

LEVERAGING SERVER ARCHITECTURES TO WIN IN THE DATACENTRIC ERA

SUMMARY – DATA IS THE NEW CRUDE – INTELLIGENCE IS THE NEW GASOLINE

One of the trendy catchphrases for organizations going through digital transformation is “data is the new oil.” A more accurate phrasing of this statement is, “Data is the new crude oil and intelligence is the new gasoline.” An organization’s ability to transform petabytes of data into meaningful intelligence enables differentiation in the marketplace.

Data management is bigger than a database and analytics tools. It is the lifecycle management of data – from collection to archiving and beyond. It starts with the creation of raw (crude) data, continues through the transformation into the actionable derivative business need (intelligence), and moves on to storage for archival and historical purposes.

The data-management market evolved significantly from few “gold-standard” structured query language (SQL) relational database management systems (RDBMS) and analytics tools such as Oracle Database. Today, unstructured data analytics – the ability to glean intelligence from big, unstructured data stores – is more than hype. It is a differentiator. Enterprises are investing in tools such as SAP HANA, Domo, and Spark to help drive faster outcomes, yet it all still comes down to infrastructure. The degree to which an organization can produce intelligence and the speed at which they can do it is dictated by the underlying server technology.

In this world of data analytics, IT decision makers must first understand how their enterprise could benefit, and second, how they can maximize the value of this benefit through their infrastructure choices. How does intelligence drive the digitally transformed business? What impact does infrastructure play in the transformation from raw data to intelligence? How do companies like Dell EMC design infrastructure and technology to advance the data transformation process? This paper will explore these questions.

DATA IS EVERYWHERE, BUT INTELLIGENCE DRIVES THE BUSINESS

Nearly every organization collects more data than it did a year ago. On average, 2.5 quintillion bytes of data are generated every day¹ and does not appear to be slowing down with the proliferation of sensors and cameras and other devices that make up the internet of things (IoT) and industrial internet of things (IIoT).

Most enterprise IT organizations struggle to manage this onslaught of data. Business units require instant access to analyze and derive intelligence that informs actions in real time. It is no coincidence those organizations that have modernized through digital transformation are better prepared to capitalize on the current gold rush.

THEN AND NOW - IT'S ALWAYS BEEN ABOUT INTELLIGENCE

Business intelligence is nothing new. Retail giant Target was founded in 1962 based on founder John F Geisse's concept of upscale discount retailing. However, the company's study of key demographic shopping patterns and resulting store layouts led to its nationwide success. This study took years to complete and led to store redesigns, merchandising, and product placement that built Target's success even in an era of online shopping.

It is applied business intelligence like the example above that separates winners from losers. Take in as much raw data as possible. Transform it into intelligence. Analyze it. Act on it. And, do it all faster and more securely than the competition.

Today, the battlefield extends to the data center where servers power the business intelligence platforms that make up a successful data management practice. Target's study required an incredible number of resources to achieve success. This multi-year study could be condensed to days with minimal human intervention and a fraction of the resources using the technology and tools available today.

Business intelligence derived from raw data is the gasoline that fuels the successful organization. This is a reality everywhere, whether an organization is a retailer aiming to personalize shopper experiences or a smart city managing traffic based on an accident or event. In fact, manufacturing plants trying to achieve efficiencies by consolidating assembly lines are early adopters of analytics.

