White Paper

The Impact of Migrating Epic EHR to Dell EMC Vblock

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In the United States, EHR technology has undergone widespread adoption over the past five years, driven primarily by regulatory incentives and mandates. For most healthcare organizations (HCOs), an EHR deployment represents one of the largest and costliest IT projects that the organization may undertake. But the challenges do not end with deployment. Maintenance and support costs for aging infrastructure are expensive. It can also be difficult to find IT staff familiar with older technology, making it more expensive to hire and retain them, thus driving up the total cost of ownership (TCO) for older EHR solutions.

The fast pace of adoption of EHRs, and other clinical systems to support new care delivery and reimbursement models, has led to many IT issues for healthcare organizations. Healthcare applications are distributed across multiple siloed systems because vendors regularly insist that their software run on dedicated, often proprietary, hardware. This is further complicated when healthcare IT inhabits a bimodal world, straddling legacy and 3rd Platform architecture built on cloud services. The majority of EHR systems were developed decades ago to support billing and revenue cycle management; vendors have only recently begun migrating their EHR products to cloud-based delivery models. However, evolving business models and regulatory requirements are forcing IT to be more agile and more responsive to end-user needs, so healthcare providers are increasingly looking to modernize their IT infrastructure by migrating their EHRs to converged infrastructure.

IN THIS WHITE PAPER

This IDC Health Insights white paper is sponsored by Dell EMC. The objectives of this white paper are to:

- Explain some of the challenges healthcare providers are facing in migrating to new EHR platforms or upgrading their EHR infrastructure.
- Explore the IT benefits of moving from Unix to x86 Linux infrastructure and the business-level benefits achieved by using Dell EMC converged infrastructure to streamline IT capabilities and deliver business results.
- Provide a case study of a Dell EMC converged infrastructure customer in the healthcare industry that has deployed Epic's EHR solution on Vblock.

This white paper is based on briefings with Dell EMC as well as interviews with Dell EMC converged infrastructure customers and IDC Health Insights' converged infrastructure and EHR research.

SITUATION OVERVIEW

Historically, large healthcare provider organizations have used highly customized, monolithic client/server-based health information system (HIS) and EHR applications installed on-premise to manage their clinical and administrative operations. These systems, originally developed in the 1980s and 1990s primarily to support billing and revenue cycle management alongside paper charts used in care delivery, have been enhanced over the years to add functionality to support electronic charting, clinical documentation, and the basic clinical decision of a meaningful use-compliant EHR. These legacy systems are rooted in 2nd Platform client/server technology, which relies heavily on PCs tapping into 1st Platform mainframe databases. As the systems have grown to support more departments and more functionality and ever-evolving regulatory requirements, they have become unwieldy and expensive for most healthcare organizations to support. Key issues with the continued use of legacy 2nd Platform systems include, but are not limited to:

- **Productivity.** Using legacy 2nd Platform HIS/EHR systems drains productivity from staff, and even HCOs with well-maintained 2nd Platform technology from vendors with professional product management organizations will see limits on performance, availability, and mobility.
- **Limited ability to add new capabilities.** While many HCOs have replaced their original homegrown systems entirely or added new EHR functionality since the inception of meaningful use, these replacement systems are still on 2nd Platform technology and are not web native. Adding functionality to support meaningful use or accountable care requires expensive long-term projects for upgrades from suppliers and/or custom development and integration.
- **Excessive total cost of ownership.** With second-generation systems implemented for meaningful use, TCO has grown, and layers of high-cost staff and infrastructure are required to maintain and support HIS/EHR systems.
- **Security.** When 2nd Platform systems are used remotely or expanded to support more functionality or facilities than originally designed for, it is difficult to reliably secure the environment. Backup, disaster recovery (DR), and IT business continuity solutions are also limited.
- **Limited mobility and collaboration tools.** 2nd Platform solutions do not leverage the cloud natively, and it is difficult to add the lightweight cloud-based mobile collaboration and consumer-facing functionality that value-based HCOs are demanding.

