

# DELL TECHNOLOGIES: READY FOR ARTIFICIAL INTELLIGENCE LEADERSHIP

COMPANY COMBINES TECHNOLOGY WITH INDUSTRY EXPERTISE TO DRIVE RESULTS

## EXECUTIVE SUMMARY

Artificial Intelligence (AI) is one of today's fastest growing technologies. Used to derive valuable insights from mountains of data, AI solves problems far more efficiently and accurately than was previously possible with traditional programming techniques. AI is transforming science and businesses around the world from cancer research to virtual assistants to autonomous vehicles.

Initially led by universities, social media, e-commerce, and search service providers, due to the availability of data, the affordability of compute and the maturity of the algorithms and models, the use cases for AI technologies are now expanding into enterprises and governments. Yet, while roughly half of all enterprises intend to deploy, many aren't sure where to begin, what data they need, or what infrastructure solutions and technologies will be required. Consequently, many organizations face daunting challenges as they consider launching AI initiatives. Selecting projects with attractive risk/reward ratios, preparing and possibly acquiring the required data sets, and mastering new technologies all require hard-to-find expertise.

This paper explores Dell Technologies' (Dell) capabilities to address these challenges. Based on Moor Insights and Strategy (MI&S) assessment and conversations with customers, we believe Dell is well positioned to help organizations spanning enterprise, small business, and the public sector to develop and run AI applications, regardless of the organization's level of expertise.

## A PRACTICAL APPROACH TO THE AI JOURNEY

The Dell family of businesses has considerable expertise in creating better business outcomes and innovation through data – the way it is accessed, catalogued, stored, protected, utilized, and put through its paces as part of an AI-driven process or algorithm. Further, the company's breadth of industry expertise spans many sectors, including finance, healthcare, telecom, various start-ups, and supercomputing sites and more. Dell built its AI strategy and portfolio to support AI and machine learning (ML) innovations from those experiences, resulting in an organization that can:

- tailor offerings to the customer's needs, wherever they may be on their AI journey, to support a practical AI roadmap to achieve business objectives;
- offer an end-to-end IT portfolio of solutions that bring AI and ML innovations to bear, spanning servers, storage, networking, software, services, and solutions for AI; and
- deliver bundled Ready Solutions for AI that can simplify configuration and management to accelerate time-to-value.

## AI FOR EVERYONE

AI, which encompasses ML and deep learning (DL), is driving the capabilities of machines to imitate intelligent human behavior. These behaviors can include analytic level functions, DL, and autonomous systems/functions. Selecting the right technology to build this capacity depends on possessing an understanding of:

- the problem/opportunity being addressed and the metrics of interest to gauge progress;
- the nature and availability of the data that machines leverage to recognize patterns and “learn” overtime to make autonomous decisions; and
- the level of skills and expertise the organization possesses or lacks.

As a result, the domain breadth can be vast and complex, but there are some commonalities among customer groups. Dell recognizes at least three different customer profiles, each distinct and each demanding a different level of AI technology and services: start-ups, enterprises, and high-performance computing (HPC) customers.

### **AI for Today's Start-ups**

Today's AI-focused start-ups typically possess both the AI expertise and industry domain knowledge needed to craft high-value solutions to problems from process automation to analytics of unstructured data that have previously been difficult to address. These companies often start with smaller development platforms such as high-performance workstations, then add scalable infrastructure needed for deployment.

Dell recognizes these start-ups are the experts and do not need a lot of handholding on the data, ML, or DL, but may benefit from pre-configured hardware and software stacks that can speed time-to-value. While these firms may start with cloud-based AI services to develop their models to ease access to new hardware and software, they typically migrate to hybrid or on-premises (on-prem) infrastructures over time to minimize cost

and data movement when ramping production. The locality of these AI systems and services is tied back to where the data lives. So-called “Data Gravity,” which is the amount of data at any given location, makes it too hard to migrate and drive AI algorithms and compute closer to the data. Organizations will soon begin to recognize the data they own is what drives business value going forward. This is why hybrid and on-prem AI solutions are becoming vital to succeed.

Good start-up examples which Dell has supported are AeroFarms, Zenuity, and OTTO Motors, each of which partnered with Dell EMC to build AI solutions. [AeroFarms](#) is an agro start-up with a multi-spectral camera mounted above the harvesting table. Dell works with AeroFarms to automate image recognition and classification to adjust nutrients, light, and other factors to improve crop yield, taste, and texture. [Zenuity](#) is a joint venture of Volvo cars and AutoLiv (Veoneer) and works to accelerate the advent of driver assistance and autonomous driving technologies. [OTTO Motors](#) uses an AI system based on Dell solutions that can predict what will be sold within 30 days with 90 percent accuracy, enabling the company to automatically purchase approximately 200,000 items per month from third-party brands with no human intervention.

### **AI for Enterprises**

Enterprises and government organizations typically possess large data repositories but may lack the expertise to extract value beyond using big data approaches developed over the last decade. These organizations typically need to start with relatively simple and practical projects with which they can build expertise and then ultimately tackle more advanced projects and technologies. Starting the journey to an AI-enabled enterprise with a moonshot approach, such as completely revamping patient treatment protocols or building an end-to-end customer service bot, rarely ends well. Rather, organizations should start with ML extensions to existing applications, then build AI value-added services and products based on DL where appropriate. MI&S has published a detailed research paper for Dell customers that might be a helpful guide.<sup>1</sup>

To help these customers leverage AI in sensible steps and deliver business value, Dell offers a rich portfolio of hardware, software, solutions, and services that it can tailor to each unique customer situation.

