CTBTO
PREPARATORY COMMISSION

preparatory commission for the
comprehensive nuclear-test-ban
treaty organization

National Data Centre Software Installation Plan for the Virtual Machines NDC-in-a-Box

(based on CentOS 7 operating system)

This document defines the installation plan of the Virtual Box with custom made CentOS operating system which contains already installed NDC-in-a-Box software.

Summary

The CTBTO provides technical assistance that enables Member States to work with IMS data and IDC products. This assistance includes the distribution and support of software packages for NDCs, as well as distribution of virtual machines with a customized CentOS Linux installation with pre-installed NDC-in-a-Box software. The packages provided to NDCs through these two distribution mechanisms cover a wide range of functionality, consisting of software to receive, work with and analyze seismic, hydroacoustic, infrasound (SHI) waveform data and radionuclide (RN) data. Currently all software components for a processing of raw SHI and RN data are divided into two separate Virtual Machines that allowed reducing their size.

Both SHI and RN Virtual Machines contain latest NDC-in-a-Box software components. A significant advance is an addition in the SHI Virtual Machine of SeisComp3 software. The aim of the Extended NDC in a Box distribution is to enable NDC users to more easily combine data from the IMS stations with data from local and national stations and from other global networks and to significantly improve the NDCs' processing capabilities by providing NDC users with an automated processing pipeline based on SeisComP3 and with enhanced detection capabilities. The RN Virtual Machine of radionuclide software modules aims at improving the quality of automatic processing results of particulate sample spectra and reducing the work load on analysts in interactive review mode.

Document history

Version	Date	Author	Description
1.0	8 July 2016	Vera Miljanovic	Created at release of the VM SHI components ver. 4.0
1.1	12 December 2016	Alexander Poplavskiy	Updated at release of the VM SHI components ver. 4.1
1.2	7 April 2017	Alexander Poplavskiy	Updated at release of the VM RN components ver. 2.0
1.3	14 June 2019	Alexander Poplavskiy	Updated at release of the VM SHI components ver. 5.0
1.4	7 November 2019	Alexander Poplavskiy	Added p.3.4 - Updating NDC-in-a-Box software
1.5	30 March 2020	Alexander Poplavskiy	Added p.3.5 - Adding SSO credentials for NMS Client
1.6	15 October 2020	Alexander Poplavskiy	Added pp.2.2 and 2.3

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1. STEP 1

1.1. Installing VirtualBox

Go to http://www.virtualbox.org and click **Downloads.** Follow the Installation Manual http://www.virtualbox.org/manual/UserManual.html, in particular Chapter 1: *First steps*.
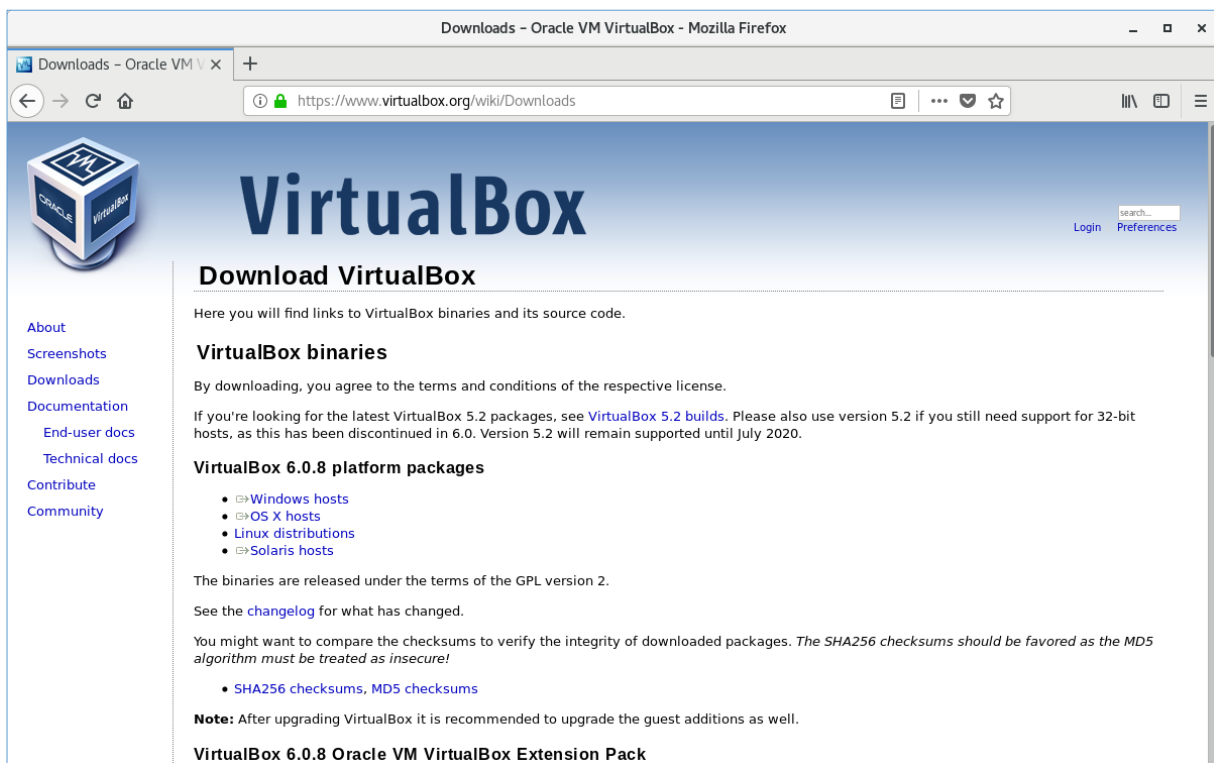

Figure 1: Oracle VM VirtualBox Download page

VirtualBox comes in many different packages, and installation depends on your host platform. If you have already installed software before, installation should be straightforward as on each host platform VirtualBox uses the installation method that is most common and easy to use. If you run into trouble or have special requirements, please refer to Chapter 2, *Installation details* for details about the various installation methods.

Note: *only VirtualBox version 6.* can run NDC-in-a-Box VMs!*

2. STEP 2

2.1. Importing Virtual Machine NDC-in-a-Box

Follow the Installation Manual, in particular Chapter 1.14: *Importing and exporting virtual machines* http://www.virtualbox.org/manual/ch01.html#ovf

