# ALLEVIATE TECHNICAL DEBT

A practical path to IT modernization powered by Intel and Red Hat

## EXECUTIVE SUMMARY

IT modernization means different things to different people. To some, it suggests a complete overhaul and revamping of the full range of server and network components—the process of developing an entirely new infrastructure based on the latest hardware, most current software stack, and up-to-the-minute virtualization technology. To others, it is a selective replacement of components to improve IT efficiency, performance, and security. In between, there are many variations and a number of hybrid approaches to modernization.

Traditional IT infrastructures are typically saddled with a heavy burden of technical debt. Past-generation technologies often require substantial maintenance and management tasks without the availability of centralized control or ready visibility into the overall network architecture. Deployment of network components can take weeks or even months to accomplish. Technicians and engineers with specialized skills are generally required to keep the infrastructure operational. Despite these drawbacks, enterprises often have deep investments in traditional systems and a reluctance to abandon those systems upon which the core of their business operations may reside.

For many organizations, the issue comes down to this: deciding whether to perform top-to-bottom modernization of an organization's datacenter or to strategically modernize with those components that add efficiency, manageability, agility and cost savings to IT operations. This paper discusses the challenges involved in making this decision and offers recommendations as to how to approach IT modernization in a pragmatic, structured way.

## UNDERSTANDING INFRASTRUCTURE MODERNIZATION

Through digital transformation and infrastructure modernization, many organizations now turn to IT as a means of differentiating themselves in a competitive marketplace. Instead of purchasing off-the-shelf applications, companies are increasingly developing their own applications and devising new approaches to IT services, taking advantage of technologies that favor rapid development, fast deployment, flexible configuration, and centralized management. In a recent report, Gartner projects that by 2020, 75% of applications deployed in the digital business space will be built, not bought.[1]

Depending on the requirements of a given organization, the path to IT modernization often takes a variety of routes. For some IT groups, it involves moving away from mainframes to more flexible distributed systems. Migrating from a RISC-based system running UNIX to Intel-based standard high-volume servers running Linux® is another route. Incorporating virtualized software, platforms, or infrastructures is one more path to modernization. Some companies add network-attached storage (NAS) or storage area network (SAN) to improve storage capabilities, build a service-oriented architecture (SOA) and supporting enterprise service bus (ESB), create web services to replace existing applications, or use a combination of these approaches. Implementing software-defined storage offers another means to modernize storage capabilities.

### FOUR WAYS TO APPROACH I.T. MODERNIZATION

Enterprises approach IT modernization in different ways. No single model covers all of the methods for transforming an IT infrastructure.

The approaches embraced by different IT groups to enable and advance digital transformation typically include these four characteristics:

- **Streamlined and automated processes**. Simplify and accelerate resource provisioning and configuration management capability—usually with self-service capability as well.

- **Elastic and scalable.** Spin up (or spin down) compute, network, and storage resources in a fluid and predictable manner to respond to a surge in the number of users and workload requirements.

- **Agile and responsive**. Support rapid application development and deployment models to minimize time to results or time to market.

- **Consumption-based.** Simplify management tasks, support service-level agreements (SLAs), corporate policies, and improve accessibility to end-users.

Whatever approach an organization selects to meet its short-term and long-term goals, doing nothing in light of the irreversible changes sweeping across the industry is a poor option.

As Gartner cited in a recent report, 45% of IT leaders strongly feel that modernizing the core enterprise applications is in the top five priority focus areas.[2]

In this report, analysts for Gartner stated that rising IT spending in the enterprise application software market is spurred primarily by modernization and the business mandate to respond to volatile demand elasticity—expanding or replacing existing business applications with Software-as-a-Service (SaaS) substitutes, taking advantage of cloud-based agility and deployment ease.

*Gartner projects that by 2020, 75% of applications deployed in the digital business space will be built, not bought.*

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1  *"Gartner Says Modernization and Digital Transformation Projects Are Behind Growth in Enterprise Application Software Market." Gartner Newsroom Press Release.* http://www.gartner.com/newsroom/id/3119717

2  *Ibid*

## ANALYSTS' PERSPECTIVE ON DIGITAL TRANSFORMATION AND THE ROLE OF MODERNIZATION

Reflecting their projected reality of present-day IT transformation, Gartner recently defined a "bimodal" model that applies to typical IT modernization initiatives. The bimodal IT concept assumes that organizations will necessarily require both old-style and modern IT infrastructures to operate for the foreseeable future. The traditional IT frameworks, or "mode 1," cannot be converted quickly or cost-effectively enough to meet all of today's requirements. "Mode 2" infrastructures, based on agile, virtualized frameworks that are cloud-native applications, will serve to effectively roll out new applications and be used for "born-on-the-web" applications adhering to the DevOps way of developing cloud-native applications.

