Welcome

Planning RouterOS Networks with GNS3

By: Michael Omondi

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Who am I?

Name: Michael Omondi

Preferred Name: **Mike**

8+ years in the IT industry.

Introduced to Mikrotik in 2014

Areas of interest:

- ✓ISP Solutions
- ✓Wireless Services
- ✓Network Security

Certifications

- ✓Mikrotik:- MTCNA, MTCRE, MTCWE & MTCTCE,
- ✓Other Vendors:- Cisco, CompTIA, Vmware, Solarwinds, Ubiquiti, Cyberoam

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Who Are We?

We are an IT company

- Training
- Consultancy
- Design, deployment and management of computer networks
- Server deployment and management
- Cloud services (storage, backup & archiving, web & application hosting etc.), Data Center Virtualization and many more.
- For more about us, please visit http://lockstepit.com

Goal

Provide adequate knowledge to make you comfortable running RouterOS in GNS3

Introduction

- In 2015, Mikrotik released a virtual RouterOS instance for x86_64 architecture.
- They called it Cloud Hosted Router (CHR)
- Designed for virtualized environments.

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Licensing

- Currently there are 4 levels of licensing.
  a) Free- 1Mbps interface speed
  b) P1- 1Gbps
  c) P10- 10Gbps
  d) P-Unlimited

Where to Use It?

- Training classes
- Exam preparation
- Testing configuration before deployment
- Production

GNS3

- Graphical Network Simulator
- Originally developed to emulate Cisco's IOS
- It's capabilities have been extended beyond just Ciscos' IOS
- For this Lab setup version 1.5.2 of GNS3 installation and its Virtual Machine counterpart will be used.

QEMU

- Quick Emulator
- Developed to virtualize x86_64 architectures in Linux
- REMEMBER: RouterOS is a Linux
- To successfully build a virtual RouterOS Lab we will enlist QEMU version 2.5.0

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System Requirement

- 64bit CPU with virtualization support
- 128 MB or more RAM for the CHR instance
- 128 MB disk space for the CHR virtual hard drive

Testing

CHR has been tested on the following platforms:

- **VirtualBox 5 on Linux and OS X**
- **VMWare Fusion 7 and 8 on OS X**
- **Qemu 2.4.0.1 on OS X**
- **Hyper-V on Windows Server 2012 *(Only Generation 1 Hyper-V virtual machine is supported at the moment)***

My System Specs

GNS3 can run on Windows, Linux and OSX

For my Presentation, I have used;

Processor: Intel Core i5 2.50GHz

RAM: 8GB

OS: Windows 10 Pro

Hypervisor: VMware Workstation 12 Pro

Steps

- **Download GNS3 from her: https://gns3.com/software/download**
- **NB: sign in is required or create an account**

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Download

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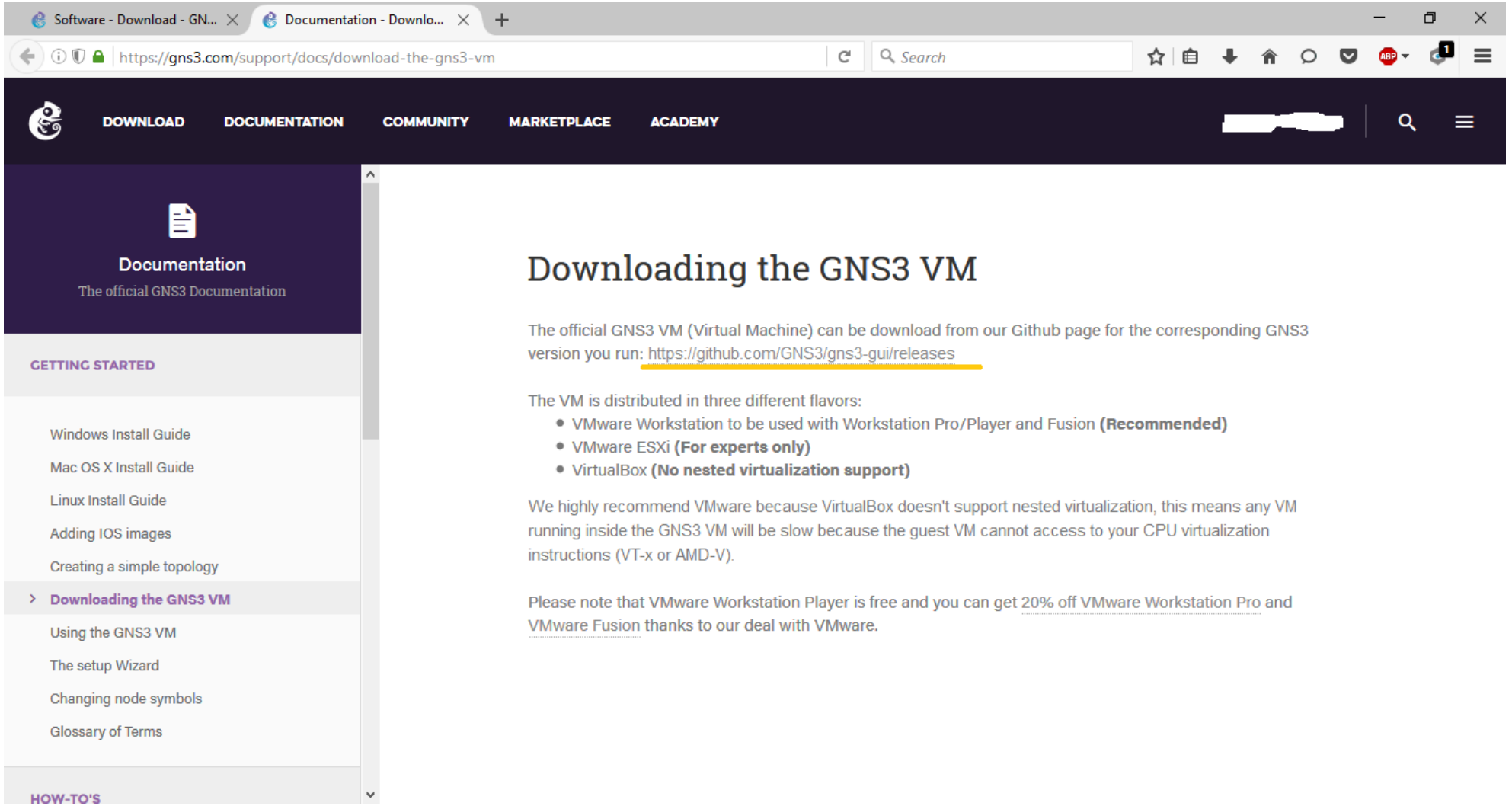
Download



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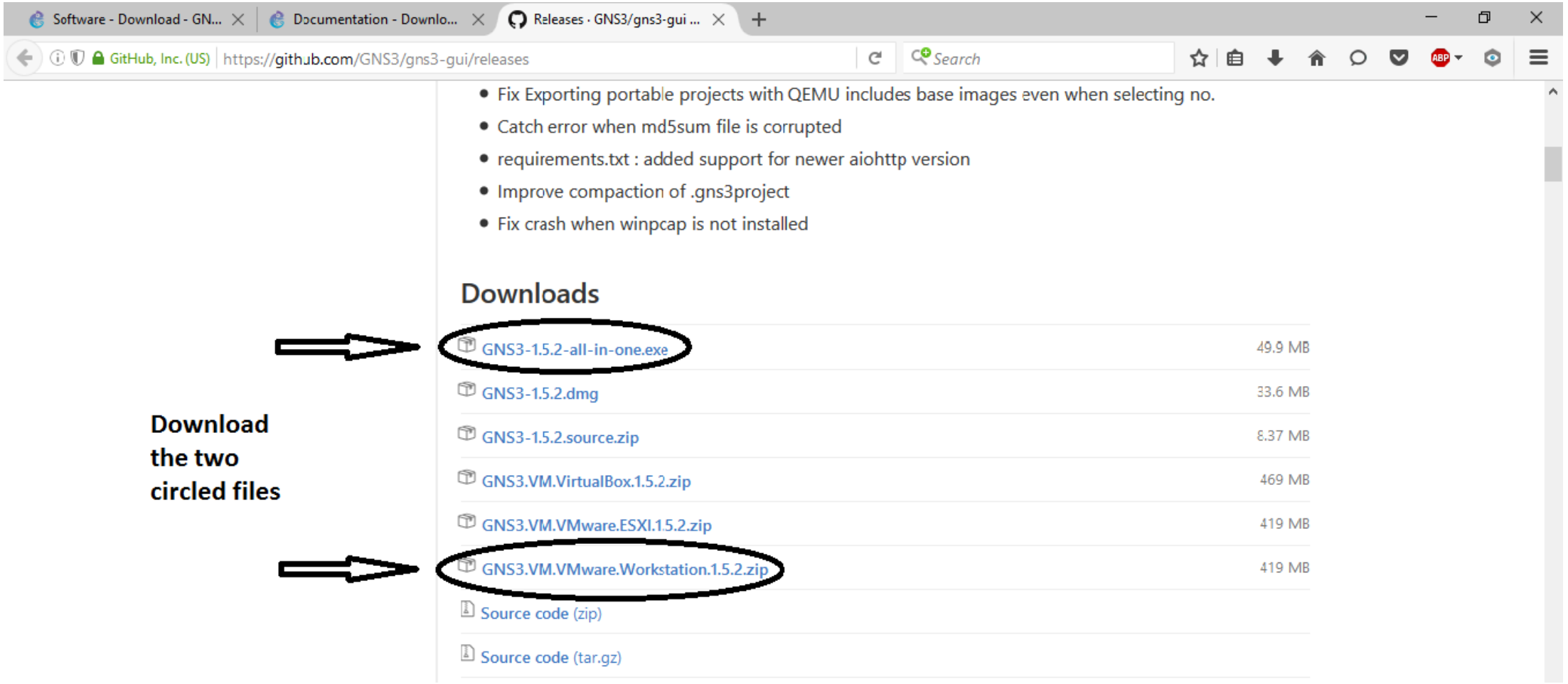
Download



Download the two circled files

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Installation

Once the download is finished;

Run the .exe file, follow the prompts.

NB: you need to be connected to the internet as the installation will download additional files

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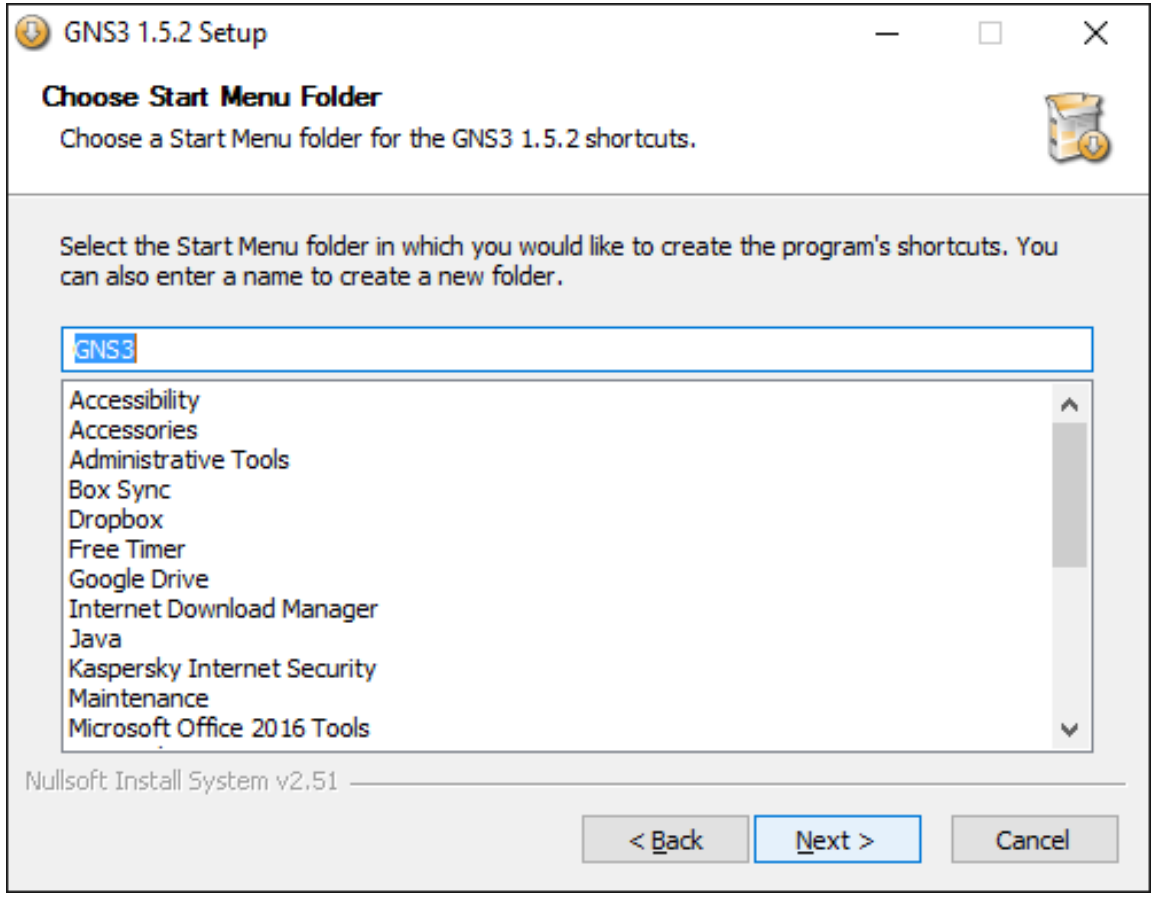
Installation Cont..



