BUSINESS BRIEF

Making the Case for Modernizing your Data Center

Managing Application Growth with Greater Agility, Control, and Cost-Efficiency

Executive Summary

IT is undergoing a dramatic change as technologies evolve, cloud solutions become more mainstream, and competition grows. Data center modernization is a requirement driven by needs of agility and innovation in the business. There is a path to modernization that helps redefine IT as a source of innovation.

This paper looks at data center modernization and the imperatives that help enable it:

- Engaging the cloud
- Enabling easy-to-use self-services
- Leveraging analytics for business innovation

Understanding these imperatives and principles behind them will help IT enable an agile, services-based infrastructure that gives the department new value for the modern business.

Is Your Data Center Ready for the Demands of Cloud?

Cloud projects are the single most important technology initiatives right now and expected to cause the most disruption in the future, with the goal being to improve service and generate new revenue streams.

Computerworld Forecast Study 2015

Enterprise applications enable users to interact with the business, create innovative ideas, and deliver competitive products and services. To keep the business agile, enterprise leaders are seeking efficient and cost-effective ways to deliver these apps to a variety of mobile devices and to enable new, connected experiences using cloud computing. Fulfilling such expectations requires IT to obtain new tools and to justify investment toward a modernized data center that leverages the capabilities of a hybrid cloud infrastructure, self-service application delivery, and rich analytics. This path to modernization allows IT to redefine their value from an infrastructure manager and supplier to a source of business innovation.

Three imperatives guide IT along the journey of modernization:

- Engage the cloud to orchestrate transformation
- Deliver easy-to-use self-services
- Drive business innovation through predictive and prescriptive analytics

40% of IT budgets spent globally on Data Center Consolidation in 2015 (33% NA).[3]

Engaging the Cloud

Adopting a hybrid cloud strategy promises improved optimization in IT with greater visibility into a highly virtualized environment. It begins with realizing a new operating model.

The Need for a New Operating Model

Modernization starts with a new way to run the data center. According to research organization IDC, only 56 percent of enterprise workloads are virtualized and 40 percent of companies are still consolidating their infrastructures.[1] That means about one-half of IT departments still run their software on traditional siloed architectures, which are increasingly complex to maintain, manage, and scale with today's applications and enterprise needs. This complexity and limited adaptability hamper optimization and efficiency, ultimately driving up total cost of ownership. Performance, cost, and the ability to scale are major roadblocks for data center innovation. The first step to adopting a new operating model is virtualization and private cloud.

The case for server consolidation, virtualization, and private cloud is well understood. They promise increased optimization of investment, as well as address pain points of data center managers. The immediate results are also well known, creating invisible workloads that require the proper tools to make them clearly visible so they can be efficiently and effectively managed and optimized. With the proper tools for virtualization, visibility, and policy-based management, IT can orchestrate workload deployment and automate maintenance and security compliance across the virtualized servers.

Industry Standard Technologies Enable Innovation

One of the early challenges with modernization is having the appropriate technologies to take advantage of innovative software solutions as they are launched. As software vendors develop new applications and software appliances, they often target the x86_64 processor architecture, considered mainstream and industry standard, and adapt their codes away from fringe architectures, such as RISC, as the market demands. Thus, moving away from proprietary approaches to industry-standard hardware for cost-efficient, software solutions allows you to leverage new and innovative approaches from a wide base of vendors. The benefits here extend to later phases in modernization.

Solutions are Available

Companies across industries are engaging this operating model, enabling new services delivery from days to minutes through automated orchestration of virtualized workloads. A 2015 study by Computerworld identified "cloud projects are the single most important technology initiative right now."[2] Many solutions are available, built from commercially available software offered by leading ISVs, such as VMware, HP, BMC, Atrium, SAP, and Microsoft, to open source solutions, such as OpenStack*.

