

# Virtualization

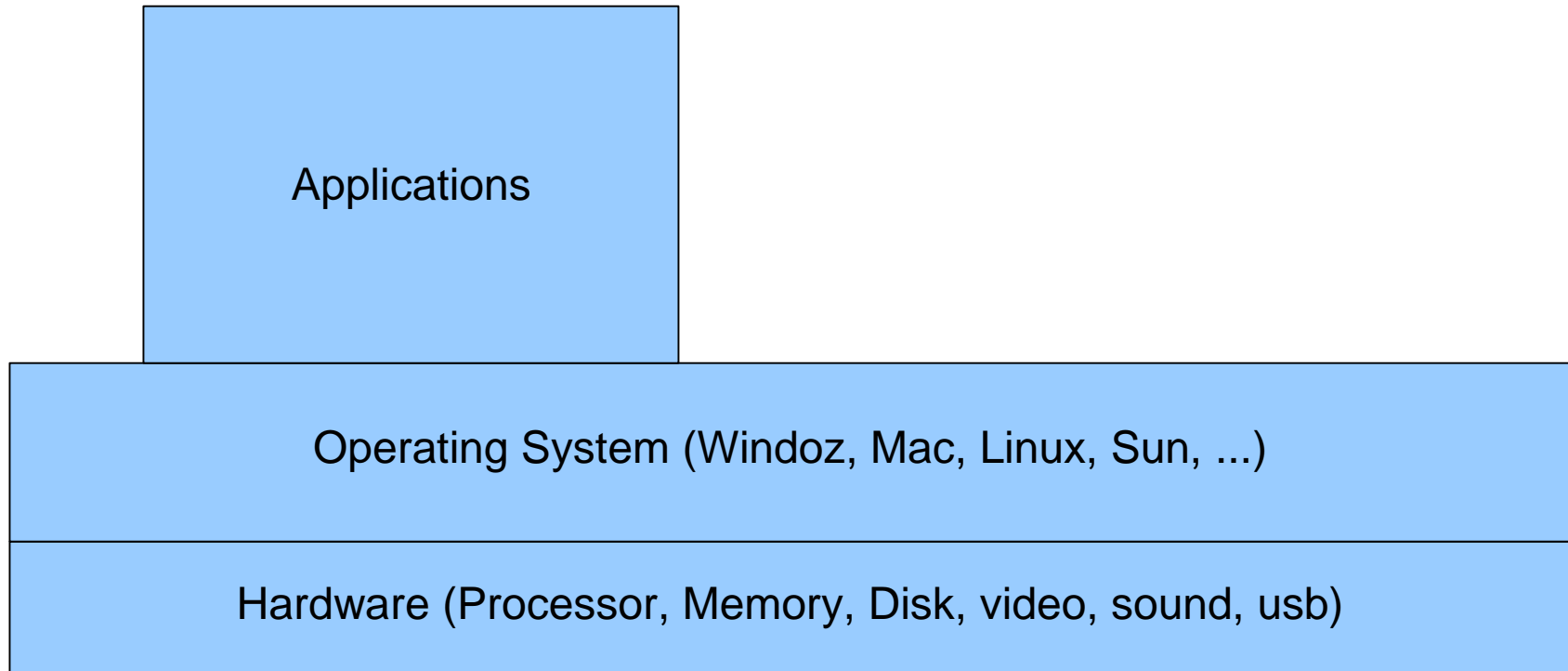
- | Phillip Lahman (re-tired programmer)
- | Why did I want to investigate Virtualization?
  - Portal Support Team, Computer Club and CA Information Technology activities.
  - VmWare experience, early part of this century.
  - Internet “buzz” left me wondering what is real.
  - GPL (free) solutions appeared to be gaining recognition and stability.
- | What have I done? GRE in virtualization.
  - Google, Read, Experiment (GRE)
  - Stumble through “Open Office Impress”

# Virtualization

- | What? (phil-osophical definition)
  - The combination of software and hardware that permits concurrent operation of multiple operating systems on one computer.
  - History: (The abbreviated version)
    - | Virtualization implementations are part of computer history. IBM delivered VM technology in the 1960s
  - Today:
    - | Many players, consolidation is occurring.
    - | Moore's law persists: Faster, cheaper hardware.
      - Intel and AMD, commodity systems.
    - | Not always faster or cheaper software

