal | 64 GB | Microsoft Windows 10 (64-bit) | Unknown | 0 MHz | 0 MB |

5 VCENTERIN ASENNUS JA KÄYTTÖÖNOTTO



VCenter Serverin käyttöönotto: VCenter-hallintapalvelin F1-VCENTER konfiguroidaan taulukon IP-osoitteeseen 10.70.66.160.

F1-VCENTER,10.70.66.160



vCenter Server Configuration

Fields marked with * are required

| | |
|---|--|
| Network configuration * | Assign static IP address |
| IP version * | IPv4 |
| System name *  | f1-vcenter.ICTLAB.local |
| IP address * | 10.70.66.160 |
| Subnet mask or prefix length * | 22 |
| Default gateway * | 10.70.64.1 |
| DNS servers * | 10.70.10.21 |
| Time synchronization mode * | Synchronize time with the NTP servers |
| NTP servers (comma-separated list) * | pool.ntp.org  |
| SSH access * | Activated |

5.1 SSO konfigurointi

Luodaan SSO domain vsphere.local ja määritetään järjestelmänvalvojan tunnukset.

SSO Configuration

Fields marked with * are required

☒ Create a new SSO domain

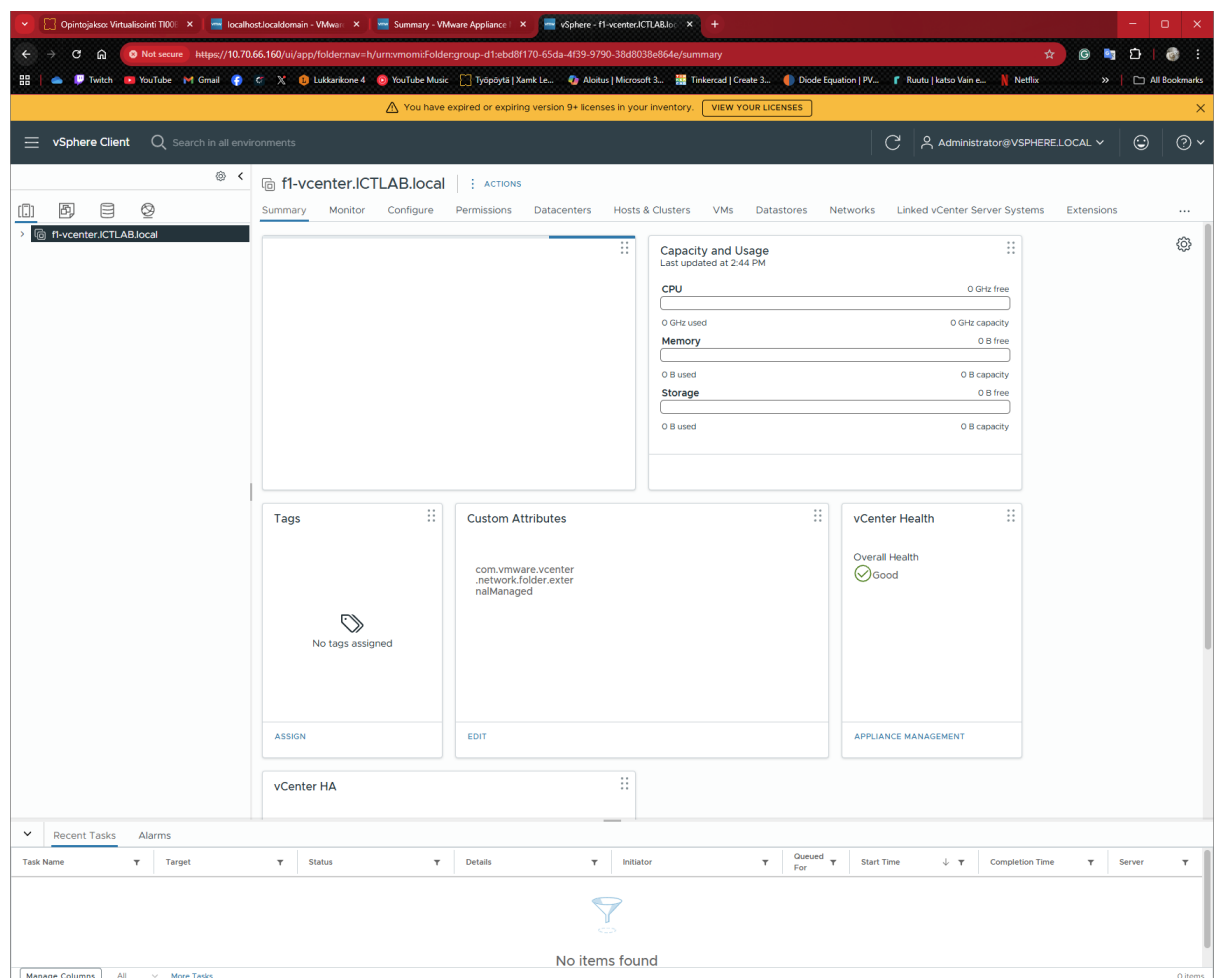
| | |
|------------------------------|---------------|
| Single Sign-On domain name * | vsphere.local |
| Single Sign-On username * | administrator |
| Single Sign-On password * | ***** |
| Confirm password * | ***** |

☐ Join an existing SSO domain

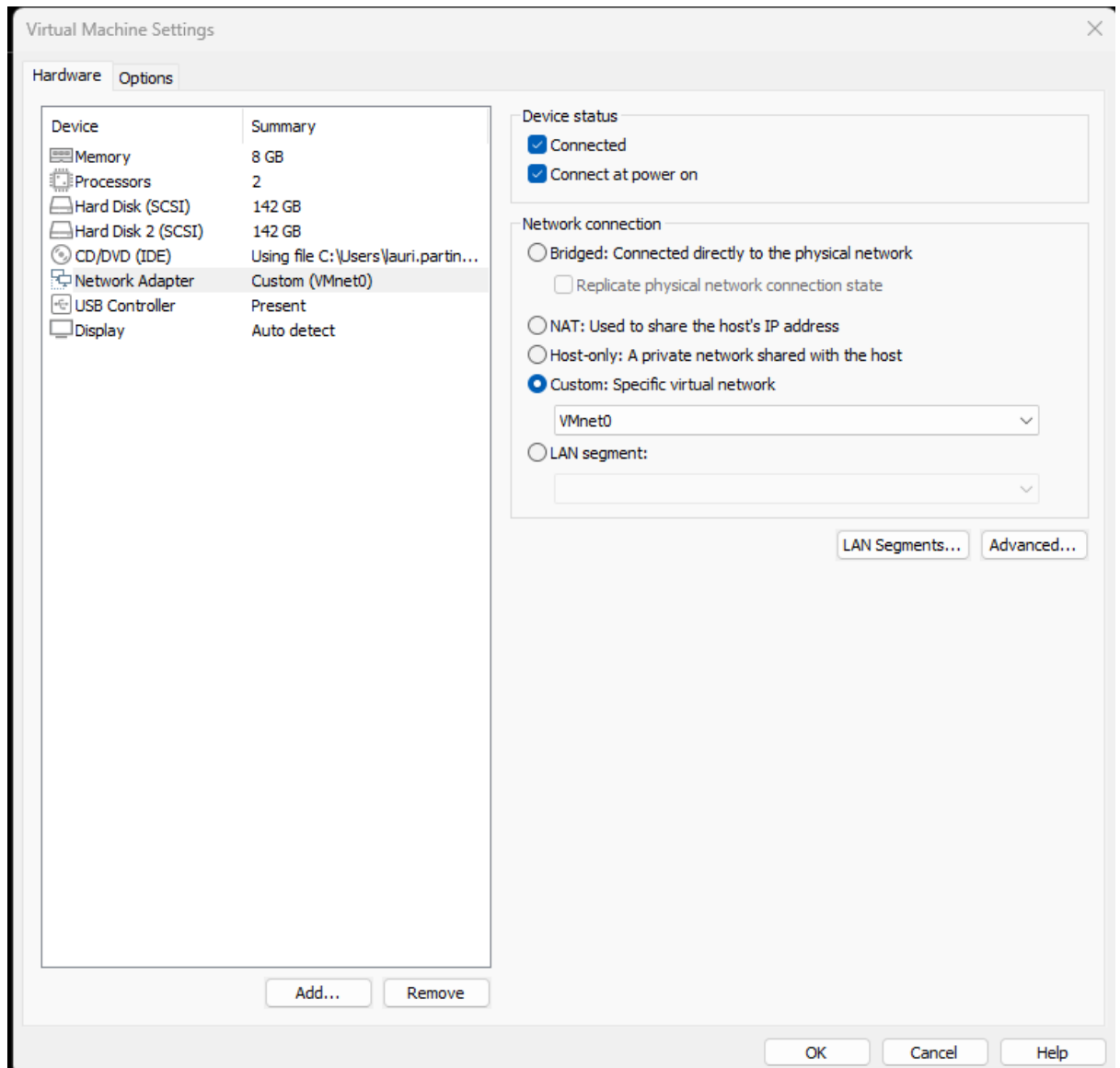
5.2 Fully qualified domainname

XX-vcenter.ictlab.local (?? = name from IP-address list).

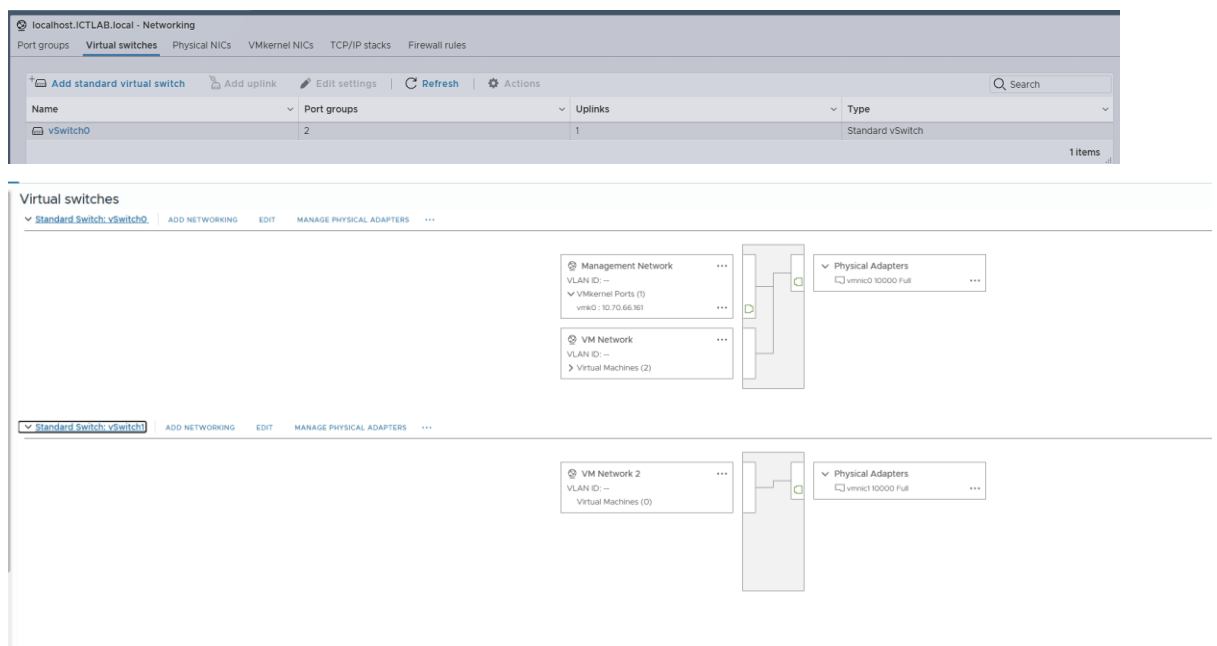
Lisätään domain nimi F1-vcenter.ictlab.local.



Luodaan verkkoadapteri VMnet0.



Luodaan kytkin 0 ja lisätään se vcenteriin.



Lisätään ESXi host vCenteriin.

