



HRG Assessment Linux Migration

Introduction

The migration from proprietary UNIX and legacy hardware and software-based environments to Linux on x86 Intel architecture (IA) is an effective way to take cost and complexity out of IT. Recently HRG interviewed IT professionals, hardware vendors, and software vendors who have been or soon will be involved in migrations to Linux. This paper explores migration to Linux as well as server, application, and work load virtualization and consolidation as customers search for more effective ways to remove cost and complexity from their information technology infrastructure.

Observations

For companies with more than a billion dollars in annual revenue, deciding which platforms, applications, and workloads to migrate--and when to migrate them--is a decision typically made by a team of business and technology experts. When HRG asked about the business drivers that prompted customers to consider migration these experts highlight both capital and operational efficiency as two key benefits of migration.

Many Java-based applications have already been migrated or are targeted for migration. Java applications are among the easiest applications to migrate--much easier than migrating C or C++ applications, for example. A Java application migration takes, on average, 3 to 5 weeks. This is primarily because Java-based applications, like those based on PHP, Perl, Ruby, or Python, use interpreters and are not compiled for specific platforms.

Most of the companies HRG interviewed for this study said that they prefer to migrate applications when new versions of the applications are made available or as licenses come up for renewal in an effort to minimize business disruptions. In addition this more gradual approach allows companies to migrate individual applications in a controlled manner there by avoiding any potentially unpleasant surprises.

The perception of Linux and x86 IA has changed significantly since the introduction of Linux as an alternative to more complex and costly proprietary enterprise server operating systems. It comes as no surprise that Linux is increasingly the operating system of choice for new deployments. With the current generation of multi-core chips that Intel, AMD, and IBM offer, Linux on x86 IA and Power is truly an enterprise-class cost-effective alternative to proprietary RISC UNIX platforms.

Migrating from Solaris to Linux

IT professionals need to verify the certification status of any ISV applications for Linux when planning a migration from Solaris to Linux. If an ISV certifies the applications that will be migrated are tested for, and

supported on Linux, then the migration of that application should be straightforward. If the ISV has not tested and does not provide support for that application on Linux then an alternative application should be selected. In the case that an alternative application solution is not available then an experienced migration partner should be sought out to assist with the migration.

More and more Solaris to Linux migrations are being driven by Oracle's acquisition of Sun. The perception is that Oracle licensing practices may lead to price hikes and as a result customers have expressed concern over a potential cost increase. This concern has already motivated some customers to migrate off of their Sun Solaris platforms.

Customers that have migrated from proprietary UNIX systems to Linux are satisfied with the outcome based on the reduction in TCO, increases in operational responsiveness and efficiency, and improved ROI for IT infrastructure capital expenditures. In addition, IT decision-makers are satisfied when migrating to the new Xeon 7500 series processor based IA platforms running Red Hat Enterprise Linux (RHEL) because of the improved features, functionality, and workload capabilities.

When migrating users from Solaris to Linux, TCO/ROI benefits are key factors. However many Sun Solaris customers express concern over the uncertainty surrounding the future of Solaris on x86 IA. With some this concern takes precedence over TCO, ROI, or even environmental concerns as they make plans to avoid being stuck on a potentially dead-end platform with no support. In addition, IT shops are migrating at an increasing rate in order to take advantage of the performance and manageability gains delivered by Linux on x86 IA platforms. HRG sees Red Hat Enterprise Linux on Intel as a proven alternative to previous generation UNIX RISC systems and unlike Solaris on x86 IA Red Hat Enterprise Linux is fully certified and supported on that platform.

HRG asked IT professionals to rate each of the following selected decision factors (see table below) with regard to their importance when planning to migrate applications, workloads, and compute infrastructure components to Linux. Ratings were done using a scale of 1-6, where 1 is least important and 6 is critical.

Cost of ownership and return on investment were ranked as most important (5.2), followed by performance and anticipated loss of control (5.1). Virtualization was rated as less important (3.5), perhaps due to a lack of understanding of the TCO, ROI, and operational benefits that can be realized through implementing a best practices-based virtualization strategy.

