Qubes OS Cheatsheet

Qubes Cheatsheet

a summary of useful qubes commands

version: 3.2

Mini Glossary

- Xen - *Hypervisor*
- VM - *Virtual Machine*
- Qube - *Qubes OS specific alias for VM*
- Dom0 - *Priviledged Xen VM (runs Qubes Manager)*
- DomU - *Normal Xen VM*
- QWT - *Qubes Windows Tools*
- PV - *Paravirtualized VM*
- HVM - *Hardware Virtual Machine*
- HVM + PV drivers - *HVM with PV drivers (Windows + QWT)*
- GUI - *Graphical User Interface*

VM Management

NOTE: All commands are executed in `@Dom0` terminal (Konsole, Terminal, Xterm etc.)

qubes-manager

- *Graphical VM Manager*

usage: `qubes-manager`

qvm-block

- *Lists/attaches VM PCI devices*

usage:

- `qvm-block -l [options]`
- `qvm-block -a [options] <device> <vm-name>`
- `qvm-block -d [options] <device>`
- `qvm-block -d [options] <vm-name>`

`qvm-block -A personal dom0:/home/user/extradisks/data.img` - *attaches an additional storage for the personal-vm*

qvm-clone

- *Clones an existing VM by copying all its disk files*

usage: `qvm-clone [options] <existing-vm-name> <new-clone-vm-name>`

`qvm-clone fedora-23 fedora-23-dev` - *create a clone of fedora-23 called fedora-23-dev*

qvm-firewall

- *Manage VM firewall rules*

usage: `qvm-firewall -l [-n] <vm-name>`

`qvm-firewall -l personal` - *displays the firewall settings for the personal-vm*

`qvm-firewall -l -n fedora-23` - *displays the firewall settings for the personal-vm with port numbers*

qvm-ls

- *Lists VMs and various information about their state*

usage: `qvm-ls [options] <vm-name>`

`qvm-ls` - *lists all vms*

`qvm-ls -n` - *show network addresses assigned to VMs*

`qvm-ls -d` - *show VM disk utilization statistics*

qvm-prefs

- *List/set various per-VM properties*

usage:

- `qvm-prefs -l [options] <vm-name>`
- `qvm-prefs -s [options] <vm-name> <property> [...]`

`qvm-prefs win7-copy` - *lists the preferences of the win7-copy*

`qvm-prefs win7-copy -s mac 00:16:3E:5E:6C:05` - *sets a new mac for the network card*

`qvm-prefs lab-win7 -s qrexec_installed true` - *sets the qrexec to installed*

`qvm-prefs lab-win7 -s qrexec_timeout 120` - *usefull for windows hvm based vms*

`qvm-prefs lab-win7 -s default_user joanna` - *sets the login user to* ***`joanna`***

qvm-run

- *Runs a specific command on a vm*

usage: `qvm-run [options] [<vm-name>] [<cmd>]`

`qvm-run personal xterm` - *runs xterm on personal*

`qvm-run personal xterm --pass-io` - *runs xterm and passes all sdtin/stdout/stderr to the terminal*

`qvm-run personal "sudo dnf update" --pass-io --nogui` - *pass a* ***`dnf update`*** *command directly to the VM*

qvm-start

- *Starts a vm*

usage: `qvm-start [options] <vm-name>`

`qvm-start personal` - *starts the personal-vm*

`qvm-start ubuntu --cdrom personal:/home/user/Downloads/ubuntu-14.04.iso` - *starts the ubuntu-vm with the ubuntu installation CD*

qvm-shutdown

- *Stops a vm*

usage: `qvm-shutdown [options] <vm-name>`

`qvm-shutdown personal` - *shutdowns the personal-vm*

`qvm-shutdown --all` - *shutdowns all VM's*

qvm-kill

- *Kills a VM - same as pulling out the power cord - immediate shutdown*

usage: `qvm-kill [options] <vm-name>`

`qvm-kill personal` - *pull the power cord for the personal-vm - immediate shutdown*

qvm-trim-template

- *Trims the disk space of a template*

usage: `qvm-trim-template <template-name>`

`qvm-trim-template debian-8` - *helpful after upgrading or removing many packages/files in the template*

qvm-sync-appmenus

- *Updates desktop file templates for given StandaloneVM or TemplateVM*

usage: `qvm-sync-appmenus [options] <vm-name>`

`qvm-sync-appmenus archlinux-template` - *useful for custom .desktop files or distributions not using dnf*

