



Dell EMC Ready Solution for HPC Life Sciences

Accelerate time to insight with high throughput and fast turnaround

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Faster time to production

Better performance

Easier scalability

Get life-changing answers, faster

For healthcare and life sciences projects, every hour closer to discovery and results can mean the difference between life and death. But life sciences organizations face many factors that may cause inefficiencies and hinder discovery. For example, it's challenging to design a system that provides the immense computational power and storage capacity required by life sciences workloads. And many organizations face the daunting task of designing and deploying HPC infrastructure while performing complex integration and performance tuning with little IT expertise or support.

The Dell EMC Ready Solution for HPC Life Sciences can accelerate time to insight for a range of applications, including genomic sequencing, drug design, cancer research, precision medicine, cryo-electron microscopy (cryo-EM) and many more.

Faster time to production

When speed to results matters, Dell EMC experts can help you build an HPC solution that addresses complex life sciences challenges and enables efficient planning, design and implementation. Dell EMC Ready Solutions for HPC are built on modular building blocks that can be configured and ordered in a simplified process that takes just hours instead of weeks.

Better performance

Dell EMC is committed to helping more people make more innovations and discoveries than any other HPC solutions vendor in the world. To that end, Dell EMC engineers and industry experts have worked in collaboration with Dell EMC customers and partners to design and tune these solutions for life sciences workloads. The Dell EMC HPC and AI Innovation Lab works closely with customers and partners to optimize, integrate and test these solutions. The Dell EMC engineering team then devotes hours to rigorously tuning these solutions for your specific applications and workloads, with a focus on efficiency, performance and reliability.

Easier scalability

Dell EMC Ready Solutions for HPC can help you get the most out of your IT infrastructure today — and tomorrow. That means creating solutions that enable you to scale easily to meet new capacity and performance demands over time. Dell EMC's extensive track record with all aspects of the computing environment — compute, storage, networking and services — enables us to implement holistic solutions that work for you from day one, with an eye toward the future.

Do any of these challenges sound familiar?

“Designing, deploying and tuning infrastructure with little IT expertise or support is complex and time-consuming.”

HPC for life sciences has traditionally been a custom-built, non-standardized technology. In addition, all aspects of an HPC solution are interconnected and impact the overall success of the system: performance, reliability, access protocols, scalability, ease-of-management, price, power and more. Building a solution from scratch that addresses each one of these requirements is naturally complex and time-consuming. The Dell EMC Ready Solution for HPC Life Sciences is a solution that can reduce deployment time and speed time to production.

Dell EMC is a leader in creating HPC solutions — regardless of size or complexity — that deliver fast setup with a wide range of optional services for maximizing HPC investments. With proven success in thousands of implementations worldwide, you can be confident with Dell EMC as your partner.

“Providing the performance required for life sciences workloads is challenging.”

Software-licensing costs and application-specific performance are greatly affected by system design, and finding the right mix for both can be difficult. You may also need code optimization to take advantage of the latest technologies. The Dell EMC Ready Solution for HPC Life Sciences features industry-specific designs that are tuned by Dell EMC engineers and industry experts for specific life sciences workloads.

“We need scalability to handle rapidly growing data sets.”

The growth of life sciences data is pushing data repositories to incredible sizes. Life sciences researchers can generate and consume data at such speed that multiple petabytes to exabytes are starting to become commonplace. And the data requirements around performance and capacity keep increasing rapidly. The design of the Dell EMC Ready Solution for HPC Life Sciences can make it easy to manage and extend storage and networking on-premises so you can grow over time.

Customer success stories

Beijing Genomics Institute

288.5TFLOPS
peak performance

20% TCO reduction
compared to previous solution

70GB I/O speed

Read the case study: [Using a modular architecture to understand the mysteries of life.](#)

Tsinghua University’s Protein Technology Center

4X increase in
compute power

50% reduction in IT
complexity

75–80% reduction
in compute time

Read the case study: [Science computing supports near-atomic structural studies.](#)

Dana-Farber Cancer Institute, Harvard Medical School and Peking University

~2PB of storage

1,000X faster averaging compared to previous solution

Read the case study: [Leveraging HPC Hardware to Run Next-generation Molecular Imaging Analysis.](#)

Dell EMC Ready Solution for HPC Life Sciences

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 Solution for HPC Life Sciences technical specifications — Bright Cluster Manager