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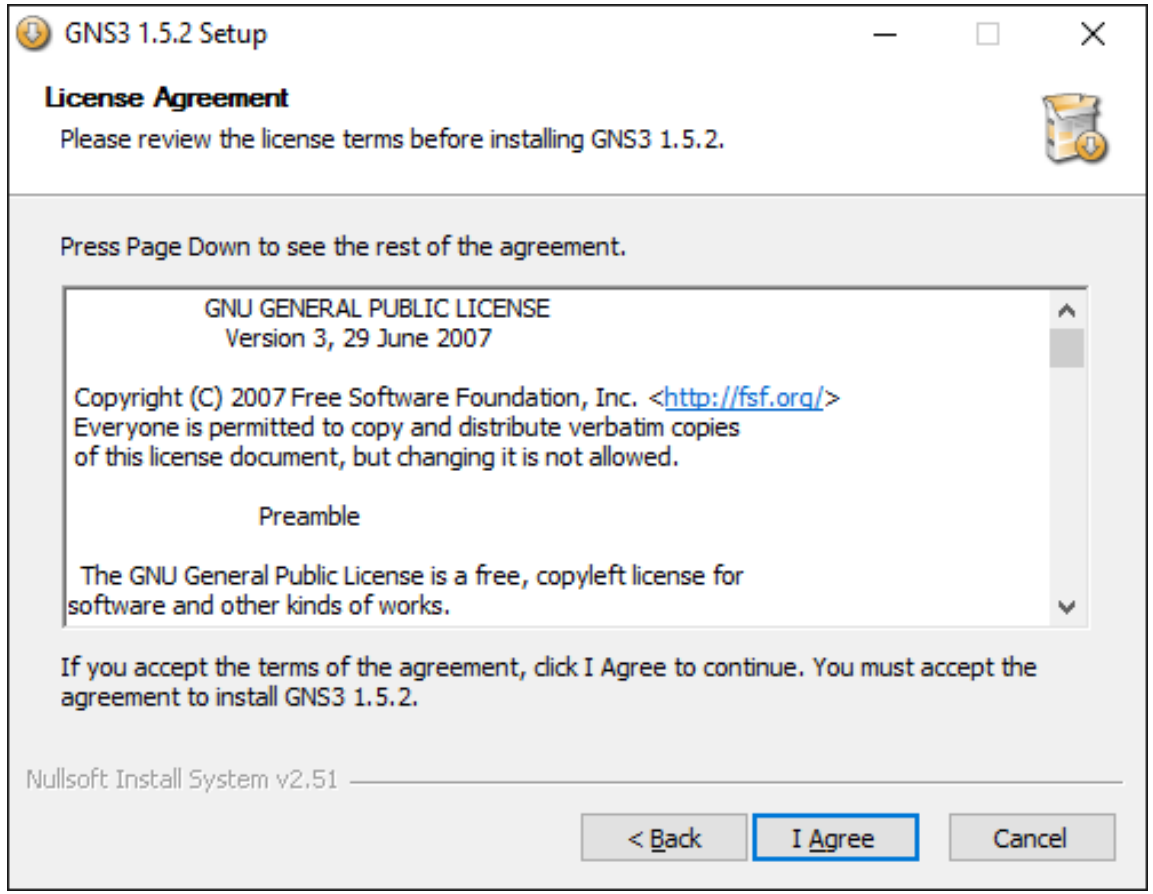
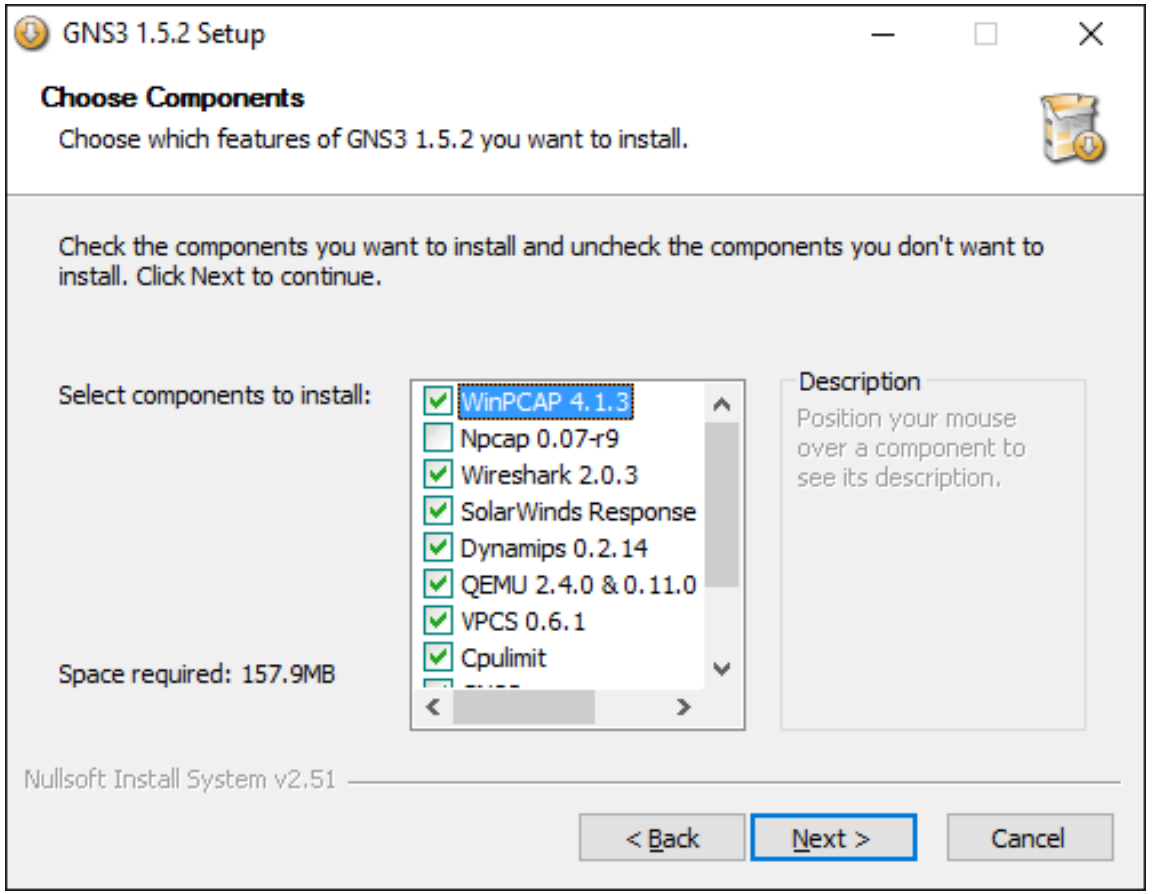
Installation Cont..





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Import VM

Once the installation is finished;

Extract the zipped VM (OVA) file

Import it into VMware

NB: you can use VMware player (free) or VMware workstation (license required).

We will use VMware Workstation 12 Pro.

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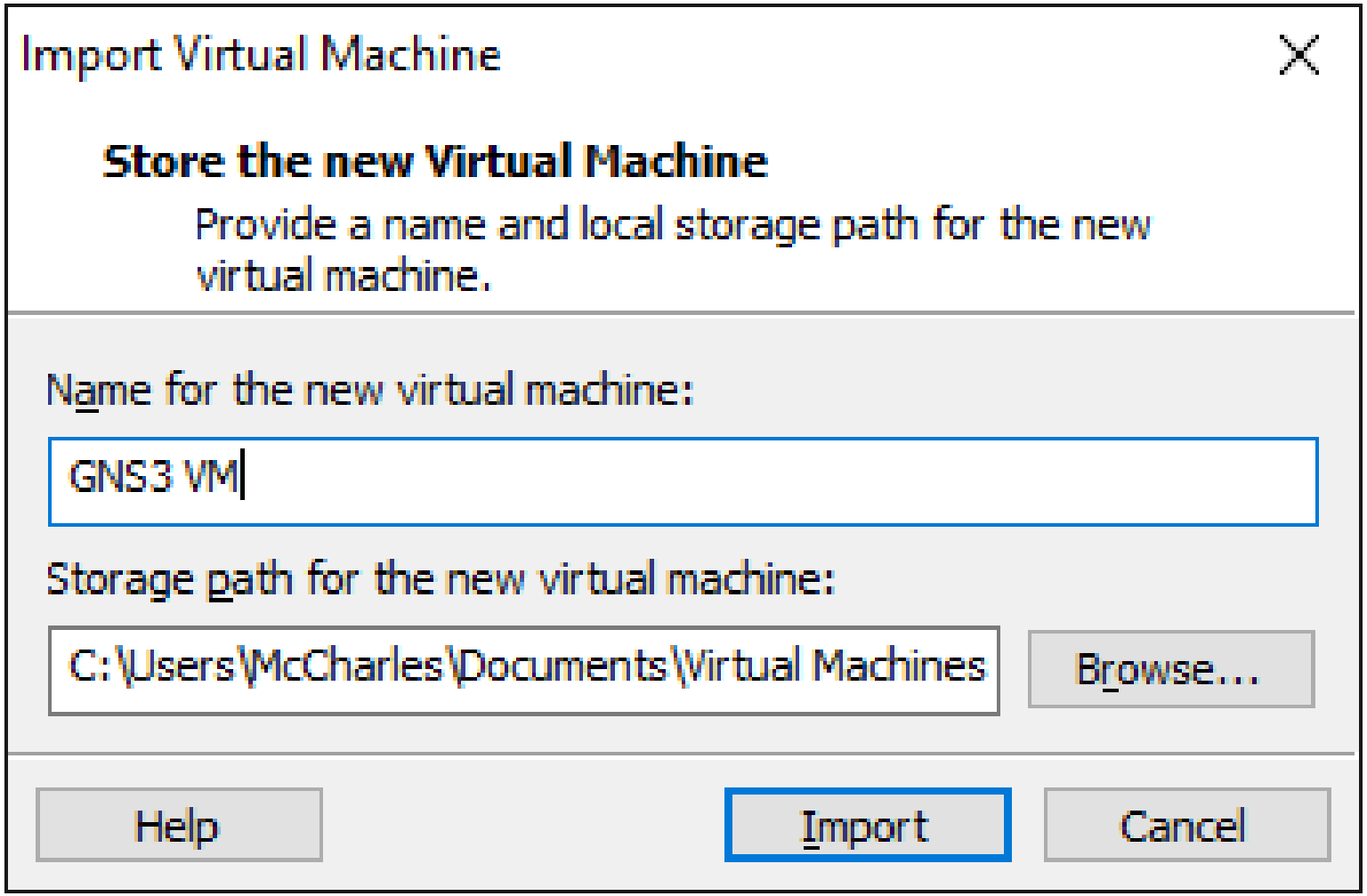
Import VM