Add Host

1 Name and location

2 Connection settings

3 Host summary

4 Host lifecycle

5 Assign license

6 Lockdown mode

7 VM location

8 Ready to complete

Name and location

Enter the name or IP address of the host to add to vCenter Server.
*Fields marked with * are required*

Host name or IP address: *10.70.64.167

Location:Datacenter

Lisätään ESXi image.

Add Host

1 Name and location

2 Connection settings

3 Host summary

4 Host lifecycle

5 Assign license

6 Lockdown mode

7 VM location

8 Ready to complete

Host lifecycle

The host lifecycle is managed with images. Set up an image to specify the software and firmware to be installed, updated, or upgraded on the host.

Set up the host image

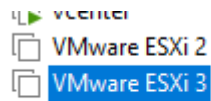
☐ Select an image from the Image Library ⓘ

☐ Extract an image from a host in this vCenter instance ⓘ

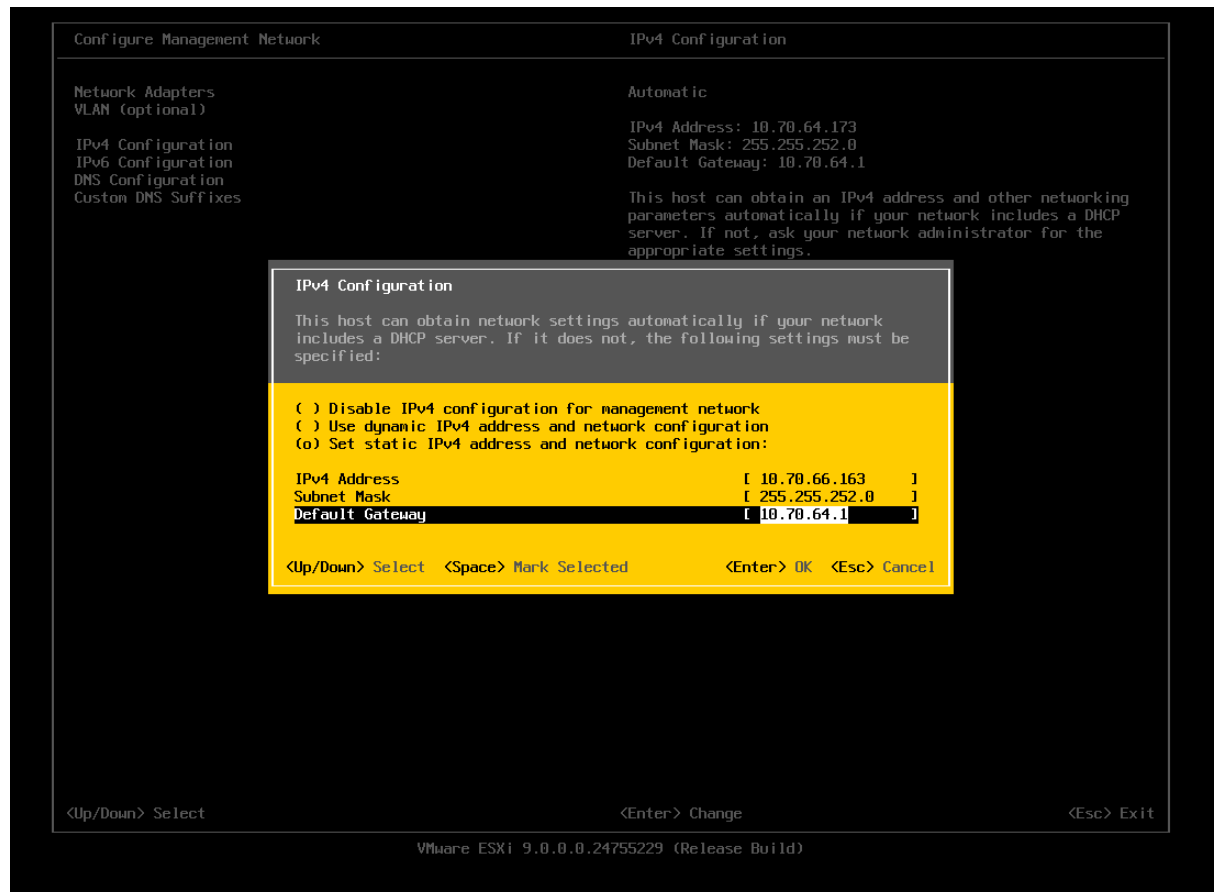
☒ Extract the image on the host ⓘ

☐ Create a new image ⓘ

Virtuaalikoneet vcenterin alla vmware.



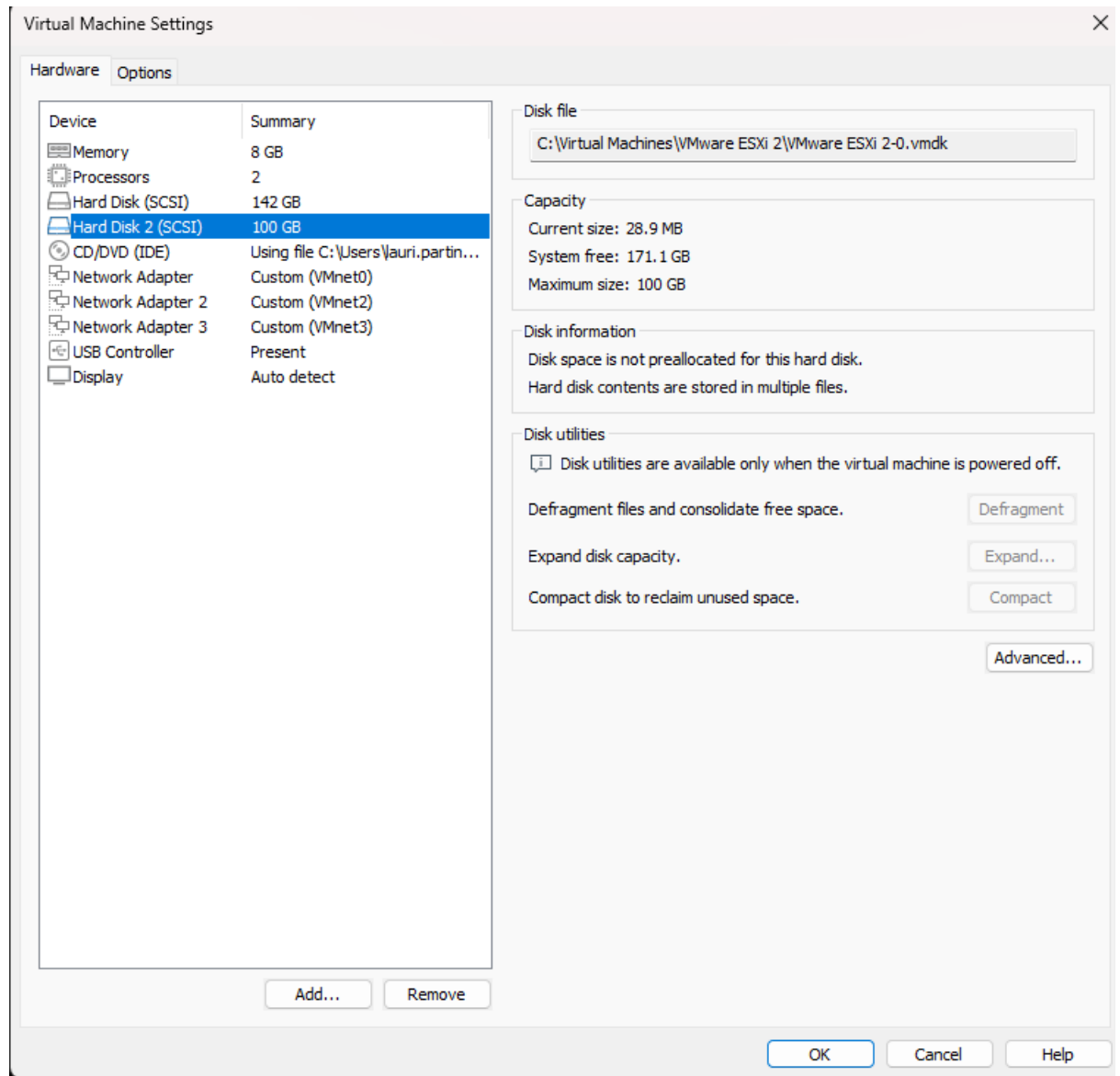
Luodaan ESXI 2 ja 3. Tässä esimerkki ESXI 3 konfiguroinnista.