Servers / processors	Head / master nodes	Choice of: PowerEdge R440 PowerEdge R640 PowerEdge R740 PowerEdge R740xd	PowerEdge R6415 PowerEdge R7425, R7415 PowerEdge M640
	Compute nodes	Choice of: PowerEdge R440 PowerEdge R640 PowerEdge R740 PowerEdge R740xd PowerEdge R940 PowerEdge R6415 PowerEdge R7425, R7415 PowerEdge M640	PowerEdge M830 PowerEdge C4140 PowerEdge C6420 PowerEdge C6320p PowerEdge FC430 PowerEdge FC640 PowerEdge FC830
	Processors	Intel® Xeon® 8100, 6100, 5100, 4100, and 3100 series Intel Xeon SKL-F (only on C6420) Intel Xeon Phi™ processor 72xx Intel Xeon E5-2600 v4 series	Intel Xeon E5-4600 v4 series Intel Xeon E5-2600 v4 series Intel Xeon E7-4800 v3, E7-8800 v4 AMD® EPYC™ 7000 series
	Accelerator nodes	Choice of: PowerEdge C4140 (up to 4 double-width GPUs) PowerEdge R740 (up to 3 double-width GPUs)	Choice of accelerators: NVIDIA® Tesla® V100 16GB and 32GB (SMX2 and PCIe), P100 (SMX2 and PCIe), P40, P4, K80
Operating systems	Head nodes	Red Hat® Enterprise Linux® (RHEL) 7.4 (2- or 4-socket)	
	Compute nodes	RHEL 7.4 for HPC Compute Node (2- or 4-socket)	
Software		Bright Cluster Manager® 8.0 Mellanox® OFED 3.4.x and 4.0 NVIDIA CUDA 9	Intel XPPSL 1.5.3 IFS 10.6

Dell EMC Ready Solution for HPC Life Sciences technical specifications — Bright Cluster Manager

Networking Omni-Path (OPA)	OPA Host Fabric Interface (HFI)	Intel Omni-Path Host Fabric Interface Adapter 100 Series 1 Port PCIe x16	
	OPA switches	Dell EMC Networking H1000 Edge series: H1048 and H1024 Dell EMC Networking H9100 series	
InfiniBand® (IB)	OPA IFS driver stack	10.6	
	IB host channel adapters	Rack: Mellanox ConnectX®-4 EDR single port or Mellanox ConnectX-3 FDR dual port	Blade: Mellanox ConnectX-3 small form factor (SFF): FDR or FDR10 mezzanine cards
	IB switches: FDR and EDR	Rack: Mellanox SwitchX® 6xxx series Mellanox SB 77xx and 78xx series Mellanox MSB 78xx series	Blade: Mellanox M4100F (supported on M630 blades) Mellanox M4100T (supported on M830 blades)
	Drivers	Mellanox OFED 3.4.x and 4.0	
Ethernet	NICs	1, 10, 40GbE (full and low profile)	
	Dell EMC Networking switches	Z and S series, 1, 10, 40GbE	
Storage	NFS	Dell EMC Ready Solution for HPC NFS Storage	
	Lustre®	Dell EMC Ready Solution for HPC Lustre Storage	
	Isilon	Dell EMC Isilon Scale-out NAS Storage	
	SAS RAID Controller	PERC 9/10 (for 14G servers)	
Systems management		Dell EMC Deployment Toolkit (DTK) Dell EMC OpenManage (OM)	

Dell EMC Ready Solution for HPC Life Sciences technical specifications — Open source option

Servers / processors	Head / master nodes	Choice of: PowerEdge R440 PowerEdge R640 PowerEdge R740	PowerEdge R740xd PowerEdge M640
	Compute nodes	Choice of: PowerEdge R440 PowerEdge R640 PowerEdge R740 PowerEdge R740xd	PowerEdge R940 PowerEdge M640 PowerEdge M830 PowerEdge C6420
	Processors	Intel Xeon 8100, 6100, 5100, 4100, and 3100 series Intel Xeon E5-2600 v4 series	Intel Xeon E5-4600 v4 series Intel Xeon E5-2600 v4 series Intel Xeon E7-4800 v3, E7-8800 v4
Operating systems	Head nodes	Red Hat Enterprise Linux (RHEL) 7.4 (2- or 4-socket)	
	Compute nodes	RHEL 7.4 for HPC Compute Node (2- or 4-socket)	
Software		OpenHPC v1.3.3 Mellanox OFED 3.4.x and 4.0	IFS 10.6
Networking	OPA		
	OPA HFI	Intel Omni-Path Host Fabric Interface Adapter 100 Series 1 Port PCIe x16	
	OPA switches	Dell EMC Networking H1000 Edge series: H1048 and H1024 Dell EMC Networking H9100 series	
	OPA IFS driver stack	10.6	
IB	IB host channel adapters	Rack: Mellanox ConnectX-4 EDR single port or Mellanox ConnectX-3 FDR	Blade: Mellanox ConnectX-3 SFF: FDR dual port or FDR10 mezzanine cards
	IB switches: FDR and EDR	Rack: Mellanox SwitchX 6xxx series Mellanox MSB 78xx series	Blade: Mellanox M4100F (supported on Mellanox SB 77xx and 78xx series M630 blades) Mellanox M4100T (supported on M830 blades)
	Drivers	Mellanox OFED 3.4 x and 4.0	
Ethernet	NICs	1, 10, 40GbE (full and low profile)	
	Dell EMC Networking switches	Z and S series, 1, 10, 40GbE	
Storage	NFS	Dell EMC Ready Solution for HPC NFS Storage	
	Lustre	Dell EMC Ready Solution for HPC Lustre Storage	
	SAS RAID Controller	PERC 9/10 (for 14G servers)	
Systems management		Dell EMC DTK Dell EMC OM	

