ABOUT ROFIQ FAUZI

• Using MikroTik (v.2.97) since 2005, as Network Engineer at WISP.
• 2007, Network & Wireless Engineer at INDOSAT Central Java Area
• 2008, Network & Telco Procurement at INDOSAT Head Quarter
• 2012-Now, MikroTik Consultant & Certified Trainer (MTCNA, MTCRE, MTCTCE, MTCWE, MTCINE, Certified Trainer) at ID-Networkers.
• 2013-Now, Network Manager at WISP Indomedianet, Indonesia

CONSULTANT

CERTIFIED TRAINER

http://www.mikrotik.com/consultants/asia/indonesia

http://www.mikrotik.com/training/partners/asia/indonesia
ABOUT ID-NETWORKERS

EXPERT LEVEL TRAINERS & CONSULTANTS

In the Most Prestigious Networking Certification

OVERVIEW
We are young entrepreneurs, we are only one training partner & consultant who has expert level trainers in the most prestigious networking certification, CCIE Guru, JNCIE Guru and MTCINE guru, which very limited number in Indonesia even Asia. Proven that hundred of our students pass the certification exam every year. We are the biggest certification factory in Indonesia.

WEBSITE
www.id-networkers.com
I have simulator, I am running on GNS3 Network simulator

I want too!!

Me too!!

Another network device can running on simulator, make easy to learn and develop network topology

Sometime, we want to create some mikrotik network topology and test how it works, for example, we want to make some test with 4-8 routers to simulate the real network and with real routerboard. We need a lot of money to make real lab.
01. LEARN MIKROTIK FEATURES
Easy to learn and practice more of MikroTik features, anytime anywhere

02. NETWORK SIMULATION
We can try some features in simulation network lab with any topology before its will deploy or implement in the real network.

03. TEACHING
Teaching someone, In ID-Networkers, we use to teach MikroTik expert training.
THE CONCEPT

Put all your devices in your POCKET
## TOOLS & INGREDIENTS

<table>
<thead>
<tr>
<th><strong>GNS3</strong></th>
<th><strong>QEMU</strong></th>
<th><strong>MikroTik ISO file</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Graphic Network Simulator</td>
<td>Known as Quick EMUlator</td>
<td>Has Mikrotik license level 0</td>
</tr>
<tr>
<td>Open Source Software</td>
<td><strong>Open source</strong> software</td>
<td>Made for x86 hardware architecture</td>
</tr>
<tr>
<td>Running on Windows, Linux</td>
<td>Emulates full system (usually a PC).</td>
<td>Usually burn in to CD</td>
</tr>
<tr>
<td>Simulate complex network topologies</td>
<td>Launch a different OS</td>
<td>To install MikroTik in to PC or power PC</td>
</tr>
<tr>
<td>Running multi vendor devices</td>
<td>As alternative: VMware, Virtual Box, KVM, etc</td>
<td>Download at</td>
</tr>
</tbody>
</table>
## MIKROTIK VIRTUALIZATION PROGRAM

Comparing between VMWare, VirtualBox and Qemu

<table>
<thead>
<tr>
<th>COMPANY</th>
<th>Possible Put in GNS3 (GUI)</th>
<th>License</th>
<th>Memory Load</th>
<th>Remark</th>
</tr>
</thead>
<tbody>
<tr>
<td>VMWare</td>
<td>Only connect</td>
<td>Free, commerce</td>
<td>High</td>
<td>1 image for 1 router</td>
</tr>
<tr>
<td>Virtual Box</td>
<td>Yes</td>
<td>Free</td>
<td>High</td>
<td>1 image for 1 router</td>
</tr>
<tr>
<td>Qemu</td>
<td>Yes</td>
<td>Free</td>
<td>Low</td>
<td>1 image for all router</td>
</tr>
</tbody>
</table>

Qemu is the best emulator to run MikroTik routeros and put on GNS3 Network simulator (GUI)
PERFORMANCE GRAPH

This graph represents how if we are using Windows 7 and add some Mikrotik-Qemu device (virtual mikrotik router) in GNS3, how it will affect performance of our Laptop or PC, especially in memory usage.

Run Mikrotik with Qemu (mikrotik virtual router) will only increase Memory/RAM usage, CPU usage will not affected.

Every add one Mikrotik-Qemu on GNS3 will consume memory/RAM usage approximately 80Mb each router.

Mean that if for example we have 4GB memory, we can calculate: (4000MB – 1500MB) / 80 = 31 routers.
HOW TO DO IT

1. Download MikroTik ISO file
2. Install ISO to Image file
3. Run image in Virtual Machine
4. Put virtual machine on Network Simulator
1. After download All tool & ISO file, move ISO file to the folder where the GNS3 program located. Go to command line and move to GNS3 folder.

