Virtualization:

Know your options on Ubuntu

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Agenda

- Definitions

- Host virtualization tools

- Desktop virtualization tools

- Ubuntu as a guest OS

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Definitions

Multiple technologies exist to provide a virtual environment:

- Emulation

- Binary translation

- Paravirtualization (with or without hardware support)

- Containment

Mutiple points of view need to be examined:

- Host (server)

- Desktop

- Guest

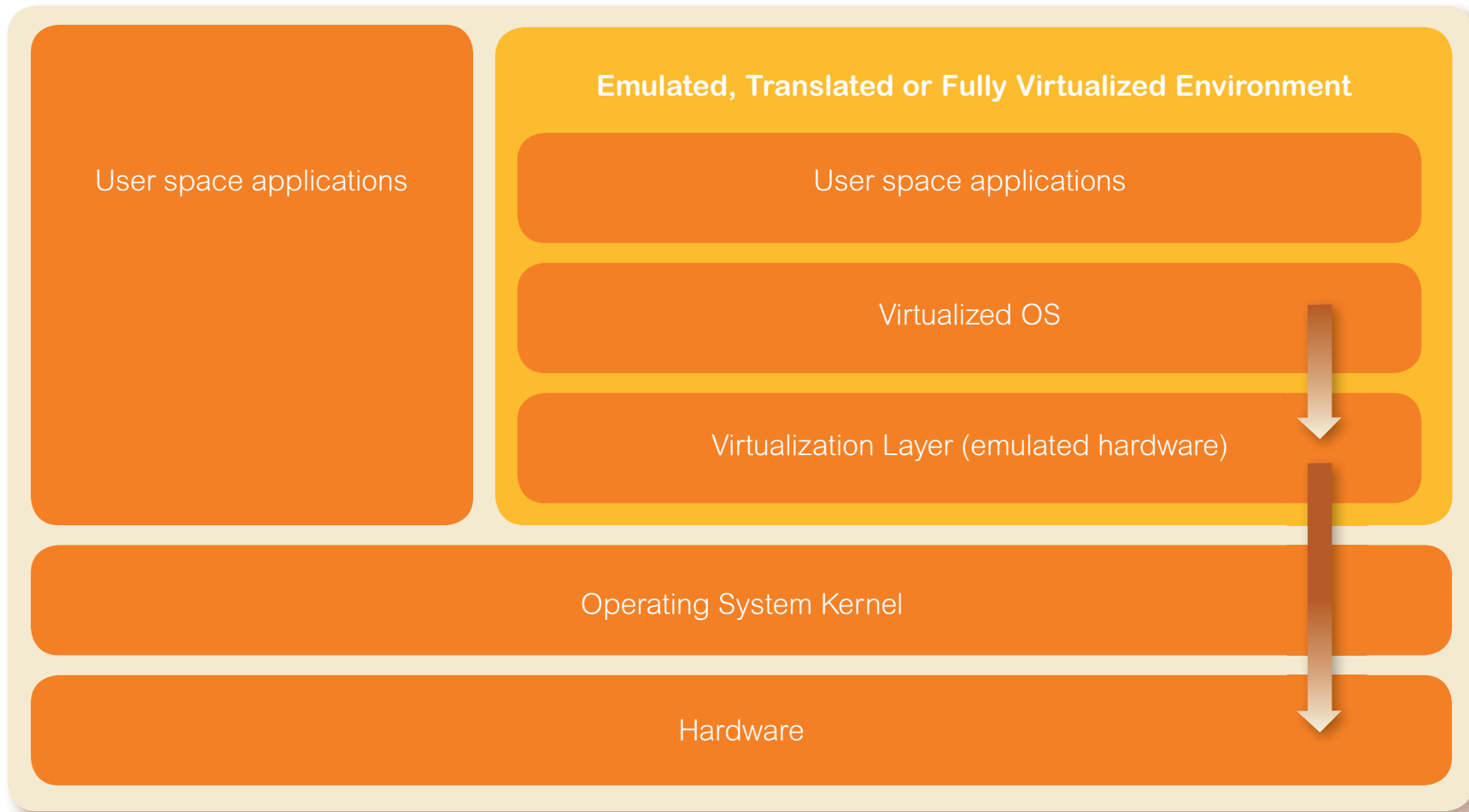CANONICAL

Definitions

Multiple states apply to each technology:

