

# Increasing Productivity with PRIMERGY x86 HPC from Fujitsu

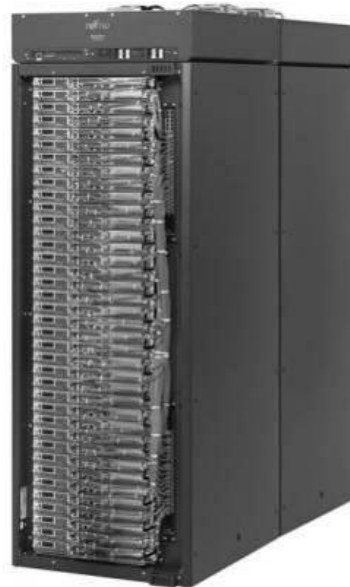
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HPC Consultant  
Fujitsu Technology Solutions (FTS)

# Fujitsu High Performance Computing



**From workplace to #1 in Top500**

PRIMERGY x86



Celsius R670

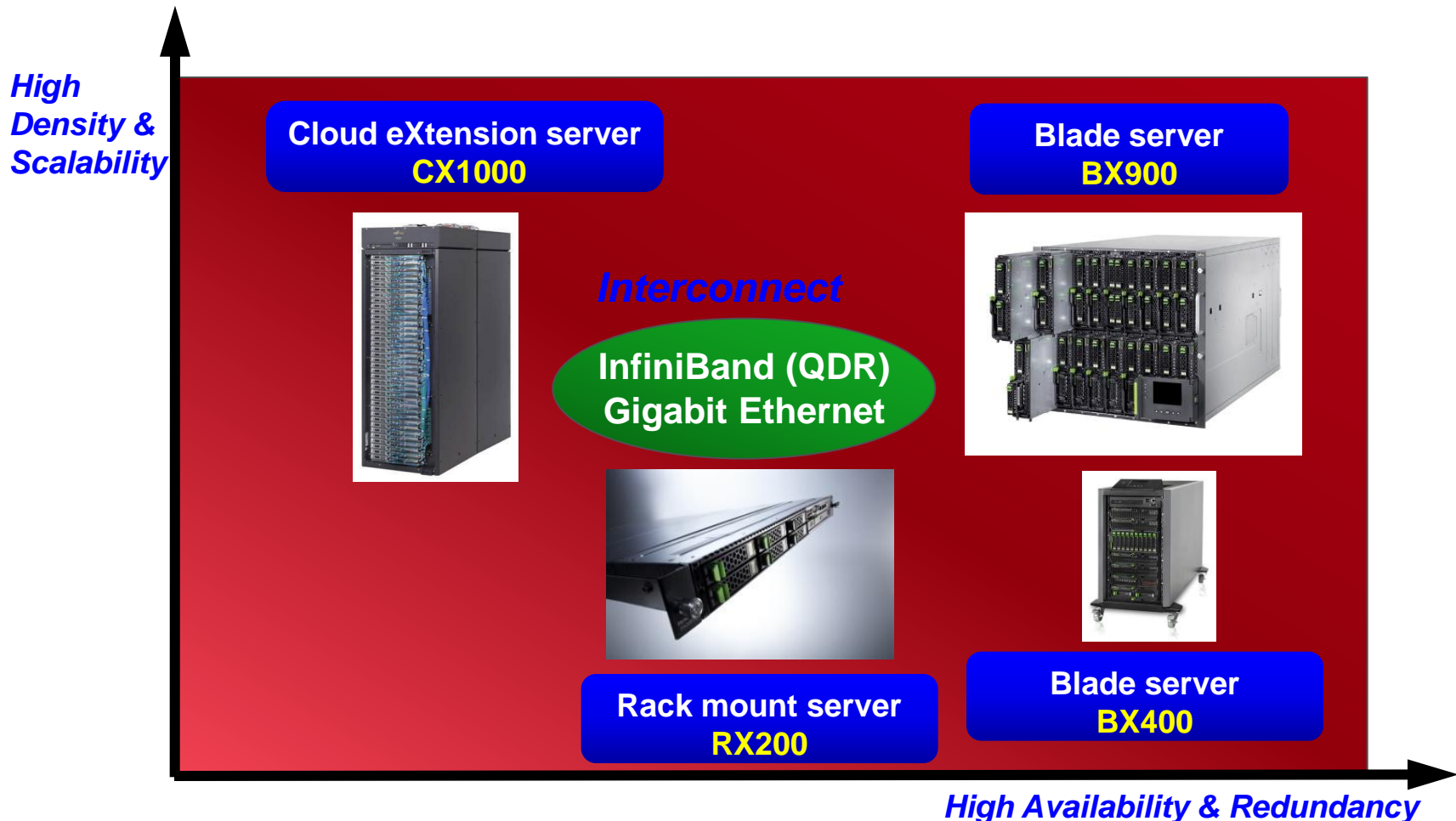