In a report released in November 2015, IDC FutureScape: Worldwide IT Industry 2016 Predictions–Leading Digital Transformation to Scale, IDC also weighed in on the importance of digital transformation.[3] The report concluded that organizations needed to initiate digital transformation projects to prevent deterioration of market positions that could lead to reduced revenues and profits. The report's author and IDC chief analyst Frank Gens noted, "We'll see massive upshifts in commitment to digital transformation (DX) initiatives, 3rd Platform IT, the cloud, coders, data pipelines, the Internet of Things, cognitive services, industry cloud platforms, and customer numbers and connections. Looked at holistically, the guidance we've shared provides a clear blueprint for enterprises looking to thrive and lead in the DX economy."

As detailed in an article for CIO Magazine, as a part of the bimodal IT concept, stability and risk are kept in balance:

"Coined by research firm Gartner, bimodal IT describes a way of managing two separate modes of IT delivery, one focused on stability and the other on agility. At Ford, bimodal IT is predicated on the company's appetite for risk. Changes to technologies developed for manufacturing plants, or tools that involve customer data, are considered high risk and must be implemented with caution in 'core mode.' Lower-risk pilots that can be tested with less stringent security, documentation or governance fall into the 'emerging mode,' she says. Emerging mode technologies that prove sound and secure may eventually move into the core mode, formalized in Ford business processes."[4]

Red Hat and Intel agree with the basic tenets of Gartner's bimodel perspective, but also consider that some of these ideas may not strictly apply, depending on the individual requirements of each organization.

Enterprises do not have to maintain their traditional infrastructures in their current state. They can enhance them in a number of ways to improve operations, reduce costs, and simplify management.

And, with planning and forethought, a common core of technology expertise can be established to bridge infrastructure maintenance and management across traditional and cloud-native implementations. These infrastructures can be aligned more closely with vital business processes and maintained in a stable way, while also being improved with a number of technologies that don't require massive re-engineering of the existing architecture.

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3   "IDC Predicts the Emergence of 'the DX Economy' in a Critical Period of Widespread Digital Transformation." BusinessWire. 2015.  http://www.businesswire.com/news/home/20151104005180/en/IDC-Predicts-Emergence-DX-Economy-Critical-Period

4   Boulton, Clint. "Why Ford's CIO is shifting gears to bimodal IT." CIO from IDG. 2015. http://www.cio.com/article/3015360/it-strategy/why-fords-cio-is-shifting-gears-to-bimodal-it.html

## BUILDING A STRONG FOUNDATION FOR INFRASTRUCTURE MODERNIZATION

Establishing an effective foundation to support an infrastructure modernization initiative requires first standardizing on industry-standard building blocks and an industry-leading operating environment.

Red Hat® Enterprise Linux and an Intel architecture-based platform, combined with a well under-stood standard operating environment (SOE), can serve as a launch pad for any number of virtual-ization solutions, cloud-based deployments, software-based appliances, and SaaS platforms.