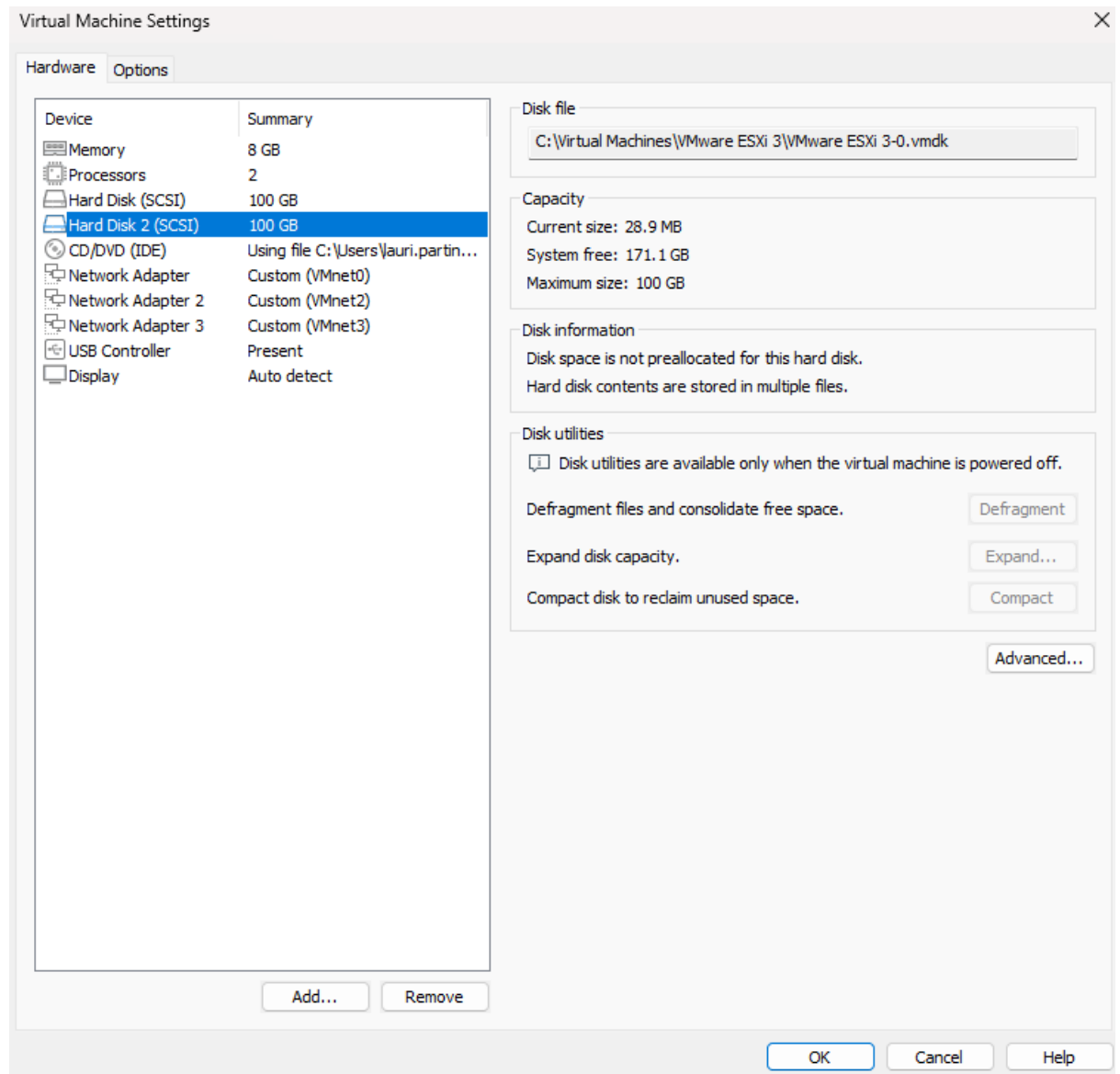
6 ESX2 JA EX3 DATASTORE LUONTI

Esx2

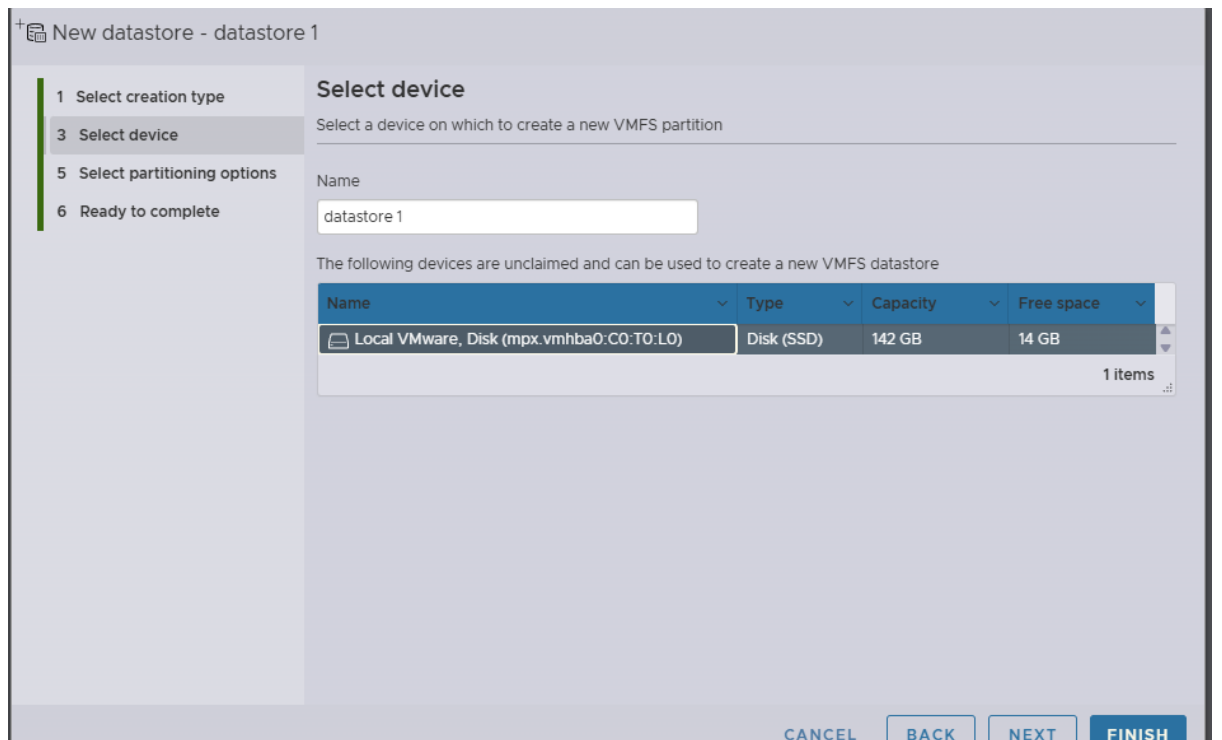
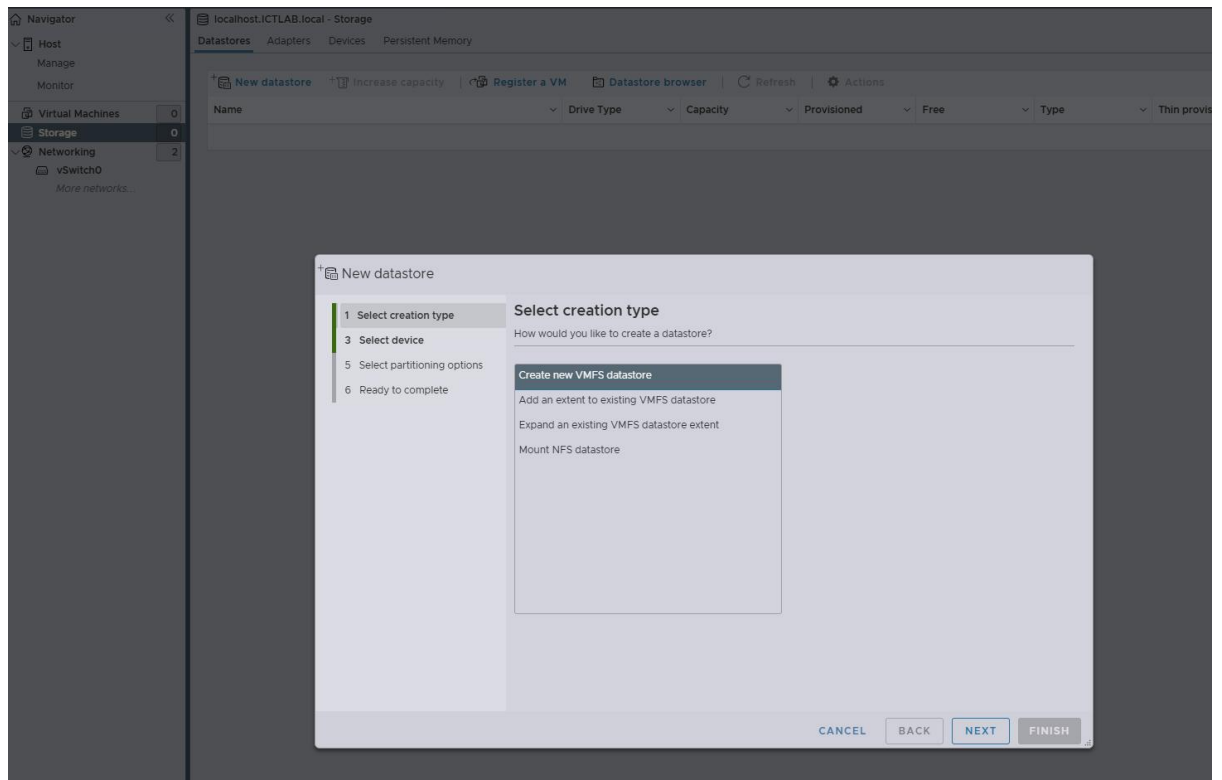
Lisätään asetuksista lisää tallennustilaa



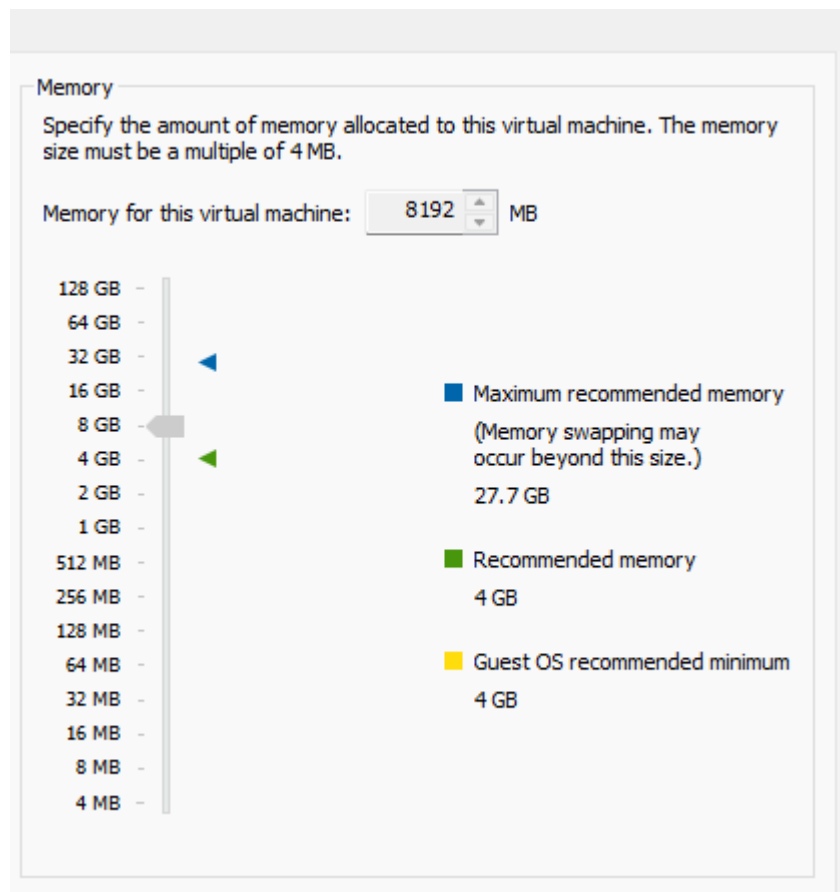
Esx3 lisää tallennustilaa



Luodaan datastore tallennustilaa varten.

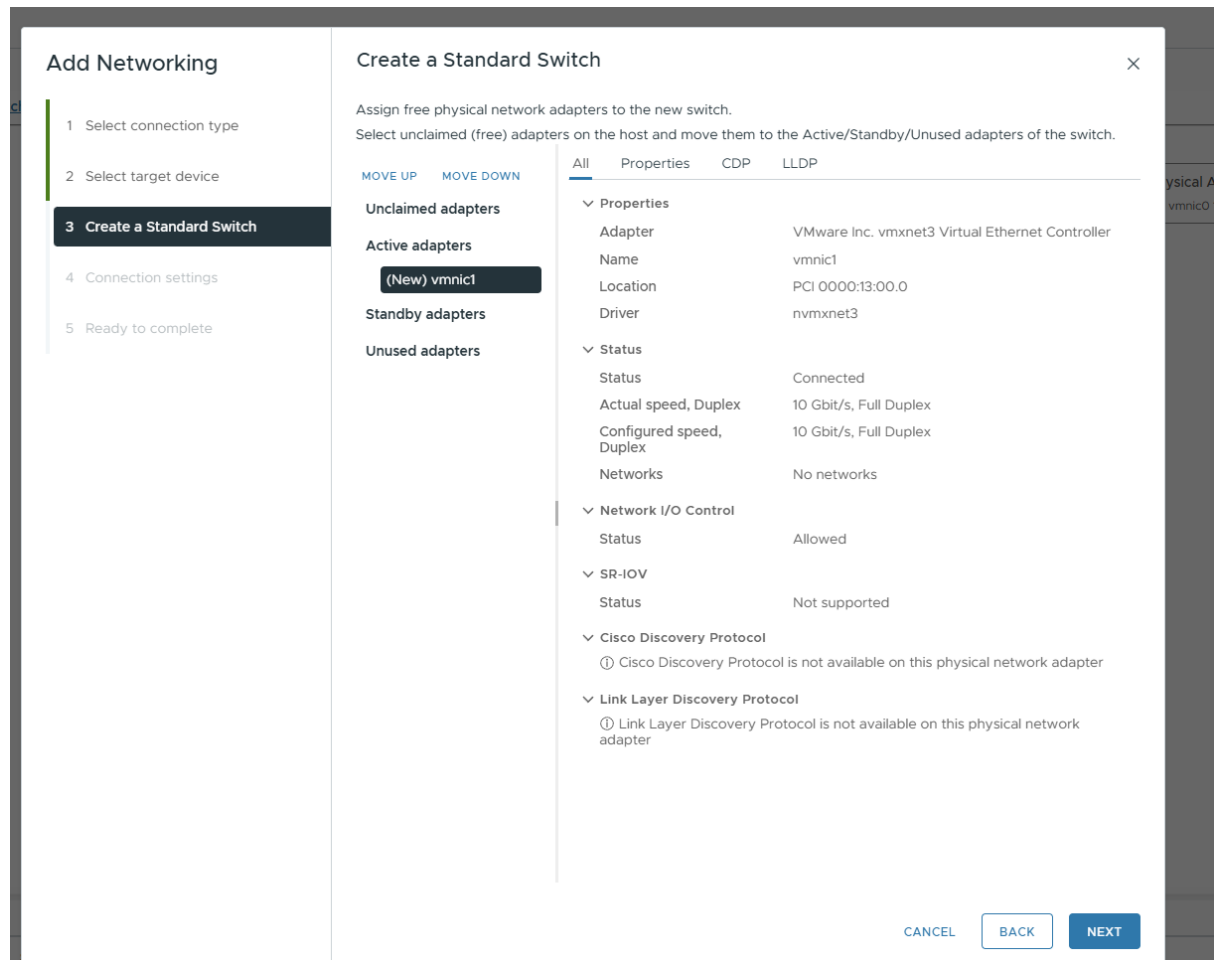


Lisätään muistia ESXi virtuaali koneille.



