



Virtualization Advancement with Linux

LinuxCon Japan

Yokohama, June 7, 2012

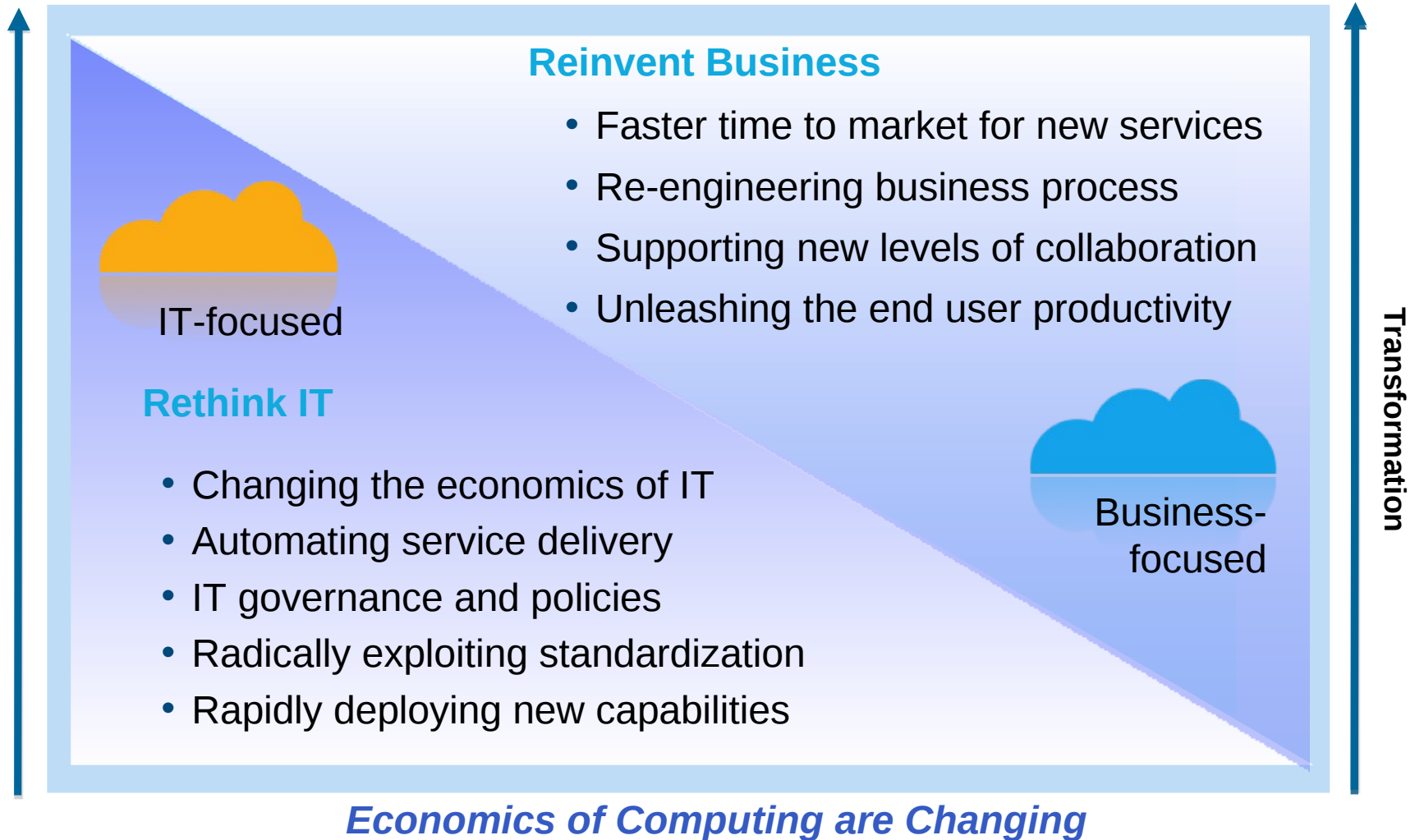
Jim Wasko

Director, IBM Linux Technology Center





Clients are rethinking IT and reinventing the way they do business





Virtualization advancement with Linux

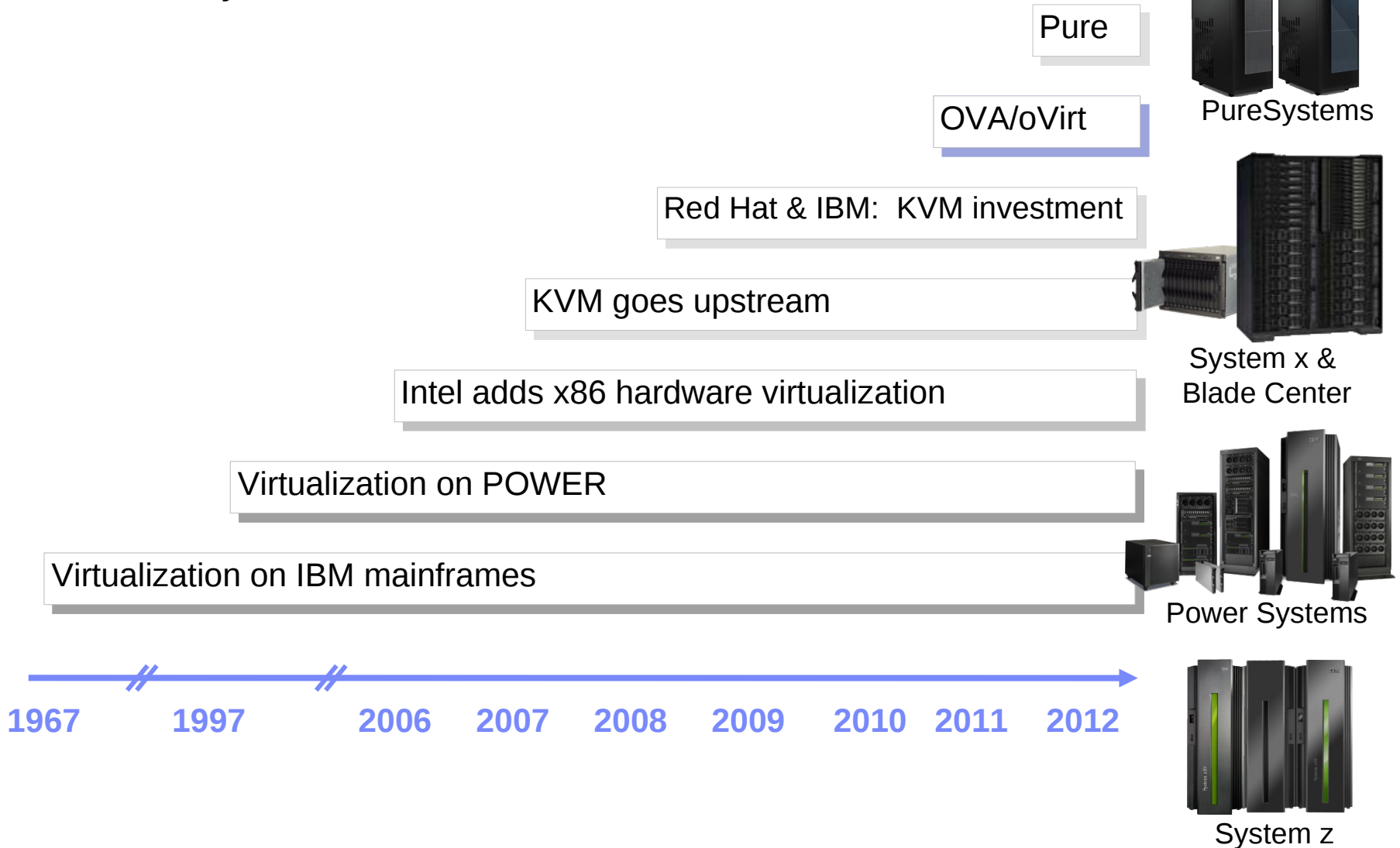
- **History of Virtualization and Linux Virtualization**
- **Recent KVM Advances**
- **Virtualization Management Advances**
- **Virtualization on large enterprise systems**
- **Virtualization for the Cloud**





IBM and Virtualization

A brief history of virtualization



Why would a client choose KVM ?