To **import** an appliance in OVF format, select "File" → "Import appliance" from the Manager window. In the file dialog that comes up, navigate to either of NDC-in-a-Box VMs files downloaded from the Secure Web Portal.
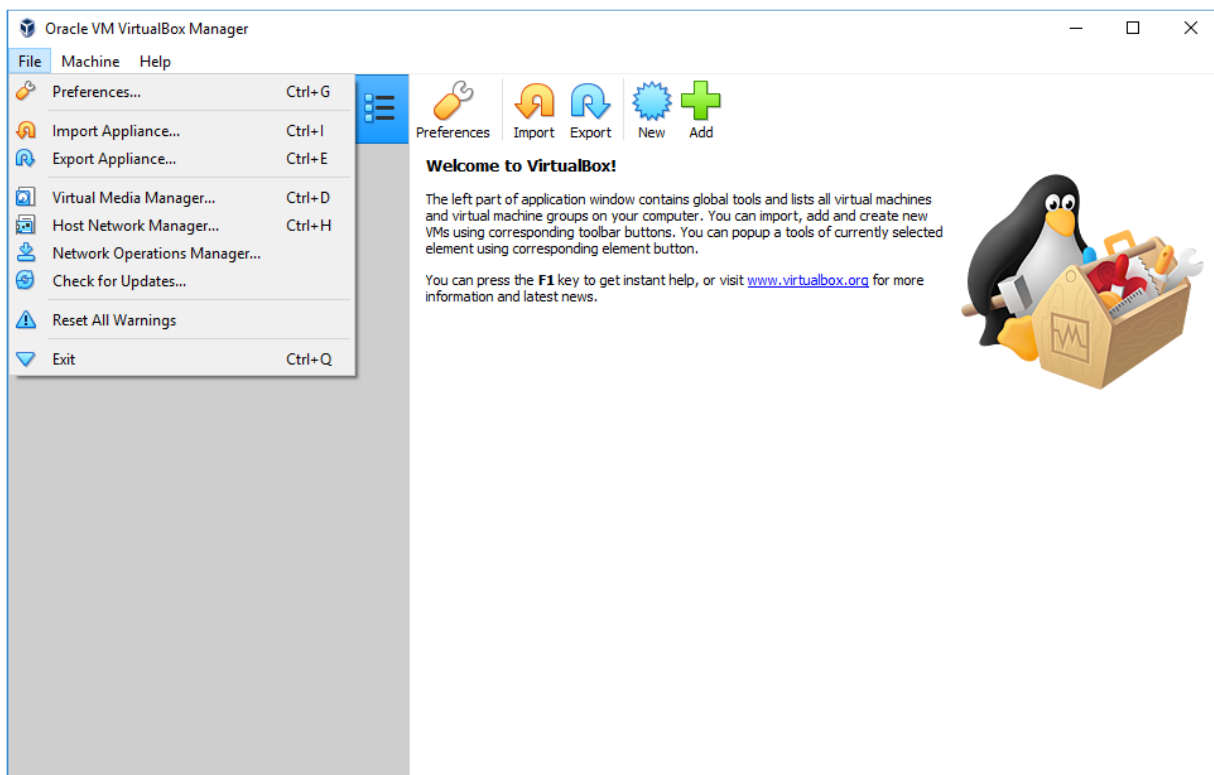

Figure 2: Oracle VM VirtualBox Manager

These files contain virtual machines described in the OVA file and allow you to change the virtual machine settings by double-clicking on the description items. Once you click on **"Import"**, VirtualBox will copy the disk images and create local virtual machines with the settings described in the dialog window. These will then show up in the list of virtual machines.

Since disk images tend to be big, and VDI images that come with virtual appliances are typically shipped in a special compressed format that is unsuitable for being used by virtual machines directly, the images will need to be unpacked and copied first, which can take a few minutes.

Note: *VirtualBox stores all VMs virtual drives into "VirtualBox VMs" folder within your system user's home directory by default. Before importing make sure that the host hard drive with user's home directory has at least 15 GB free space that will be allocated by unpacked VM. The size of the virtual drive can grow up to 100 GB as the amount of retrieved and stored in the VM waveforms and other relevant data increase. It is recommended to choose another available drive having the large amount of storage space by changing the Default Machine Folder parameter from VirtualBox Preferences.*
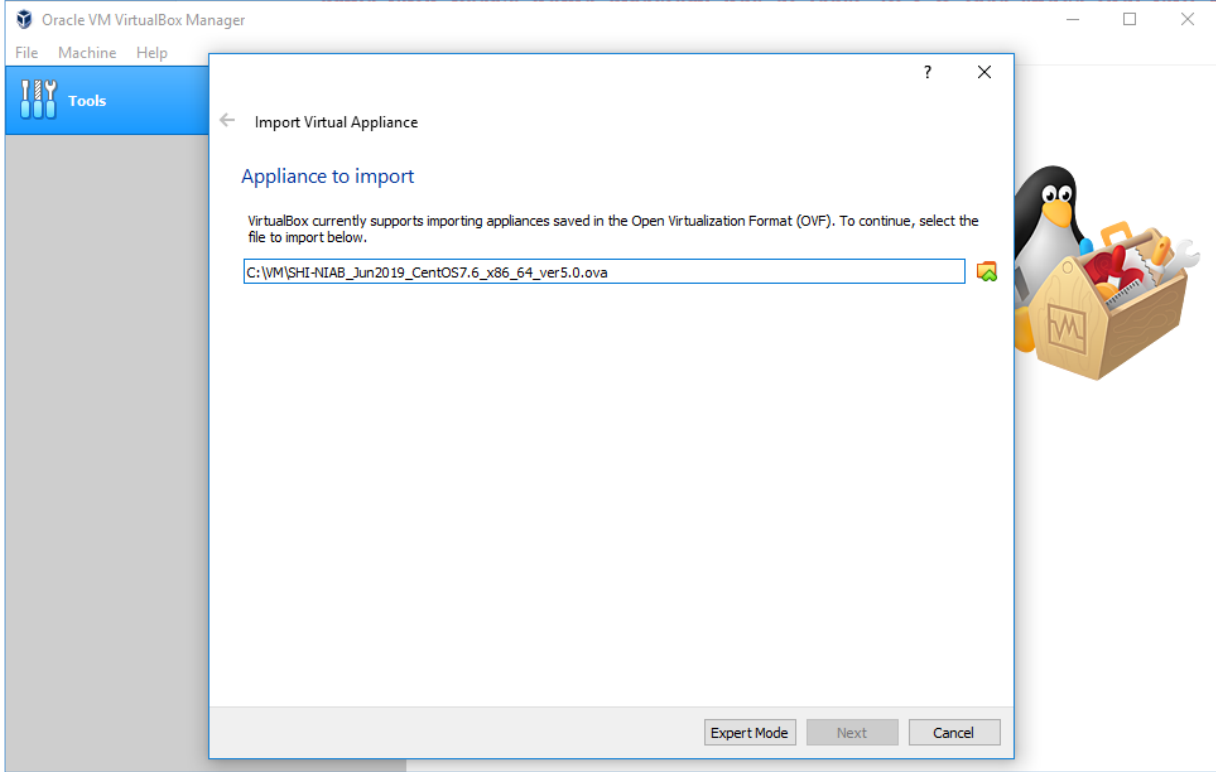

Figure 3: Import Virtual Appliance Popup with the VM NDC-in-a-Box version 5.0 selected

After selecting Next and then Import buttons, the Import will begin:
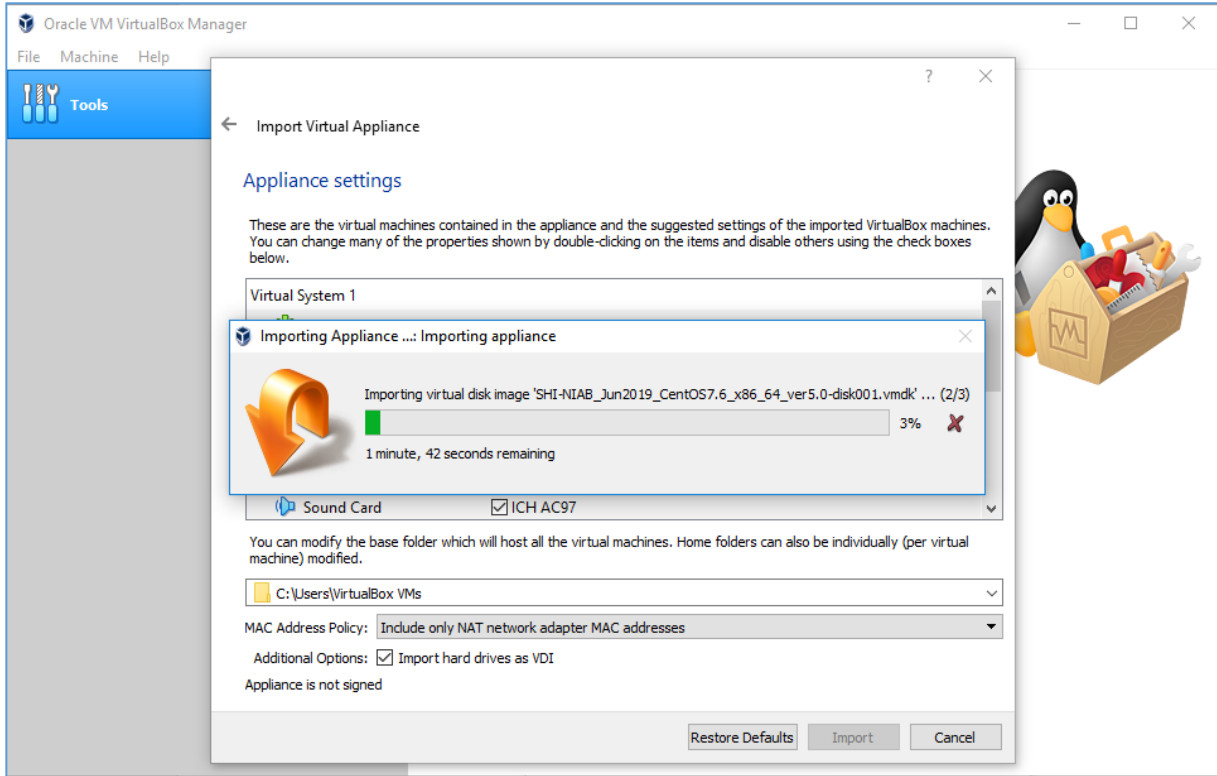