6.1 VMware vmnic virtuaalikytkimen luonti

Määritteellään fyysinen verkkokortti vmnic1 aktiiviseksi. Kytkin luodaan, jotta ESXi pystyy toimimaan jaetun tallennustilan kanssa nopeasti.



Kyttimeen asetetaan taulukosta ESXi IP-osoite.

Lisätään toinen network kortti.

Device status

☒ Connected
☒ Connect at power on

Network connection

☐ Bridged: Connected directly to the physical network

☐ Replicate physical network connection state

☐ NAT: Used to share the host's IP address
☐ Host-only: A private network shared with the host
☒ Custom: Specific virtual network

VMnet2

☐ LAN segment:

LAN Segments...

Advanced...

Lisätään vmnic2 aktiiviseksi.

Add Networking

- Select connection type
- Select target device
- Create a Standard Switch
- Connection settings
- Ready to complete

Create a Standard Switch

Assign free physical network adapters to the new switch.

Select unclaimed (free) adapters on the host and move them to the Active/Standby/Unused adapters of the switch.

MOVE UP MOVE DOWN

Unclaimed adapters

Active adapters

(New) vmnic2

Standby adapters

Unused adapters

| All | Properties | CDP | LLDP |
|--|------------|-----|------|
| <div> <div>Properties</div> <div> <div>Adapter</div> <div> <div>Name</div> <div>Location</div> <div>Driver</div> </div> </div> <div> <div>VMware Inc. vmxnet3 Virtual Ethernet Controller</div> <div>vmnic2</div> <div>PCI 0000:1b:00.0</div> <div>nvmxnet3</div> </div> </div> | | | |
| <div> <div>Status</div> <div> <div>Status</div> <div>Actual speed, Duplex</div> <div>Configured speed, Duplex</div> <div>Networks</div> </div> <div> <div>Connected</div> <div>10 Gbit/s, Full Duplex</div> <div>10 Gbit/s, Full Duplex</div> <div>No networks</div> </div> </div> | | | |
| <div> <div>Network I/O Control</div> <div> <div>Status</div> </div> <div>Allowed</div> </div> | | | |
| <div> <div>SR-IOV</div> <div> <div>Status</div> </div> <div>Not supported</div> </div> | | | |
| <div> <div>Cisco Discovery Protocol</div> <div> <div>① Cisco Discovery Protocol is not available on this physical network adapter</div> </div> </div> | | | |
| <div> <div>Link Layer Discovery Protocol</div> <div> <div>① Link Layer Discovery Protocol is not available on this physical network adapter</div> </div> </div> | | | |

CANCEL

BACK

NEXT

7 PFSENSE ASENNUS

Asennetaan pfSense aiemmin luotuun datacenteriin.

New Virtual Machine

- 1 Select a creation type
- 2 Select a name and folder
- 3 Select a compute resource
- 4 Select storage**
- 5 Select compatibility
- 6 Select a guest OS
- 7 Customize hardware
- 8 Ready to complete

Select storage

Select the storage for the configuration and disk files

☐ Encrypt this virtual machine (Requires Key Management Server)

VM Storage Policy Datastore Default

☐ Disable Storage DRS for this virtual machine

| | Name | Storage Compatibility | Capacity | Provisioned | Free | Type |
|--|------------|-----------------------|----------|-------------|----------|------|
| | datastore1 | -- | 155.5 GB | 78.44 GB | 81.51 GB | V |

Manage Columns Items per page 10 1 item

Konfiguroidaan pfSense. Asetetaan IP-osoite.

```

Network Interfaces

+-----+-----+-----+
| name | aliases | state.aliases |
+-----+-----+-----+
| ens33 | 10.70.66.164/22 | 10.70.66.164/22 |
|       | fe80::20c:29ff:fe1:fec7/64 | fe80::20c:29ff:fe1:fec7/64 |
+-----+-----+-----+

Press <Enter> to edit a network interface, <Delete> to
delete a network interface, <n> to create a new network
interface, <r> to refresh, <q> to quit.

```

```

vMX0      00:50:56:81:bd:1d    (up)
vMX1      00:50:56:81:77:3d    (up)

Enter the parent interface name for the new VLAN (or nothing if finished)
Enter the VLAN tag (1-4094): 1

VLAN Capable interfaces:

vMX0      00:50:56:81:bd:1d    (up)
vMX1      00:50:56:81:77:3d    (up)

Enter the parent interface name for the new VLAN (or nothing if finished)

VLAN interfaces:

vMX0.1      VLAN tag 1, parent interface vMX0

If the names of the interfaces are not known, auto-detection can
be used instead. To use auto-detection, please disconnect all
interfaces before pressing 'a' to begin the process.

Enter the WAN interface name or 'a' for auto-detection
(vMX0 vMX1 vMX0.1 or a): vMX0

```

Luodaan pfsense network adapterit.

Adapteri 1 (WAN): Yhdistetään ulkoiseen verkkoon (VM Network).

Adapteri 2 (LAN): Sisäinen verkko muille virtuaalikoneille (VM Network 2)

| Network Interfaces | | | |
|--------------------|-----------------|-----------------------------|---------|
| name | aliases | state | aliases |
| ens33 | 10.70.66.164/22 | 10.70.66.164/22 | |
| | | fe80::20c:29ff:fef1:fec7/64 | |

Press <Enter> to edit a network interface, <Delete> to delete a network interface, <n> to create a new network interface, <r> to refresh, <q> to quit.

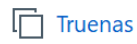
```
*** Welcome to pfSense 2.7.2-RELEASE (amd64) on pfSense ***

WAN (wan)      -> vmx0      -> v4/DHCP4: 10.70.64.101/22
LAN (lan)      -> vmx1      -> v4: 192.168.1.1/24

0) Logout (SSH only)          9) pfTop
1) Assign Interfaces         10) Filter Logs
2) Set interface(s) IP address 11) Restart webConfigurator
3) Reset webConfigurator password 12) PHP shell + pfSense tools
4) Reset to factory defaults  13) Update from console
5) Reboot system             14) Enable Secure Shell (sshd)
6) Halt system               15) Restore recent configuration
7) Ping host                 16) Restart PHP-FPM
8) Shell
```

8 TRUE NAS ASENNUS

Luodaan TrueNAS-virtuaalipalvelin tallennustilan hallintaan.



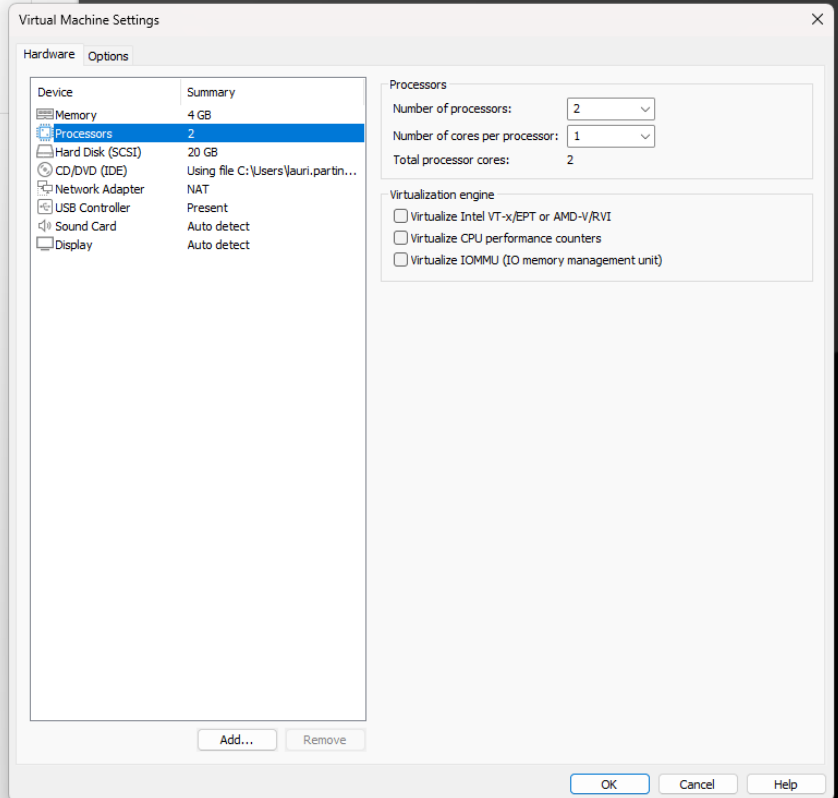
Power on this virtual machine
Edit virtual machine settings

Devices

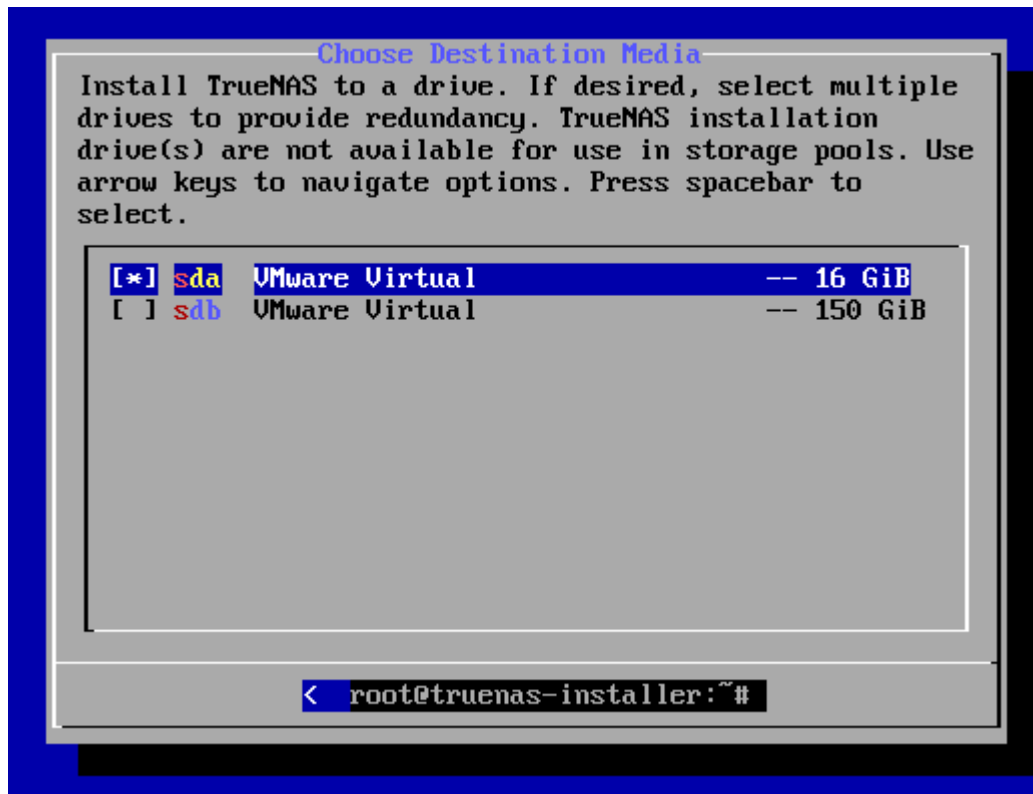
| | |
|------------------|----------------------|
| Memory | 4 GB |
| Processors | 1 |
| Hard Disk (SCSI) | 20 GB |
| CD/DVD (IDE) | Using file C:\Use... |
| Network Adapter | NAT |
| USB Controller | Present |
| Sound Card | Auto detect |
| Display | Auto detect |

