MikroTik CHR on Proxmox

Complex labbing without need for EVE-NG or GNS3

AGENDA

01

Introduction

Meet Marc Perea

02

Problem

Why do it this way?

03

Solution

Proxmox + VLANs

04

Example Walk-through

How-to and Screenshots

MARC PEREA – ADMIRAL

MIKROTIK

2006

Discovered MikroTik vs Cisco & Brocade

Aerēz
a Minim division

2015

MikroTik Certified Trainer & Managed WiFi

ADMIRAL

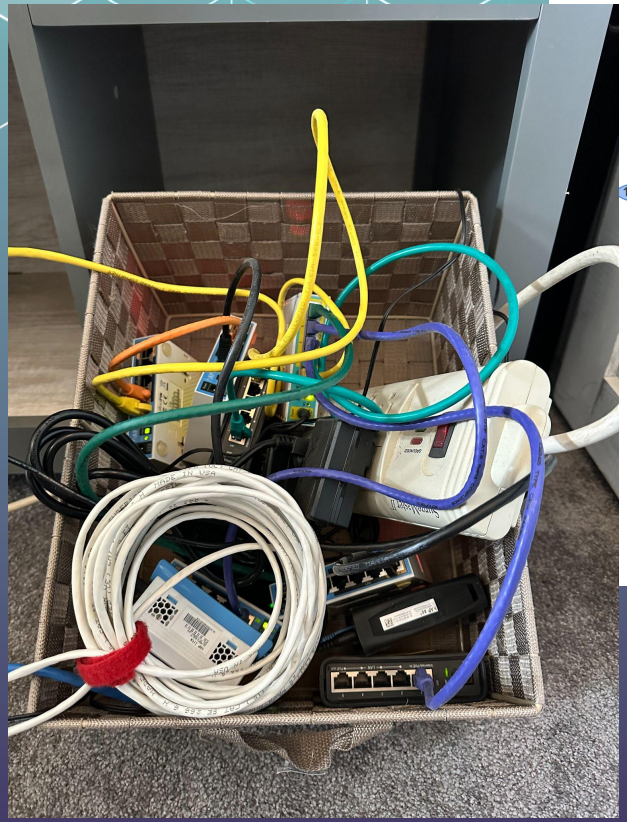
2024

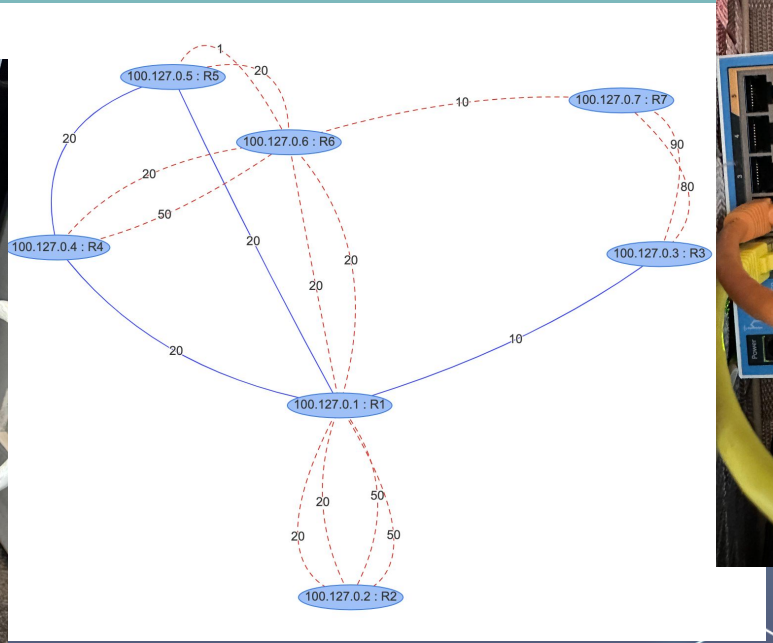
Centralized Management & Automation

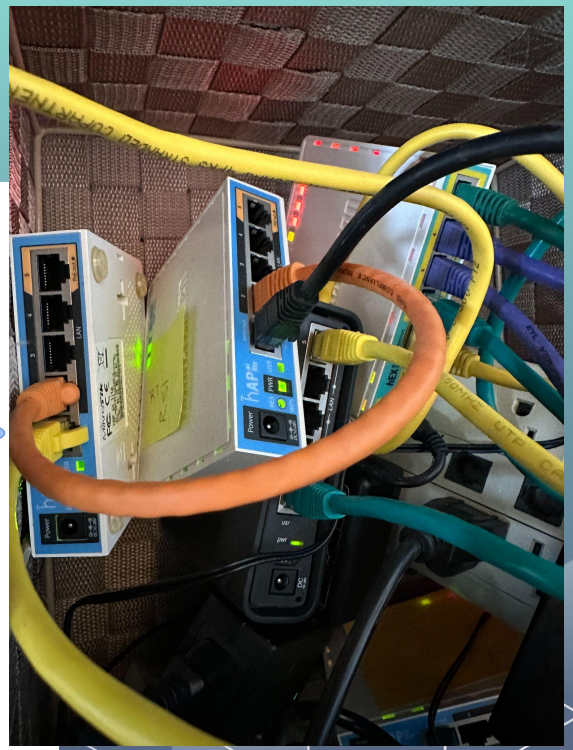
02

THE PROBLEM

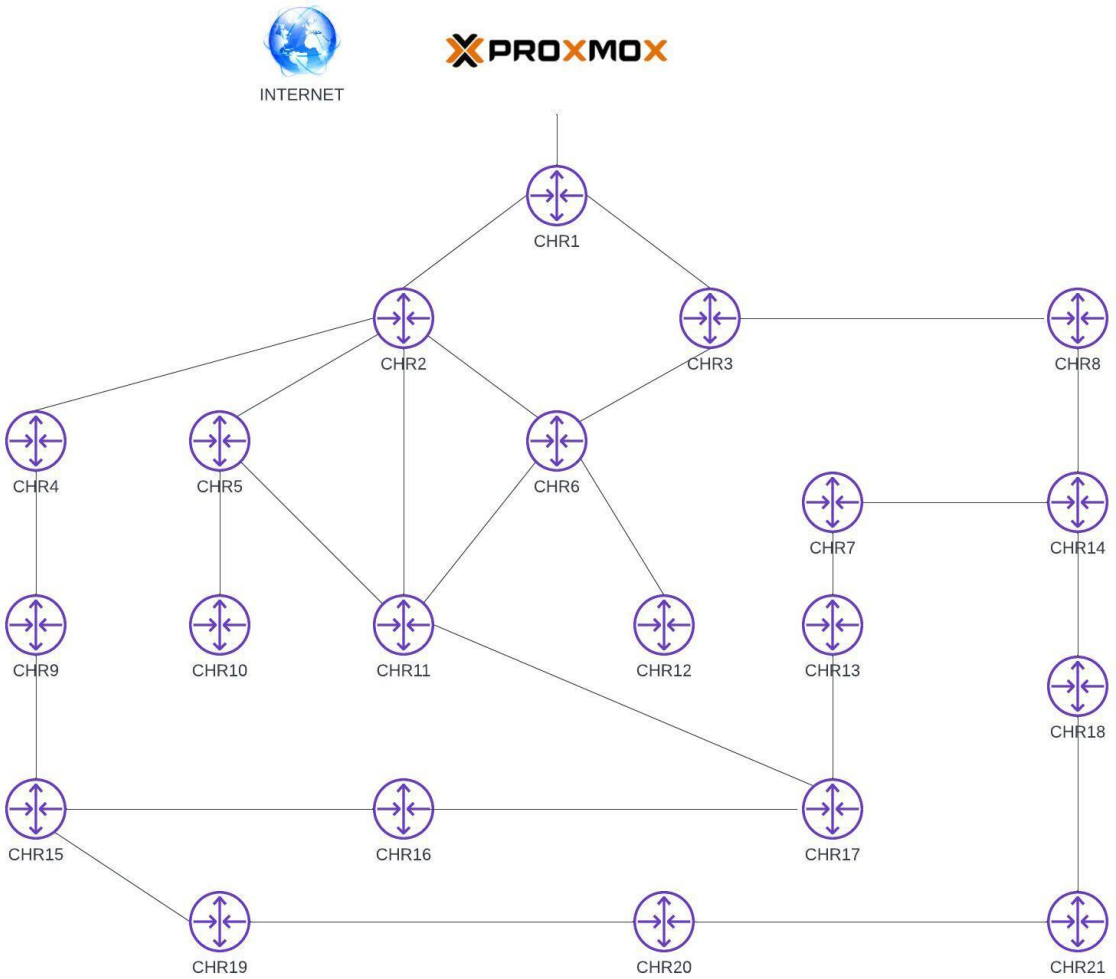
Building a complex lab with hardware is messy!







7 nodes - already ugly!


INTERNET
PROXMOX
CHR1
CHR2
CHR3
CHR8
CHR4
CHR5
CHR6
CHR7
CHR14
CHR9
CHR10
CHR11
CHR12
CHR13
CHR18
CHR15
CHR16
CHR17
CHR19
CHR20
CHR21

03

THE SOLUTION

PROXMOX + CHR

Requirements

A

LOW COST!

I'd like to spend little $

B

EASY TO USE

I want it to be easy to use and maintain

C

SIMPLE

I want to invest minimal time and effort

D

CLEAN

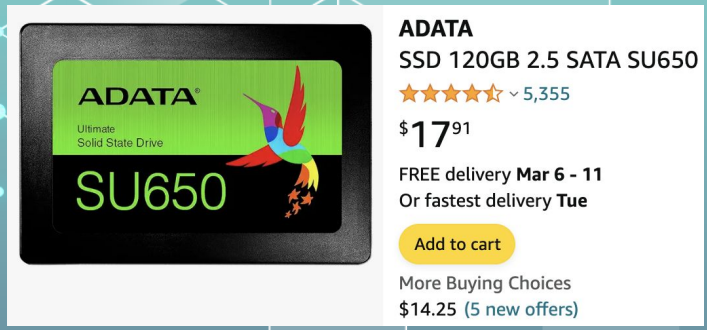
Wife aggro!

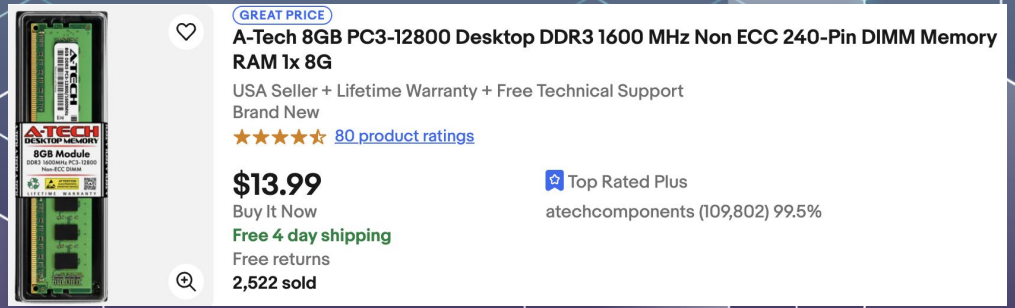
A

LOW COST

About $100 - less than cost of 3 HAP AC Lites

$40 USD Used PC





B

EASY OPERATION

Just use VLANs and bridges!

Cloning and updating Hardware is EASY!

“Everything should be made as simple as possible, but not simpler.”

—Albert Einstein

C

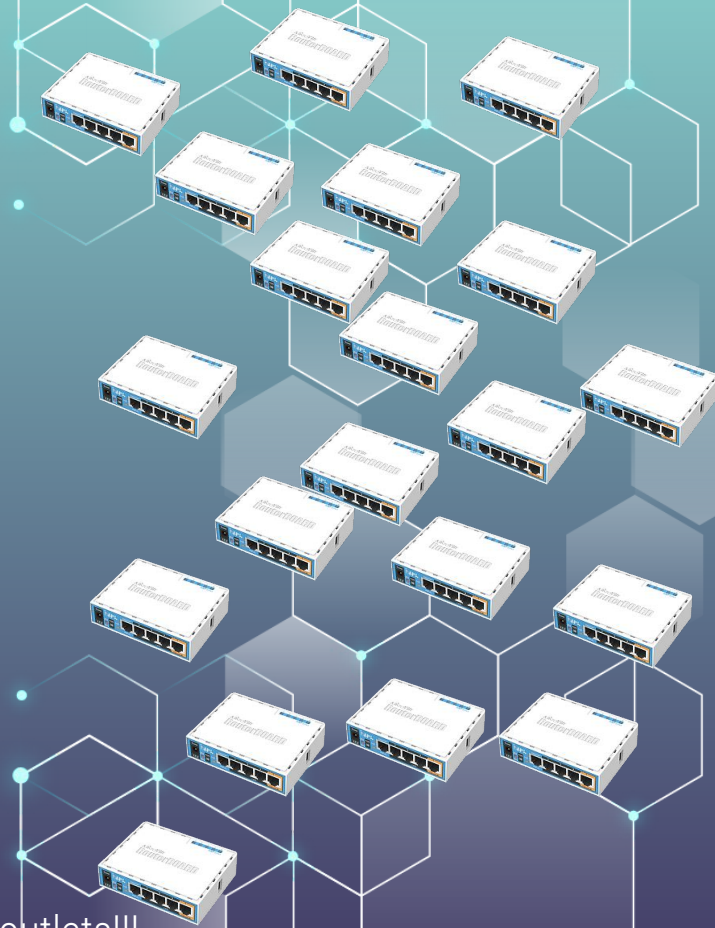
SIMPLICITY

Proxmox VS GNS3 / EVE-NG

D

CLEAN

- 1 ethernet port
- 1 power cable
- 1 spot on a shelf
- 1 AC power outlet
  - vs
- 21 routers
- 24 patch cables
- 21 power cables and outlets!!!



04

HOW-TO GUIDE

Just use VLANs and bridges!

NOT SPEAKING ABOUT

1

NETWORK ENGINEERING

2

PROXMOX INSTALLATION OR TUNING

3

OSPF CONFIGURATION OR TUNING

First – CHR on PROXMOX

Search for how to setup proxmox and follow a guide

then

Visit https://admiralplatform.com/how-to-setup-a-mikrotik-chr-on-proxmox/

or on YouTube

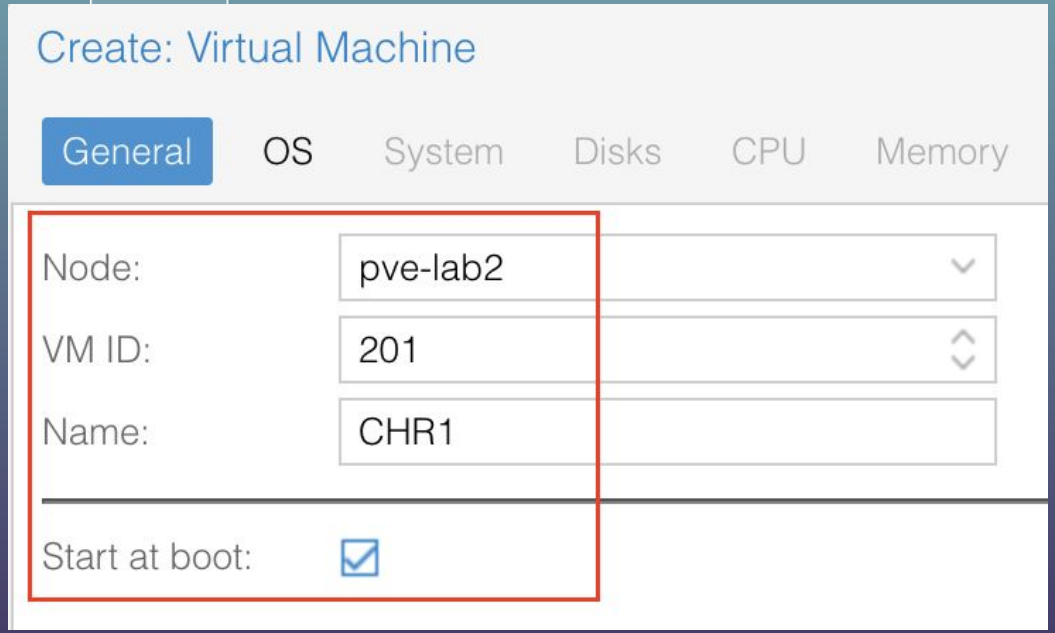
https://www.youtube.com/watch?v=F2cPJsphkbY

