

Open Horizons Summit

16.-19.September 2019
Berlin, Germany



Lab Information Technical Manual

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Author: Rob Bastiaansen

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1 Summary

If possible choose a lab-setup that does not require one or more virtual machines per attendee. Using a cloud-based service (BlueShift) or one central server (virtual machine) in the classroom network simplifies the setup and eliminates the source for many errors. If your lab requires virtual machines per attendee then please keep them to a minimum and make them as small as possible.

Make sure to have your Virtual Machines ready on Sunday before the Summit starts and hand over the files to the technical team on Sunday.

Host Configuration:

Important change for 2019:

For sessions that will use a hosted solution or another browser-only solution:

- Laptop with 8 GB RAM, i5 processor and one SSD
- OpenSUSE Leap 15.1 64 bit (with Chrome and Firefox installed, both can be used to read PDF-files)

For sessions that will use a local solution using VMware Workstation:

- Laptop with 16 GB RAM, dual core i7 processor and one SSD
- OpenSUSE Leap 15.1 64 bit (with Chrome and Firefox installed, both can be used to read PDF-files)
- VMware Workstation 15.1.0

(This doesn't mean that speakers should also run OpenSUSE. You can create your Virtual Machines on any OS, that's the main benefit of virtual machines: that they are platform independent and portable.)

You can see how the OpenSUSE Desktop looks like here: <http://www.mobileclassroom.nl/desktopvideo>

Network Configuration Summary: (complete information can be found elsewhere in this manual)

- Physical Wired Classroom Network (also bridged network VMnet0 when using VMware Workstation):
172.31.0.0 (mask 255.255.0.0) with DHCP
Use this network / subnet when you want the virtual machines to access the internet or other machines in the network, for example your speaker laptop or another central server. Also accessible via wifi. Each room has wifi enabled on the classroom router. You may use 172.31.1.1 – 172.31.1.254 to assign static IP addresses. Default Gateway and DNS at 172.31.0.1
- VMware Workstation Host Only VMnet1
172.16.1.0 (mask 255.255.255.0) with DHCP
The laptop (host) is on 172.16.1.1
Use this network / subnet if you do not want your Virtual Machines to access any other machines in the physical network.
- VMware Workstation Host Only VMnet5
172.17.2.0 (mask 255.255.255.0) NO DHCP
The laptop (host) is on 172.16.2.1
Use this network / subnet if you do not want your Virtual Machines to access any other machines in the physical network. This is the Utopia standard.
- VMware Workstation Host Only VMnet8
172.16.2.0 (mask 255.255.255.0) with DHCP
The laptop (host) is on 172.16.2.1
Default Gateway 172.16.2.2
Use this network to have an isolated network for the virtual machines on the laptop but still allow the machines to access devices on the physical network, including the router to access the internet.

If you do not have any special requirements then please use NAT, VMnet8.

Virtual Machine Tips

- Use simple naming such as S01-Win, C01-SLES for your VMs
- Keep them small, do not add unnecessary data, disable auto-update
- We have limited space on the laptop SSD's to store all labs so try to use as less space as possible.
- Create disks split in 2GB chunks, not pre-allocated, see image in this document.
- Remove floppy drive, sound controller, USB controller and other unnecessary devices
- Disable power savings features and screen savers in your Windows or Linux operating system.
- Add uuid.action = "keep" or "create" to the .vmx file, see description in this document.
- Remove references to .ISO files, set connection to physical cd-rom and not connect at power on