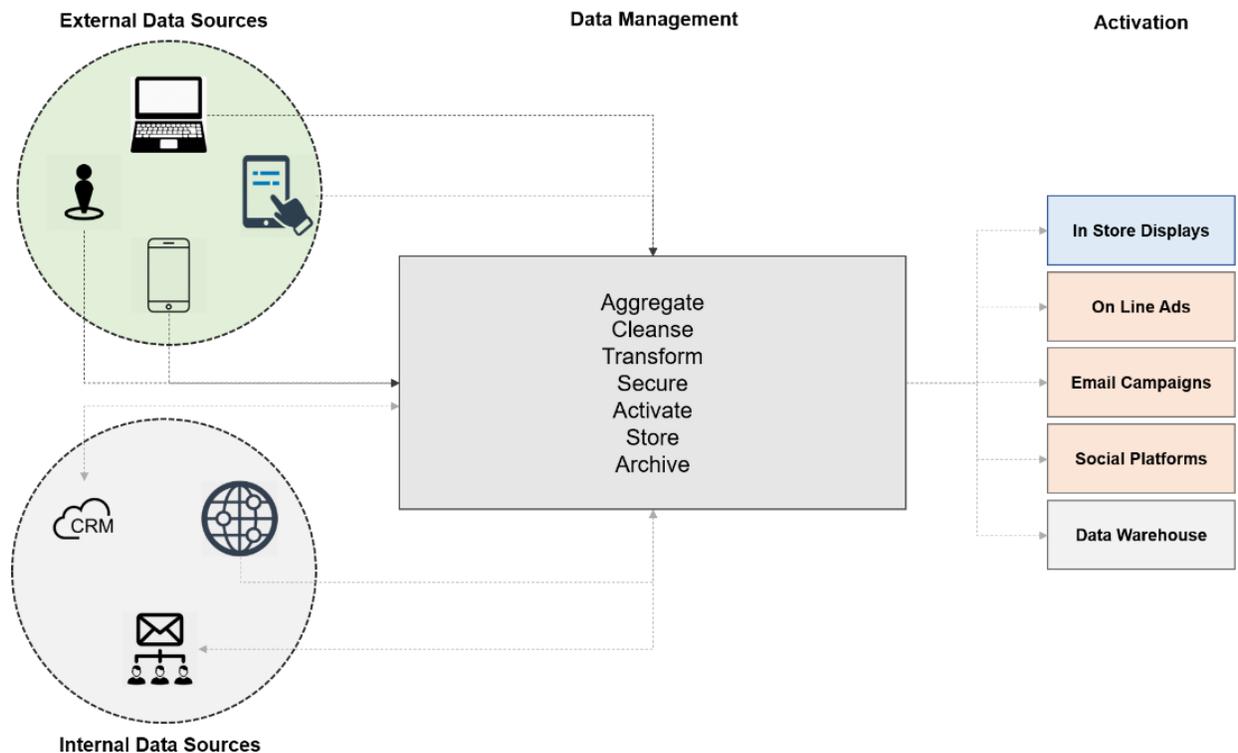
¹ https://www.domo.com/learn/data-never-sleeps-5?aid=ogsm072517_1&sf100871281=1

Data analytics tools can produce intelligence that manages power plants, health care, smart cities, and manufacturing plants when combined with the IIoT. This management produces results that save time, money and lives, every day.

HOW DATA TRANSFORMATION WORKS IN THE MODERN BUSINESS

Data management starts with the collection of massive amounts of raw data created every second from multiple sources. For example, take a shoe company creating an outreach campaign for its newest product. An effective campaign would reach the target demographic through the right channels, leading them to the preferred seller that has the product displayed in the proper location.

FIGURE 1: DATA MANAGEMENT IN THE REAL WORLD



Source: Moor Insights & Strategy

The above use case demonstrates the importance of a comprehensive data management solution to enable the digitally transformed organization. Real-time analytics engines must be employed to refine raw customer data into actionable

intelligence and these tools must coexist with (and support) the traditional data stores that are used in every enterprise for data storage and archival.