Winner of the coveted HPCwire Editors' Choice Award for Best Use of High Performance Data Analytics.¹⁰

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 in both number and size of XSEDE HPC systems for U.S. open science¹
- #1 fastest supercomputer on the African continent²
- #1 converged infrastructure³
- #1 hyper-converged infrastructure³
- #1 in traditional and all-flash storage⁴
- #1 virtualized data center infrastructure⁵
- #1 cloud IT infrastructure⁶
- #1 server virtualization and cloud systems management software (VMware®)⁷
- #1 in data protection⁸
- #1 in software-defined storage⁹

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 and AI Innovation Lab](#)
- [Cambridge Solution Centre](#)
- [University of Pisa](#)
- [San Diego Supercomputer Center](#)
- [Texas Advanced Computing Center](#)
- [Centre for High Performance Computing in South Africa](#)

Services and financing

Dell EMC understands that HPC success depends on each server, interconnect and storage component being set up, configured and tuned properly. Properly deploying a cluster and storage can be a massive investment of time and resources. Dell EMC is a leader in HPC solutions — regardless of size or complexity — with a flexible delivery model that includes fast setup with services for maximizing HPC investments. Dell EMC Services and Dell EMC partners can provide the services you need to succeed with HPC.

Dell EMC HPC Services

From design and implementation to support and systems management, Dell EMC offers a comprehensive services portfolio for HPC clusters, including on-premises and managed systems, as well as those in the cloud.

Learn more about [Dell EMC Services for High Performance Computing](#).

¹ 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](#)."

² The Next Platform, "[South African Lengau System Leaps Towards Petaflops](#)," June 2016.

³ IDC [WW Quarterly Converged Systems Tracker](#), June 2018, Vendor Revenue — Q1 2018.

⁴ IDC [WW Quarterly Enterprise Storage Systems Tracker](#), June 2018, Vendor Revenue — Q1 2018.

⁵ Dell EMC Annual Report, 2015.

⁶ IDC [WW Quarterly Cloud IT Infrastructure Tracker](#), June 2018, Vendor Revenue — Q1 2018.

⁷ IDC WW Virtual Machine and Cloud System Market Shares 2016, July 2017.

⁸ Gartner, "[Magic Quadrant for Data Center Backup and Recovery Solutions](#)," July 2017.

⁹ IDC WW Semiannual Software Tracker, 2H2016, April 2017.

¹⁰ HPCwire, "[HPCwire Reveals Winners of the 2016 Readers' and Editors' Choice Awards at SC16 Conference in Salt Lake City](#)," November 2016.

Dell EMC Professional Services

Customers can select [Dell EMC ProDeploy](#) to help them reduce costly disruptions and save time. Our experts are armed with validated HPC processes and best practices to efficiently plan, design and implement HPC solutions. With proven success in thousands of implementations worldwide, your customers can be confident with Dell EMC as their partner.

Once the HPC cluster is deployed, [Dell EMC Remote HPC Cluster Management](#) services help keep it running smoothly with proactive monitoring and management of the entire HPC solution.

[Dell EMC ProSupport Suite](#) and the ProSupport Add-on for HPC provide a single point of accountability and HPC solution experts ready to assist with advanced cluster-level support services, along with premium hardware and software support available 24x7. ProSupport also includes next-business-day on-site service with four- and eight-hour parts-and-labor response options, and escalation management with customer-set severity level options.

Dell Financial Services

Let the wealth of leasing and financing options from Dell Financial Services help your customers find opportunities when they're facing decisions regarding capital expenditures, operating expenditures and cash flow. Dell offers a wide range of payment options to make it easier than ever to meet their needs.

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

Dell EMC Customer Solution Centers

Our global network of 21 dedicated [Dell EMC Customer Solution Centers](#) are trusted environments where world-class IT experts collaborate with customers and prospects to share best practices; facilitate in-depth discussions of effective business strategies using briefings, workshops, or proofs-of-concept (PoCs); and help businesses become more successful and competitive. Dell EMC Customer Solution Centers reduce the risks associated with new technology investments and can help improve speed of implementation.

Take the next step, today

Don't wait to find out how Dell EMC can simplify and speed life sciences applications and workloads. Contact your Dell EMC or authorized channel partner representative for more details right away.

Contact us

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

