

# Key Technologies of FUJITSU Supercomputer

## PRIMEHPC FX100

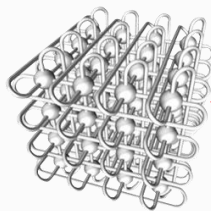


# Technology highlights



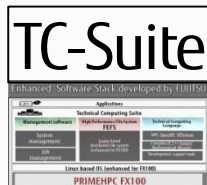
## SPARC64™ XIfx

32 compute cores with HPC-ACE2 and 2 assistant cores



## Tofu interconnect 2

Highly scalable interconnect with low latency and high bandwidth



## FUJITSU Technical Computing Suite (TC-Suite)

Fujitsu-developed HPC software stack optimized for PRIMEHPC series

# Improved performance for real applications



Over 2x performance per core compared with  
PRIMEHPC FX10



**FX100 vs FX10**

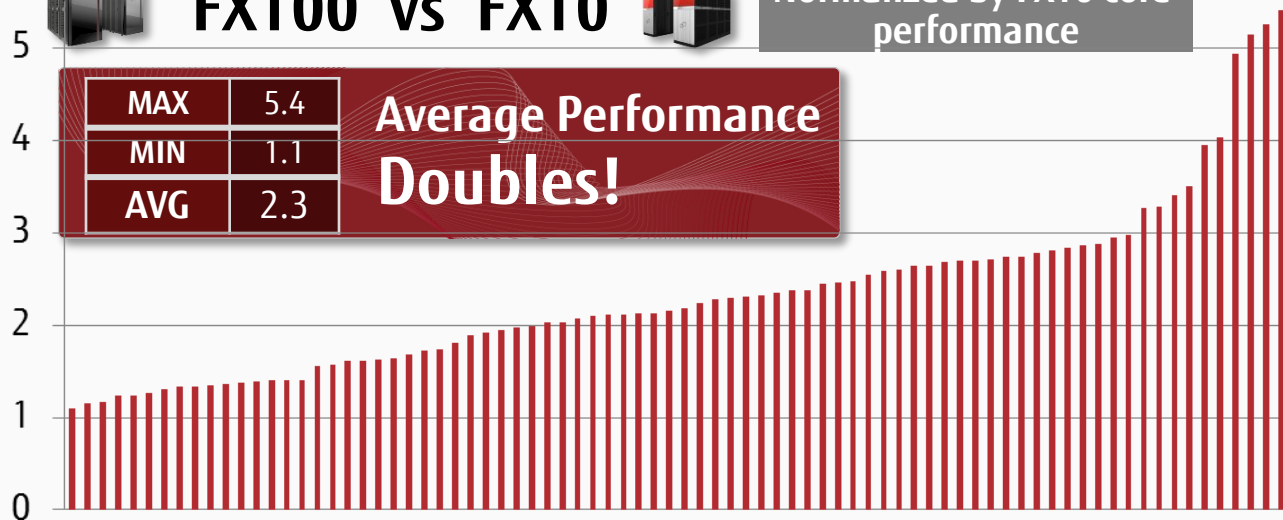


Normalized by FX10 core  
performance

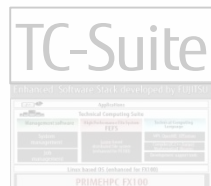
MAX	5.4
MIN	1.1
AVG	2.3

**Average Performance  
Doubles!**

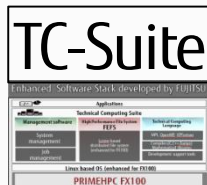
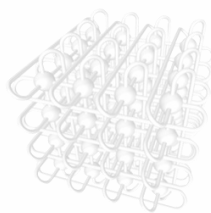
FX100 Avg.



80 Benchmark results sorted in performance order.  
These benchmarks include kernels of various applications such as HPCG, RSDFT, etc.