2 Hardware and lab setup

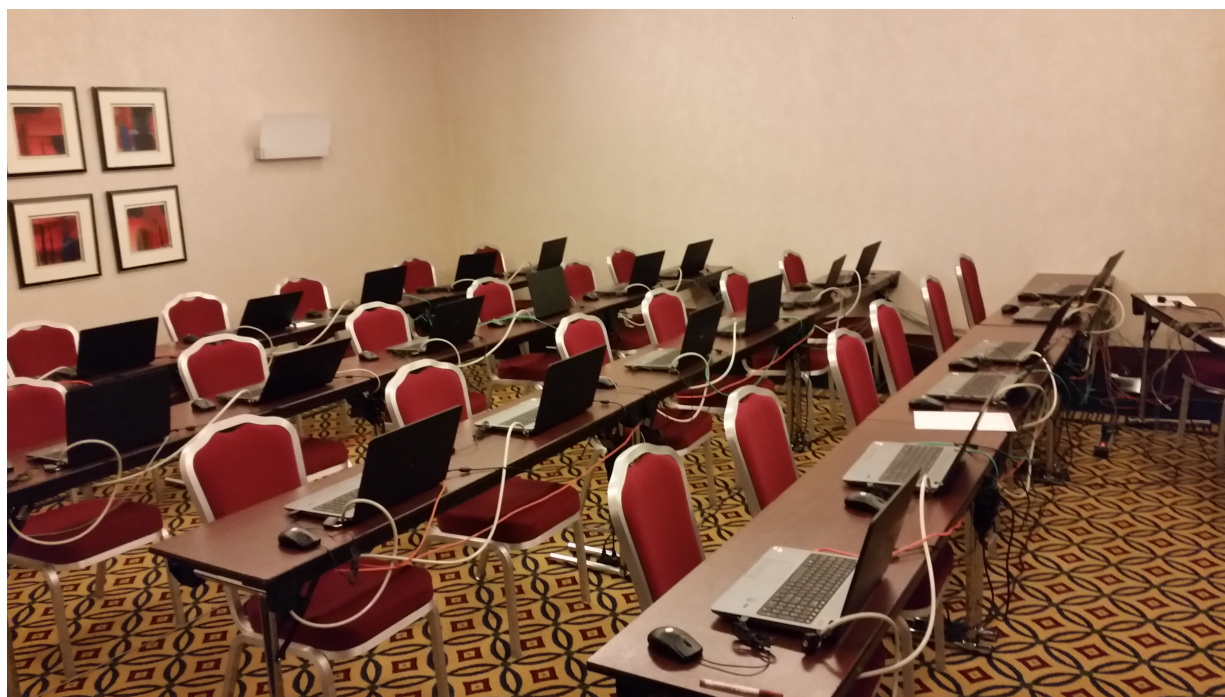
For the sessions that will use VMware Workstation there is a laptop for each delegate with 16GB RAM, dual core i7 CPU and one SSD. For sessions using a cloud-based solution, such as BlueShift, 8GB and an i5 CPU will be provided.

There will be no laptop provided for the speaker, we expect that you run your environment on your own machine that you connect to the projector. If you do not bring your own laptop or can't run the VMs yourself please let us know as soon as possible so we can provide you with a spare machine to be used during your session. So as a speaker you can also build your VMs on your own Windows or MacOS machine, there is no need to use OpenSUSE yourself. That's the main benefit of virtual machines: that they are platform independent and portable.)

Laptops in the classroom are running OpenSUSE Leap 15.1. Chrome and Firefox are installed (both can also be used to read PDF-files). When you have files (PDF, TXT) that you want distributed to the laptops in your classroom then that can be done automatically. Information about that will be made available at the summit. You can see how the OpenSUSE Desktop looks like here:

<http://www.mobileclassroom.nl/desktopvideo>

Every classroom will have a setup that looks like the one in the image below, which is from previous years. All laptops are connected to a wired network in the classroom, which is connected via a router per classroom to the internet. **Therefor all classrooms are isolated from each other.**



When possible build your lab on a setup that uses a web/cloud based service, such as BlueShift. This is the simplest to setup, does not require the distribution of data in the classroom and eliminates the source for many errors. When this is not possible you can use VMware Workstation virtual machines to build a lab environment. The simplest setup which is easiest to manage is when you use one central virtual machine that can be accessed by the attendees. You can run that virtual machine on your own laptop or if needed ask the technical team to make a laptop available for your lab.

When you are going to build your lab with one or more virtual machines per attendee then the technical team on-site will distribute the virtual machine files in the classroom. Therefor it is important that you hand over those files on Sunday. The technical team will sit down with you at the hand over to discuss the setup and test/verify the virtual machines. This will be Sunday-afternoon/ evening.

We use the setting to run all VMs in RAM so use only 13.5 GB RAM for your collection of VMs that run simultaneously.

If you have any questions or comments please contact Rob Bastiaansen: rob@mobileclassroom.nl

3 Networking

Description of network types available

Each classroom will have its own private network in subnet 172.31.0.0/16 with a DHCP-service. Addresses to be used for your fixed/manual configurations should be in the range 172.31.1.1 – 172.31.1.254. From this network you can access the computers in the classroom and the internet.

