

虚拟机网络性能测试

工程实践与科技创新III-D 虚拟化与云计算 EI313

李子龙 518070910095

2021 年 10 月 11 日

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要求

Virtualized and bare metal network performance test.

- Download QEMU 5.2.0 from <https://www.qemu.org/download/> and compile.
- Create 2 VMs with TAP mode network (e1000 and virtio-net) by QEMU.
- Connect to your VM through VNC viewer or SSH.
- Compare the network performance (e1000 and virtio-net) of your host machine and VMs.

1 连接交大云服务器

下面将使用 jCloud 虚拟机来完成实验。根据交大云关于 Linux 创建云主机的文档^[1]，创建 Ubuntu 18.04 虚拟主机。并通过创建浮动 IP 的方式，创建一个可以用于本地访问的外网 IP 地址。在安全组设置里放行 22 端口以启用 ssh 连接。



图 1: 交大云主机

使用 ssh 连接远程服务器^[2]，配置本地的 Windows Terminal^[3]，以直接通过 ssh 连接服务器，见图 2。通过 FileZilla 以方便地向服务器传输文件，见图 3。

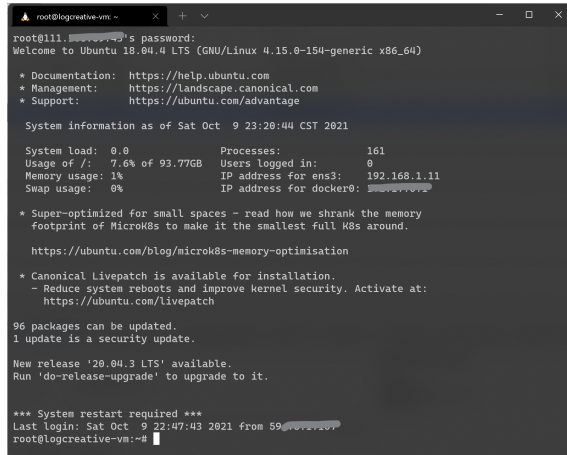


图 2: 通过 Windows Terminal 连接服务器

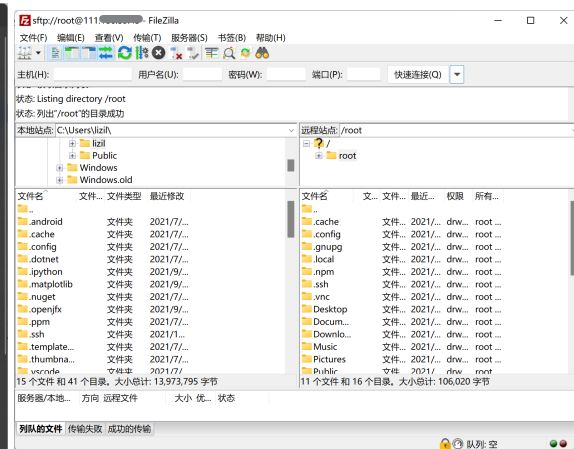


图 3: 使用 FileZilla 传输文件

2 编译 QEMU

采用 QEMU 5.2.0 (Dec 8th 2020)。根据官方的 wiki 说明^[4]，需要安装一些额外包。通过下面的脚本进行下载、编译：

Listing 1: [INSTALL.sh](#)

```
1  #!/bin/bash
2
3  cd /home/
4  curl -O https://download.qemu.org/qemu-5.2.0.tar.xz
5  tar -xvf qemu-5.2.0.tar.xz
6  cd qemu-5.2.0
7  mkdir build
8  cd build
9  sudo apt-get install glib2.0-dev libglib2.0-dev libfdt-dev libpixman-1-dev
10 zlib1g-dev
11 sudo apt-get install git-email
12 sudo apt-get install libaio-dev libbluetooth-dev libbrlapi-dev libbz2-dev
13 sudo apt-get install libcap-dev libcap-ng-dev libcurl4-gnutls-dev libgtk-3-
14 dev
15 sudo apt-get install libibverbs-dev libjpeg8-dev libncurses5-dev libnuma-dev
16 sudo apt-get install librbd-dev librdmacm-dev
17 sudo apt-get install libsasl2-dev libstdl1.2-dev libseccomp-dev libsnappy-dev
18 libssh2-1-dev
19 sudo apt-get install libvde-dev libvdeplug-dev libxen-dev liblzo2-dev
20 sudo apt-get install valgrind xfslibs-dev
21 sudo apt-get install libnfs-dev libiscsi-dev
22 sudo apt-get install ninja-build
23 sudo apt-get install libstdl1.2-dev
24 sudo apt-get install cpu-checker
25 ../configure --enable-kvm --enable-debug --enable-vnc --enable-werror --
26 target-list="x86_64-softmmu"
```

```
23 make -j8
24 make install
```

其中 libvte-2.90-dev 包已经被废弃。编译如图 4 所示成功，安装如图 5 所示成功。



图 4: 远程 QEMU 编译

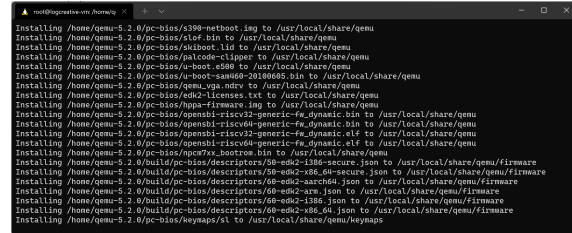


图 5: 远程 QEMU 安装

由于云主机不支持硬件虚拟化技术，将首先在本地虚拟机进行实验。VMWare Workstation 16.0 虽然支持与 Hyper-V 并存，但是如果想要使用硬件虚拟化技术，还是需要关闭 Hyper-V 功能才能使用。关闭 Windows 的 Hyper-V 功能、并且在管理员模式的 PowerShell 中彻底关闭之

```
bcdedit /set hypervisorlaunchtype off
```