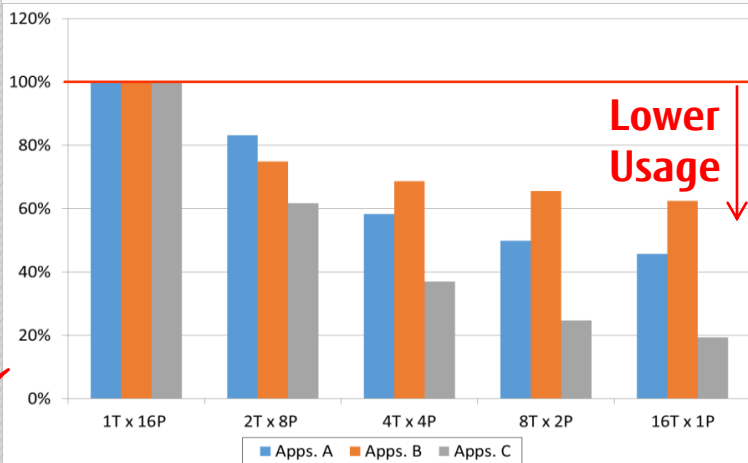


# Effect of VISIMPACT

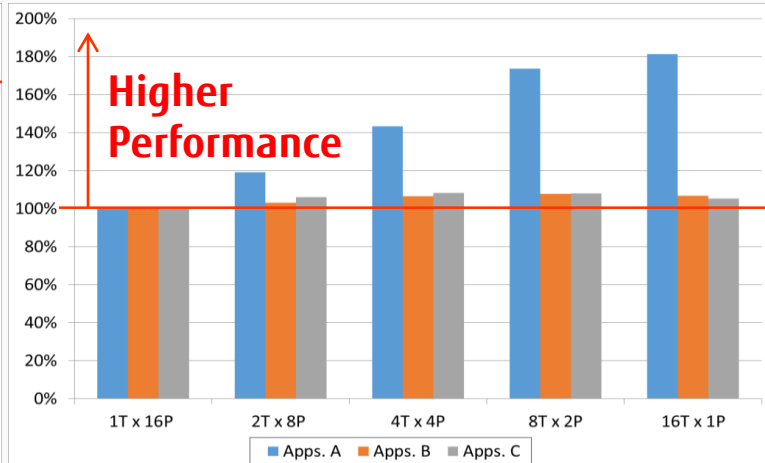


VISIMPACT improves performance  
- Lower memory usage and communication overhead

## Memory usage



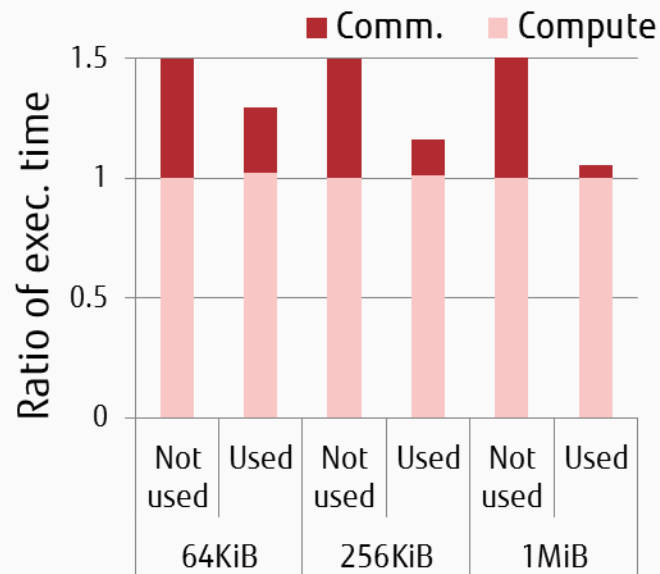
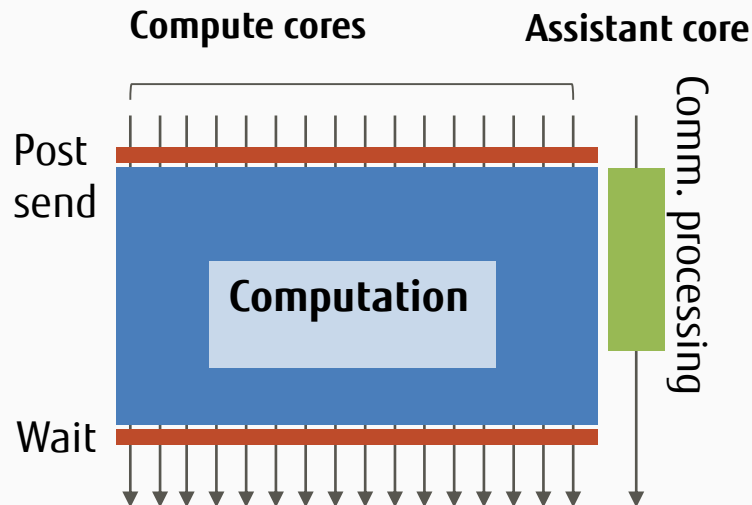
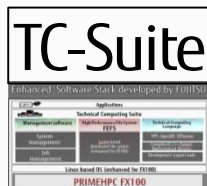
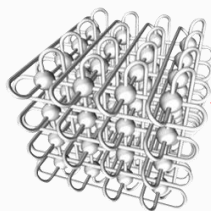
## Performance improvement