PRIMEHPC FX10

**Delivering high performance from  
technical workstations to supercomputers**

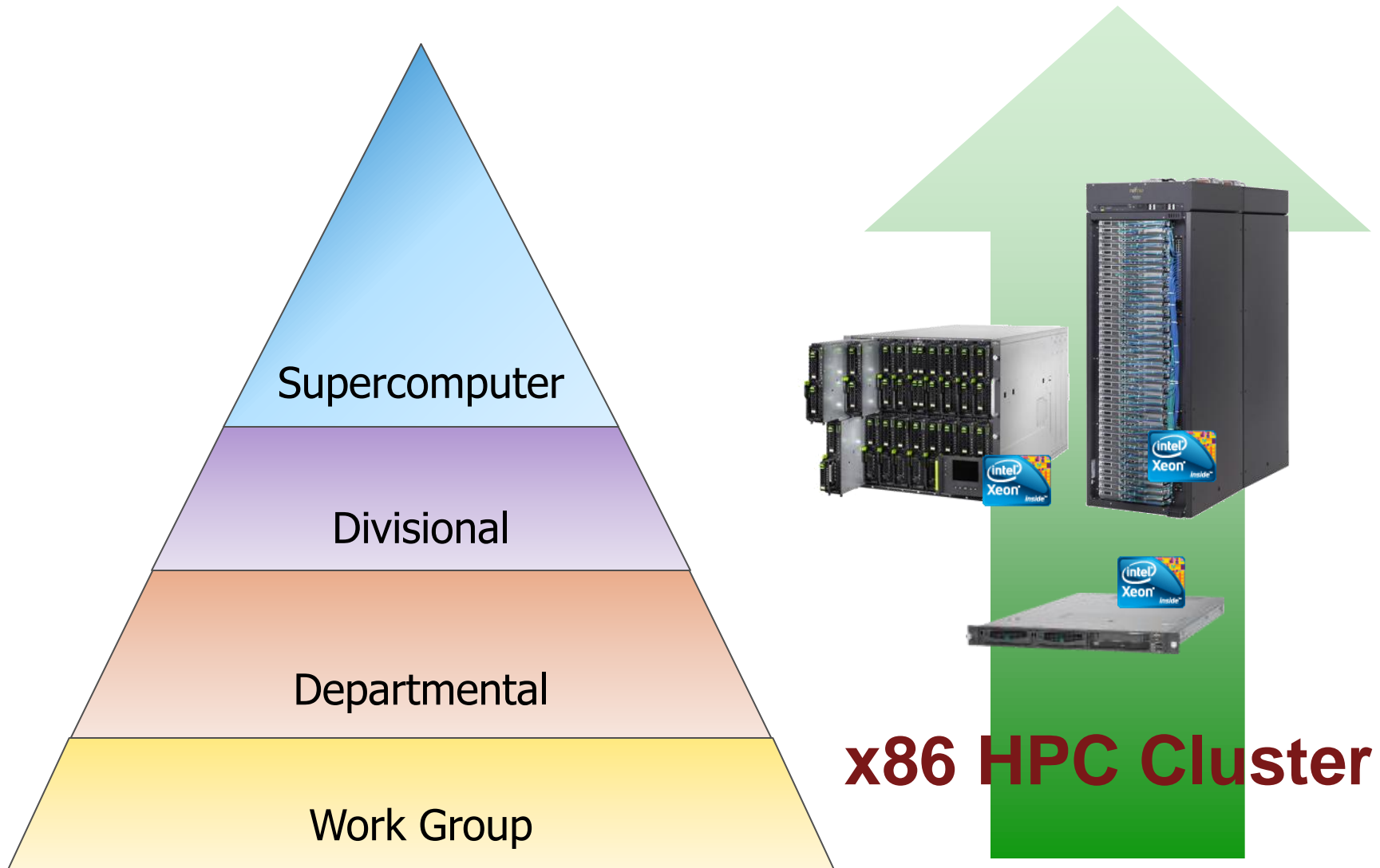
# PRIMERGY Servers for x86 HPC Cluster

- 3 Types of PRIMERGY x86 HPC cluster nodes for different user needs.
- High quality and reliability: for science research to mission critical use.

