

# Dell EMC Ready Bundle for HPC

HPC solutions that match the unique needs of a wide variety of enterprise workloads

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## Advancing HPC

## Democratizing HPC

## Optimizing HPC

## Get answers, faster

The advantage in today's marketplace goes to the data-driven enterprise. For many organizations, HPC is — or is becoming — an important source of competitive advantage. An optimized HPC solution delivers the throughput and capacity needed to manage the rapid data growth and increased workload demands presented by enterprise workloads. This allows you to capitalize on emerging trends, such as the Internet of Things (IoT), high-performance data analytics (HPDA), high-frequency trading, risk analysis, fraud detection, and motion picture animation and special effects — just to name a few.

With the Dell EMC Ready Bundle for HPC, you can quickly develop an HPC solution that matches the needs of the complex applications that drive your success. Dell EMC is committed to advancing, democratizing and optimizing HPC so organizations like yours can dream bigger and act faster than ever before.

### Advancing HPC

Dell EMC has the expertise, technology and partnerships to advance the state of the art for HPC solutions — from the workgroup to the TOP500. With Dell EMC, you can tap into a world-class team of industry experts with the domain expertise to design HPC solutions from desktop to petaFLOP. You can also plug into our HPC Innovation Lab — dedicated to cutting-edge research and development — or one of our many HPC Innovation Centers around the world. This helps you obtain a custom-built solution, fueled by user-inspired innovations that Dell EMC has developed while creating solutions for some of the world's largest service providers.

### Democratizing HPC

Dell EMC HPC solutions enable enterprises to accelerate your HPC-fueled initiatives. With Dell EMC, you can get answers faster — with a simplified design, configuration and ordering process that takes a matter of hours instead of weeks. You'll also benefit from a domain-specific design tuned by Dell EMC engineers for your specific workloads using flexible, industry-standard building blocks. And you can enjoy the confidence of tested and validated solutions architected by Dell EMC engineering with a single point of contact for services and support.

### Optimizing HPC

Our robust portfolio of products and services is optimized for HPC and delivered by a company that will be there for you over the long haul. With Dell EMC, you can select from a price/performance optimized portfolio that includes what you need for HPC — Dell EMC is the only vendor with an HPC portfolio that spans customer needs. You can also take advantage of Dell EMC management and orchestration software to optimize utilization, including hybrid cloud. Finally, enjoy a range of HPC services, from deployment and warranty to financial services.

## Industry-specific Dell EMC Ready Bundles for HPC

For more information on Dell EMC Ready Bundles for HPC for specific industry verticals, reference the solution overviews for:

- Dell EMC Ready Bundle for HPC Research
- Dell EMC Ready Bundle for HPC Life Sciences
- Dell EMC Ready Bundle for HPC Digital Manufacturing

## Typical HPC workloads

### The enterprises of tomorrow are adopting HPC today

No matter what industry you're in, HPC is changing the landscape for small, medium and large enterprises. The following are a selection of common workloads that are transitioning from traditional servers to HPC.

#### IoT → IQT

Dell EMC believes that getting value from the IoT means making things smarter. And smarter. And smarter. Dell EMC helps you move more artificial intelligence (AI) closer to the edge where data is created, then send the most relevant intelligence to the core, where thousands of data streams are correlated, and the most meaningful information is curated, at lightning speed. You'll be able to take advantage of real-time data analytics you can implement right away, as well as data refinement and optimization.

[Learn more about Dell EMC IQT.](#)

#### High-performance data analytics

Simply stated, high-performance data analytics (HPDA) is the practice of applying HPC resources to big data analytics. As data sets grow and the competition becomes more data driven, you can turn more of your data into actionable insights with HPC-enabled analytics for workloads that are too complex and too time-critical for traditional servers.

#### Oil and gas: geosciences and geoengineering

Dell EMC HPC solutions fuel the algorithms that will revolutionize oil and gas exploration by precisely pinpointing elusive oil and gas reserves. These workloads include seismic analysis, oil services, and reservoir modeling and can also include mining, natural resource management, geographic information systems (GIS) and mapping.