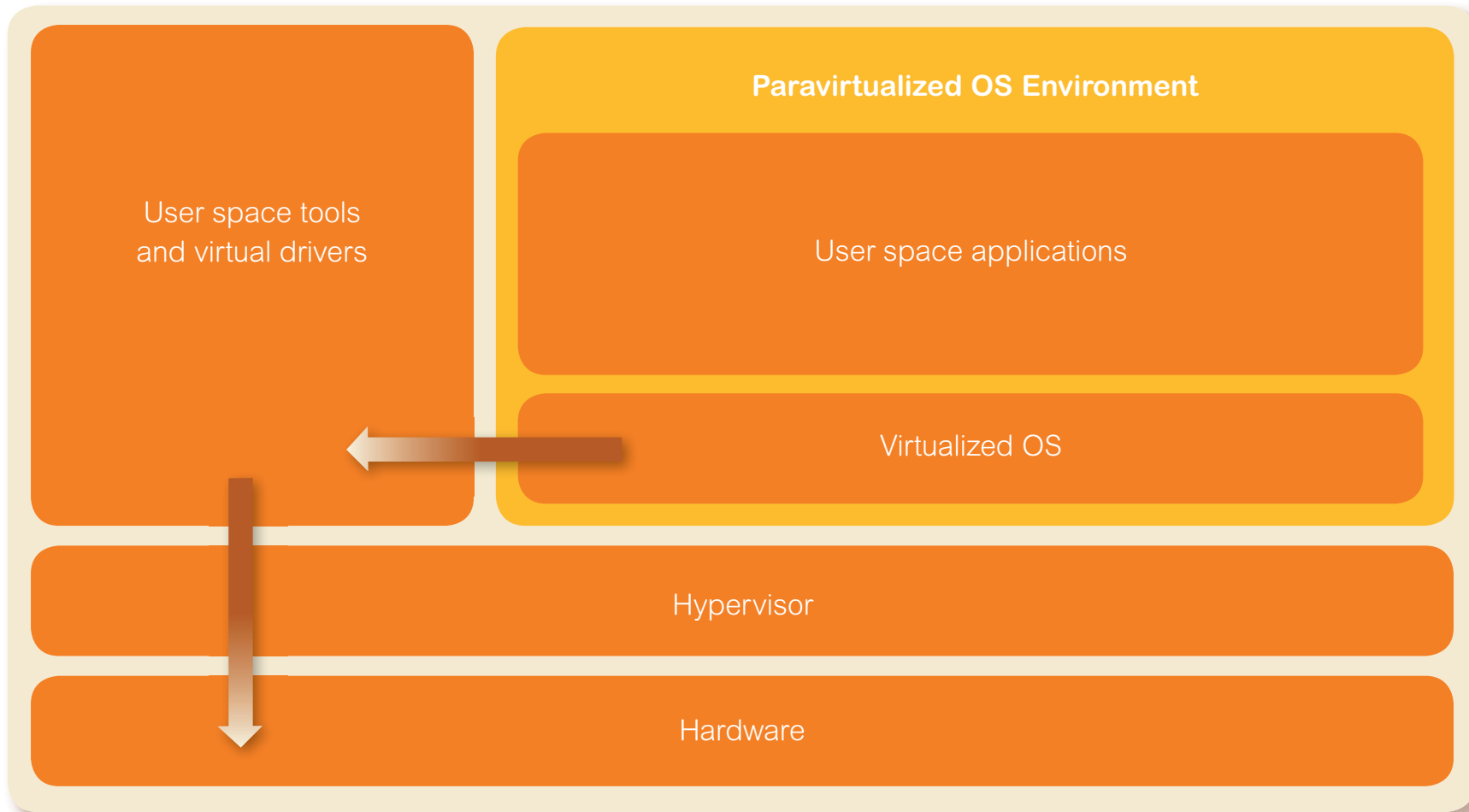- Supported

- Maintained

- Open

- Free (of charge)

Multiple functions may be required:

