Data Sheet
Fujitsu PRIMERGY HPC Cluster Application Solution for ANSYS CFD*

- One of the most accessible and usable HPC cluster for ANSYS Fluent* and CFX*
- Faster and reduced-risk acquisition from prepared production-ready systems
- Lifetime ROI can be multiplied by leveraging packaged expertise in run-time methods

Application Solution for ANSYS CFD*

To increase competitiveness more organisations, particularly smaller businesses, are looking for ways to leverage high performance computing (HPC). Some may be considering the first use of HPC, while others are extending HPC into new domains or evaluating new methodologies. Central to both is application usability and efficiency.

Fujitsu's Application Solution for ANSYS CFD is a complete HPC cluster system and production application environment designed for the Fluent* & CFX* codes. Cluster components and architecture are pre-defined for optimal price-performance, based on extensive benchmark testing with realistic models. This reduces the time and cost of acquisition, and provides an assured basis for higher efficiency and less risk.

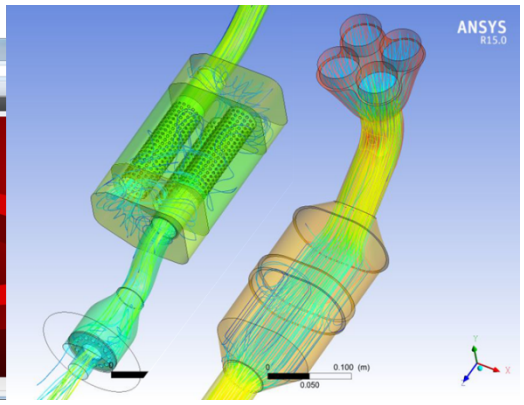
Simplicity and Expertise

Fujitsu's HPC Application Solutions simplify all aspects of HPC. Simplicity broadens the accessibility of tools previously reserved for practiced users, letting more users and projects benefit from scalable simulation. This is delivered through a dedicated HPC software environment in the solution, and particularly the Fujitsu HPC Gateway* web-based user workplace.

Yet the real transformation comes from using application methods built on codified expertise Fujitsu's Application Catalogue contains a growing range of application run-time process packages that deliver greater robustness and functional capability, particularly for increasingly intensive HPC workloads.

Pre-built packages to run ANSYS CFD codes are downloadable from the Fujitsu Application Catalogue*, to import into the local Fujitsu HPC Gateway. Through this powerful combination Fujitsu Application Solutions help integrate HPC firmly within corporate business processes by delivering reliable and accessible tools for mainstream use.

Pre-configured Fujitsu PRIMERGY HPC Cluster.



Fujitsu HPC Gateway ANSYS Fluent interface & data visualisation. [Exhaust image courtesy ANSYS Inc.]

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 behaviour. ■ 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. ■ Includes a choice of recognised batch resource managers. ■ 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 organise 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 standardised 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

