Dell EMC Ready Bundle for HPC Digital Manufacturing

Simplify and speed design with a building-block approach to HPC

Table of Contents

Get to market faster 2

Do any of these challenges sound familiar? 3
- Customer success stories 3

Dell EMC Ready Bundle for HPC Digital Manufacturing 4
- Technical specifications 4

Why Dell EMC? 6
- World-class Dell EMC HPC Innovation Centers. 6

Services and financing 7
- Dell EMC Professional Services 7
- Dell EMC Financial Services. 7

Take the next step, today 7

Faster performance

Easier scaling

Reduced risk

Get to market faster

Many small and medium manufacturers (SMMs) understand the value of using HPC to run structural analysis, computational fluid dynamics, and other prototype tests faster and with fewer errors. However, building a high-performance computing (HPC) solution from scratch can be complex and time-consuming.

The Dell EMC Ready Bundle for HPC Digital Manufacturing helps you easily deploy the resources required for the computer-aided engineering (CAE) tools that drive your success. It is designed, tuned, tested and validated specifically for digital manufacturing workloads. And each solution is built on standardized building blocks to simplify design, configuration and ordering — so you can leverage the advantages of HPC sooner and with less risk.

Faster performance

The Dell EMC Ready Bundle for HPC Digital Manufacturing features industry-specific designs that are tuned by Dell EMC engineers and industry experts for specific manufacturing workloads. The Dell EMC HPC Innovation Lab works to optimize, integrate and test these solutions. Then the Dell EMC engineering team spends hours to rigorously tune the solution for your specific applications and workloads, with a focus on efficiency, performance and reliability.

Easier scaling

Dell EMC Ready Bundles for HPC leverage a flexible building-block approach that helps you efficiently design, implement and scale HPC solutions. Dell EMC's extensive track record with the HPC computing environment — compute, storage, networking and services — enables us to implement holistic solutions that work from day one, with an eye toward the future.

Reduced risk

Purpose-built HPC building blocks are integrated and tailored for your specific workloads to speed deployment as well as help eliminate potential software and hardware issues.
Dell EMC also provides comprehensive professional services and support capabilities to help you maximize system productivity and efficiency without compromising on performance.
Dell EMC is a leader in creating HPC solutions 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.

Do any of these challenges sound familiar?

"Workstations don't provide sufficient performance for digital manufacturing workloads."

Many struggle with insufficient scalability/performance of installed workstations to get the job done. These platforms are often running at maximum capacity and don't have the ability to handle today's peak computational workloads. A properly balanced and integrated HPC system can deliver the throughput and capacity needed to manage rapid data growth and increased workload demands. Dell EMC makes it easy to customize an HPC solution to meet performance requirements with a range of available options.

"We need to be able to build out digital manufacturing infrastructure more easily, with a shorter learning curve."

Advancements in digital manufacturing software capabilities continue to push the limits of existing systems. To keep up, you need the power to scale quickly and easily. The modular, building-block design of the Dell EMC Ready Bundle for HPC Digital Manufacturing makes it easy to manage and extend compute power, storage and networking on-premises so you can grow as needed to keep pace with the competition.

"It's important for us to reduce risks for HPC investments."

HPC is an important source of competitive advantage for many SMMs. But deploying HPC systems for specific or multiple workloads requires significant investments of time and resources — and increases the chance for errors. Tested and validated Dell EMC Ready Bundles for HPC reduce deployment risks, increase system reliability and provide a single point of contact for services and support.

Customer success stories

Mikuni®: automobile engine components

20% improvement in software performance

~40% more capacity than previous workstations

Several minutes → seconds for boot up

Read the case study: Designing automobiles of the future.

Nissan® Motor Company

93% reduction in backup times

20X more capacity with 40TB available storage

30 hours → 2 hours to backup 1TB of data

Read the case study: Gearing up for the Right IT.

Nakashima Propeller: maritime components

70–80X more parallel calculations through better server performance

2 weeks → 2 days for analysis

Read the case study: Helping make maritime shipping faster and greener.

Dell EMC Ready Bundle for HPC Digital Manufacturing

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.

Technical specifications

Servers / processors	Head / master nodes	**Choice of:** PowerEdge R640 PowerEdge R740 PowerEdge R740xd
	Compute nodes	**Choice of:** PowerEdge C6420 PowerEdge R640 PowerEdge R740 PowerEdge R740xd
	Processors	Intel® Xeon® Scalable processors
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)
Cluster management		Bright Cluster Manager®
Networking		Dell EMC Networking H-Series Edge Switches based on the Intel Omni-Path Architecture Mellanox® InfiniBand® interconnect and FDR and EDR switches Ethernet adapters and switches
External storage	NFS	Dell EMC Ready Bundle for HPC NFS Storage
	Lustre®	Dell EMC Ready Bundle for HPC Lustre Storage
	Isilon	Dell EMC Isilon Scale-out NAS Storage
Systems management		Dell EMC Deployment Toolkit (DTK) Dell EMC OpenManage (OM)

Digital manufacturing reference design for those moving up from a workstation

Basic building blocks	Typical simulation types	Crash Stamping Safety Impact analysis Fluid flow	Pump design Combustion Aerodynamics Acoustics
	Typical run environment	SMP parallel jobs on a single node and MPI parallel jobs run across two-node 10GE switchless “couplet”	
	Server	PowerEdge R640 Intel Xeon Gold 6142 (32 cores per server / 64 cores per couplet)	192GB 2667MHz DDR4 memory 2 x 480GB mixed-use SATA SSDs