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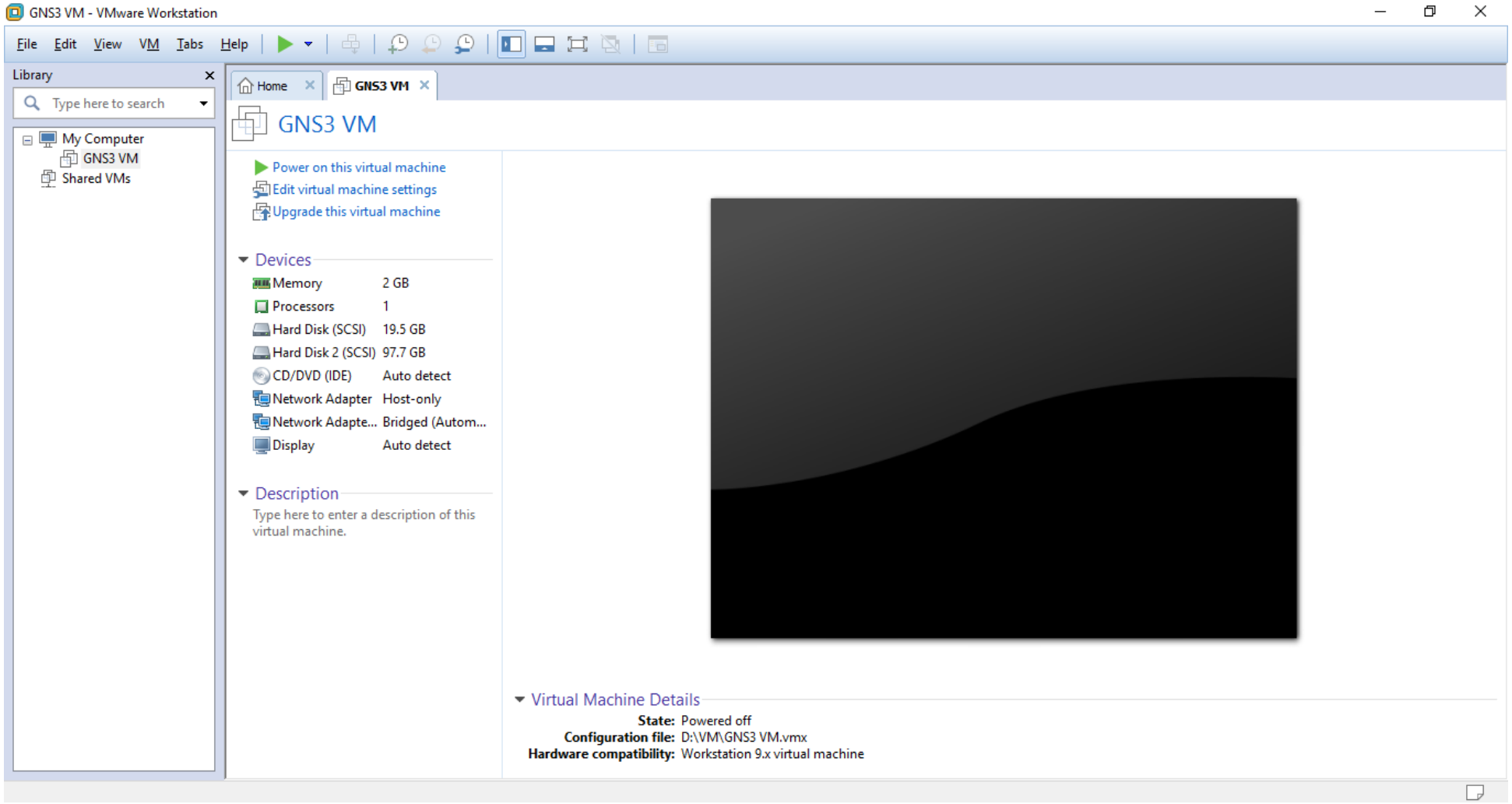
Imported VM



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What Next?

The Next thing is;

Download CHR from here:

http://www.mikrotik.com/download

NB: The file format to be downloaded depends on the hypervisor.

For our case we will download the VHDX file.

Initial Setup

Time to put the pieces together.

Open GNS3

Configure GNS3 to use the GNS3 VM

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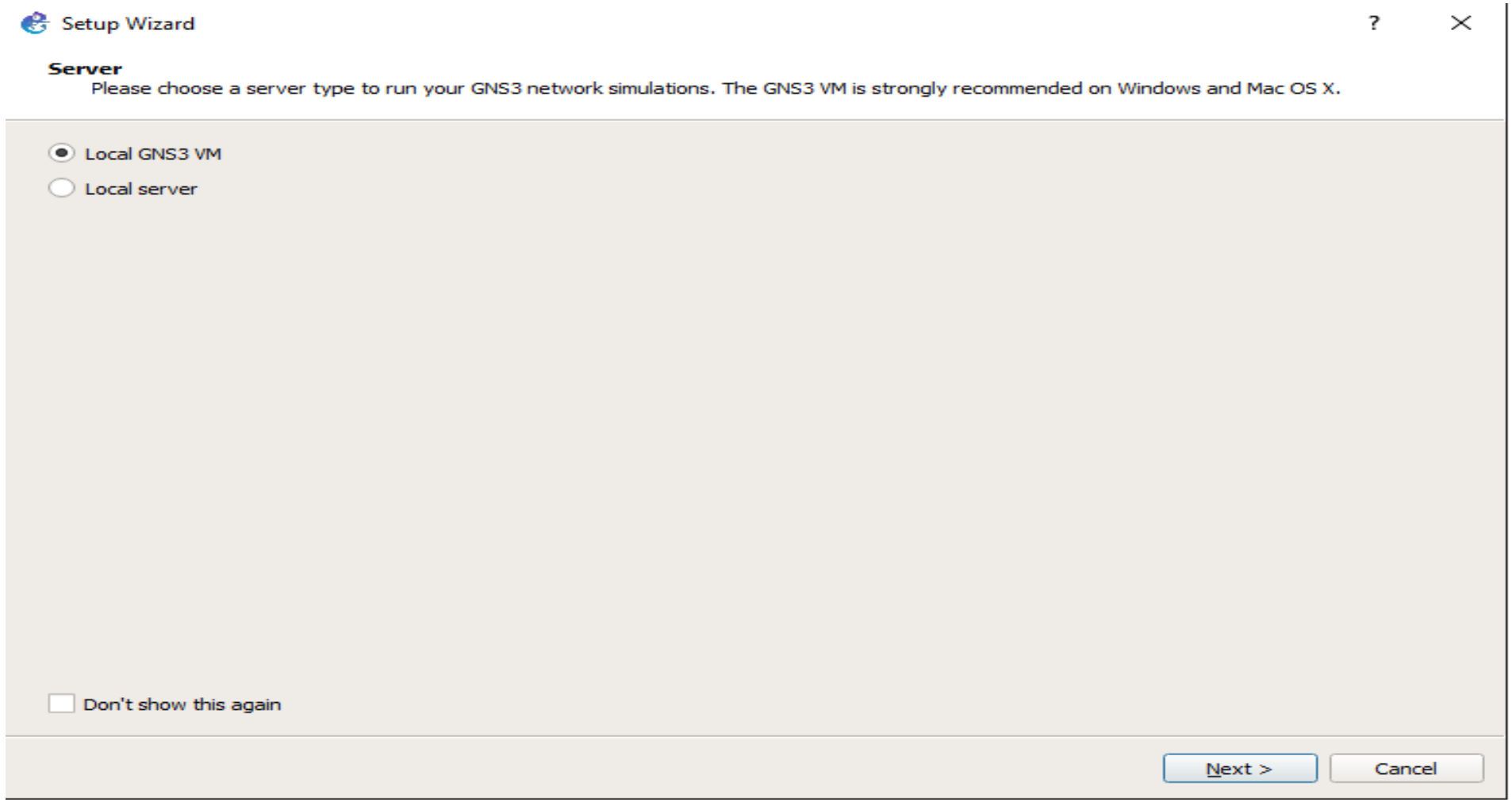
Initial Setup Cont..



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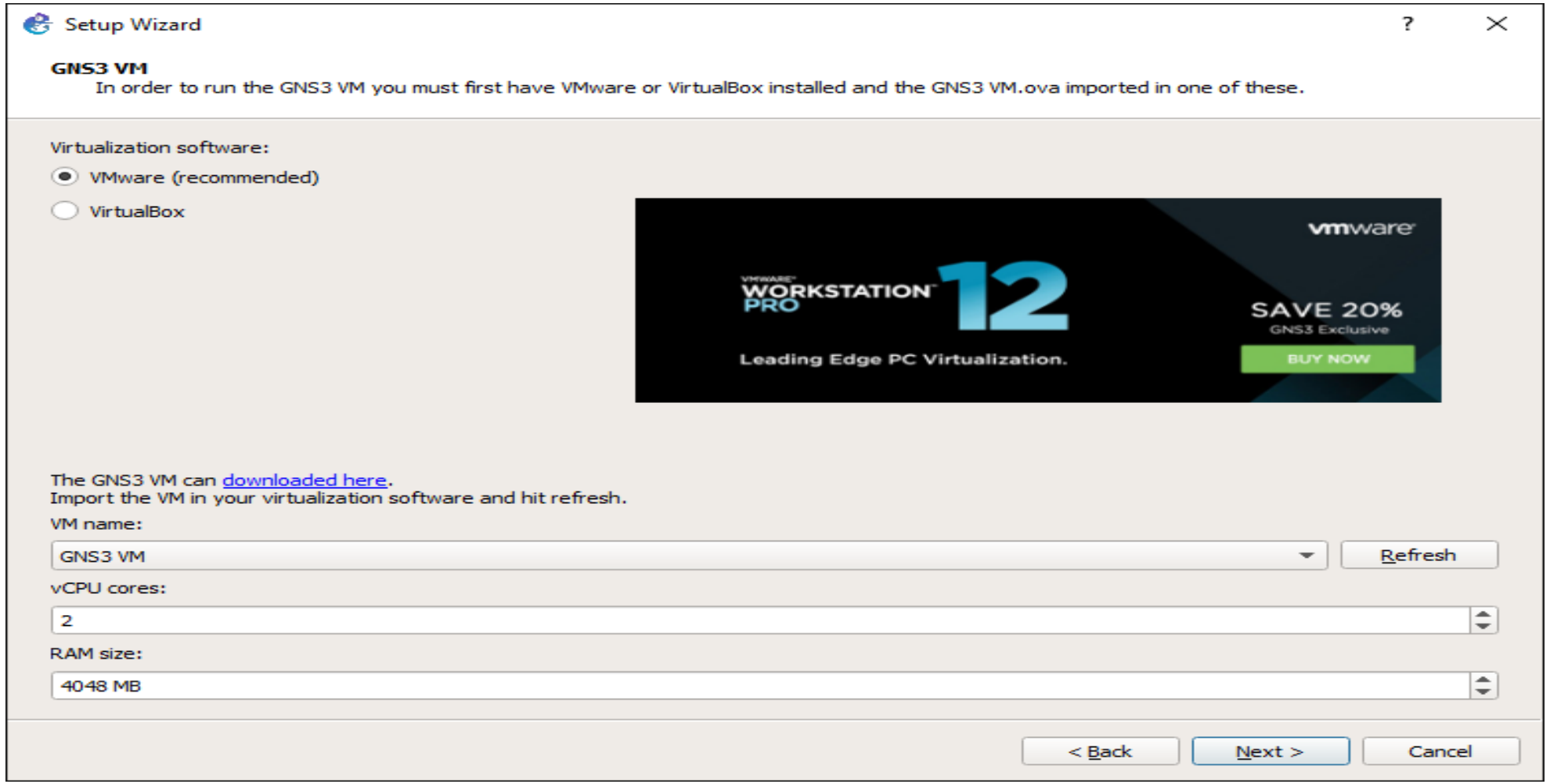
Initial Setup Cont..