Cloud Decisions – Meet your Business Imperatives

Once a commitment to the new operating model is made, among the first questions from IT is which apps should be deployed locally in a private cloud, and what services can reside in the public cloud. Your particular

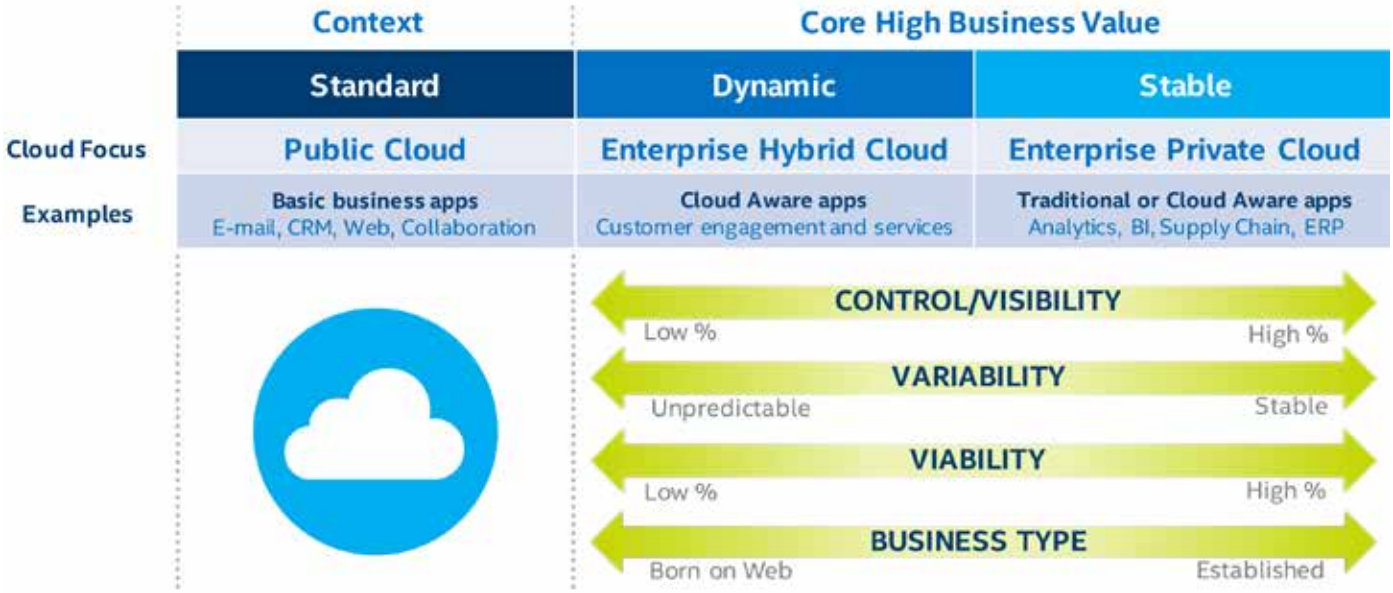

Figure 1. A Cloud Decision Guide[4]

industry and what you define as core to your business versus context to your business[5] will drive decisions of where workloads reside (Figure 1). Services requiring greater control and oversight that are core to your operations will likely be kept locally. Examples include financial workloads, trading transactions, or personal medical information in sensitive and regulated industries. While collaboration and e-mail services that are more contextual to operations can easily be managed in public resources.

Driven mainly by leadership, the cloud decision continuum is not ridged, and deciding on what remains on premises may be driven by regulatory compliance and hard and fast rules or best practices. This approach to cloud decision making can help to change how organizations build data centers that are "cloud ready."

Easy-to-Use Self-Services for the User

Users interact with the business at many different levels through applications that are often unique to their own activities. Line of business managers have lately turned to public cloud services to provide these applications to their business units as they engage new projects, because it is easy to launch these services with a self-service portal. This is not always optimal from an IT perspective, as Figure 1 reveals. Making needed services that are core to the business easy to access, then, becomes a critical function for IT. But, it requires a flexible cloud infrastructure to support a self-services provisioning portal.