Dom0

qubes-dom0-update

- *Updates or installes software in dom0*

usage: `qubes-dom0-update [--enablerepo][--disablerepo][--clean][--check-only][--gui][--action=*][<pkg list>]`

or

usage: `qubes-dom0-update`

`qubes-dom0-update --check-only` - *checks if new dom0 updates are available*

`sudo qubes-dom0-update` - *updates dom0*

`sudo qubes-dom0-update --gui` - *allows to update dom0 through a graphical window*

`sudo qubes-dom0-update --action=search <search-term>` - *searches for package in dom0 repositories*

example:

`sudo qubes-dom0-update --action=search qubes` - *searches for all* ***`qubes`*** *package in dom0 repositories*

NOTE: The tool excludes all templates (community and ITL) by default

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`sudo qubes-dom0-update --action=info <package-name>` - *displays infos about the package*

example:

`sudo qubes-dom0-update --action=info qubes-core-dom0` - *displays infos about the* ***`qubes-core-dom0`*** *package*

qubes-hcl-report

- *Generates a report about the system hardware information*

usage: `qubes-hcl-report [-s] [<vm-name>]`

`qubes-hcl-report` - *prints the hardware information on the console (terminal)*

`qubes-hcl-report personal` - *sends the hardware information to the personal-vm under* ***`/home/user`***

`qubes-hcl-report -s` - *prints the hardware information on the console (terminal) and generates more detailed report*

`qubes-hcl-report -s personal` - *sends the detailed hardware information report to the personal-vm*

Note: `qubes-hcl-report -s [<vm-name>]` generates a more detailed report. This report can contain sensitive information. Please do not upload the report if you do not want to share those information.

virsh

- *Management user tool for libvirt (hypervisor abstraction)*

usage: `virsh -c xen:/// <command> [<vm-name>]`

`virsh -c xen:/// list` - *list running VM's with additional information*

`virsh -c xen:/// list --all` - *list all VM's with additional information*

`virsh -c xen:/// dominfo personal` - *lists status of personal VM*

xl

- *Xen management tool, based on LibXenlight*

usage: `xl <subcommand> [<args>]`

`xl top` - *Monitor host and domains in realtime*

DomU

qvm-copy-to-vm

- *Copy file from one VM to another VM*

usage: `qvm-copy-to-vm <vm-name> <file> [<file+>]` - *file* can be a single file or a folder

`qvm-copy-to-vm work Documents` - *copy the* ***`Documents`*** *folder to the work VM*

`qvm-copy-to-vm personal text.txt` - *copy the* ***`text.txt`*** *file to the personal VM*

Example

- Open a terminal in AppVM A (e. g. your personal vm)
- Let's assume we want to copy the `Documents` folder to AppVM B (e. g. your work VM)
- The command would be: `qvm-copy-to-vm work Documents`

qvm-open-in-vm

- *Opens file in another VM*

usage: `qvm-open-in-vm <vm-name> <file>` - *file* can only be a single file

`qvm-open-in-vm personal document.pdf` - *opens* ***`document.pdf`*** *in the personal VM*

`qvm-copy-to-vm personal download.zip` - *opens* ***`download.zip`*** *in the personal VM*

DomU and Dom0

List Qubes commands

1. Enter in console:

- `qvm-*`
- `qubes*`

2. Press 2x times `TAB`

Output: List of `qvm-*` or `qubes*` commands.

