INTRODUCTION

It is impossible to talk about the cloud-enabled future without focusing on virtualization. All cloud infrastructure—whether private, public, or hybrid—starts with a data center virtualization foundation. By selecting an open, flexible virtualization solution, you are building a data center environment that supports your company's needs today, while preparing your path for the future.

Unfortunately, some IT leaders may overlook virtualization technology as they focus on their journey to the cloud. They may continue to rely on proprietary virtualization platforms that may not be able to support their open hybrid cloud visions. In addition, a surprising number of IT departments continue to labor under the misapprehension that their Linux servers and applications are unsuited for virtualization.

In truth, today's sophisticated, open virtualization solutions can take businesses a long way toward meeting their IT and business objectives, while providing the foundation for an open cloud environment in the future. The right virtualization solution can streamline IT operations, improve application performance (for both Windows and Linux workloads), and cut costs, even before you implement any type of cloud.

In this white paper, we look at how an open data center virtualization solution can become the cornerstone of your IT optimization effort. We show how open virtualization can meet the needs of IT, as well as the business, while providing a foundation for long-term growth into the cloud. Finally, we review considerations for selecting a virtualization solution, with emphasis on HP and Red Hat integrated solutions.

ABOUT VIRTUALIZATION

Virtualization—the decoupling of application software and operating systems from the underlying server hardware—has been around for about 50 years, but has experienced a boost recently as enterprises look for ways to deliver IT services more cost-effectively and efficiently. Virtualization enables physical server resources (processor and memory) to be dynamically allocated among multiple applications and workloads. In a virtualized environment, applications are deployed as all-inclusive virtual machines (VMs), which contain application code, operating system, and configuration in a self-contained package. The simple “packaged” VM enables true data portability, allowing it to be moved and
loaded onto any hypervisor-equipped server hardware, via a management console, as easily as moving a data file.

**How Virtualization Addresses Top Data Center Challenges**

Like any major IT decision, the choice to virtualize the data center is less about what the technology is than about what it does—specifically, enterprises need to be convinced that implementation can solve their short- and long-term problems. In a 2013 Frost & Sullivan survey, IT decision-makers from across all U.S. market segments were asked to name their top three data center challenges; results are shown in Figure 1.

**Figure 1:**
Top-Ranked Data Center Challenges Cited by U.S. IT Decision-Makers

<table>
<thead>
<tr>
<th>Challenge</th>
<th>% of Respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Capital budget constraints</td>
<td>35%</td>
</tr>
<tr>
<td>Growth of data storage requirements</td>
<td>31%</td>
</tr>
<tr>
<td>Slow/poor performance of applications</td>
<td>30%</td>
</tr>
<tr>
<td>Keeping up with new technology</td>
<td>30%</td>
</tr>
<tr>
<td>High maintenance costs</td>
<td>28%</td>
</tr>
<tr>
<td>Aging, inefficient infrastructure</td>
<td>28%</td>
</tr>
<tr>
<td>Minimizing downtime/increasing...</td>
<td>25%</td>
</tr>
<tr>
<td>Managing multiple data center environments</td>
<td>16%</td>
</tr>
<tr>
<td>Delivering applications to remote users</td>
<td>16%</td>
</tr>
<tr>
<td>Administrative complexity</td>
<td>15%</td>
</tr>
<tr>
<td>Lack of infrastructure flexibility</td>
<td>15%</td>
</tr>
<tr>
<td>Scalability of dynamic applications</td>
<td>11%</td>
</tr>
</tbody>
</table>

*Source: Frost & Sullivan 2013 Cloud User Survey*

When we look at these challenges individually, it appears that virtualization can help solve, or at least mitigate, the majority of them:

**Capital budget constraints** – Virtualization defers investment in additional server hardware by maximizing use of existing equipment.

**Growth of data storage requirements** – By optimizing existing storage capacity, virtualization allows you to store more on less hardware. Some vendors’ solutions accommodate up to three times as much storage in the same footprint.

**Slow/poor performance of applications** – A lot of factors go into application
performance, including network, available system resources, protocol and coding, and server speed and capacity. To the extent that allocation of server resources plays a role, virtualization can help address this challenge. VM portability enables technicians to quickly respond to capacity constraints by moving the VM to another server.

**Keeping up with the latest technology** and optimizations can be addressed with the right technology partner. An experienced partner with leadership and expertise in the full range of data center infrastructure models (from traditional data center virtualization, to an open private cloud, to an open hybrid cloud) can help you understand your options and develop an effective IT roadmap.

**High maintenance costs** – Simplified deployment and administration of apps, and less hardware, help virtualization reduce maintenance costs.

**Aging, inefficient servers/equipment** – Virtualization can extend the useful life of your aging servers by maximizing utilization of capacity. As you replace hardware, you can select efficient servers designed for a high-density virtualized environment; this will ensure that you continue to get the most from your infrastructure. In many cases, virtualization can actually deliver greater performance than applications installed on bare metal servers.

**Minimizing downtime/increasing availability of applications** – Virtualization can be a vital part of a high-availability strategy. Portability of VMs can eliminate planned downtime for critical applications. A virtualized environment also should easily integrate into your backup and recovery solutions.