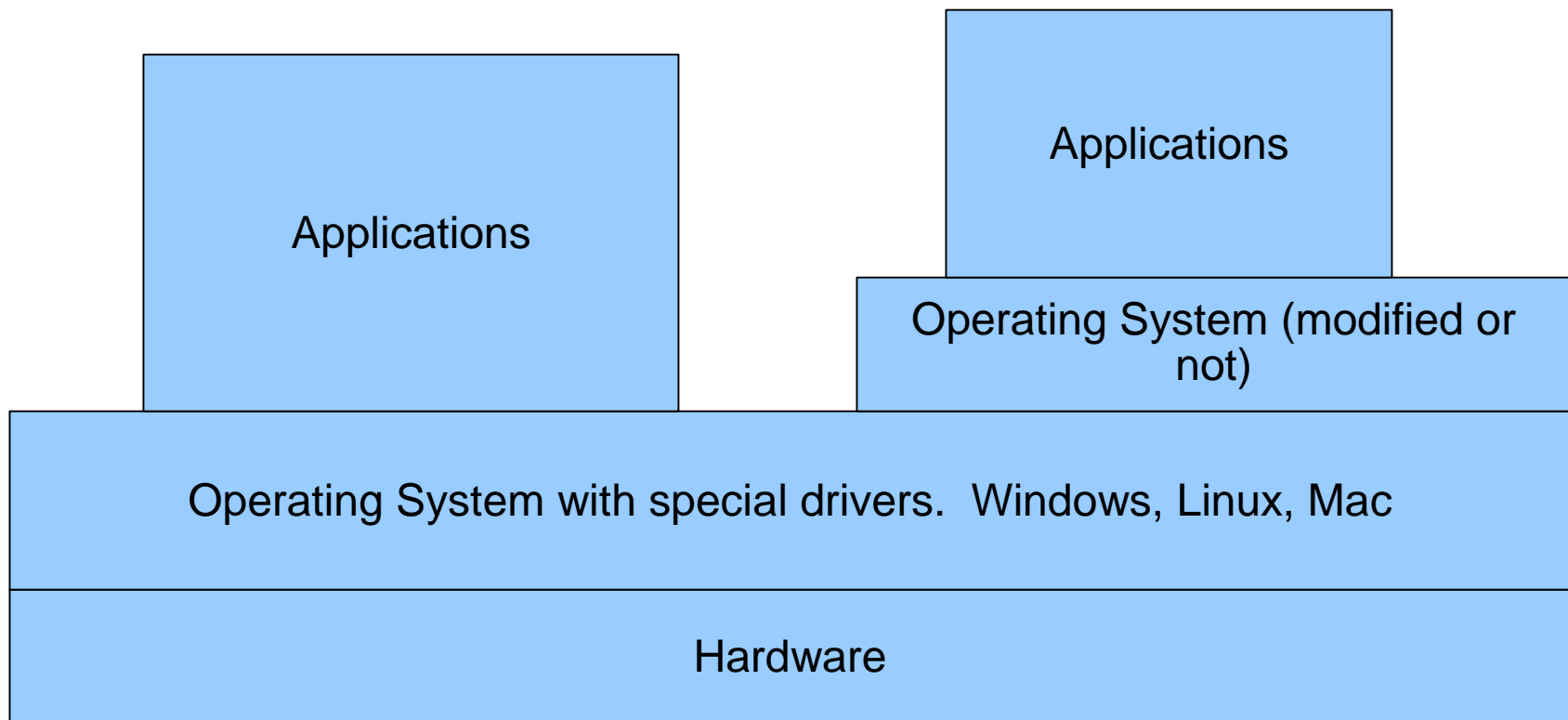
# Virtualization,

- Windows and Linux today, not virtualized



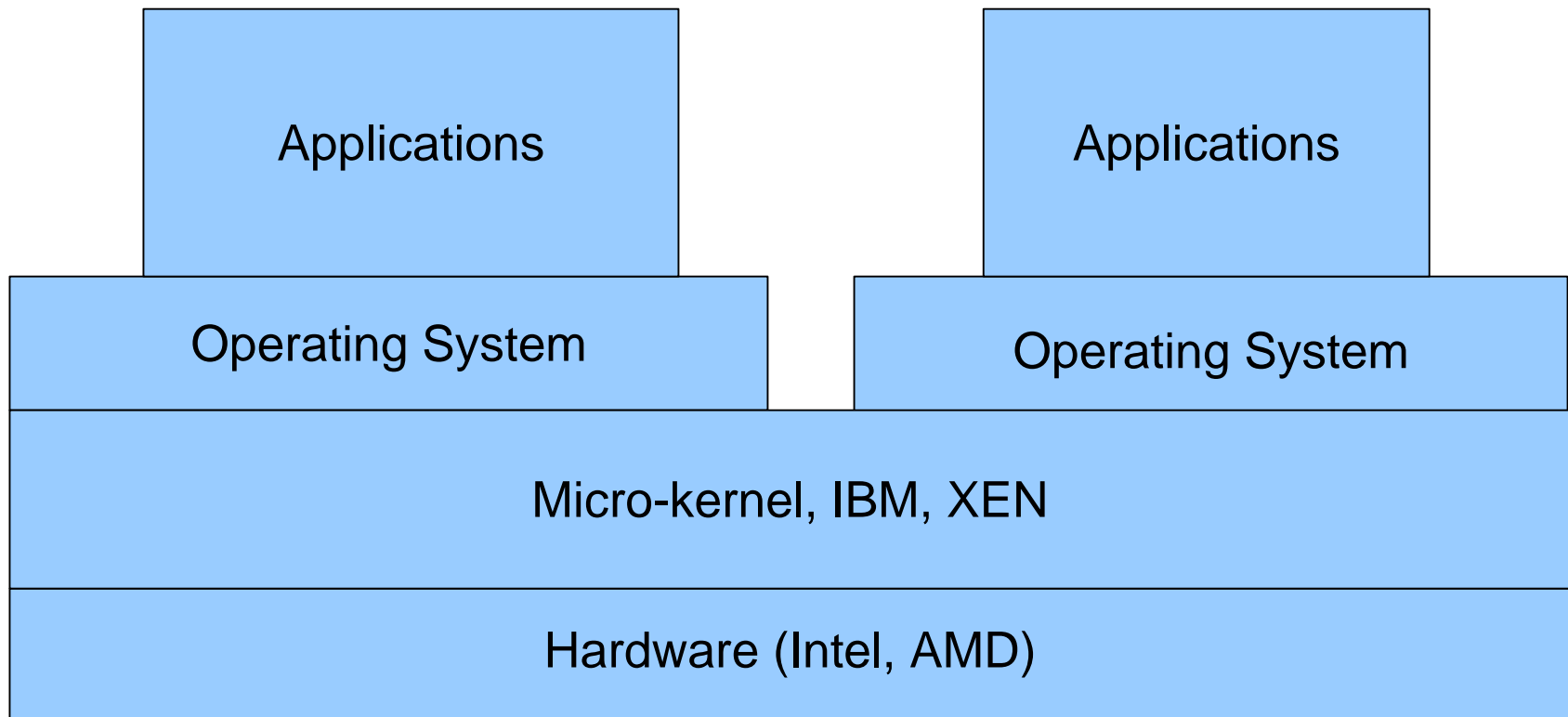
# Virtualization, One method

- VmWare, VirtualBox, OpenVZ, KVM. QEMU ....



# Virtualization, Another Method

IBM, XEN



# Virtualization References

- | A good introduction: <http://www-128.ibm.com/developerworks/library/l-linuxvirt/index.html>
- | A nice chart: <http://virt.kernelnewbies.org/TechComparison>
- | Wikipedia chart, more data :  
[http://en.wikipedia.org/wiki/Comparison\\_of\\_virtual\\_machines](http://en.wikipedia.org/wiki/Comparison_of_virtual_machines)
- | gridvm.org, provocative thoughts?
  - <http://www.gridvm.org/cat/vm/general>

# Virtualization

- | Why would you want a virtual machine?
  - Legacy applications
  - Testing
  - Convenience
    - | Recovery, replication
  - It can be done with free or not-free software.
  - Today's systems are capable, just add memory.
  - An enabler for alternative system design
    - | <http://www.gridvm.org/cat/vm/general>

# Virtualization, Players

- | VmWare ( <http://vmware.com/> )
  - VmWare Server (free), Windows and Linux host, windows and Linux guest
- | Microsoft ( <http://www.microsoft.com/virtualization/default.mspx> )
  - Virtual PC, Windows host and guest
- | Citirx ( <http://citrix.com/lang/English/home.asp> )
  - XEN Micro-kernel for X86, Windows and Linux guest
- | Sun ( <http://www.virtualbox.org/> )
  - Windows or Linux host. Windows, Linux, guest
- | Parallels ( <http://openvz.org/> )
  - Mac, Windows, Linux host, Windows, Linux guest
  - <http://www.parallels.com/virtuozzo>
  - OpenVZ, Linux host, HP performance paper

