

# VirtualBox

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Turning one computer into many

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# 1. What is Virtualization?

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- 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

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- **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

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- "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

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- 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

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- 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

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- 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

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- 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

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

# 9. Virtual Disks

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- Normally just (big) files on a real hard disk
- Can be created in two ways:
  - Full size -- higher performance
  - 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:
  - VDI (VirtualBox), VMDK (VMware), VHD (MS), HDD (Parallels)
  - OVF (proposed new standard, via conversion tools)
- Raw disk or raw partition access can be used
  - Get it wrong, and you will trash your system
  - Get it right, and your VM will have faster disk access

# 10. Snapshots

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- ❑ 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:
  - Trees of snapshots
  - This can be useful, or it can become confusing...
- ❑ Handy for quick "experimental" changes to VMs
- ❑ Can let you duplicate someone else's setup
  - Great for doing remote tech support
  - And then revert to your own setup in that VM later

# 11. Guest Additions

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- 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

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- 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

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- 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

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## □ 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](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>
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<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

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- 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?