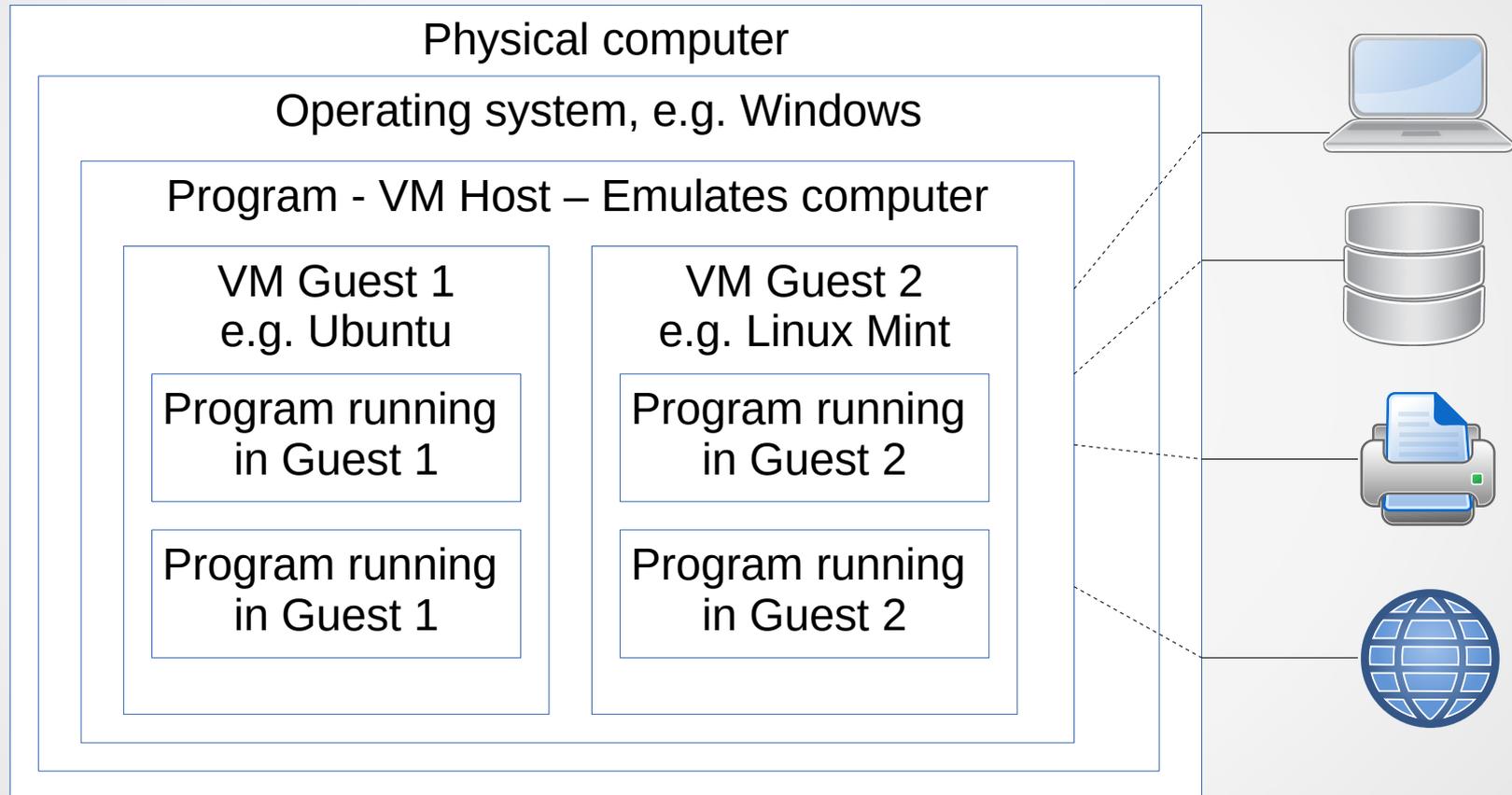# U3A FOSS Group

Virtual Machines

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What is a virtual machine

- The following comprehensive summary is taken from Microsoft, who are now a big provider:
    - A virtual machine is a computer file, typically called an image, that behaves like an actual computer. In other words, a computer is created within a computer.
    - It runs in a window, much like any other program, giving the end user the same experience on a virtual machine as they would have on the host operating system itself.
    - Multiple virtual machines can run simultaneously on the same physical computer.
    - For servers, the multiple operating systems run side by side with a piece of software called a hypervisor to manage them, while desktop computers typical employ one operating system to run the other operating systems within its program windows.
    - Each virtual machine provides its own virtual hardware, including CPUs, memory, hard drives, network interfaces and other devices.
    - The virtual hardware is then mapped to the real hardware on the physical machine