重启后，可以通过打开 虚拟机设置 里的 虚拟化 Intel VT-x/EPT 或 AMD-V/RVI 以启用之，如图 6 所示。该项检查是通过安装 cpu-checker，使用 kvm-ok 进行检查，如图 7 所示。



图 6: 打开 Intel VT-x

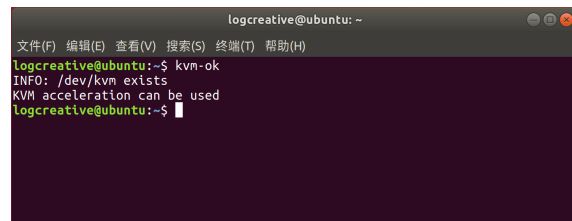


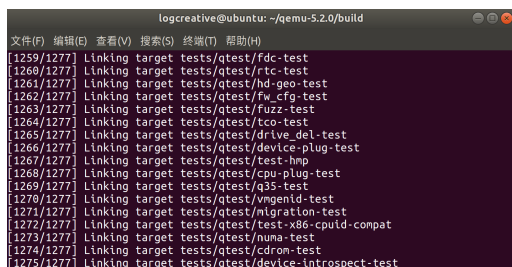
图 7: 检测 KVM 可用性

之后在本地的虚拟机上再次编译、安装，如图 8 和图 9 所示。

3 创建虚拟机

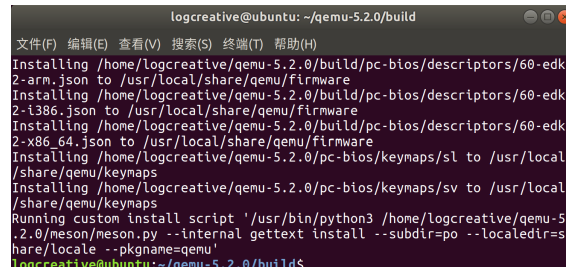
Listing 2: createvm.sh

```
1 sudo -s
2 qemu-img create -f qcow2 ubuntu.img 10G
3 qemu-system-x86_64 -m 2048 -enable-kvm ubuntu.img -cdrom ./ubuntu-18.04.5-
  desktop-amd64.iso
```



```
logcreative@ubuntu: ~/qemu-5.2.0/build
[1259/1277] Linking target tests/qtest/fdc-test
[1260/1277] Linking target tests/qtest/rtc-test
[1261/1277] Linking target tests/qtest/hd-geo-test
[1262/1277] Linking target tests/qtest/fw_cfg-test
[1263/1277] Linking target tests/qtest/fuzz-test
[1264/1277] Linking target tests/qtest/tco-test
[1265/1277] Linking target tests/qtest/drive-del-test
[1266/1277] Linking target tests/qtest/device-plug-test
[1267/1277] Linking target tests/qtest/test-hmp
[1268/1277] Linking target tests/qtest/cpu-plug-test
[1269/1277] Linking target tests/qtest/q35-test
[1270/1277] Linking target tests/qtest/mmenid-test
[1271/1277] Linking target tests/qtest/migration-test
[1272/1277] Linking target tests/qtest/test-x86-cpuid-compat
[1273/1277] Linking target tests/qtest/numa-test
[1274/1277] Linking target tests/qtest/cdrom-test
[1275/1277] Linking target tests/qtest/device-introspect-test
```

图 8: 本地 QEMU 编译



```
logcreative@ubuntu: ~/qemu-5.2.0/build
Installing /home/logcreative/qemu-5.2.0/build/pc-bios/descriptors/60-edk2-arm.json to /usr/local/share/qemu/firmware
Installing /home/logcreative/qemu-5.2.0/build/pc-bios/descriptors/60-edk2-i386.json to /usr/local/share/qemu/firmware
Installing /home/logcreative/qemu-5.2.0/build/pc-bios/descriptors/60-edk2-x86_64.json to /usr/local/share/qemu/firmware
Installing /home/logcreative/qemu-5.2.0/pc-bios/keymaps/sl to /usr/local/share/qemu/keymaps
Installing /home/logcreative/qemu-5.2.0/pc-bios/keymaps/sv to /usr/local/share/qemu/keymaps
Running custom install script '/usr/bin/python3 /home/logcreative/qemu-5.2.0/meson/meson.py --internal gettext install --subdir=po --localedir=share/locale --pkgname=qemu'
logcreative@ubuntu: ~/qemu-5.2.0/build$
```

图 9: 本地 QEMU 安装

参考文献

- [1] JCLOUD. 快速创建 Linux 云主机[M/OL]. 2021. <https://jcloud.sjtu.edu.cn/document/detail.html?mod=qstart&id=1029>.
- [2] JCLOUD. 使用密钥登录云主机[M/OL]. 2021. <https://jcloud.sjtu.edu.cn/document/detail.html?id=763>.
- [3] DHSLEGEN. Windows Terminal 连接远程 ssh[EB/OL]. 2020. <https://www.jianshu.com/p/b7a105a67253>.
- [4] QEMU. QEMU on Linux hosts[EB/OL]. 2012. https://wiki.qemu.org/Hosts/Linux#Required_additional_packages.