How to set up multiple web servers (VMs) on XenServer reusing host's static IP

In this document we show how to:

- configure ip forwarding and NAT to reuse single ip by VMs and host
- create private network (10.0.0.0/24) for VMs on second NIC (PIF)
- install from scratch the first Debian VM using already configured private network
- create new Debian VM from existing one in a few easy steps
- configure port forwarding for ssh access to existing VMs
- install and configure haproxy to reuse port 80 (http) for all VMs and still allow xapi to be bound to port 80 on XenServer

Configure ip forwarding and NAT

Initially two networks are configured for us „**Network 0**” on „NIC 0” with configured „Management” interface with static IP and bridged with physical interface via **xenbr0** bridge, and „**Network 1**” on „NIC 1” bridged with second physical interface via **xenbr1** bridge.

What we need is to enable the ip forwarding of internet traffic for xenbr1 interface via xenbr0. To do this we need to login on XenServer host and make some changes in configuration.

First edit /etc/sysctl.conf file and assure that ip_forward is set to 1:

```
/etc/sysctl.conf
net.ipv4.ip_forward = 1
```

and load the modified settings to modify current kernel settings:

```
sysctl -p /etc/sysctl.conf
```

Next we need to configure iptables to enable forwarding and NAT of intenet traffic for xenbr1:

```
iptables -I FORWARD 1 -i xenbr1 -j ACCEPT
iptables -t nat -A POSTROUTING -o xenbr0 -j MASQUERADE
```

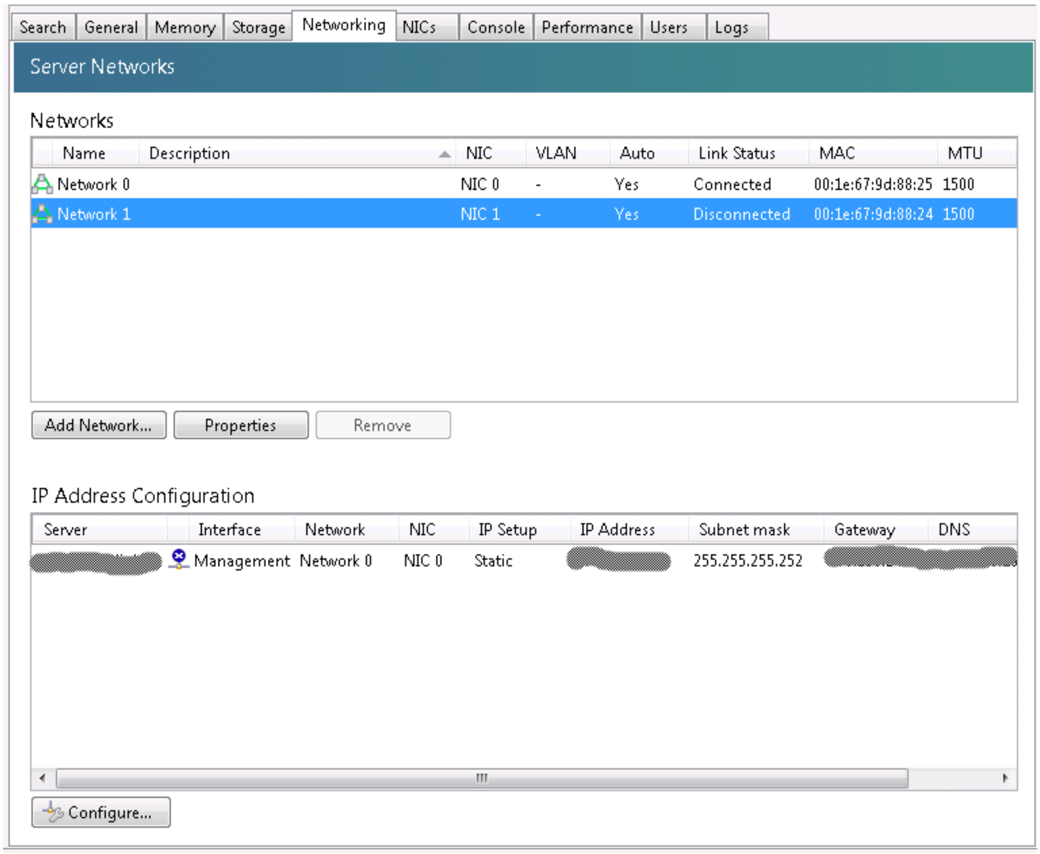
Save the new netfilter rules to persist through a system reboot:

```
service iptables save
```

Private network creation

For this step we will use XenCenter management software.

Go to **Networking** tab of the host and **Configure** new **IP Adress Configuration**



Server Networks

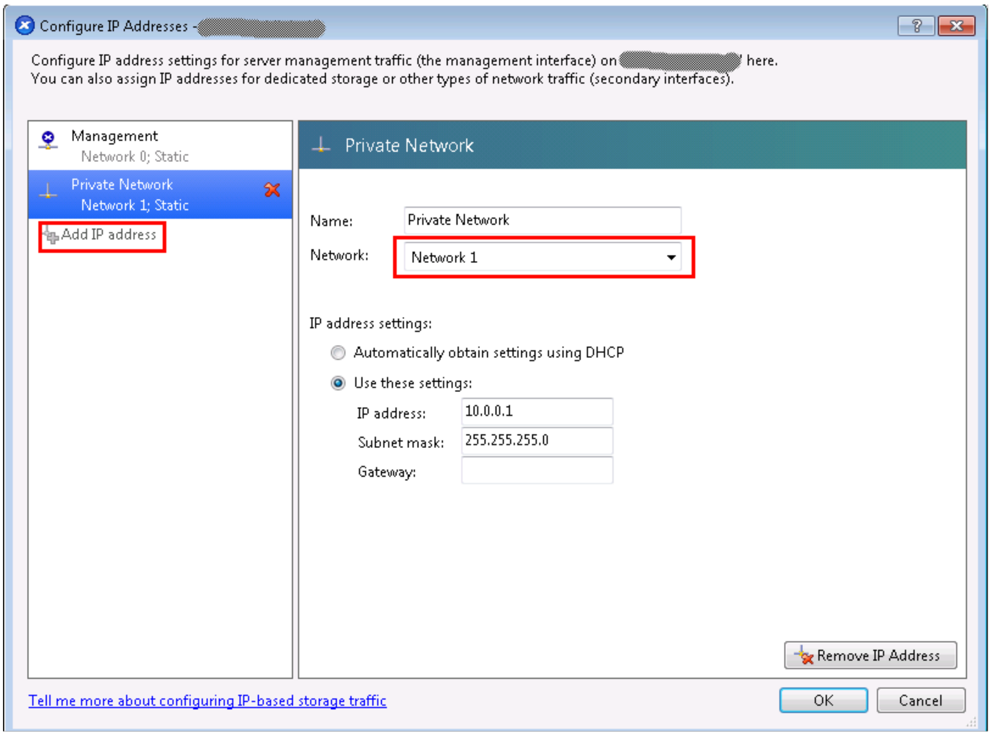
Networks

Name	Description	NIC	VLAN	Auto	Link Status	MAC	MTU
Network 0		NIC 0	-	Yes	Connected	00:1e:67:9d:88:25	1500
Network 1		NIC 1	-	Yes	Disconnected	00:1e:67:9d:88:24	1500

IP Address Configuration

Server	Interface	Network	NIC	IP Setup	IP Address	Subnet mask	Gateway	DNS
[redacted]	Management	Network 0	NIC 0	Static	[redacted]	255.255.255.252	[redacted]	[redacted]

Add IP address for your Private Network interface:


Configure IP Addresses - [redacted]

Configure IP address settings for server management traffic (the management interface) on [redacted] here.
You can also assign IP addresses for dedicated storage or other types of network traffic (secondary interfaces).