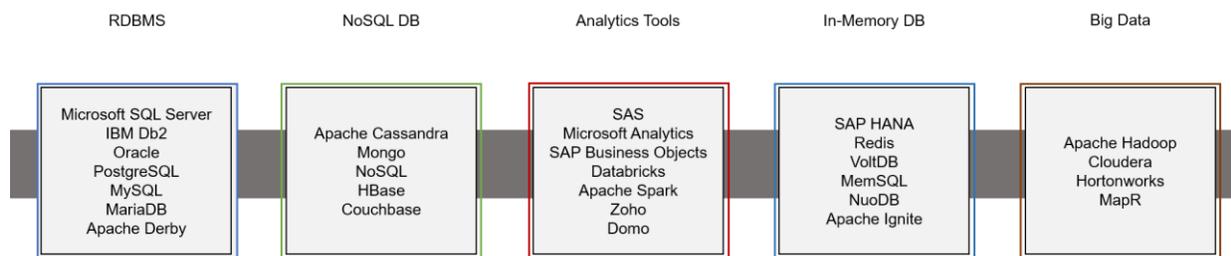
This process requires the real-time collection and transformation of data from multiple sources to feed multiple outputs. As such, speed is critical. The more accurately that a data management platform can identify the target demographic, the greater chance of overall success. The faster the data management platform can operate, the quicker ads can appear on social media platforms.

ANALYTICS – GETTING INTELLIGENCE RIGHT

Analytics is a critical component to a company’s data management strategy. The key to choosing the best analytics platform is understanding the needs of an organization’s environment. What are the use cases that will require the utilization of a data analytics engine? Is the data largely structured or are there multiple sources and data lakes to which the tool will need to connect? What is the output? These are all key questions, the answers to which can greatly inform choice.

The rise of IoT and edge computing has contributed greatly to the data headache that many IT organizations face today. Given the deluge of data being generated, it can seem near impossible to find the proverbial “needle in a haystack” through real-time analysis, but it is not. In fact, the needle has never been easier to find. But, the “how” is still complex. Analytics engines such as SAP HANA can access both structured and unstructured data sources to deliver datasets that enable finer contextual, data-driven decisions.

FIGURE 2 – THE DATA MANAGEMENT LANDSCAPE



Source: Moor Insights & Strategy

In a software-defined world, it may be easy to overlook the underlying hardware platforms that drive an organization’s analytics environment, but this can have big consequences. Data analysis can only transform data as fast as the underlying

hardware enables it. New technologies, such as Intel's Optane persistent memory, can greatly impact the performance of a query against a large dataset. Companies like Dell EMC that tailor server platforms for data management and analytics are worthy of consideration.

It is worth noting the importance of enabling technologies such as Intel Optane persistent memory, as this technology creates non-volatile memory stores that populate dual in-line memory module (DIMM) slots allowing for data locality and powerful performance gains. SAP has provided an update to HANA 2.0 (SPS 03) to optimize for Optane persistent memory. As an in-memory database, the affinity for Optane is obvious: faster analytics, quicker restart times, and several data-tiering enhancements.

DATA MANAGEMENT IN THE INTELLIGENCE-DRIVEN ORGANIZATION

Managing the needs and the wants of the modern business can often lead to reacting and responding in an ad hoc fashion, but temporary wins can result in long-term problems. Siloed and unmanageable data may ultimately be the downfall of an IT organization. Moor Insights & Strategy (MI&S) views three critical elements as vital to an effective data-management strategy

Holistic thinking wins the game

Consider the needs of the entire environment from the device to the edge to the core data center when choosing a data management platform. Intelligence is derived from many data sources and data types and data is collected and must be processed from the edge to the core data center. Finally, an organization must integrate data from multiple sources and in multiple formats to derive useful business intelligence.

Pragmatic adoption is key

New database and analytics distributions seem to hit the market on a regular basis. While a business unit may clamor for the latest unstructured analytics engine, simply fulfilling that request can lead to an environment that quickly becomes unmanageable with data sitting in many pools and in many different formats. Adoption of new technology can be important for many reasons, but a comprehensive vetting process is equally important.

Choose a data management platform solution wisely

A server hardware platform designed and tuned for the intelligence-driven environment and software and solutions that can integrate and extract intelligence from multiple data sources form a complete data management platform. An ideal solution also optimizes

tighter coupling of hardware and software and delivers performance gains and cost savings. The optimal platform also applies security methodologies that ensure data is protected along the edge-to-data-center journey.