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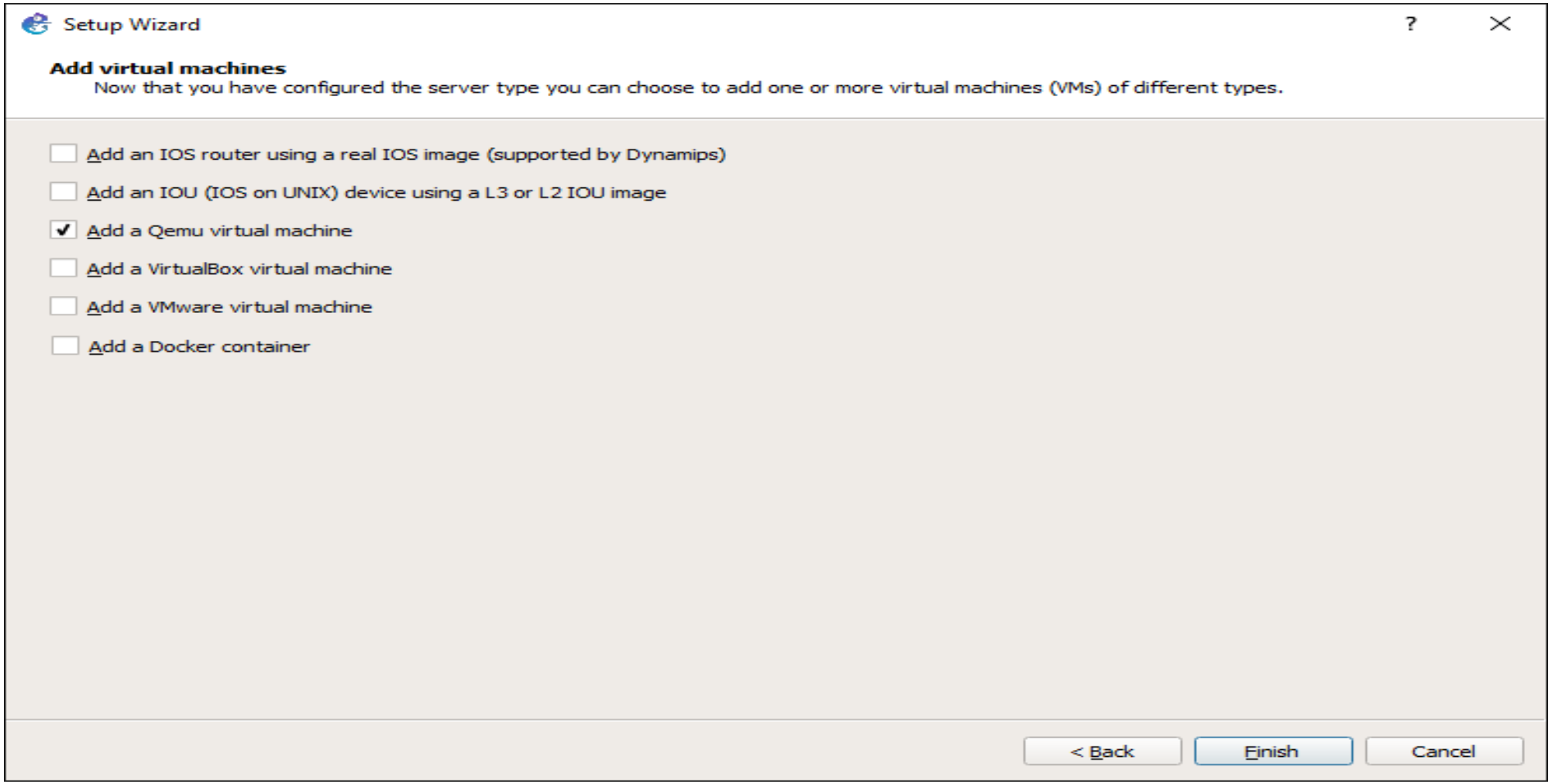
Finish Setup



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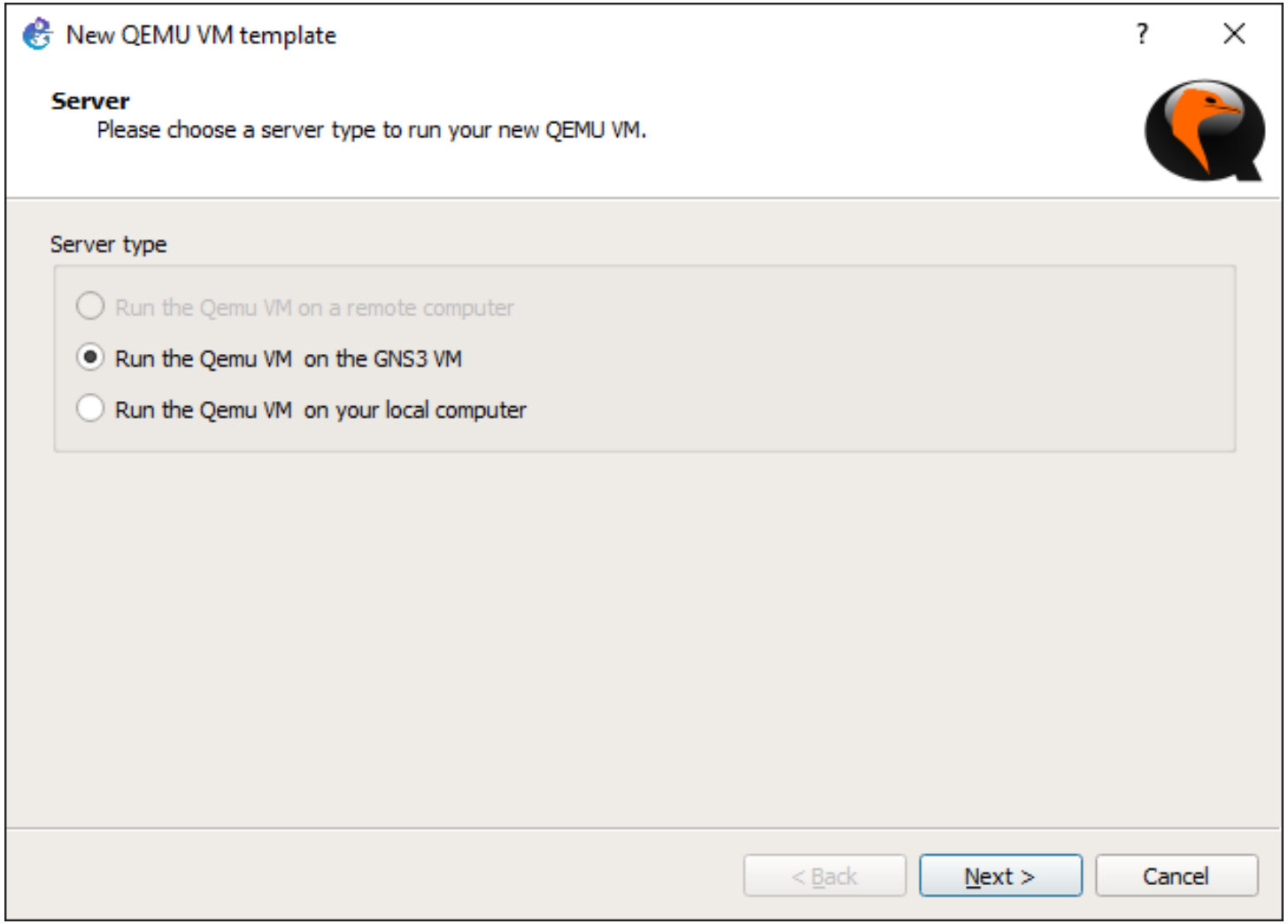
Select

Select “Run Qemu VM on the GNS3 VM”



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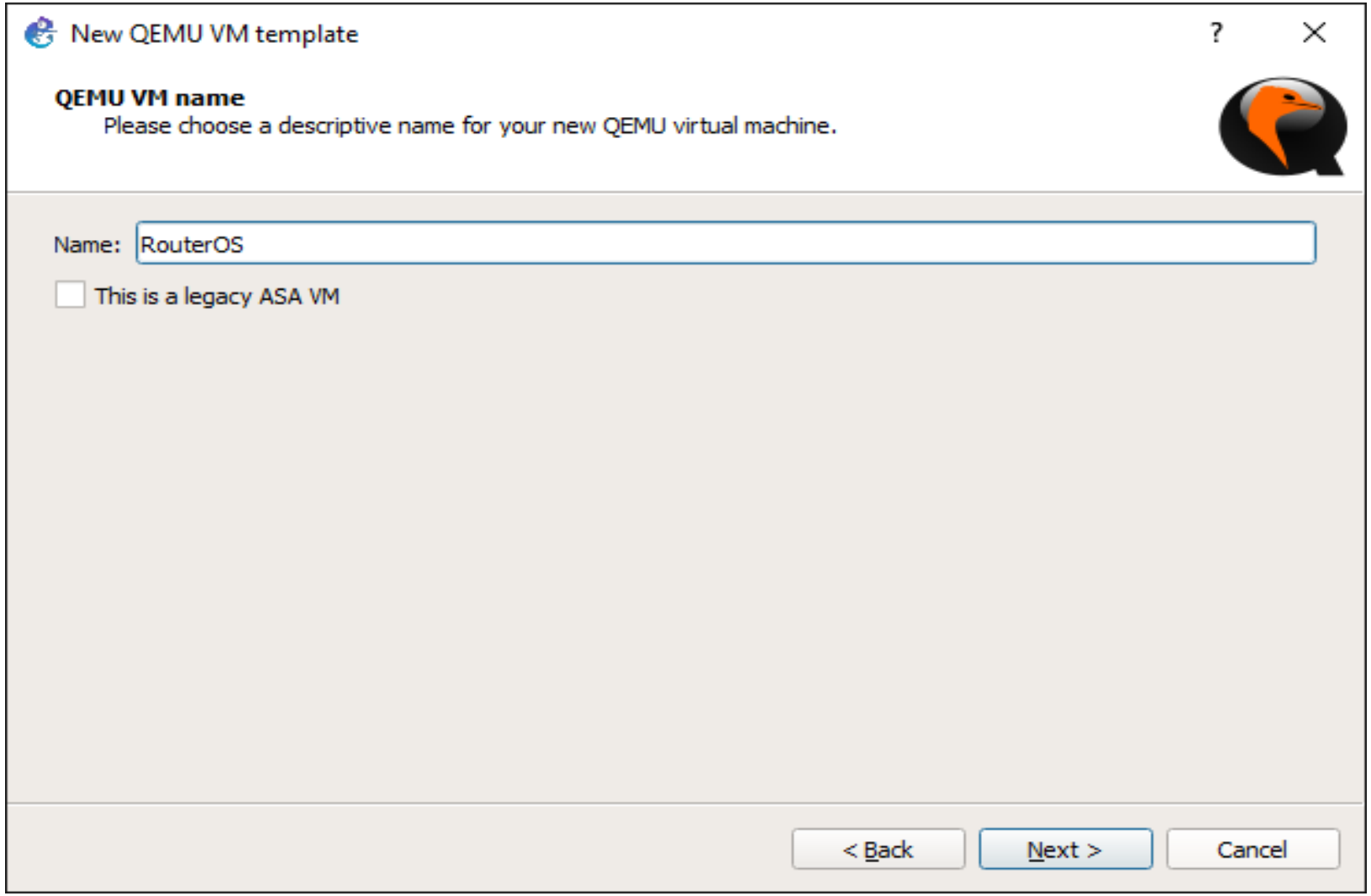
Name!