- Migration

- Live Migration

- Snapshotting

- Save / Restore

- Dynamic allocation

- Dynamic spanning
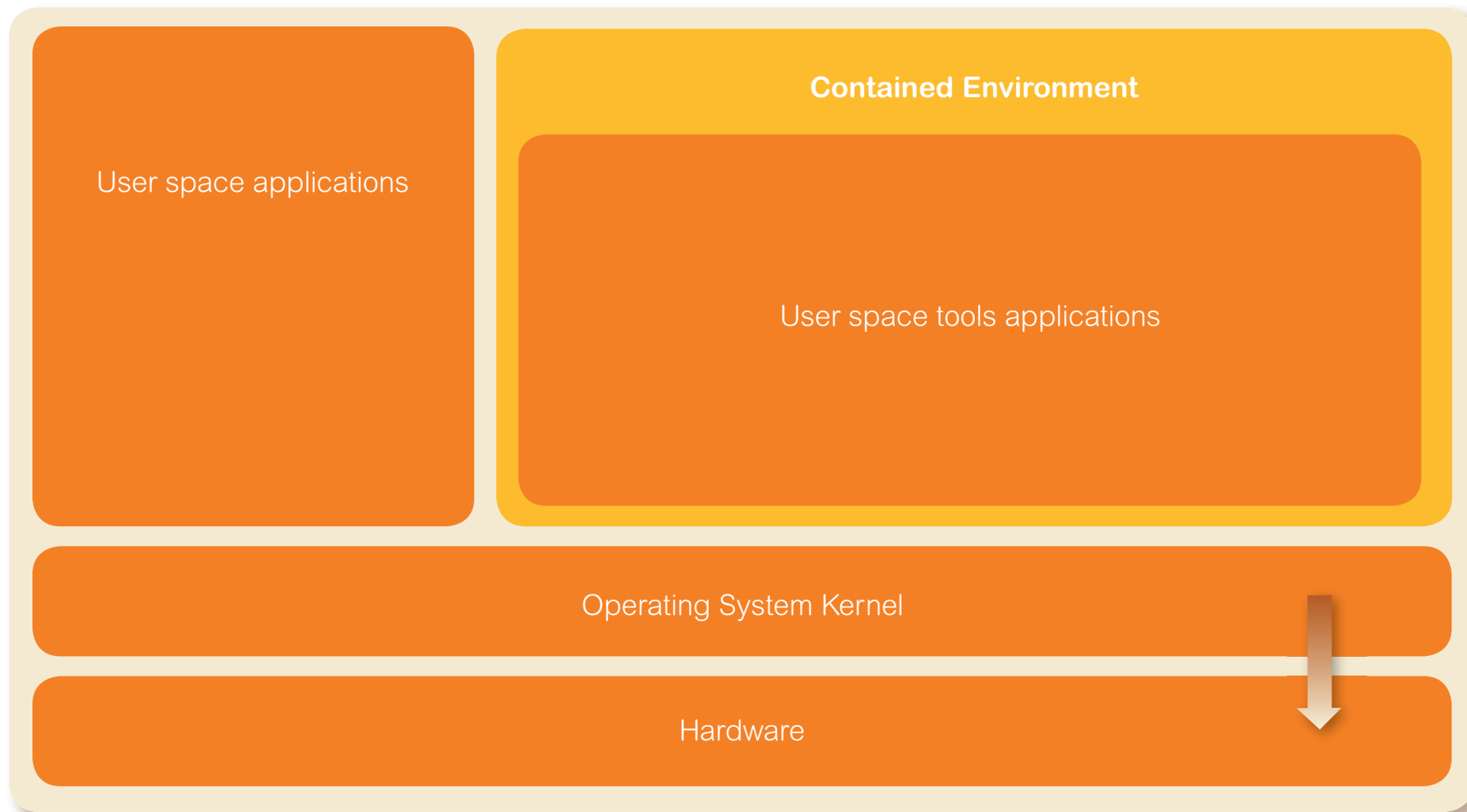
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Emulation

User space applications

Emulated, Translated or Fully Virtualized Environment

User space applications

Virtualized OS

Virtualization Layer (emulated hardware)

Operating System Kernel

Hardware

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Paravirtualization

Paravirtualized OS Environment

User space tools
and virtual drivers

User space applications

Virtualized OS

Hypervisor

Hardware

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Containment

Contained Environment

User space applications

User space tools applications

Operating System Kernel

Hardware

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Host Virtualization

KVM

Ubuntu's choice for maintained Virtualization

- Most efficient open source virtualization technology

- No special kernel required

- Simpler to maintain (less lines of code)

- Can be managed remotely

- Includes Virt-IO optimization for supporting OS

Full Virtualization requiring hardware support

- Any AMD-V or Intel-VT based servers can run it

Open (in mainstream kernel), maintained and supported

Supports:

- Migration (live migration soon)

- Save / restore (snapshotting soon)

