RED HAT ENTERPRISE VIRTUALIZATION & CLOUD COMPUTING

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KVM BACKGROUND

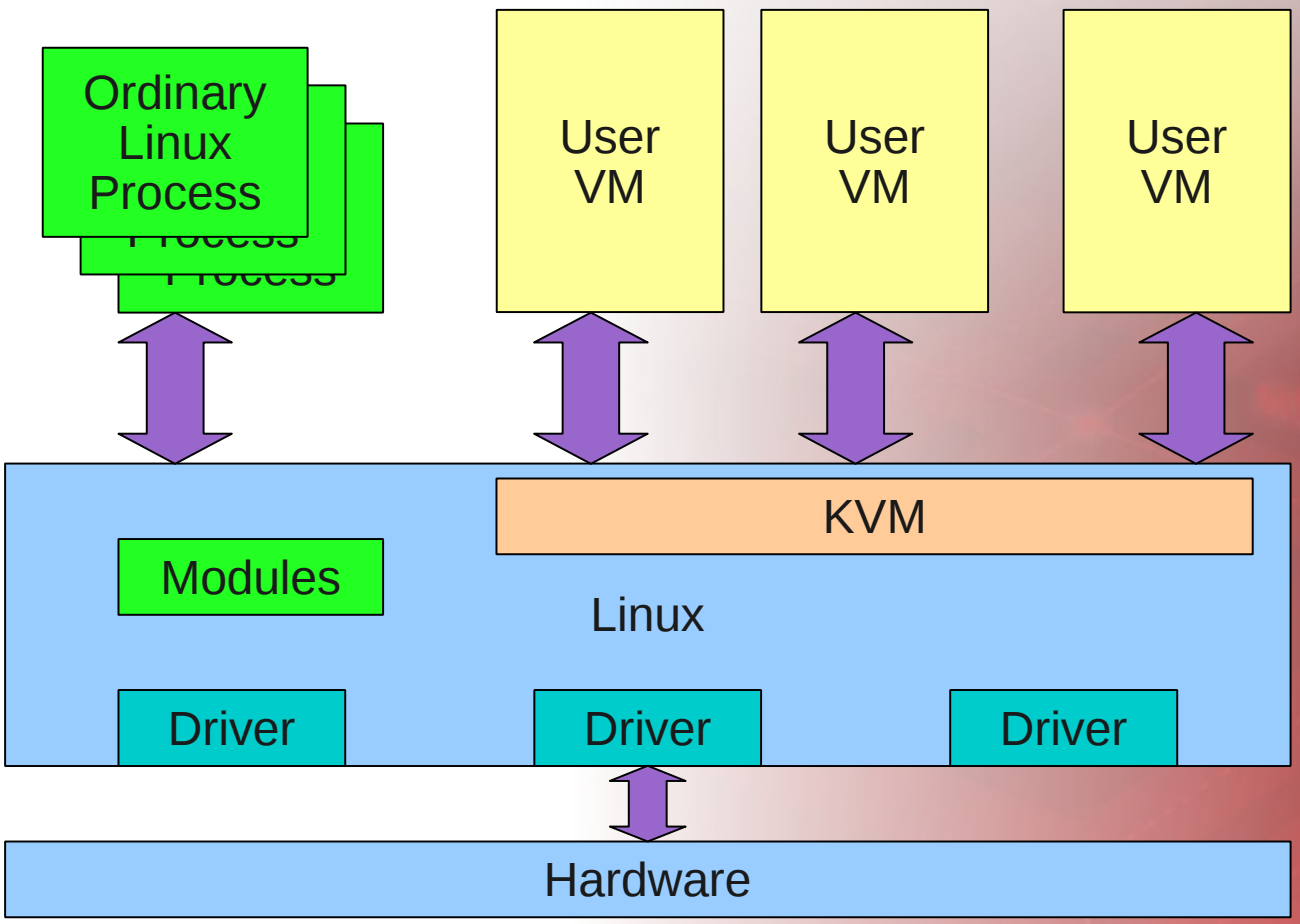
Project started in October 2006 by Qumranet

- Submitted to Kernel maintainers in December 2006
- Around 40k lines of code added to Linux

- Accepted in upstream kernel 2.6.20 (January 2007)
- *No separate kernel required*

- Shipped as part of all modern Linux distributions
- Available in Fedora since version 7
- Added to RHEL in 5.4

KVM MODEL


Ordinary Linux Process
User VM
User VM
User VM
KVM
Modules
Linux
Driver
Driver
Driver
Hardware

KVM HARDWARE SUPPORT

KVM requires hardware support:
- Intel : ***vmx*** flag
- AMD : ***svm*** flag

```
  $ egrep “svm|vmx” /proc/cpuinfo
flags      : fpu tsc msr pae vmx mce cx8 ...
```

VMX may be disabled in BIOS even if the flag appears!
- If you enable VMX then you must cold boot the machine
- Without cold boot the feature will be not be activated

RED HAT ENTERPRISE VIRTUALIZATION

Management options for the KVM hypervisor:

- **RHEL** – libvirt based management

- **RHEV** – centralized management server, multiple API choices, thin hypervisors

RED HAT ENTERPRISE VIRTUALIZATION 2.2: SERVER AND DESKTOP VIRTUALIZATION

SERVER VIRTUALIZATION

High Availability

Live Migration

System Scheduler

Image management / provisioning

OVF Import / Export

VMware and RHEL/Xen
V2V migration tool

Enhanced scalability
(16 vCPU, 256 GB RAM
Guest operating systems)

DESKTOP VIRTUALIZATION

SPICE remote rendering

- HD quality video
- Bi-directional audio/video
- USB support
- Multiple monitors

Connection Broker

Desktop pools

User Portal

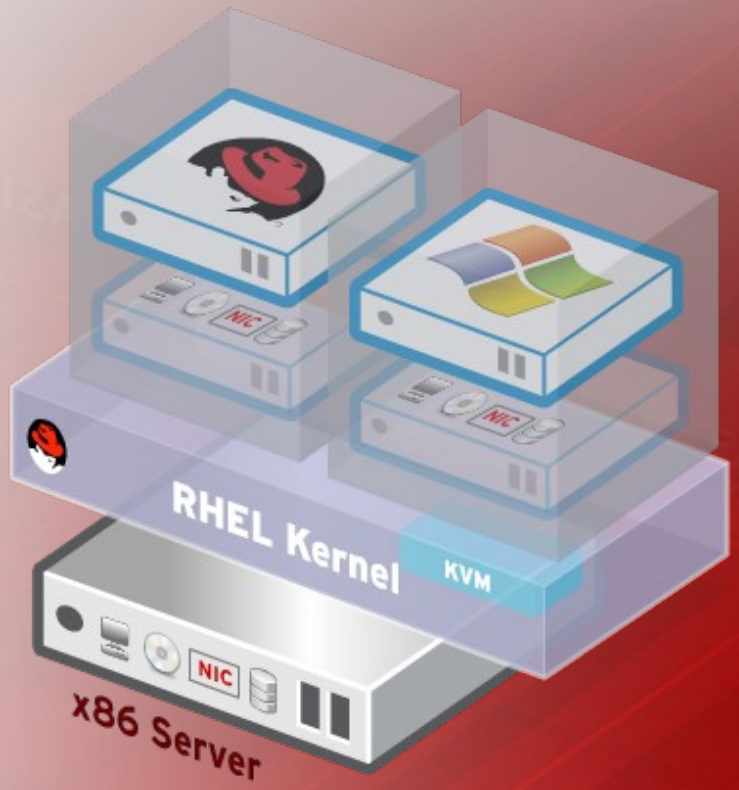
ADVANCED HYPERVISOR TECHNOLOGY

Leverages KVM (Kernel-based Virtual Machine) technology – integrated with the Linux kernel