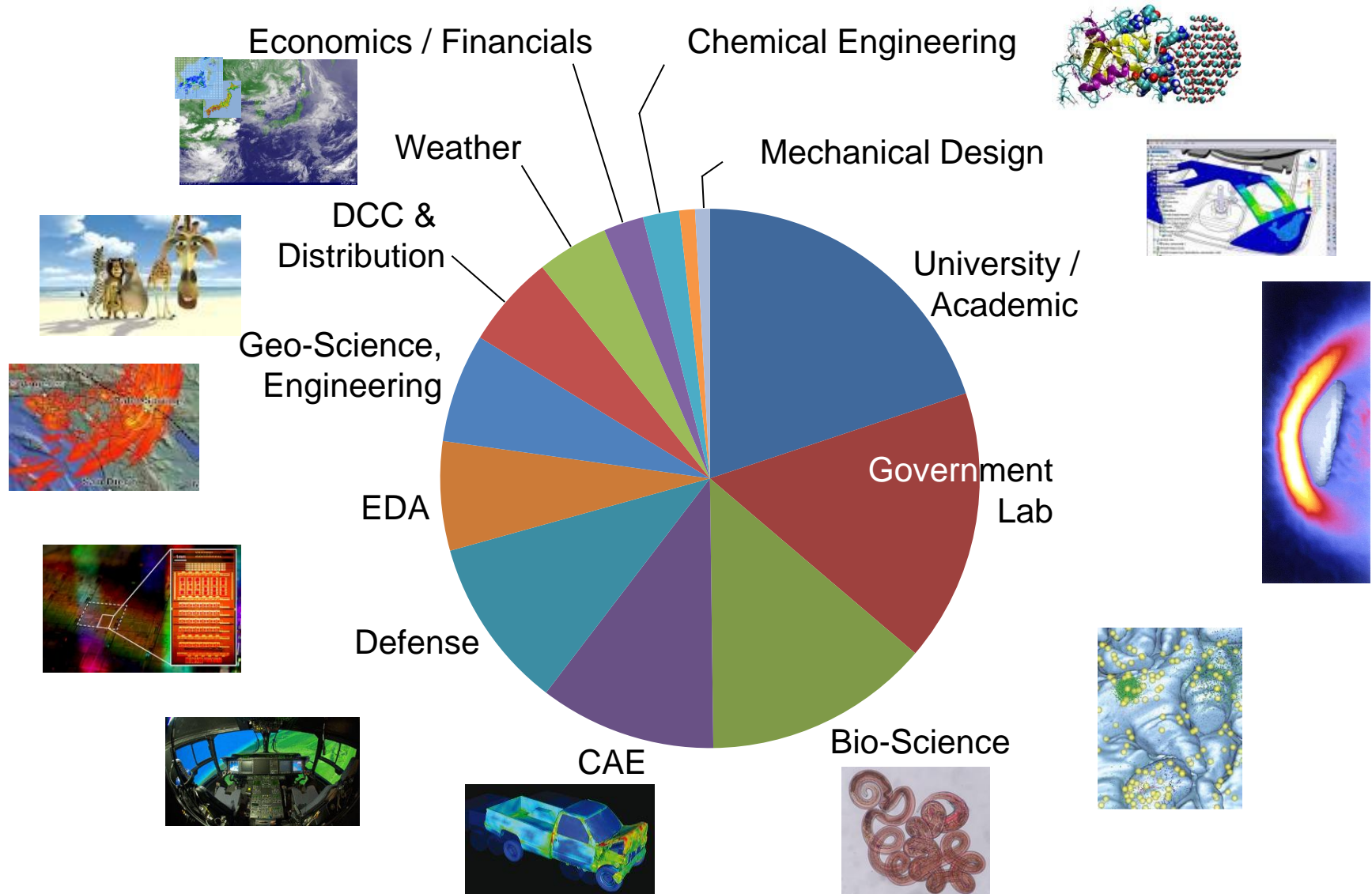


# Fujitsu's Approach for the HPC Market

Fujitsu covers the HPC segments with PRIMERGY x86 platforms



# PRIMERGY x86 for many applications





# Siemens Mobility: HPC workgroup solution

## Siemens Mobility

- Single-source supplier & system integrator for sustainable **solutions** in all areas of **rail transportation**
- Rail Automation, Railways Electrification, Commuter and Regional Trains, High-speed and Intercity trains, Components and Systems, Locomotives, Metros, Trams and Light Rail, Test and Validation Center, Service, Complete rail solutions

## Requirements on CAE infrastructure

- Integrated infrastructure for **LS-DYNA** and **FLUENT** simulations

## Fujitsu turn-key solution

### PRIMERGY x86 Ready-to-Go system

Head Node

Compute Nodes

Network

Rack and Power Distribution

Software Stack (OS + MW)

Services and Support

Consulting and Integration  
Services

#### ■ Head node

- 2 × Intel XEON, X5620 (4 Cores, 2.4 GHz)
- 5 – 6 TB RAID I/O domain

#### ■ 8 × Compute nodes

- 2 × Intel XEON, X5650 (6 Cores, 2.66 GHz)
- 24 GB RAM
- InfiniBand QDR, 40 Gb/s
- 146 GB SAS HD