# threads x # processes (#T x #P)

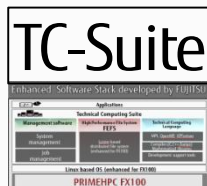
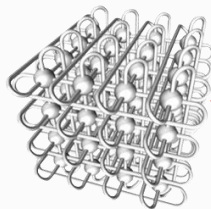
# Assistant cores offload non-blocking comm.

By enabling overlapping execution of communication and computation



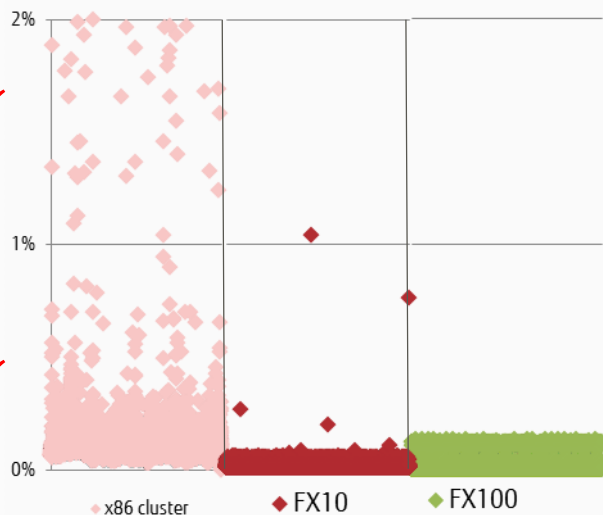
Msg. length & Assistant core usage

# Assistant cores eliminate OS jitter

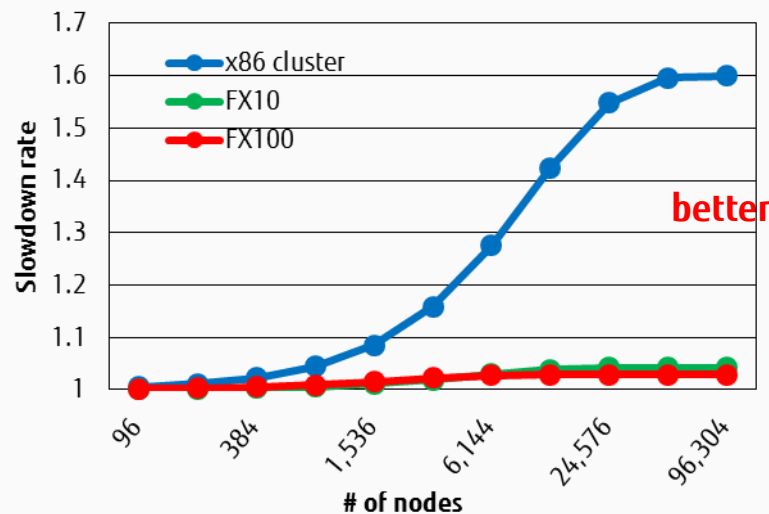


By offloading daemons, such as IO processing and MPI processing

## Dispersion of calc. time caused by OS jitter



## Estimated slowdown (comm. interval=1ms)

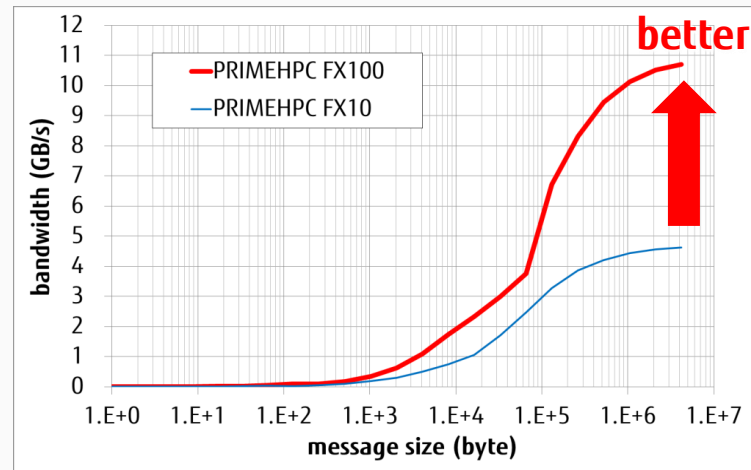
