

pulsarVmlite v1.05 - Installation and Usage

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Welcome to *pulsarVmlite*, a custom-built 32-bit virtual machine (VM) image for pulsar astronomers.

Based on a minimal install of CentOS 6, it contains all the latest versions of available search and analysis software, plotting packages and additional tools, whilst maintaining a small footprint on the host system resources.

You will find installation instructions in section A, general usage information in B, advanced usage and configuration in C, and tips on troubleshooting in D.

A. Installation instructions

1) Download and install VirtualBox

This VM was built on Oracle's VirtualBox package. In order to install the image, download and install VirtualBox for your operating system from the link below:

<https://www.virtualbox.org/wiki/Downloads>

2) Import the pulsarVmlite image

Start VirtualBox, and in the menu select

File -> Import Appliance

Browse to the .ova file to import, select it, and click

Import

3) Configure the network

When the image has completed importing, click

Settings -> Network

By default, the *pulsarVmlite* VM is configured with two network adapters.

You will be using 'Adapter 2'. This adapter is configured with 'NAT' – Network Address Translation – it uses port forwarding from the localhost and is the easiest and most suitable to set up, but the VM will not be reachable by the rest of your network.

To set up 'Adapter 2',

- On the 'Adapter 1' tab, un-tick 'Enable Network Adapter'
- On the 'Adapter 2' tab, tick 'Enable Network Adapter'.

NOTE: If you wish to set up 'Adapter 1', and have your VM available as a host on the network, please see section 'C. Advanced Usage' below.

4) Set up shared folders

The VM is configured with a maximum ~7GB of free disk space. You will need to increase your storage capacity, by configuring a shared folder on the host. Select

Settings -> Shared Folders

Click the green plus sign to add a new share.

Browse to the path of a folder on the host that you require, and select it. You will find that the 'Folder Name' box will be auto-filled, but due to a bug in VirtualBox this will produce a protocol error when you try and mount it, so please change it to

share

Ensure 'Auto-mount' is left unchecked, and click 'Ok'. You should see your folder listed.

Click 'Ok' to complete the set up.

5) Start the VM

On VirtualBox Manager, if you have an arrow and drop-down list next to 'Start', click it and select 'Headless Start', otherwise just click 'Start'. If all goes well, the system should boot to run level 3 within ~2 minutes.

If 'Headless Start' was not given as an option, you will see that the VM has booted to a terminal window. Do NOT log in to this terminal.

B. General usage

1) Logging in to the VM

1.1 Mac/Linux users

On a Mac, you will need 'XQuartz' and 'Terminal' installed in order to continue.

If you have configured the VM using 'Adapter 2', open a terminal on your host machine and type

```
ssh -X -p 2222 pulsar@localhost
```

Don't forget to forward X output by specifying '-X' above.

Enter the default password for user pulsar:

```
pulsarvm
```

Congratulations – you should now be logged in to the VM!

You will be greeted by a welcome message and a list of installed software, including where to find notes of how the software was compiled, and where to find data.

1.2 Windows users

On Windows machines, you will need 'Xming' and 'Putty' installed in order to continue.

Start Putty, and then follow these steps:

- set Host Name to 'localhost'
- set Port to '2222'
- set Connection Type to 'SSH'
- in Category -> SSH -> X11, tick 'Enable X11 forwarding'
- in Category -> Session, set Saved Session to 'pulsarVmlite'
- click 'Save'
- click 'Open'

A terminal window should pop up with 'login as:'

- enter 'pulsar', and hit Return
- enter the password 'pulsarvm', and hit Return

Congratulations – you should now be logged in to the VM!

You will be greeted by a welcome message and a list of installed software, including where to find notes of how the software was compiled, and where to find data.

Next time you start Putty, you can use the saved session you created by following these steps:

- select the saved session 'pulsarVmlite'
- click 'Load'
- click 'Open'

2) Mount shared folders

Once logged in, if you configured a shared folder above, you can mount it with:

```
sudo mount -a
```

To check that the shared folder is mounted, type

```
df -h
```

On my VM, I see that my shared folder is 96% full

<i>Filesystem</i>	<i>Size</i>	<i>Used</i>	<i>Avail</i>	<i>Use%</i>	<i>Mounted on</i>
<i>/dev/mapper/vg_pulsarvmlite-lv_root</i>	<i>6.7G</i>	<i>1.8G</i>	<i>4.6G</i>	<i>28%</i>	<i>/</i>
<i>tmpfs</i>	<i>504M</i>	<i>0</i>	<i>504M</i>	<i>0%</i>	<i>/dev/shm</i>
<i>/dev/sda1</i>	<i>485M</i>	<i>31M</i>	<i>430M</i>	<i>7%</i>	<i>/boot</i>
<i>share</i>	<i>298G</i>	<i>285G</i>	<i>13G</i>	<i>96%</i>	<i>/home/pulsar/share</i>

3) List installed software versions

In order to list the versions of installed software, in the terminal type

```
versions
```

4) Using the test data

Change directory to `/home/pulsar/testdata`

Here you will find a `.par` and `.tim` file for testing tempo2, and a search mode file (`.sf`) for testing the search and analysis software.

Have a try at launching tempo2 with the plk plugin:

```
tempo2 -gr plk -f psr1.par psr1.tim
```

Also, there is a pulsar hidden in the search mode file. See if you can find it using the tools provided.

5) Plotting

Both PGPLOT and gnuplot are installed. PGPLOT should produce a plotting window in the tempo2 test above.

To test gnuplot, type

```
gnuplot
```

At the prompt, type

```
test
```

6) Viewing images

A lightweight image viewer 'gqview' is installed. For example, this can be used for viewing PNG output from the PSRCHIVE suite of software.