2nd Platform systems simply do not offer the agility, ease of access, or time to market of 3rd Platform technology that is needed in the rapidly changing business environment of value-based care. Forward-thinking healthcare organizations that recognize the need to be more responsive to market dynamics are increasingly looking to modernize their IT infrastructure by migrating their EHRs to converged infrastructure.

Benefits of Certified Converged Infrastructure and Migrating to Linux

Numerous HCOs employ converged infrastructure to speed application deployment, simplify operations, ensure compliance, reduce costs, and enable an agile, scalable infrastructure. Converged infrastructure is pre-engineered and integrates networking, servers, storage, and virtualization before delivery to the customer. This approach allows for quick, efficient, and flexible provisioning of these resources. Also, users can be separated from assets and applications and the devices they use to access them, thus enhancing levels of security across the entire infrastructure.

Converged infrastructure is delivered through multivendor partnerships as a complete system with a single SKU and a single vendor for support services including, but not limited to, ongoing maintenance. Integrated systems simplify IT deployment and enable HCOs to transform their businesses by improving agility, efficiency, simplicity, and control.

Similarly, there are several noteworthy reasons to migrate from Unix to Linux on VMware in an x86 environment. Key benefits include:

- **Modernizing the IT infrastructure.** Remaining on Unix locks healthcare organizations into older technology. Over the years, Linux has become an enterprise-grade, highly available, and reliable platform. Kevin Waterman, CIO of Buffalo Medical Group, commented, "Having infrastructure that is up to date and easy to update and keep current maximizes the ability to capture (meaningful use) incentives and meet performance targets."
- **Reducing costs.** Unix is a proprietary operating system (OS) with all the attendant costs associated with proprietary systems including licensing and support fees. In addition, there is a shortage of talented Unix administrators, so attracting and retaining them have become expensive propositions. In contrast, Linux is open source and runs on commodity servers, and with more Linux administrators available, the total cost of ownership of a Linux environment compares favorably to Unix.
- **Flexibility and virtualization.** Linux runs on any x86 infrastructure; Unix runs only on hardware from Sun, HPE, and IBM. Given the range of x86 options, it makes sense to consolidate to Linux rather than Unix. OS and server consolidation helps reduce complexity, increase IT staff efficiencies, and reduce costs associated with operating and maintaining multiple types of architectures. Now IT staff can be freed up to work on more high-value projects rather than manage unwieldy server farms.
- **Consistent management.** Running in a mixed OS environment has its challenges. Consolidating on Linux on VMware makes VMware management consistent across the board, making it easier, more efficient, and less error prone when it comes to managing the infrastructure.

EPIC RUNS ON DELL EMC VBLOCK CONVERGED INFRASTRUCTURE

Dell EMC Vblock Systems can be customized for Epic as well as other popular EHR systems, including McKesson and MEDITECH. The preconfigured Vblock Systems are tested and validated by the respective EHR vendor. Dell EMC ships a custom-configured Dell EMC Vblock System based on the hardware configuration guide from Epic within 45 days of an order, and the system can go live in 5 days or often even 48 hours after it arrives on the datacenter floor. The Vblock System can be customized to accommodate the unique requirements of the EHR system's architecture. Vblock Systems consist of Dell EMC storage, Cisco Unified Computing System (UCS) servers, Nexus network switches, MDS SAN switches, and VMware server virtualization software.

In 2015, Epic recognized the interest in its customer base to move from Unix to an x86 platform to achieve the benefits of virtualization. At the time, Epic had 350+ customers in North America, mainly in the United States, running on version 2012, 2014, and the new 2015 release. It is expected that a majority of new customers — approximately 60% — will move to Linux off of Unix servers for databases.

Children's Medical Center Dallas

Children's Medical Center Dallas is the flagship hospital campus of Children's Health, the eighth-largest pediatric healthcare provider in the nation. Children's Health system includes Children's Medical Center Dallas with 490 beds, Children's Medical Center Plano with 72 beds, 9 specialty centers, and 20 Children's Health Pediatric Group primary care practices. As a teaching hospital, it is affiliated with the University of Texas Southwestern Medical Center. The Children's Medical Research Institute at UT Southwestern has 69 researchers focused on cancer, birth defects, and metabolic diseases.