The classroom router (gateway and DNS) is 172.31.0.1. The subnet mask for this network is 255.255.0.0. The host (laptop) has the default vmnet0 network that is bridged to this classroom network. So use this subnet and the bridged option if you want your virtual machines to connect to devices on the network, such as your laptop. This option also allows you to access the virtual machines from the classroom network, since they are all in the same subnet.

Networking diagrams with examples can be found on the next three pages.

The classroom router also has wifi enabled. The SSID will be *OHsummit-Roomname*. The password is **Network99**. This classroom wifi network can also be used by the attendees to access the internet from their devices. But is mainly provided for wireless access to the lab environment in the classroom. Since all attendees for their personal internet connectivity will use the hotel's wifi.

There will be three VMware Workstation host only networks enabled:

- VMNET1, the default, which will be in the 172.16.1.0/24 network with DHCP
- VMNET5 in network 172.17.2.0 with a subnet mask of 255.255.255.0 (This is the Utopia default) (Without DHCP)
- VMNET8, the default NAT-network, which will be in the 172.16.2.0/24 network with DHCP (Default gateway 172.16.2.2)

The host is configured with the following adapters and IP addresses:

- Physical NIC – DHCP in subnet 172.31.0.0/16
- VMNET1 address for host 172.16.1.1
- VMNET5 address for host 172.17.2.1
- VMNET8 address for host 172.16.2.1 (Default gateway 172.16.2.2)

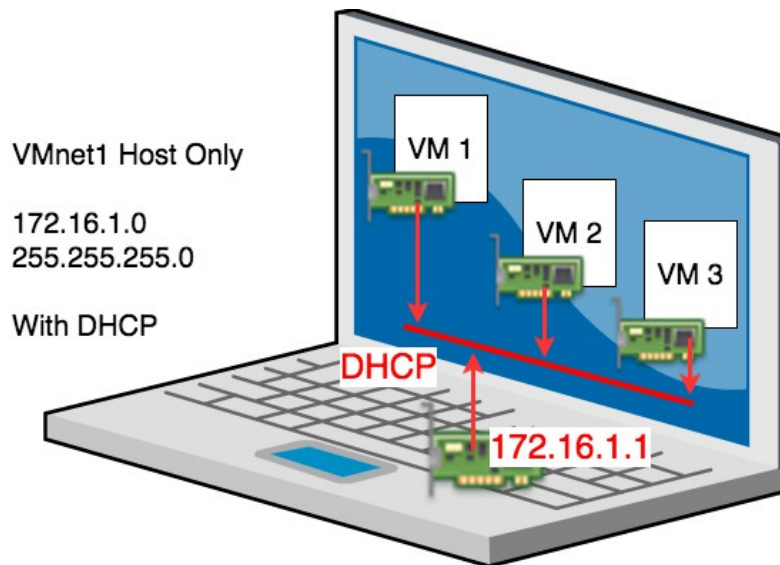
On the host-only networks 1 and 8 there is the VMware DHCP adapter providing addresses (not on VMnet5). The best practice is however to use static IP addresses for all your lab virtual machines. Only when they are being used in a bridged configuration on the classroom network using DHCP is more practical.

Having fixed IP addresses makes troubleshooting simpler because you then always know what the addresses are for your machines in case you want to test connectivity.

Over the years we have found that using NAT is the best choice if you don't have any special needs for networking. VMnet8 isolates the virtual machines on the laptop, they can't conflict with VMs on another laptop and you can use the same IP-address. In this configuration your VMs can still access the internet via the classroom network since VMware Workstation provides the Network Address Translation service. When you have a need to access the virtual machines from the classroom network (wired or wireless) then using bridged is the better option.