Host scalability: 96 cores,
1 TB RAM

Guest scalability:
16 vCPU, 256 GB RAM

Advanced capabilities: memory page sharing, SR-IOV, VT-D, SE-Linux based security policy



BENEFITS OF LINUX KVM MODEL

Leverages Linux – no need to re-invent the wheel

- Built on trusted, stable enterprise grade platform
- Scheduler, memory management, hardware support etc.
- Ease of management – use same tools for managing physical servers and hypervisors

Advanced features

- Inherit scalability, NUMA support, power management, hot-plug etc. from Linux – others have to develop from scratch
- SELinux security, advanced scheduler, RAS support etc.

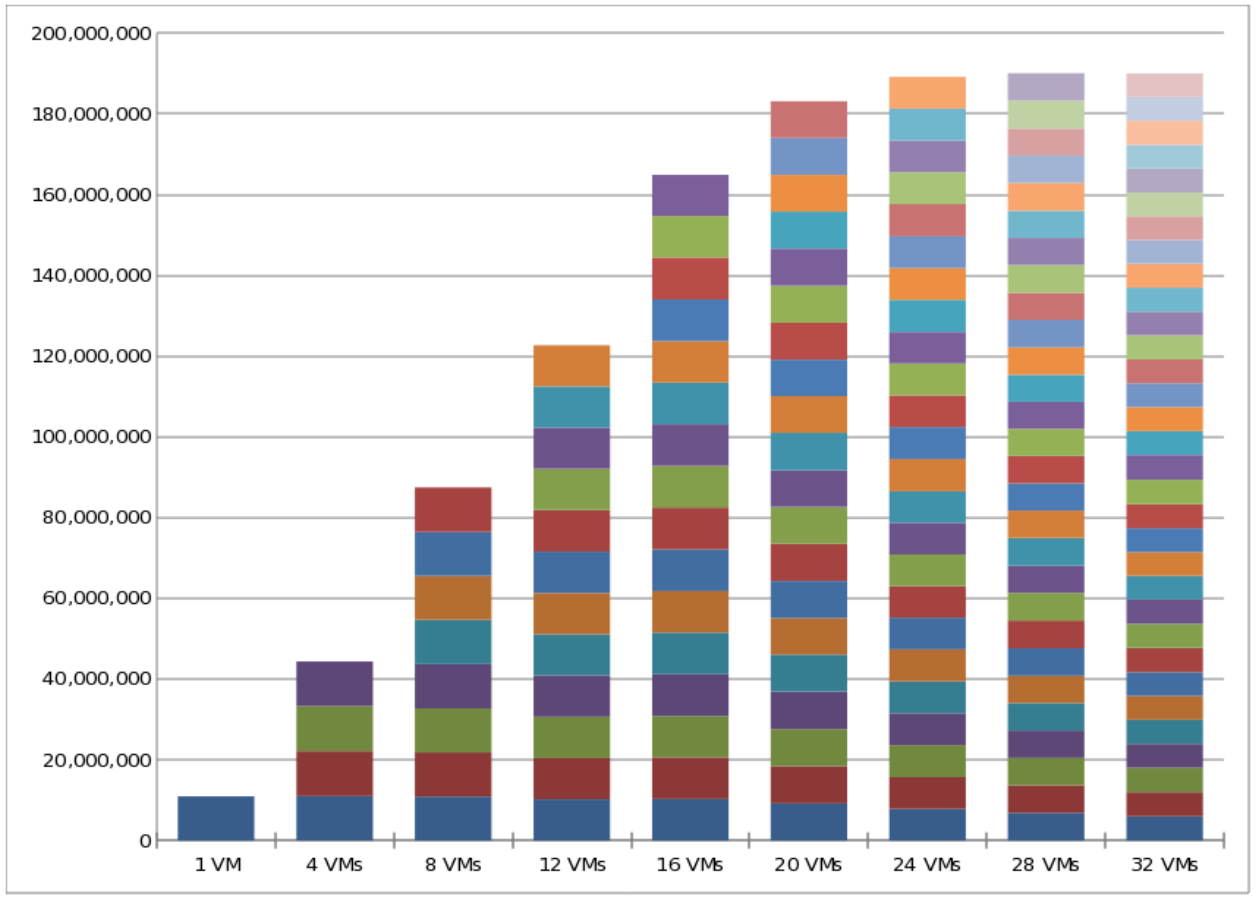
Hybrid-mode operation

- Run regular Linux applications side-by-side with Virtual Machines on the same server – much higher degree of hardware efficiency

KVM HYPERVISOR – ADVANCED FEATURES

Kernel Same-Page Merging (KSM)

Enterprise Java workload benchmark - Intel Xeon Processor X5550 with 24GB RAM - Running multiple 3GB Windows 2003 VMs - Scaling up to 200% over-commit



