Data Sheet
Fujitsu PRIMEFLEX for HPC: ANSYS CFD Appliance

- Pre-designed, fully integrated HPC clusters ANSYS® Fluent® and CFX®
- Complete user-readiness with in-built applications and intelligent run methods
- Faster acquisition, lower risk, and assured ROI

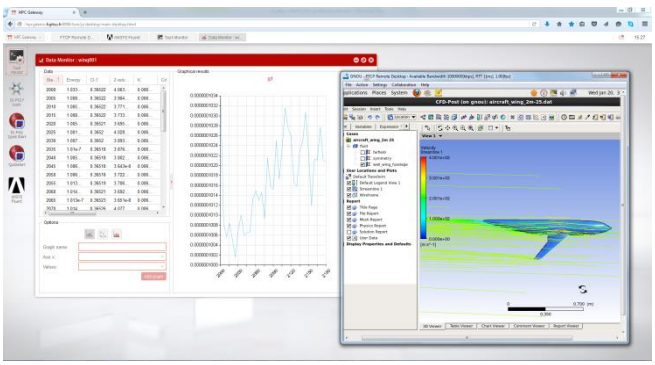
Re-balancing HPC

The insights that come from effective parallel simulation are not disputed. Yet while the opportunities to benefit from HPC multiply, the systems that drive such computation are not getting simpler – in fact it's the opposite. So while many businesses want the competitive edge that can come from successfully exploiting HPC, integration into mainstream business processes is lower than it could be. Opportunities are being lost, costs are higher, and innovation is suppressed. Fujitsu's PRIMEFLEX for HPC addresses all aspects of this problem, up to the user productivity and lifecycle value. From a baseline of optimal pre-selected and pre-integrated system components, PRIMEFLEX for HPC solutions simplify not only admin and operations, but embed expertise to assist in every action of the end-user. This is what we mean by re-balancing – leveraging the full software stack to maximize usability of HPC.

An Appliance for CFD

PRIMEFLEX for HPC reduces the time and cost of acquisition, and provides an assured basis for efficient operations with much less risk – delivering clear TCO benefits. The Appliance for ANSYS CFD is a completely tuned and integrated solution for the Fluent & CFX codes. Components are selected after extensive benchmark testing on a range of models in terms of size and physics. Each appliance is fully rack-integrated in the factory, including installation and testing of the final application/s. Finally, before shipment pre-built intelligent methods to run ANSYS CFD codes from the Fujitsu Application Catalogue are added to the onboard HPC Gateway system – a complete web-enabled user workplace. The Appliance is now ready to use immediately at the customer site by anyone – whether a practiced user or HPC newcomer.

PRIMEFLEX for HPC ANSYS CFD Appliance



Features and benefits

Main features	Benefits
HPC scaling for ANSYS CFD	
■ Both ANSYS Fluent and ANSYS CFX incorporate highly-efficient parallel algorithms to accelerate individual simulations. ■ Cost-effective HPC licensing unlocks volume parallel processing for higher-fidelity simulations. ■ HPC capacity delivers order-of-magnitude increase in throughput. ■ Dedicated ANSYS job management through ANSYS RSM, or integration with built-in intelligent automated methods under Fujitsu HPC Gateway user workplace.	■ Faster model turnaround allowing engineers to evaluate more prototypes for each project. ■ More accurate flow predictions and better analysis of intricate design structures. ■ Comprehensive fluid flow models to simulate the widest range of physical behavior. ■ Effective combination of tools and environment to enable users sustain more intensive workloads.
Optimized reference architecture	
■ Components selected for optimal price-performance on ANSYS CFD applications. ■ Validated architecture with system patterns defined for different production workloads ■ Intel Cluster Ready certification of Fujitsu PRIMERGY HPC systems.	■ Reduced effort in self-configuration and shorter time to decision. ■ Risk reduction from proven application performance. ■ Simplified adaptation to projected load, no performance bottlenecks.
Fujitsu HPC Cluster Suite (HCS)	
■ Complete system middleware stack including cluster management, batch resource manager and user working environment. ■ Fujitsu HCS Basic Edition integrated with main open source batch resource managers. ■ Fujitsu HCS Advanced Edition provides cost-optimized bundle with the leading commercial batch system, Altair's PBS Professional. ■ Factory installed and preset for customer operations.	■ Immediately production-ready at system start-up, no DIY and post-delivery add-ons. ■ Single point of support, faster issue management. ■ Integrated monitoring and administration.
Fujitsu HPC Gateway	
■ Integrated user HPC workplace comprising a full set of tools to prepare, run and organize work on the cluster. ■ Incorporates the web-based Fujitsu Application Desktop, a unique intuitive desktop-style interface allowing individuals to be more effective and providing greater traceability. ■ Dynamic monitoring of job progress, with graphical presentation of key simulation result metrics and data points. ■ Incorporates a role-based access control (RBAC) security layer to better align projects with the active team.	■ Productivity at first login. ■ Reduce or eliminate learning costs for new users, even those without Linux knowledge. ■ Widen HPC access and increase potential ROI. ■ Stronger security from more transparent and fine-grained management of critical project assets. ■ Clearer and more comprehensive management oversight of HPC workload and output.
Fujitsu Application Catalogue	
■ Pre-built packages that encode standardized and best practice application runnable methods. ■ Catalogue methods cover application-level functions as well as IT-level tuning. Current application-specific functions include input file validation, license handling, run-time monitoring and summary result reporting. ■ Packages downloadable from Fujitsu web site and self-imported, and continuously updated during the cluster lifetime.	■ Enhanced operational robustness, user productivity and project management. ■ Included in Fujitsu HPC Cluster Suite price, no additional services required. ■ Leverage expertise in production-ready HPC application methods.