Give Your VM a name



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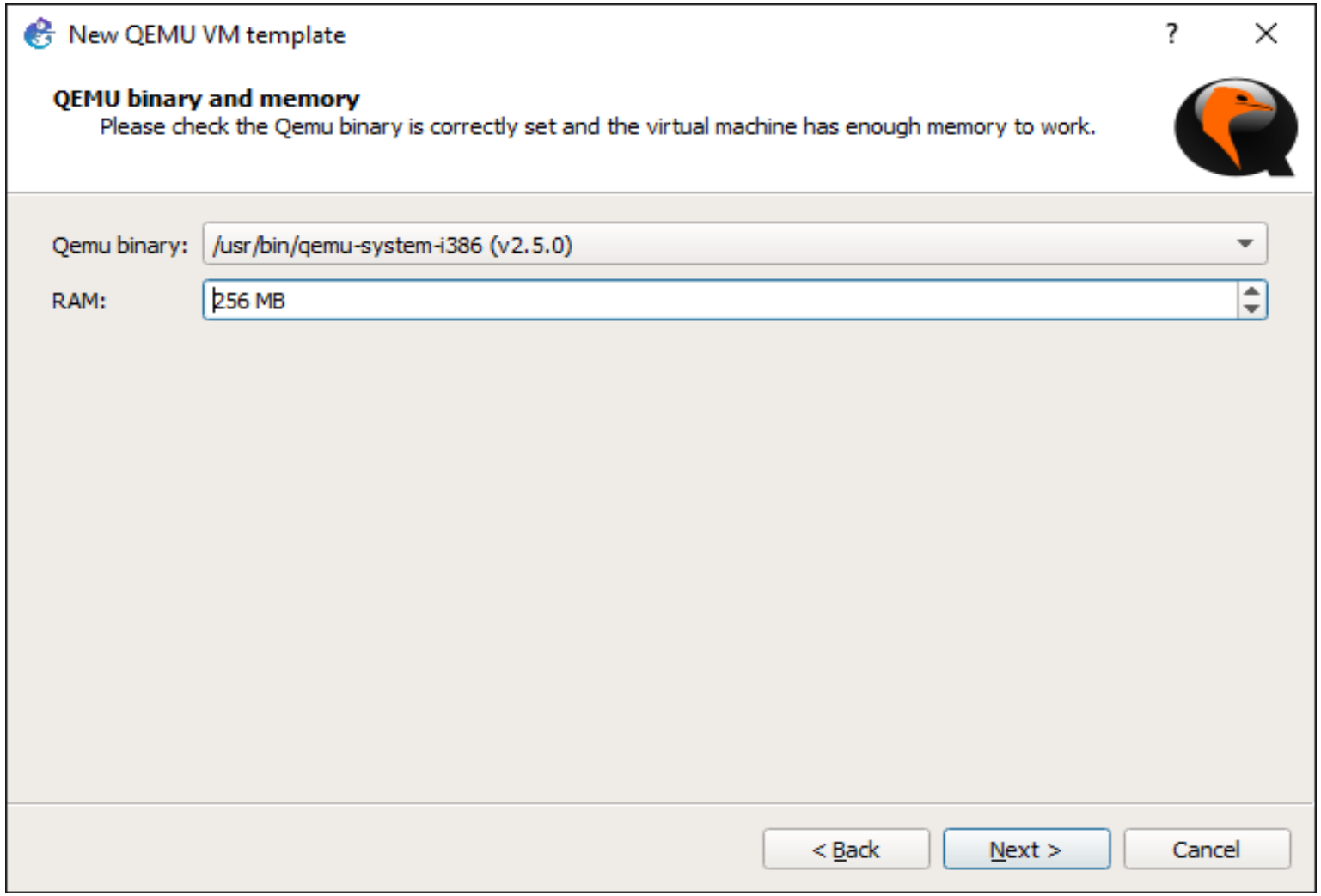
Set Memory

- Select the Qemu binay & location
- Set the Memory



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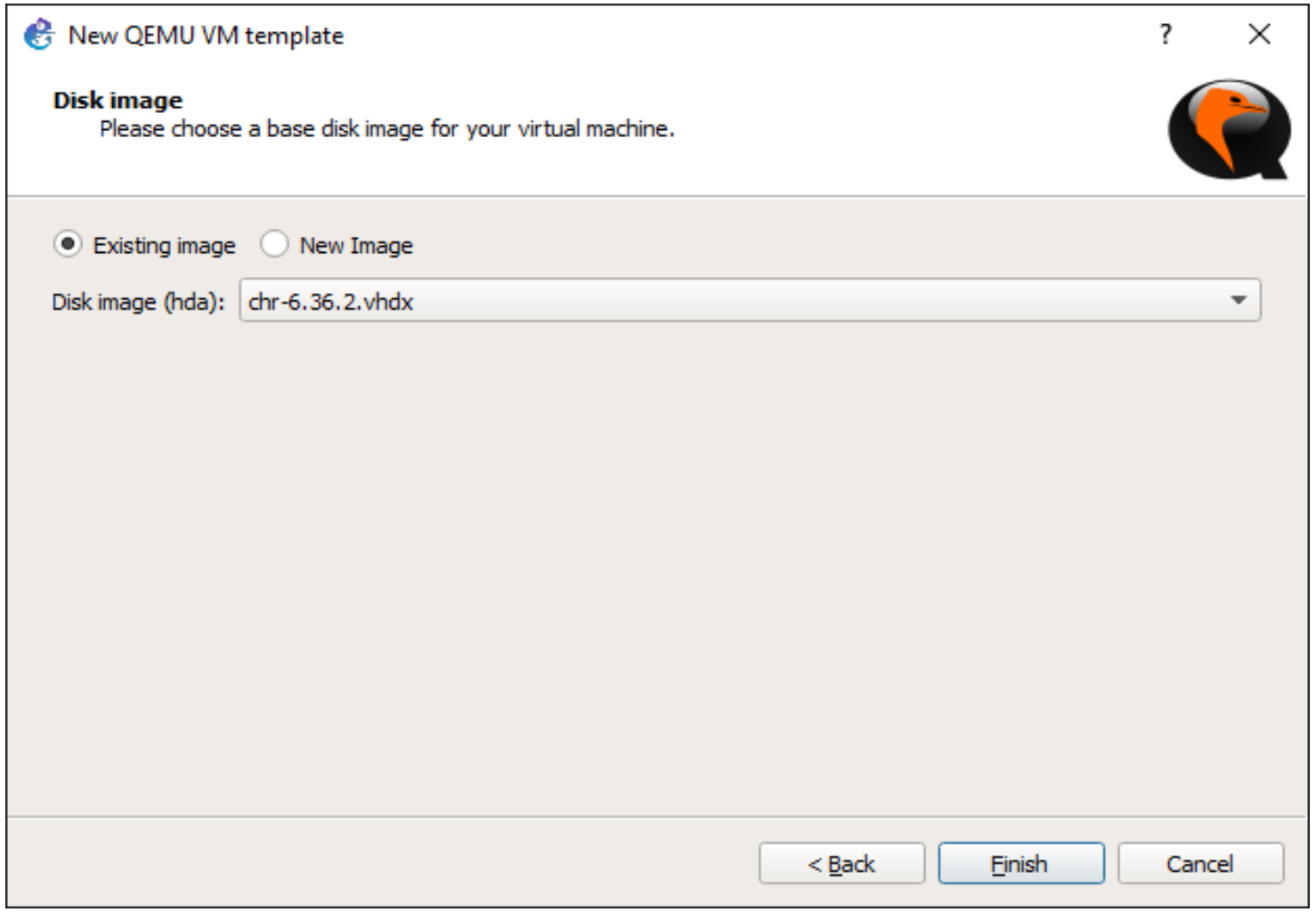
Disk Image

- Select “existing image”
- Browse to the location of your VHDX and select



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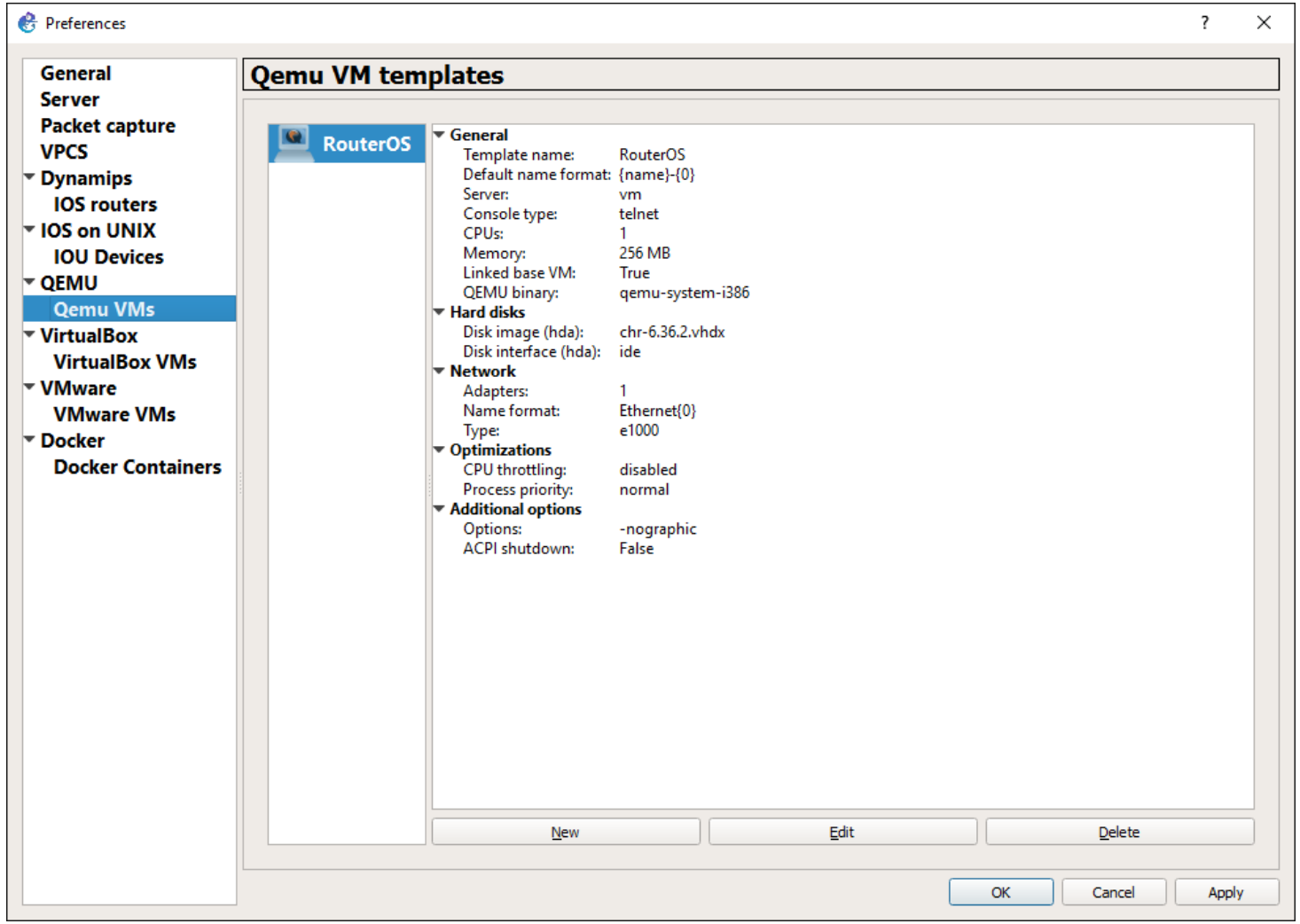
Now Set