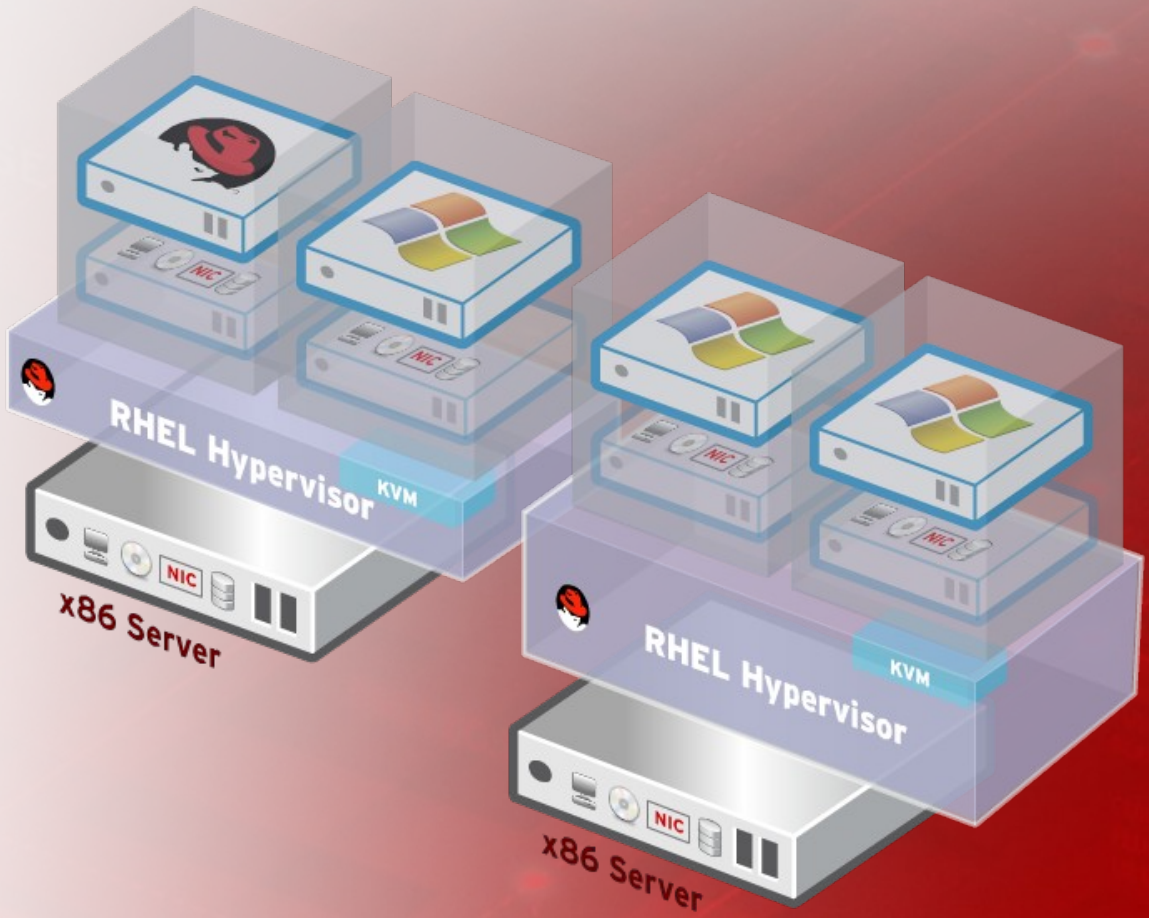
TWO PACKAGING MODELS FOR THE HYPERVISOR

RHEV-HYPERVISOR:

- Approx 100 MB in size
- Stateless and thin
- Pre-configured, no Linux skills needed.

RHEL AS A HYPERVISOR:

- Flexible
- Security hardened, corporate standard RHEL image as a virtualization host.
- Add monitoring agents, scripts etc. Leverage existing RHEL infrastructure.
- Hybrid mode capable



ADVANCED SECURITY INFRASTRUCTURE FOR SERVERS AND DESKTOPS

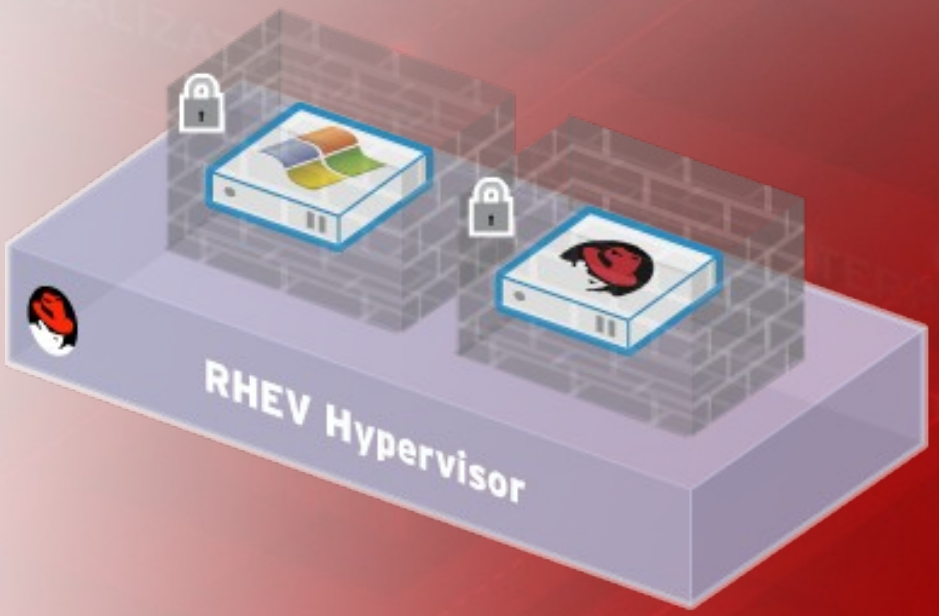
RHEV inherits the security features of Linux and RHEL

SELinux security policy infrastructure

- Provides protection and isolation for virtual machines and host
- Compromised virtual machine cannot access other VMs or host

sVirt Project

- Sub-project of NSA's SELinux community. Provides “hardened” hypervisors
- Multilevel security. Isolate guests
- Contain any hypervisor breaches
- Included in RHEL 6 and next release of RHEV



SPICE: DESIGNED FROM THE GROUND UP FOR VIRTUAL DESKTOPS

SPICE includes 3 components

> SPICE driver in the guest

> SPICE virtual graphics adapter in the host

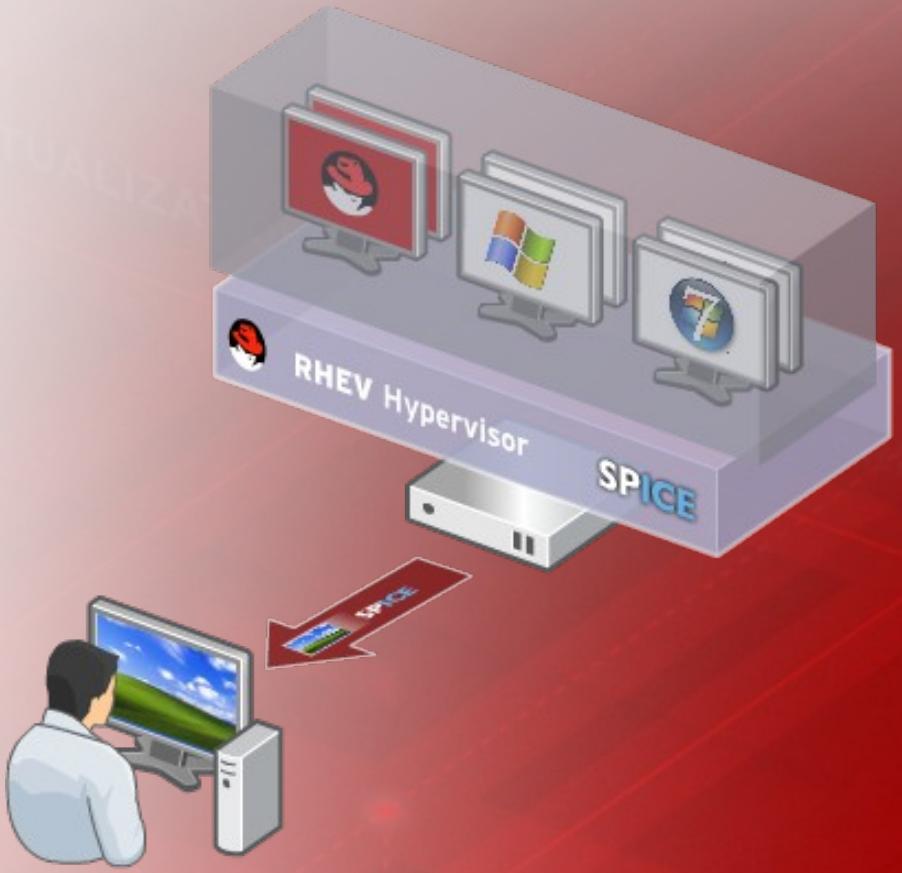
> SPICE client on the thin client

Adaptive protocol – chooses optimal point to process graphics

> In the host, or

> On the client

Highest density, optimal user-experience



AND WE DO WINDOWS TOO…

Microsoft and Red Hat reciprocal agreements for cross-certification of server operating systems

- RHEL 5.2+ guests on Hyper-V (Red Hat Certified)
- Windows 2003/2008 on RHEV (Microsoft SVVP certified)

Desktop operating systems supported on RHEV for Desktops (including WHQL drivers delivered by RHEV Tools or Windows Update)

- Windows XP (32 bit)
- Windows 7 (32 bit and 64 bit)


RED HAT'S CLOUD
ARCHITECTURE

WHAT DOES A CLOUD PROVIDE?