Topics

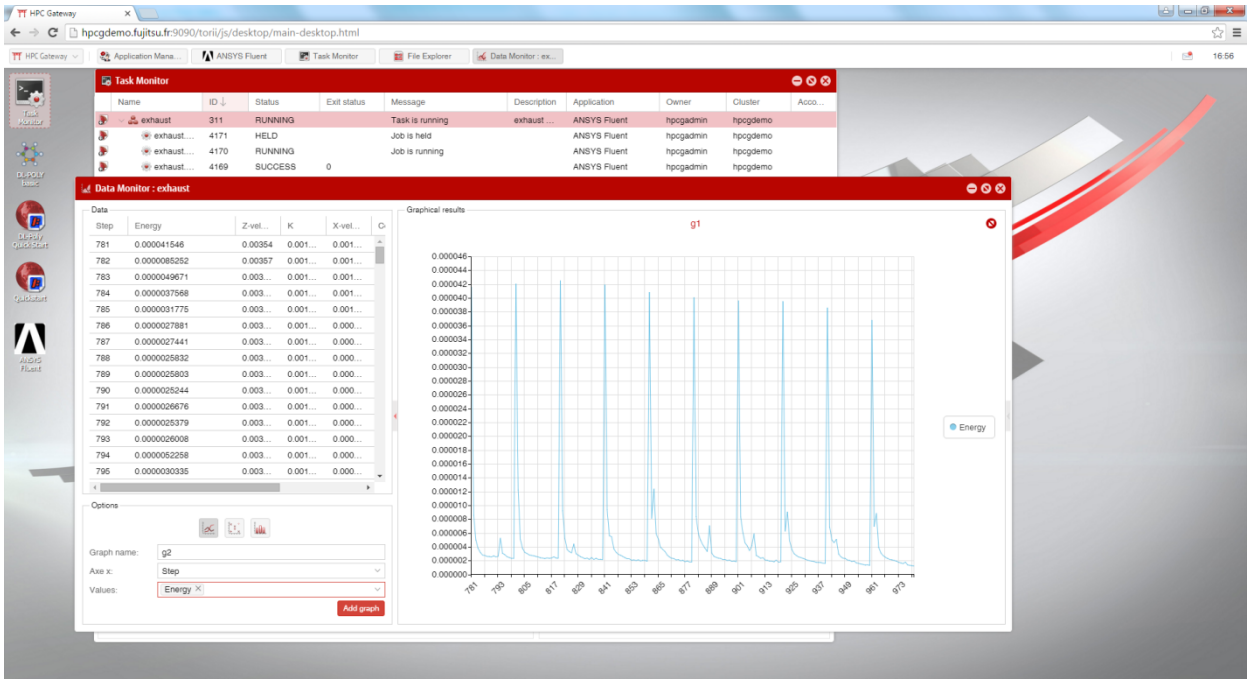
ANSYS HPC simulation

New highly detailed methods using high performance computing can allow manufacturers to get deeper insight into the behavior of the most complex systems, to create parts and assemblies that perform more effectively over a longer lifecycle. ANSYS CFD simulation applications – Fluent and CFX – are key enablers for such businesses, allowing them to study the interaction of their products within the complete system without the need for a physical testbed. Equally, simulation provides assurance to downstream integrators of the behavior of those parts under a variety of operating conditions. HPC scalability allows more detailed and realistic models to be computed with ANSYS application within an invariably limited project operational timeframe. HPC throughput capability then allows design of experiment (DoE) and robust design ensemble methods, creating several hundreds of jobs, to be run consistently on each project with process tools such as ANSYS DesignXplorer.

ROI not DIY

An HPC cluster is assembled from a various components – CPU, memory, disk, interconnect, storage, etc. – each with a choice of specification that changes on a regular basis. Optimizing this combination for a given objective is costly and requires detailed IT competence to avoid just moving bottlenecks from one place to another within the overall system. ANSYS reference configurations are based on continuously-updated measurements of application performance with realistic models, reducing the time and cost of acquisition, and lowering overall risk.

Other sources of risk include operational performance and user productivity. Reference patterns for different workloads allow better initial matching to project needs. Aggregate user productivity combines two factors: individual efficiency, and expanding HPC to more end-users. In most HPC systems user productivity is eroded by time lost in dealing with IT, rather than preparing and analyzing and the results of simulation. The Fujitsu HPC Gateway in Fujitsu Application Solutions eliminates completely these issues through an intuitive integrated workplace. Simplifying HPC can have a transformative impact for project/group leaders as this capability becomes more accessible and usable for more engineers, designers, domain specialists and technicians. Businesses can then apply this power to expand exploration of a products design space and to increase performance, quality, reliability, and ultimately innovation.