Description

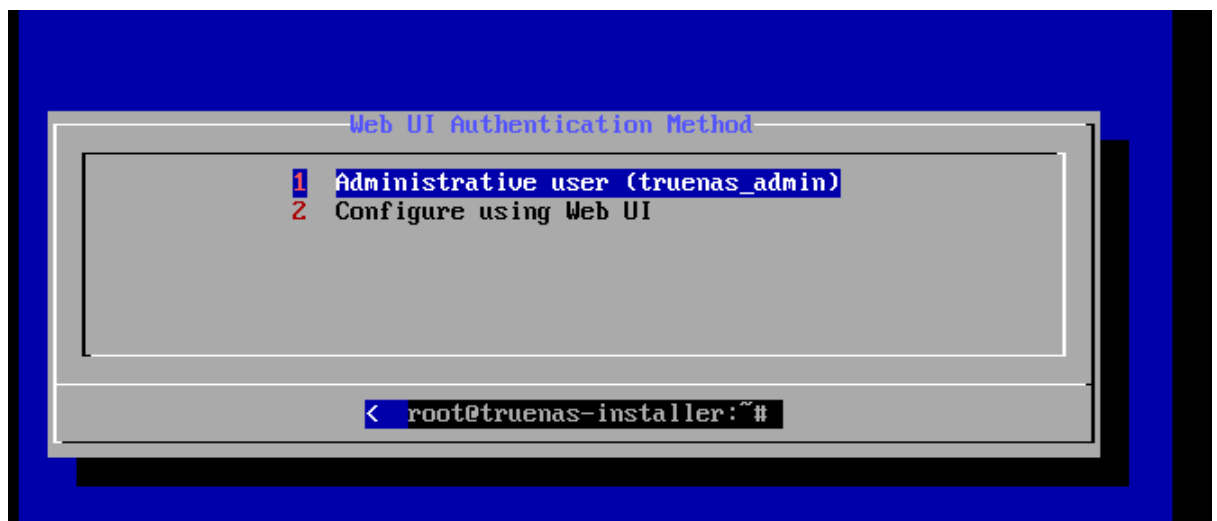
Type here to enter a description of this virtual machine.



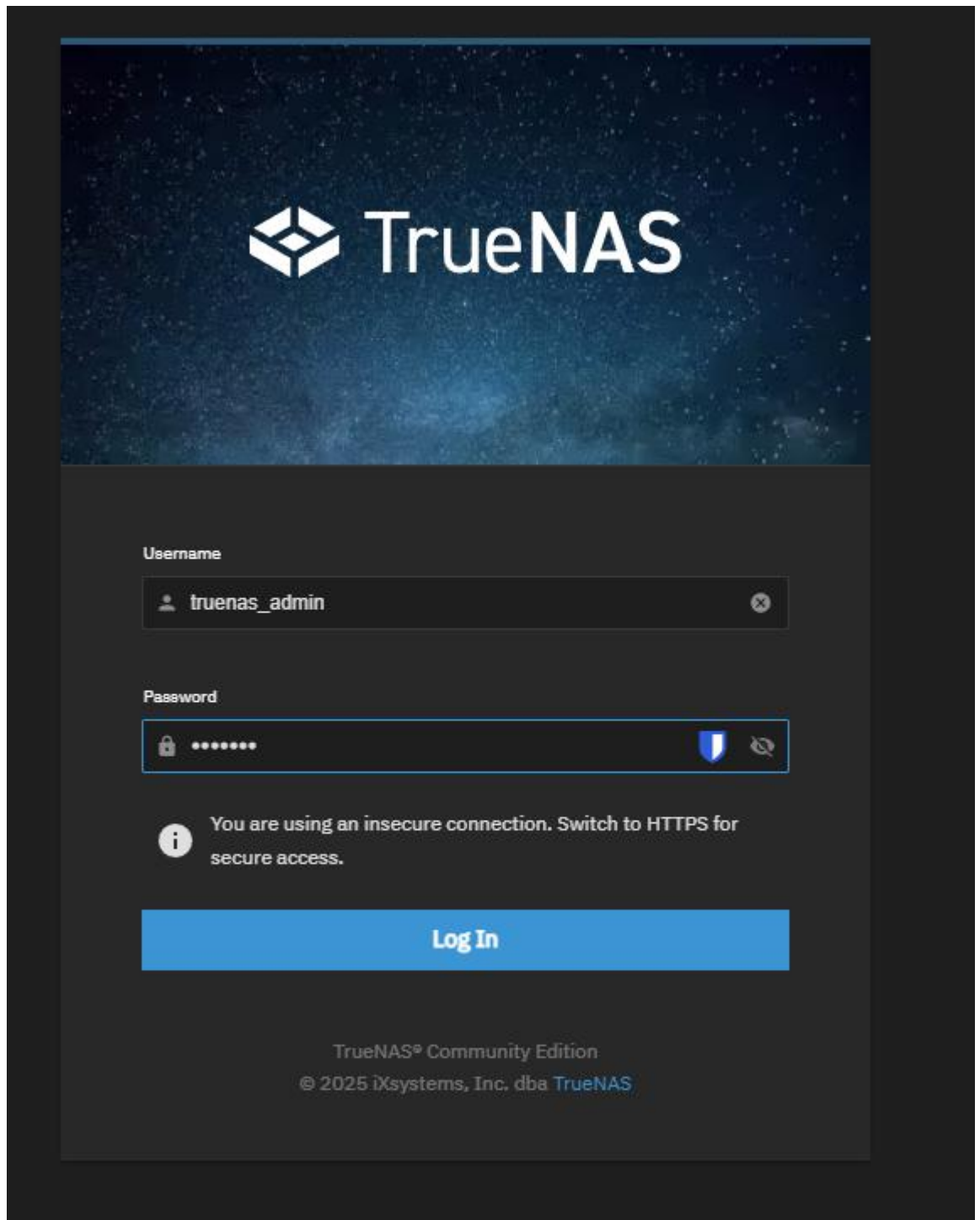
Valitaan asennusta varten luotu 16gb.



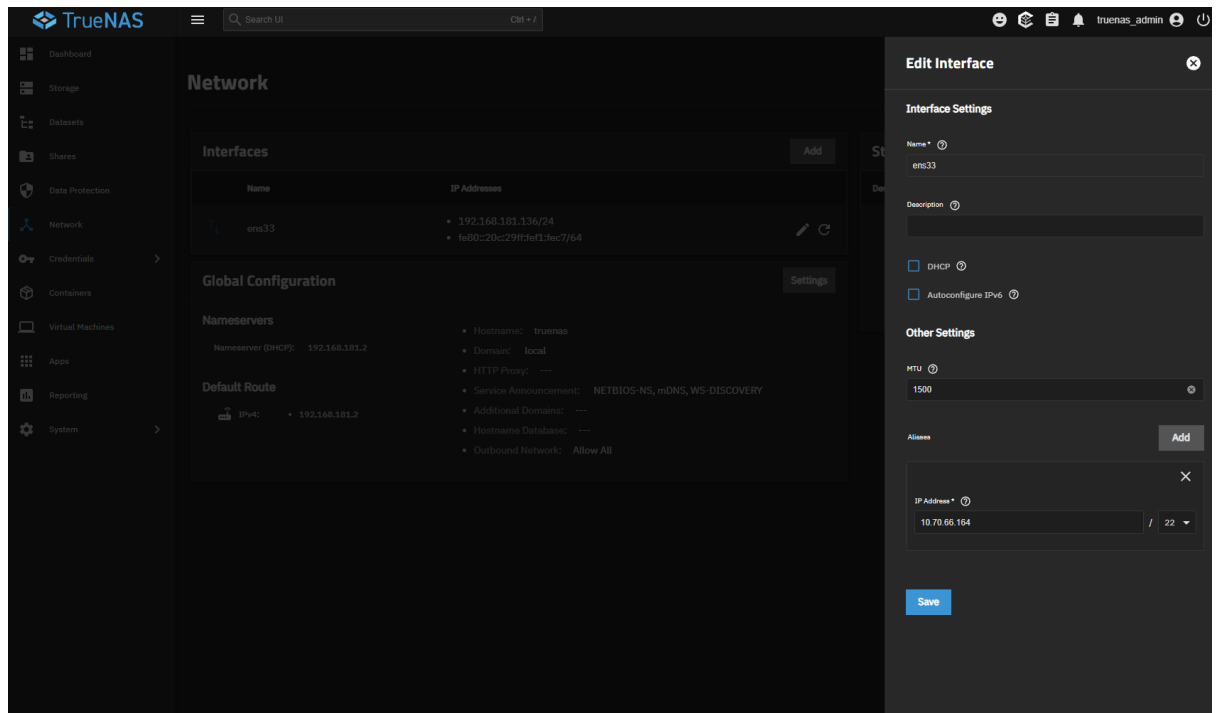
Luodaan admin käyttäjätunnukset.



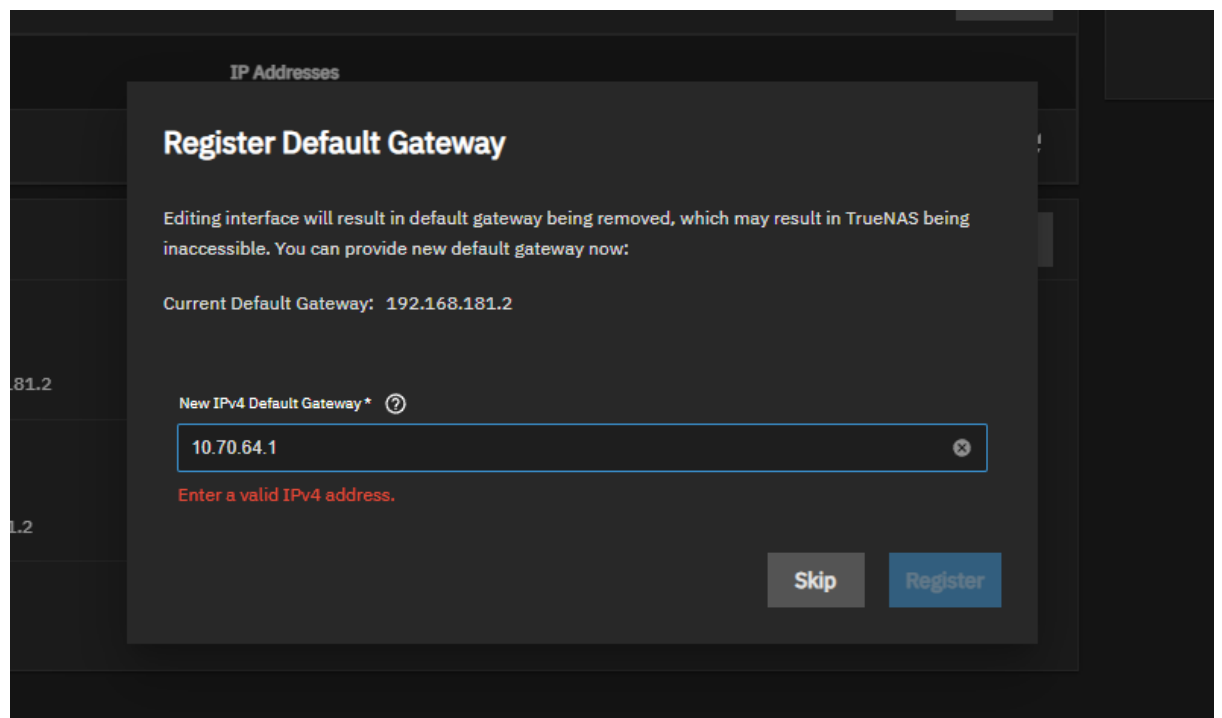
Asennuksen jälkeen kirjaudutaan asettamilla käyttäjätunnuksilla.



Konfiguroidaan Truenas verkko asetuksia. Asetetaan taulukosta Truenas IP-osoite.