Qemu VM template is now set and ready for use



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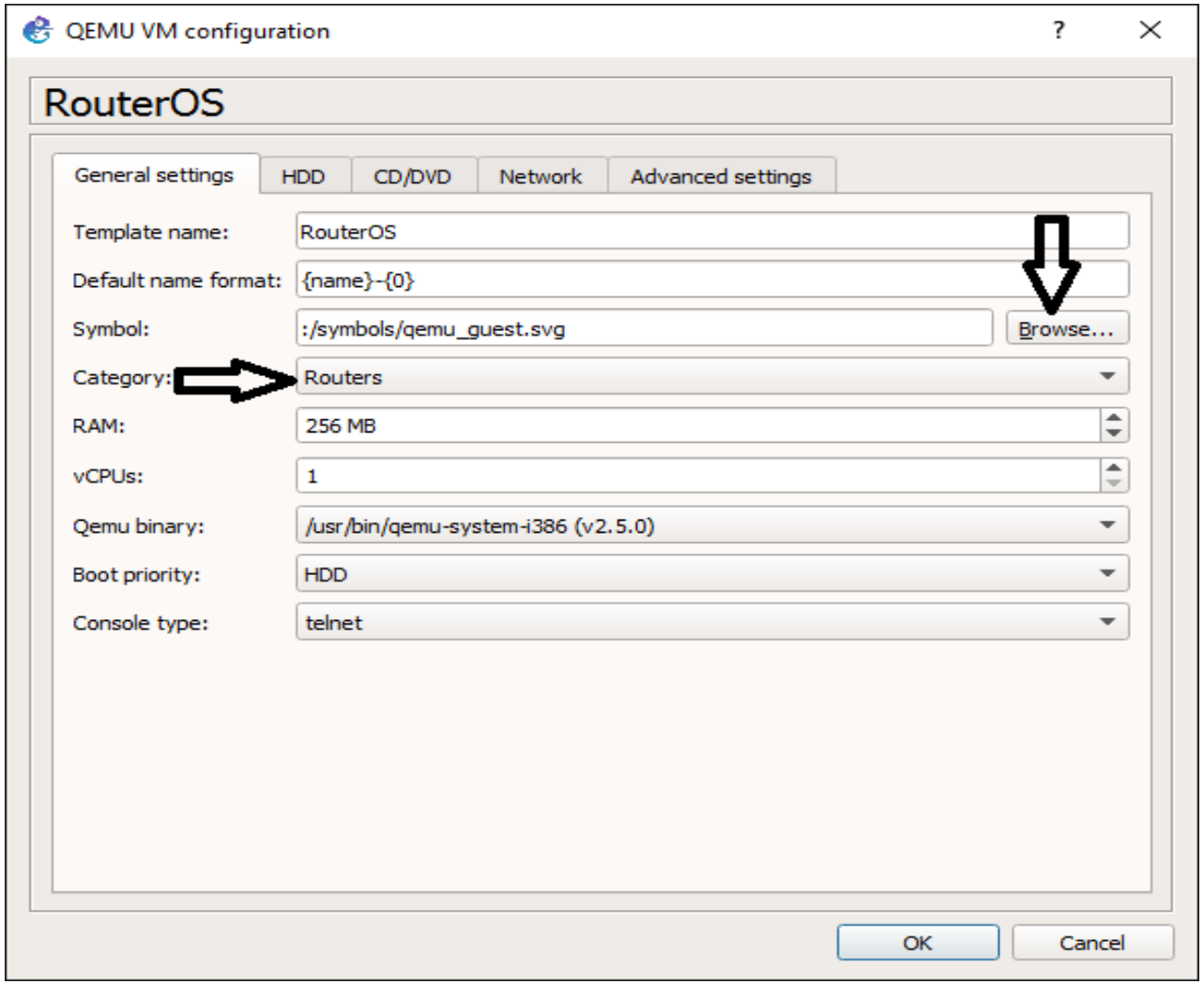
Edit Template

- Click ‘Edit’ then general tab
- Change category to ‘Routers’
- Change Symbol to that of a router



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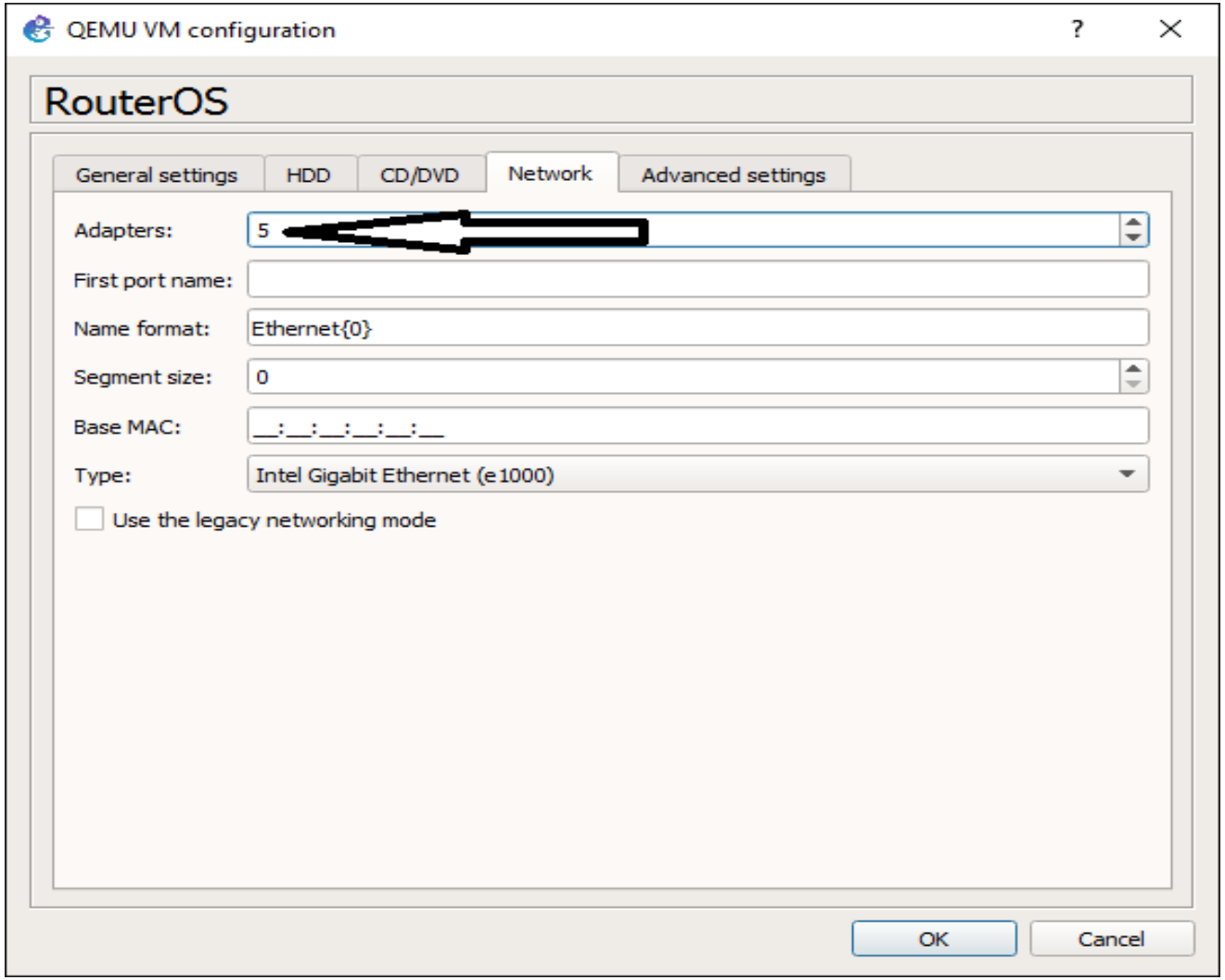
of Interfaces

Navigate to Network tab,

Under ‘Adapters’ Specify number of interfaces in the VM



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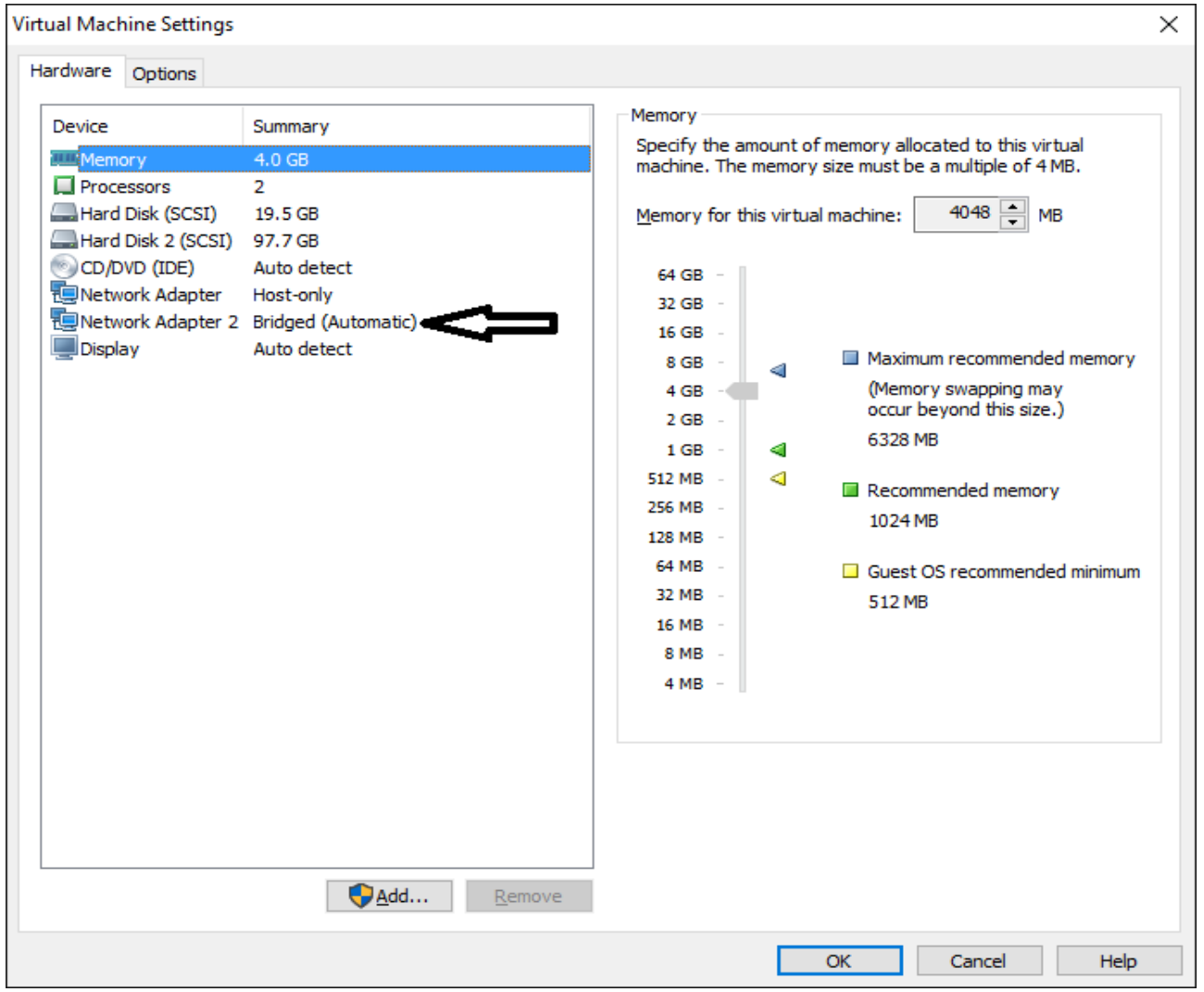
External Access

To allow VMs external access,

Configure GNS3 VM second network adapter to ‘bridge mode’