Intel provides a reliable, industry-standard hardware platform for building a modern infrastructure, offering proven interoperability and optimized performa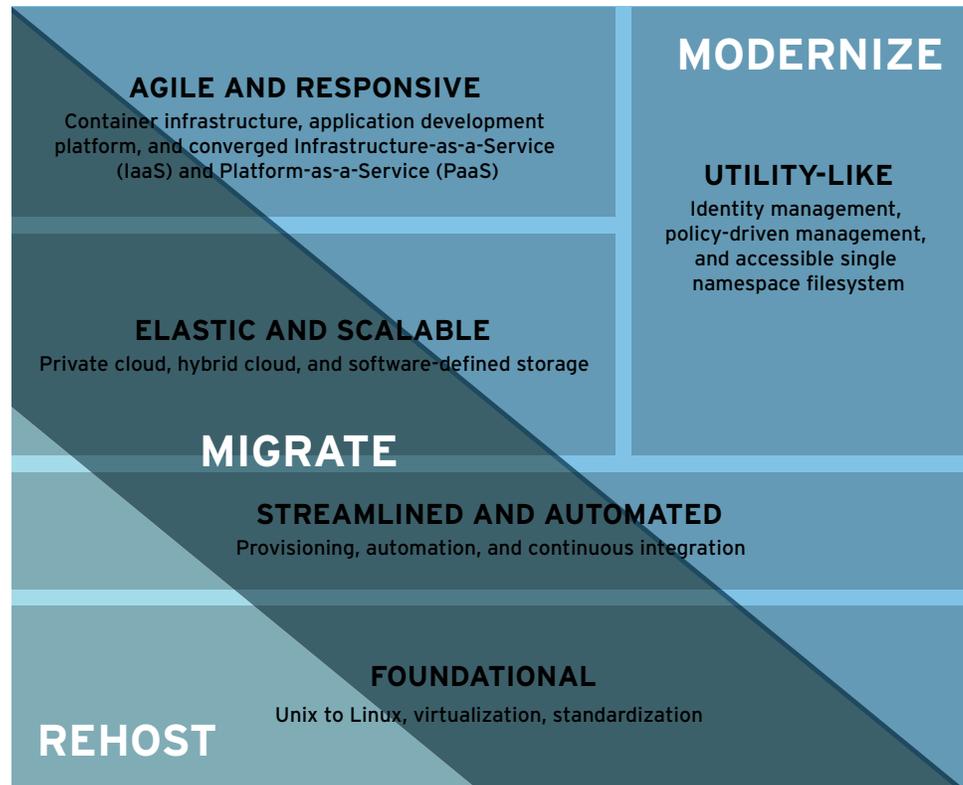nce with Red Hat software components. The strong technology partnership between Red Hat and Intel has resulted in a robust and flexible foun-dation for developing a modern IT infrastructure, supporting both conventional and cloud-native workloads while offering a common management platform.

UNIX-to-Linux migration presents a viable first step for many organizations venturing down the path to infrastructure modernization. Taking the full range of UNIX/RISC platforms and migrating their associated workloads and applications to a Linux/x86 infrastructure based on Red Hat Enterprise Linux provides a modern, flexible platform for further innovation. Organizations that rely on past-generation operating systems—including Sun Solaris on SPARC, Tru64 UNIX on VAX, HP-UX on PA-RISC, and AIX on POWER—often opt to perform a UNIX-to-Linux migration directly to a virtual or cloud-based platform so that the extensive migration process leads immediately to a more agile, manageable long-term solution.

Improving manageability, visibility, and control of resources is another key benefit of the path to IT modernization. Traditional infrastructures tend to be difficult to manage, largely due to the lack of visibility across system and network components. Beyond visibility issues, having single-point control over virtualized components also makes both management and maintenance more diffi-cult. As a part of implementing an SOE environment, Red Hat Satellite simplifies management tasks within Red Hat Enterprise Linux environments and provides oversight and control of components within the overall infrastructure. For extending management across complex environments, Red Hat CloudForms offers significant benefits. This solution offers unified management for hybrid environ-ments, providing a consistent experience and functionality across virtualization, private or public clouds, and container-based infrastructures.

Another valuable tool, particularly for IT groups looking for staged modernization of a traditional infrastructure, is Ansible Tower by Red Hat. Using the Ansible automation language and open source automation engine, this solution offers an enterprise-ready approach to the definition, provisioning, and management of complex multitier deployments. All of these capabilities provide modernization benefits for IT groups.

Intel provides a reliable industry-standard hardware platform for building a modern infrastructure, offering proven interoperability and optimized performance with Red Hat software components.

*Figure 1. IT modernization paths and characteristics*

Moving from expensive, proprietary virtualization solutions to nimble, cost-effective solutions based on open source components offers another step forward toward modernization. Red Hat Enterprise Virtualization can satisfy the business requirements of making IT processes more streamlined and improving visibility across the architecture while reducing costs. Creating an effective SOE requires specific tools that combine to bring efficiency and stability to IT processes, and it also establishes a foundation upon which to modernize an organization's infrastructure.

## EXAMPLES OF I.T. MODERNIZATION

The following actual examples illustrate the benefits of IT modernization, each employing a different approach within a bimodal IT scheme.

**Major airline IT infrastructure modernization:** A global airline based in the UK faced substantial challenges. The existing infrastructure could not sustain growth and failed to effectively support business lines. Developers needed a way to build and deploy virtual machines (VMs) on an ad hoc basis to support changing business needs. The infrastructure costs could not be projected realistically, leading to expensive over-provisioning of IT to ensure 24x7 availability of the infrastructure.

The results of the modernization—incorporating Red Hat Enterprise Linux, Red Hat Satellite, and Red Hat Enterprise Virtualization—included these benefits:

• An enhanced, responsive customer experience, supporting 450,000 daily visitors.

• Developer self-service features for deployment of virtual machines.