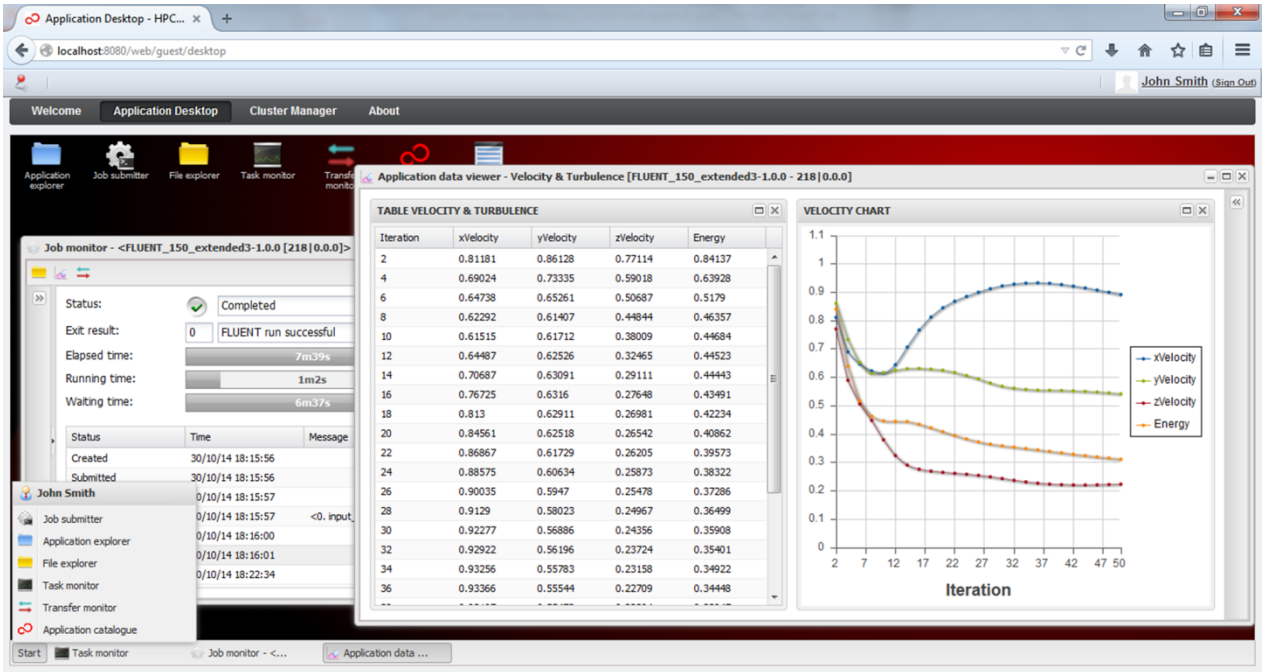
ANSYS HPC simulation

New highly detailed methods using high performance computing can allow manufacturers to get deeper insight into the behaviour 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 behaviour 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.

Simplifying HPC reduces risk and increases potential ROI

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 analysing 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 organisation.

Technical Specifications

Baseline configuration

Hardware environment		Description
Compute nodes – ANSYS Fluent, ANSYS CFX **For each node:**		4x FUJITSU Server PRIMERGY CX250 S2 in one CX400 housing
	CPU	2x Intel® Xeon® Processor E5-2680v2 10C/20T 2.80 GHz 25 MB For different workloads alternative processors are: Intel® Xeon® Processor E5-2650 V2 8C/16T 2.60 GHz 20 MB Intel® Xeon® Processor E5-2690 V2 10C/20T 3.00 GHz 25 MB
	Memory	8x 8GB DDR3-1866 R ECC memory
	Local disk	1x HD SATA 6G 250GB 7.2K HOT PL 2.5" BC
Head node		1x FUJITSU Server PRIMERGY RX300 S8
	CPU	2x Intel® Xeon® Processor E5-2630v2 6C/12T 2.60GHz 15MB
	Memory	8x 4GB DDR3-1600 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 environment		Description
Cluster software stack		FUJITSU Software HPC Cluster Suite (HCS) V2.2 Advanced Edition
Cluster user environment		Fujitsu HPC Gateway included in HCS
Operating system		
	Head node	Red Hat Enterprise Linux
	Compute node	Red Hat Enterprise Linux HPC
Application workload management		
	Cluster	ANSYS 15.0: Fluent, CFX, CFD-Post
	Client device	ANSYS 15.0: 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

Sample workloads

Scenario		Baseline CPU	Node count	Total cores
Entry level	▪ First upscale from workstations ▪ Single project ▪ Moderate sized models ▪ No optimization runs	Intel® Xeon® Processor E5-2650 V2 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 E5-2680 V2 10C/20T 2.80 GHz	8	160
Consolidated Production	▪ Committed throughput growth ▪ Increase project count and scale ▪ Expanding user base ▪ Optimization runs are systematic	Intel® Xeon® Processor E5-2690 V2 10C/20T 3.00 GHz	28	560

More information

Fujitsu OPTIMIZATION Services

In addition to 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 HPC Application Solutions, please contact your Fujitsu sales representative, Fujitsu business partner, or visit our website.
http://www.fujitsu.com/fts/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/

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