White Paper

IT Modernization: Achieving a Balance Between 2nd and 3rd Platform Investments

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Al Gillen
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IDC OPINION

The computer industry thrives on new innovation. Although embracing innovative new technology is seen as a critical factor in addressing future challenges, companies also have to continue to support their existing investments — the infrastructure that is the foundation of their operations.

That's certainly the case today given that topics such as cloud computing, OpenStack and container technology, microservices, and Internet of things (IoT) have come to dominate the conversation in the industry — but these technology changes won't replace existing investments. IDC offers the following thoughts regarding the industry today:

- Every organization needs to find a balance between embracing exciting new technologies and supporting existing investments. In other words, organizations should evaluate emerging new technologies that will become important over the next few years yet continue to invest in the upkeep and modernization of systems that make the business run today.
- In the case of modern infrastructure, that means planning for adoption of a private cloud infrastructure and extending that to a hybrid and public cloud consumption model — referred to as 3rd Platform computing by IDC — while continuing to support and modernize existing distributed systems and workloads — referred to as 2nd Platform workloads by IDC.
- An ideal approach involves embracing and investing in an efficient infrastructure that can support existing workloads while preparing your datacenter for next-generation compute requirements. Using common components, such as virtualization, storage, and management, across current and next-generation infrastructure can minimize disruption from future technology waves and provide a foundation for agile IT methods including DevOps.
- For most datacenters, the path forward mandates investment in standardization, consolidation, and adoption of enterprise cloud management to extend existing virtualized infrastructure into a true hybrid cloud environment. Planning for next-generation application development and modernizing 2nd Platform applications (by using containers for packaging and deployment along with a reliable runtime environment) are both key objectives.
- Open source is seen as central to innovation today, with open source platforms such as Linux and KVM as central elements to a modernized and standardized platform. The role Linux and KVM play is one of cross-architecture standardization for both conventional and modern applications and physical and virtual deployments and is unique in the industry.

IN THIS WHITE PAPER

This IDC white paper considers the challenge customers face today in balancing investments in existing infrastructure with goals of improving efficiency and modernizing their datacenter. Simultaneously, customers need to embrace new technology development and deployment techniques that offer the promise of substantial improvements in developer productivity, operational agility, and less expensive life-cycle management. We consider the options that customers have to attain both of these goals by using infrastructure that can support existing and next-generation workloads and the role that standardization and modernization play in achieving operational optimization.

SITUATION OVERVIEW

The IT industry has a history of reinventing itself, and it appears that we're entering into yet another dramatic chapter of change.

Historically, we have seen major architectural shifts taking place every 10-20 years, but less radical shifts occur more frequently. During just the past 15 years, the x86 computer industry has seen many game-changing technology trends, including the emergence of x86 virtualization; the availability of practical, consumable cloud computing; the emergence of an incredibly rich range of open source software solutions; and, most recently, a major shift of application development and deployment techniques.

In some cases, these technology inventions or evolutions manifest themselves as a competitive solution that — at first — appears to be inferior or unsuitable when measured against existing solutions. Those initial shortcomings are paired with desirable attributes that may be unavailable, unachievable, or unaffordable from the existing platform. Over time, the competitive platforms improve and evolve, although not necessarily into an exact replacement for the previous solution. These platforms usually end up inventing new paradigms and often embrace new ways to solve old problems, which empowers these new platforms to differentiate themselves. Ultimately, these new platforms deliver greater functionality than the solution they followed to market.

However, it is rare for new solutions to fully eradicate the need for previous solutions. Indeed, if new solutions were to methodically chase down incumbent technology, that would likely reduce the agility and innovation in the new entrants and sentence them to early obsolescence. Instead, each new technology tends to both supplant and supplement existing solutions. There are parallels for this type of replacement/improvement cycle — it is not unlike how radio supplanted and competed with newspapers and how television subsequently supplanted and over time competed more and more directly with radio.