IT ALL STARTS WITH INFRASTRUCTURE

The best analytics frameworks and applications can be severely hampered by outdated hardware. While the requirements of each organization are unique, universal truths exist regarding hardware capabilities that can drive greater performance in a data analytics environment. While this will be addressed in greater detail later in the paper, consider the following:

- Processor core count and per core performance are both critical factors. Put simply, more cores can crunch more data and a faster performing core crunches data faster.
- Processor optimizations, exposed through instruction set extensions, can provide significant performance gains in data analysis, if employed.
- Memory bandwidth and memory capacity are also critical. How fast data can be moved from memory to the cores (bandwidth) and the size of datasets that can be stored (capacity) have a significant impact on how quickly analytics jobs can be performed.
- Data locality is critical to overall performance. The closer data resides to compute, the shorter it must travel for analysis. For edge computing, server platforms should be located close to the origination of data and within those servers. Server platforms should employ storage class memory – the optimal configuration for locating data closest to compute. For example, the Dell EMC PowerEdge R840 or R940xa packaged with Intel's 2nd Generation Scalable Xeon Processors, married with Optane persistent memory, can deliver serious performance for the modern data analytics environment.

The selection of a solutions provider is equally important. Look for those with a depth of experience and a comprehensive end-to-end data management practice. All hardware is not created equal. When evaluating server solutions providers, MI&S believes there are a few considerations:

- Does the provider deploy the latest processor, memory, and storage technologies in its product portfolio?
- Does the provider have an established practice with a track record of success in data management including strong partnerships with key players?
- Can the provider offer comprehensive management and security that guarantees the reliability and safety of the data?

NEW POWEREDGE SERVERS – DESIGNED TO EXTRACT VALUE FROM RAW DATA

A robust data management and analytics strategy requires robust infrastructure. MI&S believes Dell EMC is a solutions vendor worthy of serious consideration for any organization deploying or refreshing its data management or analytics platforms. Dell EMC is recognized by companies of all sizes and across a number of verticals as the [number one server vendor in the world](#) and a leader in storage technologies. These organizations consider the PowerEdge portfolio their cornerstone. The company's breadth of experience informs a pragmatic design process that considers the range of deployment models and use cases for today's modern business.

DESIGNED FOR PERFORMANCE

The PowerEdge portfolio scales in performance from a single central processing unit (CPU), 1U form factors, to four CPU workhorses designed for high-end, data-management functions. The heart of the PowerEdge lineup sits in the two CPU and four CPU range. Equipped to support the 2nd Generation Intel Scalable Xeon processor (codenamed "Cascade Lake"), these servers also offer support for the new Intel Optane persistent memory configuration.

Two of the more interesting Dell EMC PowerEdge servers for the data management environment are the R840 and the R940xa. The richness of CPU cores to memory to storage and the ability to employ storage class memory makes them compelling. While MI&S has not tested the performance of these servers, we have reviewed their specs and they should be able to support the most demanding data management needs.