Expertise in application methods for ANSYS CFD solvers

Sustaining productive use of HPC across more projects and workloads requires a means to efficiently propagate expertise in application methods. Fujitsu HPC Gateway includes a workflow engine that enables best-practice and optimized methods to be automated. Fujitsu offers an Application Catalogue of methods encoded as pre-built packages for download and import into the local Fujitsu HPC Gateway installation. Integrating expertise in automated methods enables new and existing HPC users to leverage knowledge on a scalable basis. The Fujitsu Application Catalogue offers robust processes for running ANSYS CFD applications, including dynamic visual monitors to track results in progress. With the Fujitsu HPC Gateway Advanced Edition customers can develop their own workflows to capture and scale processes that are the unique competence of their organization.

Technical Specifications

Appliance Elements

Target applications	ANSYS Fluent, ANSYS CFX

Hardware components		Description
Compute node modules		1x FUJITSU Server PRIMERGY RX2530 M1 or 4x FUJITSU Server PRIMERGY CX2550 M1 in one CX400 M1 housing
For each node:		
	CPU	2x Intel® Xeon® Processor E5-2660v3 10C/20T 2.60 GHz 25 MB For different workloads alternative processors are: Intel® Xeon® Processor E5-2640v3 8C/16T 2.60 GHz 20 MB Intel® Xeon® Processor E5-2650v3 10C/20T 2.30 GHz 25 MB
	Memory	8x 8GB DDR4-2133 R ECC
	Local disk	1x HD SATA 6G 1TB 7.2K HOT PL 3.5" BC
Head node		1x FUJITSU Server PRIMERGY RX2540 M1
	CPU	2x Intel® Xeon® Processor E5-2603v3 6C/6T 1.60GHz 15MB
	Memory	2x 8GB DDR4-2133 R ECC
	Local disk	8x SATA 6G 1TB 7.2K HOT PL 2.5" with RAID 5/6 setup 2x SAS 6G 300GB 10K HOT PL 2.5" with RAID 1 setup
Fast interconnect	**Parallel communication, Parallel IO**	InfiniBand Intel QDR switch 36 port 40Gb/s 1x IB HCA 40Gb 1 port QDR per compute node
Standard interconnect	**Management, NFS**	Brocade ICX 6430-24, 24x 1GbE RJ45
External storage		FUJITSU Storage ETERNUS offers a range of suitable options

- Notes

The selection of optimal CPU, as well as other components, is continually reviewed by Fujitsu. Extensive benchmarking is done both with a range of models representative of real production, including full physics, as well as standard performance test cases that explore scalability and the detailed interplay to balance the various cluster components.