List installed Qubes OS packages

- *List all installed Qubes OS packages*

Fedora Dom0

In VM or Dom0: `rpm -qa \*qubes-\*` - *list (qubes-) installed packages*

Files/Folders from and to Dom0

Move Dom0 -> VM

Qubes 3.1+

- *Windows + Linux*

dom0 console: `qvm-move-to-vm <vm-name> <file> [<file+>]` - *`file` can be a single file or a folder*

`qvm-move-to-vm work screenshot-qubes-gui.png` - *moves `screenshot-qubes-gui.png` to the `personal` VM into the `/home/user/QubesIncoming/dom0` folder*

`qvm-move-to-vm personal *.png` - *moves all `.png` to the `personal` VM into the `/home/user/QubesIncoming/dom0` folder*

`qvm-move-to-vm work Pictures/` - *moves the `Pictures` folder and it's content to the `personal` VM into the `/home/user/QubesIncomi` folder*

Copy Dom0 -> VM

Qubes 3.1+

- *Windows + Linux*

dom0 console: `qvm-copy-to-vm <vm-name> <file> [<file+>]` - *file* can be a single file or a folder

`qvm-copy-to-vm personal screenshot-qubes-gui.png` - *copies `screenshot-qubes-gui.png` to the `personal` VM in the `/home/user/QubesIncoming/dom0` folder*

`qvm-copy-to-vm personal *.png` - *copies all `.png` to the `personal` VM in the `/home/user/QubesIncoming/dom0` folder*

`qvm-copy-to-vm work Pictures/` - *copies the `Pictures` folder and it's content to the `personal` VM in the `/home/user/QubesIncoming` folder*

Qubes < 3.1

- *Linux only*

```
cat /path/to/file_in_dom0 |
 qvm-run --pass-io <dst_domain>
  'cat > /path/to/file_name_in_appvm'
```

```
@dom0 Pictures]$ cat my-screenshot.png |
qvm-run --pass-io personal
'cat > /home/user/my-screenshot.png'
```

VM -> Dom0

```
qvm-run --pass-io <src_domain>
 'cat /path/to/file_in_src_domain' >
  /path/to/file_name_in_dom0
```

Copy text between VM A and B

On VM A (source):

1. CTRL+C
2. CTRL+SHIFT+C

On VM B (destination):

3. CTRL+SHIFT+V
4. CTRL+V

Install Qubes Windows Tools (QWT)

1. `sudo qubes-dom0-update --enablerepo=qubes-dom0-current-testing qubes-windows-tools` - *install the windows tools (QWT)*
2. `qvm-start <windows-vmname>` - *starts Windows VM*
3. open a `cmd.exe` or `PowerShell` and type `bcdedit /set testsigning on`
4. shutdown VM
5. `qvm-start <windows-vmname> --install-windows-tools` - *starts Windows VM and inserts Qubes Windows Tools installation CD*
6. double click on `qubes-tools-WIN7x64-<version>.exe` - *execute and install Qubes OS Windows Tools*
7. restart Windows VM

Troubleshoot

Application in VM does not start

- *How to get more information if applications in a VM refuse to start*

`qvm-run personal "command" --pass-io` - *pass command directly to the VM. Returns an error message command fails.*

`qvm-run personal "xterm" --pass-io` - *pass **`xterm`** command directly to the VM. Returns an error message or starts xterm.*

`qvm-run <vmname> "command" --pass-io --nogui` - *pass command to VM without using the GUI*

`qvm-run personal "ls" --pass-io --nogui` - *pass **`ls`** command directly to the VM. Returns error or output.*

Console in VM

- *Attach a console to a VM*

`virsh -c xen:/// console <vmname>` - *opens console in **`<vmname>`***

Why? Connect if GUI/qrexec does not work for any reason. This way you can restart/investigate a failed service.

- In Dom0 terminal: `virsh -c xen:/// console personal`
- username: **root** without a password

(and when #1130 would be implmented the same for "user")

In console mode press `CTRL` + `^` + `]` on keyboard to escape from console mode.