FIGURE 3: THE DELL EMC POWEREDGE R840 AND R940XA

	PowerEdge R840	PowerEdge R940xa
Form Factor	2U	4U
Processor/Sockets/Cores	<ul style="list-style-type: none"> • 2nd Generation Intel Xeon Scalable processors • Up to 4 processors • Up to 112 cores 	<ul style="list-style-type: none"> • 2nd Generation Intel Xeon Scalable processors • Up to 4 processors • Up to 112 cores
Memory Capacity	<ul style="list-style-type: none"> • 48 DDR4 DIMM Slots, support for RDIMM/LRDIMM - up to 6 TB max • Up to 12 NVDIMM – up to 384GB 	<ul style="list-style-type: none"> • 48 DDR4 DIMM Slots, support for RDIMM/LRDIMM - up to 6 TB max • Up to 12 NVDIMM – up to 384GB
Storage	<ul style="list-style-type: none"> • SAS/SATA & NVME – up to 184 TB 	<ul style="list-style-type: none"> • SAS/SATA & NVMe up to 245 TB
Accelerator Support	<ul style="list-style-type: none"> • Up to 2 double-width GPUs OR <ul style="list-style-type: none"> • Up to 2 full-height FPGAs 	<ul style="list-style-type: none"> • Up to 4 double-width GPUs OR <ul style="list-style-type: none"> • Up to 8 single-width, full-height FPGAs
Embedded Management	<ul style="list-style-type: none"> • iDRAC9 with Lifecycle Controller • iDRAC9 Direct • iDRAC RESTful API with Redfish • Quick Sync 2 BLE/wireless 	<ul style="list-style-type: none"> • iDRAC9 with Lifecycle Controller • iDRAC9 Direct • iDRAC RESTful API with Redfish • Quick Sync 2 BLE/wireless
Management Software	<ul style="list-style-type: none"> • OpenManage Enterprise • OpenManage Essentials • OpenManage Mobile • OpenManage Power Center 	<ul style="list-style-type: none"> • OpenManage Enterprise • OpenManage Essentials • OpenManage Mobile • OpenManage Power Center
Security	<ul style="list-style-type: none"> • TPM 1.2/2.0 • Cryptographically signed firmware • Secure Boot • System Lockdown • Secure Erase 	<ul style="list-style-type: none"> • TPM 1.2/2.0 • Cryptographically signed firmware • Secure Boot • System Lockdown • Secure Erase
Workload Affinity	<ul style="list-style-type: none"> • Data analytics • Data intensive applications 	<ul style="list-style-type: none"> • GPU Accelerated Database • Data & compute intensive workloads

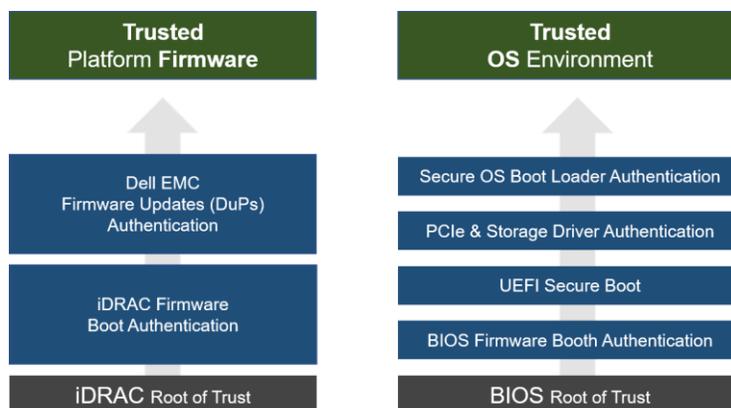
Source: Moor Insights & Strategy

DESIGNED FOR SECURITY

Protecting data has always been a top priority and the biggest challenge for IT organizations of all sizes. As the data explosion continues to proliferate and the edge continues to take shape, these challenges only grow. Data in the wild is data that can be exploited. Protection is not just a nicety, it is a “must have” requirement.

Security on Dell EMC PowerEdge servers spans from silicon to firmware to physical protections. PowerEdge servers have a silicon root of trust that assures an immutable boot image, which prevents the more insidious rootkit attacks from embedding in the system. PowerEdge security also verifies signed firmware and physically protects ports.

FIGURE 4: SILICON-BASED SECURITY



Source: Moor Insights & Strategy

Protection is only one-half of the equation when it comes to cybersecurity. What completes the PowerEdge security offering is the ability to quickly detect any intrusions and immediately respond by removing the threat and returning the Dell EMC PowerEdge server to its last known good state.

Dell EMC’s refresh of its PowerEdge server portfolio in support of Intel’s 2nd Generation Scalable Xeon launch enhances an already strong security offering. The new family of PowerEdge servers includes comprehensive silicon-based fixes that tighten Xeon security and offer advanced threat protections. Additionally, Dell EMC employed an enterprise key management system to simplify the encryption management of hard drives that reside in PowerEdge servers. Dell EMC’s approach to security appears to span supply chain, silicon and hardware, with an emphasis on data protection. PowerEdge delivers high confidence to organizations concerned with security.

DESIGNED FOR RELIABILITY

A fast-performing data management platform means nothing if that performance is unreliable. Numerous factors affect performance, including an incorrectly tuned BIOS, outdated firmware and drivers, and operating systems and patch versioning not optimized for the data stores and analytics engines running in the environment. In an intelligence-driven business, not only can things “not break,” things cannot even slow down.