SDI – Enabling the Modern Enterprise Cloud

The ecosystem has extended the concept and benefits of abstracting servers into resource pools and automating orchestration of workloads to storage and network requirements—indeed, across the entire data center—using a Software Defined Infrastructure (SDI) approach. Software-defined storage (SDS) allows rapid deployment of scalable space using SDS software to partition hardware across multiple storage solutions. Virtual Network Functions (VNFs) or Network Function Virtualization (NFV) enable fast deployment of security and network

> The enterprise may have responsibility for 85% of data generated.[6]

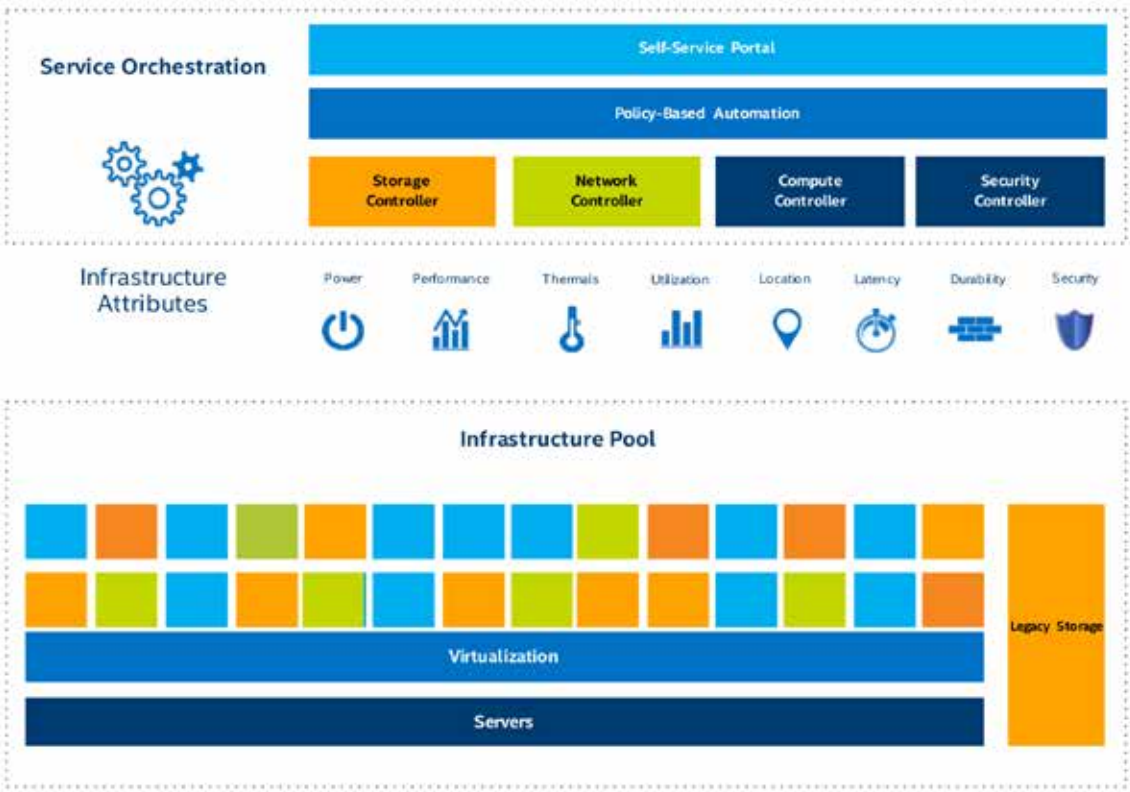

Figure 2. Software Defined Infrastructure Framework

Storage Growth Forecast is estimated at 62% increase while it represents only 2% CAGR of IT Budget – Indicates Storage Cost Reduction is Primary in Modernizing.[7]

requirements through software running on servers optimized for network operations, such as firewalls, and other functions.

According to 451 Research, 21 percent of organizations have implemented some form of SDI. And the trend will only continue to expand, according to the company's 2016 Outlook on SDI, which expects that 67 percent of all enterprise spending allocations will be on software-defined initiatives.[7] SDI is revolutionizing how organizations build data centers that are "cloud ready."

Reduce Costs with a Software-Defined Approach

With the ability to pool resources and better allocate them across the infrastructure, IT can maximize existing investments and reduce TCO through improved efficiencies. IT can also take advantage of policy driven workloads that enable the following:

- **Tighter data control.** With flexible, scalable, and cost-effective infrastructure services on premise, IT can make more strategic decisions about where sensitive data resides.
- **Increased flexibility and scalability.** Software-defined infrastructures can adjust to a defined set of loads, and then scale for additional loads easily and relatively inexpensively.
- **Rapid delivery of services.** IT becomes more responsive as a business partner, helping to speed agility and boost competitive advantage as a broker of rapid services delivery across the enterprise.