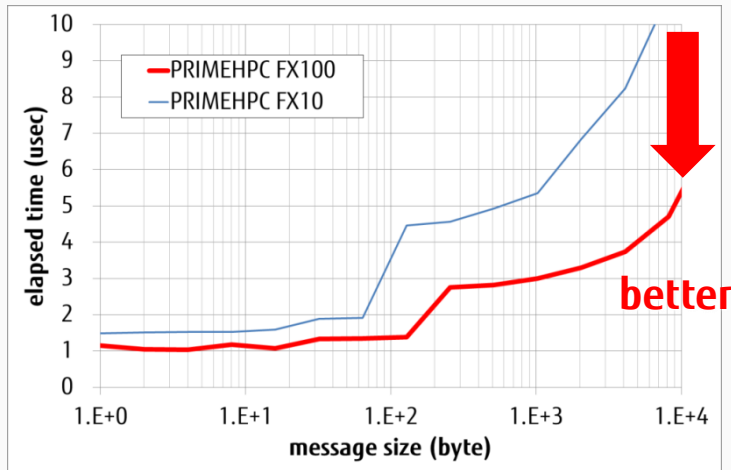
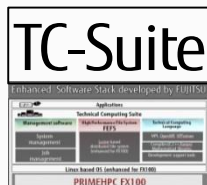
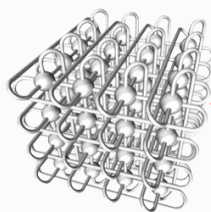


# High performance Tofu Interconnect 2



## Improved latency and bandwidth

### Pingpong latency and bandwidth

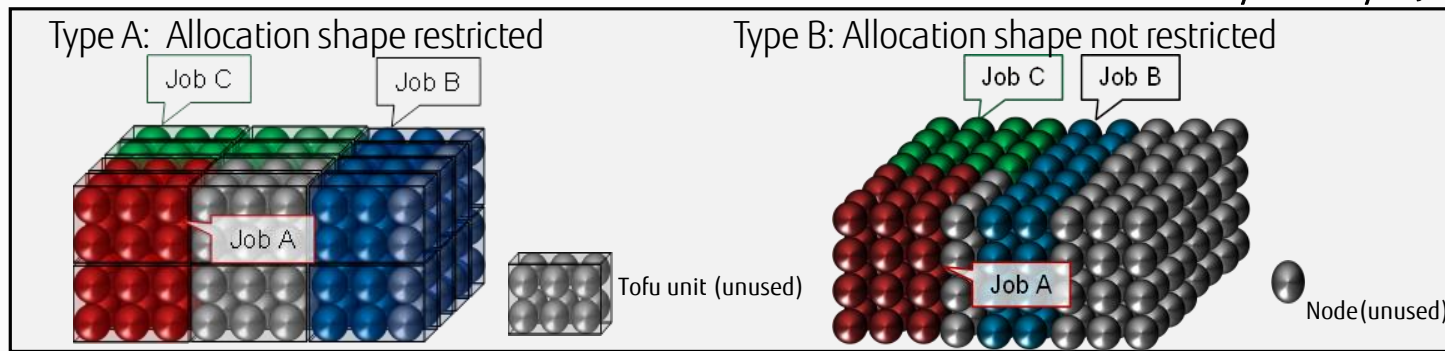


# TC-Suite: Flexible job allocation

High node usage rate to 92% can be attained and job waiting time can be shortened by allowing type B  
Type A reduces MPI comm. time with Tofu specific algorithm

	Type A	Type B
Node usage	86%	92%

Data obtained  
by courtesy of JAXA.