IT Modernization

IT modernization is a broad term that collects multiple actions into a single category. IT modernization can be about replacing aging hardware and software solutions with current versions and can also be about embracing new solutions that make it possible to meet new customer needs. An organization that is adding development tools and infrastructure software and updating decision support and analytics solutions to empower it to collect, analyze, and make business decisions from Internet of things data is a common example seen today in the industry.

IT modernization is not a project that starts and finishes on a finite schedule. Indeed, modernization is a task that is ongoing as long as a datacenter is expected to have value for years to come. To stop investing in the modernization of a datacenter is to ensure its obsolescence. On the other hand, there are waves of technology that require more investment and replacement and/or updating.

Today, the industry is in such a cycle, with significant change standing on the doorstep. The change is being driven by a confluence of technologies and business transitions, including a mature x86 platform, growth of public service providers building out a suite of platform and application services on the x86 platform, the proliferation of the Linux operating system, and the need to change the approach to application development and deployment.

The current technology choices can be grouped into several buckets, including:

- **Application development changes.** There is an emergence of new programming languages, frameworks, and application packaging. These changes are relevant primarily to brand-new applications. Today, customers are looking at Ruby, PHP, Perl, Python, Java, Node.js, and other application frameworks for hosting new applications. In many cases, we expect customers to move to container-based packaging formats for these new applications, typically with Docker or Rocket containers. We believe that few existing applications will be migrated into modern container packages or rebuilt using modern languages. The business value of these existing applications remains intact, however, as the industry evolves around them.
- **Deployment options.** The industry is no longer locked into a classic server/software/application deployment model. Virtualization freed workloads from the underlying hardware, which proved a boon for existing installed applications and systems. While virtualization remains the most widely used deployment technology, moving to a scenario where customers consume both private and public cloud resources is becoming common. Both new, Web-scale applications and traditional applications benefit from these deployment options, although there is some divergence for what applications go where. Modern applications built in a modern language and packaged in a container are more likely to land on a private and/or public cloud in a platform-as-a-service (PaaS) deployment model. Classic applications are likely to be deployed in a virtualized environment today. These applications can increasingly take advantage of private cloud and public cloud infrastructure and will be deployed there in an infrastructure-as-a-service (IaaS) model.
- **Provisioning, automation, and orchestration.** Modern infrastructure is becoming increasingly dependent upon software intended to handle provisioning, automation, and orchestration. Customers building new infrastructure today are likely to look for tools specific to provisioning (Red Hat Satellite and native tools in public cloud infrastructure), automation software (Ansible, Puppet, Chef), and orchestration (Kubernetes, Mesosphere, CloudForms). However, more traditional application provisioning and management solutions are likely to continue to be used with 2nd Platform applications.

FUTURE OUTLOOK

Organizations need to find a way to invest in exciting new technologies while continuing to provide full support for their existing infrastructure. This is easier said than done because for most organizations, two-thirds to three-fourths of their IT spend is associated with supporting existing deployments — often simplified into "keeping the lights on." Given that only a small minority of the overall IT budget is available to be invested in new technologies, the need to invest in technologies that improve the efficiency of existing technologies as well as support new deployments becomes all the more important.

IDC sees most end-user organizations facing this situation. For most companies, there are critical "systems of record" – the large corporate databases, ERP systems, and other business applications – that are widely deployed and used and are difficult to replace or migrate. Replacing them with a brand-new application, especially one written using modern languages and deployment scenarios, is not only an impossible task but also a risky move. As a result, customers tend to protect these important applications, which over time become the legacy IT that holds back the larger organization.

Fortunately, technologies are available today to support these classic applications workloads, and do so with greater efficiency, while supporting modern next-generation applications.