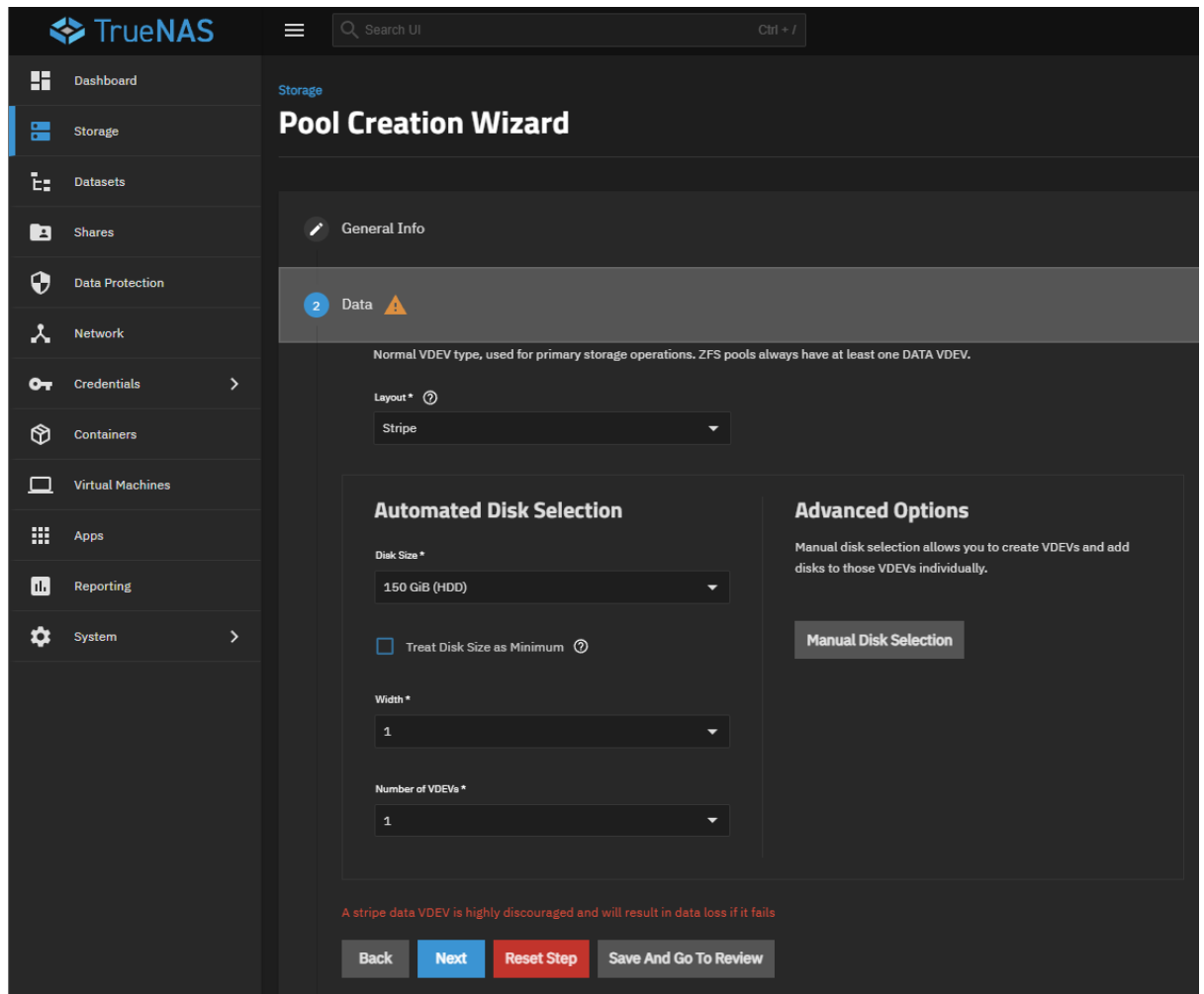


Lisätään Truenas default-gateway



8.1 Storage create pool

Pool avulla luodaan jaettua tallennustilaa.



The image shows the TrueNAS web interface for the Pool Creation Wizard. The left sidebar contains navigation links: Dashboard, Storage (selected), Datasets, Shares, Data Protection, Network, Credentials, Containers, Virtual Machines, Apps, Reporting, and System. The main content area is titled 'Storage' and 'Pool Creation Wizard'. It has two tabs: 'General Info' and 'Data' (active). The 'Data' tab shows a warning icon and text: 'Normal VDEV type, used for primary storage operations. ZFS pools always have at least one DATA VDEV.' Below this is a 'Layout' dropdown menu set to 'Stripe'. There are two main sections: 'Automated Disk Selection' and 'Advanced Options'. The 'Automated Disk Selection' section includes a 'Disk Size' dropdown set to '150 GiB (HDD)', a checkbox for 'Treat Disk Size as Minimum' (unchecked), a 'Width' dropdown set to '1', and a 'Number of VDEVs' dropdown set to '1'. The 'Advanced Options' section has a description: 'Manual disk selection allows you to create VDEVs and add disks to those VDEVs individually.' and a 'Manual Disk Selection' button. At the bottom, there is a red warning message: 'A stripe data VDEV is highly discouraged and will result in data loss if it fails'. Navigation buttons at the bottom are 'Back', 'Next' (highlighted in blue), 'Reset Step' (highlighted in red), and 'Save And Go To Review'.

TrueNAS

Storage

Pool Creation Wizard

General Info

2 Data ⚠

Normal VDEV type, used for primary storage operations. ZFS pools always have at least one DATA VDEV.

Layout * ⓘ

Stripe

Automated Disk Selection

Disk Size *

150 GiB (HDD)

☐ Treat Disk Size as Minimum ⓘ

Width *

1

Number of VDEVs *

1

Advanced Options

Manual disk selection allows you to create VDEVs and add disks to those VDEVs individually.

Manual Disk Selection

A stripe data VDEV is highly discouraged and will result in data loss if it fails

Back Next Reset Step Save And Go To Review

Luodaan 100gb SCSI virtuaalinen kovalevy datan käsittelyyn.

ISCSI Wizard

✕

✎ Target

2

Extent

3

Protocol Options

Name * ?

nas-share✕

Extent Type * ?

Device▼

Device * ?

Create New▼

Pool/Dataset * ?

/mnt/Truestorage

+ Create Dataset

▼ /mnt

▶ Truestorage

Size * ?

100 GiB✕

Sharing Platform * ?

VMware: Extent block size 512b, TPC enabled, no Xen compat mode, SSD speed▼

Back

Next

8.2 Lisätään isci adapteri vcenteriin

10.70.66.161ACTIONS

SummaryMonitorConfigurePermissionsVMsDatastoresNetworksUpdates

Storage

Storage Adapters

Storage Devices

Host Cache Configuration

Protocol Endpoints

I/O Filters

Storage Providers

Networking

Virtual switches

VMkernel adapters

Physical adapters

TCP/IP configuration

Virtual Machines

Storage Adapters

ADD SOFTWARE ADAPTER ▾REFRESHRESCAN STORAGERESCAN ADAPTERREMOVE

Add iSCSI adapter

Add NVMe over RDMA adapter

Add NVMe over TCP adapter

| | Type ▾ | Status ▾ | Identifier ▾ | Targets ▾ | D |
|-------------|--------|----------|--------------|-----------|---|
| iSCSI Contr | SCSI | Unknown | -- | 2 | 2 |

Storage Adapters

ADD SOFTWARE ADAPTER ▾REFRESHRESCAN STORAGERESCAN ADAPTERREMOVE


| | Adapter ▾ | Model ▾ | Type ▾ | Status ▾ | Identifier ▾ | Targets ▾ | Devices ▾ | Paths |
|---|-----------|------------------------|--------|----------|---|-----------|-----------|-------|
| + | vmhba64 | iSCSI Software Adapter | iSCSI | Online | iscsi_vmk(iqn.1998-01.com,vmware:localhost.ictlab.local:268882932:64) | 0 | 0 | 0 |
| ○ | vmhba0 | PVSCSI SCSI Controller | SCSI | Unknown | -- | 2 | 2 | 2 |

Manage ColumnsExport ▾2 items

PropertiesDevicesPathsDynamic DiscoveryStatic DiscoveryNetwork Port BindingAdvanced Options

ADDREMOVEAUTHENTICATIONADVANCED...

☒ iSCSI server



No items found

Laitetaan server target Truenas ip-osoite.

Add Send Target Server | vmhba64

iSCSI Server

10.70.66.164

Port

3260

☒

Inherit authentication settings from parent

CANCEL

OK

Rescan adapter + rescan storage

Storage Adapters

ADD SOFTWARE ADAPTER

REFRESH

RESCAN STORAGE

RESCAN ADAPTER

REMOVE

| | Adapter | Model | Type | Status | Identifier | Targets | Devices | Paths |
|----------------------------------|---------|------------------------|-------|---------|---|---------|---------|-------|
| <input checked="" type="radio"/> | vmhba64 | iSCSI Software Adapter | iSCSI | Online | iscsi_vmk(iqn.1998-01.com.vmware:localhost.ictlab.local:268882932:64) | 1 | 1 | 1 |
| <input type="radio"/> | vmhba0 | PVSCSI SCSI Controller | SCSI | Unknown | -- | 2 | 2 | 2 |

Manage Columns

Export

2 items

Properties

Devices

Paths

Dynamic Discovery

Static Discovery

Network Port Binding

Advanced Options

REFRESH

ATTACH

DETACH

RENAME

TURN ON LED

TURN OFF LED

ERASE PARTITIONS

MARK AS HDD DISK

MARK AS LOCAL

...

| | Name | LUN | Type | Capacity | Datastore | Operational State | Hardware Acceleration | Drive Type | Transport |
|-------------------------------------|---|-----|------|-----------|--------------|-------------------|-----------------------|------------|-----------|
| <input checked="" type="checkbox"/> | TrueNAS iSCSI Disk (naa.6589cfc000000af597d10529d46d13a2) | 0 | disk | 100.00 GB | Not Consumed | Attached | Supported | Flash | iSCSI |

9 YHDISTETÄÄN FREENAS DATASTORE VSPHERE HOSTEIHIN

Yhdistetään truenas 10.70.66.161

New Datastore

1 Type

2 Name and device selection

3 Partition configuration

4 Ready to complete

Type

Specify datastore type.

☒ VMFS

Create a VMFS datastore on a disk/LUN.

☐ NFS

Create an NFS datastore on an NFS share over the network.

☐ vVol

Create a Virtual Volumes datastore on a storage container connected to a storage provider.

New Datastore

1 Type

2 Name and device selection

3 VMFS version

4 Partition configuration

5 Ready to complete

Name and device selection

Specify datastore name and a disk/LUN for provisioning the datastore.

Fields marked with * are required

Name *

Truenas

| | Name | LUN | Capacity | Hardware Acceleration | Drive Type | Sector Format | Clu VM Su |
|----------------------------------|---|-----|------------|-----------------------|------------|---------------|-----------|
| <input checked="" type="radio"/> | TrueNAS iSCSI Disk (naa.6589cfc000000af597d10529d46d13a2) | 0 | 100.00 G B | Supported | Flash | -- | Nc |

Manage Columns
Export
1 item

9.1 Luodaan uusi virtuaalikone ja käytetään jaettua datastorea

Luotiin uusi virtuaalikone ja käytettiin aiemmin luotua Truenas nimistä jaettua datastorea.

New Virtual Machine

- Select a creation type
- Select a name and folder
- Select a compute resource
- Select storage**
- Select compatibility
- Select a guest OS
- Customize hardware
- Ready to complete

Select storage

Select the storage for the configuration and disk files

☐ Encrypt this virtual machine (Requires Key Management Server)

VM Storage Policy Datastore Default ▾

☐ Disable Storage DRS for this virtual machine

| | Name ▾ | Storage Compatibility ▾ | Capacity ▾ | Provisioned ▾ | Free ▾ | Type |
|----------------------------------|------------|-------------------------|------------|---------------|----------|------|
| <input type="radio"/> | datastore1 | -- | 155.5 GB | 86.27 GB | 72.72 GB | V |
| <input type="radio"/> | heartbeat | -- | 4.75 GB | 1.41 GB | 3.34 GB | V |
| <input checked="" type="radio"/> | Truenas | -- | 99.75 GB | 69.87 GB | 34.33 GB | V |

Manage Columns Items per page 10 ▾ 3 items

Compatibility

✓ Compatibility checks succeeded.