Figure 4: Importing Appliance working

When the importing is done, the Virtual Machine will appear in the list of the available machines. Make sure that defined Operating System is Red Hat (64-bit), otherwise you cannot run the VM.
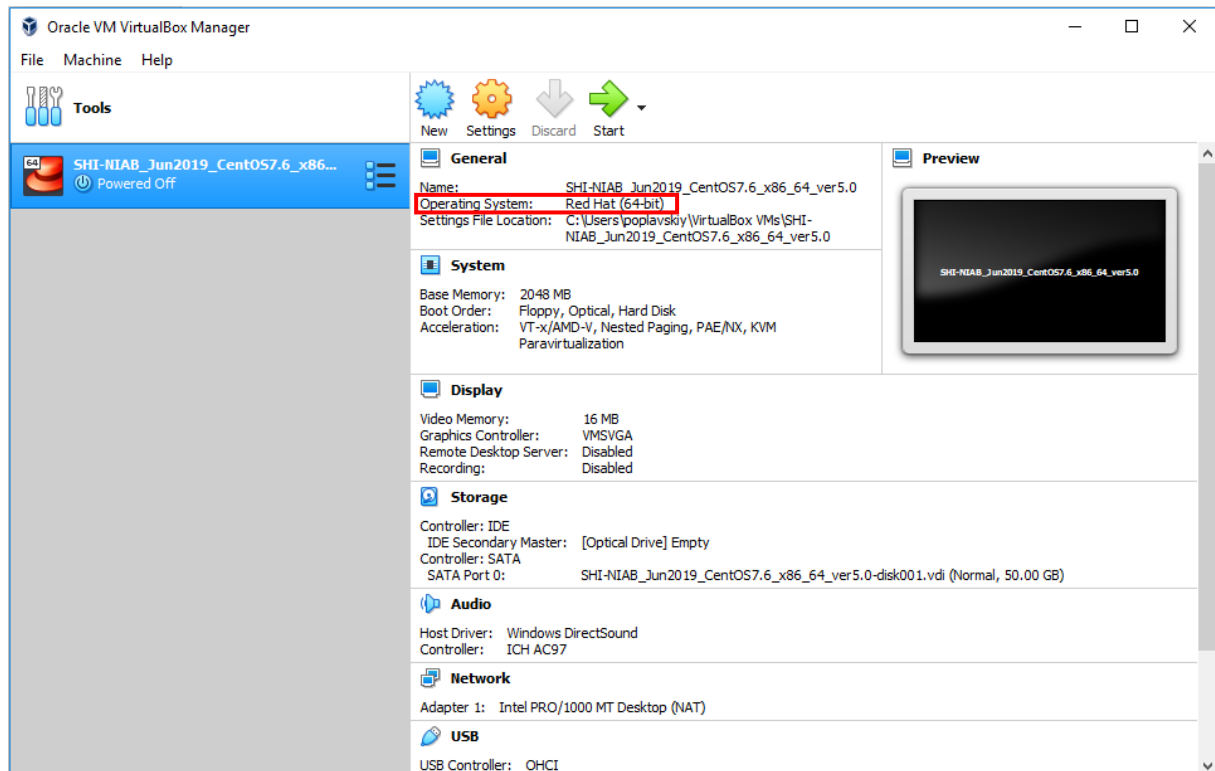

Figure 5: Virtual Box with the imported Virtual Machine NDC-in-a-Box

2.2. Allocating hardware resources to run Virtual Machine

In order to ensure a better performance of the Virtual Machine you are advised to allocate more available hardware resources for running the VM.

Click on the Setting button brings up the Settings window (see Figure 6) where you can configure the most fundamental aspects of the virtual machine such as memory and essential hardware.
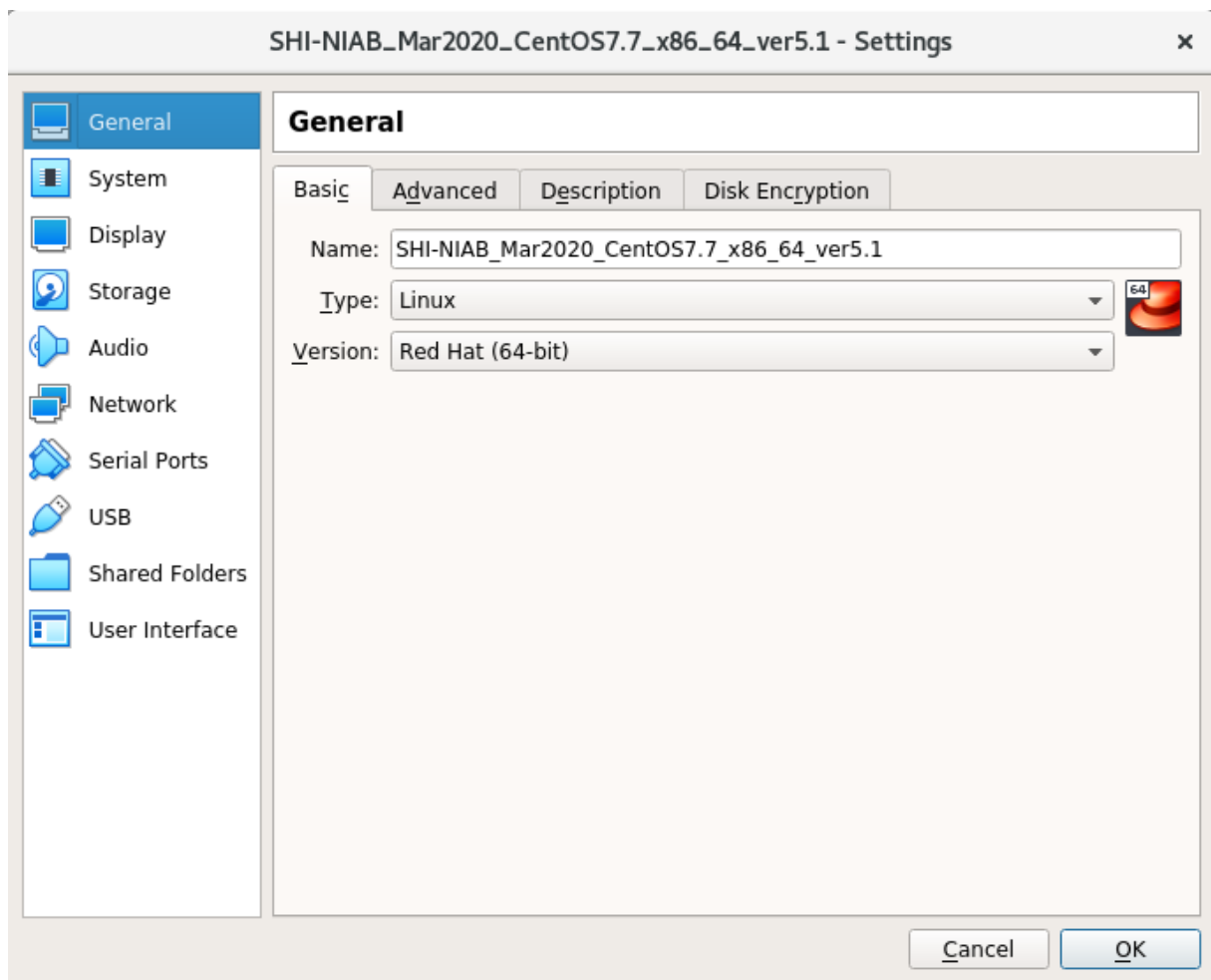

Figure 6: Settings window

Choose the System category on the right panel which groups various settings that are related to the basic hardware that is presented to the virtual machine.