#### Financial services institutions

HPC will help you process trades and transactions faster, and determine your financial risks and opportunities. Economic and financial modeling workloads include econometric modeling, portfolio management, stock market and economic forecasting, financial analysis, high-frequency trading (HFT) and fraud detection.

#### Digital content creation and distribution

HPC powers the media that captures the world's attention. Digital content creation and distribution workloads include 2D and 3D animation and special effects, film and video editing and production, multimedia authoring, image rendering, content management and distribution, and large-scale games.

### Shipping logistics/smart cities

Whether you need to track and optimize deliveries or route emergency services as efficiently as possible, HPC provides the computational power to run the complex algorithms that get people and things to the right place at the right time when there's no time to spare.

### Research

Get the power to address complex research challenges such as handling massive amounts of simulation and machine-generated data from sensor systems and scientific instruments; dealing with complex algorithms for modeling, rendering and analysis; and managing the time-criticality of research projects.

### Life sciences

Harness HPC solutions to help you handle the latest generation of complex, compute-intensive algorithms to provide faster and more accurate outcomes for workloads such as genome sequencing, handling massive amounts of data produced by modern lab equipment, and working toward predictive simulation for precision medicine (PM).

### Digital manufacturing

Produce more sophisticated products in shorter timeframes at lower costs by using HPC as a key enabler of simulation-driven prototyping and testing workloads such as structural analysis, aerodynamics, computational fluid dynamics (CFD), and computer-aided engineering and design (CAE/CAD).

## Do any of these challenges sound familiar?

**“Designing an HPC solution is outside our core expertise.”**

HPC depends on each server, interconnect and storage component being set up and configured properly. Power, cooling, space and management need to be taken into consideration when designing a solution. And software licensing costs are greatly affected by solution design. That's why properly deploying a cluster and storage can be a massive investment of time and resources with an increased chance for errors. Dell EMC has been a leader in creating HPC solutions — regardless of size or complexity — that deliver fast setup with a wide range of optional services for optimizing HPC investments. With proven success in thousands of implementations worldwide, you can be confident with Dell EMC as your partner.

**“HPC seems out of reach for an organization of our size.”**

Designing, configuring and ordering an HPC solution that's tailored for your unique requirements may seem like a daunting task — especially if you lack internal IT resources and expertise. The Dell EMC Ready Bundle for HPC speeds time to production and helps small, medium and large enterprises achieve your HPC goals with domain-specific designs built on tested and validated industry-standard building blocks with a single point of contact for services and support.

**“Optimizing an HPC solution is complex.”**

Finding the right compute mix for optimum performance can be difficult, as the use and power of coprocessors and accelerators expand. In addition, data movement, mapping and management are becoming more crucial as data sets continue to grow at a rapid pace. What’s more, the different aspects of HPC solutions are interconnected and impact the overall success, performance and productivity of the solution: high performance, high reliability, access protocols, scalability, ease-of-management, price, power and so on. Dell EMC makes it easy to customize a solution to meet performance requirements with a range of available options. Once selected, your solution can be tuned by Dell EMC engineers and industry experts for your specific workloads.

**Customer success stories**

**Austrian Institute of Technology**

<b>80% virtualization</b> eases management	<b>98% of use cases met</b> with client devices	<b>15 IT staff</b> meet the needs of 1,000+ researchers
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Read the case study: [The Knowledge Factory in the Heart of Europe.](#)

**Sensus (energy/utilities)**

<b>17 million</b> smart data points	<b>&lt;1 minute</b> real-time queries on 200TB of data	<b>Instant processing</b> of a customer’s full data set, compared to 1–2 weeks
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Read the case study: [Sensing problems before they occur, with big data analytics.](#)

**Nissan® Motor Company**

<b>93% reduction</b> in backup times	<b>20X more capacity</b> with 40TB available storage	<b>30 hours → 2 hours</b> to backup 1TB of data
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Read the case study: [Gearing up for the Right IT.](#)

## Dell EMC solutions

The base configuration shown in the following table serves as a starting point for your solution. Dell EMC engineers will assist you with designing an HPC solution for your specific needs.