General digital manufacturing reference design

Explicit solver building blocks	Typical ISV applications	CFD: ANSYS® Fluent®, ANSYS CFX®, STAR-CD®, STAR-CCM+®, OpenFOAM®, PowerFLOW® Explicit Structures: Abaqus-Explicit, LS-DYNA®, PAM-CRASH®, Altair-RADIOSS™	
	Typical simulation types	Crash Stamping Safety Impact analysis Fluid flow	Pump design Combustion Aerodynamics Acoustics
	Typical run environment	MPI parallel jobs run across 4–12 nodes	
	Server	PowerEdge C6420 Intel Xeon Gold 6142 (32 cores per server)	192GB 2667MHz DDR4 memory 2 x 480GB mixed-use SATA SSDs
Implicit solver building blocks	Typical use	ANSYS Mechanical™, Abaqus-Standard, MSC® Nastran™, NX® Nastran®, OptiStruct®	
	Typical simulation types	Noise vibration harshness (NVH) Assembly	Structural integrity (linear and non-linear)
	Typical run environment	Most jobs run on a single node and tend to require large memory to improve overall performance	
	Server	PowerEdge R640 Intel Xeon Gold 6136 (24 cores per server)	384GB 2667MHz DDR4 memory 4 x 480GB mixed-use SATA SSDs
Management building blocks	Management software	Bright Cluster Manager (optional) IPMI based cluster management tools	
	Management server building blocks	Cluster management: 1 for modest clusters; 2 for larger clusters Login: 1 for each 30–100 users	
	Server	PowerEdge R640 Intel Xeon Bronze 3106 (16 cores per server)	192GB 2667MHz DDR4 memory 2 x 480GB mixed-use SATA SSDs

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

Dell EMC PowerEdge Servers enhance 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 you 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 you 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 in both number and size of XSEDE HPC systems for U.S. open science[1]
- #1 fastest supercomputer on the African continent[2]
- #1 converged infrastructure[3]
- #1 in traditional and all-flash storage[4]
- #1 virtualized data center infrastructure[5]
- #1 cloud IT infrastructure[6]
- #1 server virtualization and cloud systems management software (VMware®)[7]
- #1 in data protection[8]
- #1 in software-defined storage[9]

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 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

[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, Q1 2017, June 2017, Vendor Revenue.

[4] IDC WW Quarterly Enterprise Storage Systems Tracker, September 2017, Vendor Revenue — EMC Q2 2017.

[5] Dell EMC Annual Report, 2015.

[6] IDC WW Quarterly Cloud IT Infrastructure Tracker, April 2017, Vendor Revenue — EMC Q4 2016.

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

[8] Dell EMC Pulse, "Gartner Recognizes EMC as a Leader in the 2016 Data Center Backup and Recovery Software Magic Quadrant," June 2016.

[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.

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 Systems 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

- Full-service leasing and financing solutions are located throughout the U.S., Canada and Europe.
- Dell EMC Financial Services can finance the total 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 design, configuration and ordering — so you can leverage the advantages of HPC sooner and with less risk. Contact your Dell EMC or authorized channel partner representative for more details right away.

Contact us

To learn more, visit dellemc.com/hpc or contact your local representative or authorized reseller.

Copyright © 2017 Dell Inc. or its subsidiaries. All Rights Reserved. Dell, EMC, and other trademarks are trademarks of Dell Inc. or its subsidiaries.

Other trademarks may be the property of their respective owners. Published in the USA 11/17 Solution overview DELL-EMC-SO-RB-HPC-DIG-MFG-USLET-101

CFX® is a trademark of Sony Corporation in Japan. ANSYS®, ANSYS Fluent®, and ANSYS Mechanical™ are registered trademarks or trademarks of ANSYS, Inc. or its subsidiaries in the United States or other countries. STAR-CCM+®, STAR-CD®, and any and all CD-adapco brand, product, service and feature names, logos and slogans are registered trademarks or trademarks of CD-adapco in the United States or other countries. OPENFOAM® is a registered trademark of OpenCFD Limited, producer and distributor of the OpenFOAM software via www.openfoam.com. PowerFLOW® is a registered trademark of Exa Corporation. Abaqus® is a registered trademark of Dassault Systèmes or its subsidiaries in the United States and/or other countries. LS-DYNA® is a trademark or registered trademark of Livermore Software Technology Corporation in the United States and/or other countries. PAM-CRASH® is a registered trademark or trademark of ESI Group in the U.S. and/or other countries. OptiStruct® and RADIOSS™ are trademarks or registered trademarks of Altair Engineering, Inc. NX® is a registered trademark of Siemens Product Lifecycle Management Software, Inc. or its subsidiaries in the United States and in other countries. MSC® and MSC Nastran™ are trademarks or registered trademarks of MSC Software Corporation or its subsidiaries in the United States and/or other countries. Nastran® is a registered trademark of the National Aeronautics and Space Administration. Intel® and Xeon® are registered trademarks of Intel Corporation in the U.S. and other countries. Lustre® is a registered trademark of Seagate Technology LLC in the United States. VMware® is a registered trademark of VMware, Inc. in the United States and/or other jurisdictions. Mellanox® and InfiniBand® are registered trademarks of Mellanox Technologies, Ltd. The Nissan® names, logos and slogans are trademarks owned by or licensed to Nissan Motor Co. Ltd. and/or its North American Subsidiaries. Bright Cluster Manager® is a trademark of Bright Computing, Inc. Red Hat® is a registered trademark of Red Hat, Inc. in the United States and other countries. Linux® is the registered trademark of Linus Torvalds in the U.S. and other countries.

Dell EMC believes the information in this document is accurate as of its publication date. The information is subject to change without notice.