Managing server environments is difficult and time consuming. Managing infrastructure consumes an inordinate amount of an IT organization's time and this demand will increase as new data environments and analytics tools are introduced into the business.

MI&S finds the Dell EMC OpenManage Enterprise systems management console, with iDRAC (Dell EMC's baseboard management controller) compelling for its ability to simplify management of the infrastructure lifecycle without sacrificing features. The strategy of OpenManage Enterprise is evident in its software design—reduce the human touchpoints with provisioning, monitoring, and maintaining servers. Essentially, “rack-it” and go.

While performance is king for the digitally transformed business seeking a competitive edge, performance will be impacted by the operating condition of the supporting infrastructure. As a result, MI&S suggests taking a critical look at how an environment is deployed, provisioned, optimized, and managed. Look for management consoles that are simple, thorough, and able to scale to the growth and complexity of needs of the business.

THE BUILDING BLOCKS FOR THE BROADER DELL TECHNOLOGIES IP PORTFOLIO

Data management and analytics environments exist in larger IT environments that range from general purpose infrastructure to the cloud to the edge and beyond. Having a single family of infrastructure (server, storage, networking, etc.) to support the needs of the environment may enable optimal performance and simplify management greatly.

The PowerEdge lineup is part of a broader Dell EMC infrastructure portfolio that ranges from hyper-converged infrastructure (HCI) solutions to reference architectures and bundled solutions. The portfolio powers the enterprise from the core data center to the edge. The company's full range of point products and solutions makes Dell EMC an end-to-end IT infrastructure provider.

Interestingly, Dell extends support of data management environments through its Ready Solutions portfolio, a family of optimized and preconfigured solutions. Ready Solutions may reduce the time-to-value equation when deploying database environments such as Microsoft SQL Server or SAP HANA. Similarly, data analytics environments may be operational in far less time and with greater simplicity. If these Ready Solutions work as designed, IT organizations can see real benefits and enterprise-like capabilities which can extend to IT organizations with fewer resources.

CALL TO ACTION

Data is the new crude. Intelligence is the new gasoline that fuels the modern business. Organizations must learn how to extract and store data. But data is unusable in this crude form. It is only when organizations refine that data into gasoline that it delivers value. The winners in this new economy will be those organizations that can collect, transform, and interpret data correctly, quickly, and securely. The underlying server technology from companies such as Dell EMC plays a critical role in data transformation.

The data management market continues to evolve at an incredible pace. Not long ago, Oracle was the king of the database management system (DBMS) market and analysis came by way of monthly and quarterly reports printed and reviewed by stakeholders.

In today's world, Microsoft and SAP have a strong play in the structured data world. However, these environments must coexist and integrate with the flood of unstructured data hitting the enterprise. IoT, IIoT, and edge computing have increased the amount of generated data exponentially. This raw, unstructured data is sitting in repositories and data stores across the enterprise waiting to be extracted and refined.

The smart IT organization invests in software and technology that bridges the structured and unstructured data realms. These investments enable smarter intelligence, faster. In turn, this intelligence is leading to faster outcomes in the digitally transformed business: faster routing of traffic based on road conditions; personalized retail shopping experiences; faster and more accurate diagnoses and care for patients; and cleaner water. The list can go on.

The smarter IT organization considers infrastructure the cornerstone of its data management and analytics strategy. Without the right infrastructure, businesses will never realize the full benefits of real-time analytics. Unsecure hardware that lacks tuning for data management will lead to substandard performance of data easily exploited. Ultimately, infrastructure that is not data-optimized comes at a cost and that cost can be measured in higher total cost of ownership (TCO) for IT and lost business for the organization.

MI&S believes the newest Dell EMC PowerEdge servers are worthy of serious consideration for any business seeking to benefit from modern data management platforms. Dell's solutions enable a synergy across the data management operating environment from CPU to server to operating system and applications.

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