### Dell EMC Ready Bundle for HPC technical specifications

<b>Servers / processors</b>	<b>Head / master nodes</b>	<b>Choice of:</b> PowerEdge R440*, R430 PowerEdge R640, R630 PowerEdge R740, R730 PowerEdge R740xd, R730xd	PowerEdge R6415* PowerEdge R7425*, R7415* PowerEdge M640*, M630 M1000e, M630 VRTX
	<b>Compute nodes</b>	<b>Choice of:</b> PowerEdge R440*, R430 PowerEdge R640, R630 PowerEdge R740, R730 PowerEdge R740xd, R730xd PowerEdge R940, R930 PowerEdge R6415* PowerEdge R7425*, R7415* PowerEdge M640*, M630 M1000e, M630 VRTX	PowerEdge M830 PowerEdge C4140*, C4130 PowerEdge C6420, C6320 PowerEdge C6320p PowerEdge FC430 PowerEdge FC640*, FC630 PowerEdge FC830
	<b>Processors</b>	Intel Xeon Scalable Processors	
	<b>Accelerator nodes</b>	<b>Choice of:</b> PowerEdge C4140*, C4130 (up to 4 double-width GPUs) PowerEdge R740 (up to 3 double-width GPUs)	<b>Choice of Accelerators:</b> NVIDIA® Tesla® V100 (SMX2 and PCIe), P100 (SMX2 and PCIe), P40, P4, K80
<b>Operating systems</b>	<b>Head nodes</b>	Red Hat® Enterprise Linux® (RHEL) 7.4 (2 or 4 socket)	
	<b>Compute nodes</b>	RHEL 7.4 for HPC Compute Node (2 or 4 socket)	
<b>Cluster management</b>		Bright Cluster Manager®	
<b>Networking</b>		Dell EMC Networking H-Series Edge Switches based on the Intel® Omni-Path Architecture InfiniBand® interconnect and FDR and EDR switches Ethernet adapters and switches	
<b>External storage</b>	<b>NFS</b>	Dell EMC Ready Bundle for HPC NFS Storage	
	<b>Lustre®</b>	Dell EMC Ready Bundle for HPC Lustre Storage	
	<b>Isilon</b>	Dell EMC Isilon Scale-out NAS Storage	
<b>Systems management</b>		Dell EMC Deployment Toolkit (DTK) 6.1 (for 14G servers and 13G servers — sustaining only)	
		Dell EMC OpenManage (OM) 9.1 (for 14G servers and 13G servers)	

\*Available Q1 CY18

## Solution overview

Winner of the coveted HPCwire Editors' Choice Award for Best use of High Performance Data Analytics.<sup>11</sup>

[Dell EMC PowerEdge Servers](#) optimize performance across the widest range of applications with highly scalable architectures and flexible internal storage.

[Dell EMC Ready Bundle for HPC NFS Storage](#) is reliable, easy to administer and has very good performance within certain boundaries.

[Dell EMC Ready Bundle for HPC Lustre Storage](#) allows customers to tap into the power and scalability of Lustre with simplified installation, configuration and management features.

[Dell EMC Isilon Scale-Out NAS Storage](#) is flexible storage that provides large capacity and high performance. Powered by Intel Xeon processors, Isilon solutions are ideal for demanding enterprise file workloads.

[Bright Cluster Manager for HPC](#) lets customers deploy clusters over bare metal with a management view that spans the hardware, operating system, software and users.

## Why Dell EMC?

The combination of Dell and EMC brings together two industry-leading companies with strong reputations for value and innovation. Dell EMC holds leadership positions in some of the biggest and largest growth categories in the IT infrastructure business, and that means you can confidently source your IT needs from one provider — Dell EMC.