On the Motherboard tab you can find the Base Memory scrollbar. The amount of memory given here will be taken away from your host machine and presented to the guest OS, which will report this size as the virtual computer's installed RAM.

Move the pointer to the right border of the green field to settle a possible maximum of recommended amount of RAM to be allocated from the host OS (see Figure 7).
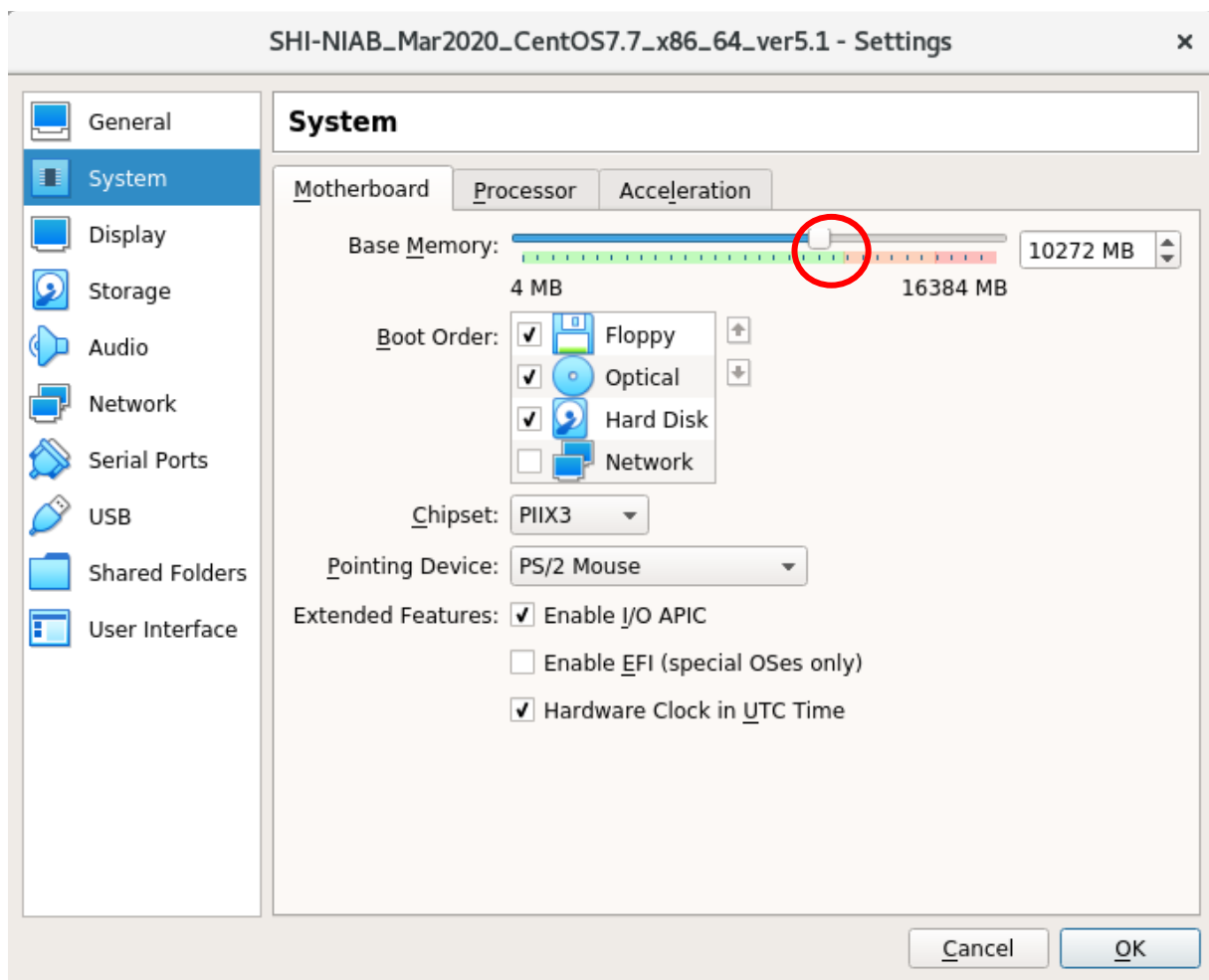

Figure 7: Setting the base memory

The memory you give to the VM will not be available to your host OS while the VM is running, so do not specify more than you can spare.

Switch to the Processor tab to configure settings for the CPU used by the virtual machine. Similarly, as for the Base Memory move the pointer to the right border of the green field.
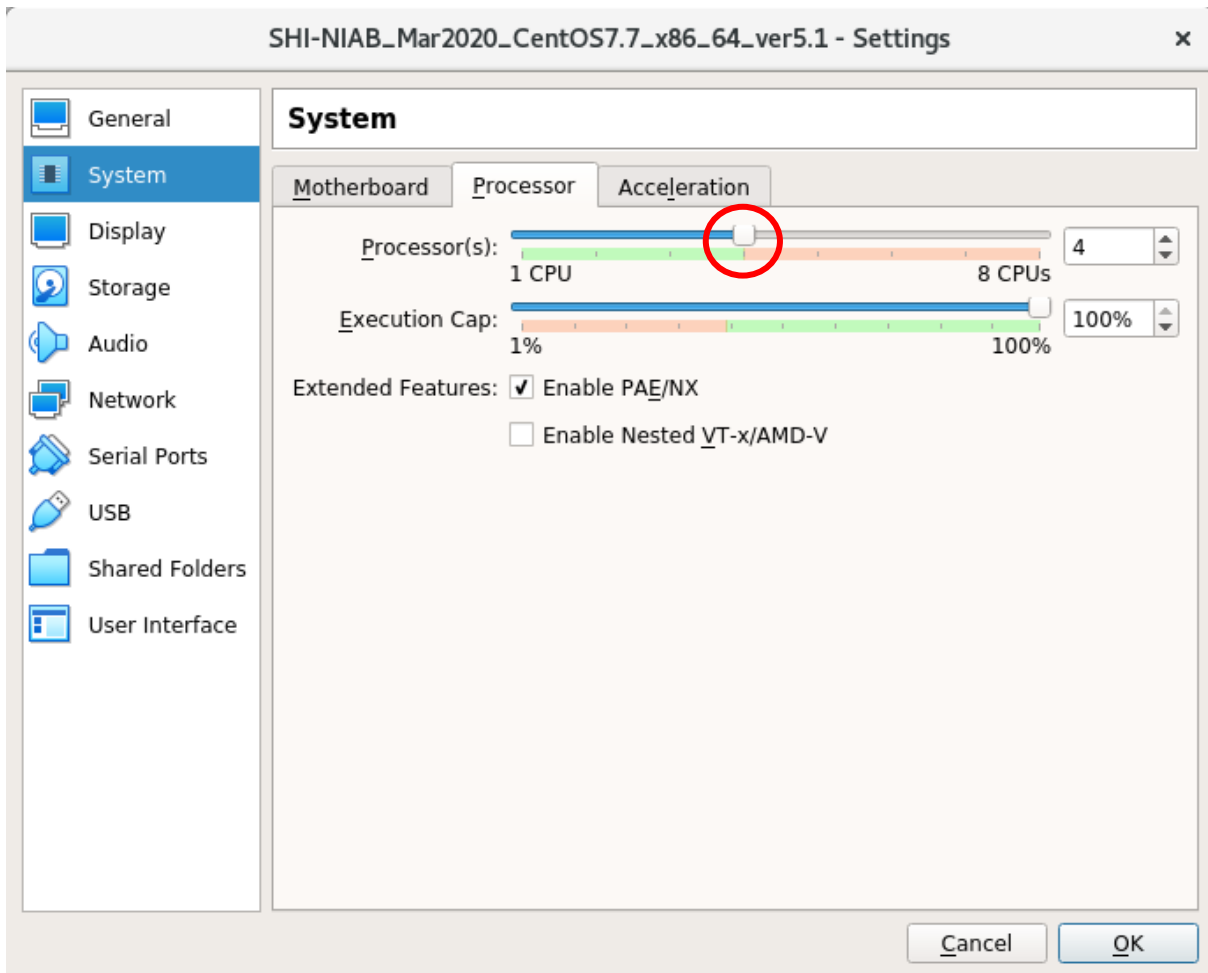