Software components		Description
Cluster software stack		FUJITSU Software HPC Cluster Suite (HCS) V3.0 Advanced Edition
Cluster user environment		Fujitsu HPC Gateway included in HCS
Batch resource manager		Altair PBS Professional
Operating system		
	Head node	Red Hat Enterprise Linux
	Compute node	Red Hat Enterprise Linux HPC
Application environment		
	Cluster	ANSYS 15.x and ANSYS 16.x: Fluent, CFX, CFD-Post
	Client device	ANSYS 16.x: Workbench Platform, DesignXplorer and other tools
	Automated methods	Pre-built packages for running ANSYS Fluent and ANSYS CFX are downloadable from the Fujitsu Application Catalogue

Technical Specifications

Workload appliances

Scenario		Baseline CPU	Node count	Total cores
Entry level	▪ First upscale from workstations ▪ Single project ▪ Moderate sized models ▪ No optimization runs	Intel® Xeon® Processor E5-2640v3 8C/16T 2.60 GHz	4	64
Project Growth	▪ Established higher-resolution models ▪ Several concurrent projects ▪ Optimization methods emerging ▪ Robust design approach introduced	Intel® Xeon® Processor E5-2660v3 10C/20T 2.60 GHz	8	160
Consolidated Production	▪ Committed throughput growth ▪ Increase project count and scale ▪ Expanding user base ▪ Optimization runs are systematic	Intel® Xeon® Processor E5-2660v3 10C/20T 2.60 GHz	28	560

- Notes

The above represent indicative HPC appliances for using ANSYS CFD. They allow customers to tune the final configuration for their needs, while benefitting from the same pre-installed system and environment available as a core part of the appliance design and assembly process.
The head node of each cluster may be adapted from the baseline in order to accommodate increased job management workloads, user concurrent connections and near-line storage.

More information

Fujitsu Services

In addition to PRIMEFLEX for HPC Application Solutions, Fujitsu provides a range of platform solutions. They combine reliable Fujitsu products with the best in services, know-how and worldwide partnerships.

Fujitsu Portfolio
Build on industry standards, Fujitsu offers a full portfolio of IT hardware and software products, services, solutions and cloud offering, ranging from clients to datacenter solutions and includes the broad stack of Business Solutions, as well as the full stack of Cloud offering. This allows customers to leverage from alternative sourcing and delivery models to increase their business agility and to improve their IT operation's reliability.

Computing products
www.fujitsu.com/global/services/computing/

Software
www.fujitsu.com/software/

More information

Learn more about the Fujitsu PRIMEFLEX for HPC Application Solutions, please contact your Fujitsu sales representative, Fujitsu business partner, or visit our website.
www.fujitsu.com/global/hpc

Fujitsu green policy innovation

Fujitsu Green Policy Innovation is our worldwide project for reducing burdens on the environment.
Using our global know-how, we aim to contribute to the creation of a sustainable environment for future generations through IT.
Please find further information at
www.fujitsu.com/global/about/environment/

Copyright

Conditions

This software product is supplied under the conditions described in the current standard software license terms and conditions of Fujitsu Technology Solutions GmbH and the applicable standard license terms and conditions of any third-party software supplier. If you do not know these conditions, we will provide you with those upon request.

Disclaimer

Technical data are subject to modification and delivery subject to availability. Any liability that the data and illustrations are complete, actual or correct is excluded. Designations may be trademarks and/or copyrights of the respective manufacturer, the use of which by third parties for their own purposes may infringe the rights of such owner.

Contact
FUJITSU LIMITED

Website: www.fujitsu.com/global/hpc
2016-01-05 CE-EN

All rights reserved, including intellectual property rights. Changes to technical data reserved. Delivery subject to availability. Any liability that the data and illustrations are complete, actual or correct is excluded.
Designations may be trademarks and/or copyrights of the respective manufacturer, the use of which by third parties for their own purposes may infringe the rights of such owner.
For further information see www.fujitsu.com/fts/resources/navigation/terms-of-use.html
©2016 Fujitsu Technology Solutions GmbH