Bridging to Modern IT Infrastructure

Most organizations have already begun building a bridge to modern infrastructure through the adoption of virtualization software technology. Today, 80% of workloads are running on virtualized infrastructure, which creates a level of agility on x86 servers that was nearly impossible just over a decade ago. The benefit of having a virtualized infrastructure includes the following:

- **Mobility.** Workloads aboard virtualized infrastructure are inherently more flexible and can be moved to where the resources are aligned with the resource needs.
- **Standardized.** An operating system running on a hypervisor can be handled in a more consistent manner than operating systems running directly on hardware resources.
- **Future ready.** A virtualized infrastructure is able to run a mixture of traditional (2nd Platform) applications and is able to support the infrastructure required for a modern application (3rd Platform).

While a modern environment supporting a collection of container-based microservice applications gets all the buzz in the trade press and at conferences, the only companies that can embrace that compute model without some allowance for supporting 2nd Platform workloads are new start-ups that have no legacy IT. For the rest of the industry, a strategy of supporting both 2nd Platform and 3rd Platform is not only optimal but arguably mandatory. During the near term, organizations must separate development and deployment of containerized 3rd Platform applications from development and deployment of 2nd Platform applications. However, vendors such as Red Hat make it possible to repackage 2nd Platform applications into a containerized deployment, which provides upside benefit from a deployment and life-cycle management perspective with little risk. How broadly customers choose to repackage 2nd Platform applications into containers remains to be seen.

Linux customers enjoy an added benefit in navigating this transition because 3rd Platform applications seem to have settled on Linux as the preferred operating system. As a result, the same basic infrastructure can be used for both 2nd Platform and 3rd Platform applications. Container-based applications are intended to be used with a "thin" Linux operating system, such as Red Hat Enterprise Linux Atomic Host. Red Hat Enterprise Linux customers can easily mix and match Red Hat Enterprise Linux and Red Hat Enterprise Linux Atomic Host in the same virtualized infrastructure.

Beyond the Operating System

Most customers today, particularly upper midmarket to large customers, need far more than just infrastructure software for their environments. Larger organizations need to have a full set of solutions, including storage, management, orchestration, virtualization, virtualization management, and cloud system software. The Linux and open source ecosystem includes all of the previously mentioned prerequisites and has increasingly moved to a Linux-centric model. That is, open source projects today are usually built with the assumption that the default operating system and hypervisor will be Linux and KVM.

For example, OpenStack was developed with Linux and KVM as the assumed foundation. Today, all major Linux distribution vendors offer an OpenStack implementation as part of their Linux portfolio or offer it as a companion product. Likewise, other open source technologies, such as the open source Ceph distributed storage system software, have been embraced by Linux distribution vendors. For example, Red Hat has built on the open source Ceph technology to deliver an open source–based storage solution.

CHALLENGES/OPPORTUNITIES

The activities being pursued as part of an IT modernization project have changed over the years, and today's activities are heavily focused around consolidation and standardization, with that work taking on an increasing urgency to embrace next-generation application development and deployment models.

Challenges and opportunities associated with IT modernization include:

- **Hardware standardization.** In recent years, we have seen many organizations working toward standardizing their hardware on x86 servers in either rack-optimized or blade configurations, with some organizations embracing integrated or hyperconverged solutions as an addendum to the larger x86 deployment. The belief among many organizations is that x86 offers good price/performance attributes and that these systems have achieved acceptable levels of availability and scalability. Combined with modern infrastructure software, including private cloud and virtualization software, and more failure-resistant application programming and deployment models, x86 servers have emerged as a favorite in the industry.
- **Standardization requires change.** The endgame of a standardized software stack, running on a standardized virtual machine, offers lower capex and opex. However, there is cost associated with migrating to a standardized infrastructure. The opportunity for customers is the ability to embrace modern application development using containers and OpenStack-based deployments, but with lower operational costs associated with line-of-business applications.
- **A modernized infrastructure is more compatible with public cloud.** The more modern and standard a company's IT is, the easier (and less expensive) it will be to move to an IaaS or a PaaS public cloud offering. Public clouds are standardized, and that standardization provides the economic benefit. Being more standardized in your datacenter makes you more likely to be successful in public cloud. While not every organization is in a rush to move to public cloud infrastructure, having the technology in place to do so when the time comes can be an advantage. In the interim, having a private cloud that uses technologies similar to those that will be used in public cloud infrastructure eases a future expansion.
- **Operating system and infrastructure software standardization.** An analog that is happening to virtualization standardization is the standardization of related infrastructure software layers, including the base operating system. The use of a minimal number of operating system products (vendors) and, even within a given vendor, a limited number of release versions reduces the support matrix and lowers operational costs, reduces the difficulty of managing life cycles, and, in turn, standardizes software product selections further up the stack. We are seeing considerable interest in the so-called "thin" operating systems, which offer a stripped-down configuration intended to be used in an environment where containers are deployed as the deployment engine for modern applications.
- **Virtualization and private cloud infrastructure software standardization.** Virtualization software has had a dramatic impact on modern datacenters. We have seen standardization at the virtualization engine level, with three primary hypervisors in use for customers: a commercialized version of KVM such as Red Hat Virtualization, VMware vSphere, and