Figure 8: Setting the number of virtual CPU

You should not configure virtual machines to use more CPU cores than are available physically. This includes real cores, with no hyperthreads.

Note: *If you run two VMs at the same time, even more memory and cores will be allocated for the second VM, which may not even be able to start if that memory is not available.*

2.3. Generating a new random MAC Address

In order to identify the Virtual Machine as a unique unit of the network it is highly recommended to generate a random MAC address.

Choose the Network category on the right panel and click Advanced to open additional settings and click the blue icon at the right side of the MAC Address field to generate a random MAC Address.
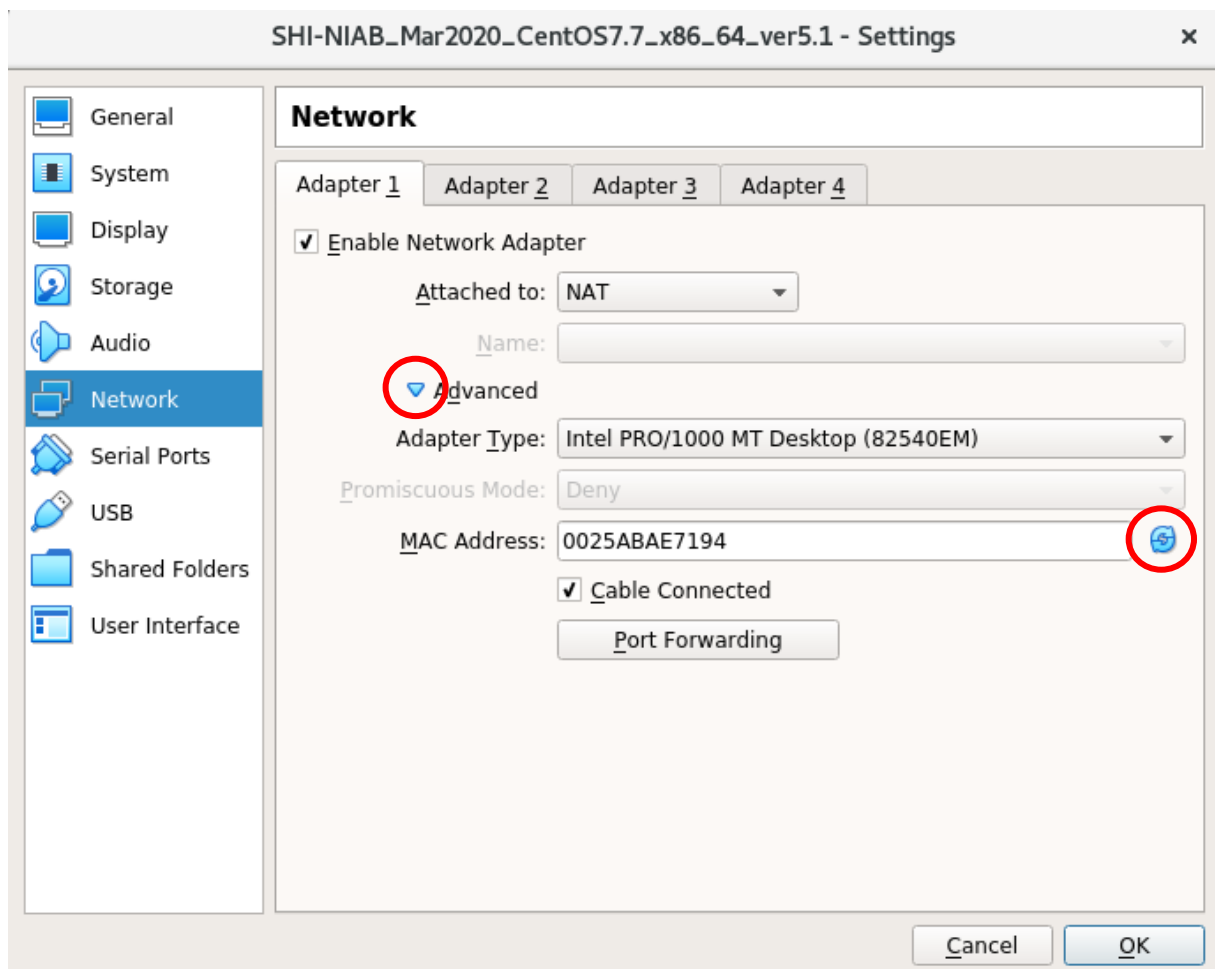

Figure 9: Generating random MAC Address

Click OK button to save all parameters. You are now ready to start the VM.

3.   STEP 3

3.1   Starting Virtual Machine NDC-in-a-Box

To start the virtual machine, select its entry from the list of Manager window and hit "Start" button from the top panel.

Depending on allocated hardware resources (RAM and number of cores) the booting may take up to one minute.
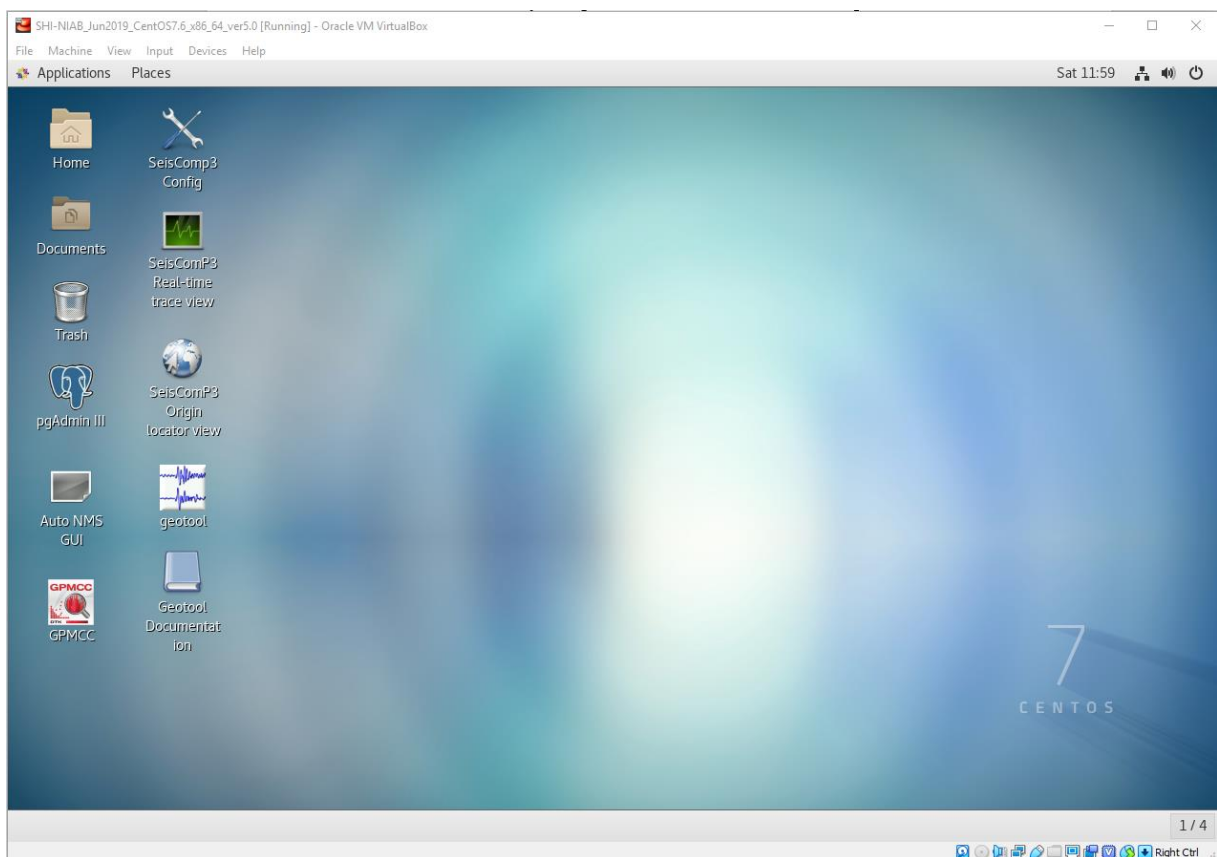