Prepare PROXMOX

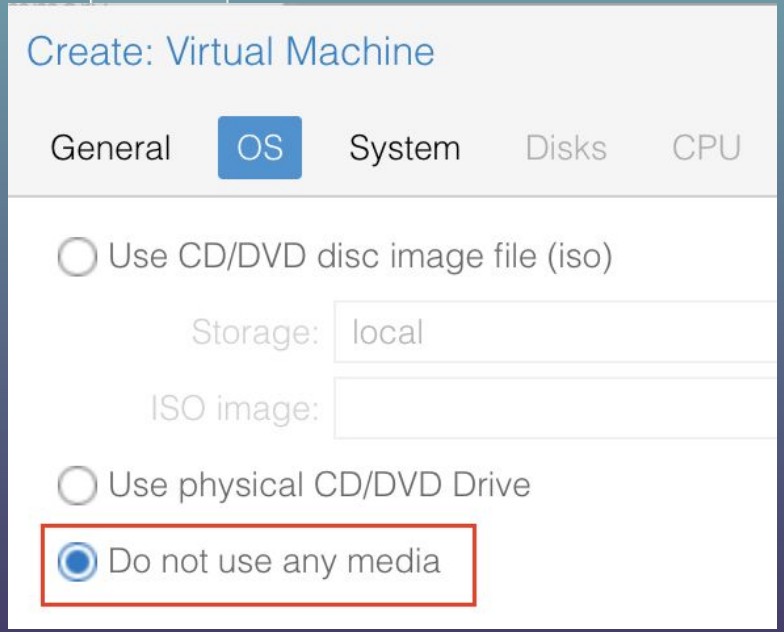
Click on Open SHELL on the main menu

- wget https://download.mikrotik.com/routeros/6.48.6/chr-6.48.6.img.zip
- apt-get update
- apt-get upgrade
- apt-get install unzip
- unzip chr-6.48.6.img.zip
- qemu-img convert -f raw -O qcow2 /root/chr-6.48.6.img /chr-6.48.6.qcow2

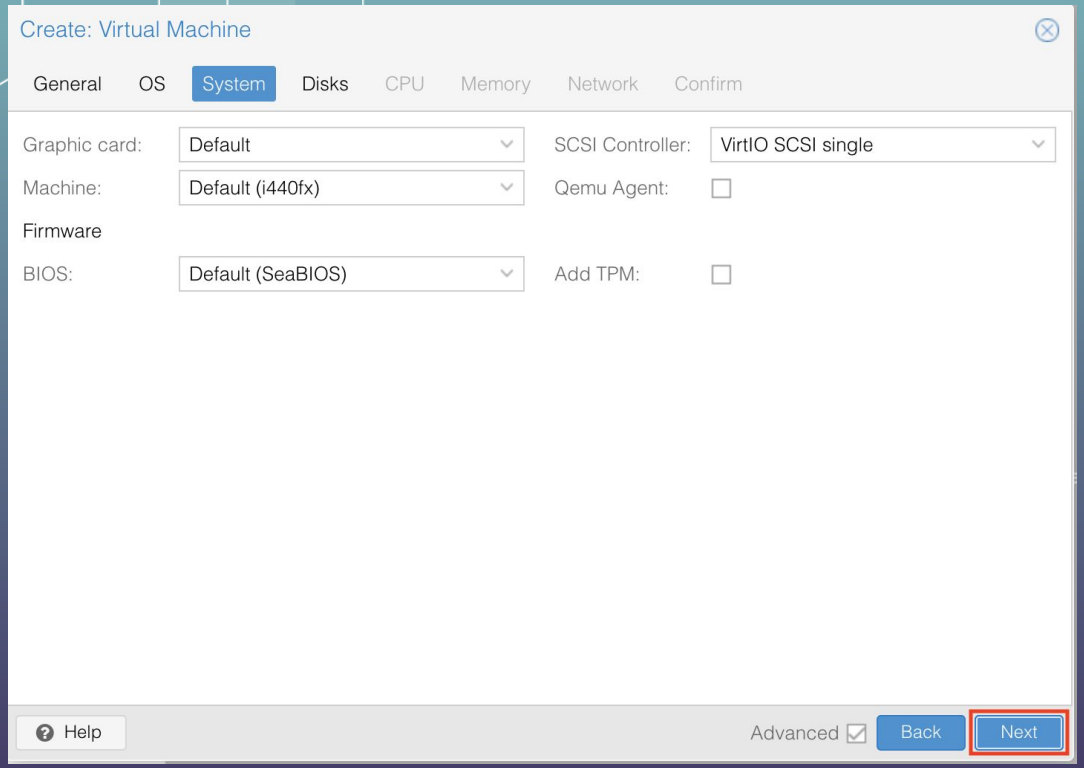
CREATE NEW VM – NAME AND ID



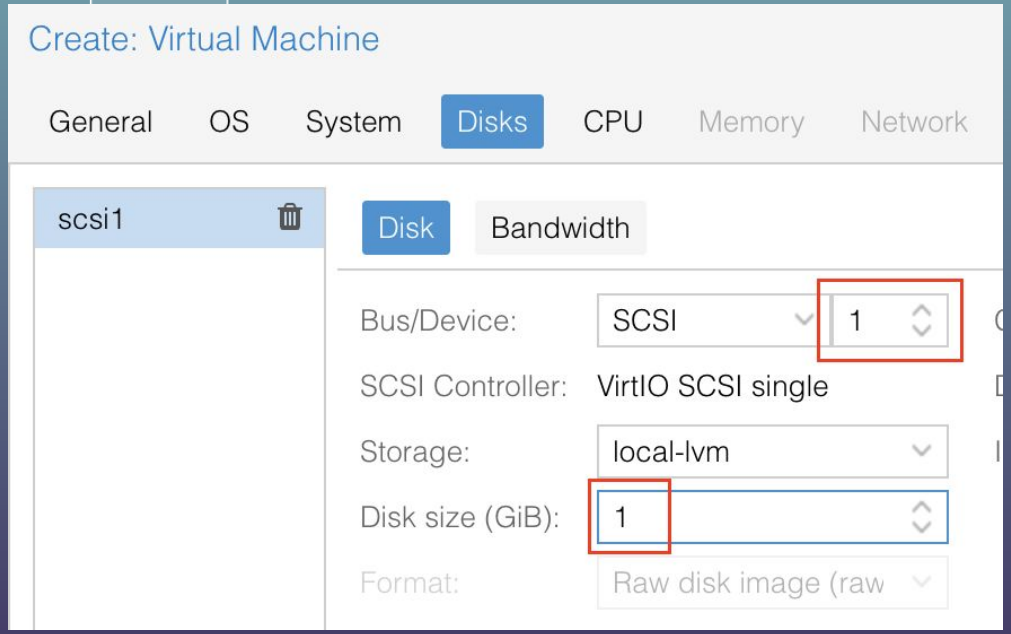
CREATE NEW VM – NO MEDIA



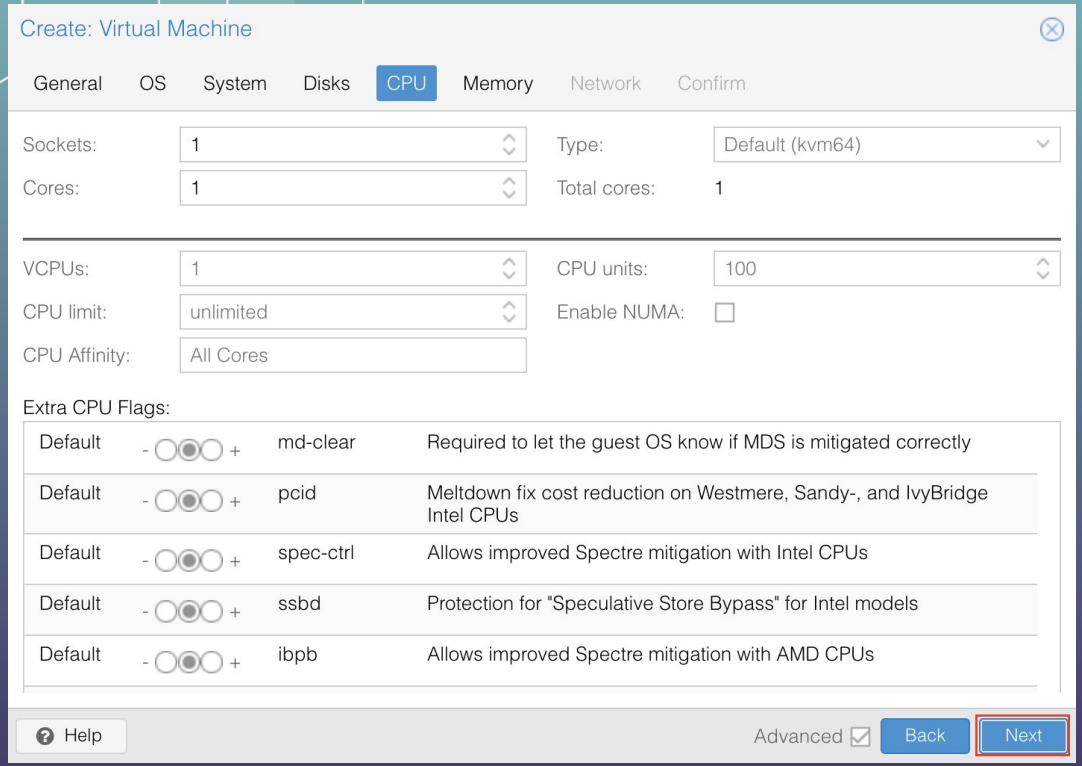
CREATE NEW VM – NEXT



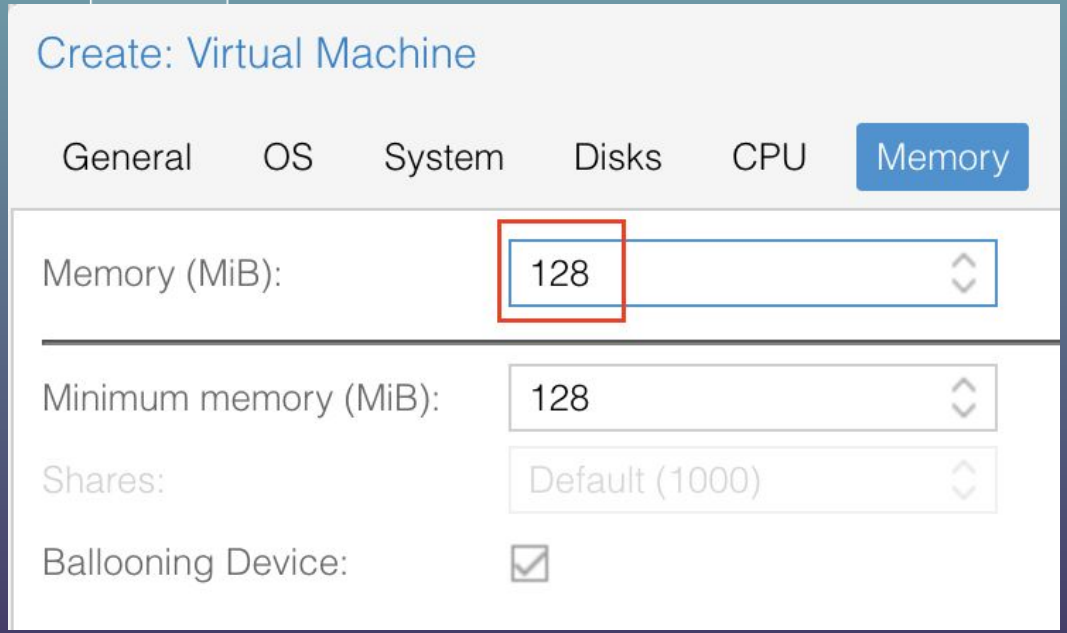
CREATE NEW VM – DISK I



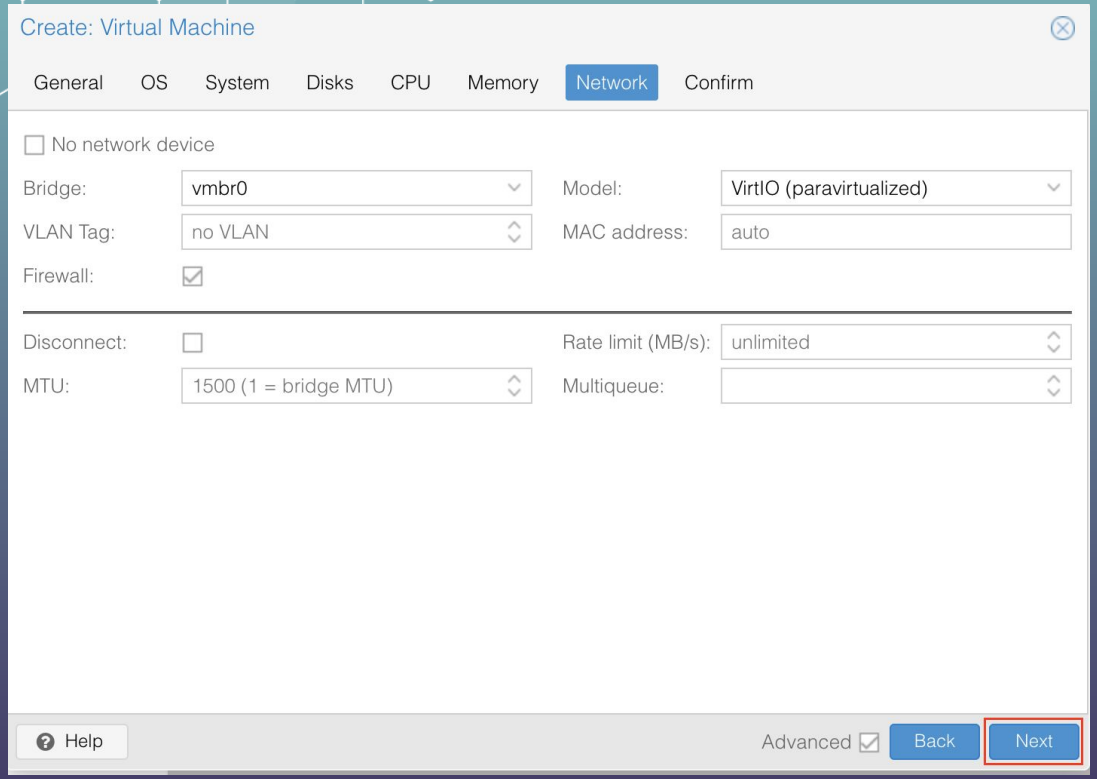
CREATE NEW VM – CPU



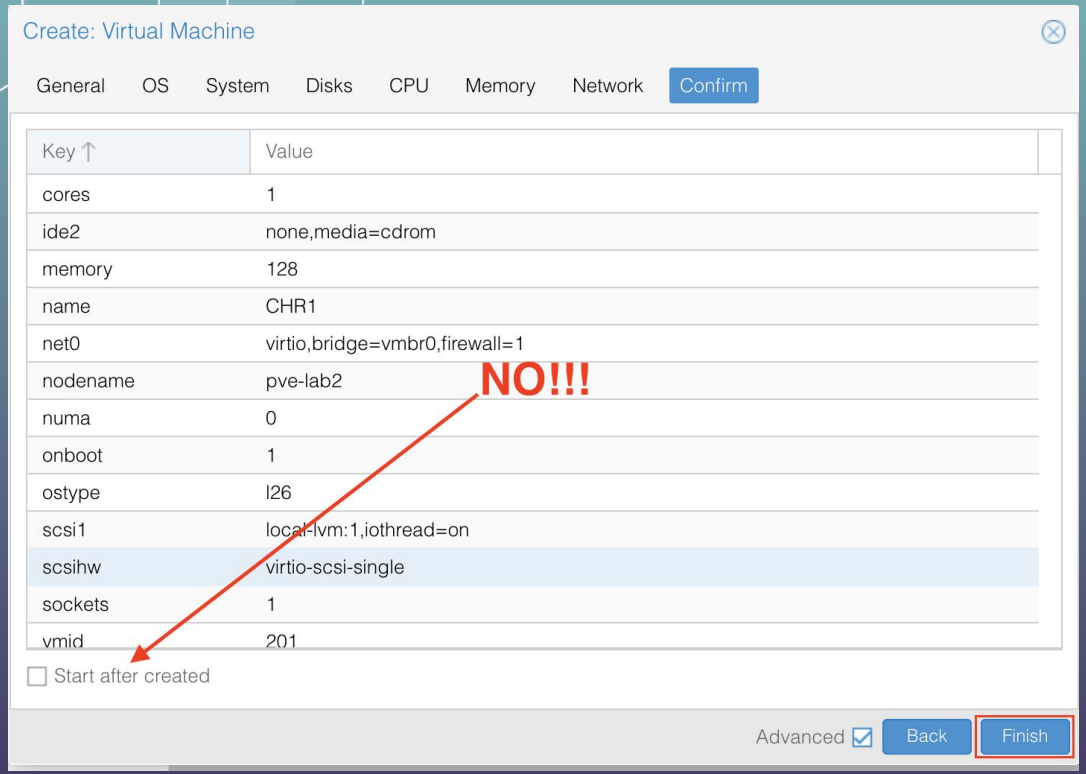
CREATE NEW VM – RAM



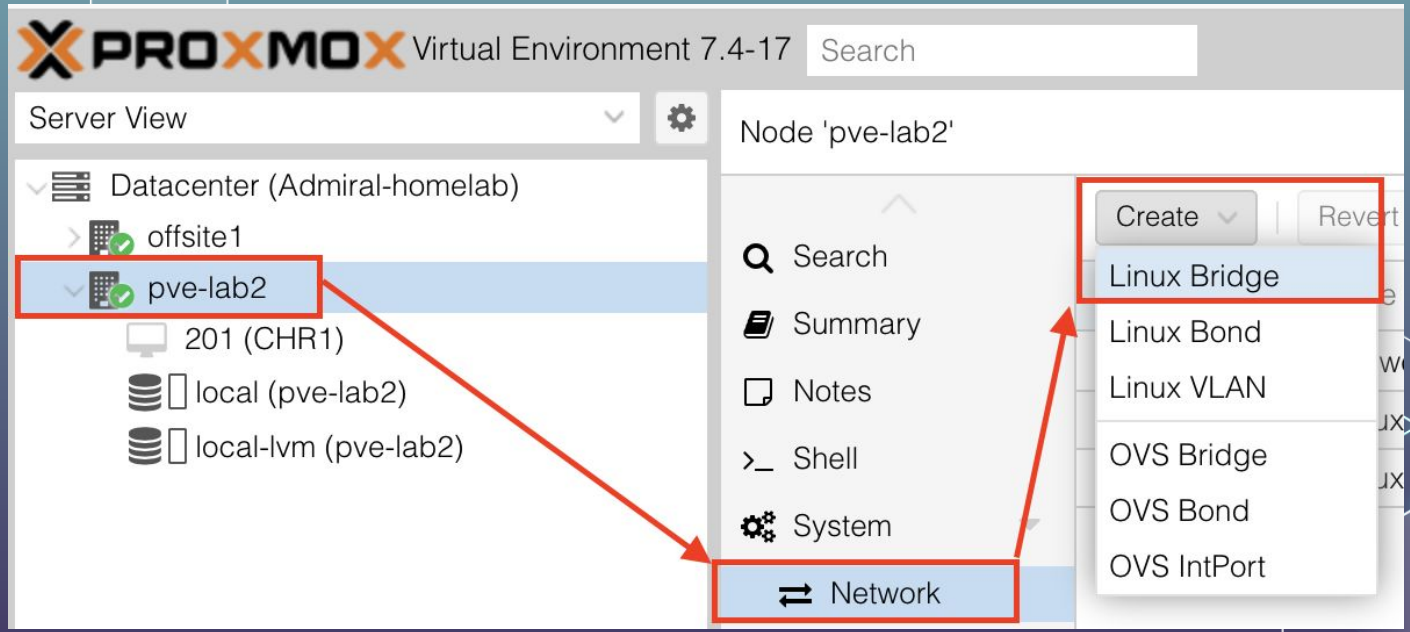
CREATE NEW VM – NET – more later...