AppVM Log files

- *Log files in AppVMs*

`/var/log/qubes` - *log file directory*

log files per DomU VM:

- `guid.<vmname>.log` - *graphical information*
- `pacat.<vmname>.log` - *sound information*

- `qrexec.<vmname>.log` - *inter VM communication information*
- `qubesdb.<vmname>.log` - *qubesdb information*

Get Qubes OS Version

- *Get the Qubes OS release version*

`cat /etc/qubes-release` - *prints Qubes release in human readable form*

`rpm -qa \*qubes-release\*` - *prints exact Qubes release number*

Get Xen Version

- *Display the Xen version*

`xl info | grep xen_version` - *prints the Xen version*

Qubes OS / Xen Boot

- *Qubes OS and Xen system/kernel messages*

`dmesg` - *prints error, warning and informational messages about device drivers and the kernel during the boot process as well as when we connect a hardware to the system on the fly.*

`xl dmesg` - *prints error, warning and informational messages created during Xen's boot process*

TIP: use `dmesg` and `xl dmesg` in combination with `less`, `cat`, `tail` or `head`.

Grow disk

qvm-grow-private

- *Increase private storage capacity of a specified VM*

usage: `qvm-grow-private <vm-name> <size>`

Example

- In dom0 terminal: `qvm-grow-private personal 40GB`
- In the personal VM: `sudo resize2fs /dev/xvdb`

Enlarge AppVMs TMPFS

Enlarge `/tmp` if you run out of space on the default ~200MB

`sudo mount -o remount,size=1024M /tmp` - *enlarge the space to 1024MB*

Inter VM Networking

NOTE: Does not expose services to the outside world!

Make sure:

- Both VMs are connected to the same firewall VM
- Qubes IP addresses are assigned to both VMs
- Both VMs are started

In Firewall VM terminal:

```
$ sudo iptables -I FORWARD 2 -s <IP address of A> -d <IP address of B> -j ACCEPT
```

- The connection will be unidirectional `A -> B`
- Optional: Bidirectional `A <-> B`

In Firewall VM terminal:

```
$ sudo iptables -I FORWARD 2 -s <IP address of B> -d <IP address of A> -j ACCEPT
```

- Check your settings (e. g. using ping)
- Persist your settings:

```
Assume:
  IP of A: 10.137.2.10
  IP of B: 10.137.2.11
```

In Firewall VM terminal:

```
$ sudo bash
# echo "iptables -I FORWARD 2 -s 10.137.2.10 -d 10.137.2.11 -j ACCEPT" >> /rw/config/qubes_firewall_user_script
# chmod +x /rw/config/qubes_firewall_user_script
```

for bidirectional access:

```
# echo "iptables -I FORWARD 2 -s 10.137.2.10 -d 10.137.2.11 -j ACCEPT" >> /rw/config/qubes_firewall_user_script
```

Add USB Wifi card to sys-net VM

- *Attach a USB Wifi card to sys-net VM*

The bus and device number can be different than shown in this example:

1. `qvm-pci -l sys-net` - *list all attached pci devices of sys-net*
2. `lsusb` - *e. g.* **Bus 003** *Device 003: ID 148f:2870 Ralink Technology, Corp. RT2870 Wireless Adapter*
3. `readlink /sys/bus/usb/devices/003` - *Important Bus 003 -> 003*
4. The result of readlink: `../../../devices/pci-0/pci0000:00/0000:00:12.2/usb3` - *Important 00:12.2*
5. `qvm-pci -a sys-net 00:12.2` - *attach USB device 00:12.2 to sys-net*
6. `qvm-pci -l sys-ne` - *check if device 00:12.2* is

Templates

Fedora

- *Fedora template specific*

Installing the Template

`sudo qubes-dom0-update qubes-template-fedora-26` - *installs the Fedora 26 template*

`sudo qubes-dom0-update qubes-template-fedora-25` - *installs the Fedora 25 template*

`sudo qubes-dom0-update qubes-template-fedora-24` - *installs the Fedora 24 template*

`sudo qubes-dom0-update qubes-template-fedora-23` - *installs the Fedora 23 template*

