

VirtualBox

Turning one computer into many

Jonathan Marsden
jmarsden@fastmail.fm

09 January 2010

0. Contents

1. What is Virtualization?
2. Uses for Virtualization
3. Virtualbox Overview
4. Virtualbox Hardware Requirements
5. Installing Virtualbox on Ubuntu
6. Creating a virtual machine
7. Running the virtual machine
8. Networking
9. Virtual Disks
10. Snapshots
11. Guest Additions
12. Guest Additions - Shared Folders
13. Limitations of Virtualbox OSE
14. Further Ideas and Resources
15. Summary and Questions

1. What is Virtualization?

- Very generally, virtualization is turning a real physical thing into a software-only digital version of that thing
- Virtualization:
 - "the abstraction of computing resources"
- Virtual Machine (VM):
 - a software implementation of a machine (computer) that executes programs like a real machine
- In the PC and Ubuntu Linux context, generally we are creating one or more "virtual" computers that run on one real computer

2. Uses for Virtualization

- **Separate applications (or users) onto different VMs**
 - For security or to meet application needs
- **Consolidate physical servers onto one powerful one**
 - Save power and cooling and rack space costs
- **Software testing and development**
 - Run many different OSes at once
 - Try out things that might "break" your PC
 - Even try out Linux on a Windows PC!
- **Rapid deployment**
 - Creating new (virtual) machines almost instantly
- **Run an OS intended for one CPU on a machine with a different CPU**
 - cross-platform virtualization - not part of this talk

3. Virtualbox Overview

- "PC" virtualization software from Sun (now Oracle)
- Two editions, one free software, one not
 - Use the free one, virtualbox-ose (Open Source Edition)
- Runs on Linux or Windows (or Mac OS X, or even OpenSolaris) host OSes
- Friendly GUI interface to get you started easily

- "Serious server" virtualization is not the primary goal
 - Such uses may do better using KVM instead

4. Virtualbox Hardware Requirements

- No special CPU requirements for 32bit use (unlike KVM)
- VT-x support is needed for 64bit virtualization
 - `egrep '(vmx|svm)' /proc/cpuinfo`
- The more CPU cores the better
 - (At least) 1 core per simultaneous VM is wise
- The more RAM the better
 - Add the RAM use of host + each VM
- Disk I/O will become a bottleneck if you push things hard

5. Installing Virtualbox on Ubuntu

- Just one command:

```
sudo apt-get install virtualbox-ose -y
```

- Installation on Windows or other Linux distros is similarly easy

6. Creating a virtual machine

- Applications -> Accessories -> Virtualbox OSE
- New (follow the wizard, make a new virtual disk)
- Plenty of options for the techies to tweak

- Defaults work well for newcomers
 - They work for techies too, mostly

7. Running the virtual machine

- Double click it to start
- Follow the First Run Wizard (first time only)
- Use it. Reboot it, shut it down when done.
- Mounting and unmounting CDs/ISO images
- Command line interface exists: VBoxManage, VBoxHeadless, ...

```
vboxmanage --help # Use this for help
```

8. Networking Virtual Machines

- NAT by default
 - o Fine for outbound, no use at all inbound
- Bridged host interface
 - o Works way better than NAT, once set up (can SSH in, etc.)
 - o Setup is automatic in newer versions of Virtualbox
- Internal network
 - o Just network between VMs on one physical machine
- <https://help.ubuntu.com/community/VirtualBox/Networking>

9. Virtual Disks

- Normally just (big) files on a real hard disk
- Can be created in two ways:
 - o Full size -- higher performance
 - o Dynamically expanded as needed - more convenient
- 8 GBytes is a workable size for most "normal" uses
- In practice as low as 2.5 GBytes to 5 GBytes is often fine
- Disk file formats:
 - o VDI (VirtualBox), VMDK (VMware), VHD (MS), HDD (Parallels)
 - o OVF (proposed new standard, via conversion tools)
- Raw disk or raw partition access can be used
 - o Get it wrong, and you will trash your system
 - o Get it right, and your VM will have faster disk access

10. Snapshots

- Allows "undo everything since I made a snapshot"
- Creates a secondary disk file containing only changes
- In Virtualbox 3.1.x you can have many snapshots:
 - o Trees of snapshots
 - o This can be useful, or it can become confusing...
- Handy for quick "experimental" changes to VMs
- Can let you duplicate someone else's setup
 - o Great for doing remote tech support
 - o And then revert to your own setup in that VM later

11. Guest Additions

If you can modify the guest OS you can have better integration with the host OS

- Better video integration
 - Screen resolution changes
 - Full screen use
- Mouse integration
- Copy and paste between VMs and host machine
- Time synchronization
- Shared folders
- Seamless windows
- Automated Windows guest logons

Needs locally built kernel modules in each guest

- In Ubuntu, DKMS does this automatically
- Devices -> Install Guest Additions

```
sh /media/cdrom0/VBoxLinuxAdditions-amd64.run
```

12. Guest Additions - Shared Folders

- Useful for moving files to and from VMs
- Can be permanent or transient

- To mount a shared folder with your user's UID, do:

```
sudo mount -t vboxsf FOLDERNAME  
/PATH/TO/MOUNT-POINT/ -o uid='id -u'
```

13. Limitations of Virtualbox OSE

- No built in RDP or VNC access to VMs
 - Non-free edition provides RDP
- No access to USB devices
 - Non-free edition provides USB pass-through
- Full Graphical UI at all resolutions
 - Needs (free) Guest Additions
 - Even then, does not always work 100%
- Will not coexist with KVM virtualization

```
sudo service kvm stop # Fixes this on Ubuntu
```

14. Further Ideas and Resources

- Teleportation (!)
 - Moving virtual machines around between physical computers, live
 - New feature introduced in VirtualBox 3.1.x
- Network Tracing
 - Per VM packet capture facilities included
 - See http://www.virtualbox.org/wiki/Network_tips
- Resources:
 - <http://www.virtualbox.org>
 - <http://download.virtualbox.org/virtualbox/3.1.2/UserManual.pdf>
 - <https://help.ubuntu.com/community/VirtualBox>
 - <http://www.techthrob.com/2009/03/02/virtualization-in-linux-a-review-of-four-software-cho>
 - <http://en.wikipedia.org/wiki/Virtualization>

15. Summary and Questions

Summary: virtualbox-ose is an

- open source
- free and
- (relatively) easy

way to create and use virtual machines under Linux (or even Windows).

Useful for:

- all manner of testing, and
- using multiple (virtual) machines at once without needing to buy extra hardware

Any questions?