**Managing multiple environments** – The right virtualization solution offers a path toward effective management of a heterogeneous environment; one that may include public, private, and hybrid clouds, as well as on-premises and hosted facilities.

**Delivering applications to remote users** – The right virtualization platform ensures that authorized users have secure access to their applications and data, while guarding against data breaches, simultaneously helping businesses adhere to data privacy and security regulations.

**Administrative complexity** – The best virtualization solutions will eliminate the need for separate administrative processes and tools for different operating systems and infrastructure configurations. They will include robust toolsets that automate and simplify tasks associated with provisioning infrastructure and building, deploying, and managing virtual workloads. User-friendly management consoles minimize the need for technical specialization, allowing for staffing flexibility.

**Lack of infrastructure flexibility** – An open virtualization solution offers the flexibility to meet your heterogeneous workload requirements. It should equally support Windows and Linux operating systems, servers and desktop environments. Furthermore, it should provide an open and extensible framework of Application Programming Interfaces (APIs) that allow customization with your unique infrastructure.
Scalability of dynamic applications – A virtualized workload can be replicated and deployed in minutes, enabling you to quickly scale up or scale down in response to changing needs.

How Virtualization Benefits the Business

An open virtualization solution must benefit more than the IT department to earn the support of your company’s senior business leaders. Today’s IT department is more than simply a cost center; it is transforming into a strategic, value-added organization that is deeply invested in the overall business goals. For this reason, savvy IT leaders seek to understand how virtualization technology solutions will benefit the business as a whole. Some business benefits of virtualization include the following:

- **Increase business agility** – In a traditional data center environment, requests from line of business managers for new or expanded applications trigger an onerous, lengthy process that includes requisitioning capital budget for new infrastructure purchases; procuring and provisioning the hardware; deploying application software in a test environment; and, finally, deploying the application to production. Because a virtualized environment reduces and eliminates a number of these steps, IT is able to immediately support, rather than thwart, the business’s need to move quickly in response to business demands and market conditions.

- **Support innovation** – In today’s business environment, IT has the opportunity to drive innovation and differentiation through technology initiatives such as collaboration, mobility, and analytics. However, as long as IT resources (budget and people) are tied up in keeping current workloads running, there is little room for new initiatives. Virtualization can free up budget (capital and operating), as well as valuable time, giving technical staff the freedom to explore ways to innovate and grow the business.

- **Establish internal service level agreements** – A well functioning virtualized infrastructure can offer the degree of consistency that IT needs to build SLAs for internal LoB clients. An SLA associated with time-to-provision a new application will win support from LoB managers. Thanks to the easy scalability of the virtualized environment, IT can also establish objectives or SLAs associated with application performance during peak times.

- **Support around-the-clock business operations** – As the concept of the “business day” collapses under the more demanding expectations of employees, customers, and partners, even routine maintenance outages are unacceptable. Since virtualization supports portability, workloads can be easily moved among servers or even to new locations, enabling applications to remain live even during maintenance tasks. Virtualization can also facilitate disaster recovery plans, ensuring that workloads are quickly brought back on line following an unexpected disruption.
Who is Using Virtualization?

Not surprisingly, virtualization has gained a significant following among IT decision-makers. According to a Frost & Sullivan survey, nearly 60 percent of U.S. businesses currently utilize virtualization in their data centers, or plan to implement it.

As shown in Figure 2, Windows workloads represent the highest percentage of virtualized workloads, at 73 percent. Yet, use of Linux virtualization is growing at a faster pace. As a percentage of total virtualized workloads, Linux will increase by 25 percent over the next three to five years, compared with a four percent decline for Windows. Figure 2 shows the split among virtualized workloads, along with future plans, as reported by respondents to the Frost & Sullivan user survey.

Figure 2: Split Among Virtualized Workloads, by Operating System

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VIRTUALIZATION AND THE CLOUD: WHICH IS RIGHT FOR YOUR BUSINESS NOW?

Virtualization is the foundation to cloud architecture, and therefore is vital to your long-term IT roadmap, which will likely include cloud environments. However, that does not mean that your business requires a private cloud to meet its needs today. Each company must evaluate its business demands and determine its own journey to the cloud.

Currently, virtualized data centers far outpace private clouds. Whereas more than half of businesses currently utilize server virtualization in their data centers, just 10 percent have implemented a private cloud. As shown in Figure 3, the responses of IT decision-makers reflect a range of plans and perceptions about the private cloud.

**Figure 3: Implementation and Plans to Implement a Private Cloud**

The results indicate that, although cloud computing is still in its early stages, the majority of businesses are evaluating the model with an eye to including it in their future plans. As such, even as they reap the benefits of data center virtualization, it is important that they invest in a platform that will facilitate growth in the future.

*Source: Frost & Sullivan 2013 Cloud User Survey*
WHAT TO LOOK FOR IN A VIRTUALIZATION PLATFORM

Savvy IT leaders continue to invest in their data center virtualization solutions, looking for ways to continue to add efficiencies, reduce costs, and improve performance. In addition, they install virtualization platforms that pave the way for future evolution, including providing a path to an open private cloud, and even open hybrid clouds.