Factor	Average
Cost-of ownership / Return on investment	5.2
Performance	5.1
Anticipated loss of control	5.1
Security	4.7
Potential service disruption	4.6
Barriers to change	4.5
New business applications and initiatives	4.4
Technical concerns	4.3
Business and technology strategy:	4.3
Datacenter space and energy optimization	4.0
Virtualization	3.5

Moving SAP to Linux on IA

Some customers are considering migration of their SAP enterprise application workloads from UNIX to Linux on IA or Linux on the mainframe. These customers plan to migrate their applications and leave their data where it is for now. This gives them the flexibility to test the features and functionality of Linux before committing to a complete infrastructure migration. This is particularly relevant for large enterprise customers who have SAP systems hosted on large Sun servers with Oracle as the backend database. Many of these customers have expressed concern over the future of their installed Sun systems and are now looking for alternatives. Once these customers are satisfied with the performance and RAS features of the current generation of Linux IA platforms, they will either migrate their data base to these new x86 IA platforms or to Linux on the mainframe perhaps running Linux in a logical partition (LPAR) on an IBM System Z mainframe.

Healthcare

Healthcare is a relatively conservative industry, and can be slow to embrace leading-edge industry trends. Healthcare customers should approach migrating business critical workloads carefully, due to the weight of regulation, deep concern for information security, and potential for litigation. Healthcare systems in use by hospitals, HMO's, insurance providers and government agencies / regulators are typically large complex software applications involving strictly-controlled patient records and Electronic Medical Records (EMR). Many of these applications are either highly customized or uniquely configured and as a result are expected to move slowly to Linux over time. The move to Linux in healthcare will be driven in an effort to reduce cost, improve productivity and efficiency, and deliver more responsive user friendly end user focused capabilities.

Moving to Linux on the Mainframe

Interview - Health Benefits Provider

This Health Benefits provider is evaluating Linux as a viable long-term platform to ensure that it will save them money. They plan to host new applications on Linux instead of AIX. Applications certified for Linux that can run in multiple environments are good candidates for migration and rehosting to Linux when a new release becomes available. IBM Websphere is an application that can be moved to Linux in this manner. They will wait for the next release, and rehost the application on Linux at that time.

IBM MQ, Websphere Application Server, and Java-based applications have moved to Linux. They are doing a limited migration with Oracle RAC. They are running Websphere MQ on AIX and plan to migrate it to a Linux partition on the mainframe.

Over the next 3 to 5 years as applications and platforms come up for refresh, they will decide if moving them to Linux makes sense. They will move from AIX to Linux on the mainframe if the cost model works in their favor. Part of their migration plan is to consolidate disparate systems which were inherited through a series of acquisitions. They use VMware for virtualization and consolidation on Intel in order to reduce costs and improve server utilization. They feel that the security on Red Hat Enterprise Linux is fine. It has been evaluated and approved by their in-house security team.

They have had good experience with Red Hat Enterprise Linux. They go through IBM for Red Hat Enterprise Linux support and they also have an enterprise agreement with Red Hat. Full support and the ability to get an enterprise agreement (including 2-hour response time if they discovered a bug in the operating system) are critical. Free Linux is out of the question.

Standards and system standardization are very important. Standardizing on Linux will reduce administrative and management costs and provide more sustainable levels of service.

They have looked into cloud computing but because they are a healthcare company they have huge concerns about security and privacy issues in the cloud. They may engage in the cloud for specific activities with other vendors. A pilot planned with Amazon, for example, allows collaboration between medical providers in the cloud.

Financial Services

The financial industry leads the healthcare industry in terms of the number of migrations of core workloads to Linux. There is some variation based on which software applications or workloads are being considered for migration. In a number of cases large back-end databases are being kept where they are for now perhaps until more hands-on experience and peer references accumulate. In financial services users are beginning to migrate COBOL-based application workloads to Linux. However, due to the size and complexity of many of these applications these migrations are not moving at a rapid pace.

Moving to Linux on x86 IA

Interview - Large Bank

Every five-to-seven years as applications are refreshed or new releases are available, the company decides on a case-by-case basis which application and information management software environments they will migrate to Linux. Workloads with a high number of instances such as WebSphere (J2EE), web serving (non IIS/Windows), and Oracle are targeted for Linux migration. All new business will be on Linux or Windows. zOS on the mainframe is still a strategic part of their IT infrastructure. Migrations are considered at the refresh of all UNIX applications.

Currently only VSAM, CICS, and Cobol are not candidates for migration to Linux or Windows. DB2 on AIX will be considered for migration to Linux in the near future.