A Cloud provides an abstraction layer to manage scale and complexity

- Self service
- Abstracted, elastic resources
- Location-independent storage & services
- Users, Groups
- Accounting
- API's, Drivers, Tools
- Federation

Cloud: **Resource abstraction,** Second Abstraction maps cloud to virtual resources

Virtualization: **Hardware abstraction,** First Abstraction maps virtual to physical resources

Bare metal: **Full access,** No Abstraction

PHASE 1: CONSOLIDATE

VIRTUALIZE YOUR SERVERS

Virtualize your physical hardware to achieve higher utilization, consolidation, and flexibility.

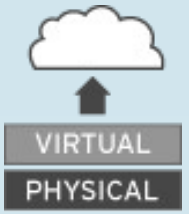
Virtualization increases the utilization of physical servers and provides a foundation for cloud computing.

PHASE 2: AUTOMATE

BUILD A PRIVATE CLOUD

As you expand your use of virtualization, build a private cloud to manage the scale and complexity.

A private cloud abstracts multiple instances of virtual resources into elastic pools of computation with self-provisioning and scalable services.

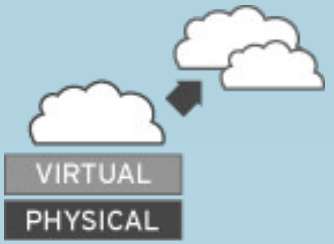


PHASE 3: UTILITY

ADD A PUBLIC CLOUD

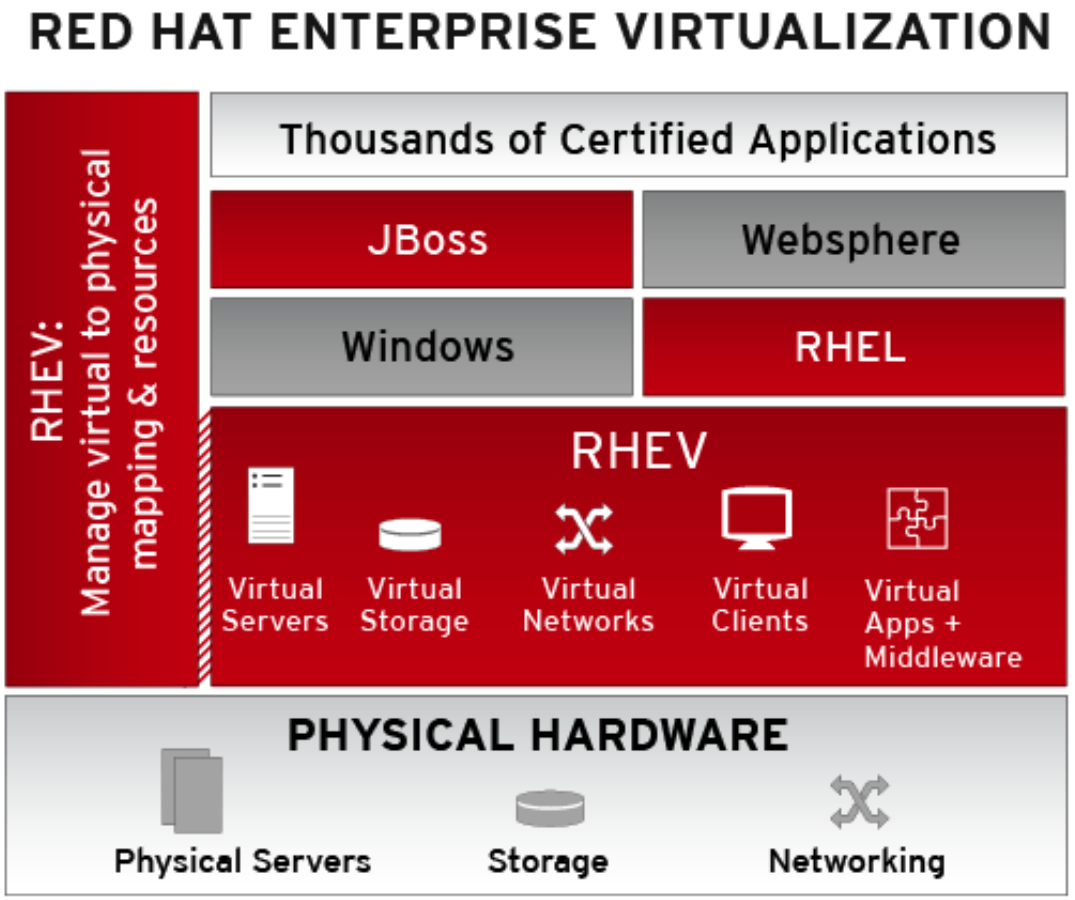
As you expand your use of cloud computing, add public cloud providers delivered as a utility to increase capacity and lower costs.

Red Hat's cloud architecture lets you manage and integrate various virtualization systems and public cloud providers together. This allows you to leverage public cloud computing as a utility.