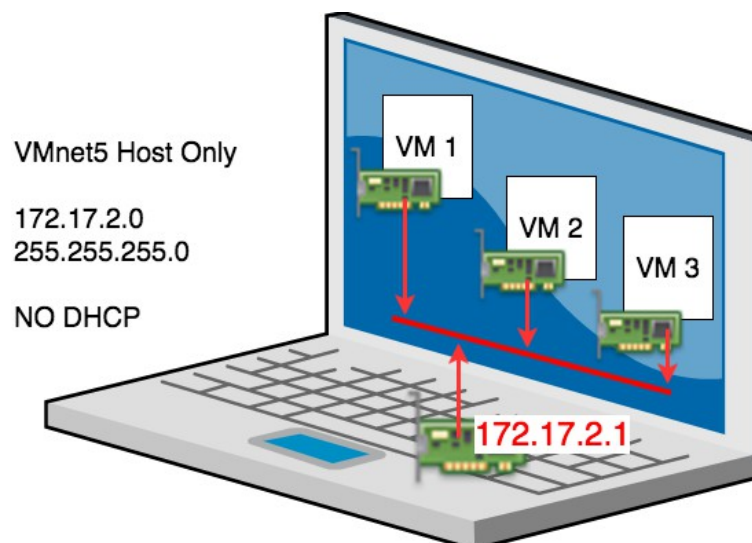
Network Diagrams

VMnet1 Host Only



As you can see in the VMnet1 Host Only network, as the name implies, the three virtual machines in this picture can communicate with each other and with the host on a private network. There is no connectivity between any physical network (not wired and not wireless) so your lab-environment is completely isolated.

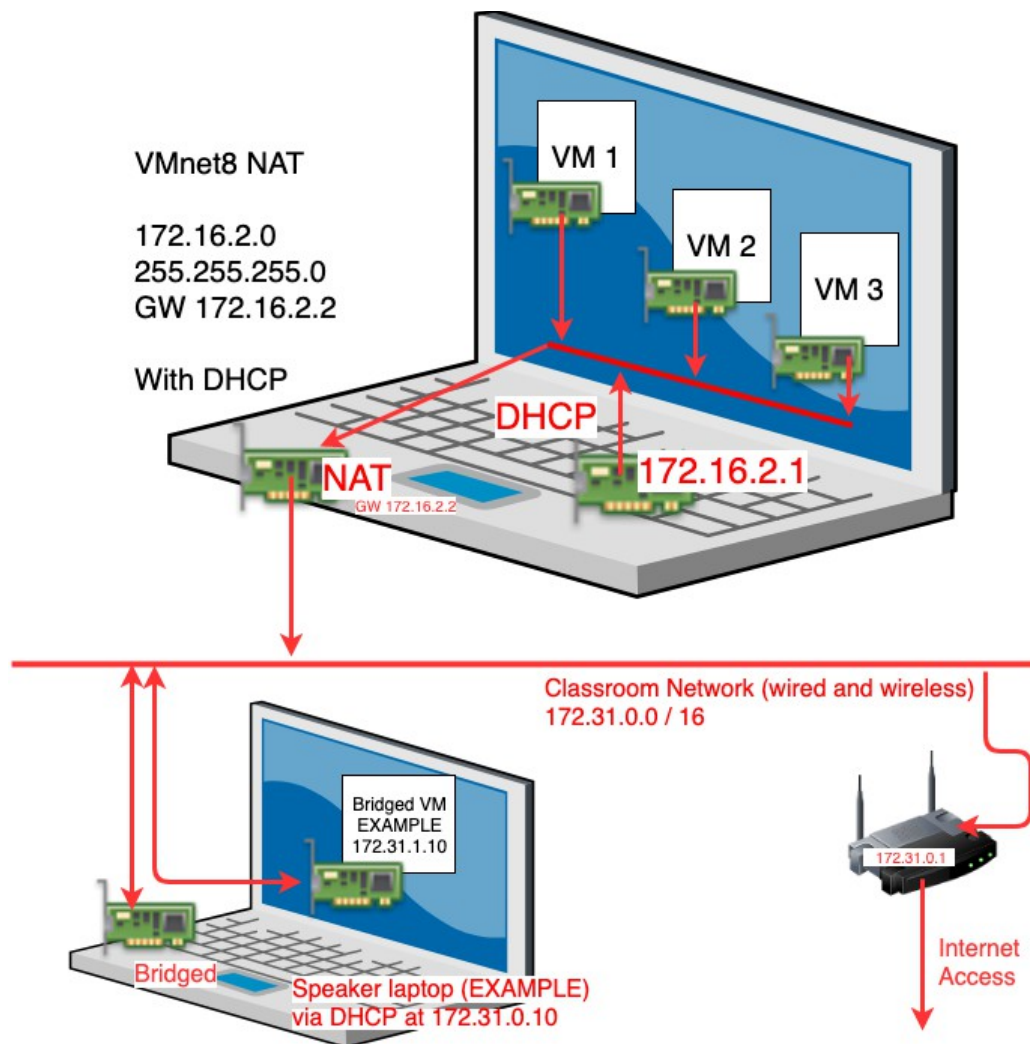
VMnet5 Host Only



This setup is almost identical to the VMnet1 setup. It has been created to match the Utopia On-Line demo-system standard from MicroFocus that uses subnet 172.17.2.x. When you download virtual machines from that library you can use them in this VMnet5 without any modification. There is NO DHCP service in this setup. So make sure all virtual machines have a fixed IP address.