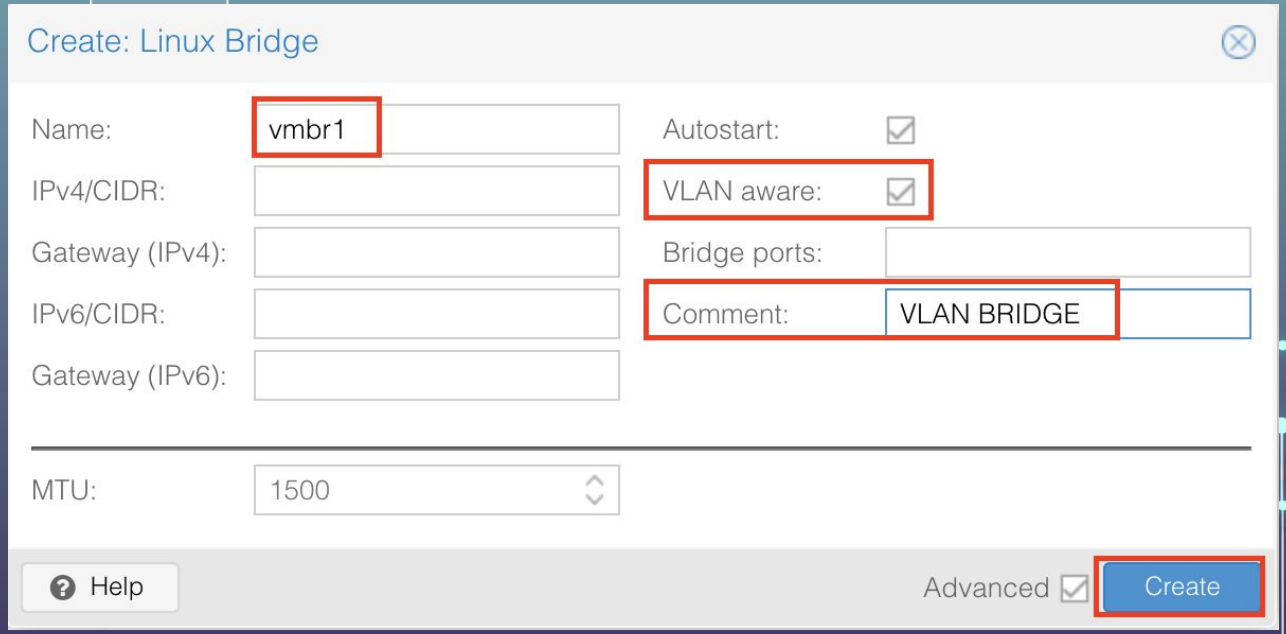
FINISH – FOR NOW...