Benefits of moving to Linux include:

- *Lower cost*
- *Fewer H/W SKUs (For example, the cost per server is less on x64 than on proprietary UNIX boxes.)*

Challenges include:

- *Organizational awareness*
- *Platform maturity*
- *Staff experience (Updated UNIX systems administration skills are required for migrating, managing, and maintaining Linux.)*

As a large financial corporation, they would not consider free Linux offerings and prefer Red Hat Enterprise Linux because of the available support and application certifications.

They desire multi-platform ISV solutions that allow them to run applications on the most appropriate hardware/OS platform. On the infrastructure side, they choose the platform, not the middleware. Initial Linux target workloads have been selected that are cross-platform with little or no developer impact.

Key ISVs considered in strategic IT planning and implementation include Oracle, Microsoft, IBM, and VMware.

Evaluating Red Hat Enterprise Linux on IBM Z series

Interview - Credit Card Company

This US-based credit card company is running Red Hat Enterprise Linux 5 on most servers. They are virtualizing with VMware ESX, and are moving Java and dot.net Windows workloads over to Linux. They are well-past the planning stage, and are implementing on the server side. In addition, they are considering opening up an IBM System z Linux virtualization platform.

Thousands of applications and workloads will be moved to Linux. This is in the implementation phase. The interviewee was not able to provide an example of an application that would not be moved to Linux.

Nearly the entire datacenter will be moved over to Linux from Windows. UNIX is only between 1 and 2% of the current workload.

Portability is the primary reason for moving to Linux. Applications can be moved from an Intel box to a Z box without much work because they are all running Linux. They prefer the IBM System z system chip sets on Linux.

The skills required for migrating, managing, and maintaining Linux include system programmer skills, middleware support skills, project management work, and more.

This company is moving toward becoming a pure IBM shop. They are also moving from Windows and UNIX operating systems to mostly Red Hat Enterprise Linux. They have not yet developed a plan to use more of the System z chip sets to replace their IA systems.

Moving from Solaris to Linux

Interview - Financial services company

This financial information and services company is getting ready to evaluate which Solaris applications can be migrated to Linux. They intend to complete their migration plan in 2010. There is a very high likelihood that they will start migrating to Linux applications this year, although the overall business climate may dictate the timing of this planned migration.

They are a Solaris shop and uncertain about the future of Solaris. The Oracle acquisition is driving them to evaluate options. This, the industry trend toward Linux, and the potential savings are the main reasons they are evaluating Linux at this time.

Solaris applications, including financial and market tracking tools, are the ones being considered for migration to Linux. They have some distribution-related applications on Linux already.

They are not planning to migrate any workloads to Windows. Windows is used on the desktop. Users access their Solaris applications through their Windows desktop and use Windows for email and word processing.

Just the Solaris applications will be migrated to Linux.- Non-Solaris applications workloads are not candidates for migrating to Linux or Windows.

Linux is viewed as a way to reduce overall technology expenses and increase productivity. The company also likes the overall reliability of the operating system, its hardware portability (more choices), and the number of applications available.

Plans are to migrate to more Linux-based systems over time.

The company is just getting started with virtualization--primarily for developers. They are using Solaris Containers. They use a lot of freeware and also have internally-developed applications that run on Solaris and Linux. They have about 70-80 system administrators and application developers/maintainers on-staff. These people will need some training to get familiar with Linux before they can effectively run their business on Linux.

They have a skilled staff so they believe they have the necessary skills to migrate to, manage, and maintain Linux. They will need some training to get familiar with differences between Linux and Solaris.

Cost reduction is the key benefit associated with migrating to a Linux IA based platform for application development.

Moving to Linux on x86 IA

Interview - Oil and Gas Company

This Large oil and gas company has some systems running on RHEL 4 and others that are moving to RHEL 5. As an organization they are committed to RHEL 5 and are buying new hardware as well. They are buying systems with Intel's Xeon 7500 series processor technology to run Red Hat Enterprise Linux version 5 on. The applications they are running on Linux are the typical geophysical and geological applications that many in the Petroleum / Energy sector run.

They have some critical applications running on Windows 2008 servers which are used for 3D modeling for the oil and gas industry and they are not planning to migrate those applications to Linux. There are technical applications used by engineers that only run on Windows and there are no plans to migrate those to Linux. The other side of their business is geologists and engineers and they are used to Microsoft productivity tools and there are tools that they use that only run on top of Microsoft Windows that they use for productivity. They do no in-house software development and only buy best-of-breed application solution software. They run Windows thin clients with back-end servers running Linux in a manner that is very similar to Citrix. They have high-end graphic servers that run Windows supported by high end Linux servers running middleware in a manner that is similar to VMware running on Windows but with the underlying technology being Linux. Their Linux infrastructure supports thin client applications that are Windows-based (64-bit).