   ```
   C:\Users\admin>cd C:\Program Files\GNS3
   C:\Program Files\GNS3>
   ```

2. Then run the command to make the image file, for example named mikrotik.img

   ```
   C:\Program Files\GNS3>qemu-img.exe create -f qcow2 mikrotik.img 256M
   Formatting 'mikrotik.img', fmt=qcow2 size=268435456 encryption=off cluster_size=0
   ```

3. Install ISO file to the current image, I assume that the ISO file name is "mikrotik.iso", you can adjust file name to match with the following command

   ```
   C:\Program Files\GNS3> qemu.exe mikrotik.img -boot d -cdrom "mikrotik.iso"
   ```
LAB DEMO

4. Qemu will show MikroTik installation process similar to when we install it using CD-room

Just follow the INSTALLATION WIZARD
LAB DEMO

5. After the installation is complete (indicated by RouterOS reboot), close the window and try boot from image

C:\Program Files\GNS3>qemu.exe mikrotik.img -boot c

Qemu will boot and run routeros until see the login prompt MiroTik routeros

6. Put Mikrotik image to the Qemu Guest in GNS3
   – Open GNS3 program
   – Make a symbol for mikrotik device, click Edit > Symbol Manager
Choose one of symbol that we want to use as Qemu Guest, and give a name “MikroTik ROS”
7. Make Qemu Guest in order to load mikrotik image that we create before, in GNS3 menu, go to Edit > Preferences > and go to Qemu Guest tab:

- Set Qemu Guest name
- Set binary image, direct to mikrotik image
- Set virtual memory allocation
- Set number of ethernet card
- Set ethercart model
LAB DEMO

8. Mikrotik in GNS3 device is ready to use.

1. Drag and drop mikrotik device from devices menu to work area.
2. Run the device until qemu guest / mikrotik image has finished booting.
BREAK, it's time to QUIZ

Answer the question, and get free MikroTik RB951Ui-2HnD

Powered by Free!MikroTik

dari MU untuk MU
How to use winbox to remote our virtual router?
INSTALL LOOPBACK INTERFACE

HARDWARE WIZARD

Find the Hardware Wizard command:
1. Click the Start menu.
2. Search for “cmd”.
3. Right-click on “cmd” and select “Run as Administrator”.
4. Enter “hdwwiz.exe”

MICROSOFT LOOPBACK ADAPTER

Then follow this step:
1. In the "Welcome to the Add Hardware Wizard", click Next.
2. Select "Install the hardware, manually select from a list (Advanced)" and click Next.
3. Scroll down and select "Network adapters" and click Next.
4. Select under Manufacturer "Microsoft" and then under Network Adapter "Microsoft Loopback Adapter" and click Next.

We also possible to create loopback interface in your PC/laptop using GNS3, in menu Tool>Loopback Manager
**PROCESS**

1. **Welcome to the Add Hardware Wizard**
   - This wizard helps you install driver software to support older devices that do not support Plug-and-Play and which are not automatically recognized by Windows.
   - You should only use this wizard if you are an advanced user or you have been directed here by technical support.
   - If your hardware came with an installation CD, it is recommended that you click Cancel to close this window and use the manufacturer's CD to install this hardware.
   - To continue, click Next.

2. **What do you want the wizard to do?**
   - Search for and install the hardware automatically (Recommended)
   - Install the hardware that I manually select from a list (Advanced)

3. **Select a hardware type**
   - You can select the type of hardware you are installing.
   - If you do not use the hardware category you want, click Show All Devices.
   - Common hardware types:
     - Memory technology driver
     - Modems
     - Multi-port serial adapters
     - Network adapters
     - PCMCIA adapters
     - Ports (COM & LPT)
     - Printers
     - Other devices
     - Other devices
     - Other devices

4. **Network Adapter**
   - Click the Network Adapter that matches your hardware, then click OK. If you have an installation disk for this feature, click Have Disk.
   - Manufacturer: Intel
   - Intel Corporation
   - Microsoft
   - This driver is digitally signed. Tell me why driver signing is important

5. **Hardware to install**
   - Microsoft Loopback Adapter
   - To start installing your new hardware, click Next.

6. **Completing the Add Hardware Wizard**
   - The following hardware was installed:
   - Microsoft Loopback Adapter
   - Windows has finished installing the software for this device.
   - To close this wizard, click Finish.
CONNECT LOOPBACK INTERFACE TO GNS3

CONFIGURE CLOUD IN GNS3

To connect between loopback interface & GNS3 we need to do following steps:
1. In GNS3 choose device type cloud and drag and drop to work area.
2. Right click twice on the device to configure it.
3. Go to “C1” menu and tab “NIO Ethernet”
4. Point “Generic Ethernet NIO” to loopback interface that we created previously, if not yet detected you need to reboot your laptop.
5. Choose, add, apply and OK

CONNECT LAPTOP TO ROUTER DEVICE

To connect between laptop and MikroTik virtual router device, we need to do following steps:
1. After cloud had been configured, add mikrotik device and Ethernet switch device on work area.
2. Connect between three of them using link device.
3. Configure IP address on MikroTik device one subnet with loopback interface, now you can ping and remote it via laptop
Choose loopback interface, add and OK
CONFIGURE DEVICE IP ADDRESS

ID-NETWORKERS | www.training-mikrotik.com
rename interface to "loopback" to make easy to identify loopback interface
REMOTE DEVICE USING WINBOX

Open winbox in your PC/Laptop and connect to device IP address
THANK YOU FOR YOUR TIME

And see u in the next MUM

This slide also can be found at www.training-mikrotik.com and www.freemikrotik.com.

“If you cannot survive in the tired of learning, then you will be suffering by the pain of stupidity” (Imam Syafii)
If you have any other questions or would like me to clarify anything else, please, let me know. I am always glad to help in any way I can.

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