- #1 fastest growing provider of Intel Enterprise Edition for Lustre deployments<sup>1</sup>
- #1 in both number and size of XSEDE HPC systems for U.S. open science<sup>2</sup>
- #1 fastest supercomputer on the African continent<sup>3</sup>
- #1 converged infrastructure<sup>4</sup>
- #1 in traditional and all-flash storage<sup>5</sup>
- #1 virtualized data center infrastructure<sup>6</sup>
- #1 cloud IT infrastructure<sup>7</sup>
- #1 server virtualization and cloud systems management software (VMware®)<sup>8</sup>
- #1 in data protection<sup>9</sup>
- #1 in software-defined storage<sup>10</sup>

<sup>1</sup> Dell EMC press release, "[Dell Innovation to Democratize High Performance Computing and Accelerate Mainstream Adoption](#)," November 2015.

<sup>2</sup> Dell EMC has the most systems in XSEDE, including the largest system. Systems include SDSC Comet, SDSC, TACC Jetstream, TACC Stampede, LSU SuperMIC and TACC Wrangler. TACC Stampede is the largest system in XSEDE. See "[XSEDE Resources](#)."

<sup>3</sup> The Next Platform, "[South African Lengau System Leaps Towards Petaflops](#)," June 2016.

<sup>4</sup> IDC WW Quarterly Converged Systems Tracker, Q1 2017, June 2017, Vendor Revenue.

<sup>5</sup> IDC WW Quarterly Enterprise Storage Systems Tracker, September 2017, Vendor Revenue — EMC Q2 2017.

<sup>6</sup> Dell EMC Annual Report, 2015.

<sup>7</sup> IDC WW Quarterly Cloud IT Infrastructure Tracker, April 2017, Vendor Revenue — EMC Q4 2016.

<sup>8</sup> IDC WW Virtual Machine and Cloud System Market Shares 2016, July 2017.

<sup>9</sup> Dell EMC Pulse, "[Gartner Recognizes EMC as a Leader in the 2016 Data Center Backup and Recovery Software Magic Quadrant](#)," June 2016.

<sup>10</sup> IDC WW Semiannual Software Tracker, 2H2016, April 2017.

<sup>11</sup> HPCwire, "[HPCwire Reveals Winners of the 2016 Readers' and Editors' Choice Awards at SC16 Conference in Salt Lake City](#)," November 2016.

## World-class Dell EMC HPC Innovation Centers

### Leverage these invaluable assets

You can work directly with Dell EMC HPC experts to test and tune solutions prior to purchase at worldwide Dell EMC HPC Innovation Centers:

- [Dell EMC HPC Innovation Lab](#)
- [Cambridge Solution Centre](#)
- [University of Pisa](#)
- [San Diego Supercomputer Center](#)
- [Texas Advanced Computing Center \(TACC\)](#)
- [Centre for High Performance Computing in S.Africa](#)

## Services and financing

### Dell EMC Professional Services

Solutions customized for your needs

Leverage on-site integration or application implementation with [Dell EMC Professional Services](#).

#### Support is always on for you

Enjoy unlimited access to 24x7 chat, email and phone support services with how-to assistance and disaster recovery from [Dell EMC ProSupport](#). For example, [Remote HPC Cluster Management](#) keeps HPC solutions running smoothly, with proactive monitoring and management.

#### Deployment assistance when you need it

You can trust Dell EMC to deploy the racked configuration in your data center, including network cabling, operating system, firmware and hypervisor with [Dell EMC ProDeploy](#). For example, Dell EMC has a list of service offerings that make cluster installation deployment easier, including [Rack Integration](#), [Data Center Deployment and HPC Cloud Bursting](#).

### Dell EMC Financial Services

- Leasing and financing solutions are available throughout the U.S., Canada and Europe.
- Dell EMC Financial Services can finance your technology solution.
- Electronic quoting and online contracts offer an efficient purchase experience.

Learn more about [Dell EMC Financial Services](#).

## Take the next step, today

Don't wait to find out how Dell EMC can simplify and speed your adoption of tested, validated HPC solutions. Contact your Dell EMC or authorized channel partner representative for more details right away.

### Contact us

To learn more, visit [dell EMC.com/hpc](http://dell EMC.com/hpc) or [contact](#) your local representative or authorized reseller.