An Open Alternative

- Most recent step in the **evolution of x86 virtualization technology**
- An **open source alternative** to other hypervisors for both Windows and Linux workloads



A Smarter Choice

- Lower total **cost** of ownership compared to other providers
- **Enterprise-class** performance, scalability and security
- Technical leadership and business agility through **open source development community**
- **Open**: avoids vendor lock-in
- **Ecosystem** of Virtualization Management tools and ISV applications





Summary and Proof Points

KVM is Ready for Business

Performance

KVM published **94%** higher virtual machine consolidation in SPECvirt; KVM holds the **Top 7** virtual machine consolidation scores on SPECvirt ⁽¹⁾

Security

SE Linux enables KVM to provide Mandatory Access Control security between virtual machines

Lower Cost

KVM is **39%** cheaper over a 3-year TCO compared to competition ⁽²⁾



Cortal Consors
BNP PARIBAS

"We believe that Kernel-based Virtual Machine (KVM) is a truly high-performance virtualization technology, which fully exceeds our needs"

Anja Schaffer,
Director, Data Center International,
Cortal Consors



Brazilian Federal Highway Police (DPRF)

"In the final results, it offered us energy saving, easier management of assets and more availability for services. Compared to proprietary solutions, we saved more than 80% in the overall cost."

Lourival Filho,
Brazilian Federal Highway Police (DPRF)

(1) Source: SpecVirt_sc2010 results:

http://www.spec.org/virt_sc2010/results/specvirt_sc2010_perf.html

(2) Source: Red Hat Enterprise Virtualization for Servers: Competitive pricing guide, 2010



KVM Performance

- Tuned Performance of KVM is Excellent
 - ✓ Many examples

- Out-of-the-box Performance of KVM is poor
 - ✓ IBM, Red Hat, SuSE, Canonical, and others working to make this better

- Sweeping Generalities
 - ✓ KVM excels on large-memory, large-core systems
 - ✓ Excels with high-end I/O hardware
 - ✓ Strong virtual block I/O
 - ✓ Lags virtual network I/O (recent kernels fix this)

KVM Data Center Performance

- In a data center, hypervisor performance heavily influenced by data coming into and going out of the physical hardware
 - ✓ Data center design is just as important as hypervisor performance and tuning

- How you use KVM also effects how it performs
 - ✓ Guest provisioning practices and how they interact with storage and networking choices
 - ✓ Density of Virtual Machine loading on servers; how heavily to over-commit resources

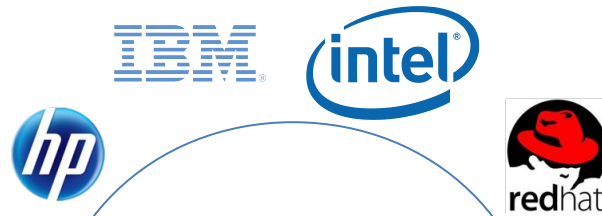


KVM is Gaining Momentum: the Open Virtualization Alliance

An alliance that includes leading...

- Virtualization
- Data Center and
- Cloud Solution Providers

Governing Members



250+ Members and counting!

to help...

- Increase overall **awareness** of KVM
- Drive the **adoption** of KVM based solutions
- Foster an **ecosystem** of third-party solutions around KVM.
- Encourage KVM **interoperability**
- Promote **Best Practices** and highlight **Customer Successes**



KVM Manageability

- Manageability has been a weakness for KVM
- Dramatic Improvement over the past 12 months
 - ✓ RHEV 3 from Red Hat
 - ✓ VMControl 2.4 from IBM
 - ✓ Smart Cloud Provisioning from IBM
 - ✓ xCAT, Moab from Adaptive Computing
 - ✓ Backup, p2v, v2v from Acronis
 - ✓ Red Hat KVM marketplace
- <http://marketplace.redhat.com/rhev/>