- Integration with the existing infrastructure, resulting in a highly available and more scalable IT infrastructure.

**Global automotive business:** A worldwide automotive business engaged in vehicle remarketing and digital services needed a more automated infrastructure with easier provisioning. They required a scalable, flexible platform capable of supporting 18 million unique visitors per month and handling 30 different companies under the brand umbrella. Business units within the firm needed faster access to new capabilities.

The completed IT infrastructure modernization—providing infrastructure provisioning and configuration management—offered these advantages:

- Savings of over 4,500 hours in engineering time.

- Soft savings in developer productivity amounting to $4,900,000.

- Rapid provisioning of IT resources, primarily virtual machines, down to about 20 minutes rather than hours or days.

**Leading analytics software company:** A company with substantial expertise in the use of big data and customer analytics wanted to expand and diversify its business, reaching more middle-market customers. To accomplish this, they envisioned creating a more agile and responsive infrastructure and developing a suite of services using a cloud-based delivery channel.

The outcome of the IT modernization effort—based on Red Hat Atomic Platform and Red Hat Cloud Suite—produced these benefits:

- Reduction in the time to value required to develop new analytic solutions, up to 70% in comparison with typical on-premise software.

- Support for self-service features to make access to new tools readily available to developers, clients, and partners, streamlining the design and deployment of new functionality significantly.

- More efficient business processes and smoother operations with added support and consulting from Red Hat.

**University IT infrastructure modernization:** A liberal arts college in Singapore needed an IT environment that could be managed by an IT staff of just six team members, flexible enough to contend with expectations of rising demands in the near term, and automated for minimal maintenance tasks.

The modernized IT infrastructure deployment—utilizing Red Hat Cloud Infrastructure and Red Hat Ceph Storage—provided:

- Server installations can now be performed in a matter of one or two hours. Previously, this required several days to accomplish.

- A staff of nine is able to manage the entire IT infrastructure, using their Linux skills to perform tasks on servers running Red Hat Enterprise Linux and a cloud infrastructure based on Red Hat OpenStack® Platform.

- Resources can be flexibly scaled up or down, as required. At the conclusion of a class, provisioned VMs and compute nodes are destroyed and the resources returned to the research department.

**High-volume reservations agency:** A reservation agency contending with a high volume of requests, up to 210,000 queries per second, required a more effective infrastructure for mapping traveler requests to current airline and hotel inventories. High consistency and fast response times were a vital need.

The resulting modernization—based on Red Hat Atomic Platform, container technology, and Red Hat Cloud Suite—produced these improvements:

- Better support for a wider variety of applications, not only HTTP or stateless services.

- An improved operational model and greater efficiency.

- Automated scheduling across the cluster, allowing flexible use of available resources.

These are just a few of the available examples of how IT modernization efforts can effectively meet business challenges.

More details of specific Red Hat engagements with organizations can be found at http://www.redhat.com/en/success-stories.

## INTEL, RED HAT, AND THE PATH TO MODERNIZATION

As technology partners and leaders in the digital transformation of enterprise computing, Intel and Red Hat have collaborated on many open source projects, programs, and proofs of concept that have contributed to the reliability, interoperability, and agility of modern IT infrastructures. For example, the Intel Open Network Platform (Intel ONP), a reference architecture for accelerating software-defined networking and network functions virtualization, incorporates CentOS, derived from Red Hat Enterprise Linux 7,  optimized for the Intel hardware platform. Collaborative work between Intel and Red Hat on Red Hat OpenStack Platform has made it much easier to set up and manage a complete cloud environment based on Intel architecture.

A demonstration project, using Intel ONP as a blueprint, combined hardware and software technologies from the two companies—including Red Hat OpenStack Platform, the Intel® Xeon® processor E5 v3, and Intel Communications Chipset 89xx Series—to show that dynamic service chaining in an SDN environment was an effective technique for rapid provisioning and better network management.[5]

Red Hat Ceph Storage on Intel architecture has been co-engineered for massive scalability at lower cost for those organizations moving from traditional storage to software-defined storage. The list of cooperative and collaborative achievements between Red Hat and Intel is long and goes back many years—as far back as Red Hat's inception.

Building a solid foundation to support both traditional and modern infrastructures is a prime requirement for businesses intent on driving innovation, spurring business growth, and remaining competitive in an IT sense. Red Hat and Intel have established the framework and openly share the expertise that is needed for organizations to construct that solid foundation.

