Cloud Computing

Host based Virtualization (virtualbox, VMware player, KVM, WSL)

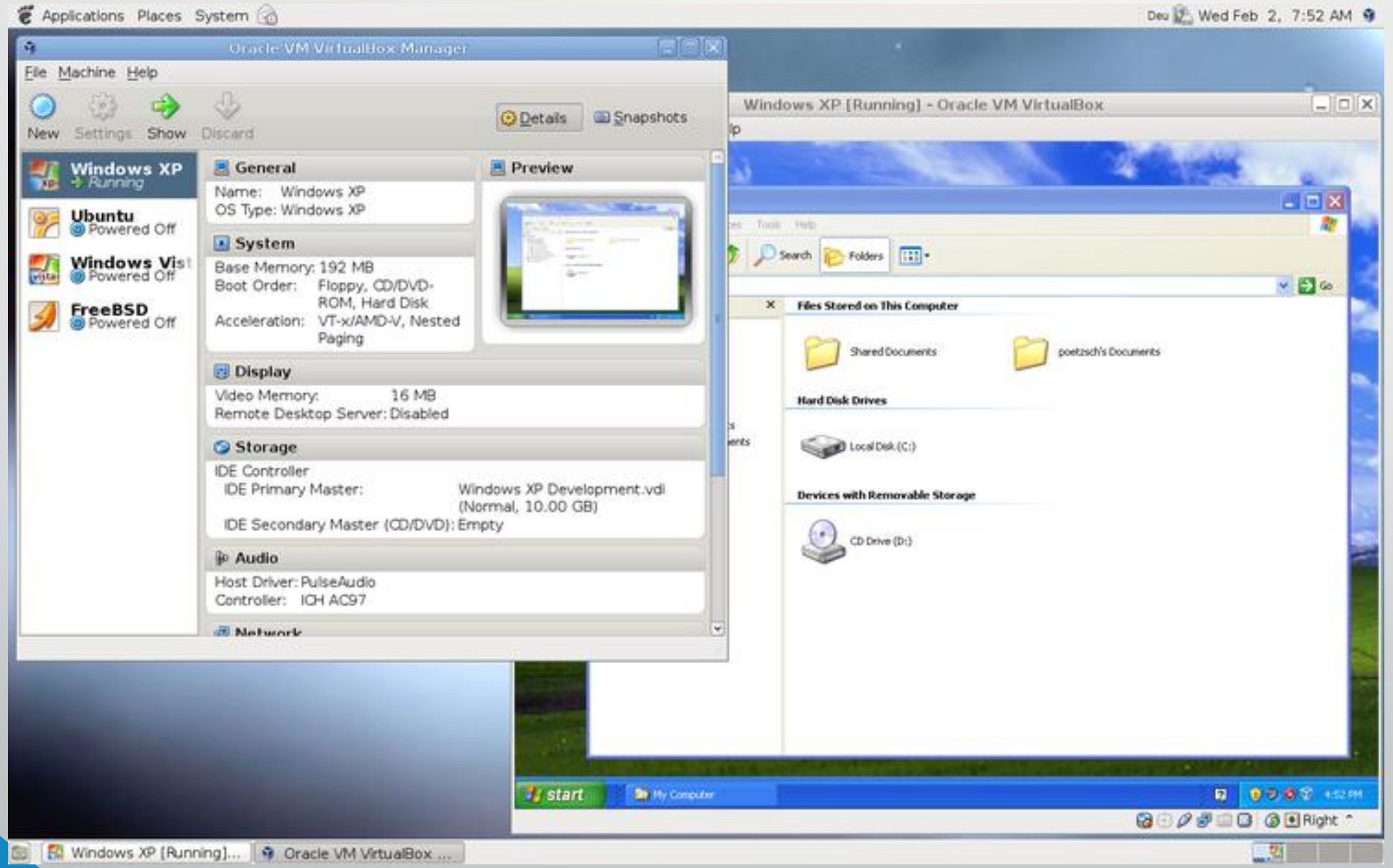
OVF, OVA

- Open Virtualization Format
- 2007, VMware, Dell, HP, IBM, Microsoft and XenSource created the „Open Virtual Machine Format”
- Contains:
  - Ovf descriptor (XML): cpu, memory description
  - One or more disks images, optional certifications
- The entire file structure can be managed in one (OVA) Open Virtualization Appliance (tar file)