# Virtualization, Players

- | Qumranet (<http://qumranet.com/>)
  - KVM, Linux host, Windows or Linux guest
  - Requires Intel ??? or AMD ???
- | QEMU (<http://fabrice.bellard.free.fr/qemu/>)
  - Processor emulator. Much more than virtualization.
  - Important because it appears components of this project are consumed by Xen and KVM
- | Who is missing? HP, IBM
  - [http://en.wikipedia.org/wiki/Integrity\\_Virtual\\_Machines](http://en.wikipedia.org/wiki/Integrity_Virtual_Machines)
    - | Itanium host
  - [http://en.wikipedia.org/wiki/Advanced\\_Power\\_Virtualization](http://en.wikipedia.org/wiki/Advanced_Power_Virtualization)
    - | PowerPC host

# Virtualization, features

- | Provide an environment that looks like bare iron
  - Power button
  - Configurable
    - | Number of processors
    - | Memory allocation
    - | Size of disk
      - Virtual (file) or real (partition)
    - | Video size (resolution)
    - | USB
    - | CD-ROM (real or ISO)
    - | Sound

# Microsoft Windows 2000

## Configuration

**File Location** D:\Documents and Settings\Phillip\My Documents\Parallels Virtual Machines\win2000\win2000.pvs

**Guest OS** Windows 2000 **Boot Sequence** Hard Disk, Floppy, CD-ROM

**Acceleration** High **Auto Start** Off

**Modified** 3/14/2008 9:38:35 PM **VM State** Stopped

## Resources

**Memory** 520 MB

**Floppy** D:\Program Files\Parallels\Parallels Workstation\vmtools.fdd




4000 MB · D:\Documents and Settings\Phillip\My



File Machine Help

-  New
-  Settings
-  Delete
-  Start
-  Discard

 **Win2k**  
 ⏻ Powered Off

-  Details
-  Snapshots
-  Description

 **General**

Name	Win2k
OS Type	Windows 2000
Base Memory	530 MB
Video Memory	16 MB
Boot Order	Floppy, CD/DVD-ROM, Hard Disk
ACPI	Enabled
IO APIC	Disabled

 **Hard Disks**

Primary Master	Win2k.vdi [Normal, 3.87 GB]
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 **CD/DVD-ROM**

Host Drive	G:
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 **Floppy**

Not mounted

 **Audio**


Adapter	Windows DirectSound
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 **Network**

Adapter 0	NAT
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 **Serial Ports**

Disabled

 **USB**

Device Filters	0 (0 active)
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 **Shared Folders**

None

 **Remote Display**

Disabled

# Virtualization, performance

- | Difficult to find meaningful data
  - What is “meaningful”?
  - Google, “VmWare benchmark” “VmWare versus Xen” “Xen benchmark”, “kvm benchmark”, “qemu benchmark”
- | A VmWare publication. No date, Appears to be early 2007.
  - <http://www.vmware.com/overview/performance/benchmarks.html>
- | The rebuttal: [http://weblog.infoworld.com/virtualization/archives/2007/03/xensource\\_versu.html](http://weblog.infoworld.com/virtualization/archives/2007/03/xensource_versu.html)
- | This: <http://www.gridvm.org/xen-vs-kernel-containers-performance-and-efficiency.html> led to this: <http://www.hpl.hp.com/techreports/2007/HPL-2007-59.pdf>
  - “The main cause of performance overhead in Xen is the number of L2 cache misses.”

# Virtualization, Conclusions

- ┆ Virtualization is real (Huh?, oxymoron? )
- ┆ Plenty of players
  - Picking the survivor(s) is difficult.
    - ┆ VmWare for sure?
    - ┆ What about the others?
- ┆ Is it a solution looking for a problem?
  - No !
  - Virtualization is an enabler.

# Virtualization, Demo

- | A wimpy laptop
  - XP host, Windows 2K guest
  - 768 megabytes host memory
  - 256 megabytes guest memory
  - 4 gigabyte virtual disk
- | Monitor process explorer during demo.