In researching best-of-breed virtualization platforms, look for the following characteristics:

▪ **Open** – While a number of leading virtualization providers have proprietary platforms, you can better protect your business by choosing an open virtualization platform to support your heterogeneous, multi-vendor environment. An open virtualization platform will enable you to avoid vendor lock-in, while providing a foundation for future growth to an open hybrid cloud, at your pace, on your terms, when you are ready.

▪ **High Performance** – A key benefit of virtualization is that it maximizes hardware utilization and application performance. For both Windows and Linux workloads, the Kernel-Based Virtual Machine (KVM) hypervisor technology offers superior scalability and maximum hardware utilization. Ask vendors to support performance claims with third-party statistics that show actual performance improvement.

▪ **Flexible** – It is not necessary to implement different virtualization solutions for your Linux and Windows workloads. Instead, choose a flexible, open virtualization platform that can support all your virtualized servers and desktops, Linux and Windows.

▪ **Management and administrative tools** – Look for comprehensive management tools that offer sophisticated functionality within a simple user interface. To minimize the management burden and training time, choose a platform that easily integrates with your existing infrastructure.

▪ **Forward-looking** – Even if you have no current plans to move into the cloud, planning for that eventuality provides choice and a flexible foundation. Choose a virtualization solution that supports cloud environments—one that facilitates movement of applications and workloads into the cloud, when you are ready.

The Value of a Converged Virtualization Solution

Virtualization increases data center density, allowing you to run more applications and workloads within the same footprint. While a flexible virtualization platform can work with nearly any server—even the existing hardware assets currently within your data center—you will maximize your results by choosing hardware that is designed to support...
virtualization. High performance servers and storage system are built to maximize capacity utilization. A converged solution that is pre-engineered to work with a specific virtualization platform also has the advantage of “plug and play” installation, increasing time-to-value—factors that can offset the higher cost of a converged solution compared to a do-it-yourself installation of the virtualization solution on a generic server.

**WHY HP AND RHEV VIRTUALIZATION SOLUTION?**

Enterprises looking to get the most from their virtualized data center would do well to consider a solution that combines HP infrastructure and Red Hat Enterprise Virtualization (RHEV).

As the leader in open source virtualization, RHEV is built upon open standards, offering you the flexibility to integrate RHEV with your existing data center infrastructure assets. RHEV supports a broad range of Red Hat Linux and Windows operating systems; and since it utilizes the powerful KVM hypervisor technology, it can scale to hundreds of hosts and thousands of virtual machines, without performance degradation. This means you can confidently run your applications on fewer servers, incurring less capital, operating and maintenance costs.

Red Hat continues to invest in the RHEV platform to improve its performance, functionality, and usability. Its latest release, version 3.2, includes enhancements to its management tools, networking, and storage capabilities. The version furthers its already highly extensible management framework, adding new plug-in architecture to the graphical user interface that provides integration with third party management tools, such as HP Insight Control. With enterprise features such as storage, live migration, live snapshots of VMs, and automated load balancing, RHEV continues to exhibit industry-leading performance, as measured by an industry-recognized third-party testing firm.

To help businesses truly maximize the value of RHEV and derive the lowest total cost of ownership, Red Hat has partnered with HP, a leader in data center solutions. HP's ConvergedSystem 700x solution is an integrated solution that optimizes HP’s high-performance ProLiant servers and 3Par storage to support virtualized workloads. HP ConvergedSystem 700x solutions are pre-engineered to support leading hypervisors.

The HP RA for Red Hat Enterprise Virtualization on HP ConvergedSystem 700x delivers a reference architecture for a seamless solution that has been tested and certified by HP and Red Hat, allowing you to focus on improving your business. Furthermore, future versions of both the hardware and software are assured to work together, allowing users to avoid the frustration associated with labor-intensive, out-of-synch refresh schedules. Because the server and virtualization software are designed to work together, there is little “friction” that can negatively impact application performance. Instead, data moves seamlessly through each touchpoint. This maximizes the value of the virtualized data center.
Many businesses find that traditional data center virtualization continues to offer a cost-effective way to meet their current business demands and support short-term business goals.

For most enterprises, the keys to a successful virtualized infrastructure are flexibility and performance. Choose an open virtualization solution that enables you to operate across multiple environments, today and in the future. In addition, be sure your solution optimizes resource utilization so you can run the maximum number of virtual machines in the minimal amount of space. Finally, ensure that the solution scales effectively so that you do not experience performance degradation as your business demands increase.

By selecting a converged solution like HP ConvergedSystem 700x for deploying Red Hat Enterprise Virtualization, you can be assured of a powerful, yet flexible, virtualization environment that will grow with you, all the way to the cloud. In doing so, you are serving your company’s interests, now and in the future.

Lynda Stadtmueller
Program Director – Cloud Computing
Stratecast | Frost & Sullivan
lstadtmueller@stratecast.com

To learn more about HP and Red Hat virtualization solutions, click here.
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Frost & Sullivan
331 E. Evelyn Ave. Suite 100
Mountain View, CA 94041