7 years ago they started migrating from SGI on Solaris to Red Hat Enterprise Linux. They started with clusters and now the remaining Oracle servers are being migrated to Red Hat Linux. They also have Windows but for a different environment. Today there are only a handful of applications running on Solaris compared to 1000s of machines running other OSs. They don't pay maintenance on Solaris any longer. Workloads on Solaris comprise less than one percent of their total workloads. The workloads on Window/Linux is about half with the Windows mix being the customer desktop. They consider proprietary applications to be too expensive and a single point of failure.

They have migrated approximately 50% of their applications, workloads, and compute infrastructure components to Linux.

ISV applications that have not been ported to Linux will be migrated as soon as versions of those applications are available for Linux.

They went to Linux because of open source, price, and performance. Proprietary systems are just too expensive and they don't move that fast. Price and on-going maintenance expenses are a big reason for moving to a Linux system vs. a proprietary system. Linux is very strategic for them.

The support provided by Red Hat is a key benefit when migrating to Linux IA platforms.

They do not use free software because they are a business and need solid support which is critical for them. They need support for availability of the HW and the OS and the ISV certification and they see Red Hat has the vendor (ISV and Hardware) backing that is critical to their company. It is critical that all components work together.

Key strategic ISVs are Halliburton/Landmark Graphics Corp and Schlumberger. These companies are embedded in their company and provide the major software components of their IT architecture.

They are committed to using Intel based systems.

They use cloud computing for some web enabled applications however they continue to rely heavily on in-house applications for graphics and image rendering. In their opinion cloud computing really can't support image rendering applications today. They do not feel that cloud computing is appropriate for the oil and gas business today but perhaps in the future if the infrastructure that underpins cloud computing can support sub-second response times and high throughput data they will reconsider.

Telecommunications

Large telecommunications companies are starting to rewrite and migrate applications to Linux. Many customers in the telecommunications industry initially moved off of Sun Solaris SPARC servers onto Solaris on x86 IA servers. Now we are seeing some of those same customers considering, planning, and executing a move from Solaris to Linux on x86 IA as their platform of choice. Red Hat customers in the telecommunications industry rely on Red Hat Enterprise Linux to provide the required levels of scalability, reliability, performance, availability, and security. These key capabilities, as well as reduced latency and robust throughput, are just some of the functionality that Red Hat Enterprise Linux is successfully delivering for customers in the telecommunication industry.

Mission-critical and highly customized applications

Many applications and workloads that remain on proprietary platforms are core mission-critical applications that require a deliberate and rigorous migration approach. These applications and workloads are now starting to move over to Linux. The introduction of the Intel Xeon 7500 series processor, in conjunction with the significant technical advances made by Linux vendors like Red Hat, encourages these migrations. Customers find that choosing Linux allows them to explore cutting-edge virtualization technology, while maintaining (or improving) reliability, scalability, availability, throughput, and security standards. Now that many of the easy-to-migrate workloads have moved to Linux, we are seeing larger enterprise workloads like ERP, CRM, financial, and medical systems starting to move to Linux.

The migration of highly customized, in-house applications takes significantly longer than the migration of standardized software solutions. Custom, in-house software may lack proper, complete documentation, and this coupled with complex or poorly written code, may require extensive discovery and analysis when migrating complex workloads.

WebSphere, Peoplesoft, SAP, applications written in C++, and older, large and complex applications take longer to migrate. However, consultants involved with migrations to Linux have told HRG that the larger the enterprise, the faster the ROI and large organizations that migrate to Linux are seeing ROI in the range of 25-30% per year.

Mainframe class customers

Customers with larger mainframe systems are partitioning their mainframe applications, and then moving a portion of the partitioned application workload to Linux. For example, a large financial services customer was initially running everything on the mainframe. They realized they could benefit by moving a partition of applications off the mainframe. They maintained the database and all of the connections to it on the mainframe, but the application code was moved to Linux on IA, saving a substantial amount of money on licenses.

Historically, mainframe shops have searched for ways to do more with less: controlling costs and reducing energy consumption, real estate / space requirements, and environmental conditioning and HVAC requirements. With recent announcements from Red Hat, Intel, and AMD there is now an alternative for mainframe-bound workloads. Customers who take advantage of server virtualization and workload consolidation require fewer resources to support the same levels of functionality, throughput, availability, performance, and security. The result is a new generation of Linux platforms, delivering substantial cost reduction as well as meaningful savings in energy, environmental conditioning, and physical space requirements.