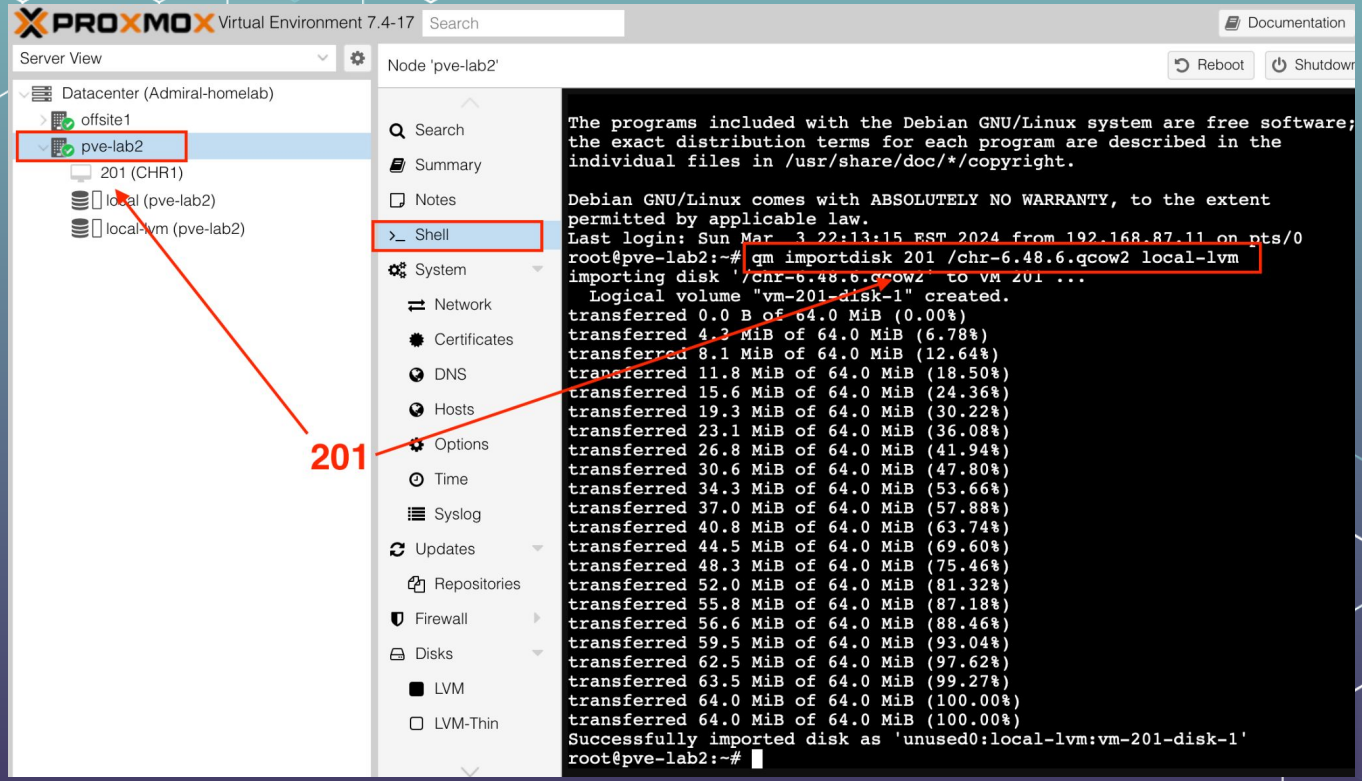
CREATE NEW BRIDGE



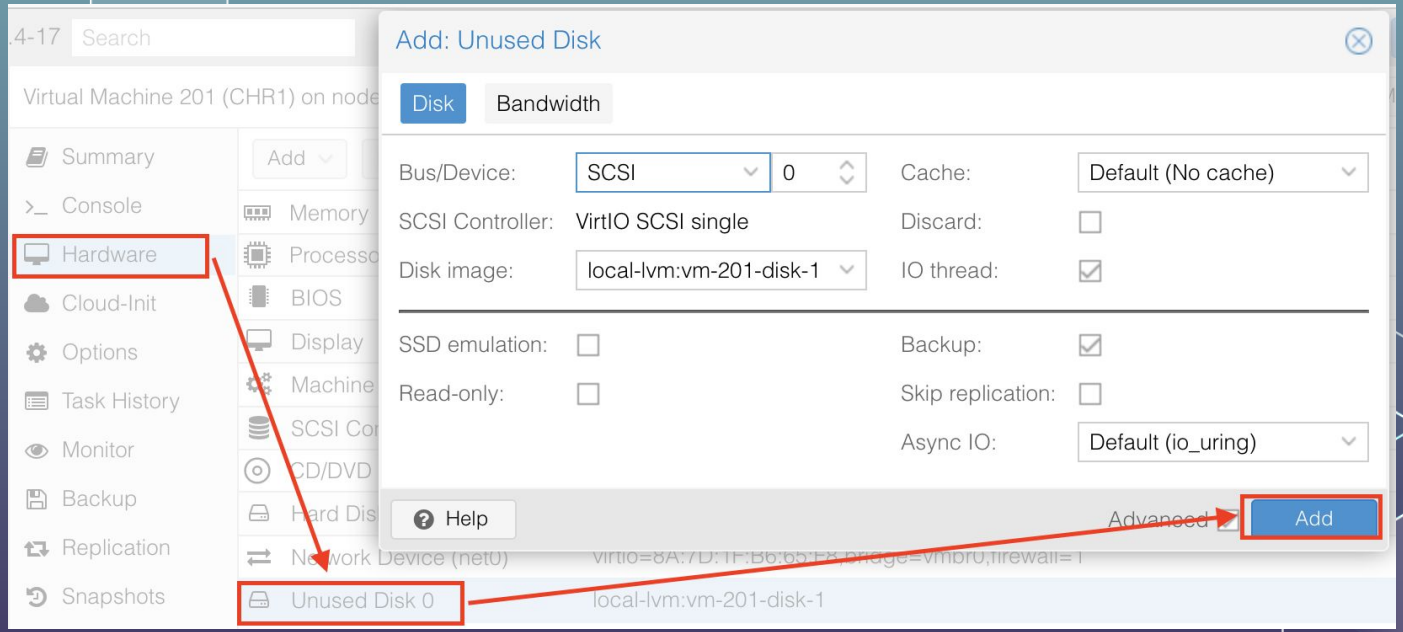
CREATE NEW BRIDGE



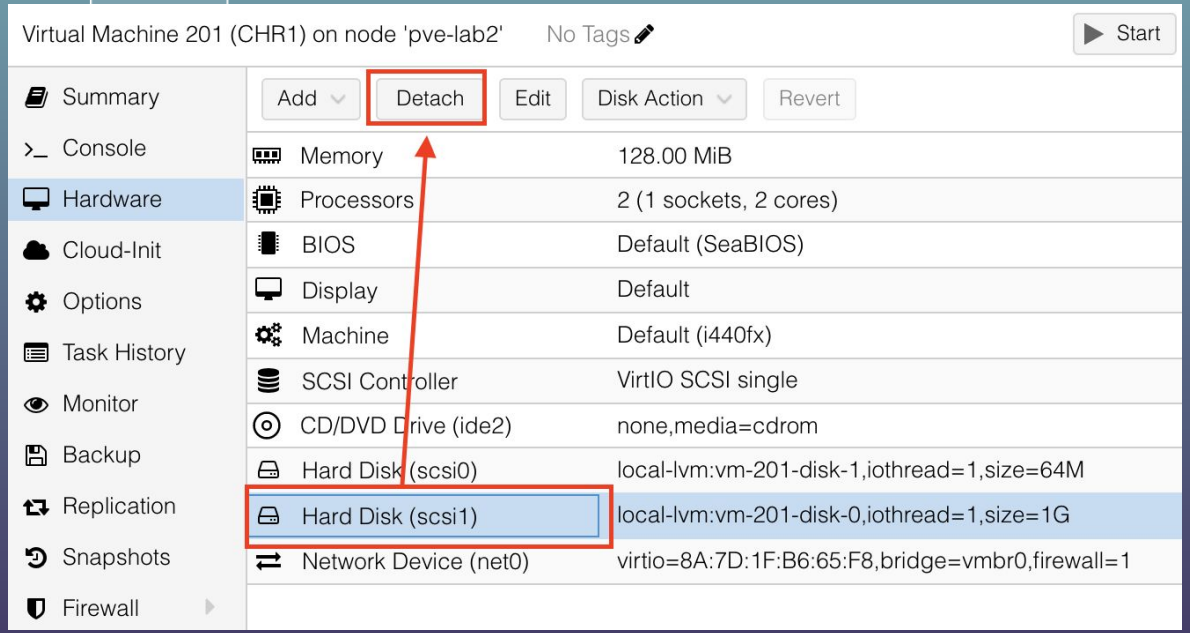
MAKE DISK USABLE WITH VM-ID



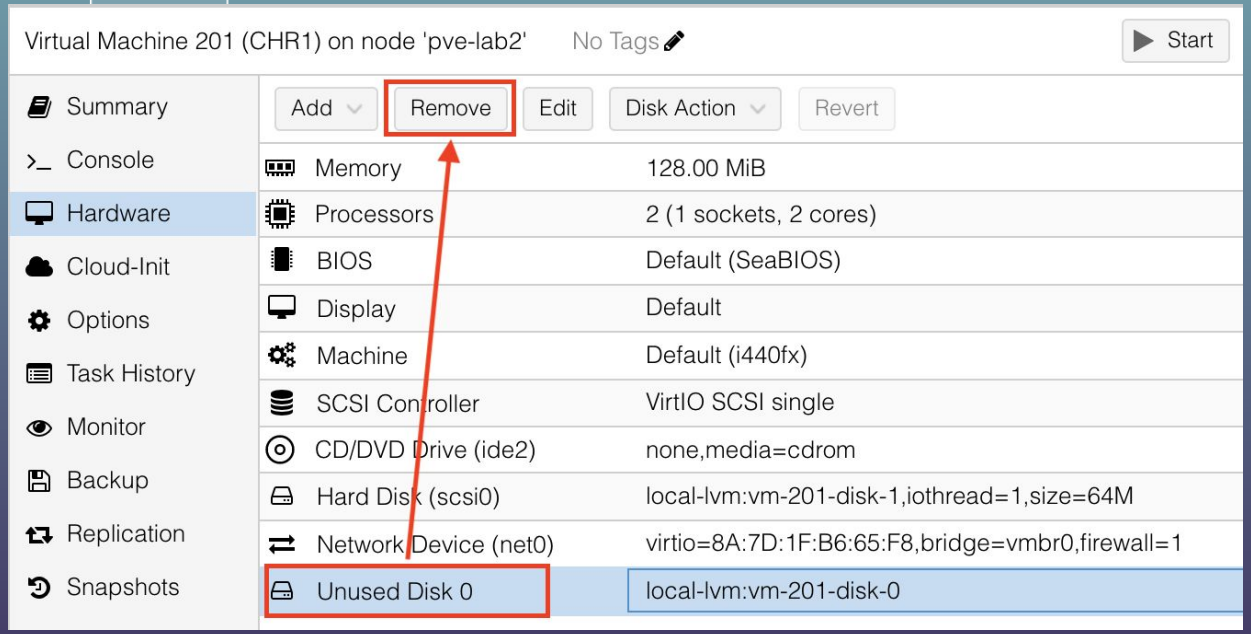
ADJUST HARDWARE



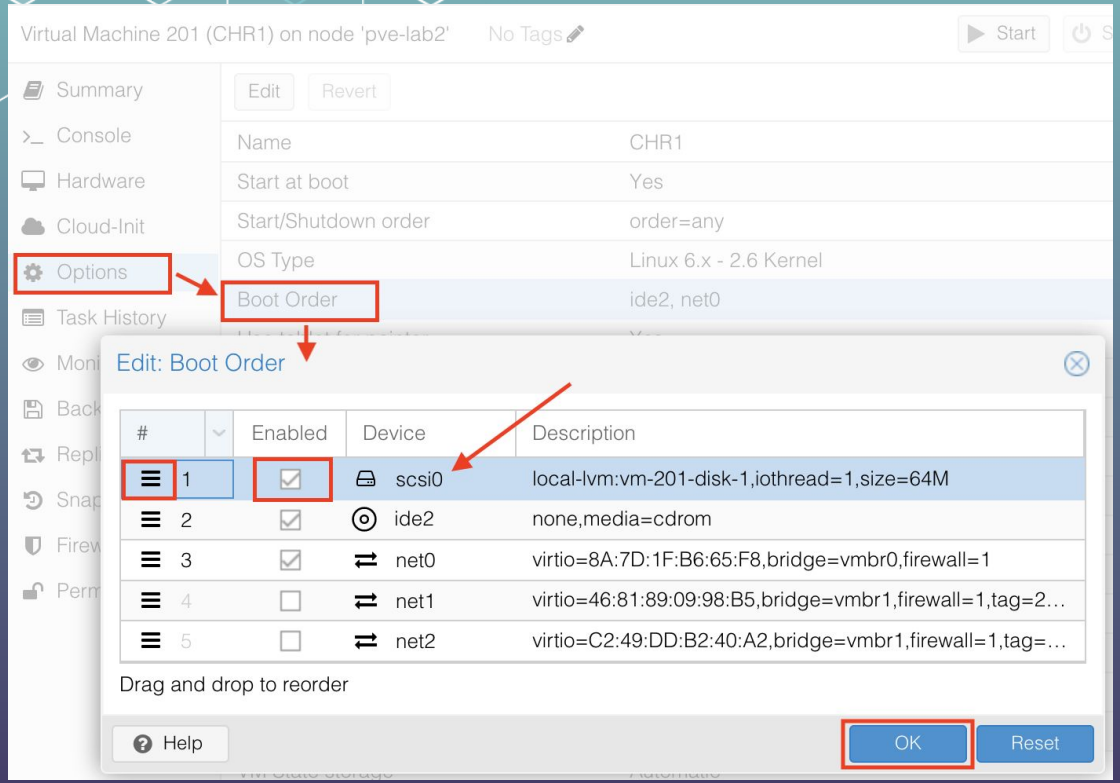
ADJUST HARDWARE

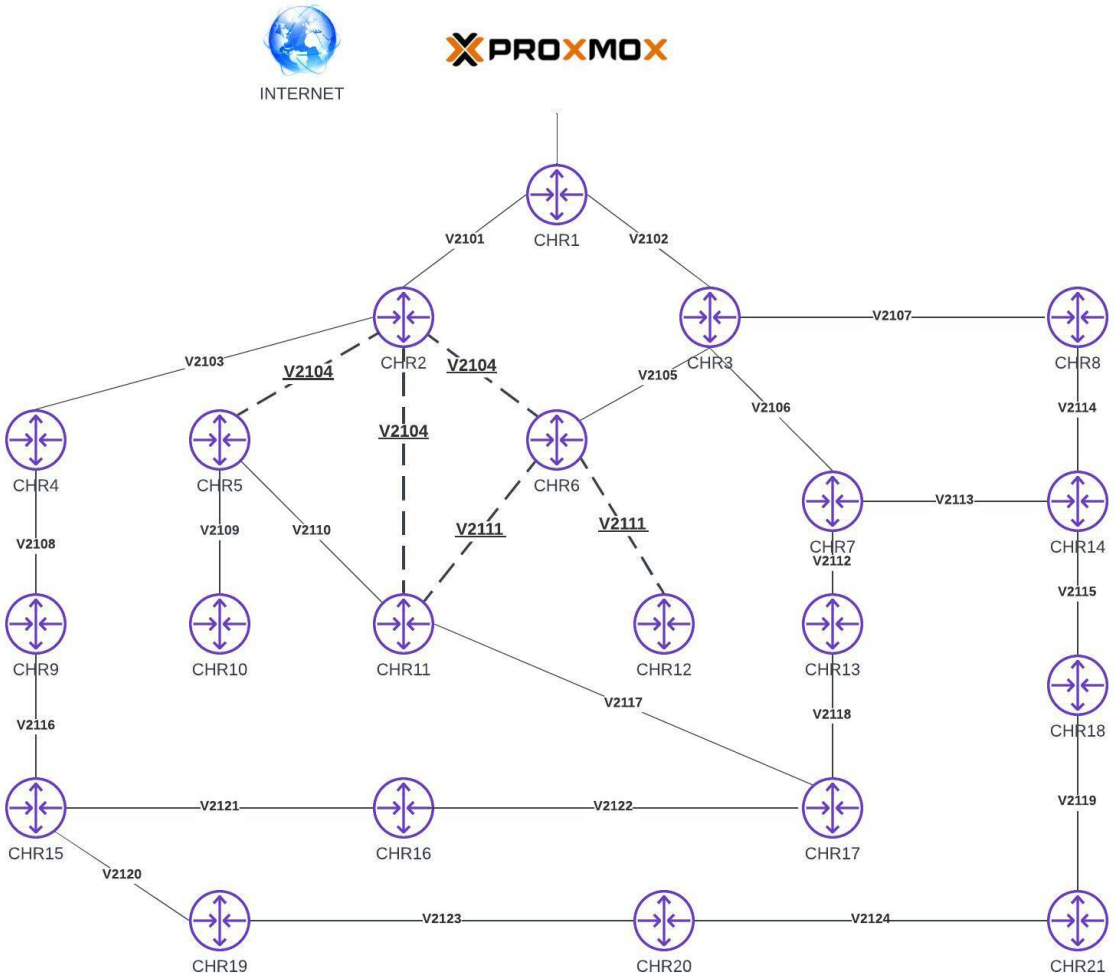


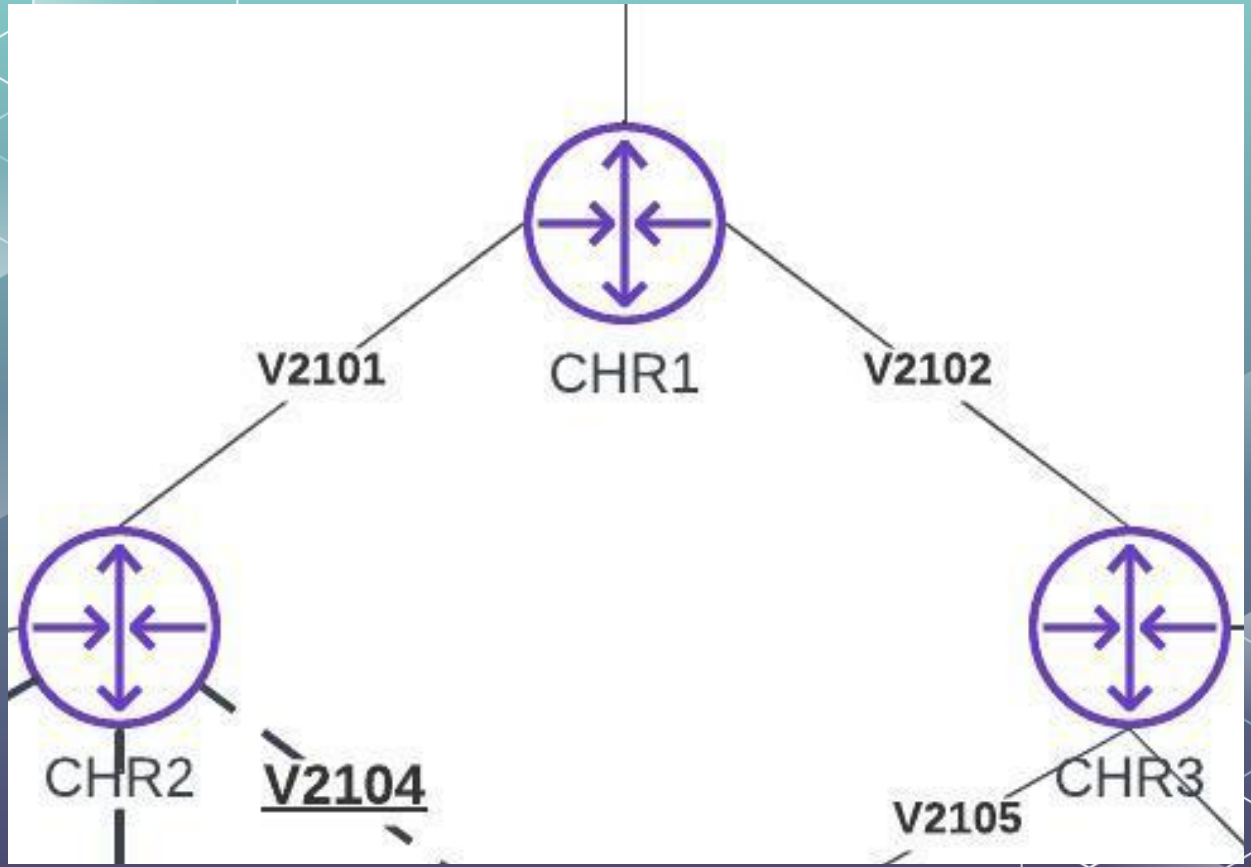
ADJUST HARDWARE



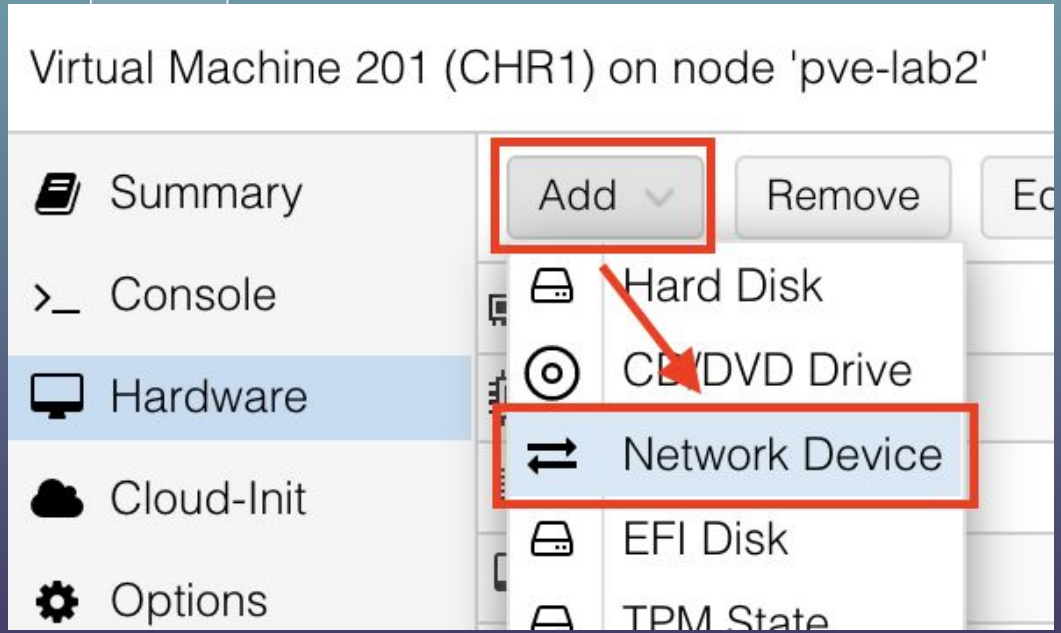
USE THE DISK TO BOOT



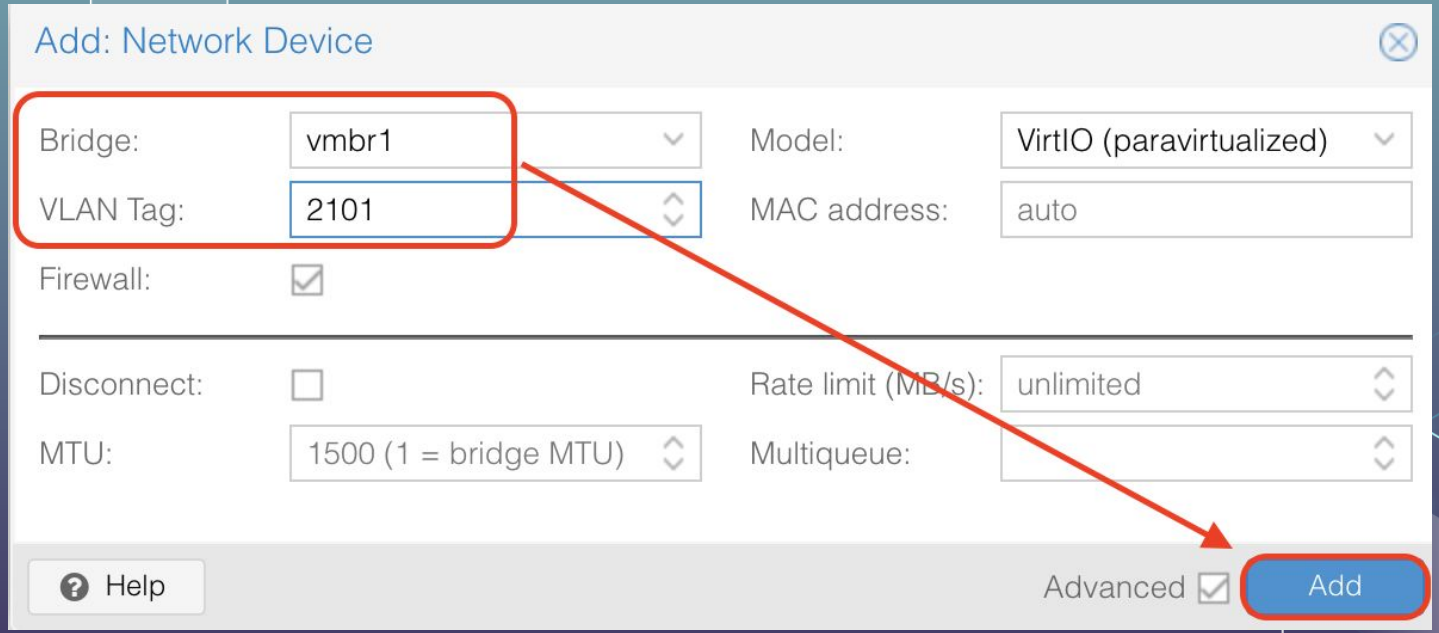

INTERNET
PROXMOX
CHR1
CHR2
CHR3
CHR4
CHR5
CHR6
CHR7
CHR8
CHR9
CHR10
CHR11
CHR12
CHR13
CHR14
CHR15
CHR16
CHR17
CHR18
CHR19
CHR20
CHR21
V2101
V2102
V2103
V2104
V2104
V2104
V2105
V2106
V2107
V2108
V2109
V2110
V2111
V2111
V2112
V2113
V2114
V2115
V2116
V2117
V2118
V2119
V2120
V2121
V2122
V2123
V2124


