

Optimized Pre-Copy Live Virtual Machine Migration for Memory-Intensive Workloads : Configuration Manual

MSc Research Project
Cloud Computing

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Optimized Pre-Copy Live Virtual Machine Migration for Memory-Intensive Workloads : Configuration Manual

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1 Introduction

This paper outlines the actions required to effectively implement the project. This project is run on the Windows 10 system using Virtual Box v6.1. The procedures for installing Virtual Box on a Windows system, establishing a virtual machine, installing virtual machine manager, connecting to a client, and migrating a virtual machine from host to client are shown. The paper also includes configuration information for the various systems involved in the project.

2 Prerequisites

Following tools and softwares are required to complete the project.

2.1 Oracle Virtual Box

Oracle VM Virtual Box *Oracle VirtualBox* (n.d.), created by Oracle Corporation, is a free and open-source hosted hypervisor for x86 virtualization. It enables users to install several guest operating systems on a single physical computer. 64-bit virtual machine with Linux operating system were created using the below configuration :

- System Type: 64-bit, x-64 based processor
- Processor: 8
- Memory: 4.8 GB
- Disk Capacity: 545 GB
- Operation System: Linux Ubuntu 20.04.02 LTS

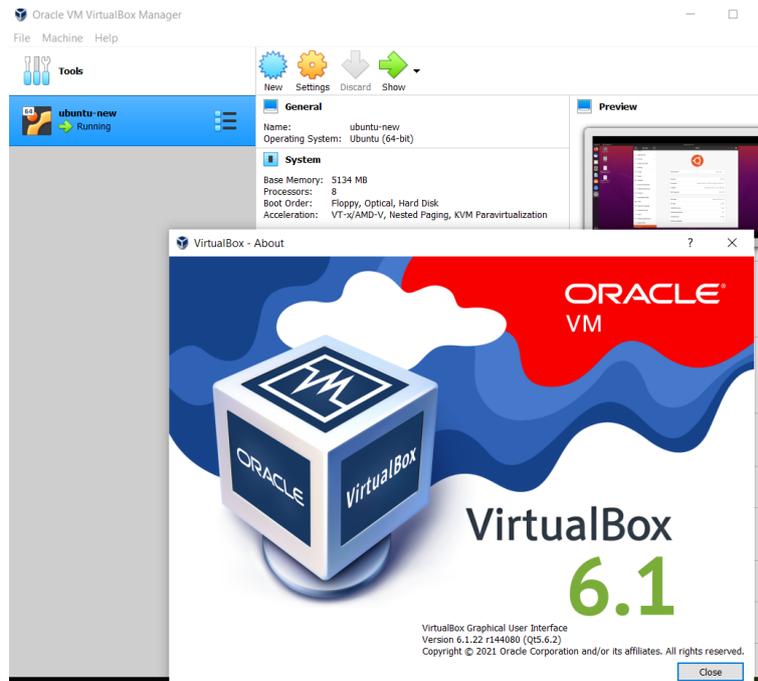


Figure 1: Oracle Virtual Box

2.1.1 Hardware Configuration

This section provides hardware configuration of system hosting Oracle Virtual Box 1.

- System Type: 64-bit, x-64 based processor
- Processor: Intel(R) Core(TM) i5-1035G1 CPU @ 1.00GHz 1.19 GHz
- RAM: 8.00 GB
- Operation System: Windows 10

3 System Configuration

This section provides system configuration of the host, client, and Virtual Machine used in migration.

3.1 Host

- System Type: 64-bit, x-64 based processor
- Processor: 8
- Memory: 4.8 GB
- Disk Capacity: 545 GB
- Operation System: Linux Ubuntu 20.04.02 LTS
- IP Address: 10.0.2.15

3.2 VM to be Migrated

- Processor: 5
- Memory: 2 GB
- Operation System: Linux Ubuntu 18.04

3.3 Client

- Processor: 8
- Memory: 8 GB
- Disk Capacity: 512 GB
- Operation System: Linux Ubuntu 20.04.2 LTS
- IP Address: 192.168.0.188

4 Implementation

This section provides details about steps involved in executing the migration.

The first step is to check whether the CPU supports the hardware virtualization or not, and KVM installation.