Enabling a Foundation for SDI

As mentioned above, industry standard architecture is core to enabling innovative data center environments. With the robust foundation of pooled compute, network, and storage resources—all running on industry-standard hardware—enterprises can easily shift to more mature, cloud-ready states that enable higher levels of automation and provisioning for all workloads.

Successful SDI Examples

SDI is successfully being implemented across industries. National service provider, CenturyLink,* has reduced service deployments from months to minutes by updating their cloud operating system.

Kroger,* one of the country's largest grocery chains experienced a 10X footprint reduction in servers across their data centers and an 80 percent cost reduction by using Software Defined Storage with VMware VSAN* running on Intel® Xeon® processors, Intel® SSD Pro, and Intel® networking solutions. Their story can be read at https://communities.intel.com/community/itpeernetwork/blog/2015/09/17/scaling-software-defined-storage-in-retail.

IT as a Strategic Innovation Driver—Analytics at work

Implementing SDI and delivering applications as a service allow IT to focus on how it can add more value for its customers. Analytics drives innovation in the business. IT, with its knowledge of company workloads and as the steward of corporate data, can leverage its position to increase its own strategic value. Using predictive and prescriptive analysis, the organization can help drive adoption of analytics solutions based on a wide range of scale-up (in-memory databases) and scale-out (big data) frameworks to accommodate the increasing volume, variety, and velocity of data the organization acquires.

Analytics is changing how businesses operate and succeed. Across the landscape, companies come and go, often by how they leverage the data they have and continue to acquire. Analytics itself is evolving from yesterday's tracking spreadsheets that showed what had happened in the past, to business intelligence systems that help diagnose the causes of trends, to predictive and prescriptive analytics, identifying what line of business can do to achieve a specific outcome. The future of analytics will include more automated, intelligent operations based on machine learning and analyzing streaming data from a wide variety of sources to enable true real-time operations.

Examples of companies who leverage data for success include Parkinson's Research,* who is leveraging wearables for subjective to objective analysis of progression of the disease. Using Big Data analytics, Intel and The Michael J. Fox Foundation* are changing real-time data into real-time progression analysis, supporting the advancement and understanding of health through technology. Read more about this effort at www.intel.com/content/www/us/en/big-data/parkinson-disease-michael-j-fox-foundation-video.html

The Penn Medicine Heart Failure and Transplant Program leverages the Trusted Analytics Platform (TAP) open source project, which combines a solution stack that includes Big Data analytics for predictive identification of patients at risk of heart failure, reducing costs and increasing service to patients at risk. Read more at www.intel.com/content/www/us/en/big-data/penn-medicine-trusted-analytics-platform.html

Intel® Technology Enables Modernization

Intel® technologies run a large portion of the world's data centers. Intel® architecture-based solutions help IT maximize infrastructure investments and include a portfolio of interoperable, scalable, and programmable products and technologies that enable IT to modernize. And, while Intel is not often thought of as an analytics expert, the vast investment Intel makes in the ecosystem, relationships with ISVs to help them optimize software, and contributions to open source projects give Intel a unique perspective and ability to help companies clarify their analytics objectives and the path to modernizing their data center.

Intel® Technologies for Modernization

Key products and technologies include:

- Intel® Xeon® processors E7 v4 family
- Intel® Xeon® processors E5 v4 family
- Intel® Atom™ processors
- Intel® Xeon Phi™ processor
- 3D XPoint™ Memory and Memory Technologies
- Intel® Solutions for Lustre* Software
- Intel® Gigabit Ethernet Switch Modules
- Intel® Omni-Path Architecture
- Intel® QuickAssist Technology for compression and encryption acceleration offload (in standalone devices and part of Intel Xeon processor E5 and E7 family)
- Intel® Solid State Drive (SSD) Data Center Family with NVMe
- Intel® Cache Acceleration Software (Intel® CAS)
- Intel® Security products

Intel also offers a wide range of solutions to help speed and simplify software development for storage and other modernization efforts. These include the following:

- Intel® Intelligent Storage Acceleration Library (Intel® ISA-L)
- Intel® Storage Performance Development Kit (Intel® SPDK)
- Intel® Math Kernel Library (Intel® MKL)
- Intel® Integrated Performance Primitives (Intel® IPP)

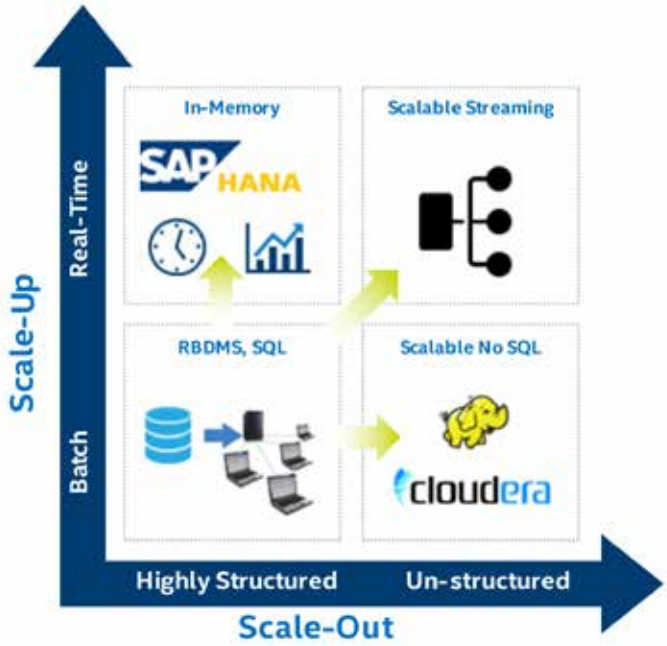

Figure 3. The Analytics Solutions Landscape

Getting Started with Modernization: A Checklist

If increasing agility and reducing TCO are now top priorities for your business, then implementing the next steps in your modernization journey is critical. This checklist can help you get started.

- **Understand the business problem.** Work with your users to define the compelling business imperatives. What key business initiatives might benefit most from a more flexible IT approach? Do you need to improve quality of service delivery? What are the business requirement needs for your unique workloads?
- **Assess your current infrastructure.**
- **Evaluate costs.** Consider the operational costs of your current environment, such as space, HVAC, replacement costs, and performance. What can you do differently to increase flexibility?
- **Look for opportunities.** Consider opportunities to gain efficiencies by leveraging updates to your compute, storage, and networking using Software Defined Infrastructures. Non-Volatile Memory Express* (NVMe) and SSDs. These investments can pay off quickly by changing the full life-cycle management of your storage.
- **Identify a pilot project.** Pinpoint the project that is best solved by moving to cloud-based workloads and software-defined projects with a high probability of success.
- **Evaluate risk to your data.** Determine which data is strategic to your business or core, and identify legal and regulatory requirements with which you must comply.
- **Consider your platform and deployment options.** Will you build your solution from a portfolio of vendors and open-source hardware and software, a pre-validated turnkey solution, or a converged or hyper-converged option?
- **Get educated**. Read white papers, research studies, and analyst reports. See what other companies have learned when implementing their own modernization journey. Build on their best practices. Find reference architectures of proven solutions at Intel® Builders Program.

Take the first steps with Intel architecture-enabled solutions. Find solution briefs, proof-of-concept publications, reference architectures, and vendor connections at Intel® Builders Program.

Learn more at **cloudbuilders.intel.com**.

[1] IDC 2016.

[2] 2015 Computerworld forcast.

[3] Tech Target April 2015.

[4] Crossing the Chasm: Dr. Geoffrey Moore Marketing and Selling High-tech Products to Mainstream Customers (1991, revised 1999 and 2014).

[5] Crossing the Chasm: Dr. Geoffrey Moore Marketing and Selling High-tech Products to Mainstream Customers (1991, revised 1999 and 2014).

[6] The Digital Universe of Opportunities: Rich Data and the Increasing Value of the Internet of Things: Executive Study. EMC Digital Universe with Research and Analysis by IDC (April 2014). emc.com/leadership/digital-universe/2014iview/executive-summary.htm.

[7] 451 Research Voice of the Enterprise survey 2016.

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