Private Network

Name: Private Network

Network: Network 1

IP address settings:

○ Automatically obtain settings using DHCP

● Use these settings:

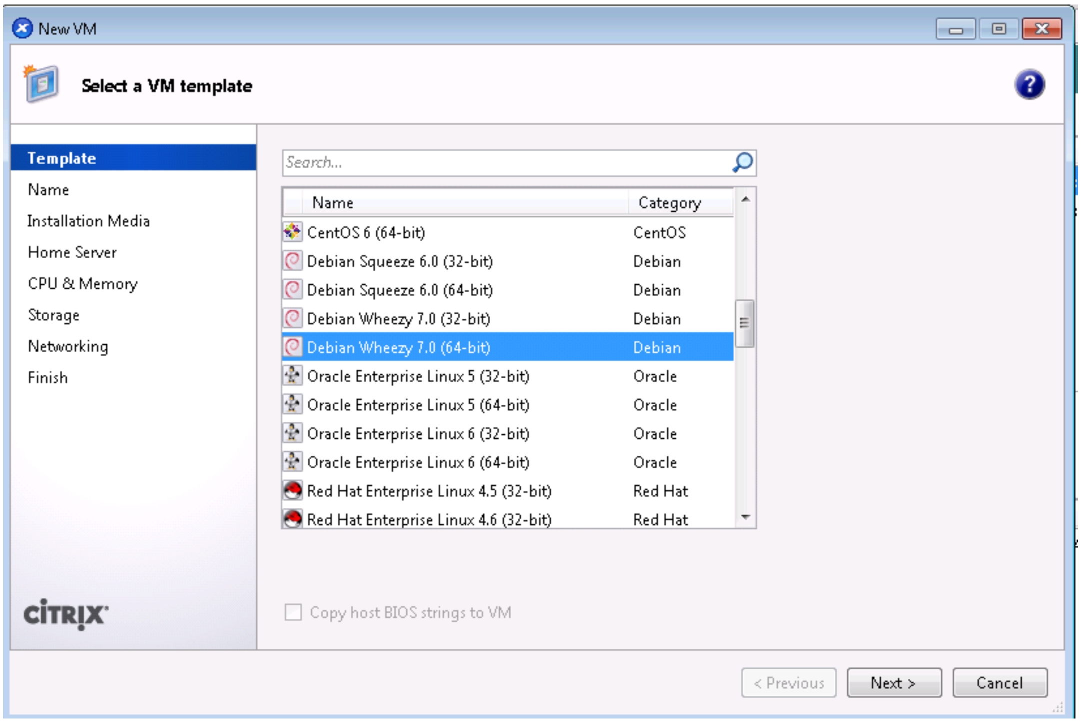
IP address: 10.0.0.1

Subnet mask: 255.255.255.0

Gateway:

Installing first Debian VM

In XenCenter right click on your host and choose “**New VM...**”.



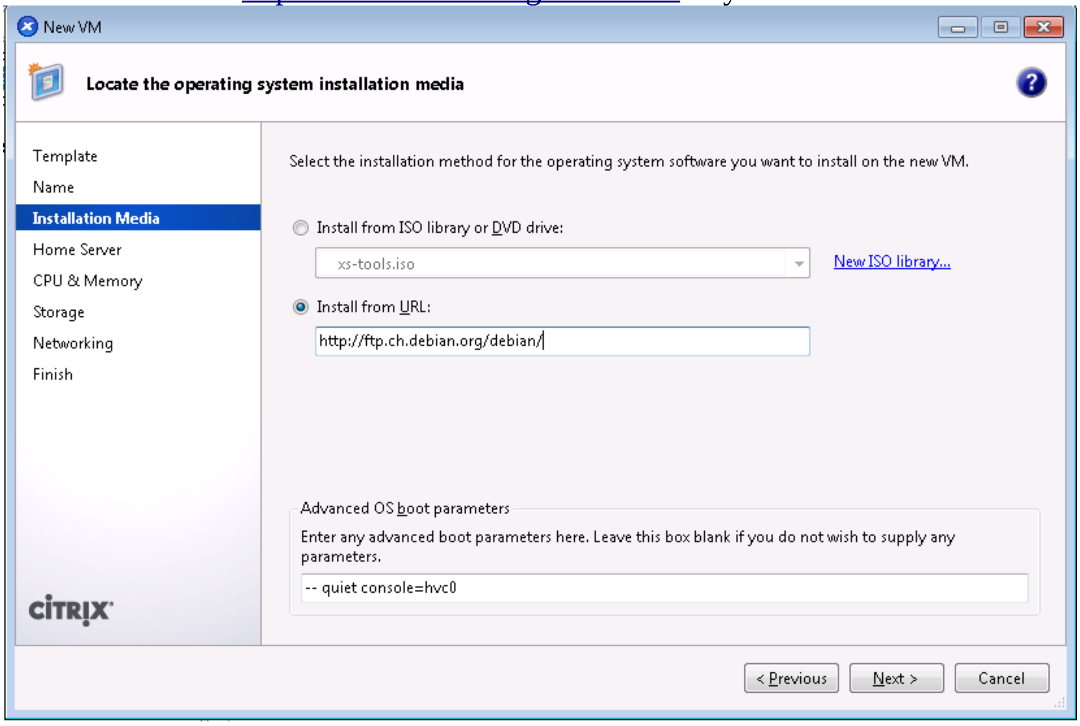
Name	Category
CentOS 6 (64-bit)	CentOS
Debian Squeeze 6.0 (32-bit)	Debian
Debian Squeeze 6.0 (64-bit)	Debian
Debian Wheezy 7.0 (32-bit)	Debian
Debian Wheezy 7.0 (64-bit)	Debian
Oracle Enterprise Linux 5 (32-bit)	Oracle
Oracle Enterprise Linux 5 (64-bit)	Oracle
Oracle Enterprise Linux 6 (32-bit)	Oracle
Oracle Enterprise Linux 6 (64-bit)	Oracle
Red Hat Enterprise Linux 4.5 (32-bit)	Red Hat
Red Hat Enterprise Linux 4.6 (32-bit)	Red Hat

□ Copy host BIOS strings to VM

Choose appropriate template (Debian Wheezy 7.0 (64-bit) in our case).

On the “**Name**” screen set it's name and description.

For “**Installation Media**” choose “**Install from URL**” and enter one of the URLs from Debian worldwide mirror sites list https://www.debian.org/mirror/list or your own mirror:



Select the installation method for the operating system software you want to install on the new VM.

○ Install from ISO library or DVD drive:

xs-tools.iso

● Install from URL:

http://ftp.ch.debian.org/debian/

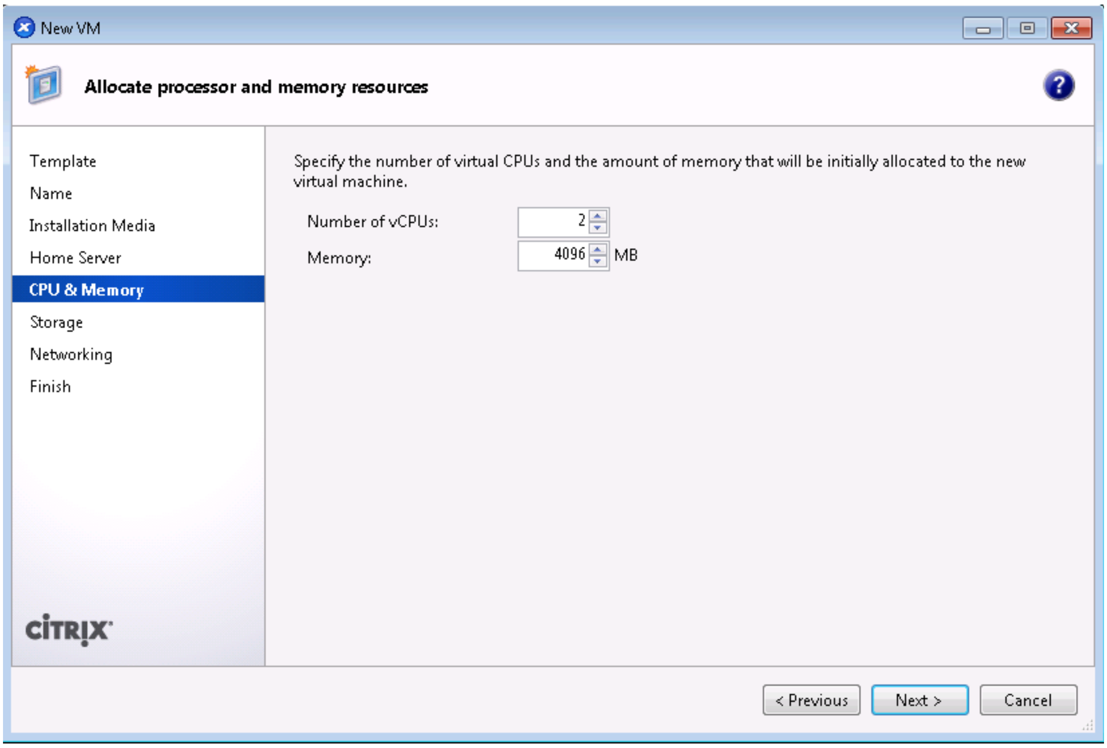
Advanced OS boot parameters

Enter any advanced boot parameters here. Leave this box blank if you do not wish to supply any parameters.

-- quiet console=hvc0

On “**Home Server**” screen simply confirm the Xen host on which you want to create new VM.

On “**CPU & Memory**” screen set number of vCPUs and Memory (keep in mind that you can total number of vCPUs for all VMs on your host is not limited by physical number of CPUs on the host!).



New VM

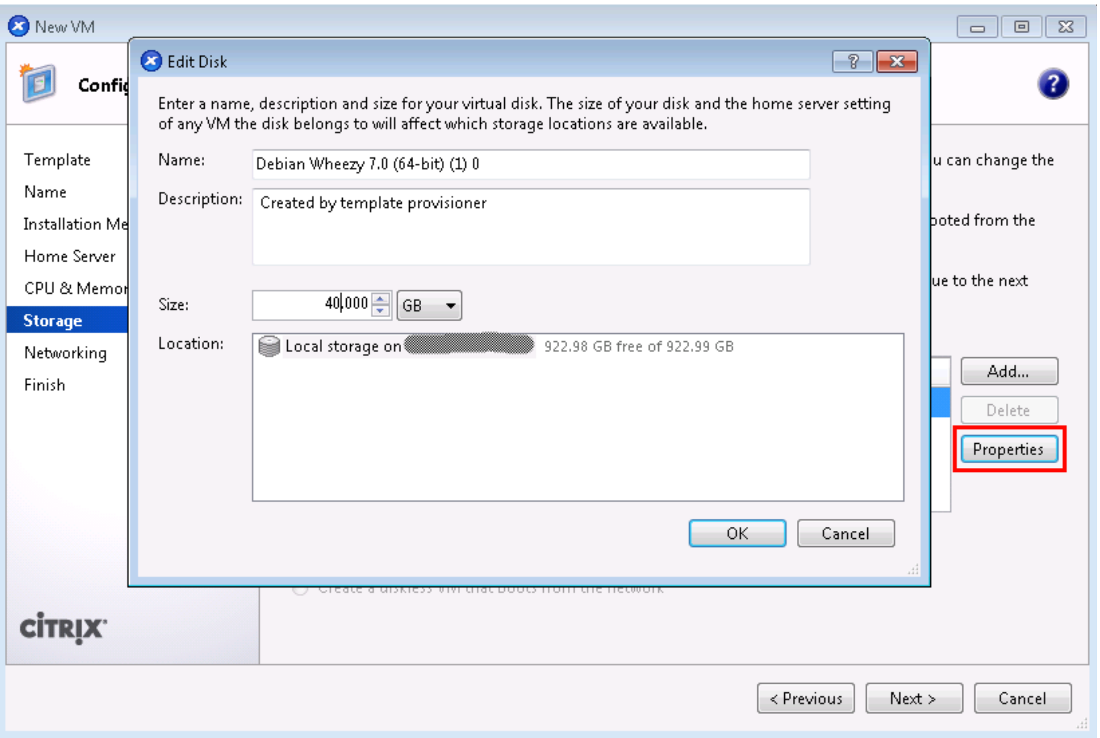
Allocate processor and memory resources

Specify the number of virtual CPUs and the amount of memory that will be initially allocated to the new virtual machine.

Number of vCPUs: 2

Memory: 4096 MB

On “**Storage**” screen modify the default size of the main storage of your VM to some more reasonable size than default 8GB … 40GB seems to be better ;)



New VM

Edit Disk

Enter a name, description and size for your virtual disk. The size of your disk and the home server setting of any VM the disk belongs to will affect which storage locations are available.

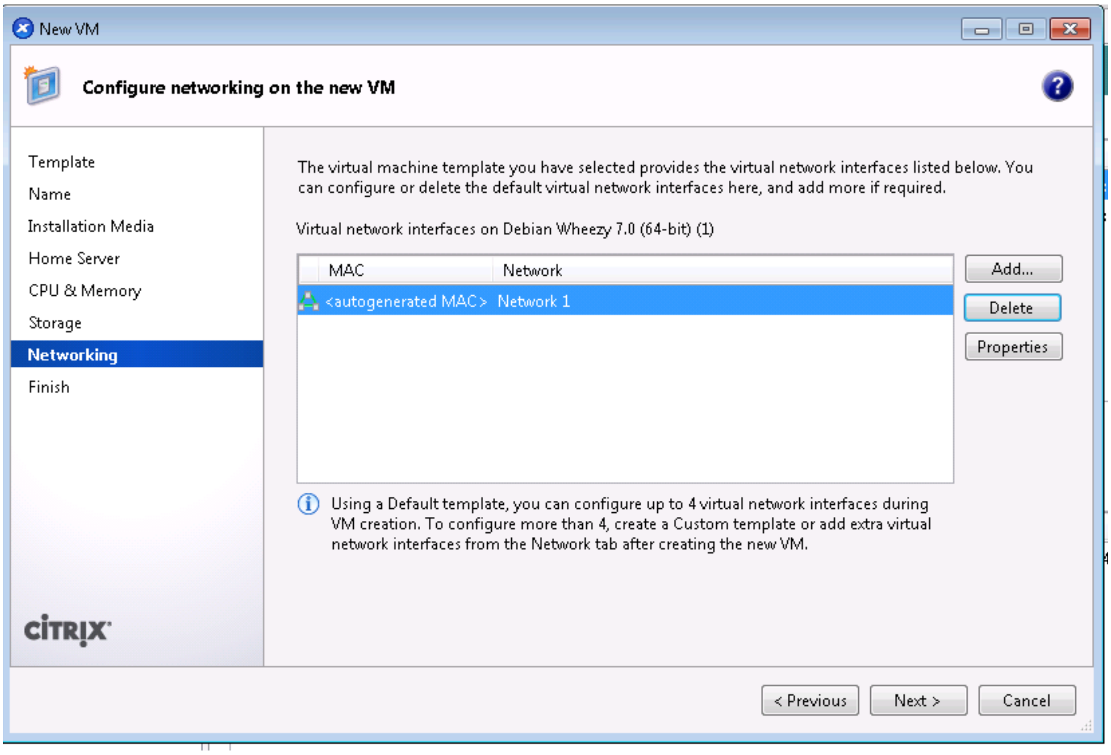
Name: Debian Wheezy 7.0 (64-bit) (1) 0

Description: Created by template provisioner

Size: 40000 GB

Location: Local storage on [redacted] 922.98 GB free of 922.99 GB

On “**Networking**” screen make sure that only your private “**Network 1**” is configured for your new VM.