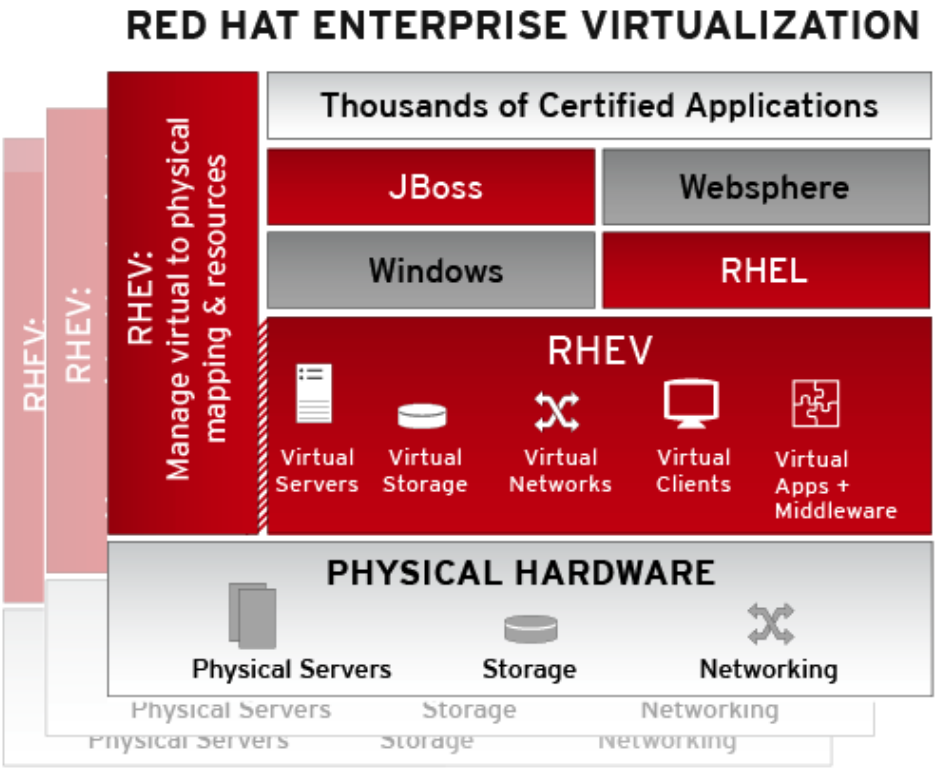


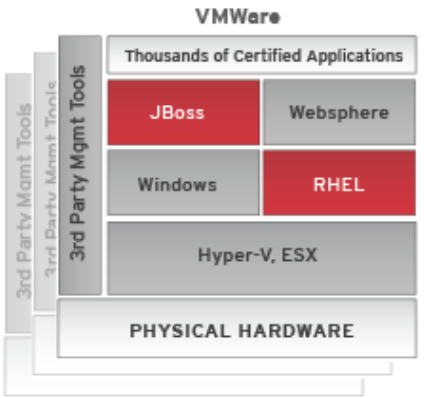
START WITH VIRTUALIZATION

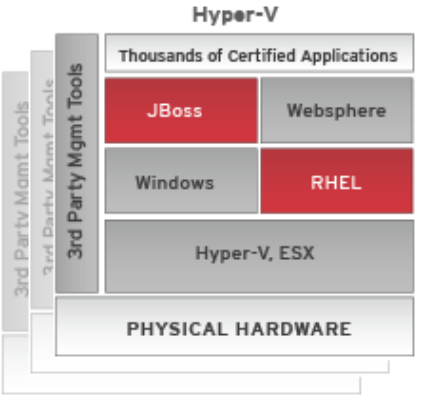
- Quality of service (QoS) protection
- Granular, policy-based security in the kernel
- Industry-leading reliability, availability, scalability (RAS)
- Exceptional performance