A good Dell enterprise customer example is [Mastercard](#), which completes 165 million financial transactions per hour against 1.9 million rules, to protect customers from fraud in real-time using data analytics and AI solutions. Mastercard’s knowledge and use of

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<sup>1</sup> [Moor Insights & Strategy: The AI Starter Guide for IT Leaders](#)

data enabled them to create an entirely new business called [Mastercard Advisors](#). The organization's AI solutions today also include fraud prevention, anti-money laundering and biometrics identification. <sup>2</sup>

### **AI for HPC Installations**

HPC and research organizations are similar to a large start-up in that they already possess deep expertise in AI technologies and domain expertise in their specific sciences. However, HPC installations require infrastructure at significant scale unlike start-ups. These deployments reach thousands of nodes that require low-latency networking and massive storage infrastructure with the management tools needed for the care and feeding of these valuable resources. Dell brings a wealth of experience and technologies to these environments born from decades of HPC engagements in research and industry, having built and supported some of the world's largest and most technologically advanced HPC installations.

One of many HPC examples is the University of Cambridge which is dedicated to furthering the development of impactful research via collaboration with private industry, technology companies, and other members of the HPC and AI community. The university is one of Dell's [HPC and AI Innovation Centers](#). Another HPC example is MIT Lincoln Labs. which has been using AI/ML/DL on Dell solutions to analyze medical imaging for faster diagnosis and help government agencies with image recognition.

## **DELL TECHNOLOGIES PORTFOLIO FOR AI**

Whether buying systems for ML or DL, Dell offers what we believe may be the industry's richest portfolio of IT hardware. Dell's products span the range of AI deployments, including Internet of Things (IoT) gateways, workstations, servers, storage, Ready Solutions for AI, and supercomputers. Dell Services include AI Customer Solutions Centers, AI and HPC Innovation Labs, and more. Consequently, Dell is well equipped to meet the needs of practically any organization, large or small, and any AI application.

### **Hardware for ML**

Standard two-socket servers will meet most ML projects' needs making the Dell PowerEdge R740 or R740xd ideal ML platforms. These general purpose 2U servers provide future-proofing for subsequent DL projects, supporting accelerators and plenty

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<sup>2</sup> [Fighting fraud the smart way – with data analytics and artificial intelligence](#)

of mass storage in a 2U chassis. For larger models, the xd version supports extra storage capacity.

For a desk-side workstation, the Dell Precision 5820 and 7920 towers offer cost effective platforms for development and moderate-size deployments with one or two high-performance Intel Xeon central processing unit (CPUs), NVIDIA graphics processing unit (GPUs), up to ten storage devices, and plenty of memory.

### **Hardware for DL**

DL is incredibly compute-intensive that almost always requires fast GPUs, especially for the training phase. Dell PowerEdge C4140 supports the needs for scalable server solutions needed to train production deep neural networks. Each C4140 supports up to four NVIDIA Tesla V100 (Volta) GPUs interconnected with NVIDIA NVLINK 2.0 fabric. Eight or more C4140s can be clustered for larger scale product models, delivering up to 500 petaFLOPS of ML performance. For development, the PowerEdge T640 provides a desk-side or rackable server that supports up to four GPUs for performance-demanding applications.

### **Ready Solutions for AI**

Dell EMC introduced pre-configured Ready Solutions for AI to simplify the configuration process, lower costs, and speed deployment of distributed multi-node ML and DL clusters. These integrated systems come optimized with hardware, software — including a Dell EMC-created Data Science Provisioning Portal — and services. This class of offerings is relatively new in the market, which we believe helps Dell EMC stand out as a vendor who understands the technology and is simplifying the job for the AI practitioner. See our comments on these solutions in [this video](#).

### **Dell EMC Storage for AI**

Storage performance is critical for ML projects to create a balanced solution and Dell EMC offers a broad portfolio of all-flash and hybrid storage products that can meet the demanding requirements of AI. In fact, we believe Dell EMC has perhaps the industry's broadest range of storage solutions, including high end storage with Isilon and ECS and distributed storage solutions with NFS and Lustre.

### **Dell EMC Services for AI**

Dell EMC offers fixed-scope and project-based services to help their customers get up to speed in AI, ML, and DL. The company has developed and deployed state-of-the-art solutions in almost every industry vertical with a focus on healthcare, financial services,

telecommunications, utilities, and media entertainment. Dell's practice is comprised of experienced data scientists who can help design models and algorithms and prepare data to be processed in popular frameworks. While Dell's fast servers and storage are the engines for AI, Dell recognizes data is the fuel which requires preparation and tagging for AI.

## CONCLUSIONS AND RECOMMENDATIONS

Dell offers an impressive portfolio of products and services for AI, all born from direct experience with its client base. We believe the new Ready Solutions for AI are a cut above the competition with integrated hardware and software stacks to speed time-to-solution. Thus, Dell Technologies offers what many vendors put on the shelf from today's technologies and invests in new technologies and writing software. The company also provides integration that we believe will keep them in front as the AI market continues to evolve. For those organization struggling with their AI initiatives or needs fast hardware, we believe Dell can help accelerate time to concrete business results with practical AI.

For more information, visit: [DellEMC.com/AI](https://DellEMC.com/AI) and [DellTechnologies.com/AI](https://DellTechnologies.com/AI).

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