Children's Health

- Founded: 1913
- Key metrics in 2015:
  - $2.9 billion in revenue
  - 40 locations
  - 592 licensed beds
  - 7,000 employees
  - 1,120 physicians
  - The eighth-largest pediatric healthcare provider in the United States
  - Second busiest in terms of admissions and emergency department visits

Key Business Drivers for Change

The primary business drivers at Children's Health for migrating from AIX, the most commonly deployed Unix platform supporting Epic today, to Linux on a converged infrastructure platform were twofold and board driven:

- **Provide disaster recovery/business continuity capabilities.** Senior management promised the board that the hospital would have highly available disaster recovery capability for Epic by the end of 2015. Enhancing DR capabilities was seen as an opportunity in general, and the lack of a geographically redundant recovery plan for Epic systems was viewed as a risk. Disaster recovery was made easier using VMware vCenter Site Recovery Manager (SRM) or vSphere Replication. Another consideration was the size of the disaster recovery site, which was limited in terms of square footage size. Something with a small footprint would help the IT organization achieve its objectives, so physical form factor was also important.
- **Improve total costs.** In the long term, financial savings was the second strategic priority. Children's Health wanted to reduce operating spend through standardization on the x86 platform and virtualization in the datacenter. The hospital IT organization could also leverage x86 talent in the Dallas metro area.

Pre-Implementation: IT Challenges

Children's Medical Center Dallas began installation of Epic in 2007 in part to provide an enterprisewide single instance of the EHR system across the inpatient and ambulatory settings. Children's Medical Center Dallas campus partners – the UT Southwestern Medical Center and Parkland Health and Hospital System – were also in the midst of implementing Epic. With patients flowing back and forth between the facilities, it made sense to use the same EHR system.

Fast-forward to 2015. Children's Health initially bought the Vblock System for everything but the Cache database. When the AIX servers for the database came due for a refresh, the organization compared the $3 million price tag to refresh the AIX servers with the $1.6 million license fee to move to Linux. Hardware maintenance costs for an aging environment were clearly increasing and difficult to justify. In addition, the talent needed to support AIX was difficult to find; IT management was concerned about running the risk of not being deep enough in certain technical areas. Scaling the AIX environment would be expensive from a hardware, services, and talent perspective, so the decision was made to

move to an x86 environment. Children's Health was one of the first Epic customers to migrate a live AIX environment over to Linux.

Implementation Process: Migrating from AIX to Linux

In 2015, the IT organization started the conversion from AIX to Linux onto the Vblock System using Epic 2014 code. The migration began with the 12–15 non-production systems that enabled staff to hone their processes before embarking on the production systems. The first production environment to move to Linux was Epic EHR, so the project entailed more than just a hardware conversion. The second part of the project entailed deploying business continuity and disaster recovery capabilities.

The conversions required a new operational mentality. This methodical approach to scripting out the conversion has served the IT organization well not only for successful conversions of non-production and production environments but also to be prepared in the event the DR processes need to be run. The IT organization created a "runbook" that described step-by-step how to do each procedure. The resulting script is a living document and is adjusted as necessary.

Benefits Achieved

- **Increased performance.** One of the first things that users have seen as a benefit to converting to Linux on a converged infrastructure is performance. The process of nightly extract, transform, load (ETL) into the data warehouse is faster. Increased performance is a result of the flexibility to add memory and compute power, along with the move to flash-based storage systems.
- **Decreased complexity.** A converged infrastructure reduces the complexity of the environment. The IT team doesn't have to learn or be experts on all layers of the stack. Instead, it can focus on the Epic application layer.

Next Steps

As a result of the migration from AIX to Linux, a new support structure will be established to support the converged environment. Children's Health will be able to put talent to work in higher priority areas, and the organization will add more network resources to the datacenter teams, with Cisco and virtual networks and fabric experts working side by side. Ultimately, Children's Health is looking to create a full stack support team.