V2101
CHR1
V2102
CHR2
V2104
CHR3
V2105

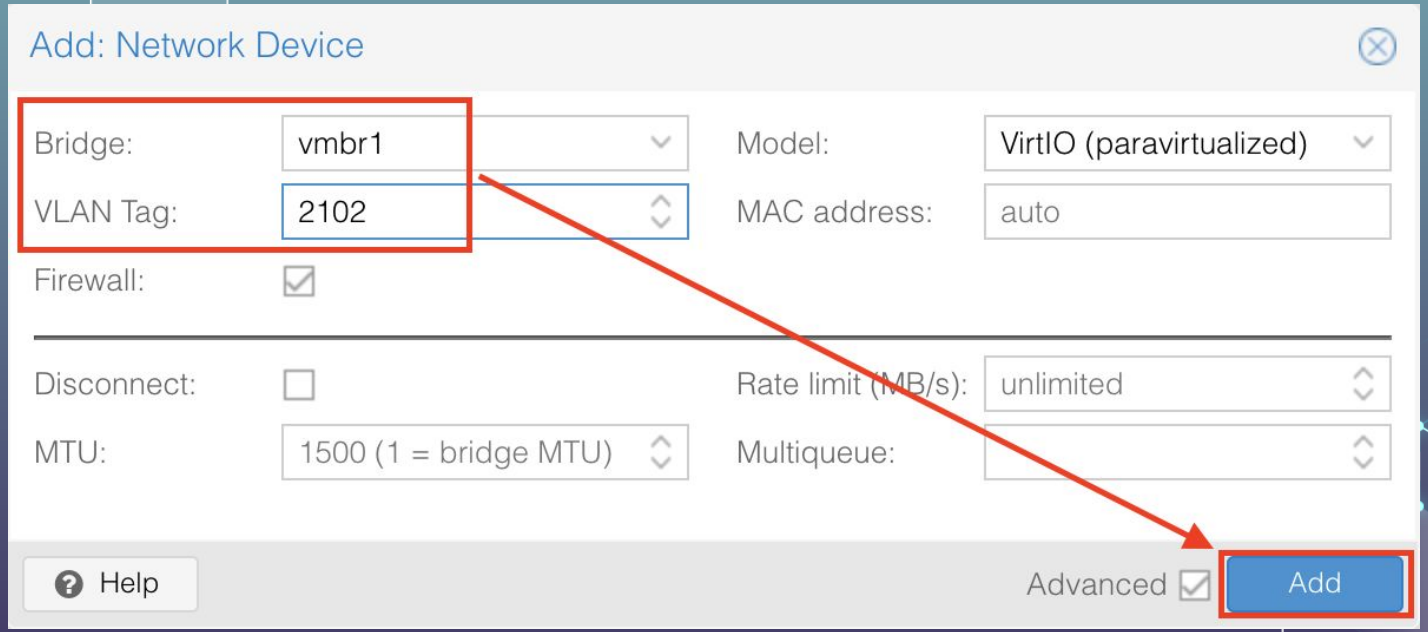
ADD A NIC to CHR2



ADD A NIC to CHR2



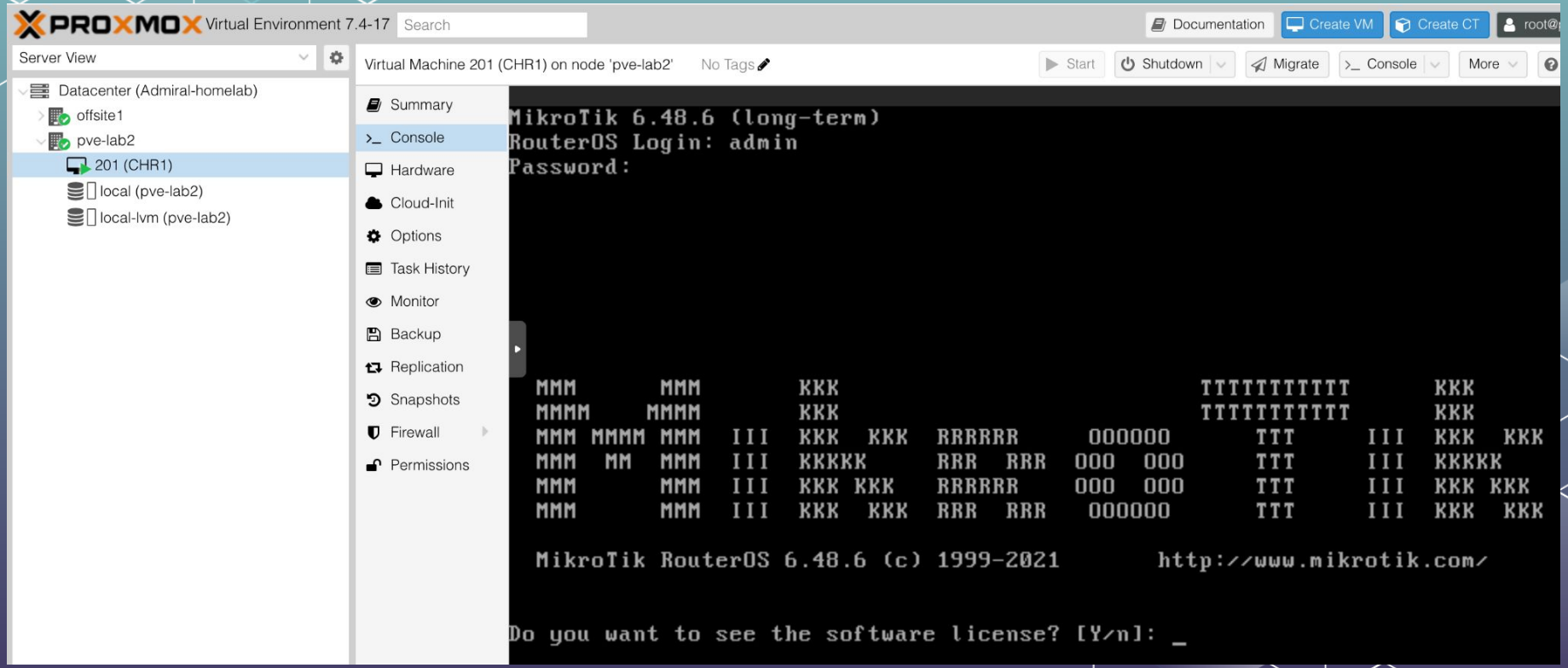
ADD A NIC to CHR3



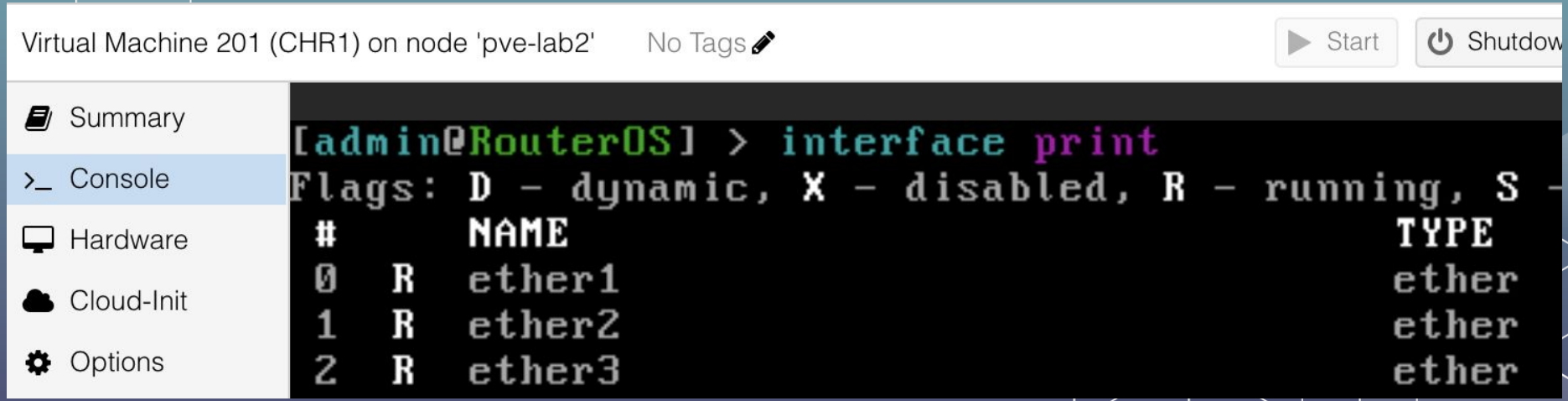
FINAL NETWORK

⇄ Network Device (net0)	virtio=8A:7D:1F:B6:65:F8,bridge=vmbr0,firewall=1	**INTERNET**
⇄ Network Device (net1)	virtio=46:81:89:09:98:B5,bridge=vmbr1,firewall=1,tag=2101	**To CHR2**
⇄ Network Device (net2)	virtio=C2:49:DD:B2:40:A2,bridge=vmbr1,firewall=1,tag=2102	**To CHR3**

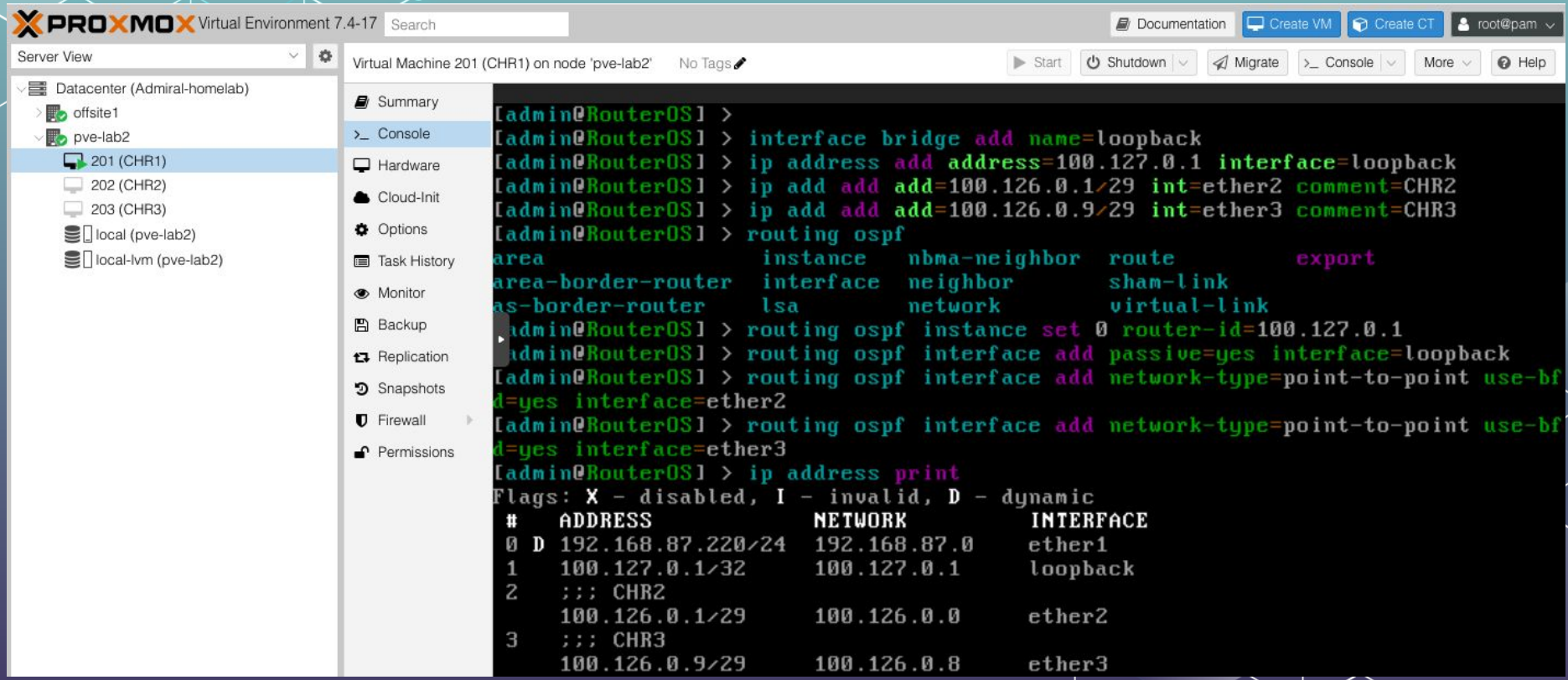
NOW YOU CAN START THE CHR VM!



3 NICs – Internet, CHR2, CHR3



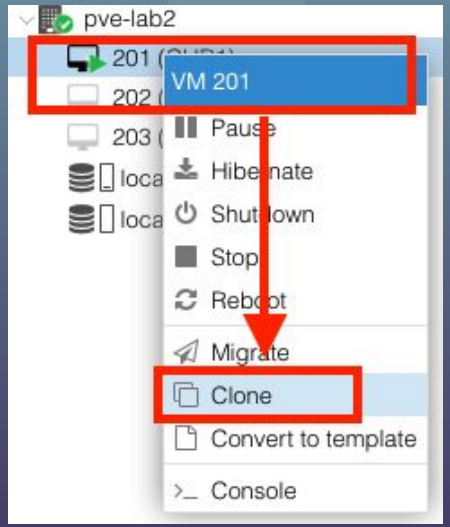
Configure the network

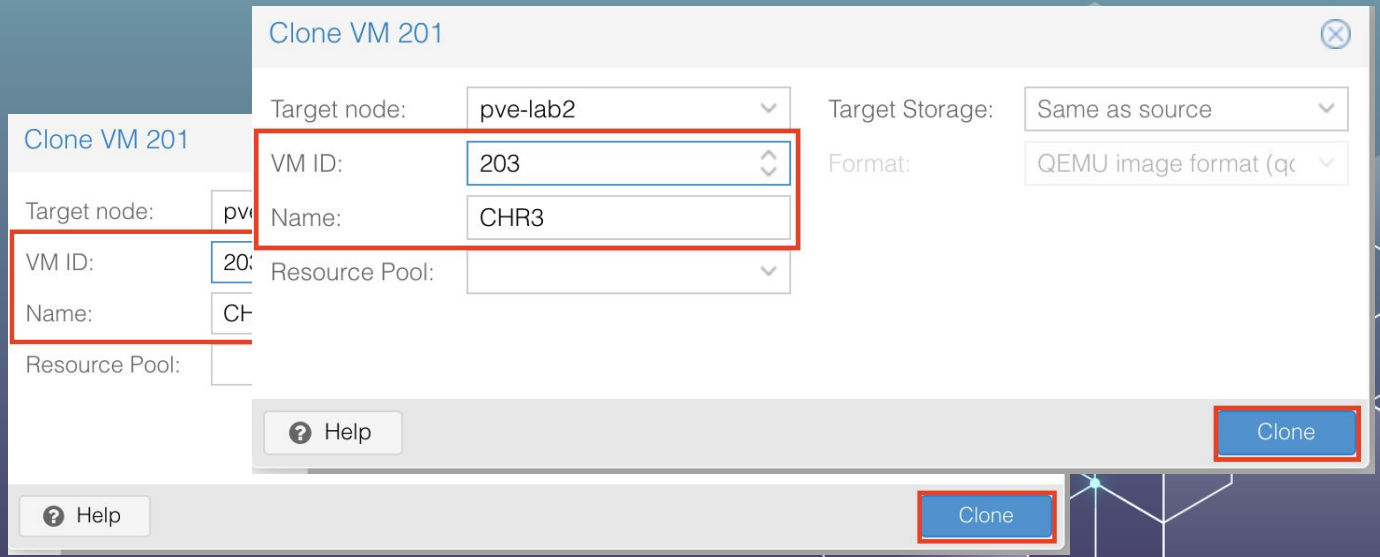


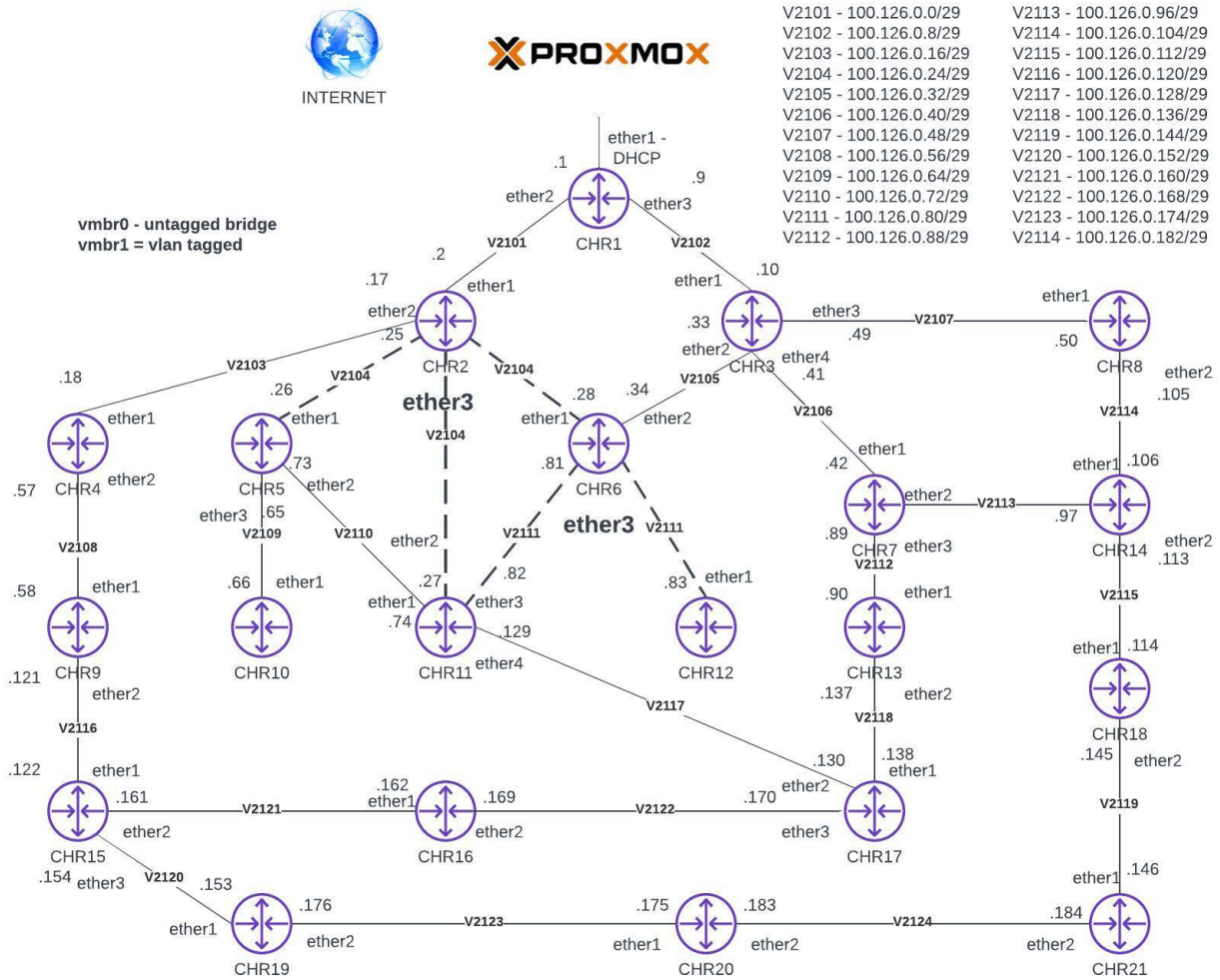
CHR1 Configuration

```
/interface bridge add name=loopback
/routing ospf instance set 0 distribute-default=if-installed-as-type-1 router-id=100.127.0.1
/ip address add address=100.127.0.1 interface=loopback
/ip address add address=100.126.0.1/29 comment=CHR2 interface=ether2
/ip address add address=100.126.0.9/29 comment=CHR3 interface=ether3
/ip dhcp-client add disabled=no interface=ether1
/routing ospf interface add interface=loopback passive=yes
/routing ospf interface add interface=ether2 network-type=point-to-point use-bfd=yes
/routing ospf interface add interface=ether3 network-type=point-to-point use-bfd=yes
/routing ospf network add area=backbone network=100.127.0.1/32
/routing ospf network add area=backbone network=100.126.0.0/29
/routing ospf network add area=backbone network=100.126.0.8/29
/system identity set name=CHR1
```