Updating, Searching & Installing Packages

Fedora > 21

- installing packages: `dnf install <package-name>`
- search for a package: `dnf search <package-or-word>`
- updating template: `dnf update`

Fedora <= 21

- installing packages: `yum install <package-name>`
- search for a package: `yum search <package-or-word>`
- updating template: `yum update`

Fedora Minimal

- *Fedora minimal template*

Qubes OS:

`sudo qubes-dom0-update qubes-template-fedora-26-minimal` - *installs the Fedora 26 minimal template*

`sudo qubes-dom0-update qubes-template-fedora-25-minimal` - *installs the Fedora 25 minimal template*

`sudo qubes-dom0-update qubes-template-fedora-24-minimal` - *installs the Fedora 24 minimal template*

`sudo qubes-dom0-update qubes-template-fedora-23-minimal` - *installs the Fedora 23 minimal template*

Debian

- *Debian template*

Installing the Template

- `sudo qubes-dom0-update qubes-template-debian-8` - *Debian 8 "Jessie"*

Qubes OS <= 3.1:

- `sudo qubes-dom0-update qubes-template-debian-7` - *Debian 7 "Wheezy"*

Updating, Searching & Installing Packages

- installing packages: `apt-get install <package-name>`

- search for a package: `apt-cache search <package-or-word>`
- updating template:
  1. `apt-get update`
  2. `apt-get dist-upgrade`

Qubes OS + Whonix

- *Whonix is an Debian based OS focused on anonymity, privacy and security*

Whonix consists of two components:

1. Whonix-Gateway (uses TOR for all connections to the outside world)
2. Whonix-Workstation (for application)

Install Whonix

Whonix-Gateway TemplateVM Binary Install `@Dom0`:

```
sudo qubes-dom0-update --enablerepo=qubes-templates-community qubes-template-whonix-gw
```

Whonix-Workstation TemplateVM Binary Install `@Dom0`:

1. `export UPDATES_MAX_BYTES=$[ 4 * 1024 ** 3 ]`
2. `sudo qubes-dom0-update --enablerepo=qubes-templates-community qubes-template-whonix-ws`

Next Steps

1. Create a Whonix-gateway ProxyVM, through Qubes VM Manager
2. Create a Whonix-workstation AppVM, through Qubes VM Manager
3. Update your Whonix-Gateway and Whonix-Workstation TemplateVMs (how to -> see debian)
4. (Re)Start Whonix-Gateway ProxyVM
5. Start Whonix-Workstation AppVM

Archlinux

- *Archlinux template*

Installing the Template

In Qubes OS 3.2:

```
sudo qubes-dom0-update --enablerepo=qubes-templates-community qubes-template-archlinux
```

or manually

Use the following instructions: Archlinux Template

Updating, Searching & Installing Packages

- installing packages: `pacman -S <package-name> [<package-name-2>...<package-name-n>]`
- search for a package: `pacman -Ss <package-or-word>`
- updating template: `pacman -Syyu`

Removing Templates

- *Which were installed using the package manager*

Remove installed template

@Dom0: `sudo dnf remove [<template-package-name>]`

`sudo dnf remove qubes-template-debian-8` - *remove the Debian 8 VM and qubes-template-debian-8 package*

List all installed templates

@Dom0: `sudo dnf list installed qubes-template-*`

Create VM from VMware or VirtualBox images

1. Download the image in an AppVM
2. Install `qemu-img` tools - *e. g.* `dnf install qemu-img` *for fedora*
3. Convert the image to a raw format:
   - VMware: `qemu-img convert ReactOS.vmdk -O raw reactos.img`
   - VirtualBox: `qemu-img convert ReactOS.vdi -O raw reactos.img`

Qubes OS Directories

Dom0 (Qubes OS)

- *Qubes OS specific directories*

- `/var/log/qubes` - *Qubes OS VM log files*
- `/var/lib/qubes` - *Qubes OS VMs and other Qubes OS specific files*

Qubes OS Repositories

- http://yum.qubes-os.org - *Browsable Fedora repositories*