Saying the same in pictures

Physical computer

Operating system, e.g. Windows

Program - VM Host – Emulates computer

VM Guest 1
e.g. Ubuntu

Program running
in Guest 1

Program running
in Guest 1

VM Guest 2
e.g. Linux Mint

Program running
in Guest 2

Program running
in Guest 2

Why would I use a VM?

- Again, Microsoft provide a good summary:
  - The guest virtual machine is sandboxed from the rest of the system
  - The software inside a guest virtual machine can't escape or tamper with the computer itself.
  - This gives an ideal environment for testing other operating systems including:
    - beta releases
    - accessing virus-infected data
    - running software or applications on operating systems they weren't originally intended for.
- I would add some more concrete use cases:
  - Try out different Linux distros
  - Run Windows and Linux on same PC, without dual boot
  - Run Windows and Linux apps at the same time
  - Try out risky changes without putting system at risk
  - Do things without leaving footprints on main computer
- For a business, why run expensive physical servers when you can rent a VM environment in the cloud
  - Upgrades, disaster recovery, data distribution, etc are much easier

How do I go about it? (part 1)

- VM Host environment
  - VMWare – primarily for commercial use
  - **VirtualBox** – Base package is FOSS, simple to use
  - KDE, QEMU (Linux only)
- VM Guest environments
  - Can install your environment of choice from scratch
  - Much easier to download a pre-built environment
  - **osboxes.org** offers scores of Linux distributions

How do I go about it? (part 2)

- Download and install VirtualBox on host computer

  - https://www.virtualbox.org/wiki/Downloads

    - Choose Windows or Linux as appropriate

    - No need for the Extension pack

  - A few prompts need to be okayed, but basically straightforward

- Download guest image of your choice from here:

  - https://www.osboxes.org/virtualbox-images/

- Or you can download your own distribution file or Windows ISO file, and install it on the virtual computer

How do I go about it? (part 3)

- Run VirtualBox and create a new VM

- The steps are described very clearly here:

  - https://www.osboxes.org/guide/

- For now, we will just apply the steps corresponding to the first three screenshots, which are sufficient to create a working VM.

- There is a missing step at the start of the third screen

- We need to decompress and transfer our downloaded image into a suitable location

  - Note that you need a program like 7zip (available for Windows and Linux) to decompress the VM image from the .7z container that downloads

  - Virtualbox expects the image to be in a location like:

    - C:\Users*username*\VirtualBox Vms*osname*\Snapshots

  - But you can point it elsewhere

Getting it working well

- It is now easy to boot up your VM from inside VirtualBox
- This brings you to a login prompt, but what is the password?
    - All osboxes images are configured with User: osboxes.org, Password: osboxes.org
- Now we can log in, run programs, etc
    - Try accessing the internet
    - Running a text editor
- However, copy and paste does not yet work outside of the guest environment
    - This is easily fixed using Guest Additions
        - Mount the Guest Additions CD
        - From a shell, run sudo /media/cdrom/VboxLinuxAdditions.run
        - Enable bidirectional shared clipboard in Virtualbox Devices menu
    - May need to reboot the VM
- How to access files in host environment?
    - With VM running, go to Virtualbox Devices menu, select USB, then click on your memory stick
    - Should automatically mount within the VM
    - Files can now be read and written to the memory stick

Saving the VM, moving the VM

- When you have finished with the VM

- In the Virtualbox menu, File, Close

  - Offers 3 choices:

    - Power off

    - Send shutdown signal

    - Save machine state

- In all cases, the machine is shut down, and the image file is updated

- The save state is interesting, as you can save the VM in mid execution, then resume later with no need to exit running programs etc.

  - Everything is saved, as the program state, memory state etc is all saved in the image file

- You can move image files easily between different hosts

  - Just create a new VM on the new host as before, and give it the transferred image file to run from