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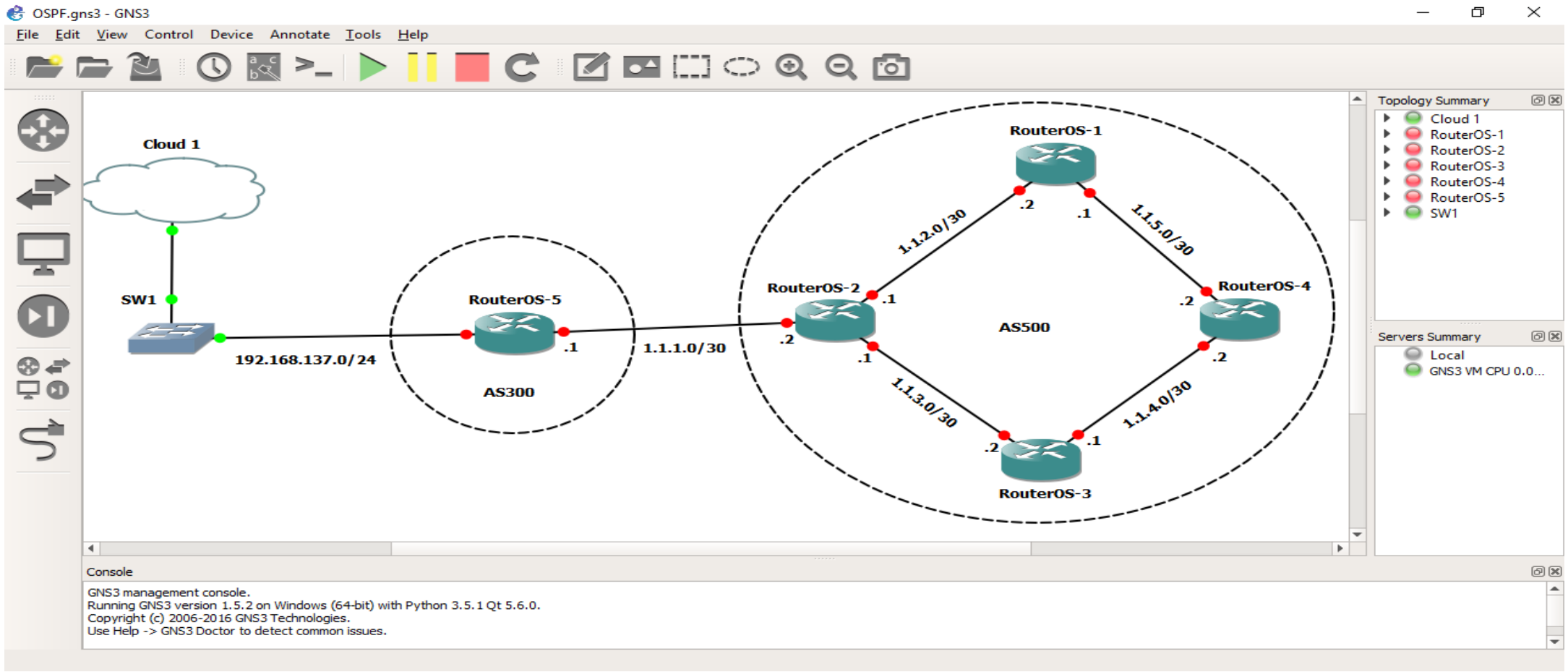
Get to Work!

Drag RouterOS to the blank canvas to set up your desired network



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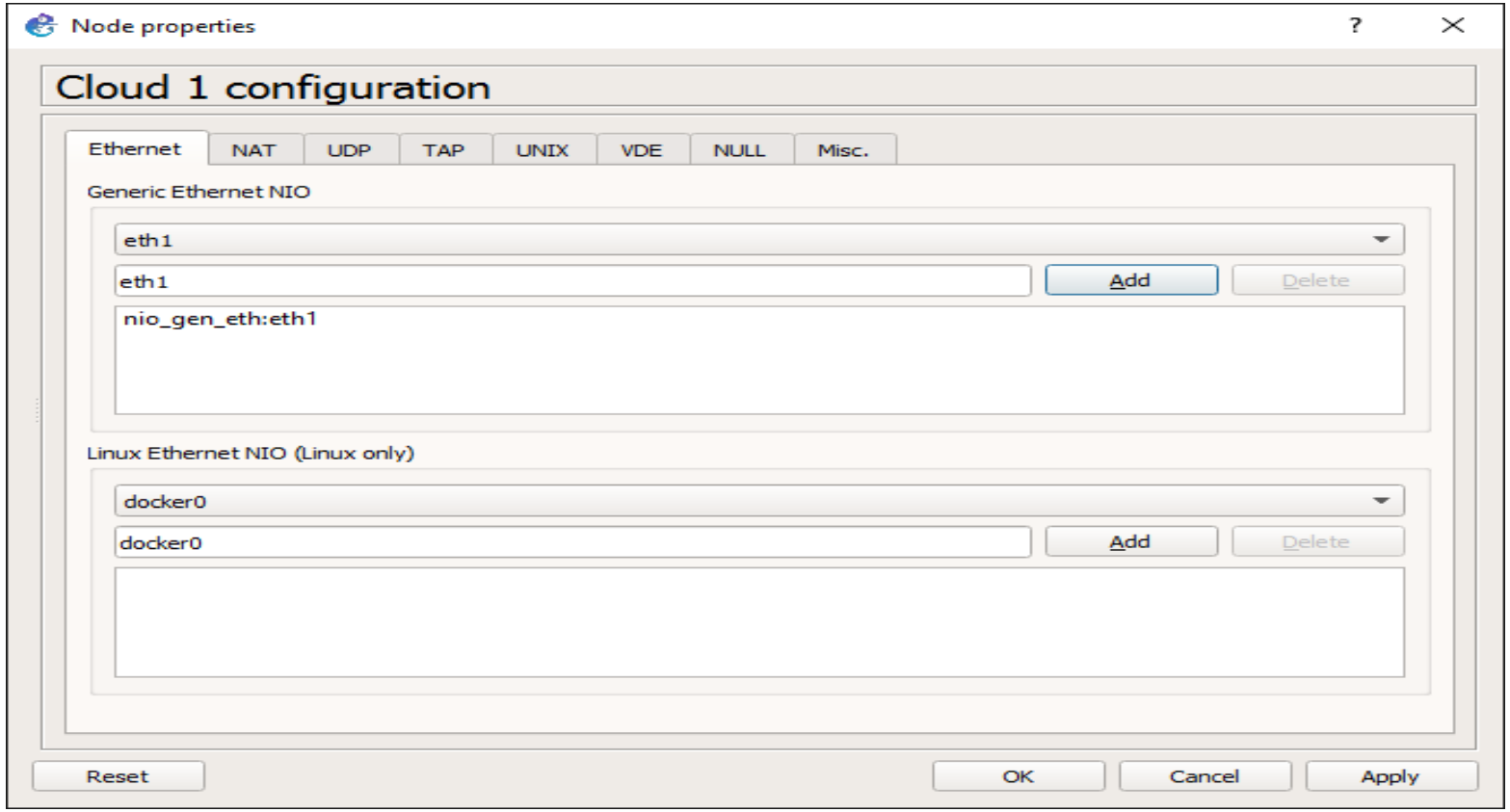
Cloud!

Use the Cloud to connect your VMs to external resources



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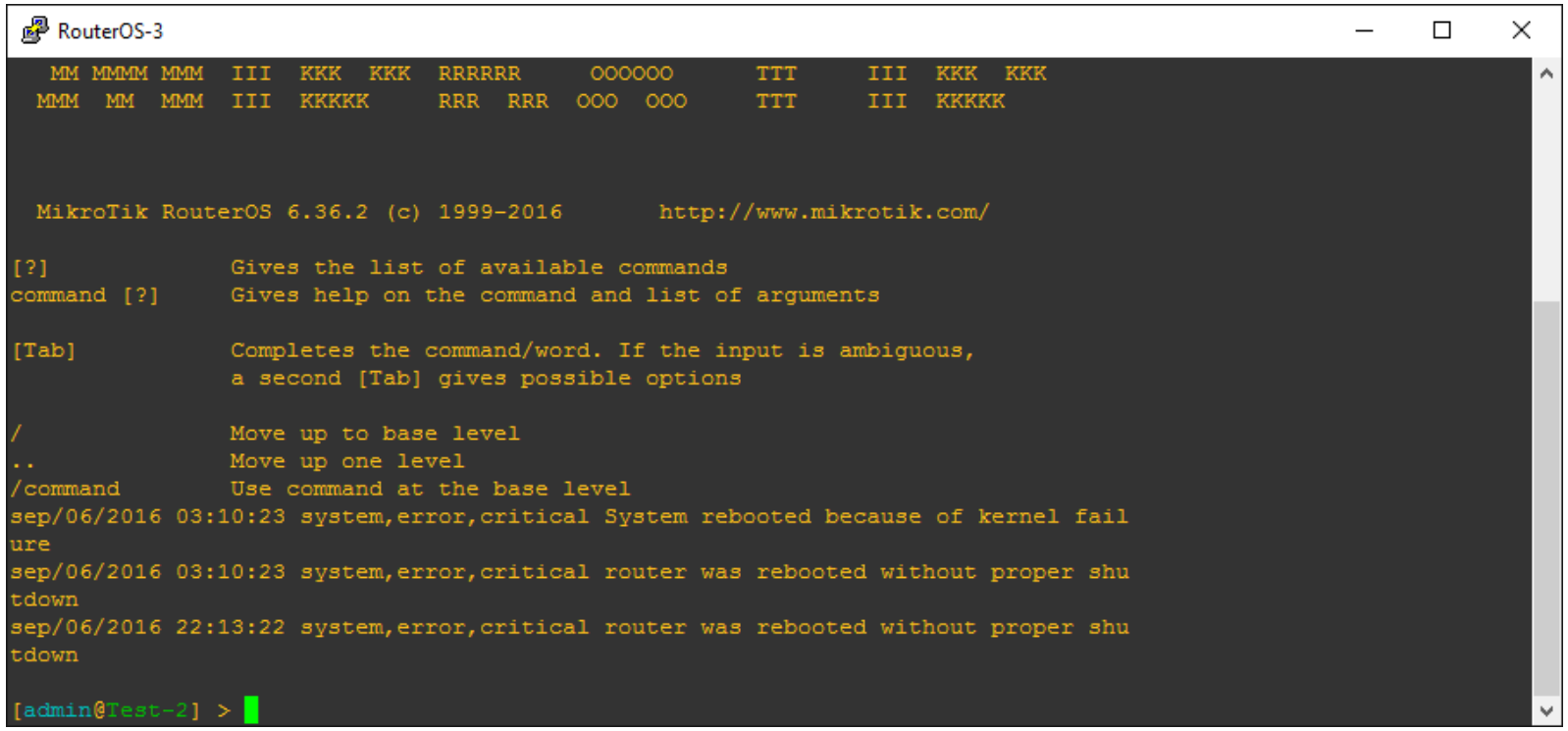
Console

Power up your routers by right-clicking each and selecting ‘start’

Or power all at once with green ‘start’ button at the top.