Migration to Linux on IA

Since the introduction of Intel Xeon 7500 series processors in early 2010, many pre-recession systems (systems that have been in place for three or more years) are being migrated to Linux or Windows on x86 IA. These systems were not previously replaced due to budgetary constraints, but are now being migrated as corporate profitability improves. Many of these pre-recession systems are previous generation HP/UX on Itanium, Sun Solaris on SPARC, or earlier proprietary systems from IBM, SGI, and others.

With new x86 IA chipsets from Intel and AMD, migrations from proprietary UNIX systems to Linux can garner three-fold to five-fold server consolidation—and this is without virtualization. This type of consolidation heavily depends on the specific workload, target platform, and operating system choices, so savings may vary.

Scale on-demand

With Linux x86 IA Linux platforms, customers no longer have to make large, up-front investments to get the functionality and performance their business requires. Customers can buy what they need as they need it. This ability to scale on-demand frees up capital for more productive and effective business use. Key motivators for those considering a move to Linux are the dramatic and achievable improvements in TCO and ROI.

Memory and I/O

Prior to the introduction of Intel VTd, AMD-V, and the PCI-SIG's Single Root I/O Virtualization (SR-IOV) specification memory intensive applications running on Linux x86 IA platforms faced the very real potential for I/O bottlenecks. In this context I/O bottlenecks would have the same effect as a DOS (denial of service) attack has on a web server essentially shutting down access to any memory intensive application on the affected IA platform. Now with Red Hat's support for these standards combined with support for three new SR-IOV-compliant 10 Gigabit Ethernet cards memory bottlenecks on Linux x86 IA systems are no longer an issue in all but the most extreme cases.

Previously if you were running a high transaction rate application serving more than a few clients or if you were doing real time or near real time data service for multiple clients the potential for virtualized applications and workloads to bottleneck on Linux x86 IA was significant. With the adoption of these new standards, SR-IOV cards, and additional NUMA support from Intel and RHEL this problem has effectively been solved and applications that would previously have been I/O bound can now be run on Linux x86 IA platforms. Thanks to these advances customers can now run databases, file serving applications, even high transaction rate messaging applications on Linux x86 IA.

Red Hat Enterprise Linux 5 takes advantage of the functionality provided by the new generation of multi-core chips from Intel and AMD as well as IBM's new eight-core Power7 processors. In HRG's opinion RHEL 5 -- enhanced to handle large enterprise class virtualized workloads -- will serve to broaden the use of virtualization and ultimately the adoption of Cloud Computing. Virtual machines now have direct access to PCI device drivers without the overhead required by previous virtualization technology. While some I/O-intensive applications--such as database servers--could previously expect as much as a 30% drop in performance when virtualized, these new technologies are expected to reduce latency to 5% or less.

Virtualization

The promise of flexible, agile, compute-on-demand cloud-based infrastructure has at its core full blown hardware, software, and device-based virtualization. Red Hat, Intel, and AMD have made significant inroads in these areas. The applications and workloads that currently reside on previous generation platforms can now be migrated to an integrative virtualized cloud computing infrastructure (whether that cloud be public or private) with little impact to performance, improved manageability, and reduced cost.

Red Hat provides a rich ecosystem for their virtualized environment comprised of over 3,500 certified applications from over 2,200 ISVs. Red Hat maintains the application programming interfaces (APIs), which allows an application to be certified once and deployed anywhere. Applications certified to run on Red Hat Enterprise Linux will also run unmodified on any Red Hat supported hypervisor including KVM, VMware, and Microsoft Hyper-V. While almost all certified applications run without modification there are a small number of certified applications that will require some customization in order to support direct access for unique hardware devices for example such as a specific graphics device or dongle. However, these cases are the exception to the rule.

Kernel-based virtual machine - KVM

KVM, an open source virtualization solution, is a loadable kernel module that converts the Linux kernel into a bare-metal hypervisor by leveraging hardware-assisted virtualization features provided by Intel VT-X / VT-d or AMD-V-enabled CPUs. KVM is supported by most leading software and systems vendors, including Red Hat, AMD, HP, IBM, Intel, Novell, Siemens, and SGI.