- Dynamic allocation

Best for single host virtualization at this time

Can be managed through Libvirt and VirtManager

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Xen

Available in Ubuntu since 6.06

Paravirtualization / Full virtualization

- Supports a range of OS guests with hardware support

- Only modified OS without

Requires a specific kernel (huge patches, some in mainstream)

Open, community maintained, not supported

Supports:

- Live migration

- Save / restore

- Dynamic allocation

Can be managed through Libvirt

OpenVz

Open source version of Virtuozzo, now part of Parallels

Containment technology

- Shows as multiple independent instances of Linux OS, sharing the same kernel

Requires a specific kernel

Open, community maintained, not supported

Highly efficient virtualization

- Very small overhead

- Allows for high density of guests

Supports:

- Live migration

- Snapshotting

- Dynamic allocation

VServer

Containment technology

- Shows as multiple independent instances of same OS, sharing the same kernel

Requires a specific kernel

Open, community maintained, not supported

Highly efficient virtualization

- Very small overhead

- Allows for high density of guests

Supports

- Migration

- Save / restore

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VMware ESX

Host does not run Ubuntu but it's own Linux flavour

Full virtualization

Expansive, maintained and supported by VMware, not open

Supports

- Live migration

- Snapshotting

- Save / restore

- Dynamic allocation

- Dynamic spanning

Ubuntu 8.04 LTS is being certified by VMware

VMware ESX is being certified by Canonical as a "hardware platform"

Console only full featured on windows

Best data centre virtualization technology at this time, if you can afford it

VMware Server

Binary translation technology

Runs in user space (no special kernel)

Free of charge but not open source, maintained by VMware, not supported

Supports

- Migration

- Snapshotting

Common, easy choice for testing for development, but not very efficient

Server summary

	Other OS	HW Virt	Open	Maint.	Support	Live Migr.	Snapsh.	Alloc.	Deploy.
KVM	✔	✔	✔	✔	✔			✔	
XEN	✔	✔	✔	Community		✔	✔	✔	
OpenVz			✔	Community				✔	
vServer			✔	Community				✔	
VMware ESX	✔	✔		Publisher	✔	✔	✔	✔	✔
VMware Server	✔			Publisher		✔	✔		

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Desktop Virtualization

Four choices for desktop virtualization

- VirtualBox (OSE and closed source)

- Parallels workstation

- VMware player

VirtualBox

- Developed by InnoTek, recently acquired by Sun

- Open source edition (OSE) lacks USB, RDP, USB over RDP compared to the closed source version

- Can use hardware virtualization extensions

- Does not need a special kernel (only a kernel module)

- Very efficient for interactivity on desktop

- OSE: open, community maintained, not supported

- Closed source: vendor supported and maintained, free of charge for personal and evaluation use

Parallels Workstation

- Can use hardware virtualization extensions

- Does not need a special kernel

- Closed source, trial-ware, supported and maintained by publisher

- Does not yet run on 2.6.24 kernels

- Good support for USB and sound

VMware Player

- New version coming to support Ubuntu 8.04

- Does not need a special kernel (only a kernel module)

- Closed source, vendor maintained but not supported, free of charge

- Cannot be used to install new virtual machines

Ubuntu as a Guest OS

- JeOS

- Ubuntu-VM-Builder

- Certifications and compatibilities

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JeOS - Just enough OS

Special - virtual kernel with only required drivers

Ubuntu-minimal install by default

- Less than 100MB ISO image

- Less than 300MB installed footprint

Benefits

- Better performances on the same hardware compared to a full non-optimised OS

- Smaller footprint of the virtual appliance on their valuable disk and RAM space

- Fewer updates and therefore less maintenance than a full server installation

Hundred's of virtual appliances already built on JeOS

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Ubuntu-VM-Builder

Simple efficient way to create an Ubuntu guest in less than 2 min*

Can create KVM and VMware guests

Many customizations available (suite, kernel, packages, etc.)

Use cases:

- Automated creation of guests for Hosting services

- Included in make script for ISV willing to ship a virtual appliance

- Used for grid computing deployment and update of task orientated VMs

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Demo

Let's create an Ubuntu 8.04 guest

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What's next

No more ISOs or JeOS

- Option in the server installer

- Pre-built base VM for VMware and KVM

More features for KVM, Libvirt and VirtManager

Expanded function for Ubuntu-VM-Builder

- Working as a web service

- Part of a pre-built Virtual Appliance for KVM and VMware

VM deployment using Cobbler

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