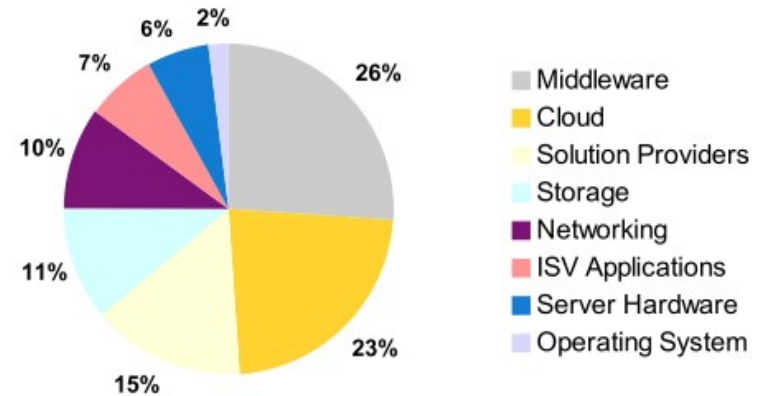
KVM is driven by industry organizations with strong membership and execution plans



- Increase **awareness** of KVM
- Drive the **adoption** of KVM based solutions
- Foster an **ecosystem** of solutions around KVM
- Encourage KVM **interoperability**
- Promote **Best Practices** and highlight **Customer Successes**

250+ Total Members
(as of 5/30/12)

OVA Membership by Type



OVA Key Activities:

- Events, Educational Webcasts, Analyst Papers, Case Studies, Press Releases, Web



Growth of an open virtualization ecosystem requires more than just a hypervisor

- Feature rich management platform
- Well defined APIs throughout the stack
- Active and OPEN development community
- Readily accessible systems and tools for all users
- 3rd party products that extend the hypervisor

oVirt Key Activities

- Initial seeding based on RHEV-M 3.0 Beta
- Components now available as open source
- Almost 4700 downloads
- First integrated community release: Feb 9, 2012
- Asia developer training tour happened in March (Beijing and Shanghai)



KVM adoption has increased sharply over the past 6 months

- **Drivers of adoption:**

- Technical progress of KVM Solutions
 - Improvements in RHEL 6.x over RHEL 5.x
 - Improvements in RHEV-M 3.0 over v2.2
- Derivation of trust and maturity as characteristics of KVM due to time in the marketplace
- Emerging view that KVM is a fundamental feature of the Linux Operating System
- Economic Factors
- Cloud computing



KVM Customer References

IBM

IBM References for KVM (hardware/software/cloud)



Brazilian Federal Highway Police (DPRF)