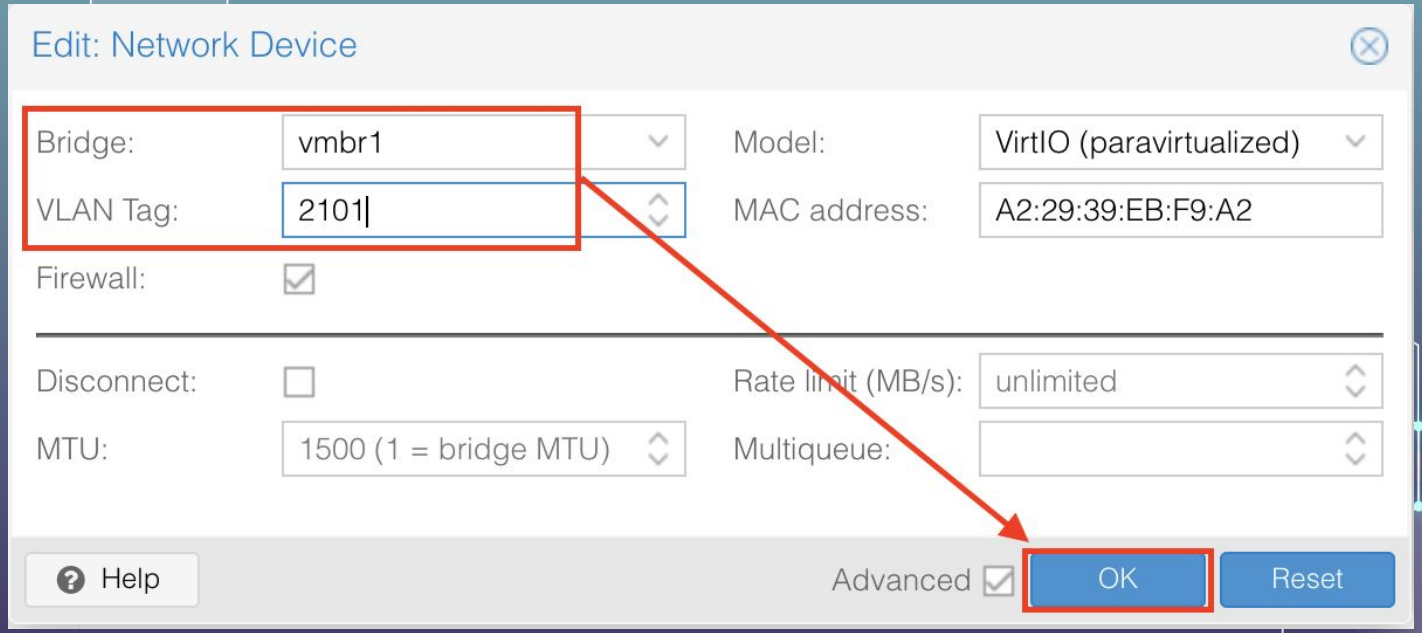
NOW MAKE CHR2 and CHR3 using CLONE!



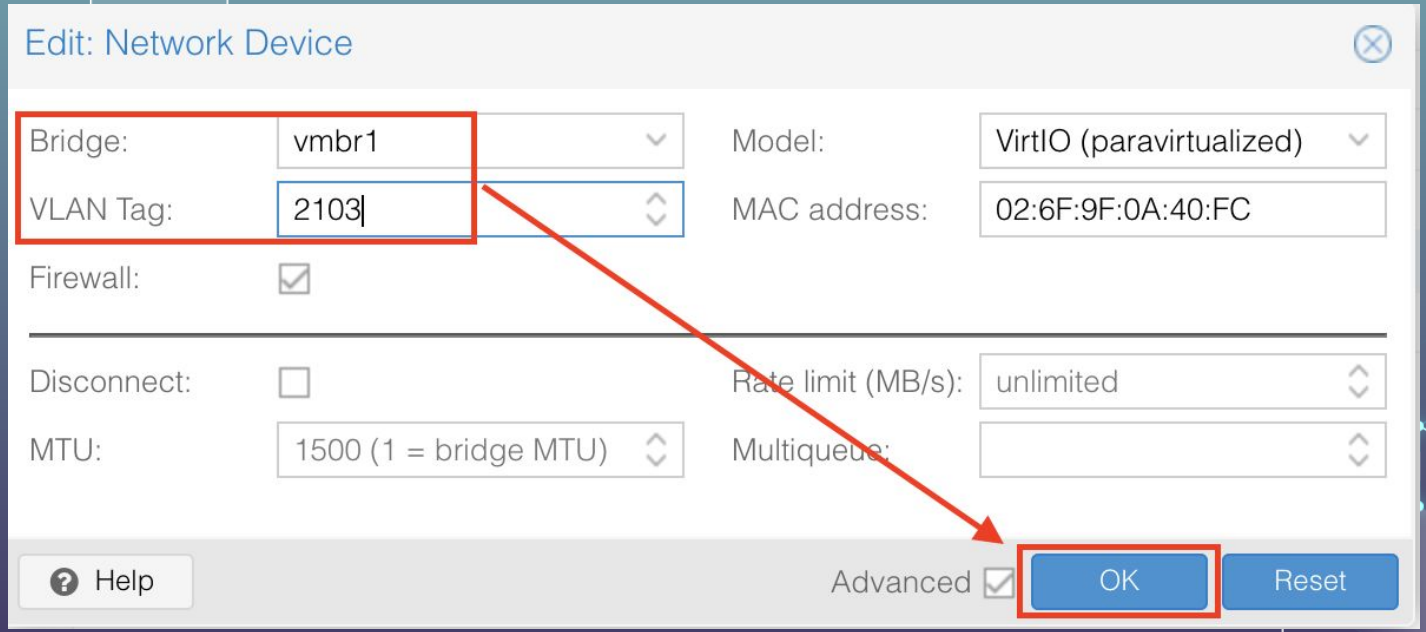



INTERNET
PROXMOX
V2101 - 100.126.0.0/29
V2102 - 100.126.0.8/29
V2103 - 100.126.0.16/29
V2104 - 100.126.0.24/29
V2105 - 100.126.0.32/29
V2106 - 100.126.0.40/29
V2107 - 100.126.0.48/29
V2108 - 100.126.0.56/29
V2109 - 100.126.0.64/29
V2110 - 100.126.0.72/29
V2111 - 100.126.0.80/29
V2112 - 100.126.0.88/29
V2113 - 100.126.0.96/29
V2114 - 100.126.0.104/29
V2115 - 100.126.0.112/29
V2116 - 100.126.0.120/29
V2117 - 100.126.0.128/29
V2118 - 100.126.0.136/29
V2119 - 100.126.0.144/29
V2120 - 100.126.0.152/29
V2121 - 100.126.0.160/29
V2122 - 100.126.0.168/29
V2123 - 100.126.0.174/29
V2114 - 100.126.0.182/29
vmbr0 - untagged bridge
vmbr1 = vlan tagged
CHR1
CHR2
CHR3
CHR4
CHR5
CHR6
CHR7
CHR8
CHR9
CHR10
CHR11
CHR12
CHR13
CHR14
CHR15
CHR16
CHR17
CHR18
CHR19
CHR20
CHR21
ether1 - DHCP
ether3
ether4

CHR2 - NIC 1 to CHR1

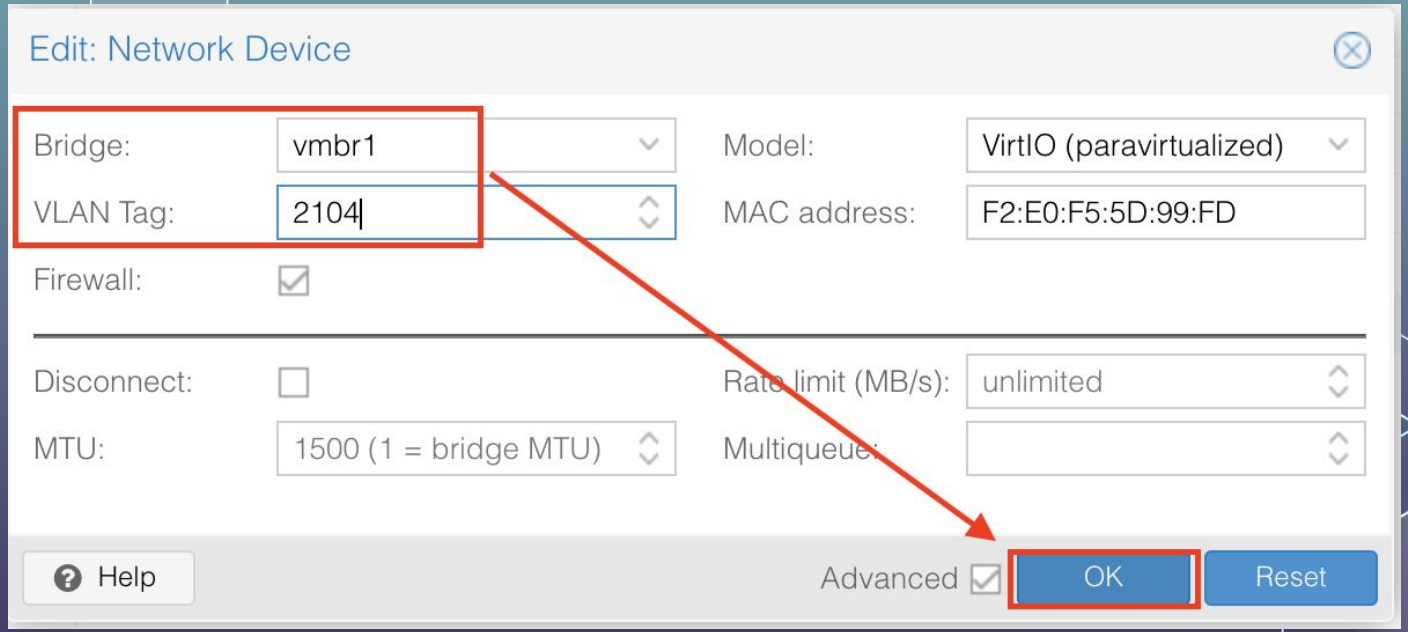


CHR2 – NIC 2 to CHR4



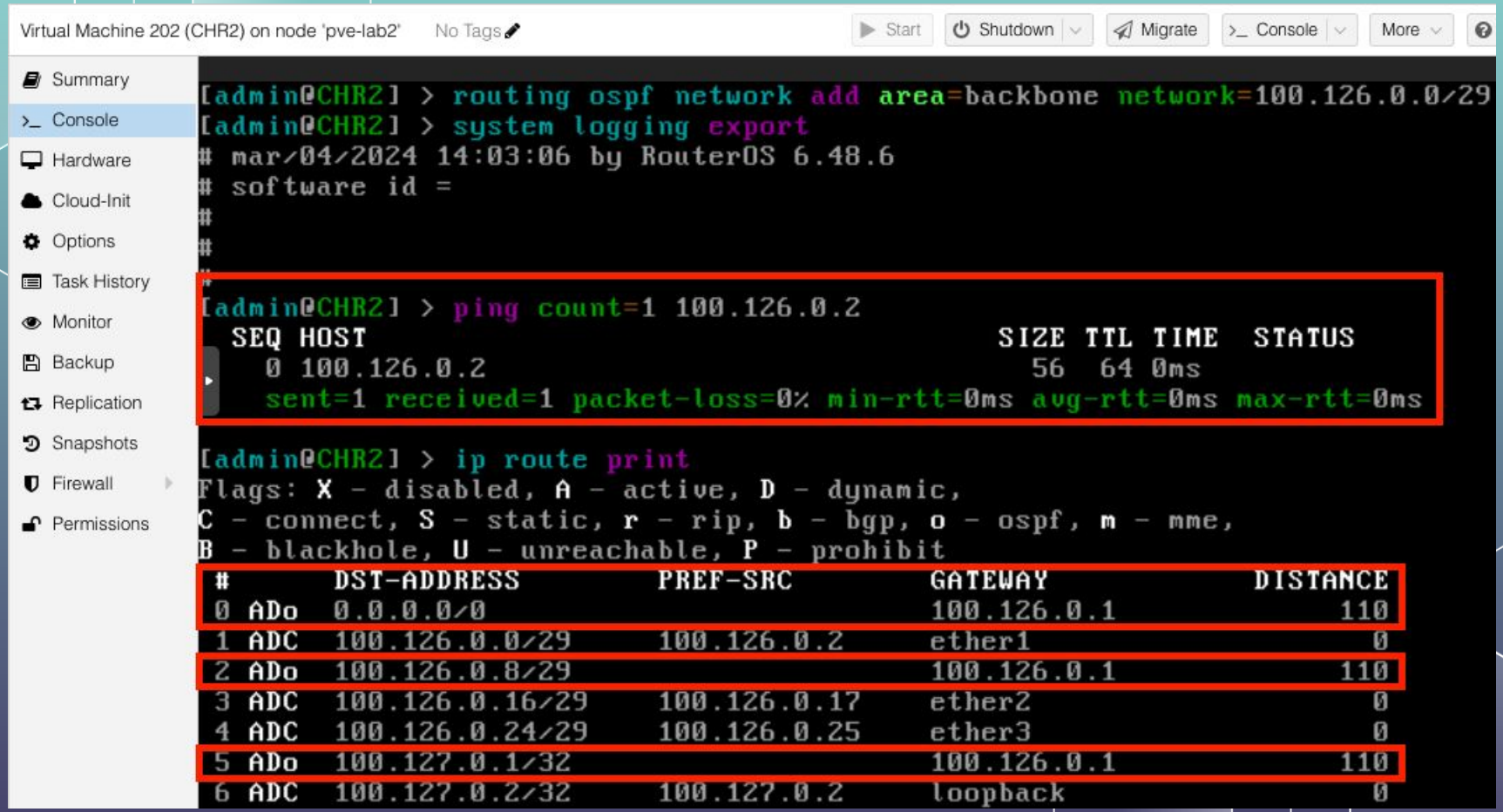
CHR2 – NIC 3 emulated switch!