Configure networking on the new VM

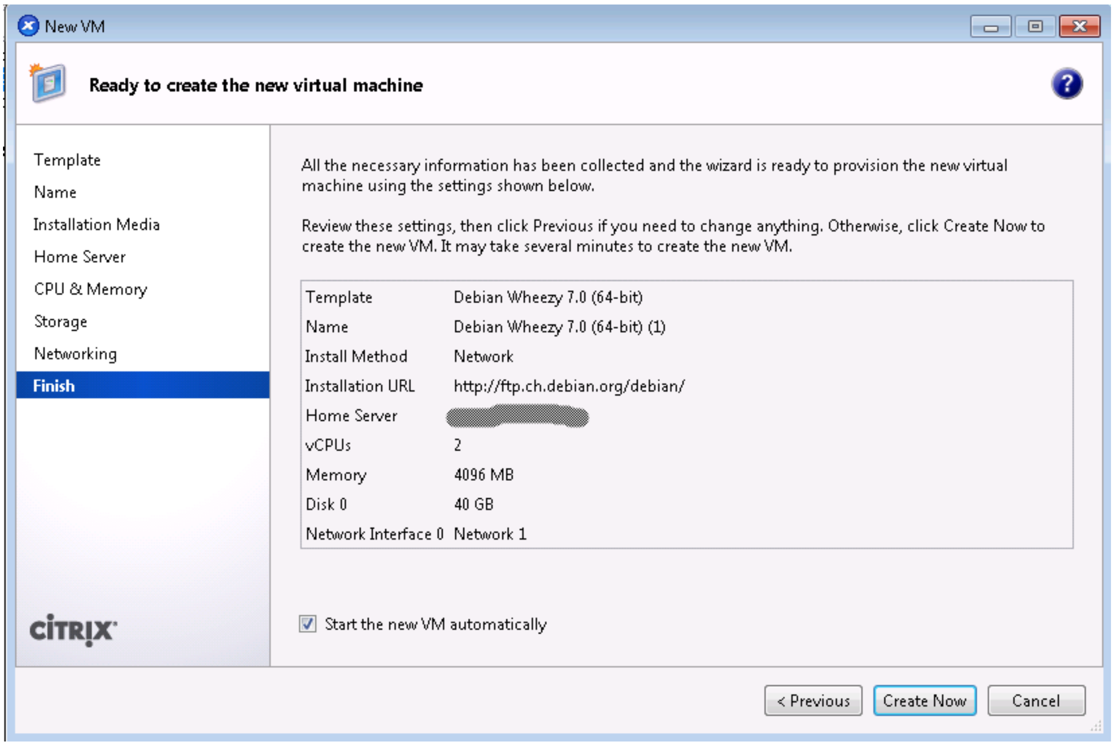
The virtual machine template you have selected provides the virtual network interfaces listed below. You can configure or delete the default virtual network interfaces here, and add more if required.

Virtual network interfaces on Debian Wheezy 7.0 (64-bit) (1)

MAC	Network
<autogenerated MAC>	Network 1

Using a Default template, you can configure up to 4 virtual network interfaces during VM creation. To configure more than 4, create a Custom template or add extra virtual network interfaces from the Network tab after creating the new VM.

The “**Finish**” screen shows the summary of your new VM:



Ready to create the new virtual machine

All the necessary information has been collected and the wizard is ready to provision the new virtual machine using the settings shown below.

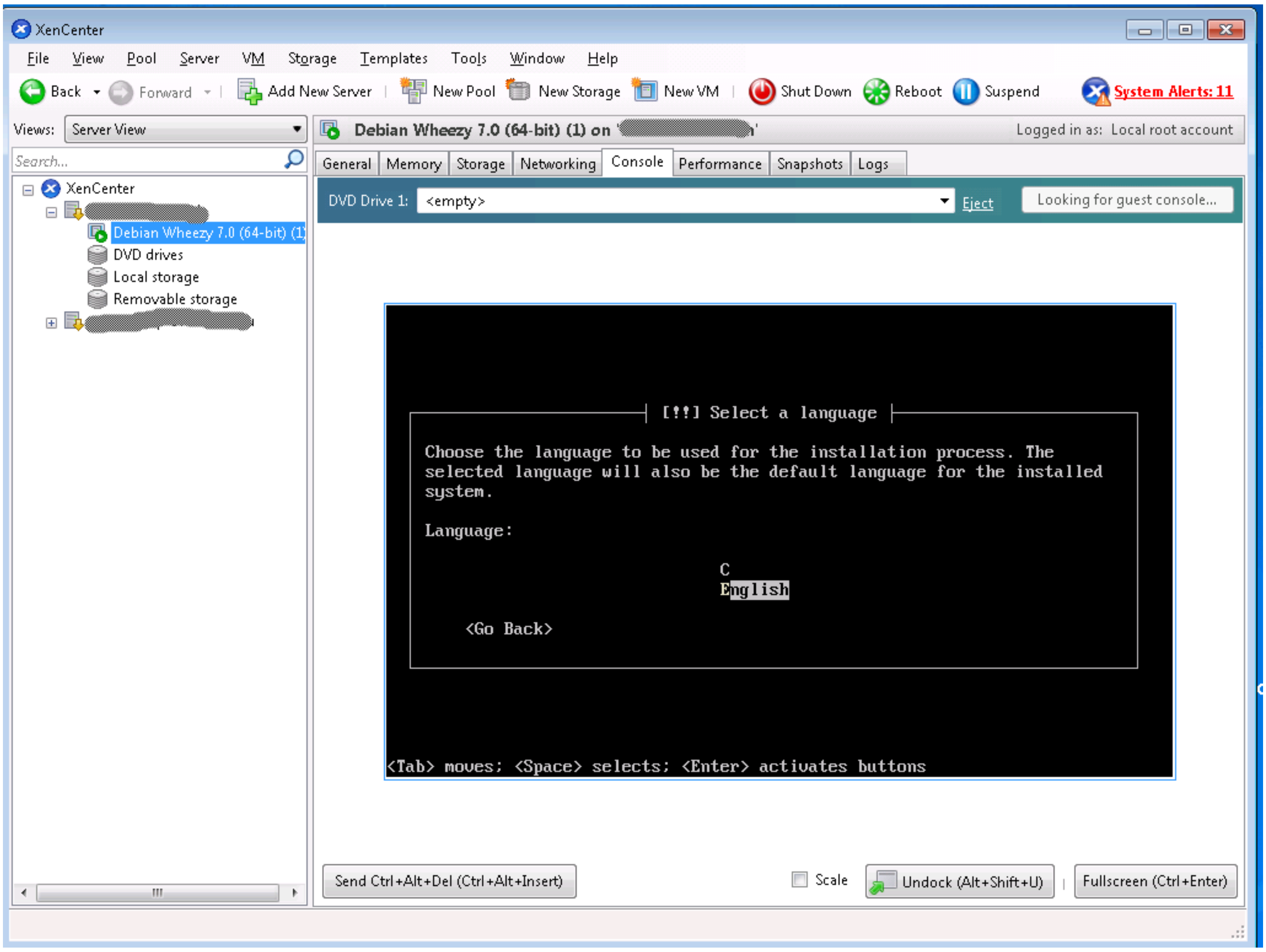
Review these settings, then click Previous if you need to change anything. Otherwise, click Create Now to create the new VM. It may take several minutes to create the new VM.