Figure 10: Desktop of the SHI Virtual Machine NDC-in-a-Box version 5.0

Note: *The virtual machines NDC-in-a-Box have one user in the system –* _ndcuser_ *with password* _ndcuser_. *The same password is set for the root.*

3.2 Installing Guest Additions

The VirtualBox Guest Additions will make your life much easier by providing closer integration between host and guest and improving the interactive performance of guest systems.

Select **Devices->Insert Guest Additions CD Image** from the main window of the VirtualBox:
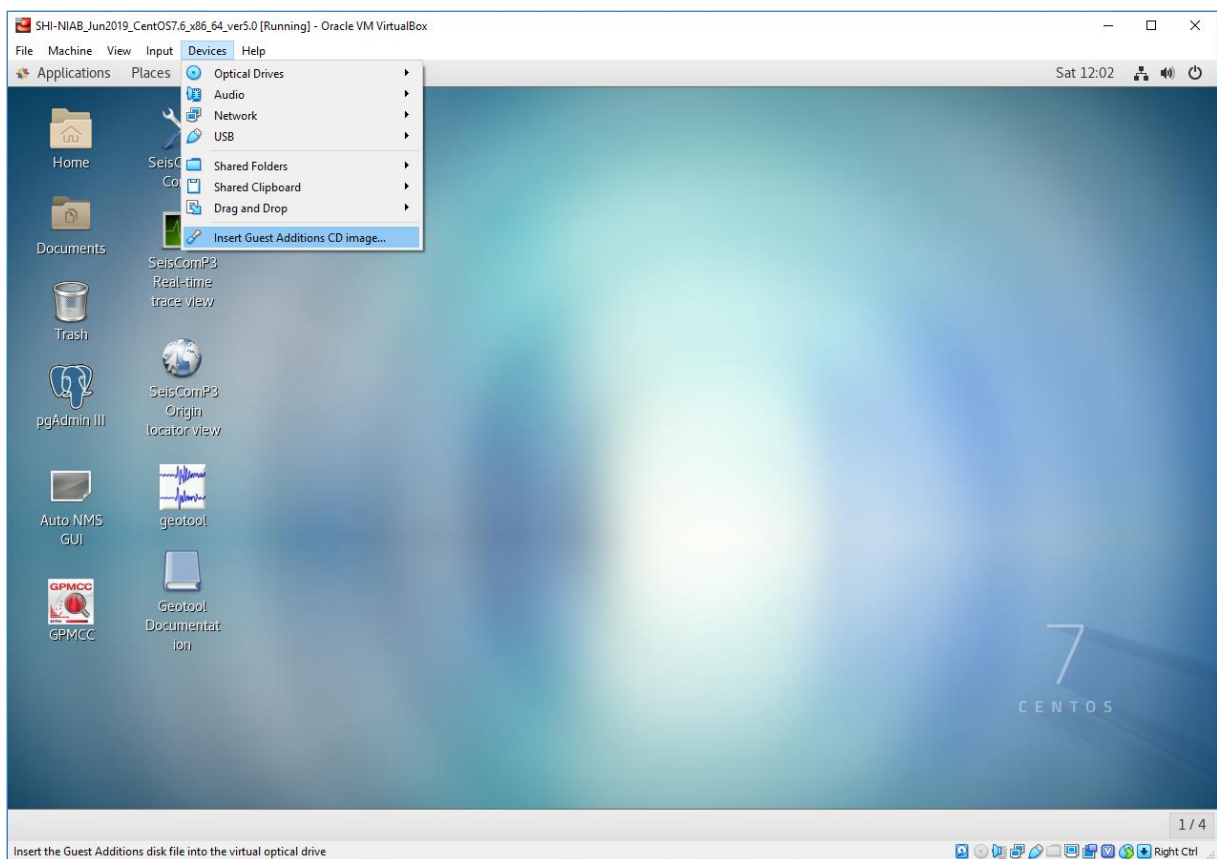