Virtualbox

- Operating system required
- Linux/UNIX, MAC OS, Windows
- Use emulation, hardware acceleration

VirtualBox


Applications Places System
Wed Feb 2, 7:52 AM
Oracle VM VirtualBox Manager
File Machine Help
New Settings Show Discard
Details Snapshots
Windows XP Running
Ubuntu Powered Off
Windows Vista Powered Off
FreeBSD Powered Off
General
Name: Windows XP
OS Type: Windows XP
System
Base Memory: 192 MB
Boot Order: Floppy, CD/DVD-ROM, Hard Disk
Acceleration: VT-x/AMD-V, Nested Paging
Preview
Display
Video Memory: 16 MB
Remote Desktop Server: Disabled
Storage
IDE Controller
IDE Primary Master: Windows XP Development.vdi (Normal, 10.00 GB)
IDE Secondary Master (CD/DVD): Empty
Audio
Host Driver: PulseAudio
Controller: ICH AC97
Network
Windows XP [Running] - Oracle VM VirtualBox
Search Folders
Files Stored on This Computer
Shared Documents
poetzsch's Documents
Hard Disk Drives
Local Disk (C:)
Devices with Removable Storage
CD Drive (D:)
start
My Computer
Right
Windows XP [Running]...
Oracle VM VirtualBox ...

Options

- Basic resources:
- CPU, RAM, Hard Disk
- 1. CPU
  - Available hardware virtualization
- 2. Memory
  - So choose to run alongside a host OS too!

Options 2.

- HDD
  - VDI (virtualbox image)
  - VMDK (Vmware image)
  - VHD (Windows Virtual machine image)
  - QCOW (Qemu image)

Options 3.

- Virtual Network card
  - 5 network card emulation (+1 virtual virtio-net)
  - Modes:
    - NAT Network address translation
    - Bridged network (Bridge device between host NIC and guest NIC)
    - Internal (for internal use only)
    - Host-only (between the host OS and virtual machines)

Options 4.

- Serial port share
- USB port share (USB over network)
- Shared directories (Between the host OS and the guest OS)

Snapshot

- Snapshot is a momentary backup of the virtual machine
- All virtual machine settings (XML)
  - The full image of the virtual disk is saved
  - When restoring, this state will return to whatever was deleted from the disk
  - Differencial image
  - Snapshot at runtime (memory dump)

Vmware Workstation Player

- The VMware solution for simplified virtualization
- Similar to virtualbox
- Lots of pre-installed virtual machines :
- https://marketplace.cloud.vmware.com/#

WSL

- Windows Subsystem for Linux
- We can use a Linux file system, commands and GUI apps while still using Windows
  - Latest versions are virtualized using Hyper-V ("Virtual Machine Platform" subset)
  - It can be problematic with other hypervisors (VMware, VirtualBox), but support has been added in newer versions.
- Open source!
- Two versions: WSL1 and WSL2

Forrás: https://learn.microsoft.com/en-us/windows/wsl/faq#can-i-use-wsl-for-production-scenarios-

WSL1 vs. WSL2 – why better?

With WSL2:

- We are using a full Linux kernel
- 100% system call compatibility
- It runs the Linux versions as isolated containers

WSL1 vs. WSL2 – why better?