Template	Debian Wheezy 7.0 (64-bit)
Name	Debian Wheezy 7.0 (64-bit) (1)
Install Method	Network
Installation URL	http://ftp.ch.debian.org/debian/
Home Server	[redacted]
vCPUs	2
Memory	4096 MB
Disk 0	40 GB
Network Interface 0	Network 1

☑ Start the new VM automatically

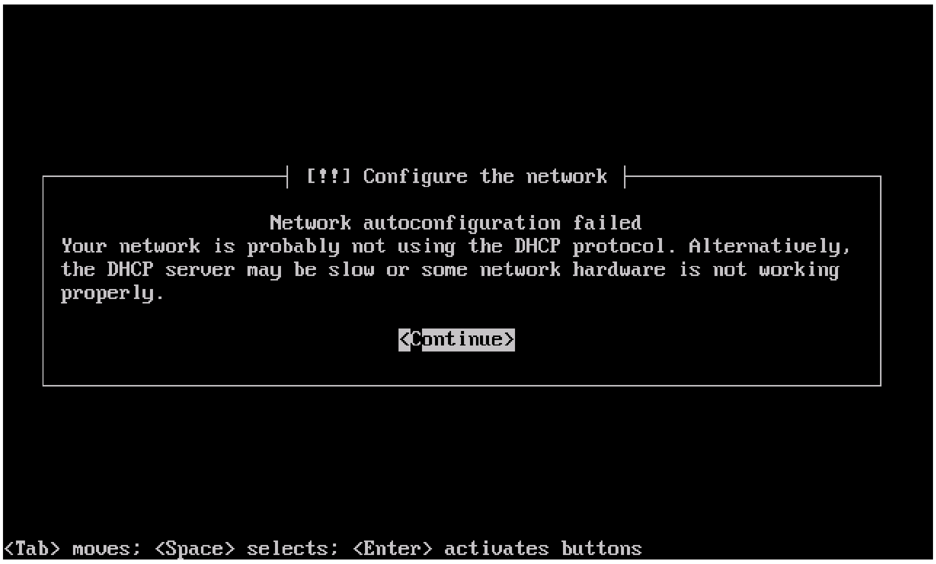
When you click “**Create Now**” your VM will be created and be ready for installing fresh Debian directly from the network from the mirror you have specified on Installation Media screen.

A few seconds after you created your VM you should be able to see it is running and you can select **Console** tab to follow installation of Debian OS on your machine:


XenCenter
File View Pool Server VM Storage Templates Tools Window Help
Back Forward Add New Server New Pool New Storage New VM Shut Down Reboot Suspend System Alerts: 11
Views: Server View
Search...
XenCenter
[redacted]
Debian Wheezy 7.0 (64-bit) (1)
DVD drives
Local storage
Removable storage
[redacted]
Debian Wheezy 7.0 (64-bit) (1) on '[redacted]'
Logged in as: Local root account
General Memory Storage Networking Console Performance Snapshots Logs
DVD Drive 1: <empty>
Eject
Looking for guest console...
Send Ctrl+Alt+Del (Ctrl+Alt+Insert)
Scale
Undock (Alt+Shift+U)
Fullscreen (Ctrl+Enter)

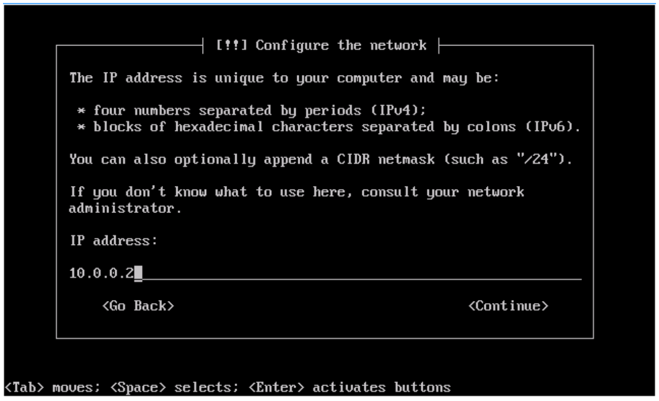
```
                    ┤ [!!] Select a language ├

 Choose the language to be used for the installation process. The
 selected language will also be the default language for the installed
 system.

 Language:

                              C
                              English

     <Go Back>

<Tab> moves; <Space> selects; <Enter> activates buttons
```

In our case we choose “English” on “Select a language” screen.
On “Select your location” we choose “other”, “Europe”, “Switzerland”.
On “Configure locales” we choose “United states – en_US.UTF-8”.
And we configure “American English” keyboard.
Now you will see the following screen:

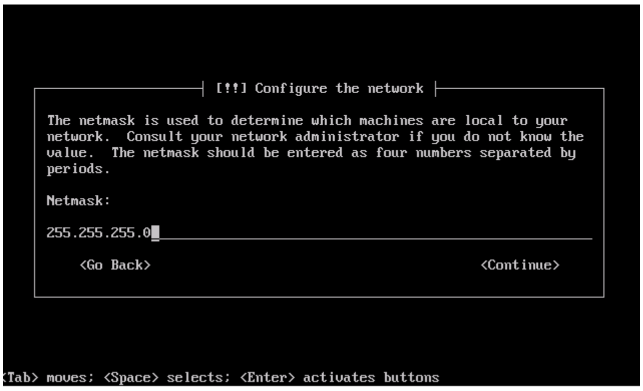


```
                 ┤ [!!] Configure the network ├

                  Network autoconfiguration failed
 Your network is probably not using the DHCP protocol. Alternatively,
 the DHCP server may be slow or some network hardware is not working
 properly.

                             <Continue>

<Tab> moves; <Space> selects; <Enter> activates buttons
```

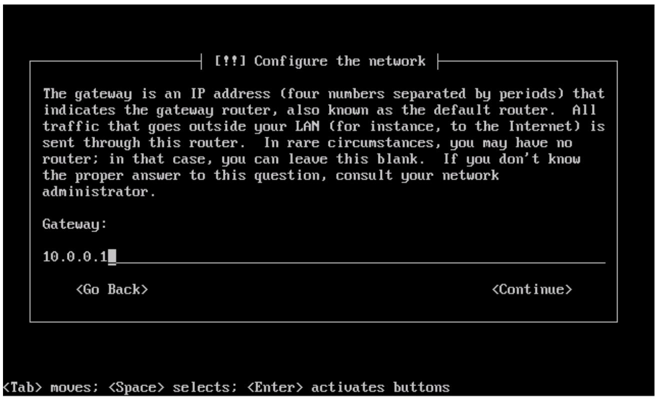
Don't worry, now you have to “**Continue**” and choose to “**Configure network manually**”.
In our case for the first Debian VM we will set IP address 10.0.0.2/24, we set Gateway to 10.0.0.1 (the IP we assigned to our Private Network NIC 1 interface), and we provide name server address from our hosting provider:



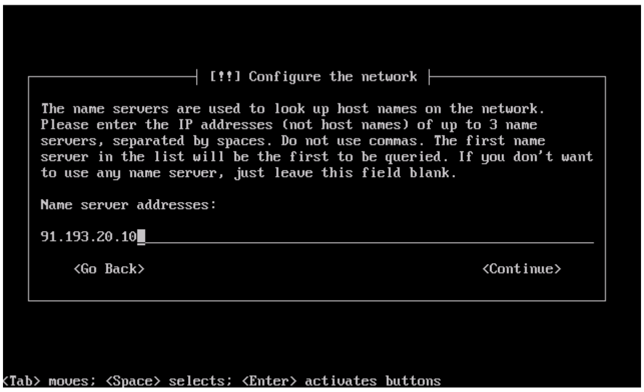
```
[!!] Configure the network

The IP address is unique to your computer and may be:

 * four numbers separated by periods (IPv4);
 * blocks of hexadecimal characters separated by colons (IPv6).

You can also optionally append a CIDR netmask (such as "/24").

If you don't know what to use here, consult your network
administrator.

IP address:

10.0.0.2

    <Go Back>                                     <Continue>

<Tab> moves; <Space> selects; <Enter> activates buttons
```



```
[!!] Configure the network

The netmask is used to determine which machines are local to your
network.  Consult your network administrator if you do not know the
value.  The netmask should be entered as four numbers separated by
periods.

Netmask:

255.255.255.0

    <Go Back>                                     <Continue>

<Tab> moves; <Space> selects; <Enter> activates buttons
```



```
[!!] Configure the network

The gateway is an IP address (four numbers separated by periods) that
indicates the gateway router, also known as the default router.  All
traffic that goes outside your LAN (for instance, to the Internet) is
sent through this router.  In rare circumstances, you may have no
router; in that case, you can leave this blank.  If you don't know
the proper answer to this question, consult your network
administrator.

Gateway:

10.0.0.1

    <Go Back>                                     <Continue>

<Tab> moves; <Space> selects; <Enter> activates buttons
```