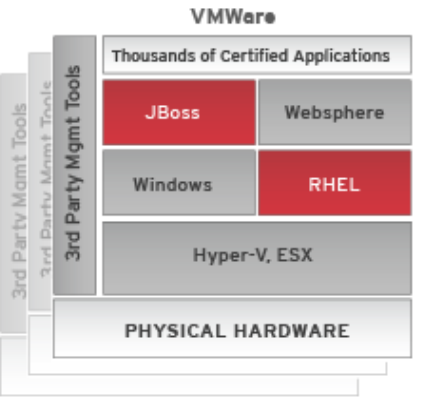


GROW YOUR VIRTUALIZATION DEPLOYMENT

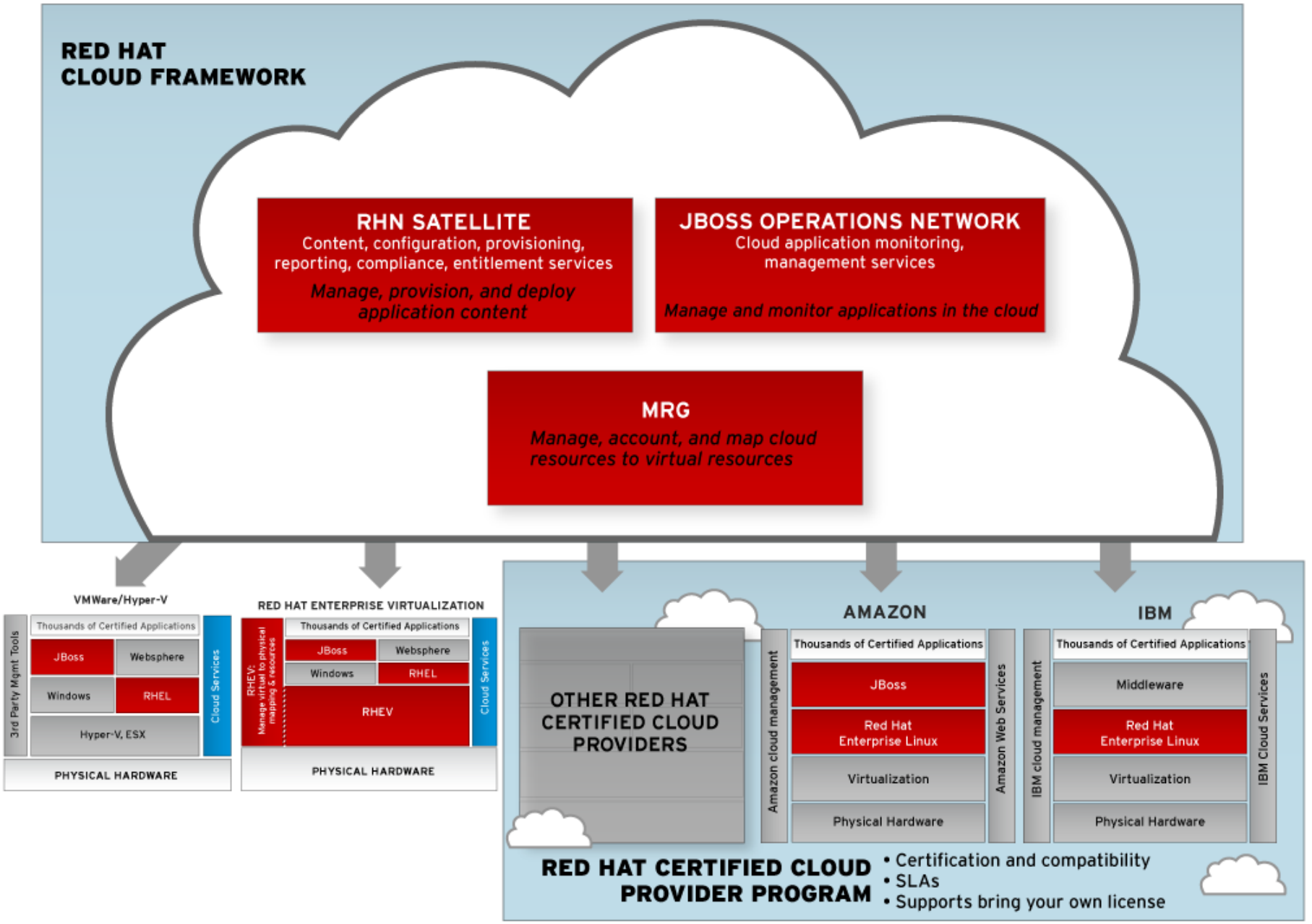






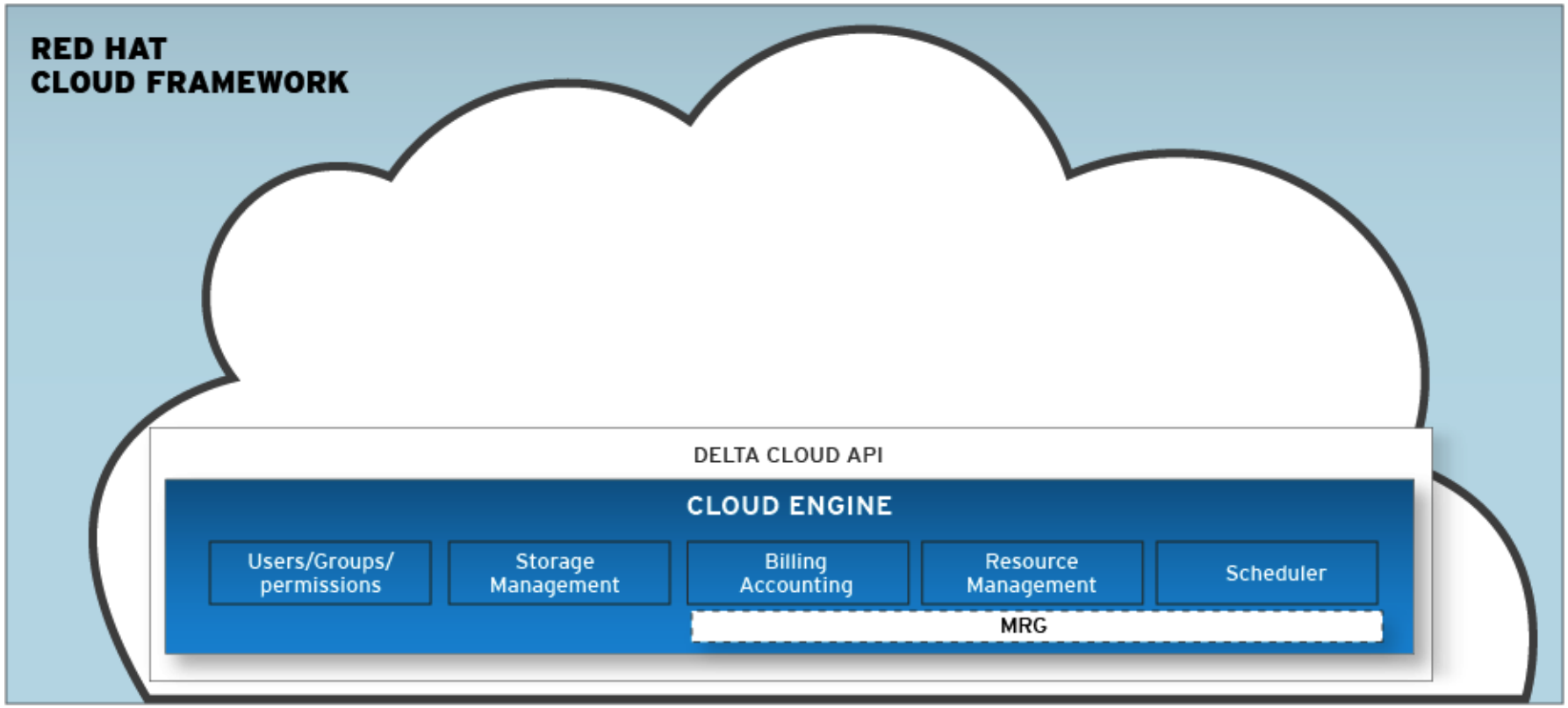


BUILD A PRIVATE CLOUD



CURRENT OFFERINGS
FUTURE OFFERINGS
PARTNER OFFERINGS

ROADMAP TO GREATER AGILITY



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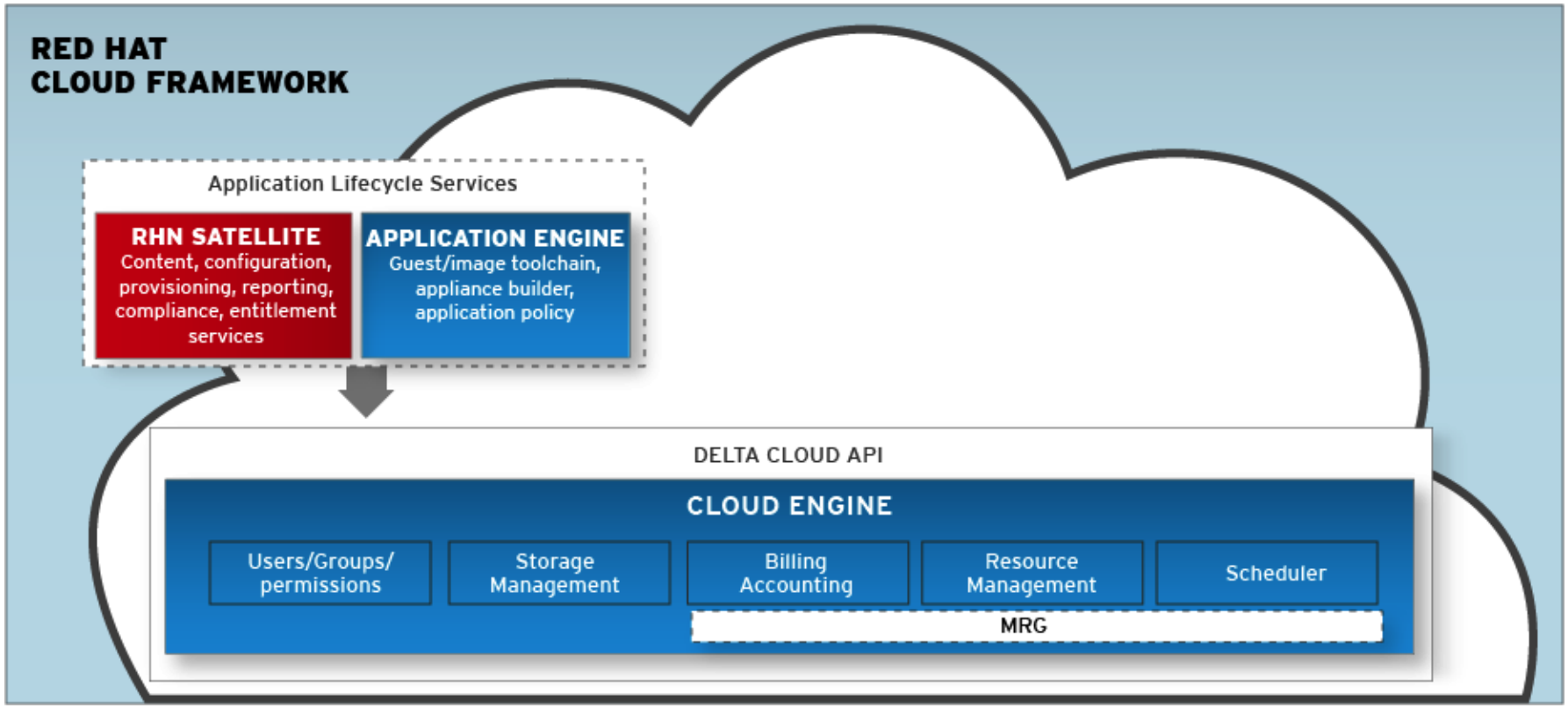