Console in by right-clicking and select ‘console’



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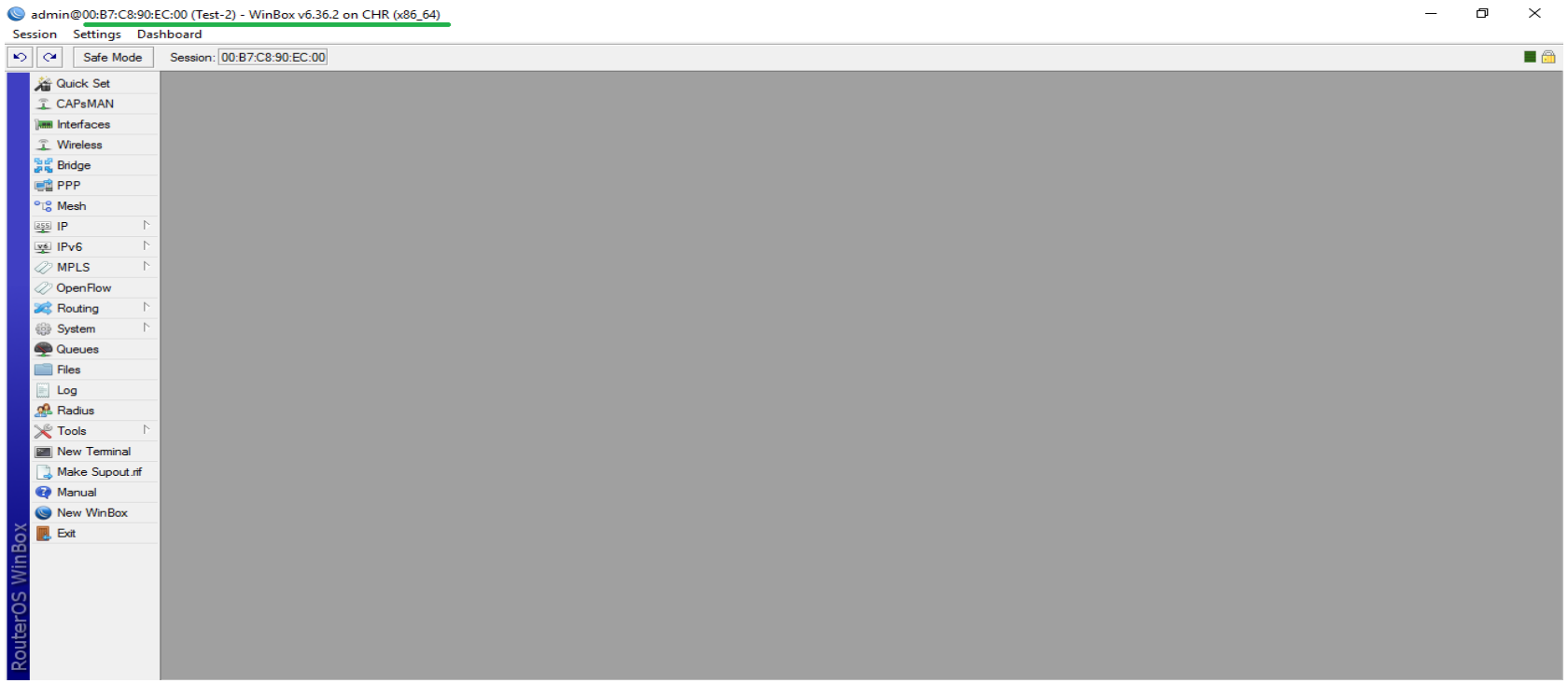
Winbox

At this point, the router can be configured using Winbox.

/tool romon set enabled=yes



Application (in my Case)

- Consulting for a small WISP that wanted to scale up
- Need for uptime/HA with BGP
- Faster convergence with OSPF
- Improved Network Security

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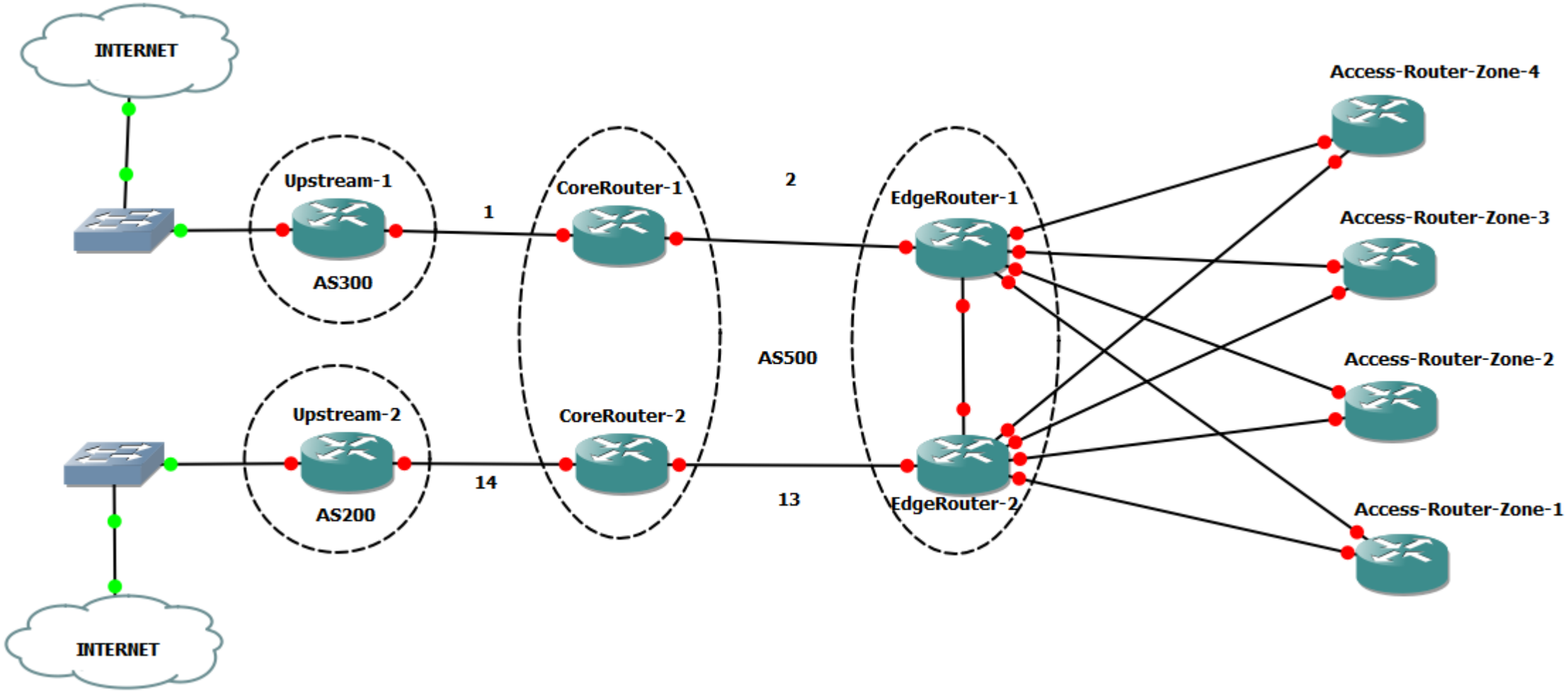
Our Proposal



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BGP Setup

```
[admin@CoreRouter-1] > /routing bgp instance set default as=500 redistribute-static=no

[admin@CoreRouter-1] > /routing bgp peer add remote-address=41.217.X.Y remote-as=200

[admin@CoreRouter-1] > /routing bgp instance set default redistribute-static=yes
```

NOTE: Swap IP address and AS Number with the correct ones for each of the Core Routers and the Upstream Routers.

OSPF Setup

```
[admin@EdgeRouter-1] /routing ospf instance> add name=default

[admin@EdgeRouter-1] /routing ospf instance> set 0 router-id=1.1.1.1

[admin@EdgeRouter-1] /interface bridge> add name=loopback

[admin@EdgeRouter-1] > ip address add address=X.X.X.X/32 interface=loopback

[admin@EdgeRouter-1] /routing ospf network> add network=Y.Y.Y.0/22 area=backbone
```

NOTE: Swap Router ID, Network statements, Loopback IP Address with the correct ones for each of the participating routers.

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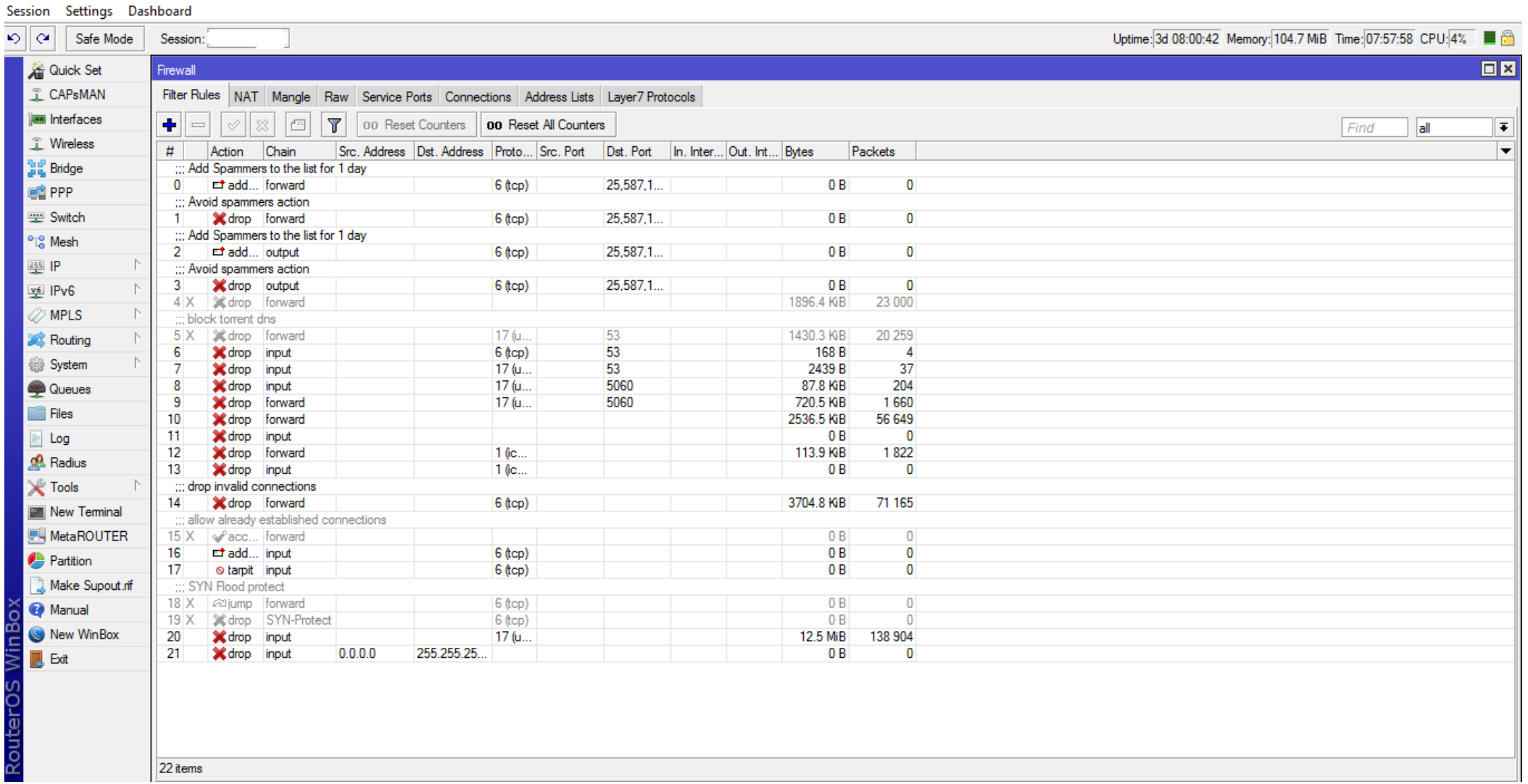
Firewall/Security



Other Tools

- **GNS3 is bundled with useful tools such as;**
  - ***VPCS (Virtual PC Simulator)- This is a simple network testing tool that has essential commands like traceroute, ping, arp built in.***
  - ***Wireshark: A powerful protocol analyzer that can be used to capture and analyze packets***

Migration

Q. *How do we move from simulation to production Or to another platform?*

- *GNS3 stores all project files under one folder which is movable to another computer. RouterOS template image file (.img) should also be copied together with the project itself and placed into 'GNS3/images' folder on target machine.*
- *Qemu stores images in qcow2 (copy-on-write) format. These images can be run separately from GNS3.*
- *If in production environment different hypervisor is used, qcow2 image can be converted to various formats using 'qemu-img convert' command*

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Advantages

- Training –Almost as realistic as building a mock network with real equipment
- Network Validation –Allows you test network designs and changes before they are applied to a production network
- Reduces downtime
- Increases ROI

Summary

- CHR is a fully functional RouterOS
- Any descent computer that supports virtualization can be used for Lab scenario
- GNS3 Lab configurations can be migrated to other systems or production.
- Wireshark and other tools are bundled with GNS3 for testing and analysis
- The uses are only limited by your imagination

The End

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Thank You!

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