Comparing features

Expand table

Feature	WSL 1	WSL 2
Integration between Windows and Linux	✅	✅
Fast boot times	✅	✅
Small resource foot print compared to traditional Virtual Machines	✅	✅
Runs with current versions of VMware and VirtualBox	✅	❌
Managed VM	❌	✅
Full Linux Kernel	❌	✅
Full system call compatibility	❌	✅
Performance across OS file systems	✅	❌
systemd support	❌	✅
IPv6 support	✅	✅

When WSL1 is a better choice

- Faster Windows file access from WSL1
- Serial port access (<- WSL2 also supports serial port access through USBIPD)
- Stricter memory usage
  - The memory usage of WSL2 changes continuously — it returns unused memory to Windows.
  - However, as long as WSL is running, it doesn't do this yet! With longer usage, this can become more significant.
  - WSL1 is not obsolete. It will remain an available solution alongside WSL2.

WSL2

- High-level Linux integration on Windows
- Although it's a type of VM, it offers much faster boot times
- The localhost address space is shared by default
- GPU support — useful, among other things, for AI workloads
- Can also run inside a VM (nested virtualization)
- Supports the *wsl.conf* file used by WSL1
- Default WSL version

WSL – VM or container?

- WSL1:
  - No full Linux kernel
- WSL2:
  - Lightweight VM, with a Linux kernel inside
  - Inside the VM, however, isolated containers are running.

- In short: a supported, deeper Linux integration for Windows systems.

Forrás: https://learn.microsoft.com/en-us/windows/wsl/compare-versions#comparing-wsl-1-and-wsl-2

WSL – different than traditional

Compared to a traditional operating environment:

- A lightweight utility VM automatically manages resources here
  - In some cases, WSL may shut down automatically (e.g., a web server)
- Host Windows files are accessible by default (via the */mnt* directory)
- WSL can also handle Windows executables
- The kernel is updated automatically
- GPU access works differently than on a typical Linux system

Forrás: https://learn.microsoft.com/en-us/windows/wsl/faq#can-i-use-wsl-for-production-scenarios-

WSL2 peripherals

- USB device access:
  - USBIPD
- Networking:
  - Hyper-V Manager -> virtual switch -> .wslconfig file
- GUI usage:
  - WSLg (xserver, wayland)
- Backups:
  - „wsl --export" or „wsl --import"

Practical task

- The oreacle acquisition after the virtualbox was removed from the virtual repository
- Simple script to install vbox to Ubuntu Linux 22.04
- `wget http://dev2.tilb.sze.hu/vboxinstall.sh`
- `chmod +x vboxinstall.sh`
- `./vboxinstall.sh`