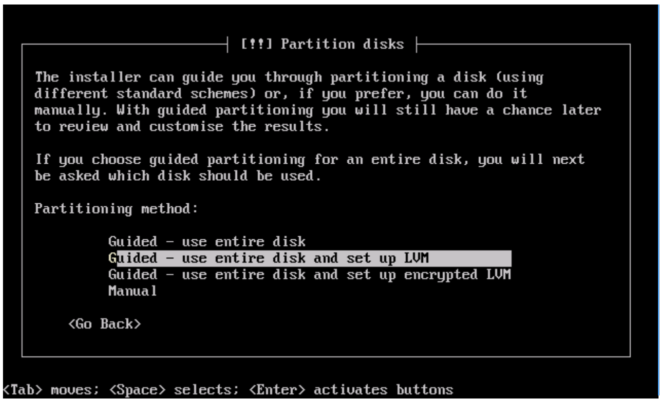


```
[!!] Configure the network

The name servers are used to look up host names on the network.
Please enter the IP addresses (not host names) of up to 3 name
servers, separated by spaces. Do not use commas. The first name
server in the list will be the first to be queried. If you don't want
to use any name server, just leave this field blank.

Name server addresses:

91.193.20.10

    <Go Back>                                     <Continue>

<Tab> moves; <Space> selects; <Enter> activates buttons
```

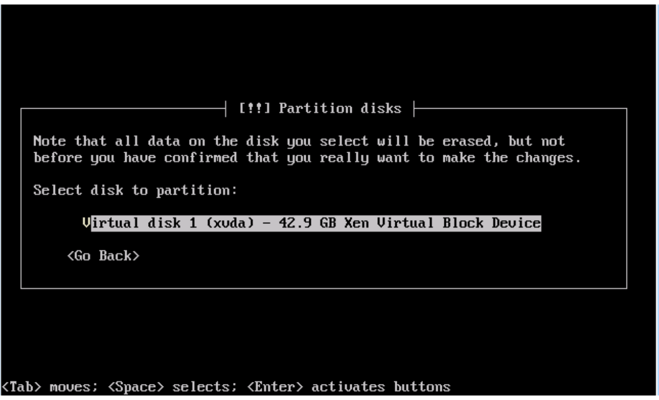
Next you will have to choose the name and domain name for your VM, we choose “**debian**” for name.

On the next screen you have to “**Choose a mirror of the Debian archive**”, provide HTTP proxy information (we left it blank).

Follow the next screens providing root name and password and data for non-root user account.
On “Partition disks” screen we choose to use LVM

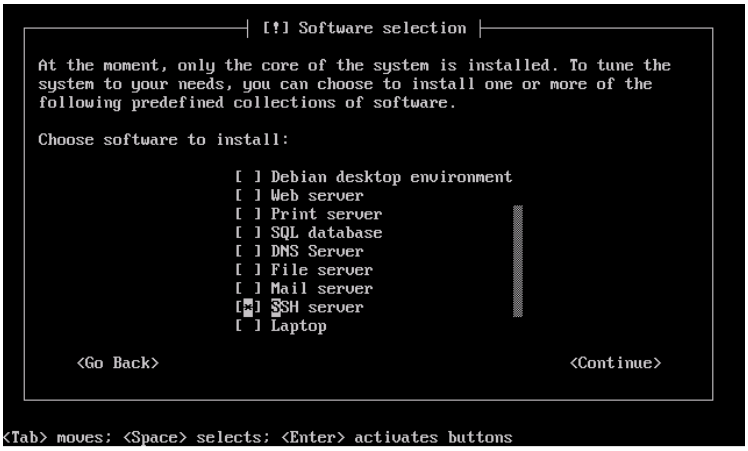


```
[!!] Partition disks

The installer can guide you through partitioning a disk (using
different standard schemes) or, if you prefer, you can do it
manually. With guided partitioning you will still have a chance later
to review and customise the results.

If you choose guided partitioning for an entire disk, you will next
be asked which disk should be used.

Partitioning method:

        Guided - use entire disk
        Guided - use entire disk and set up LVM
        Guided - use entire disk and set up encrypted LVM
        Manual

    <Go Back>

<Tab> moves; <Space> selects; <Enter> activates buttons
```



```
[!!] Partition disks

Note that all data on the disk you select will be erased, but not
before you have confirmed that you really want to make the changes.

Select disk to partition:

      Virtual disk 1 (xvda) - 42.9 GB Xen Virtual Block Device

    <Go Back>

<Tab> moves; <Space> selects; <Enter> activates buttons
```

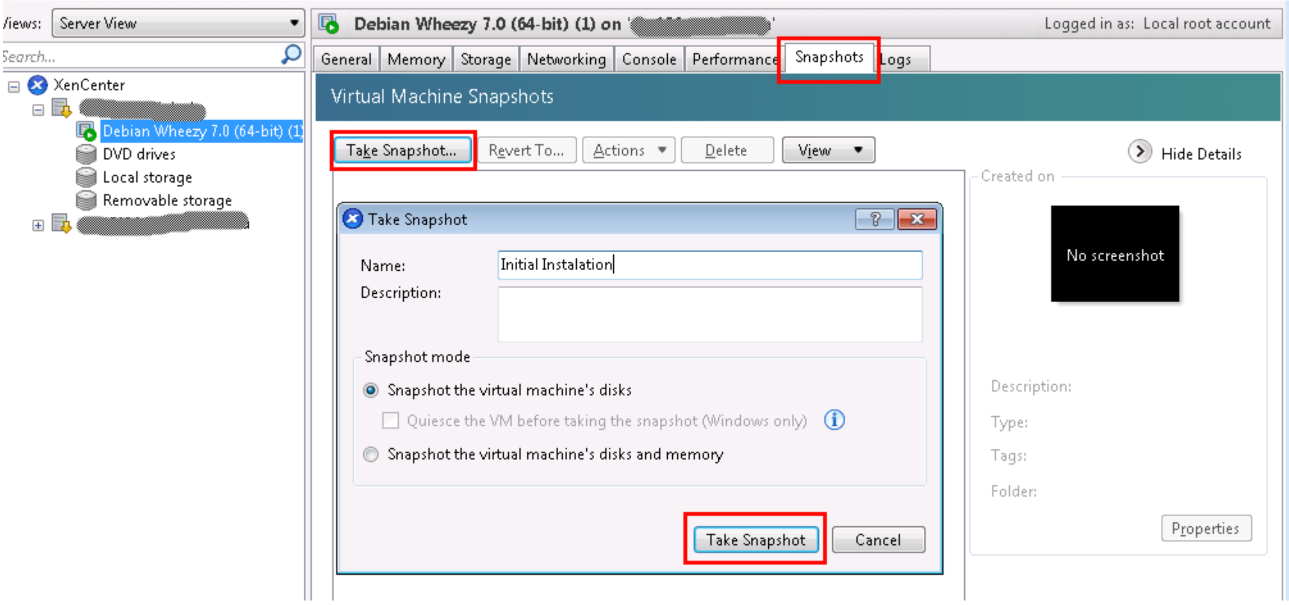
Continue to the “**Software selection**” screen, on which we propose to leave only basic utilities and “SSH server” software:



```
                    [!] Software selection

 At the moment, only the core of the system is installed. To tune the
 system to your needs, you can choose to install one or more of the
 following predefined collections of software.

 Choose software to install:

                     [ ] Debian desktop environment
                     [ ] Web server
                     [ ] Print server
                     [ ] SQL database
                     [ ] DNS Server
                     [ ] File server
                     [ ] Mail server
                     [*] SSH server
                     [ ] Laptop

     <Go Back>                                          <Continue>

<Tab> moves; <Space> selects; <Enter> activates buttons
```

Continue the installation process … the system after a few minutes should be up and ready. You can log to your new system using Console or after configuring port forwarding for ssh (explaind further in this document) connect to it remotely using SSH.