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**5** *"Going Virtual: Intel and Red Hat Demonstrate SDN Service-Chaining Solutions." Intel Corporation. 2015. http://www.riverbed.com/document/fpo/Partners/Intel,%20Red%20Hat,%20and%20Riverbed%20WAN%20Optimization%20Service%20Chaining.pdf*

## VIRTUALIZATION AND BEYOND

Virtualization—of compute platforms, network storage, network functions, and network infrastructures—has provided IT groups with technologies for optimizing compute resources in an agile and highly visible way. The momentum behind the move toward open standards, commodity hardware, and open source innovation has accelerated the transformation of the modern IT estate. Cloud computing has opened opportunities to create SaaS, PaaS, and IaaS frameworks to encompass IT challenges in a flexible, manageable way.

Whether an infrastructure is built from the ground up to incorporate the full benefits of virtualization or strategic virtualization solutions are added to an existing framework to modernize it, there are advantages and potential drawbacks to consider. The complexities of virtualization do require solutions that demonstrate interoperability among components within a wide range of environments, particularly for those organizations adopting a multimodal strategy and selectively upgrading the capabilities of the traditional infrastructure.

The release of Red Hat Enterprise Virtualization, a component of the Red Hat Cloud Infrastructure, represents a unifying step, letting organizations  more easily move from a traditional virtualization model to a cloud-based environment built using OpenStack. Traditional infrastructures can be enhanced significantly with Red Hat Enterprise Virtualization as part of the migration away from UNIX workloads on conventional platforms to modern Linux deployments in the cloud. This also provides a staged movement toward large-scale IT modernization without risking the stability or integrity of business applications that perform vital operations for the organization. To simplify this type of transition, Red Hat Enterprise Virtualization includes a conversion tool, Virt-v2v, designed to seamlessly move workloads from other hypervisors into a cloud-based environment.

## IMPROVING INTEGRATION COLLABORATIVELY

Working collaboratively, Intel and Red Hat have tested and refined Intel architecture hardware platforms running Red Hat Enterprise Linux in a variety of environments, establishing and defining reference architectures that help eliminate guesswork and experimentation, building infrastructures around open standard software ingredients, leading to solid, stable IT infrastructures. When integrating components from diverse sources that may span commercial and open source solutions, having a tested architecture as a framework can vastly reduce development and deployment times.

The Intel Open Network Platform has served as a reference architecture for a number of joint projects based on Red Hat OpenStack Platform, including engagements with Dell, HP, and NASDAQ that met key challenges in specific market sectors. These types of collaborative endeavors are fueling modernization efforts around the globe and demonstrating the value of creating agile, cost-effective environments with enhanced manageability.

## DIGITAL TRANSFORMATION REQUIRES A FOUNDATION OF MODERN INFRASTRUCTURE

The path to a modern IT infrastructure can be substantially streamlined with proven hardware and software components optimized by Red Hat and Intel for deployment to public and private clouds, supporting cloud-native workloads and containerized architectures based on OpenStack, Gluster, Ceph, and OpenShift.

"*Every organization needs to find a balance between embracing 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.*

**AL GILLEN**
ANALYST, IDC

When the need for a bimodal infrastructure becomes a practical necessity for your organization, take advantage of the latest architectures and certified components to make the transformation as seamless and efficient as possible. Both Red Hat and Intel have developed programs and devised measured approaches to help in the design, development, and deployment of modern digital infrastructures.

## NEXT STEPS

IT modernization is not a single path, but an extended journey that can bring your organization the benefits of modern technology without entirely disrupting the essential groundwork of your existing IT operations. With a modern foundation in place, your organization will be equipped to integrate and take advantage of the technologies that underlie agile development, rapid deployment, streamlined provisioning, and single-point network management.

Contact Red Hat or an authorized Red Hat partner for consultation on the next steps toward a modern infrastructure, a journey that you can begin today.

To gain a better understanding of where your organization stands in terms of modern IT technologies, take the Red Hat IT Modernization Assessment: https://roianalyst.alinean.com/ent_02/loadToolkitMetrics.do?domainID=48500456929022 5961&Source_ID=AlineanTest

To learn more about the Red Hat pathway to IT modernization visit: https://www.redhat.com/en/resources/red-hat-pathway-it-modernization.
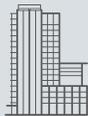
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Red Hat is the world's leading provider of open source software solutions, using a community-powered approach to provide reliable and high-performing cloud, Linux, middleware, storage, and virtualization technologies. Red Hat also offers award-winning support, training, and consulting services. As a connective hub in a global network of enterprises, partners, and open source communities, Red Hat helps create relevant, innovative technologies that liberate resources for growth and prepare customers for the future of IT.

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