CHALLENGES AND OPPORTUNITIES

The market challenges that HCOs face help position vendors with the broadest portfolio of converged infrastructure solutions and experience in running mission-critical datacenters like Dell EMC and address an HCO's challenges to:

- **Reduce risk.** The decision to procure a new enterprisewide EHR system is more often than not a board-level decision because of the high cost of total ownership and the impact migrating to a new EHR system can have on patient care. Healthcare organizations cannot afford the risk of using untested, unproven solutions that run on a fragmented infrastructure. Healthcare organizations need to deploy their EHRs on a proven infrastructure that is designed to optimize application performance or provide high availability.

- **Comply with privacy and security regulations.** As more patient information is moved into EHRs and made accessible both inside and outside the organization via a range of devices, including mobile devices, the risk of a breach rises. New care delivery and reimbursement models require collaboration and access to patient information across medical trading partners, which are enabled by HIPAA-certified cloud-based clinical systems delivered as a service.
- **Ensure continuous operations.** Many healthcare settings are 24 x 7 operations requiring round-the-clock access to mission-critical clinical applications. In extreme situations, lack of access to essential patient health information could mean the difference between life and death. Thus uptime, computing performance, and reliability are critical considerations when evaluating healthcare IT.
- **Respond to cost pressures.** More than half of U.S. hospitals are operating in the red. Declining reimbursement rates by private and public payers are exacerbating an already precarious financial position for providers. Therefore, careful consideration of the total cost of healthcare IT ownership is essential. More efficient IT operations will enable HCOs to reinvest IT cost savings in more innovative technologies and meaningful use and accountable care applications.
- **Improve interoperability.** Interoperability challenges are further compounded because the EHR market is highly fragmented, with vendors offering a wide range of solutions on a variety of technology platforms for small, medium-sized, and large practices and hospitals. It is not uncommon for an integrated delivery system to have 10–20 different EHR products from nearly as many vendors as represented in its healthcare IT application portfolio. In addition to the various EHR products, wide-ranging clinical applications in inpatient and ambulatory settings across the continuum of care must be connected to establish fully operational integrated patient records.
- **Have access to a broad portfolio of technologies.** An extensive network of technology partners enables Dell EMC to customize Dell EMC converged systems to meet customer-specific requirements.

ESSENTIAL GUIDANCE

Converged infrastructure enables IT to be more responsive to the business needs of HCOs and execute strategic initiatives more quickly. Healthcare organizations looking to migrate to converged infrastructure should consider the following recommendations:

- **Present the value proposition to clinical and financial leadership.** Be clear about the expected results from the project, whether your organization is focused on ROI, care quality improvement, IT service levels and response times, productivity, application performance enhancement, or other goals.
- **Identify critical workloads and applications.** Workloads and applications are the critical pivot points for cloud and convergence decisions, so HCOs should evaluate which ones will have the highest impact and prioritize them to move to a converged infrastructure. In addition, HCOs should consider options for moving infrastructure to the cloud where appropriate.
- **Partner with vendors with a broad portfolio and healthcare expertise.** Singular portfolios versus complex portfolios will impact infrastructure decisions and datacenter design. HCOs should partner with vendors that have a broad partner ecosystem and that are committed to the healthcare industry. An extensive partner network is critical to putting together a preconfigured converged infrastructure system that will be flexible and meet the HCO's unique needs.

Selecting partners that are focused on the healthcare market and that understand the unique marketplace dynamics that challenge customers is critical to the successful deployment of a converged infrastructure. Healthcare providers should align with vendors that are dedicated to certified integrated infrastructure with market-leading technologies and professional services. Lean on vendors and resellers to be true partners.

- **Consider the financial stability of the vendor organization.** All the flexibility that a solution may provide will not matter if the vendor does not continue to sell and support the product.

Converged infrastructure systems have moved rapidly to mainstream use, with HCOs increasingly deploying mission-critical tier 1 applications on the converged infrastructure platform. Moving to a certified converged infrastructure improves an HCO's ability to focus on transforming business and clinical processes and ultimately creating IT-enabled services, such as analytics as a service, to support population health management and accountable care initiatives.

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