CANCEL
BACK
NEXT

9.2 Kopioidaan asennettu virtuaalikone toiseen datastoreen

Testataan, pystyykö virtuaalikoneita siirtämään toiseen datastoreen migrate ominaisuutta hyödyntäen.

Migrate | windows

- Select a migration type**
- Select storage
- Ready to complete

Select a migration type

Change the virtual machines' compute resource, storage, or both.

VM ORIGIN ⓘ

- ☐ **Change compute resource only**
Migrate the virtual machines to another host or cluster.
- ☒ **Change storage only**
Migrate the virtual machines' storage to a compatible datastore or datastore cluster.
- ☐ **Change both compute resource and storage**
Migrate the virtual machines to a specific host or cluster and their storage to a specific datastore or datastore cluster.
- ☐ **Change management layer** New
Migrate the virtual machines to the vSphere Supervisor.
- ☐ **Cross vCenter Server export**
Migrate the virtual machines to a vCenter Server not linked to the current SSO domain.

Migrate | alpine

1 Select a migration type

2 Select storage

3 Ready to complete

Select storage

✕

Select the destination storage for the virtual machine migration.

VM ORIGIN ⓘ

BATCH CONFIGURE

CONFIGURE PER DISK

Select virtual disk format

Same format as source



VM Storage Policy

Keep existing VM storage policies

☐ Disable Storage DRS for this virtual machine

| | Name | Storage Compatibility | Capacity | Provisioned | Free | Type |
|----------------------------------|------------|-----------------------|----------|-------------|----------|------|
| <input checked="" type="radio"/> | datastore1 | -- | 155.5 GB | 141.78 GB | 25.03 GB | V |
| <input type="radio"/> | Truenas | -- | 99.75 GB | 17.41 GB | 82.34 GB | V |

Manage Columns

Items per page 10 2 items

Compatibility

✓ Compatibility checks succeeded.

CANCEL

BACK

NEXT

9.3 Luodaan klusteri ja liitetään vSphere hostit klusteriin

Klusteri luodaan, jotta resurssien hallinta olisi mahdollisimman optimoitua.

New Cluster

Basics



1 Basics

2 Image

3 Review

Name Klusteri

Location Datacenter

 vSphere DRS ☒ vSphere HA ☒vSAN ☒ ☐ Enable vSAN ESA

Choose how to set up the cluster's image

- ☒ Select an image from the Image Library
- ☐ Extract an image from a host in this vCenter instance
- ☐ Extract an image from a new host
- ☐ Create a new image
- ☐ Manage configuration at a cluster level

CANCEL

NEXT

Vedä aiemmin luodut hostit klusteriin.



Lisätään v motion ja fault tolerance.

vmk0 - Edit Settings | 10.70.66.161

Port properties

IPv4 settings

IPv6 settings

TCP/IP stack

Default

MTU (Bytes) *

1500

Available services

Configuring vSAN/vSAN Witness and vSAN Storage Cluster Client Network interfaces together is not supported.

Enabled services

☒ vMotion

☐ vSphere Replication NFC

☐ NVMe over TCP

☐ Provisioning

☐ vSAN

☐ NVMe over RDMA

☒ Fault Tolerance logging

☐ vSAN Witness

☒ Management

☐ vSAN Storage Cluster Client

☐ vSphere Replication

☐ vSphere Backup NFC

10.70.66.162 | ACTIONS

Summary

Monitor

Configure

Permissions

VMs

Datastores

Networks

Updates

Storage

Storage Adapters

Storage Devices

Host Cache Configuration

Protocol Endpoints

I/O Filters

Storage Providers

Networking

Virtual switches

VMkernel adapters

Physical adapters

TCP/IP configuration

Virtual Machines

Virtual switches

Standard Switch: vSwitch0

ADD NETWORKING...

EDIT

MANAGE PHYSICAL ADAPTERS

...

Management Network

VLAN ID: --

VMkernel Ports (1)

vmk0 : 10.70.66.162

View Settings

Edit Settings

View Settings

Remove

Physical Adapters

vmnic0 10000 Full

...

10 CHANGE YOUR NETWORK ISOLATION ADDRESS TO YOUR VCENTER ADDRESS

| | Option | Value |
|---|-----------------------|------------|
| ⋮ | das.isolationaddress0 | 10.70.64.1 |

1 item

11 HEARTBEAT KONFFAUS

Luodaan toinen ISCSI vara tallennustilaksi.

iSCSI Wizard

Target

2 Extent

3 Protocol Options

Name * ?

heartbeat

Extent Type * ?

Device

Device * ?

Create New

Pool/Dataset * ?

/mnt/Truestorage

+ Create Dataset

/mnt

Truestorage

Size * ?

5 GiB

Sharing Platform * ?

VMware: Extent block size 512b, TPC enabled, no Xen compat mode, SSD speed

Back

Next

Luodaan heartbeat datastore

New Datastore

1 Type

2 Name and device selection

3 VMFS version

4 Partition configuration

5 Ready to complete

Name and device selection

Specify datastore name and a disk/LUN for provisioning the datastore.
Fields marked with * are required

Name *

heartbeat

| | Name | LUN | Capacity | Hardware Acceleration | Drive Type | Sector Format | Clu VM Sup |
|-------------------------------------|--|-----|----------|-----------------------|------------|---------------|------------|
| <input checked="" type="checkbox"/> | TrueNAS iSCSI Disk (naa.6589cfc0000004c320e cbefc2294bafd) | 0 | 5.00 GB | Supported | Flash | -- | No |

Manage Columns

Export

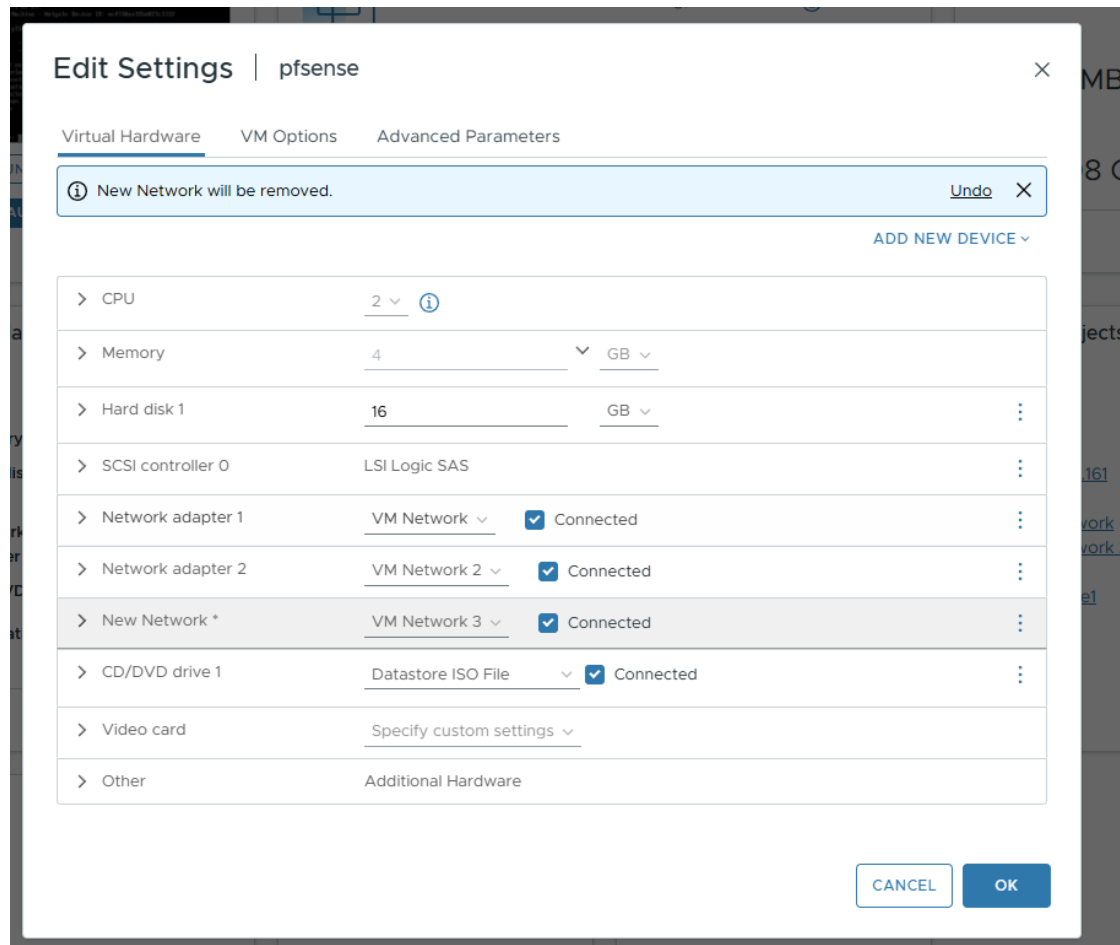
1 item

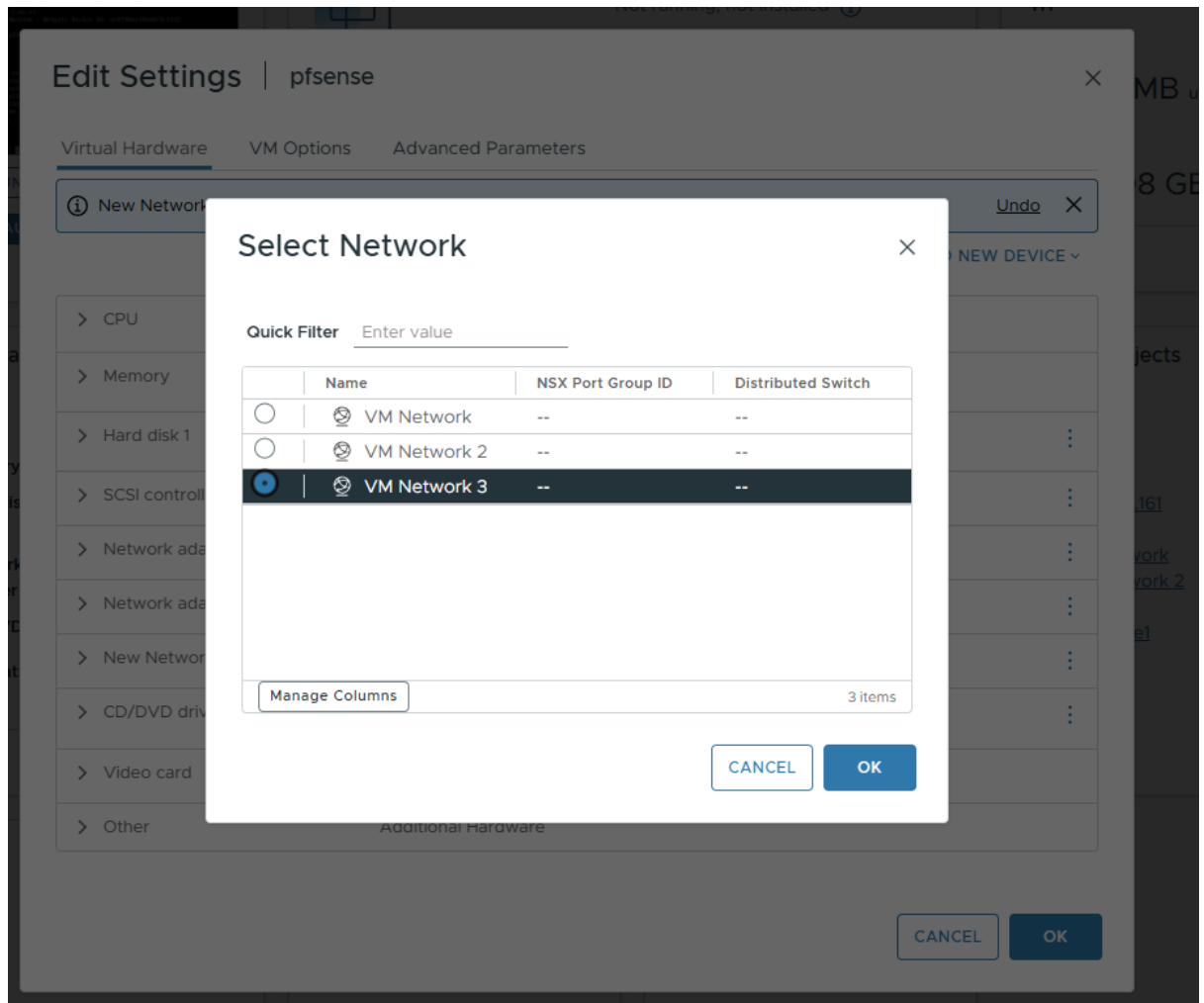
CANCEL

BACK

NEXT

11.1 Lisätään kolmas interface pfSenseen.





Lisätään network address: 192.168.2.0/24

vmk2 - Edit Settings | 10.70.66.161

Port properties

IPv4 settings

IPv6 settings

Fields marked with * are required

- ☐ No IPv4 settings
☐ Obtain IPv4 settings automatically
☒ Use static IPv4 settings