IBM Smart Cloud Enterprise



IBM Research Compute Cloud

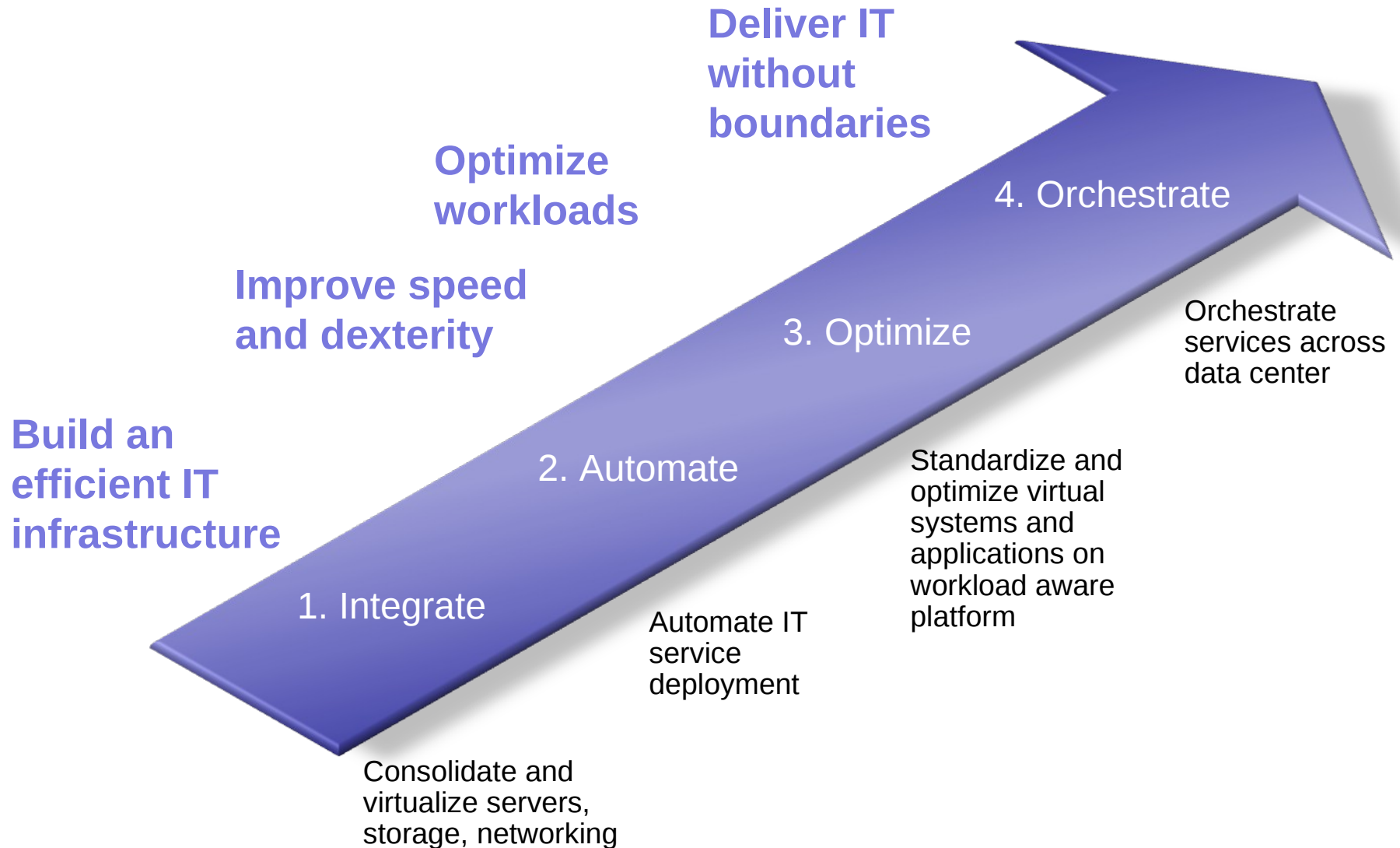
Industry

OVA non-IBM References for KVM (hardware/software/cloud)





Virtualization is the foundation of delivering higher value stages of Cloud



Case Study: IBM SmartCloud Enterprise

"KVM provides effective price points, enhanced scalability, and performance capabilities that are well suited to IBM enterprise needs"

- Jan Jackman, VP, Global Cloud Services, IBM Global Technology Services



IBM SmartCloud
Enterprise

- **Spans 8 datacenters**
- **1000 KVM hosts**
- **6000 Virtual Machines**
- **IBM System x iDataPlex servers**
- **Red Hat Enterprise Linux with KVM**

Agility and reducing risks

- Lower virtualization management costs
- Multi-tenant security

Higher quality services

- Supports both Windows and Linux
- Guaranteed quality of service for virtual machines

Doing more with less

- Economy of scale through low KVM unit cost
- Higher densities of virtual machines delivers scalability

Case Study: IBM Research Compute Cloud



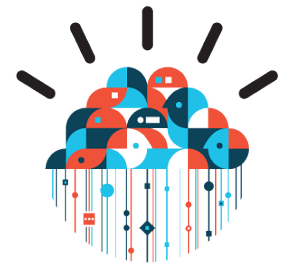
First and largest Cloud inside IBM

- Worldwide, on-demand and always available
- KVM chosen for cost, performance and stability of environment
- IBM Research Compute Cloud migrated from Xen to KVM with no disruption
- Over 200 iDataplex Nodes using KVM
- 2,000 concurrent instances
- 600+ custom images in Cloud Catalog
- Thousands of users across 39 countries
- IBM internal chargeback on IBM Research Compute Cloud usage

Linux virtualization is greatly expanding IT capabilities.