Be aware that when using the Utopia-standard there is no communication between your virtual machines and the physical network. So if you plan to use some sort of central server in the classroom network then DO NOT use this setup but reconfigure your machines to use NAT or Bridged networking.

VMnet8 NAT



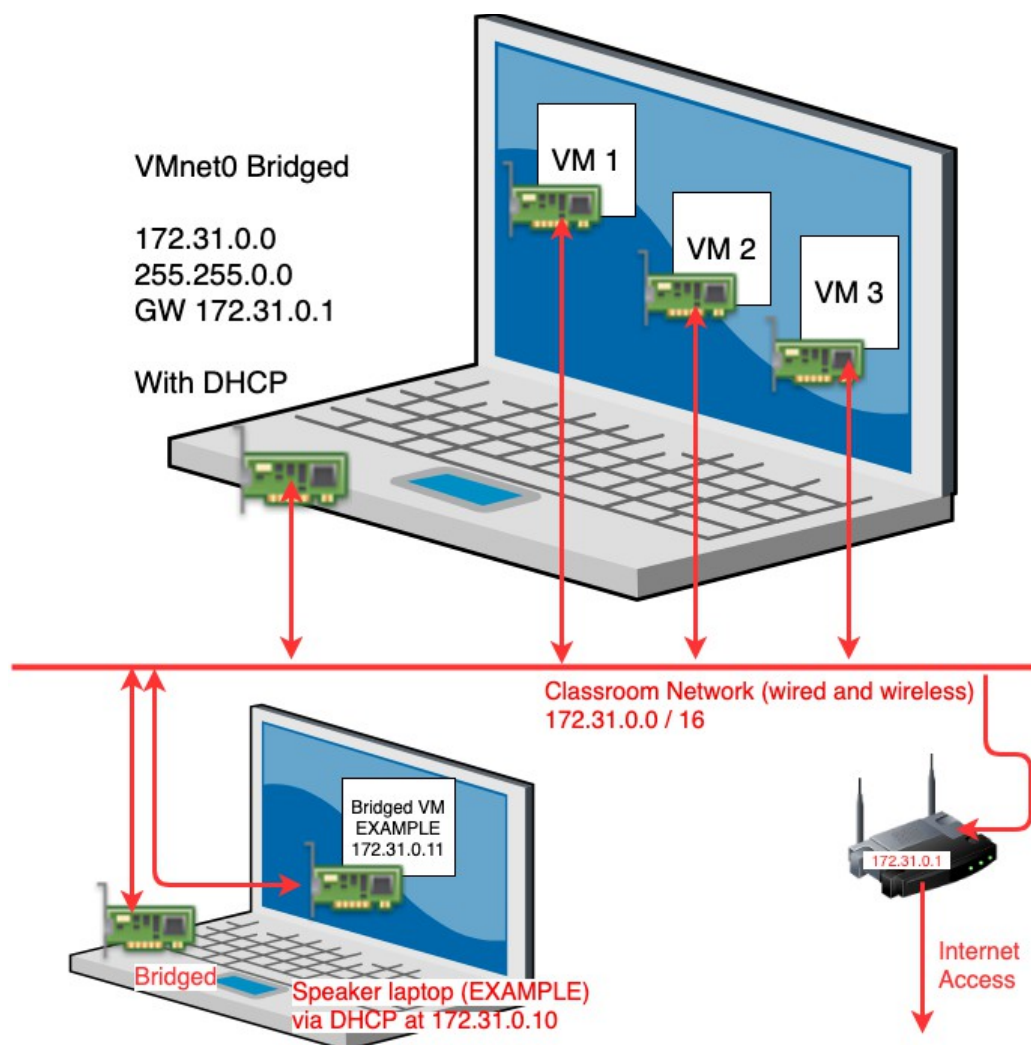
In this setup the three virtual machines on the delegate's laptop run behind a NAT (Network Address Translation) router and are not accessible from the classroom network. So they can run with the same MAC-address and IP-address on each laptop. But they can access machines on the physical network.