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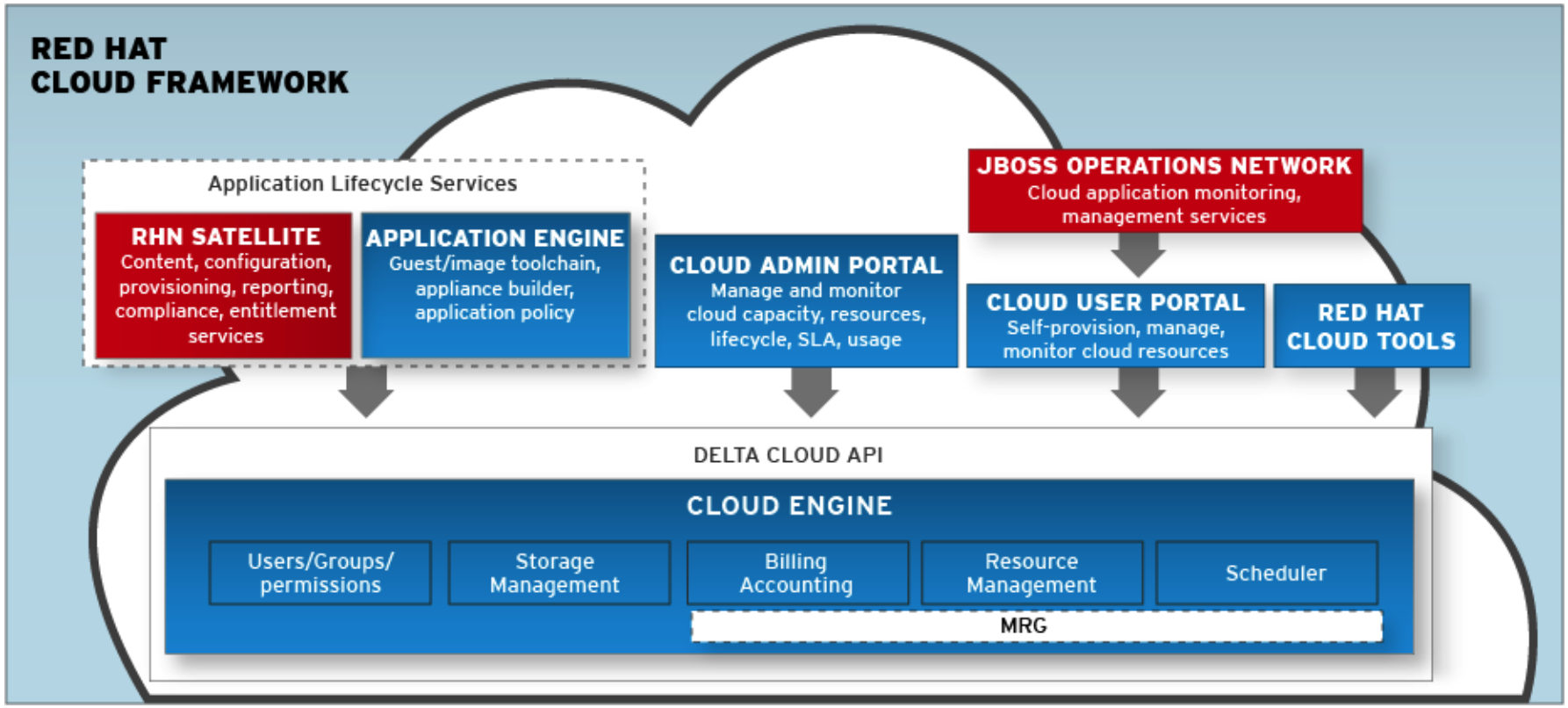

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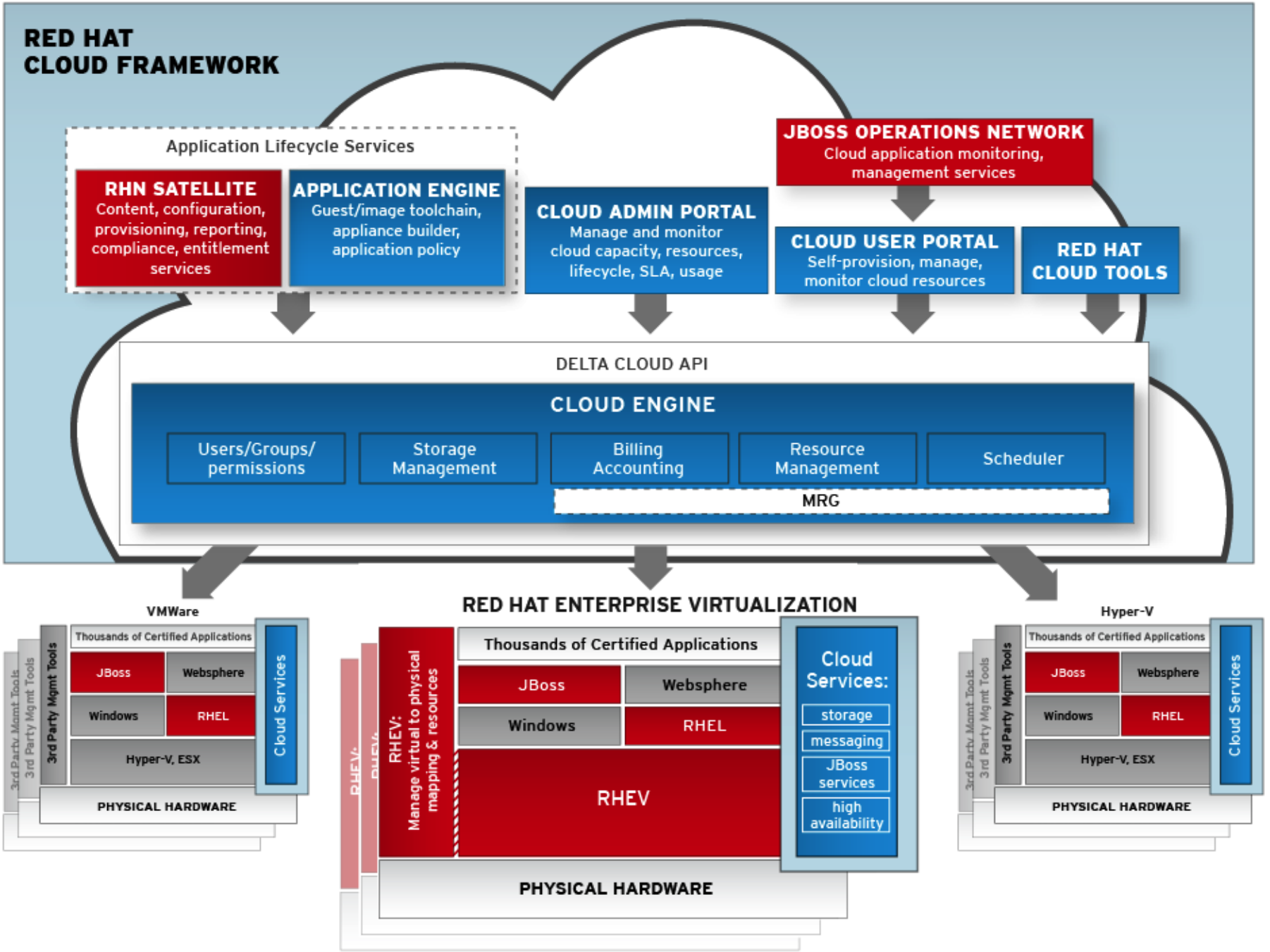