This is a good moment to make initial Snaphot of your first Debian VM:



Debian Wheezy 7.0 (64-bit) (1) on '[redacted]'

Logged in as: Local root account

Virtual Machine Snapshots

Take Snapshot

Name: Initial Instalation

Description:

Snapshot mode

● Snapshot the virtual machine's disks

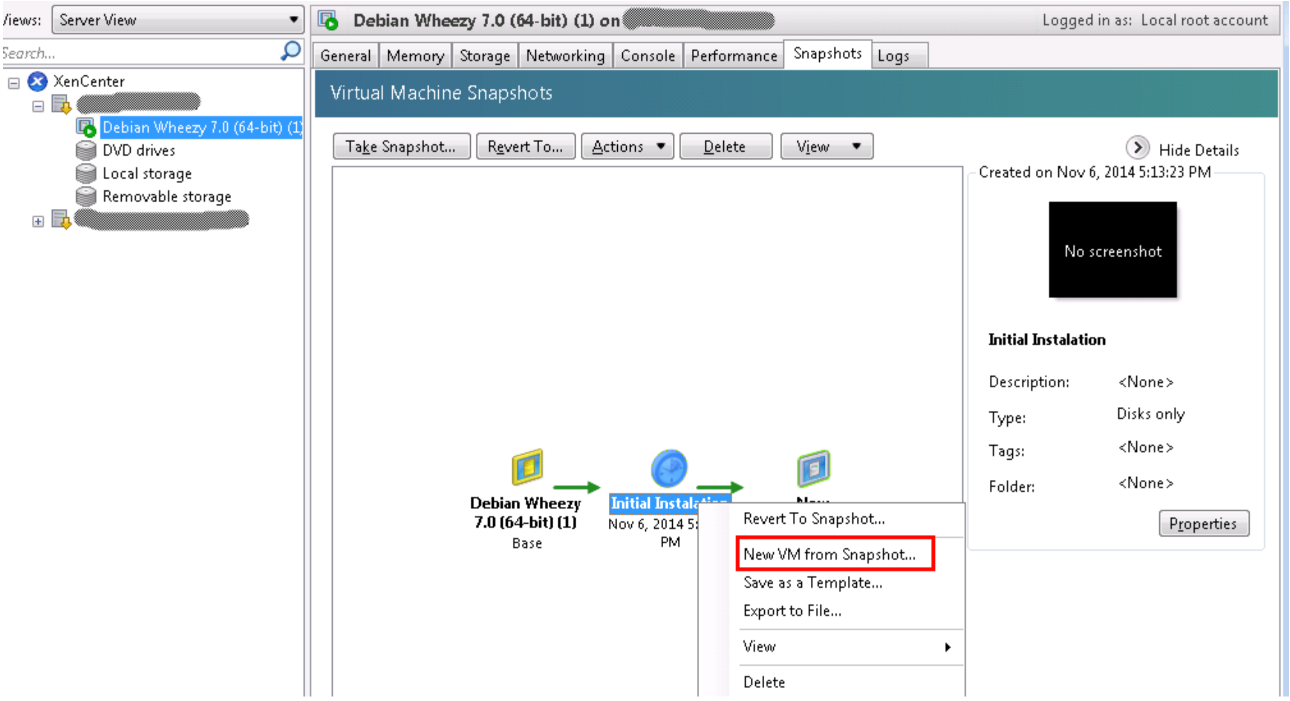
□ Quiesce the VM before taking the snapshot (Windows only)

○ Snapshot the virtual machine's disks and memory

Installing second Debian VM based on existing Debian VM

When you have the first Devian VM configured and running you can create a new Debian VM based on it in a few simple steps.

Go to snapshots screen, choose a snapshot which you will use as a base for new VM right click it and choose “**New VM from Snapshot ...**”.