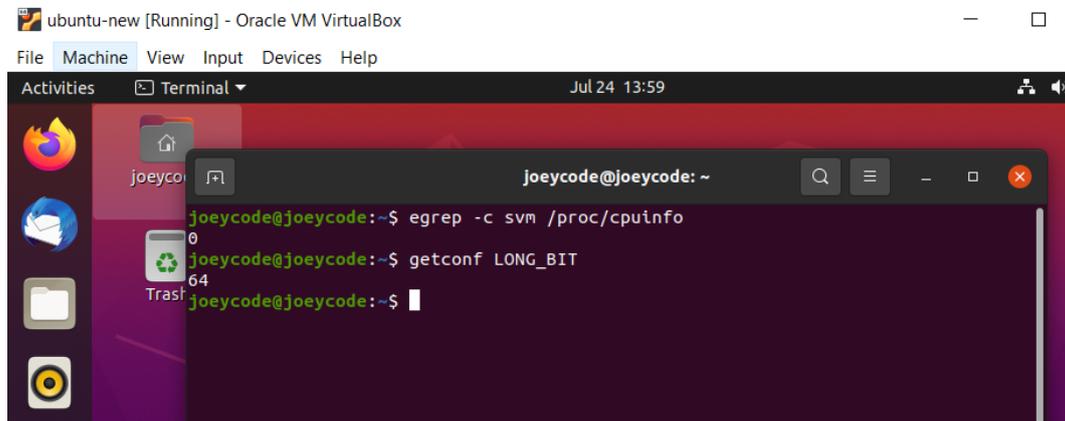


Figure 2: CPU Check

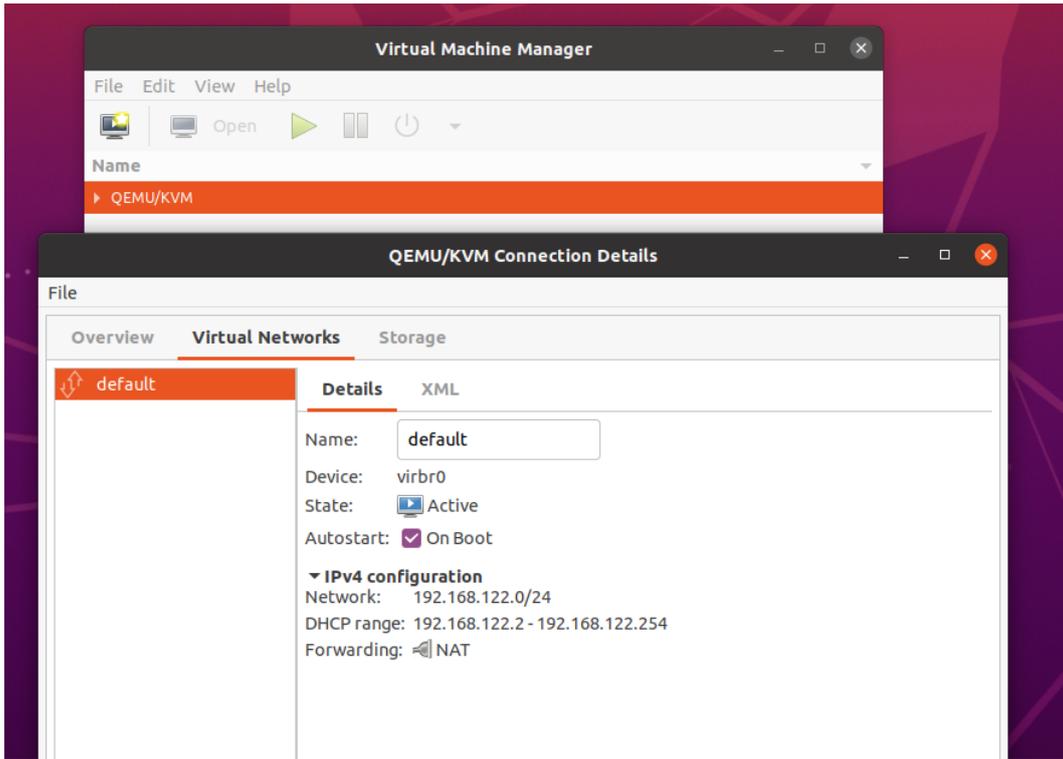


Figure 3: Virtual Machine Manager

The second step is to build a virtual machine. The creation contains the virtual machine's name, the type of operating system in which it is built, an ISO image, disk space, and RAM. The iso image must be downloaded in order for the procedure of mounting the nfs to include the path to the iso image.