In a terminal, type

```
gqview
```

Then browse to the image file and select it.

7) Viewing postscript files or pdfs

In a terminal, type

```
evince <filename>
```

8) Viewing/editing text files

You can view or edit text files with the following text editors:

```
gedit  
emacs  
vi
```

9) Monitoring system tasks

You can monitor system tasks, CPU/memory usage etc. with

```
htop
```

C. Advanced usage

1) Command line VM control

The *pulsarVmlite* VM behaviour can be controlled at the command line on the host. Here are some examples:

Import

```
VBoxManage import pulsarVmlite_*.ova
```

Start

```
VBoxManage startvm pulsarVmlite --type headless
```

Poweroff

```
VBoxManage controlvm pulsarVmlite poweroff
```

Pause

```
VBoxManage controlvm pulsarVmlite pause
```

Resume

```
VBoxManage controlvm pulsarVmlite resume
```

Adding a shared folder (VM must be powered off before running this command)

```
VBoxManage sharedfolder add pulsarVmlite --name share --hostpath  
</path/to/host/folder>
```

To simplify the above usage, just add some aliases to your *.bash_profile* or *.bashrc* as follows, for example:

```
alias startVM='VBoxManage startvm pulsarVmlite --type headless'
```

2) Manage shared folder configuration

Shared folders are auto-mounted at boot time, and mount configuration including mount points and permissions can be found in the file */etc/fstab*

The default installation *fstab* file has the following line added

```
share /home/pulsar/share vboxsf umask=0022,gid=500,uid=500 0 0
```

Please see the *fstab* man page for more details.

To mount shared folders in the VM manually

```
sudo mount -t vboxsf share /home/pulsar/share
```

To unmount

```
sudo umount /home/pulsar/share
```

3) Terminal history logging

An automated backup and rotation of bash history is provided by the script

```
bash_history_archiver.sh
```

and history settings can be found in the `.bashrc` file. The logs are archived after a defined number of entries.

4) Setting up the Bridged Network Adapter (Adapter 1)

If you are connecting to a non-CSIRO network, you can configure your VM with its own IP address, such that it will be accessible from anywhere on the LAN.

Adapter 1 is configured as a 'Bridged Adapter' and suitable for a network where the VM can obtain an IP address over DHCP. This is generally not suitable on a CSIRO network that limits IP address leasing to machines with defined MAC addresses. However this adapter is suitable on any other network operating with a DHCP server, such as a home Wi-Fi network.

On the 'Adapter 1' tab, ensure 'Enable Network Adapter' is ticked, and in the 'Attached to' drop-down list select

Bridged Adapter

Then select the adapter 'Name' from the drop-down list. If for example you are using a Mac on a Wi-Fi network, you may see an item like this

en1: Wi-Fi (AirPort)

Next, on tab 'Adapter 2', ensure 'Enable Network Adapter' is un-ticked. Click 'Ok' and start your VM.

While the VM boots, open a terminal on your host machine and type

```
ping pulsarVMlite
```

If the network has been correctly configured, and the VM has received an IP address via DHCP, the ping command should return with something like

64 bytes from pulsarVmlite.localdomain (192.168.2.160)...

NOTE: If you cannot ping the VM, and get 'host not found' errors, the chances are that either your network or adapter are not configured correctly (see section 'D. Troubleshooting' below.)

If the ping was successful, you can now ssh in to the VM as the default user 'pulsar' with

```
ssh -X pulsar@pulsarVmlite
```

D. Troubleshooting

Network connectivity

If you are using the bridged network adapter, 'Adapter 1', and are unable to connect to your VM, please check the following on the host:

- You have a Wi-Fi network available or an Ethernet cable plugged in
- You are connected to a network and have an IP address. If your host machine is a Mac, open a terminal and type e.g.

```
ifconfig en1 | grep -w "inet"
```

If you have a valid IP address, you may see something like

```
inet 192.168.2.156 netmask 0xfffff00 broadcast 192.168.2.255
```

- The IP address has been assigned by DHCP. Type

```
ipconfig getpacket en1 | grep server_identifier
```

If the DHCP server is alive, you may see something like

```
server_identifier (ip): 192.168.2.1
```

If you cannot get an IP address assigned by DHCP, you can assign the VM a static IP address as follows:

- Start the VM manually from the VirtualBox manager GUI

- Log in to the terminal that opens
- Add the network settings to `/etc/sysconfig/network-scripts/ifcfg-eth0`

Comment out the lines as hashed below:

```
DEVICE=eth0
HWADDR=08:00:27:50:FA:6F
TYPE=Ethernet
UUID=54a19f4b-bc21-4143-9981-cb85b527b9b0
#ONBOOT=yes
#NM_CONTROLLED=yes
#BOOTPROTO=dhcp
```

Uncomment the following, and add your IPADDR, NETMASK and GATEWAY:

```
ONBOOT=yes
NM_CONTROLLED=no
BOOTPROTO=static
IPADDR=192.168.1.146
NETMASK=255.255.255.0
GATEWAY=192.168.1.1
```

- Save the file
- Edit `/etc/resolv.conf` with your nameserver e.g.

```
nameserver 192.168.1.1
```

- Turn NetworkManager off

```
service NetworkManager stop
chkconfig NetworkManager off
```

- Restart the network

```
service network restart
```

You should see eth0 configured with a static IP address.

- Open a terminal on the host and ssh in with the given IP address e.g.

```
ssh -X pulsar@192.168.1.146
```

- Add the VM's new IP address and hostname to the hosts' `/etc/hosts` file