to CHR5 + CHRII + CHR6

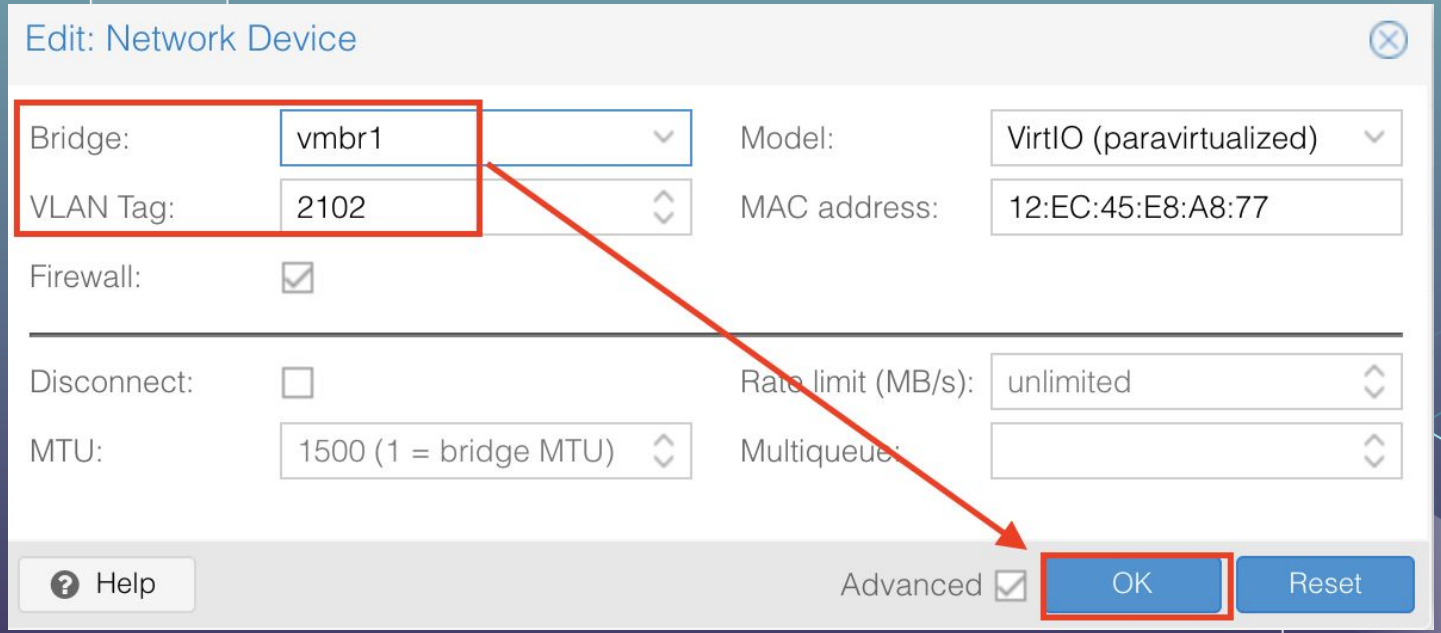


CHR2 Configuration

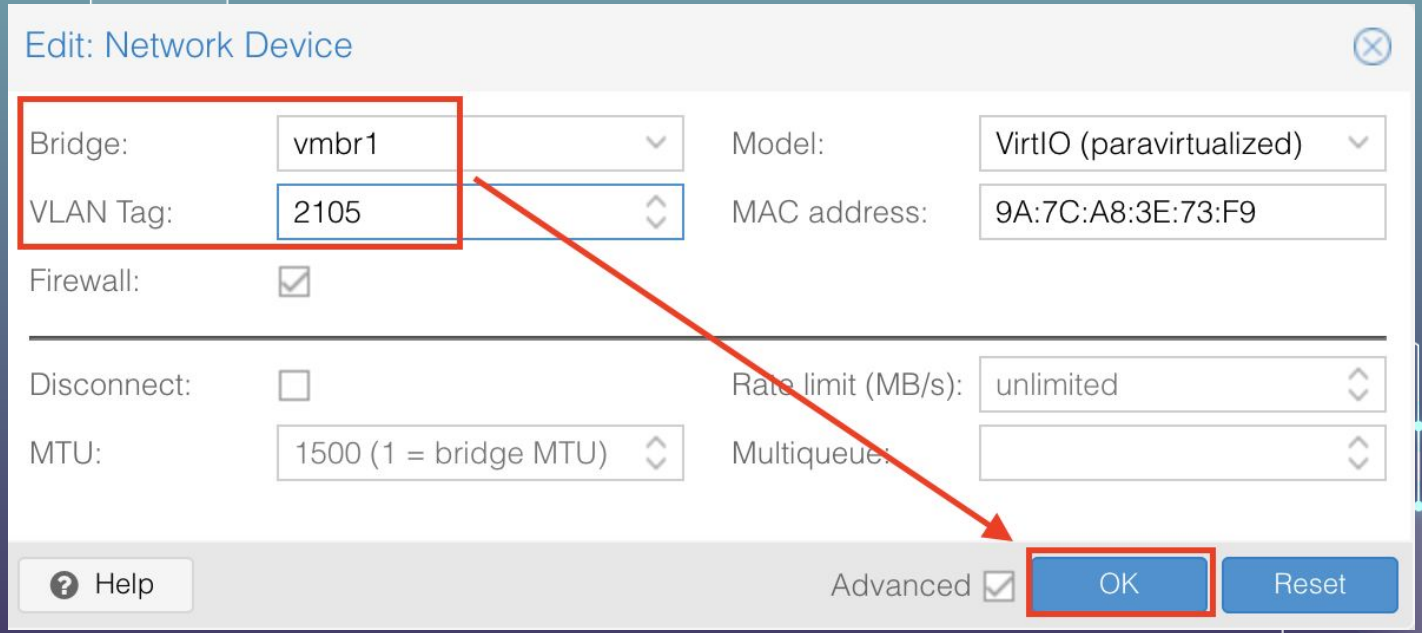
```
/interface bridge add name=loopback
/routing ospf instance set [ find default=yes ] router-id=100.127.0.2
/ip address add address=100.126.0.2/29 comment=CHR1 interface=ether1
/ip address add address=100.127.0.2 interface=loopback
/ip address add address=100.126.0.17/29 comment=CHR4 interface=ether2
/ip address add address=100.126.0.25/29 comment=CHR5,11,6 interface=ether3
/routing ospf interface add interface=loopback passive=yes
/routing ospf interface add interface=ether1 network-type=point-to-point use-bfd=yes
/routing ospf interface add interface=ether2 network-type=point-to-point use-bfd=yes
/routing ospf interface add interface=ether3
/routing ospf network add area=backbone network=100.127.0.2/32
/routing ospf network add area=backbone network=100.126.0.16/29
/routing ospf network add area=backbone network=100.126.0.24/29
/routing ospf network add area=backbone network=100.126.0.0/29
/system identity set name=CHR2
/tool romon set enabled=yes
```


Virtual Machine 202 (CHR2) on node 'pve-lab2'
No Tags
Start
Shutdown
Migrate
Console
More
Summary
Console
Hardware
Cloud-Init
Options
Task History
Monitor
Backup
Replication
Snapshots
Firewall
Permissions
[admin@CHR2] > routing ospf network add area=backbone network=100.126.0.0/29
[admin@CHR2] > system logging export
mar/04/2024 14:03:06 by RouterOS 6.48.6
software id =
#
#
[admin@CHR2] > ping count=1 100.126.0.2
SEQ HOST SIZE TTL TIME STATUS
0 100.126.0.2 56 64 0ms
sent=1 received=1 packet-loss=0% min-rtt=0ms avg-rtt=0ms max-rtt=0ms
[admin@CHR2] > ip route print
Flags: X - disabled, A - active, D - dynamic,
C - connect, S - static, r - rip, b - bgp, o - ospf, m - mme,
B - blackhole, U - unreachable, P - prohibit
DST-ADDRESS PREF-SRC GATEWAY DISTANCE
0 ADo 0.0.0.0/0 100.126.0.1 110
1 ADC 100.126.0.0/29 100.126.0.2 ether1 0
2 ADo 100.126.0.8/29 100.126.0.1 110
3 ADC 100.126.0.16/29 100.126.0.17 ether2 0
4 ADC 100.126.0.24/29 100.126.0.25 ether3 0
5 ADo 100.127.0.1/32 100.126.0.1 110
6 ADC 100.127.0.2/32 100.127.0.2 loopback 0

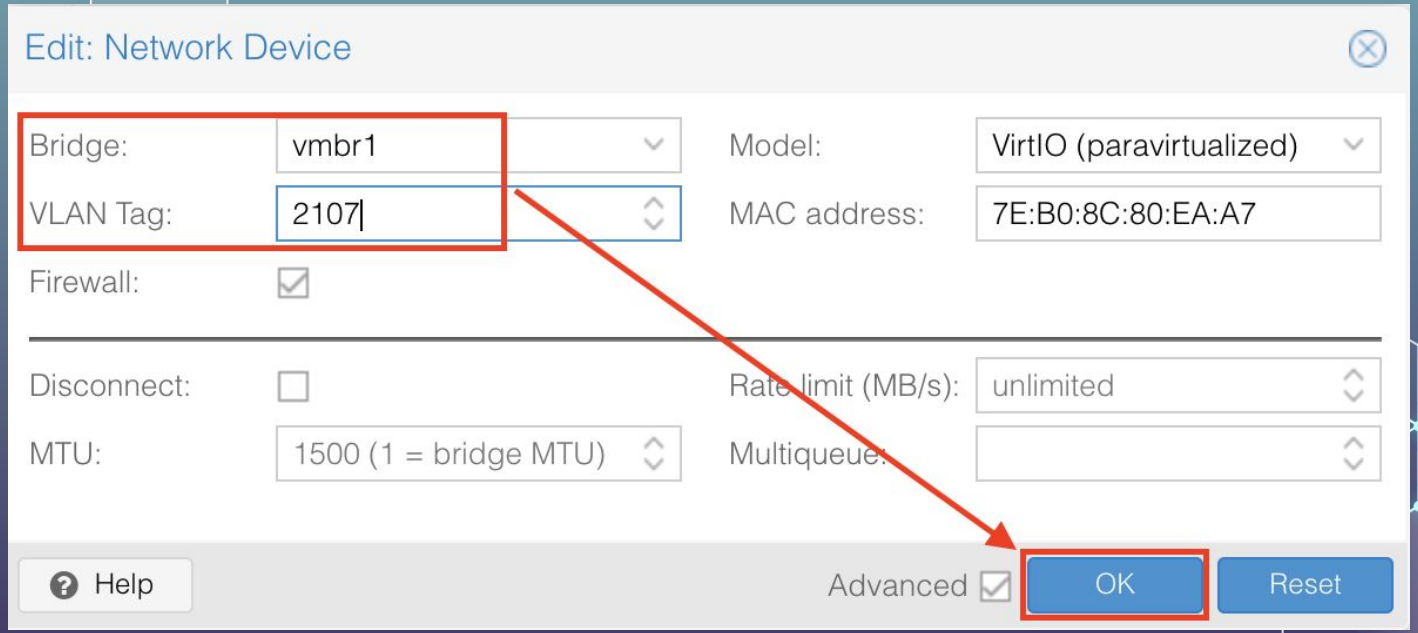
CHR3 – NIC 1 to CHR1



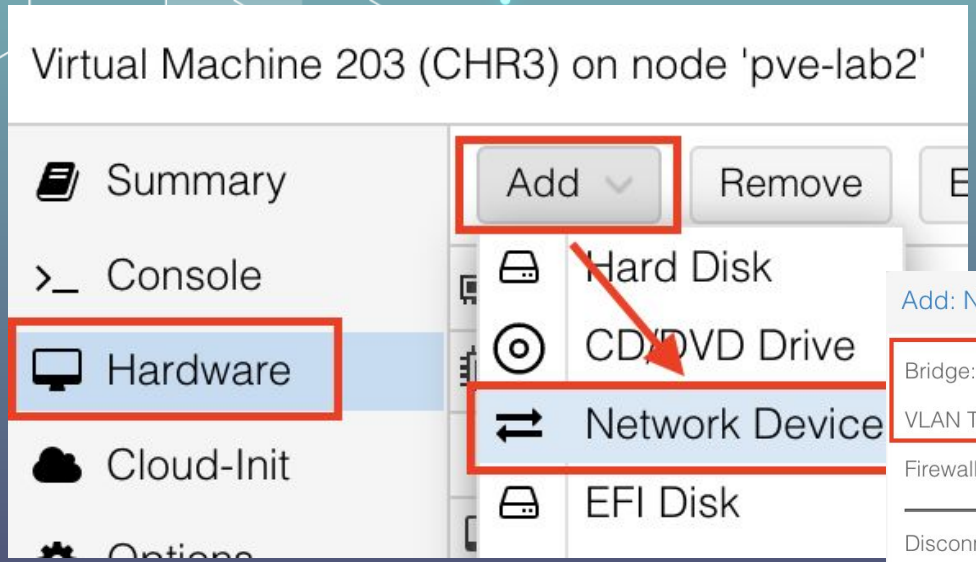
CHR3 – NIC 2 to CHR6

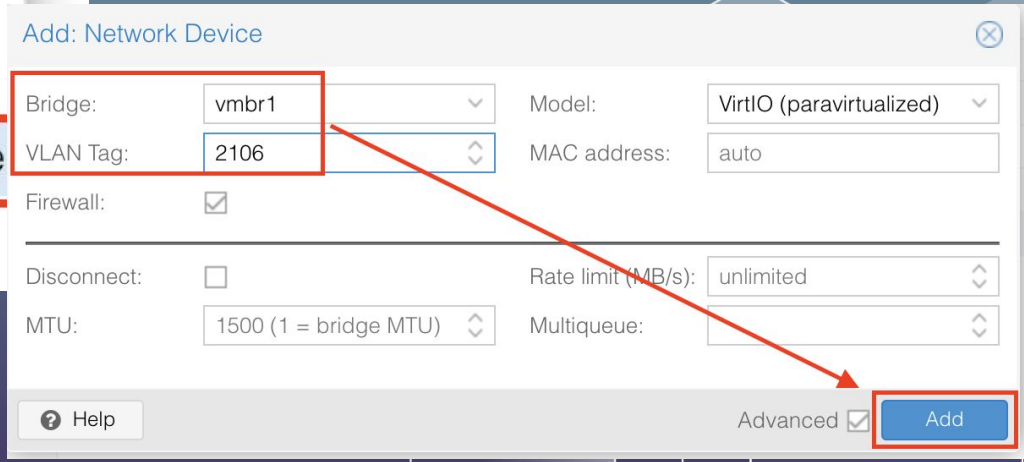


CHR3 – NIC 3 to CHR8



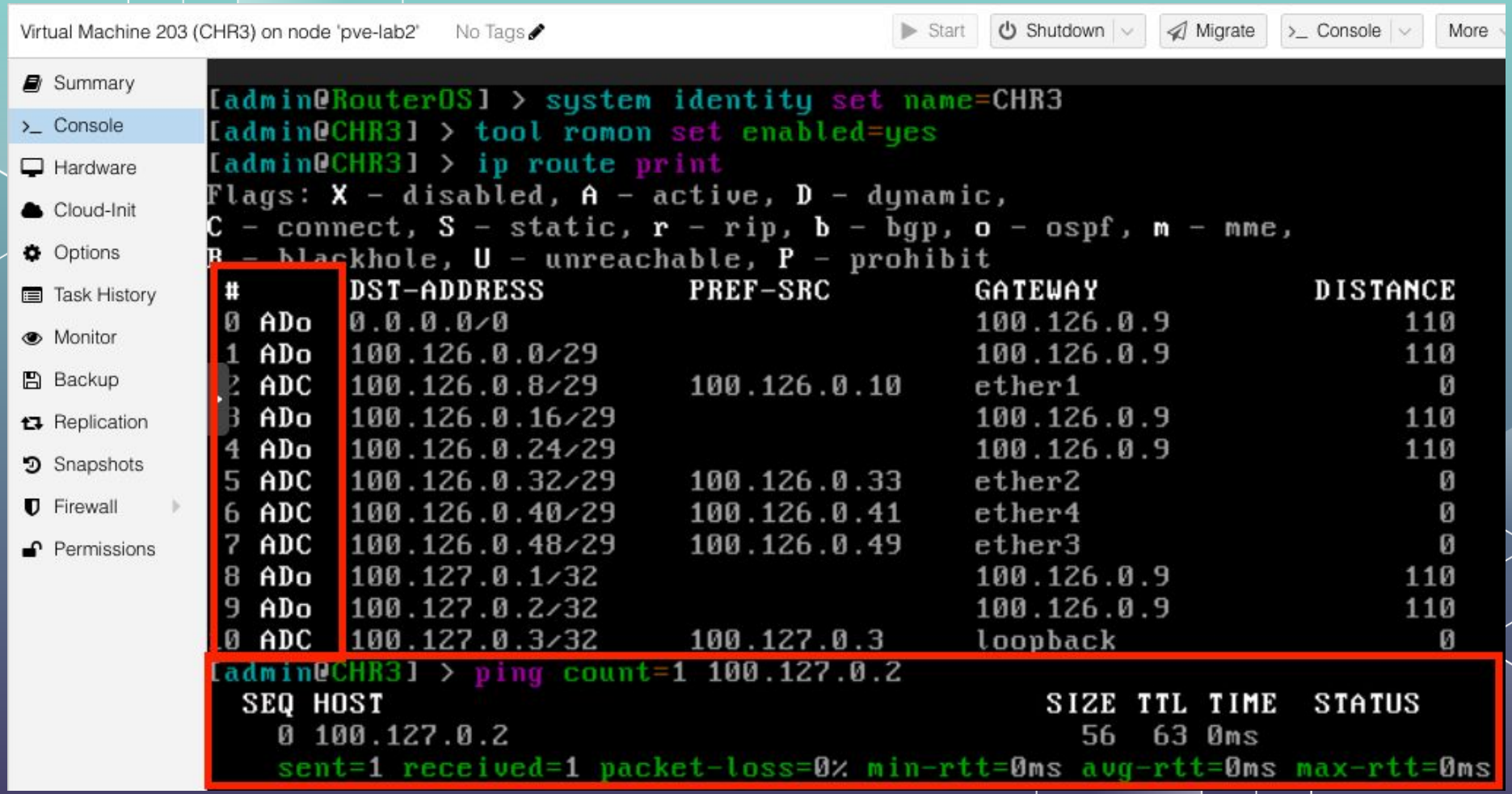
CHR3 – ADD NIC 4 to CHR7





CHR3 Configuration

```
/interface bridge add name=loopback
/routing ospf instance set [ find default=yes ] router-id=100.127.0.3
/ip address add address=100.126.0.10/29 comment=CHR1 interface=ether1
/ip address add address=100.127.0.3 interface=loopback
/ip address add address=100.126.0.33/29 comment=CHR6 interface=ether2
/ip address add address=100.126.0.49/29 comment=CHR8 interface=ether3
/ip address add address=100.126.0.41/29 comment=CHR7 interface=ether4
/routing ospf interface add interface=loopback passive=yes
/routing ospf interface add interface=ether1 network-type=point-to-point use-bfd=yes
/routing ospf interface add interface=ether2 network-type=point-to-point use-bfd=yes
/routing ospf interface add interface=ether3 network-type=point-to-point use-bfd=yes
/routing ospf interface add interface=ether4 network-type=point-to-point use-bfd=yes
/routing ospf network add area=backbone network=100.127.0.3/32
/routing ospf network add area=backbone network=100.126.0.8/29
/routing ospf network add area=backbone network=100.126.0.32/29
/routing ospf network add area=backbone network=100.126.0.40/29
/routing ospf network add area=backbone network=100.126.0.48/29
/system identity set name=CHR3
/tool romon set enabled=yes
```