Figure 11: Install Guest Additions step1

New popup VBox_GAs_6.0.8 (or later versions) will appear, as well as the icon of DVD on the desktop. Click **Run**.
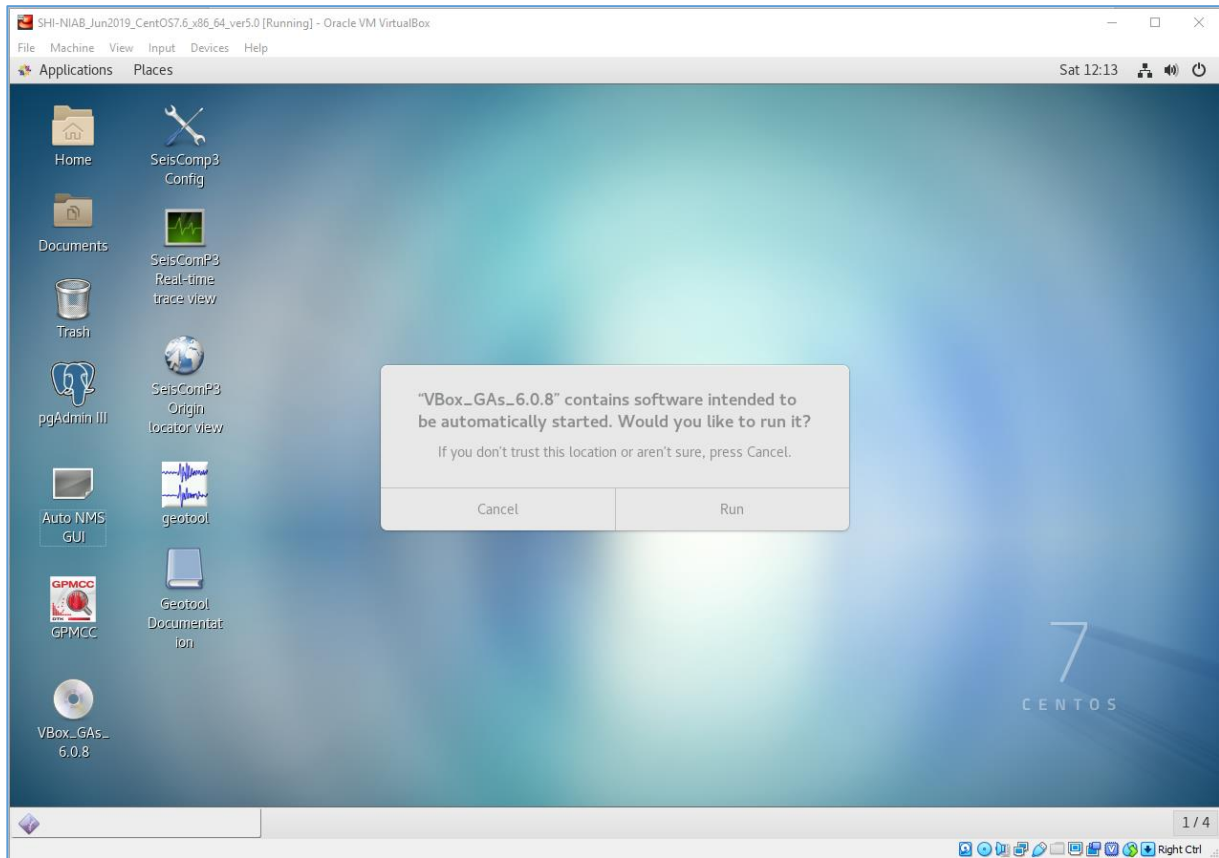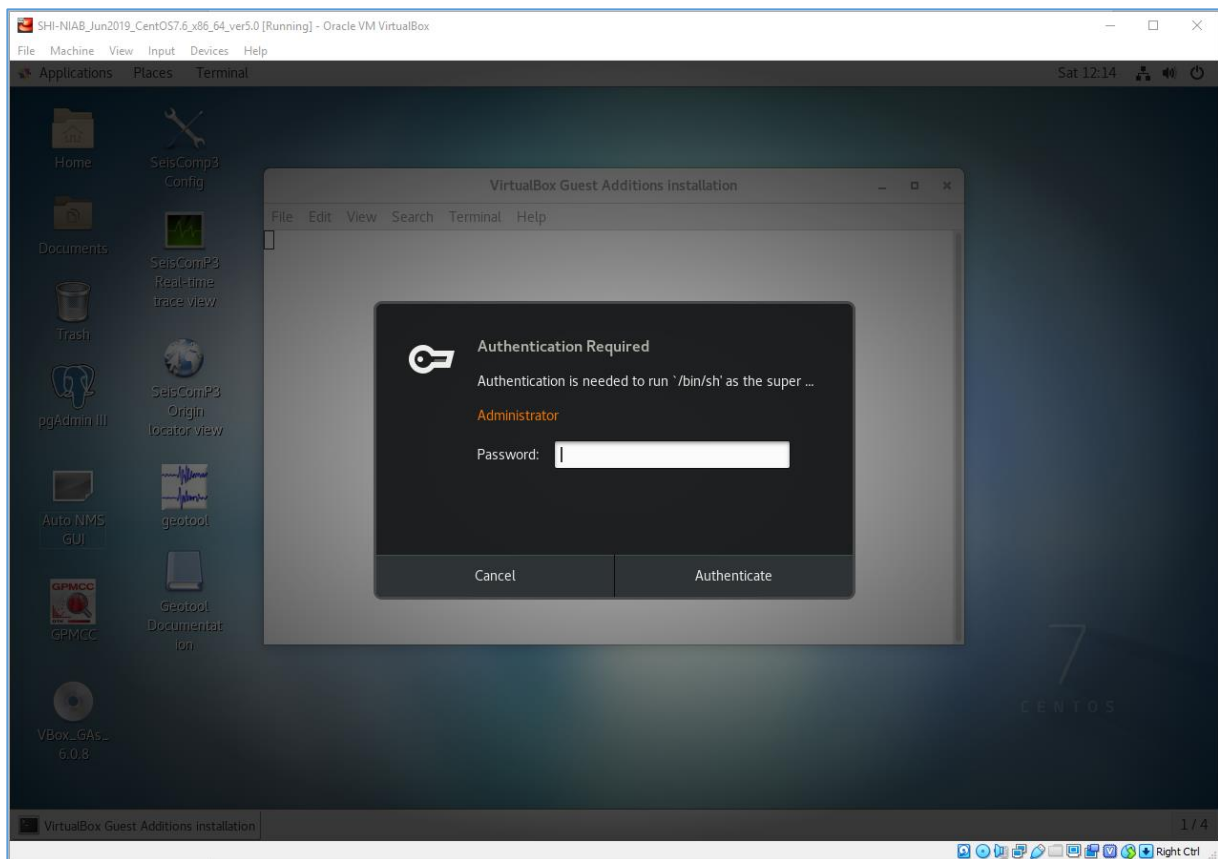

Figure 12: Install Guest Additions step2

Figure 13: Install Guest Additions step3

Type **ndcuser** for root password.

Click on **Authenticate** and wait till the command finishes.

Once it is done, press Enter then you can unmount the VBox_Gas virtual DVD by clicking on its icon on the desktop with right mouse button and selecting Eject. Restart the Virtual Machine.

3.3   Creating shared folder

With the "shared folders" feature of VirtualBox, you can access files within your host system from the guest system. This is similar to how you would use network shares in Windows networks except that shared folders do not need require networking, only the Guest Additions. Shared Folders are supported with Windows (2000 or newer), Linux and Solaris guests.

First, close down the Virtual machine and go back to the VirtualBox. In the VirtualBox, select the virtual machine entry in the list within the Manager window and press the "Settings" button at the top.

Settings popup will appear. In that popup, select Shared Folders in the left panel, and in the right, press on the "+" sign to add Machine Folders (follow the location of the mouse).
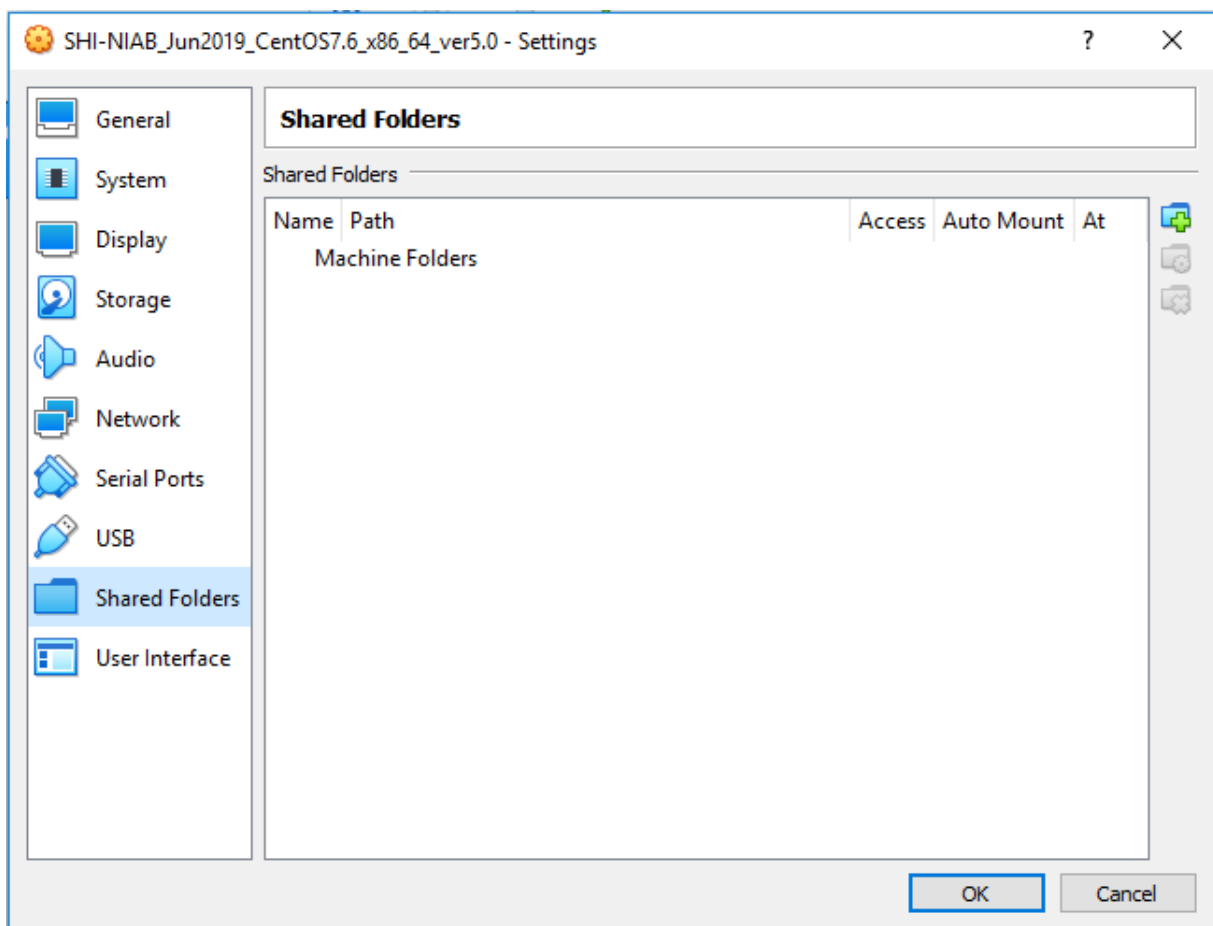