In the example picture above if you would run a virtual machine in bridged mode on your laptop with IP address 172.31.1.10 then all virtual machines on all delegate laptops would be able to access that central virtual machine. (This address is an example, chosen from the free to use range in each classroom, 172.31.1.1 – 172.31.1.254, the classroom subnet is 172.31.0.0 – 255.255.0.0) If the speaker laptop would be assigned IP address 172.31.0.10 on the classroom network via DHCP then that address would also be accessible from each virtual machine on the delegate's laptop. (Tip: check your firewall for allowed incoming traffic.)

Be aware that there is no communication path from the classroom network to the virtual machines on the delegate's laptop. As always with NAT you can go out, traffic will flow back into the machines if the connection was initiated from behind the NAT-router, but you can not initiate communications from the outside (classroom network) into the laptop NAT-network. This is similar to most home-networks that are behind NAT-routers. If you would require access from the classroom network into the virtual machines on the laptop then you need to use Bridged Networking.

This NAT-setup is most often the best choice because it allows you to use an identical IP-address-setup isolated per delegate-laptop and you still have the flexibility to access the internet via the classroom router and any other machine in the classroom network.

VMnet0 Bridged Networking



With bridged networking all participants (laptops and virtual machines) are directly connected to the classroom network. Each machine will be assigned an IP address via DHCP on the physical network in subnet 172.31.0.0 / 16. You can use the address from 172.31.1.1 – 172.31.1.254 for any fixed assignments.

This setup allows you to initiate communications from any machine on the classroom network to any other machine on that same network. It is also possible to access the virtual machines on the delegate's laptop from the wireless network provided for your classroom. You can find the network with SSID OHsummit-roomname, the key is: Network99.