Microsoft Hyper-V. Of these three, solutions built using the KVM hypervisor have emerged as the industry favorite for use in conjunction with the popular OpenStack cloud system software technology. The next step in infrastructure software standardization is coming from OpenStack and the emergence of application container technology, such as Docker, which could allow the underlying infrastructure layers to become even more standardized.

- **Management as an enabler.** The movement toward a greater level of standardization is directly related to reducing the burden on IT to stand up, manage, and orchestrate workloads. While automating legacy applications has its challenges, most IT organizations recognize the opportunity to improve automation with modern 3rd Platform applications. Typically, deployments for 3rd Platform solutions land in a private or a public cloud and as such are dependent upon self-service provisioning tools, use automation software for management, and are orchestrated using software versus manual oversight. Red Hat has invested in both organic development and acquisitions (recently with its acquisition of Ansible) to build out its management portfolio to support a DevOps deployment model.
- **Application package standardization.** The single most exciting development in the industry today is the emergence of application container technology that allows application code and its direct dependencies (runtime libraries, frameworks, etc.) to be grouped together in a "container." This self-contained application is then able to be deployed on a less comprehensive operating system stack that offers a smaller attack surface and the ability to be patched and maintained without directly impacting the runtime containers that use it.
- **Application portability.** Directly related to application standardization is the benefit of application portability. As organizations move to 3rd Platform deployments using next-generation applications, those applications, and groups of applications, are able to be moved from private cloud to public cloud or from one public cloud to another thanks to the abstraction provided by container packaging.
- **Storage standardization.** As an extension to private cloud and hyperconvergence, the industry has seen a distinct move toward storage system standardization through open source projects such as Ceph, Swift, and Cinder. Today, the industry is moving toward the next phase of standardization at the network infrastructure level.
- **Modernization requires change management.** It is important to encourage internal customers to move to the most current operating systems and embrace the most modern infrastructure software layers. If internal customers are reticent to support modernization efforts, it is important to anticipate the need for proactive change management.

CONCLUSION

Innovation is a hallmark of the technology industry. Change can be perceived as disruptive and costly, but it is nonetheless necessary if organizations are to remain competitive and avoid obsolescence in an ever-changing world.

Organizations need to embrace change in a way that balances the needs of existing, business-critical infrastructure and services while empowering and enabling agile application delivery to compete and win in a constantly changing competitive landscape.

Open source software has emerged as one of the key enablers for organizations wishing to remain agile and competitive but at the same time be efficient in supporting and modernizing existing business-critical applications.

For most datacenters, the path toward tomorrow's compute paradigm mandates a perpetual cycle of infrastructure standardization and modernization. Planning for next-generation application development using containers for application packaging and deployment, along with a reliable runtime environment for existing infrastructure, remains the holy grail.

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Global Headquarters

5 Speen Street
Framingham, MA 01701
USA
508.872.8200
Twitter: @IDC
idc-insights-community.com
www.idc.com