Figure 14: Creating Shared Folder step1

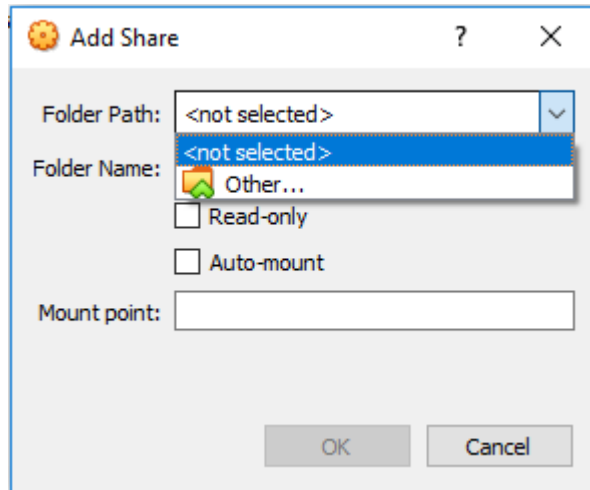After selecting the "+" sign, **Add Share** popup will appear.

Figure 15: Creating Shared Folder step2

Click on the dropdown box **Folder Path** and select **Other** directory**,** and choose any directory on your host computer which you want to have shared with the VM, for example, the Share directory on C-drive, as in Figure 16**.**
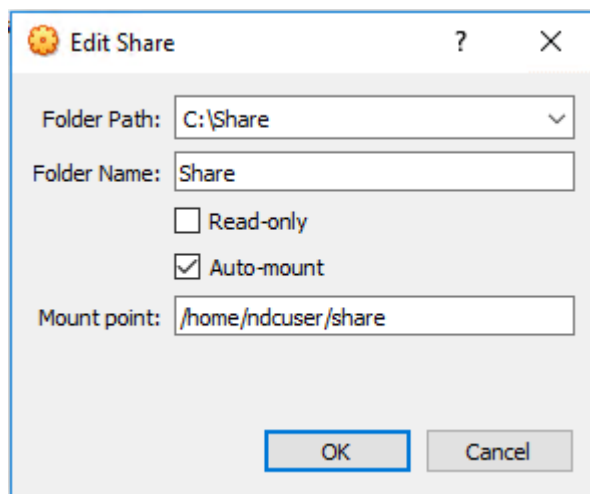

Figure 16: Creating Shared Folder step3

Note that **Auto-mount** box should be checked. After selecting it, you need to specify the **Mount point**, it is supposed to be the directory in the home directory of "ndcuser": /home/ndcuser/share for example.

After click **OK, the** folder C:\Share should appear in the **Machine Folders** list.
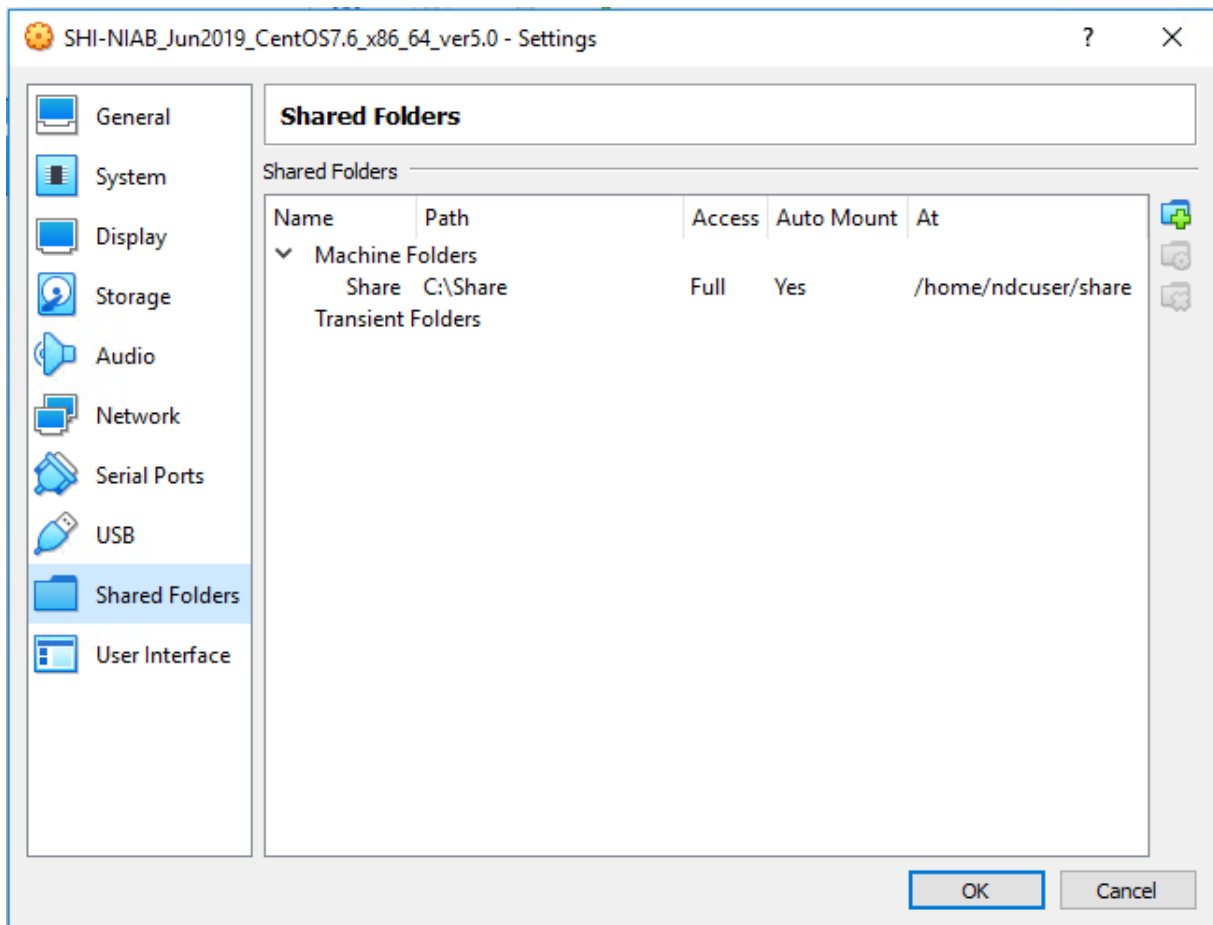

Figure 17: Creating Shared Folder step4

You can now start the Virtual Machine again, as in p.3.1. You should have now the **share** directory in the user home and its icon on the desktop which let you access files from the host system from within the VM.

If you faced any difficulties during installation and configuration NDC-in-a-Box Virtual Machine or have any questions, please contact us through alexander.poplavskiy@ctbto.org. Thank you.