With Red Hat Enterprise Linux 5.4, Red Hat announced support for the KVM hypervisor, making KVM the principal solution in their enterprise virtualization offerings. Features inherited from Red Hat Enterprise Linux 5.5 include better memory management and improved device interactions. On Intel machines running VT-d extensions, PCI devices can be swapped and reassigned and memory can be reallocated while the VM is running. This eliminates the requirement to shut down servers or virtual machines in order to migrate a VM or change the amount of RAM allocated to a VM.

KVM supports the live migration of a virtual machine between physical hosts without interruption to service, as well as, preserving a virtual machine's current state on disk, allowing that VM to be stored and resumed at a later time. Through KVM the work that Red Hat does on the Linux kernel is inherited into the virtual environment. In the past, companies providing hypervisors had to create functionality that was redundant between the hypervisor and the OS kernel. This resulted in overhead and inefficiencies, and slowed the adoption of virtualization. KVM delivers a much more efficient means for Linux on IA to deliver virtualization and painlessly take advantage of future Linux evolutions without incurring the overhead of redundant functionality.

Cloud computing

Cloud computing is evolving into an integrated IT services offering that should be able to provide everything a customer needs to successfully plan, deploy, and manage their IT business operations. Cloud computing has the potential to help organizations simplify, consolidate, virtualize, and re-architect their computing infrastructure while reducing cost.

Red Hat has teamed up with partners like Amazon to bring to market a standard, reliable public cloud computing platform. Using Red Hat Cloud Foundations Edition One products to plan, build, and manage a private cloud customers can run and manage applications inside the data center as well as in Red Hat Certified Public clouds like Amazon EC2.

Cloud technologies promise reduced IT cost, shorter time-to-market, cost-sharing with other users, and instant availability of resources. In this context, server virtualization facilitates resource management while supporting dynamic resource scalability.

HRG believes that as public cloud computing continues to evolve the ability to abandon or greatly reduce internal IT capabilities in favor of cost reduction, increased agility, increased productivity, and almost real-time responsiveness to changing market and competitive conditions will become reality. Organizations concerned with security, availability, and reliability will need to resolve those concerns before considering the "public option". At this time, however, it appears that many companies considering moving a portion of their IT onto the cloud are likely to keep their most critical workloads in-house or on a private cloud.

Conclusion

Regardless of whether a company is migrating from Solaris to Linux, or UNIX to Linux the fact that these companies are moving from proprietary UNIX-based solutions to Linux on x86 IA or Linux on the mainframe speaks volumes about the current economic and competitive business environment. As IT professionals are continually forced to do more with less and to stretch capital budgets to the breaking point in order to wring out every last penny's worth of value these same IT professionals are finding relief from the squeeze by migrating to Linux. And while Linux in and of itself delivers significant cost and productivity advantage Linux on x86 IA represents an unbeatable winning combination for all but the most calcified and entrenched proprietary system bound IT shops.

With the new IA Linux platforms customers are realizing that they no longer have to make large platform investments up front to get the functionality and performance their businesses require. Now these customers can buy what they need as they need it in order to scale on demand therefore freeing up capital for more productive and effective business use. Key among decision factors when considering a move to Linux on IA are the dramatic and achievable improvements in TCO and ROI.

With server virtualization and workload consolidation and the new generation of Linux on IA platforms IT professionals require fewer physical resources to support the same levels of functionality, throughput, availability, performance, and security, resulting in significant cost reductions due to reduction in energy, environmental conditioning, and physical space requirements.

Linux enhanced to handle large virtualization loads in conjunction with chip-based technologies is certain to broaden the use of virtualization and the adoption of Cloud Computing. Hypervisor technologies such as the Kernel-based Virtual Machine (KVM) have reduced virtualization related overhead and latency to 5% or less and in combination with SR-IOV is releasing the true benefit of virtualization for high transaction rate high throughput workloads. The promise of a flexible, agile, compute on demand Cloud based infrastructure has at its core full hardware and software virtualization.

HRG believes that Cloud Computing as an integrated IT services offering enables organizations of all sizes and levels of evolutionary maturity to simplify, consolidate, virtualize, and re-architect their computing infrastructure for the future while taking significant costs out of the equation. Cloud technologies and services hold the promise of reduced IT costs, shorter time-to-market, sharing costs with other users, and having instant availability of resources. The virtualization of servers will facilitate best practice based resource management while supporting the dynamic on-demand scalability that is uniquely available through Cloud Computing implementations.

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