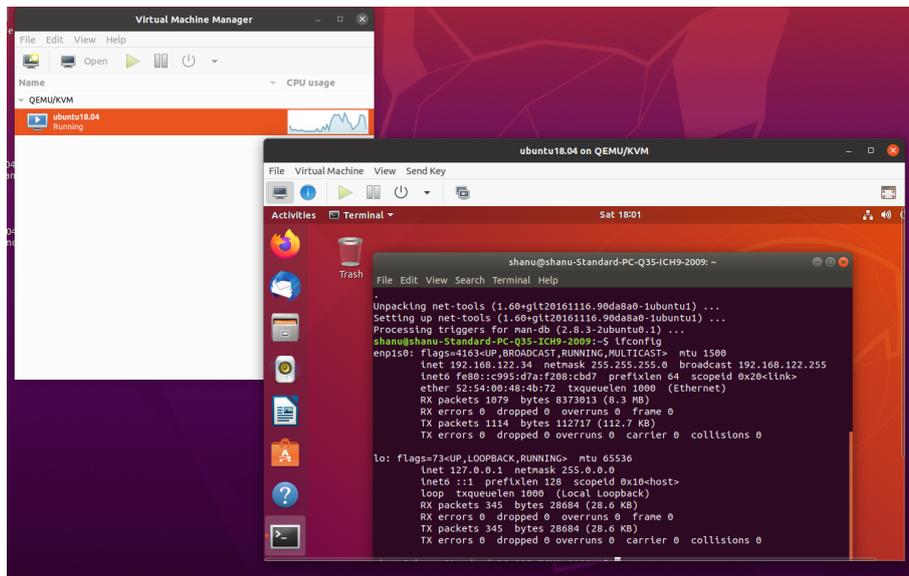


Figure 4: VM Creation

The third step step is NFS mounting and firewall configuration.

```
joeycode@joeycode:~$ sudo apt-get install nfs-kernel-server
[sudo] password for joeycode:
Reading package lists... Done
Building dependency tree
Reading state information... Done
nfs-kernel-server is already the newest version (1:1.3.4-2.5ubuntu3.4).
The following packages were automatically installed and are no longer required:
 chromium-codecs-ffmpeg-extra gstreamer1.0-vaapi
 libgstreamer-plugins-bad1.0-0 libva-wayland2 linux-headers-5.8.0-43-generic
 linux-hwe-5.8-headers-5.8.0-43 linux-image-5.8.0-43-generic
 linux-modules-5.8.0-43-generic linux-modules-extra-5.8.0-43-generic
Use 'sudo apt autoremove' to remove them.
0 upgraded, 0 newly installed, 0 to remove and 158 not upgraded.
```

Figure 5: NFS on host

```
joeycode@joeycode:~$ sudo mkdir /var/nfs/general -p
joeycode@joeycode:~$ sudo ls -la /var/nfs/general
total 8
drwxr-xr-x 2 root root 4096 Aug  2 17:27 .
drwxr-xr-x 3 root root 4096 Aug  2 17:27 ..
joeycode@joeycode:~$ sudo chown nobody:nogroup /var/nfs/general
joeycode@joeycode:~$ sudo ls -la /var/nfs/general
total 8
drwxr-xr-x 2 nobody nogroup 4096 Aug  2 17:27 .
drwxr-xr-x 3 root root 4096 Aug  2 17:27 ..
```

Figure 6: Directory on host

```
joeycode@joeycode:~$ sudo ufw status
Status: active

To Action From
--
2049 ALLOW Anywhere
22/tcp ALLOW Anywhere
2049 (v6) ALLOW Anywhere (v6)
22/tcp (v6) ALLOW Anywhere (v6)

joeycode@joeycode:~$ sudo ufw allow from 192.168.0.188 to any port nfs
Rule added
joeycode@joeycode:~$ sudo ufw status
Status: active

To Action From
--
2049 ALLOW Anywhere
22/tcp ALLOW Anywhere
2049 ALLOW 192.168.0.188
2049 (v6) ALLOW Anywhere (v6)
22/tcp (v6) ALLOW Anywhere (v6)
```

Figure 7: Firewall Configuration

The next step includes the migration of VM. The VM is created in host machine and both the system ip must be connected.

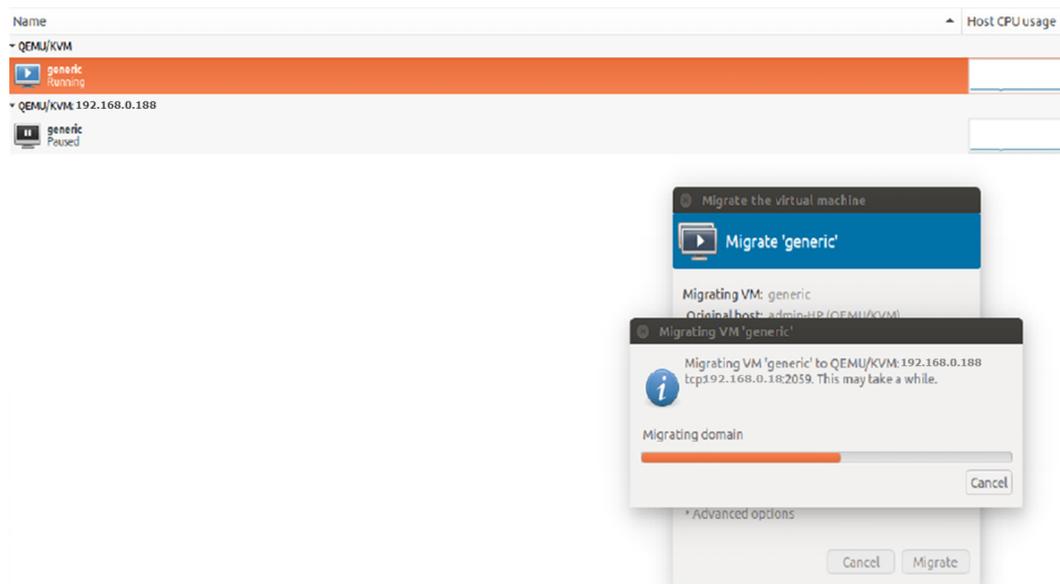


Figure 8: VM Migration

References

Oracle *VirtualBox* (n.d.).
URL: <https://www.virtualbox.org/>