

Virtualization type:

- Hyper-V
- VMware
- XEN
- KVM
- Instruction transform

Hypervisor / VMM(virtual machine monitor) / Emulator

- QEMU
- bochs
- VMware-Player / VMware-workstation
- VirtualBox
- ...



Management virtual machine  
Emulate physical hardware

Management tools:

- Libvirt
- virt-manager
- OpenStack
- VirtualBox
- libguestfs-tools
- ...

Terminology:

- Host machine
- Guest machine
- Hardware-assisted virtualization

# qemu

qemu-user -- QEMU user mode emulation binaries

qemu-system -- QEMU full system emulation binaries

Tips:

qemu-kvm is the old name of qemu-system-x86\_64(or qemu-system-x86)

Run a virtual x86\_64 machine(default hardware, no disk, no network card)

```
$qemu-system-x86_64
```

Create a virtual disk(type: [file image](#)):

```
$qemu-img create -f qcow2 vda.qcow2 10G
```

Run a virtual x86\_64 machine(default hardware, one disk, one CD device, no network card)

```
$qemu-system-x86_64 -had vda.qcow2 -cdrom ubuntu-17.10.1-desktop-amd64.iso
```

Create a virtual x86 machine with 4 core cpu, 4G memory, one disk, one CD device, one network card, accelerated by KVM (another mode is tcg):

```
$qemu-system-x86_64 -name test \  
-smbios type=0,uefi=on \  
-machine pc-q35-2.4,accel=kvm \  
-enable-kvm \  
-smp 4 \  
-m 4G \  
-boot menu=on \  
-drive if=none,file=vda.qcow2,format=qcow2,id=vda \  
-device virtio-blk-pci,drive=vda \  
-cdrom ubuntu-17.10.1-desktop-amd64.iso \  
-netdev bridge,id=net0,br=virbr0 \  
-device virtio-net-pci,netdev=net0
```

Emulation :

Every virtual physical device maps a real thing existed in host machine.

There are some questions if the first execution command:

- acl (/etc/qemu/bridge.conf)
- Couldn't create tun/tap device
- Xorg can't run in root privilege

## Virtualization:

- CPU virtualization: virtualization intel VT-X (nested virtualization)
- Network virtualization(SDN, software define network): `man ip link`, bridge / bond / macvlan / macvtap ...
- Storage virtualization(SDS, software define storage)
- Memory virtualization
- Security virtualization
- GPU virtualization
- ...

Logical means virtualization.

Run guest in terminal:

```
#!/bin/bash
```

```
qemu-system-x86_64 -name test \  
  -smbios type=0,uefi=on \  
  -machine pc-q35-2.4,accel=kvm \  
  -enable-kvm \  
  -smp 4 \  
  -m 4G \  
  -boot menu=on \  
  -drive if=none,file=vda.qcow2,format=qcow2,id=vda \  
  -device virtio-blk-pci,drive=vda \  
  -cdrom ubuntu-17.10.1-desktop-amd64.iso \  
  -netdev bridge,id=net0,br=virbr0 \  
  -device virtio-net-pci,netdev=net0 \  
  -chardev stdio,id=charchannel0 \  
  -device isa-serial,chardev=charchannel0,id=serial0 \  
  -append "root=/dev/vda1 console=ttyS0" \  
  -initrd initrd.img-4.13.0-21-generic -kernel vmlinuz-4.13.0-21-generic \  
  -display none
```

What is docker?

Lxc(linux container, openvz)

Namespace(isolated) / cgroup(control)