VirtualBox

Download linux lite

- https://www.linuxliteos.com/download.php
- Install OS in virtualbox

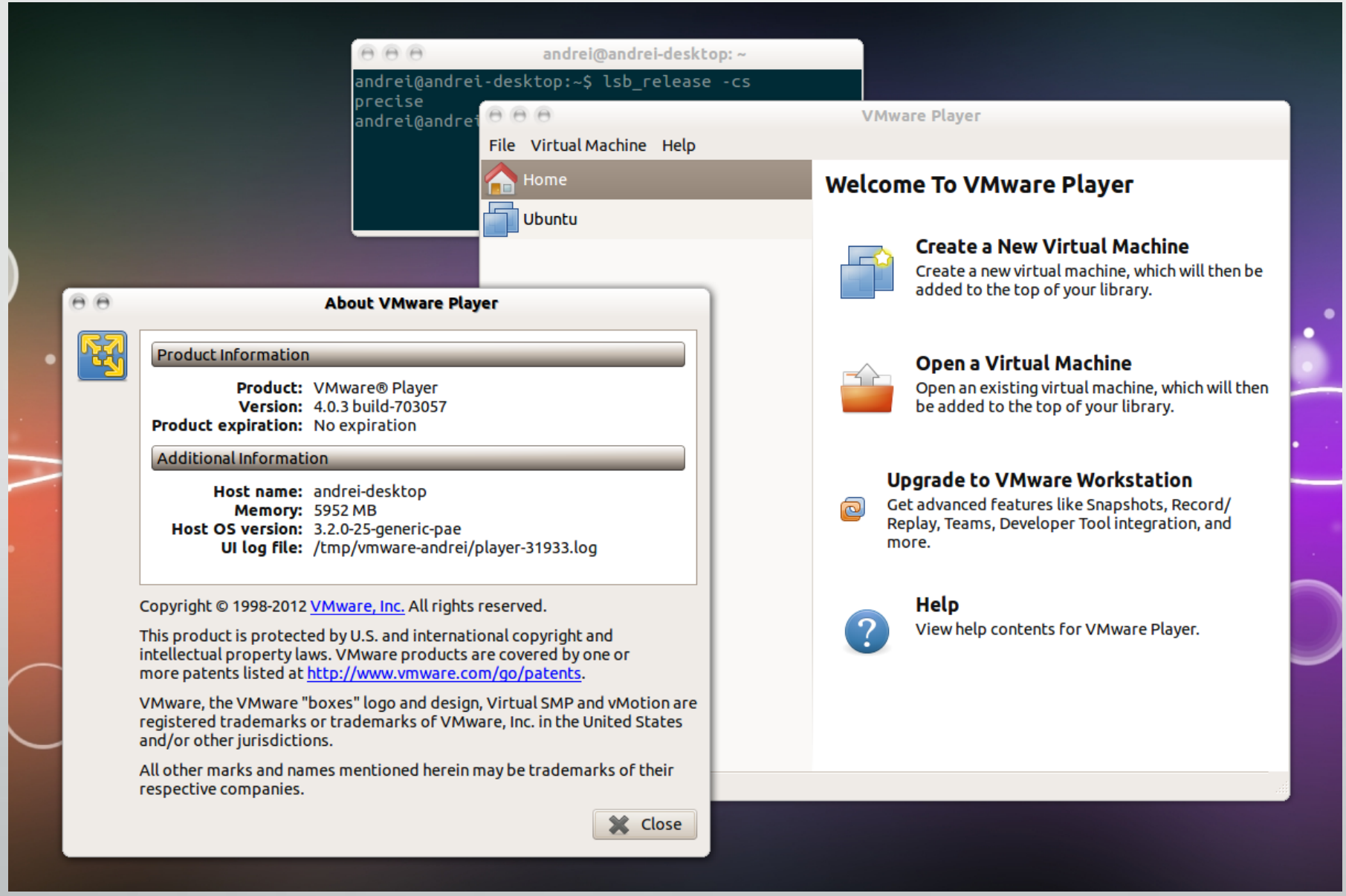
Host file system share

- settings -> shared folders
- Path: /mnt
- Directory name: mnt
- Mount point: /mnt

- In VM: `mount -t vboxsf mnt /mnt`

Exercise

- Vmware player is out from 2015 on Linux platfrom!
- `apt-get install build-essential linux-headers-`uname -r``
- `wget dev2.tilb.sze.hu/vmware-player.bundle`
- `chmod +x vmware-player.bundle`
- `./vmware-player.bundle`


andrei@andrei-desktop: ~
andrei@andrei-desktop:~$ lsb_release -cs
precise
andrei@andrei
VMware Player
File
Virtual Machine
Help
Home
Ubuntu
Welcome To VMware Player
Create a New Virtual Machine
Create a new virtual machine, which will then be added to the top of your library.
Open a Virtual Machine
Open an existing virtual machine, which will then be added to the top of your library.
Upgrade to VMware Workstation
Get advanced features like Snapshots, Record/ Replay, Teams, Developer Tool integration, and more.
Help
View help contents for VMware Player.
About VMware Player
Product Information
Product: VMware® Player
Version: 4.0.3 build-703057
Product expiration: No expiration
Additional Information
Host name: andrei-desktop
Memory: 5952 MB
Host OS version: 3.2.0-25-generic-pae
UI log file: /tmp/vmware-andrei/player-31933.log
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Close

Mini vm download

- wget http://dev2.tilb.sze.hu/VM.ova
- In VMware player open VM.ova
- ping google.com

KVM

- While on Linux OS, there is no difference between a server application and a desktop application, you can also do server virtualization on the desktop.
- KVM:
- `apt install -y qemu-kvm libvirt0 virt-manager bridge-utils`
- `virt-manager`