IPv4 address * 192.168.2.0

Subnet mask * 255.255.255.0

Default gateway ☐ Override default gateway for this adapter

10.70.64.1

DNS server addresses 10.70.10.21

CANCEL

OK

12 VMWARE VSPHERE PROACTIVE HA

Testataan klusterin HA and FT ominaisuuksia sulkemalla yksi vSphere ESX-serveri.

Edit Proactive HA | Klusteri

Proactive HA ☒

Failures & Responses

Providers

You can configure how Proactive HA responds when a provider has notified its health degradation to vCenter, indicating a partial failure of that host. In the event of a partial failure, vCenter Server can proactively migrate the host's running VMs to a healthier host.

Automation Level

Automated

Virtual machines will be migrated to healthy hosts and degraded hosts will be entered into quarantine or maintenance mode depending on the configured Proactive HA automation level.

Remediation

Quarantine mode

Balances performance and availability, by avoiding the usage of partially degraded hosts as long as VM performance is unaffected.

CANCEL

OK

Klusteri Vsphere DRS automatisoidaan resurssien jako klusterissa. Muutetaan asetuksia.

Edit Cluster Settings | Klusteri



vSphere HA ☒

- Failures and responses
- Admission Control
- Heartbeat Datastores
- Advanced Options

You can configure how vSphere HA responds to the failure conditions on this cluster. The following failure conditions are supported: host, host isolation, VM component protection (datastore with PDL and APD), VM and application.

Enable Host Monitoring ⓘ ☒

| | |
|-------------------------------|---|
| > Host Failure Response | Restart VMs ▾ |
| > Response for Host Isolation | Disabled ▾ |
| > Datastore with PDL | Power off and restart VMs ▾ |
| > Datastore with APD | Power off and restart VMs - Conservative restart policy ▾ |
| > VM Monitoring | VM Monitoring Only ▾ |

CANCEL

OK

Edit Cluster Settings | Klusteri

vSphere HA

Failures and responses

Admission Control

Heartbeat Datastores

Advanced Options

vSphere HA uses datastores to monitor hosts and virtual machines when the HA network has failed. vCenter Server selects 2 datastores for each host using the policy and datastore preferences specified below.

Heartbeat datastore selection policy:

☒

 Automatically select datastores accessible from the hosts

☐

 Use datastores only from the specified list

☐

 Use datastores from the specified list and complement automatically if needed

CANCEL

OK

Lisätään kerner kytkimeen 1.

VMkernel adapteri luodaan, jotta ESXi voi viestiä verkon kautta eri palveluiden ja muiden isäntien kanssa.

Esimerkki konfiguraatio.

Add Networking

1 Select connection type

2 Select target device

3 Port properties

4 IPv4 settings

5 Ready to complete

Select connection type

Select a connection type to create.

☒ VMkernel Network Adapter

The VMkernel TCP/IP stack handles traffic for ESXi services such as vSphere vMotion, iSCSI, NFS, FCoE, Fault Tolerance, vSAN, host management and etc.

☐ Virtual Machine Port Group for a Standard Switch

A port group handles the virtual machine traffic on standard switch.

☐ Physical Network Adapter

A physical network adapter handles the network traffic to other hosts on the network.

CANCEL

NEXT

Valitaan switch 1.

Add Networking

1 Select connection type

2 Select target device

3 Port properties

4 IPv4 settings

5 Ready to complete

Select target device

Select a target device for the new connection.

☐ Select an existing network

☒ Select an existing standard switch

☐ New standard switch

Quick Filter

Enter value

| | Switch |
|----------------------------------|----------|
| <input type="radio"/> | vSwitch0 |
| <input checked="" type="radio"/> | vSwitch1 |

Manage Columns2 Items

CANCEL

BACK

NEXT

Add Networking

- Select connection type
- Select target device
- Port properties**
- IPv4 settings
- Ready to complete

Port properties

Specify VMkernel port settings.
*Fields marked with * are required*

| | | | |
|-----------------|-----------------------|------|--|
| Network label * | VMkernel | | |
| VLAN ID | None (0) ▾ | | |
| IP settings | IPv4 ▾ | | |
| MTU | Get MTU from switch ▾ | 1500 | |
| TCP/IP stack | Default ▾ | | |

Available services

❗ Configuring vSAN/vSAN Witness and vSAN Storage Cluster Client Network interfaces together is not supported.

| | | | |
|------------------|--|--|---|
| Enabled services | <input checked="" type="checkbox"/> vMotion | <input type="checkbox"/> vSphere Replication NFC | <input type="checkbox"/> NVMe over TCP |
| | <input checked="" type="checkbox"/> Provisioning | <input type="checkbox"/> vSAN | <input type="checkbox"/> NVMe over RDMA |
| | <input type="checkbox"/> Fault Tolerance logging | <input type="checkbox"/> vSAN Witness | |
| | <input checked="" type="checkbox"/> Management | <input type="checkbox"/> vSAN Storage Cluster Client | |
| | <input type="checkbox"/> vSphere Replication | <input type="checkbox"/> vSphere Backup NFC | |

CANCEL BACK NEXT

Kytöminen 2 konfigurointi. vmnic3 varten.

Add Networking

1 Select connection type

2 Select target device

3 Connection settings

4 Ready to complete

Select connection type



Select a connection type to create.

☐ **VMkernel Network Adapter**

The VMkernel TCP/IP stack handles traffic for ESXi services such as vSphere vMotion, iSCSI, NFS, FCoE, Fault Tolerance, vSAN, host management and etc.

☒ **Virtual Machine Port Group for a Standard Switch**

A port group handles the virtual machine traffic on standard switch.

☐ **Physical Network Adapter**

A physical network adapter handles the network traffic to other hosts on the network.

CANCEL

NEXT

Add Networking

1 Select connection type

2 Select target device

3 Create a Standard Switch

4 Connection settings

5 Ready to complete

Create a Standard Switch

Assign free physical network adapters to the new switch.
Select unclaimed (free) adapters on the host and move them to the Active/Standby/Unused adapters of the switch.

MOVE UP

MOVE DOWN

Unclaimed adapters

Active adapters

(New) vmnic2

Standby adapters

Unused adapters

All

Properties

CDP

LLDP

Properties

Adapter

Name

Location

Driver

Status

Status

Actual speed, Duplex

Configured speed, Duplex

Networks

Network I/O Control

Status

SR-IOV

Status

Cisco Discovery Protocol

Link Layer Discovery Protocol

VMware Inc. vmxnet3 Virtual Ethernet Controller

vmnic2

PCI 0000:1b:00.0

nvmxnet3

Connected

10 Gbit/s, Full Duplex

10 Gbit/s, Full Duplex

No networks

Allowed

Not supported

Cisco Discovery Protocol is not available on this physical network adapter

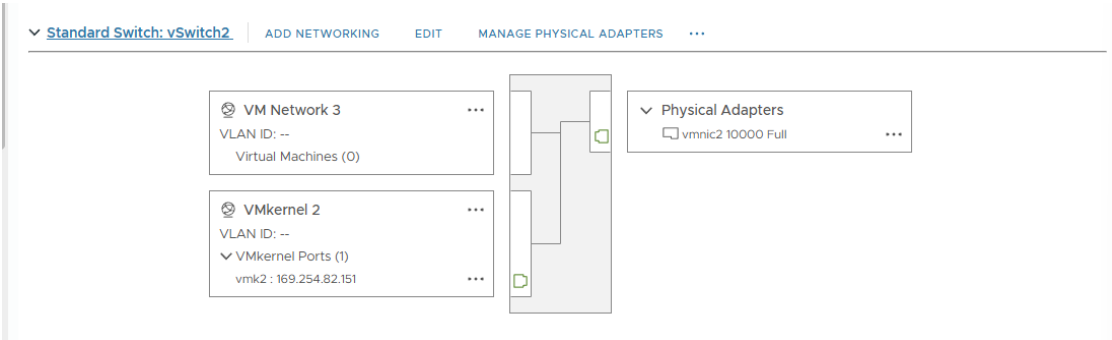
Link Layer Discovery Protocol is not available on this physical network adapter

CANCEL

BACK

NEXT

vSwitch2 topologiassa.



13 DAS. ISOLATIONADDRESS0. V-CENTER IP-OSOITE 10.70.66.160

Edit Cluster Settings
Klusteri

vSphere HA
☒

Failures and responses

Admission Control

Heartbeat Datastores

Advanced Options

Option

Value

ADD

| | Option | Value |
|---|-----------------------|--------------|
| ⋮ | das.isolationaddress0 | 10.70.66.160 |

1 item

CANCEL

OK

14 PÄIVITETÄÄN VSPHERE-SERVERIT LIFECYCLE MANAGER HYÖDYNTÄEN

Aluksi tarkistetaan isäntäkoneiden sopivuus. Käytetään Remiate-toimintoa. Kun aiemmin luotu vSphere DRS on käytössä Lifecycle Manager siirtää virtuaalikoneet automaattisesti päivittävältä isäntäkoneelta toiselle. Isäntäkone menee maintenance tilaan päivityksen ajaksi.

The screenshot shows the vCenter Server Appliance Management interface. The top navigation bar includes 'Summary', 'Monitor', 'Configure', 'Permissions', 'Hosts', 'VMs', 'Datastores', 'Networks', and 'Updates'. The 'Hosts' section is expanded, showing 'Image', 'Hardware Compatibility', 'VMware Tools', and 'VM Hardware'. The 'Image' section is selected, displaying the 'Image Name' as 'autogen-software-spec-1'. Below this, a table lists the 'Default Image' details: 'ESXi Version' (9.0.0.0.24755229), 'Vendor Addon' (None), 'Firmware and Drivers Addon' (None), and 'Components' (No additional components). A 'CHECK COMPLIANCE' button is visible. The 'Image Compliance' section shows a status of 'All hosts in this cluster are compliant'.

| Image | |
|----------------------------|--------------------------|
| Image Name | autogen-software-spec-1 |
| Default Image | |
| ESXi Version | 9.0.0.0.24755229 |
| Vendor Addon | None |
| Firmware and Drivers Addon | None |
| Components | No additional components |

Image Compliance
Last checked on 12/17/2025, 5:59:33 PM (0 days ago)
All hosts in this cluster are compliant

14.1 Päivitetään vCenter-server vCenter Server Appliance Management

Päivittäminen tapahtuu taulukosta vcenter <https://10.70.66.160:5480> IP-osoit-
teesta. Päivitetään check updates kohdasta ja valitaan tarkista url+CD-Rom
kohta, joka hakee päivitykset.