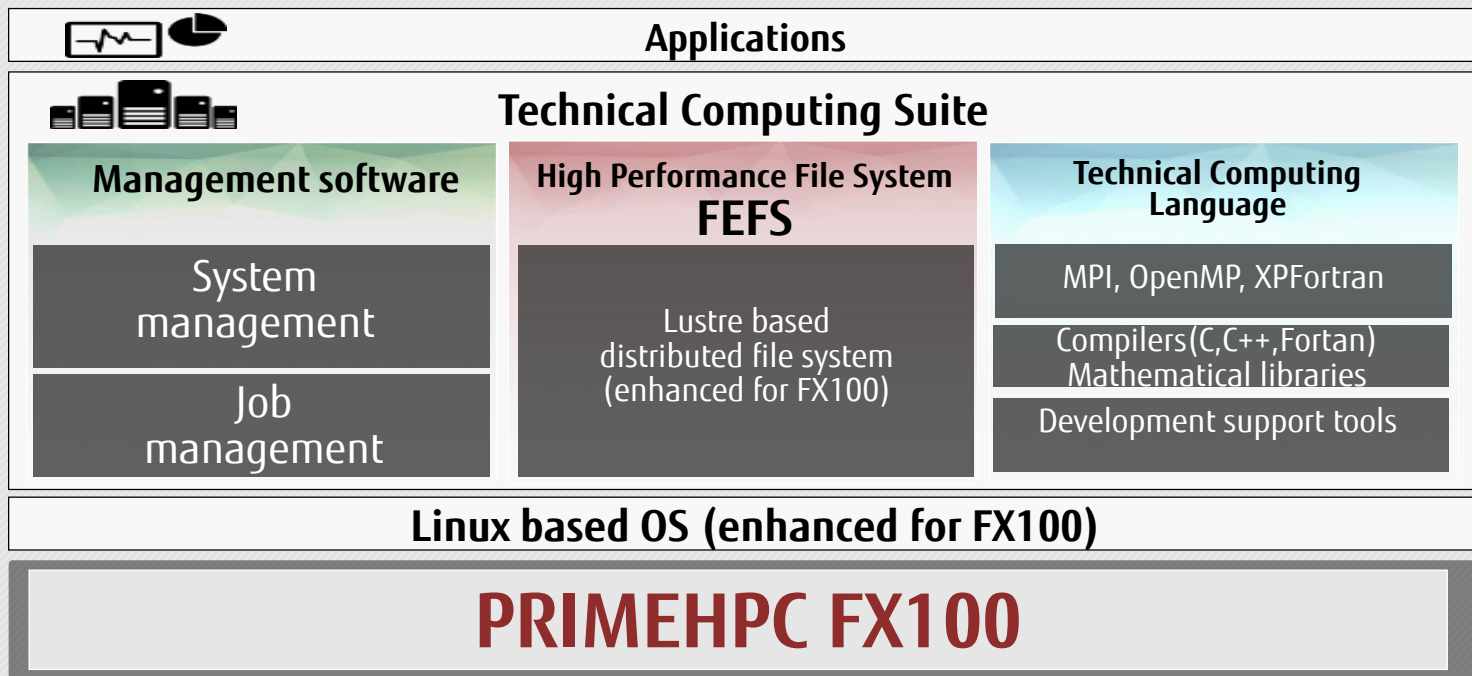
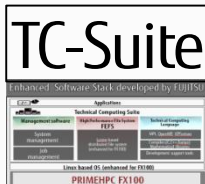
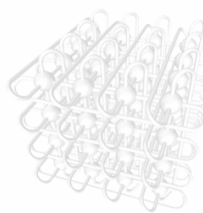


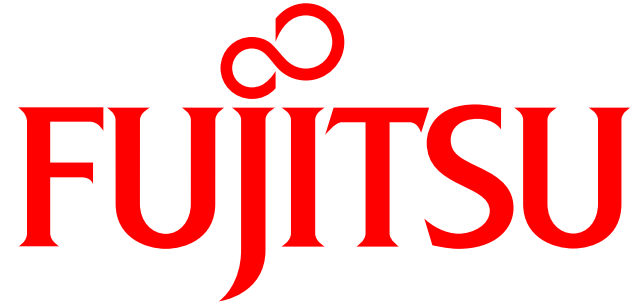


# Technical Computing Suite



## Enhanced software stack developed by FUJITSU





shaping tomorrow with you