- KVM offers the function, performance, and flexibility needed across a broad range of solutions.
- The collaborative efforts around Linux virtualization are rapidly improving KVM and other components.
- Cloud and other solutions will build on Linux virtualization.

Thank you!



For any questions about IBM, Linux and Virtualization in Japan, please contact
Masahiro Furutera
Linux Alliance Manager, Global ISV, IBM Japan
furutera@jp.ibm.com



Legal

Trademarks and Disclaimers

The following are trademarks of the International Business Machines Corporation in the United States and/or other countries. For a complete list of IBM Trademarks, see www.ibm.com/legal/copytrade.shtml:

IBM, the IBM logo, BladeCenter, Calibrated Vectored Cooling, ClusterProven, Cool Blue, POWER, PowerExecutive, Predictive Failure Analysis, ServerProven, System p, System Storage, System x, System z, WebSphere, DB2 and Tivoli are trademarks of IBM Corporation in the United States and/or other countries. For a list of additional IBM trademarks, please see <http://www.ibm.com/legal/copytrade.shtml>.

The following are trademarks or registered trademarks of other companies:

Java and all Java based trademarks and logos are trademarks of Sun Microsystems, Inc., in the United States and other countries or both Microsoft, Windows, Windows NT and the Windows logo are registered trademarks of Microsoft Corporation in the United States, other countries, or both. Intel, Intel logo, Intel Inside, Intel Inside logo, Intel Centrino, Intel Centrino logo, Celeron, Intel Xeon, Intel SpeedStep, Itanium, and Pentium are trademarks or registered trademarks of Intel Corporation or its subsidiaries in the United States and other countries. UNIX is a registered trademark of The Open Group in the United States and other countries or both. Linux is a trademark of Linus Torvalds in the United States, other countries, or both. Cell Broadband Engine is a trademark of Sony Computer Entertainment Inc. InfiniBand is a trademark of the InfiniBand Trade Association.

Other company, product, or service names may be trademarks or service marks of others.

NOTES:

Linux penguin image courtesy of Larry Ewing (lewing@isc.tamu.edu) and [The GIMP](#)

Any performance data contained in this document was determined in a controlled environment. Actual results may vary significantly and are dependent on many factors including system hardware configuration and software design and configuration. Some measurements quoted in this document may have been made on development-level systems. There is no guarantee these measurements will be the same on generally-available systems. Users of this document should verify the applicable data for their specific environment.

IBM hardware products are manufactured from new parts, or new and serviceable used parts. Regardless, our warranty terms apply.

Information is provided "AS IS" without warranty of any kind.

All customer examples cited or described in this presentation are presented as illustrations of the manner in which some customers have used IBM products and the results they may have achieved. Actual environmental costs and performance characteristics will vary depending on individual customer configurations and conditions.

This publication was produced in the United States. IBM may not offer the products, services or features discussed in this document in other countries, and the information may be subject to change without notice. Consult your local IBM business contact for information on the product or services available in your area.

All statements regarding IBM's future direction and intent are subject to change or withdrawal without notice, and represent goals and objectives only.

Information about non-IBM products is obtained from the manufacturers of those products or their published announcements. IBM has not tested those products and cannot confirm the performance, compatibility, or any other claims related to non-IBM products. Questions on the capabilities of non-IBM products should be addressed to the suppliers of those products.

Prices are suggested US list prices and are subject to change without notice. Starting price may not include a hard drive, operating system or other features. Contact your IBM representative or Business Partner for the most current pricing in your geography.

Any proposed use of claims in this presentation outside of the United States must be reviewed by local IBM country counsel prior to such use.

The information could include technical inaccuracies or typographical errors. Changes are periodically made to the information herein; these changes will be incorporated in new editions of the publication. IBM may make improvements and/or changes in the product(s) and/or the program(s) described in this publication at any