PHASE 3: UTILITY

CURRENT OFFERINGS
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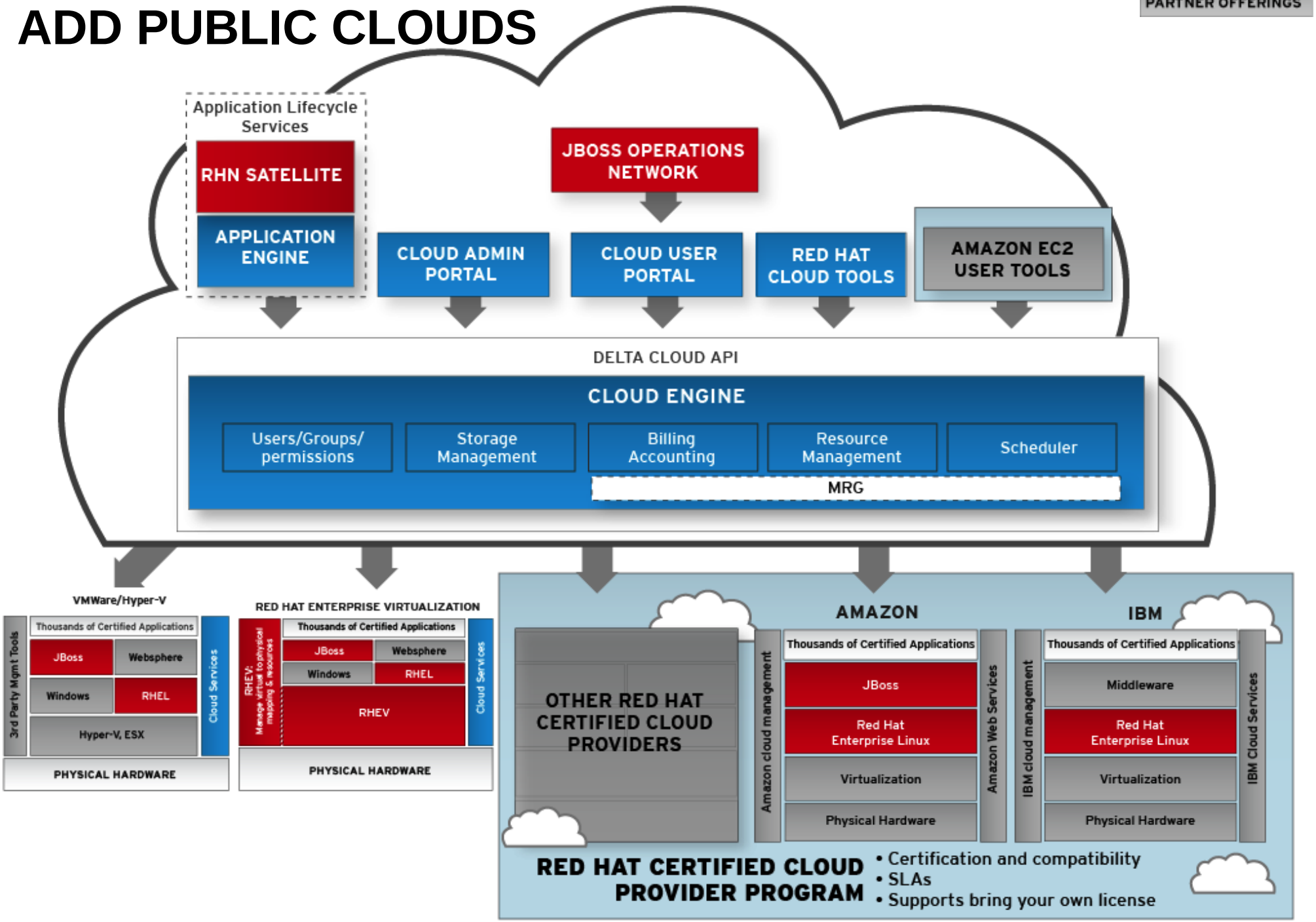
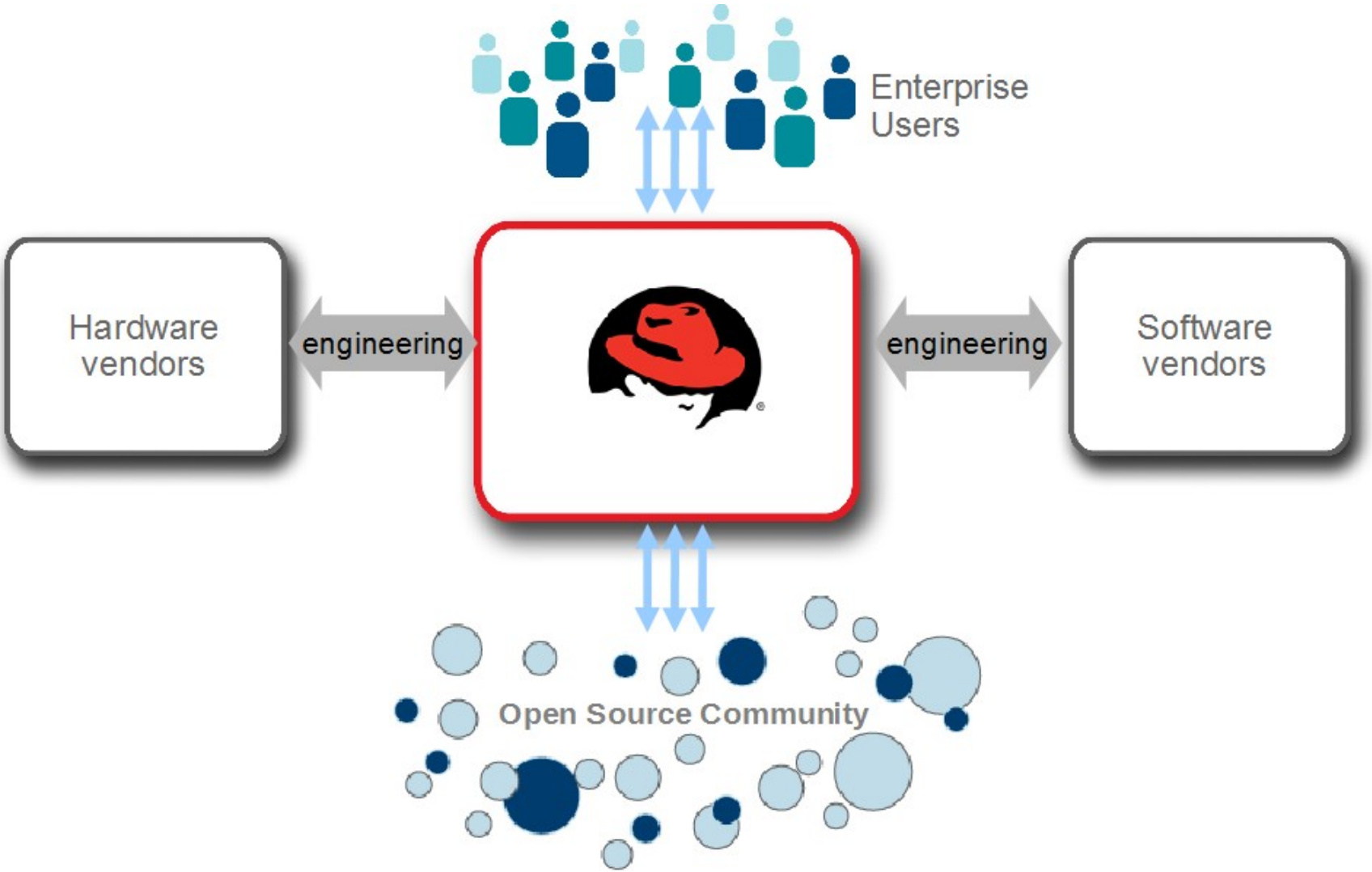
ADD PUBLIC CLOUDS



RED HAT BRINGS COMMUNITY, VENDORS, USERS TOGETHER



THANK YOU!

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http://www.redhat.com/rhev/