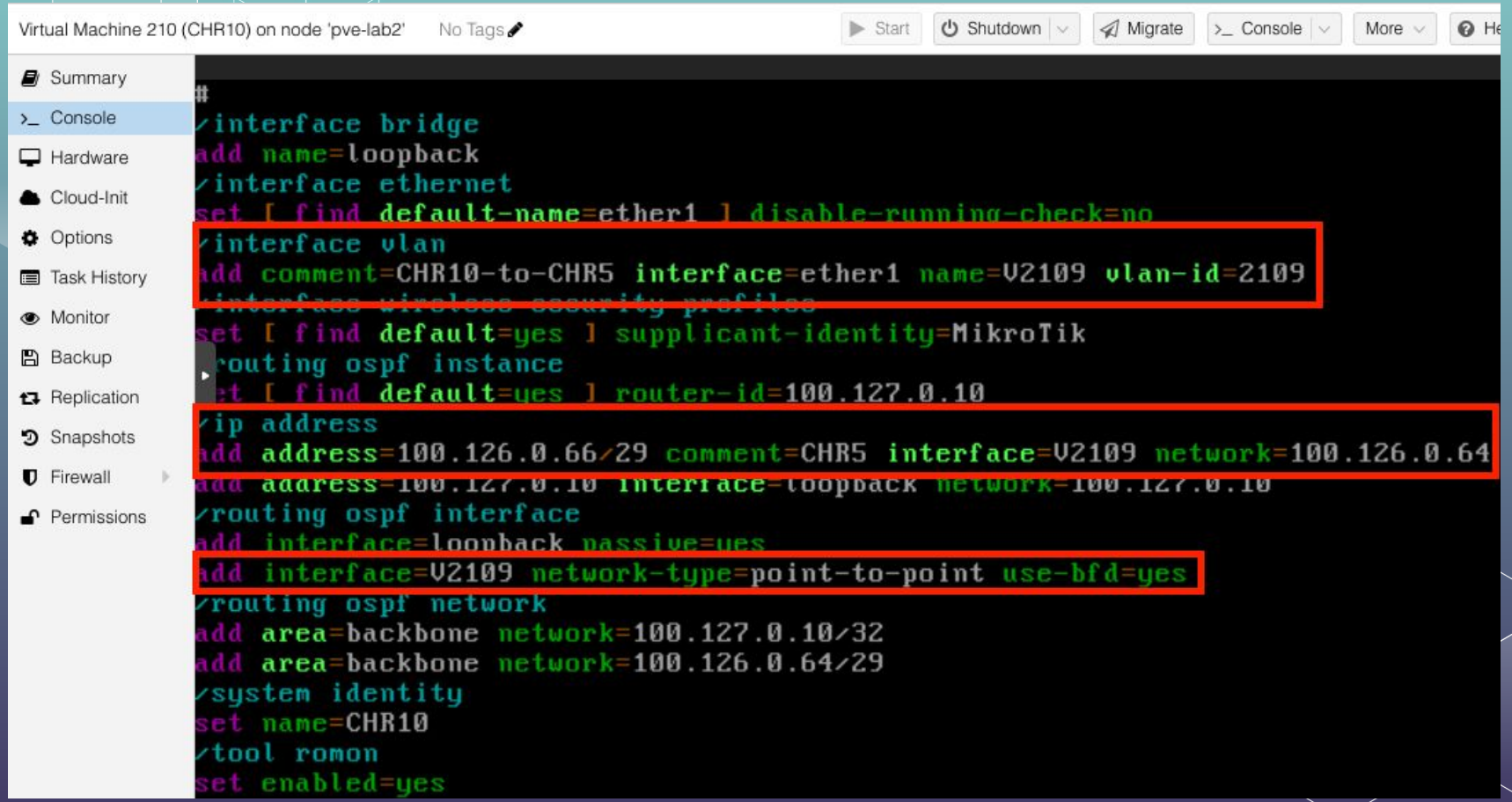

Virtual Machine 203 (CHR3) on node 'pve-lab2'
No Tags
Start
Shutdown
Migrate
Console
More
Summary
Console
Hardware
Cloud-Init
Options
Task History
Monitor
Backup
Replication
Snapshots
Firewall
Permissions
[admin@RouterOS] > system identity set name=CHR3
[admin@CHR3] > tool romon set enabled=yes
[admin@CHR3] > ip route print
Flags: X - disabled, A - active, D - dynamic,
C - connect, S - static, r - rip, b - bgp, o - ospf, m - mme,
B - blackhole, U - unreachable, P - prohibit
DST-ADDRESS PREF-SRC GATEWAY DISTANCE
0 ADo 0.0.0.0/0 100.126.0.9 110
1 ADo 100.126.0.0/29 100.126.0.9 110
2 ADC 100.126.0.8/29 100.126.0.10 ether1 0
3 ADo 100.126.0.16/29 100.126.0.9 110
4 ADo 100.126.0.24/29 100.126.0.9 110
5 ADC 100.126.0.32/29 100.126.0.33 ether2 0
6 ADC 100.126.0.40/29 100.126.0.41 ether4 0
7 ADC 100.126.0.48/29 100.126.0.49 ether3 0
8 ADo 100.127.0.1/32 100.126.0.9 110
9 ADo 100.127.0.2/32 100.126.0.9 110
10 ADC 100.127.0.3/32 100.127.0.3 loopback 0
[admin@CHR3] > ping count=1 100.127.0.2
SEQ HOST SIZE TTL TIME STATUS
0 100.127.0.2 56 63 0ms
sent=1 received=1 packet-loss=0% min-rtt=0ms avg-rtt=0ms max-rtt=0ms

Now refer to network diagram and CLONE VMs, renumber VLANs in HARDWARE tab to correspond with the network design

- If the interface names get off (i.e. ether7) just delete the HARDWARE network interface(s) and re-add them
- Change IP addresses
    - Loopbacks and etherN
- Update ROUTING - OSPF
    - INSTANCE ROUTER-ID
    - NETWORKS
    - INTERFACES
- Update SYSTEM IDENTITY

TRICKS!

You can use Proxmox to do the VLAN
You can use MikroTik CHR to tag the VLAN!!!



TRICKS!

Use BRIDGING to combine VLAN + broadcast

Virtual Machine 212 (CHR12) on node 'pve-lab2' No Tags

Start | Shutdown | Migrate | >_ Console

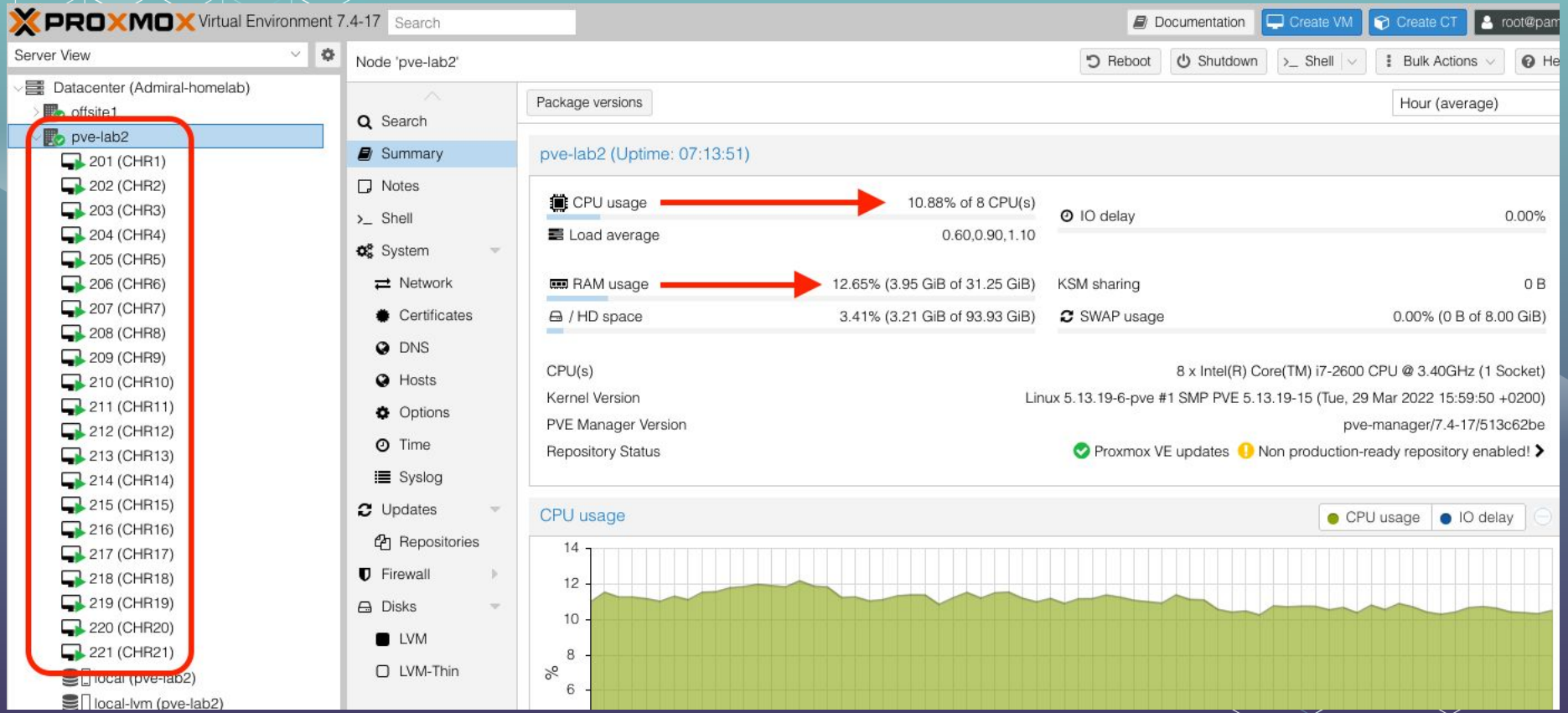
- Summary
- Console
- Hardware
- Cloud-Init
- Options
- Task History
- Monitor
- Backup
- Replication
- Snapshots
- Firewall
- Permissions

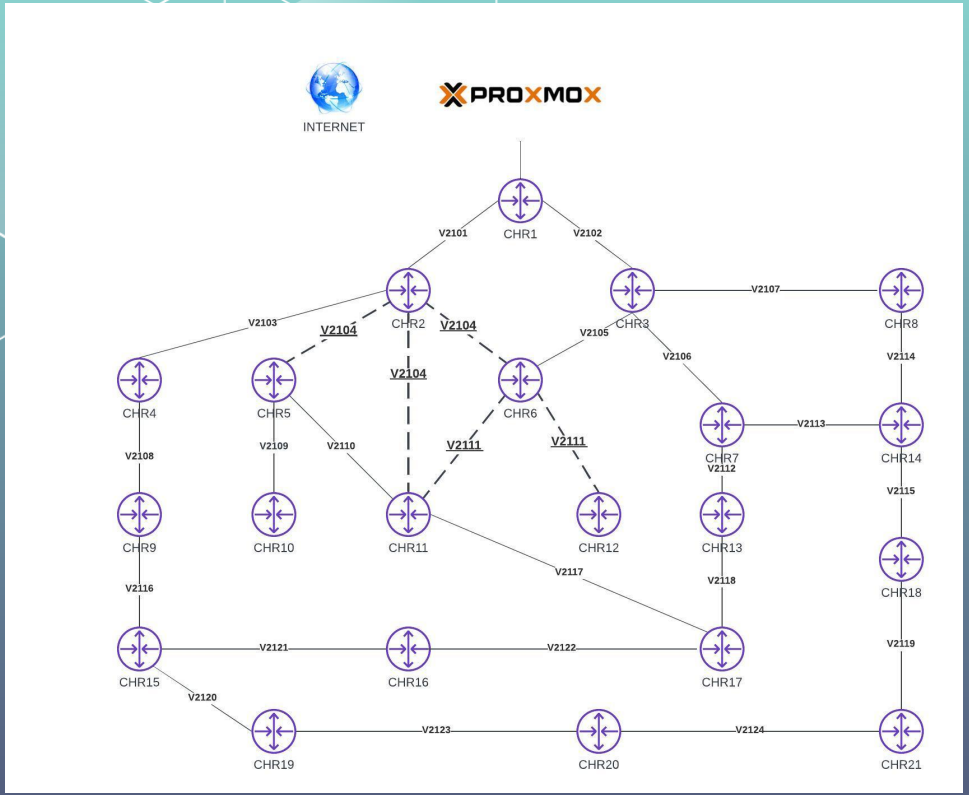
```
/interface bridge
add name=loopback
/interface ethernet
set [ find default-name=ether1 ] disable-running-check=no
/interface vlan
add comment=CHR12-to-CHR6+11 interface=ether1 name=V2111 vlan-id=2111
/interface wireless security-profiles
set [ find default=yes ] supplicant-identity=MikroTik
/routing ospf instance
set [ find default=yes ] router-id=100.127.0.12
/ip address
add address=100.126.0.83/29 comment=CHR6+11 interface=V2111 network=\
    100.126.0.80
add address=100.127.0.12 interface=loopback network=100.127.0.12
/routing ospf interface
add interface=loopback passive=yes
add interface=V2111
/routing ospf network
add area=backbone network=1
add area=backbone network=1
/system identity
set name=CHR12
/tool romon
set enabled=yes
[admin@CHR12] >
```

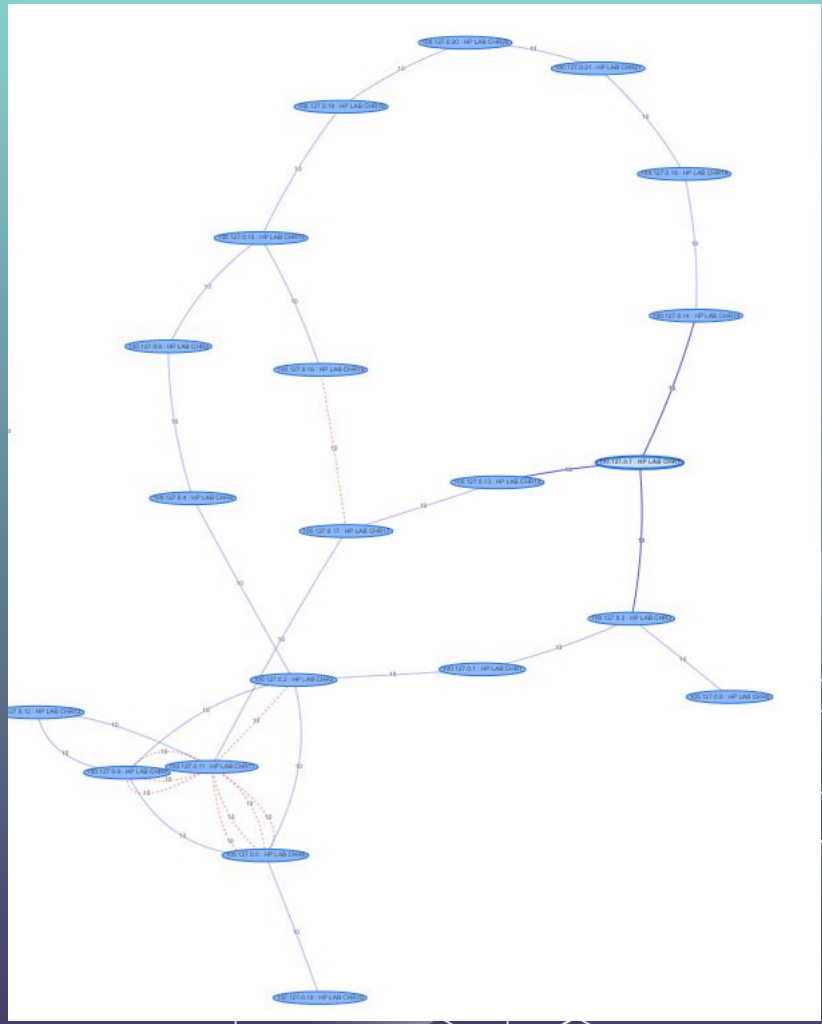
```
[admin@CHR12] > routing ospf neighbor print
 0 instance=default router-id=100.127.0.6 address=100.126.0.81 interface=V2111
   priority=1 dr-address=100.126.0.81 backup-dr-address=100.126.0.82
   state="Full" state-changes=5 ls-retransmits=0 ls-requests=0 db-summaries=0
   adjacency=5m4s

 1 instance=default router-id=100.127.0.11 address=100.126.0.82 interface=V2111
   priority=1 dr-address=100.126.0.81 backup-dr-address=100.126.0.82
   state="Full" state-changes=5 ls-retransmits=0 ls-requests=0 db-summaries=0
   adjacency=5m4s
[admin@CHR12] >
```

LOW POWER USE!!!







Auto Generated Network Map by Admiral
My mission was successful!

THANK YOU!

Do you have any questions?
marc@admiralplatform.com
Admiral Centralized MikroTik Management and Automation

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