Created on Nov 6, 2014 5:13:23 PM

Initial Instalation

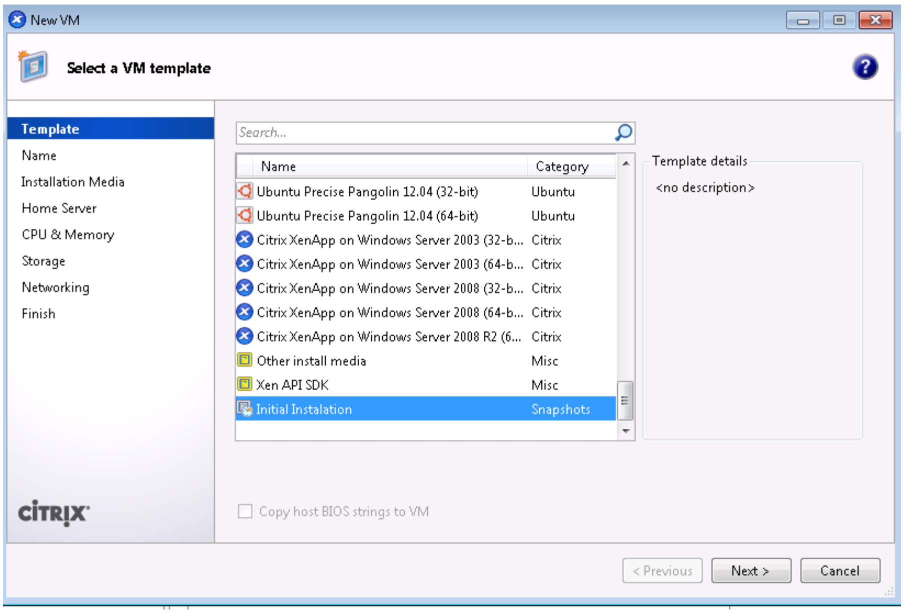
Description: <None>

Type: Disks only

Tags: <None>

Folder: <None>

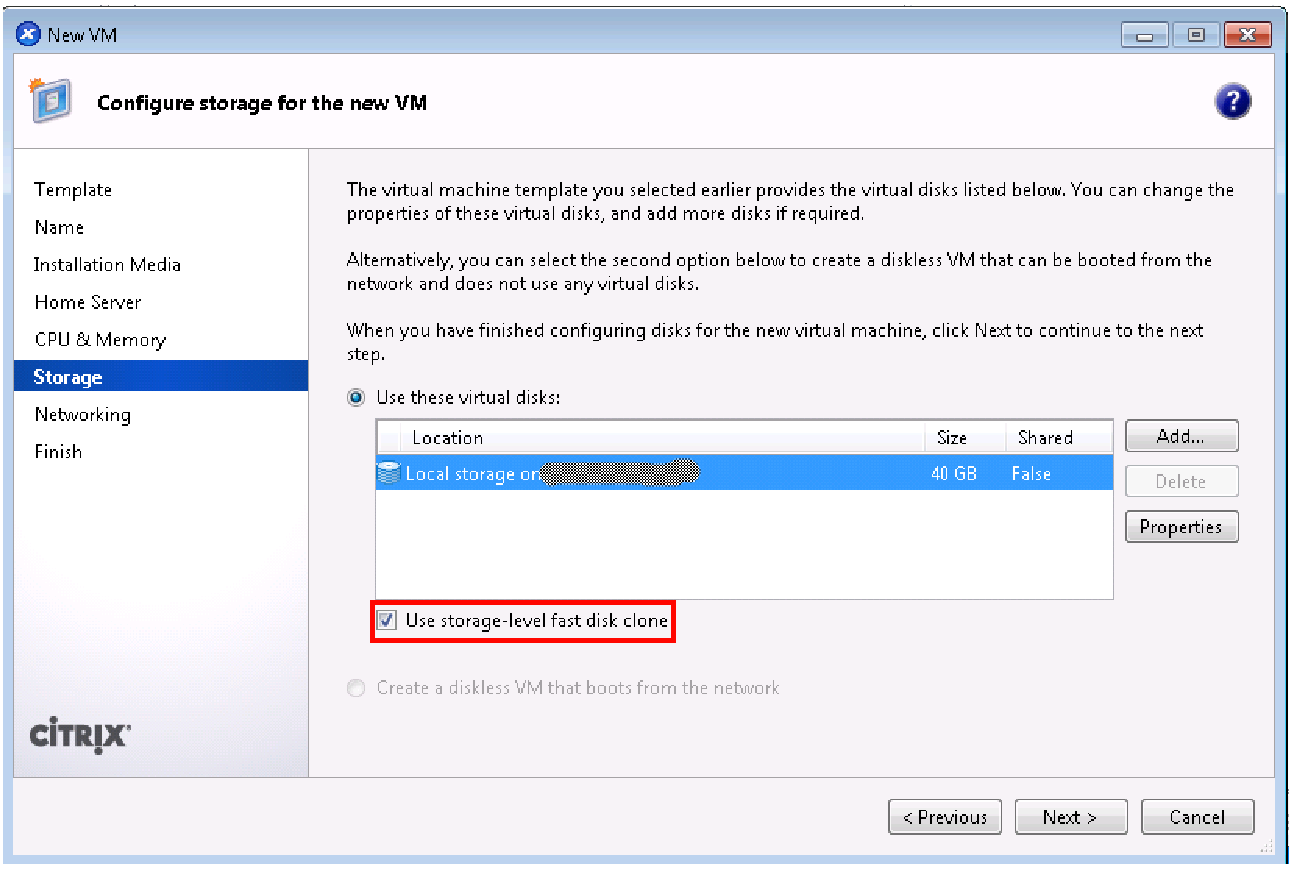
You will see the familiar screen with a new option on “**Template**” screen:



Name	Category
Ubuntu Precise Pangolin 12.04 (32-bit)	Ubuntu
Ubuntu Precise Pangolin 12.04 (64-bit)	Ubuntu
Citrix XenApp on Windows Server 2003 (32-b...	Citrix
Citrix XenApp on Windows Server 2003 (64-b...	Citrix
Citrix XenApp on Windows Server 2008 (32-b...	Citrix
Citrix XenApp on Windows Server 2008 (64-b...	Citrix
Citrix XenApp on Windows Server 2008 R2 (6...	Citrix
Other install media	Misc
Xen API SDK	Misc
Initial Instalation	Snapshots

On “**Installation Media**” you can leave the default chosen “**DVD drive:**” “**<empty>**”.

On “**Storage**” screen you will see a new option “**Use storage-level fast disk clone**”. When checked it will make reuse the storage occupied by the snapshot from which you create the VM and only incremental changes made on your new VM will be stored separately (so simply saying you save some space but you sacrifice a speed a little bit (very little in the fact)).



Configure storage for the new VM

The virtual machine template you selected earlier provides the virtual disks listed below. You can change the properties of these virtual disks, and add more disks if required.

Alternatively, you can select the second option below to create a diskless VM that can be booted from the network and does not use any virtual disks.

When you have finished configuring disks for the new virtual machine, click Next to continue to the next step.

● Use these virtual disks:

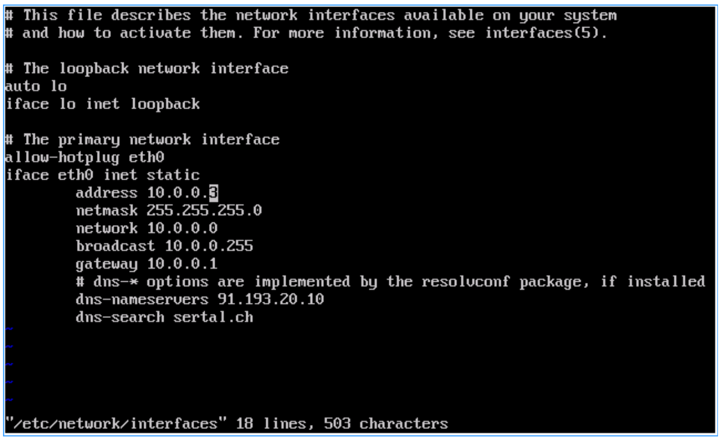
Location	Size	Shared
Local storage on [redacted]	40 GB	False

☑ Use storage-level fast disk clone

○ Create a diskless VM that boots from the network

Finish the wizard and log into your new machine using **Console**.

Now there are a few more steps you have to do. Your OS on new VM uses the same hostname and IP address as your template machine, so you have to change this by editing **/etc/hosts**, **/etc/hostname** and **/etc/network/interfaces** files changing hostname to debian2 and ip address to 10.0.0.3.



```
# This file describes the network interfaces available on your system
# and how to activate them. For more information, see interfaces(5).

# The loopback network interface
auto lo
iface lo inet loopback

# The primary network interface
allow-hotplug eth0
iface eth0 inet static
        address 10.0.0.3
        netmask 255.255.255.0
        network 10.0.0.0
        broadcast 10.0.0.255
        gateway 10.0.0.1
        # dns-* options are implemented by the resolvconf package, if installed
        dns-nameservers 91.193.20.10
        dns-search sertal.ch
~
~
~
~
~
"/etc/network/interfaces" 18 lines, 503 characters
```

After that changes reboot the machine and enjoy your second Debian VM.

Configure port forwarding for ssh access to existing Vms

For each VM for which you want to have remote access via SSH you have to create DNAT rule in netfilter. Remember to persist your changes using “service iptables save”:

```
iptables -t nat -A PREROUTING -i xenbr0 -p tcp --dport 1022 -j DNAT --to 10.0.0.2:22
iptables -t nat -A PREROUTING -i xenbr0 -p tcp --dport 1122 -j DNAT --to 10.0.0.3:22
service iptables save
```

Installation and configuration of haproxy

First we need to add repository containing haproxy package:

rpm -Uvh http://dl.fedoraproject.org/pub/epel/5/i386/epel-release-5-4.noarch.rpm

Now we are ready to install haproxy package:

yum install haproxy

After successful installation edit **/etc/haproxy/haproxy.cfg** configuration file using the following template:

```
[… we can leave global settings and defaults sections untouched ... ]

frontend  main *:8080
    acl host-vm1 hdr(host) -i host-vm1.yourdomain.com
    acl host-vm2 hdr(host) -i host-vm2.yourdomain.com
    use_backend vm1 if host-vm1
    use_backend vm2 if host-vm2
    default_backend xapi

backend xapi
    server  xapi 127.0.0.1:80 check

backend vm1
    server  vm1 10.0.0.2:80 check
```

```
backend vm2
    server  vm2 10.0.0.3:80 check
```

We configured haproxy to listen on port 8080 since xapi process binds to port 80 and there is no configuration option for changing this. Instead of listening on port 80 we redirect all external traffic going to port 80 to pass through our haproxy using simple port redirection on firewall:

```
iptables -t nat -A PREROUTING -i xenbr0 -p tcp --dport 80 -d <xenbr0-ip>
-j DNAT --to <xenbr0-ip>:8080
service iptables save
```