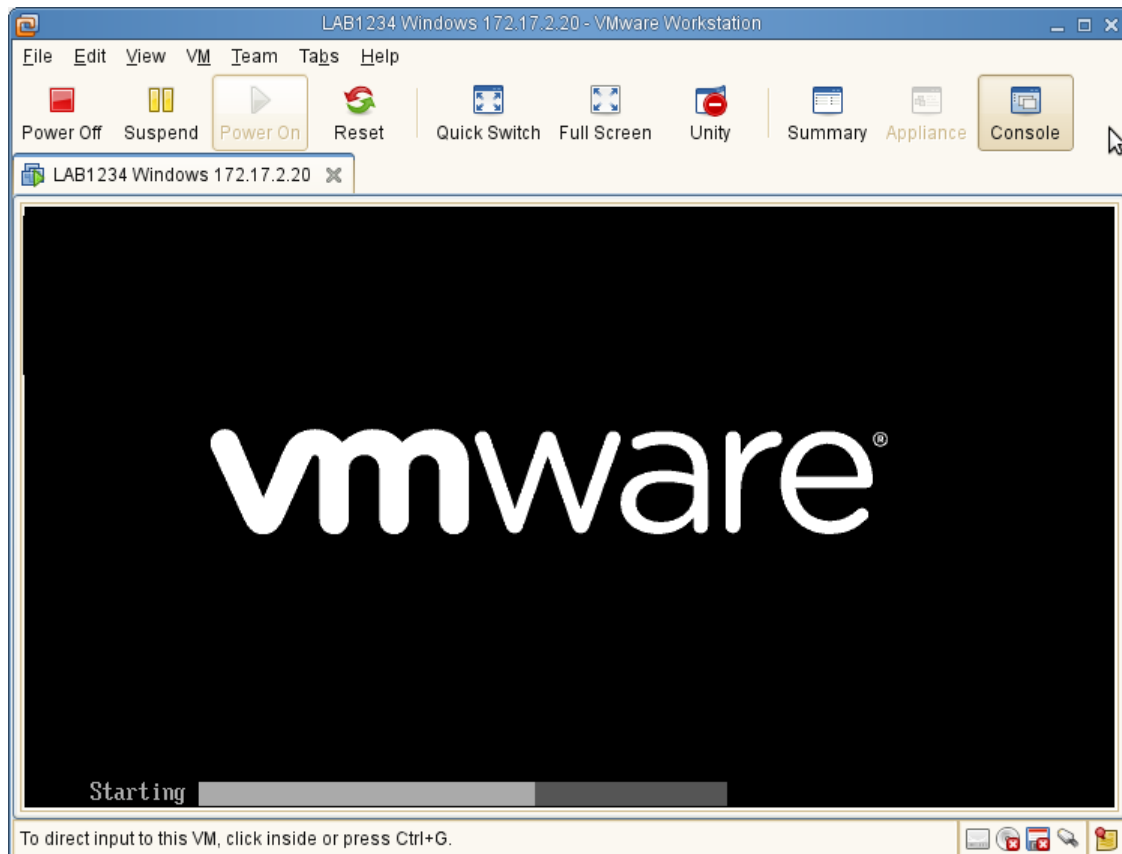
4 Naming Convention

Please give your virtual machine folder and file name a short descriptive name.

For example if your session is B01 then use folder B01 and name the VM B01.vmx or if you have two VMs then for example B01-win.vmx and B01-linux.vmx.

Note that the folder and file names are not directly related to the display name. So with these short file name examples you can still use a display name such as: *B01 Some Lab Name Windows*.

Please use the LAB name in the description of your virtual machines, this allows the technical team but also your students to easily identify if the right VMs are running for your session.



5 Handing over the Virtual Machines to the technical team

Be prepared to deliver your lab-files to the technical team on a portable hard disk that you can leave with the team. **So don't use your personal data-harddisk for this purpose.** The technical team will copy your VM's and files from that hard disk to their systems and return your hard disk. The tech-team will distribute the VMs' to all the laptops in your classroom.

- Do not ZIP your virtual machines, we need to copy them in their native format.
- If your VM has grown please use the shrink feature to reduce the size.
- Before shrinking remove any unnecessary data from the virtual machines
- Power off the virtual machines, do not use suspend because of CPU-compatibility.
- Copy the virtual machines after completely closing VMware Workstation otherwise files will be in use.
- Add UUID.ACTION to your .VMX file. See the next section.

When you handover your VMs to the team they will verify the setup together with you based on a Virtual Machine Handover Form that will be available pre-printed with your session name and co-speaker name. But here is an example of the form so that you already know what information we require for the Virtual Machines for each session:

OH Summit VM Handover Form

(VM setup details at www.mobileclassroom.nl/ohsummit)

Did you check:

- VMs in a folder with just your lab number (L01, C03, P08 etc)
- VMs on a hard disk or USB key with just your VMs, not your personal data and not your only original disk with the VMs
- removed unneeded sound adapter / USB controller
- removed links to your local .iso files for cd-rom player, and set to disconnect at power on

Lab Number	
Speakers	
Scheduled	

VM folder name	Guest OS and version	Assigned RAM	Total disk space GB	Networking Bridged (VMnet0) / VMnet1 / VMnet5 / VMnet8	VMware Tools Installed (yes/no)	UUID.action setting placed in .vmx (create or keep)	Start VM before session starts (yes/no)	Remarks

Lab Description	
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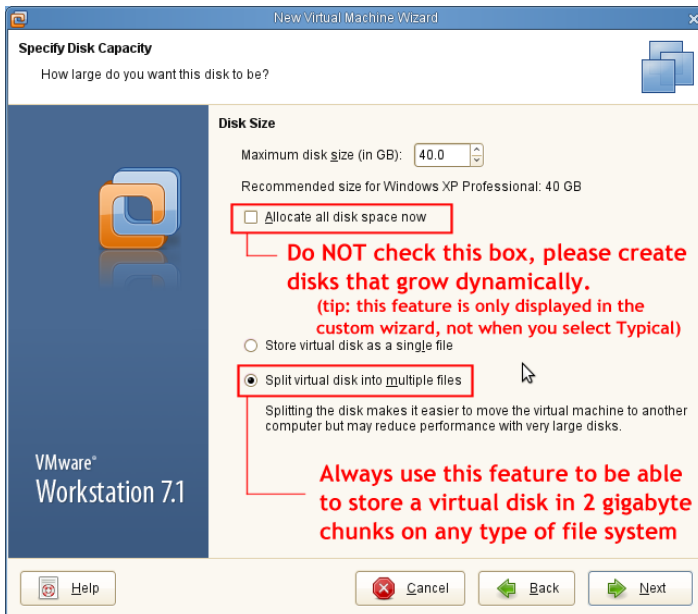
6 Virtual Machine tips

When delivering the Virtual Machines to the technical team on-site it is important that they are optimized as much as possible.

Do not ZIP your virtual machines, we need to copy them in their native format.

