Towards Exascale Computing
Fujitsu offers full range of HPC platform solutions

Petascale supercomputer
Fujitsu developed SPARC chips and Tofu interconnect for high performance, high reliability, and high operability

K computer
Developed with RIKEN

PRIMEHPC FX10

x86 Clusters
PRIMERGY supports latest x86 CPU & MIC and GPGPU etc. and adopts Fujitsu's latest packaging technologies for high performance and high operability

PRIMERGY CX400

BX900/BX400
RX200/RX900
Fujitsu HPC R&D focus

- High performance & practical use for real applications
- High reliability & scalable performance w/ lower power consumption
- Software stack on Linux OS for both SPARC & x86 platforms

**PRIMEHPC FX10**
- x86 clusters
- Scalable parallel file system (FEFS)

**Compute node**
- SPARC64 IXfx 16 core (236 GF)
- Memory 32/64GB
- General purpose CPU
- SIMD & software controlled cache (HPC-ACE)
- Single socket compute node
- High-memory BW (85 GB/s)

**Interconnect**
- Tofu 6D mesh/torus 5 GB/s x bi-dir x 10
- Low-latency and high BW interconnect with collective communication support (Tofu)
Architecture continuity and improvement

- Uncompromised bandwidth and calculation performance promise superb application performance
- Ultimate energy efficiency
- Super reliable

**CPU technology development**
- 40GF, 4-core VISIMPACT
- 128GF, 8-core VISIMPACT & HPC-ACE
- 236.5GF, 16-core VISIMPACT & HPC-ACE
- VISIMPACT & HPC-ACE

**Interconnect technology development**
- IB DDR Fat tree & Collective ops
- 6D mesh/torus Tofu interconnect with Tofu barrier for collective operations
- Tofu interconnect with Tofu barrier

Approach toward Exascale computing

Fujitsu is developing a Post-FX10 system
- 100 PFLOPS capable
- New technologies toward Exascale

Two-year FS projects sponsored by Japanese government (MEXT)
- Plan and propose a future direction of future system development

National projects

Development | Operation of K computer

HPCI strategic applications program
App. review | FS projects
Exa-system development project (Proposing)
Feasibility study toward Exascale

This study is a part of the "Feasibility Study on Future HPC R&D" program led by MEXT, Japan.

Post-petascale Machine

Evolution of the K computer architecture

Co-design with various target applications

Novel system software stack covers x86 clusters and post-petascale machines

Revolutions by co-design

Target Applications selected in FY2012

ALPS

Algorithms and Libraries for Physics Simulations

RSDFT

Real-Space Density-Functional Theory

COCO

CCSR Ocean Component Model

NICAM

Nonhydrostatic Icosahedral Atmospheric Model
How can we reach the Exascale?