When building your virtual machines:

- Make your virtual machines as small as possible
- Do not add unnecessary data to your virtual machines
- Do not pre-allocate the disk space (files will grow as you add data)
- Use the feature to split your disks in 2GB chunks



- Remove unnecessary hardware: floppy drive, sound adapter, USB controller
- Place uuid.action = "keep" or "create" in each .vmx file (see later in this chapter)
- Remove any references to ISO-images
- VM display name includes session number (B01-Win, B01-DC, B01-Lin, etc)
- Preferably only use one start snapshot
- Create any snapshots when virtual machine is powered off.

Some general VM tips:

For all operating systems:

- disable automatic updates

For Windows Operating Systems:

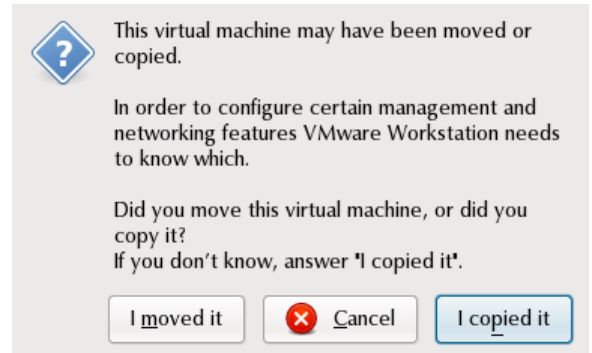
- disable windows powersave, otherwise your virtual machines will be paused automatically after a while.

UUID.ACTION = “keep” or “create”

Virtual Machine Moved/Copied Identifier and Mac Address behaviour explained

When we copy the Virtual Machines to the laptops in the training rooms VMware Workstation will notice that they are not in their original location. It will then respond with a message such as in the image on the right. The question is if the VM is moved or copied.

The reason for this process is that an absolute clone of a virtual machine would have the same identifier but also the same MAC-address on the network, which could lead to problems. Therefore it is important to make the right choice. When you answer I copied it, it will create a new identifier and generate a new MAC-address (since after copying there are now two or more identical VMs) When you answer I moved it it will keep the identifier and MAC-address, since it is the same VM but in a different location.



To automate answering this question you need to consider what the right answer to the question should be and place one of these lines in the .vmx file of your VM:

`uuid.action="create"` To answer I copied it and create a new identifier and MAC-address

`uuid.action="keep"` To answer I moved it and keep the identifier and MAC-address

Just add one of these lines to the end of the file. It is best practice to add this line to the .vmx file when it is not in use by VMware Workstation. And to use **notepad** or another text editor to add this line. (**Do not** use Word or another word processor since they often modify the quotes (") into different characters based on the font.)

The short instruction/rule of thumb:

- If your VM runs a version of Windows and you do not have software or a configuration that uses the MAC-address (you probably have not) then add `uuid.action="create"` to the .vmx file.
- If your VMs run a version of Linux then please test how it responds to changing the MAC-address. (Create a snapshot / clone and try) If you are running your VMs in the Host Only network (VMNET1 / VMNET5) or NAT network (VMNET8) then you are safe to use `uuid.action="keep"` because it is isolated in the host. If it is bridged (VMNET0) you must create a new MAC-address to prevent networking conflicts and you should add `uuid.action="create"` to the .vmx file.

The longer version:

- With the Windows OS there are no versions that bind a networking configuration to the MAC-address, therefore with Windows you are safe to always create a new identifier and MAC-address. The only exception would be if you are using software that uses the MAC-address for anything. There for example are programs that use that unique address to bind the licensing to. But this is becoming very rare. So therefore with Windows you can almost always safely add the `uuid.action="create"` to the .vmx file. By using this choice your VMs will always be properly configured for both host-only and bridged networking.
- With Linux distributions it's a different story because there have been many operations systems, including OES and SLES11, that bind the eth0 config to the MAC-address. So when you change that address it would break the networking configuration. Many recent distributions

no longer store the configuration this way so when you change the MAC-address no harm is done. When this is the case the best choice is to set the `uuid.action="create"` setting in the `.vmx` file because then it will work in host-only and bridged configurations. If you are not sure then your best bet is to first create a snapshot of the VM and then test copying it and see if creating the new identifier breaks your networking configuration.

If you have any questions or comments please contact Rob Bastiaansen.
rob@mobileclassroom.nl