■ ~ 1.3 Tflops



RX300 S6



RX200 S6



## A\*STAR

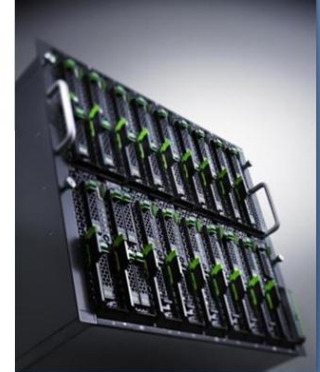
- Singapore's lead government agency
- Fostering world-class scientific research
  - Biomedical Sciences
  - Physical Sciences & Engineering
- Spurs growth in key economic clusters

## Fujitsu and A\*STAR (IHPC)

- R&D partnership to jointly develop
    - Applications
    - Technologies
- for the use of next-gen. supercomputer in
- Computational Fluid Dynamics
  - Material Sciences

## PRIMERGY x86 BX900

- 450 server blades (3888 cores)
- 45 Teraflops peak performance
- Efficiency of 91% based on Linpack



**Fastest Supercomputer in South East Asia**

## ■ Hybrid System consisting of three computational server systems

**Application Development Unit for the Next Generation Supercomputer**

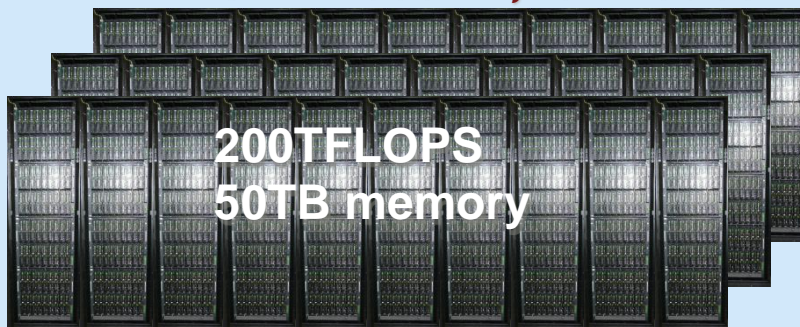
***FX1 300 nodes***



12TFLOPS  
4.6TB memory

**Large-scale Parallel Computation Unit**

***PRIMERGY BX900 2,134 nodes***

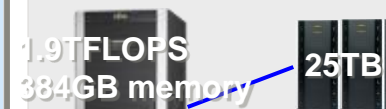


200TFLOPS  
50TB memory

LINPACK BMT  
191.4 TFLOPS,  
efficiency 95.66%

**SMP Server**

***SPARC Enterprise M9000***



1.9TFLOPS  
384GB memory

25TB

Disk Storage  
***ETERNUS4000 M600***

Infiniband Switch

Gigabit Ethernet Switch

Disk Storage

**I/O nodes**

***SPARC Enterprise M9000( x 2)***



1.2 PB

***ETERNUS DX80( x 36)***



1PB

**Tape Storage**

***ETERNUS LT270( x 2)***

LAN





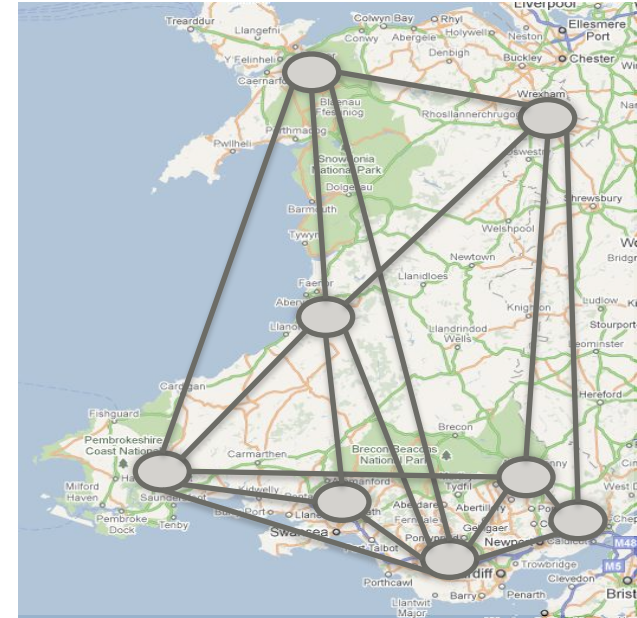
# HPC Wales – A Grid of HPC Excellence

## Motivation and background

- Position Wales at the forefront of supercomputing
  - Promotion of research, technology and skills
- Improvement of economic development
  - **Creation of 400+ quality jobs, 10+ new business**

## Implementation and rollout

- Distributed HPC clusters among 15 academic sites
  - With central hubs, tier 1 and 2 sites
  - portal for transparent, easy use of resources
  - Rollout completed by Q1 2012



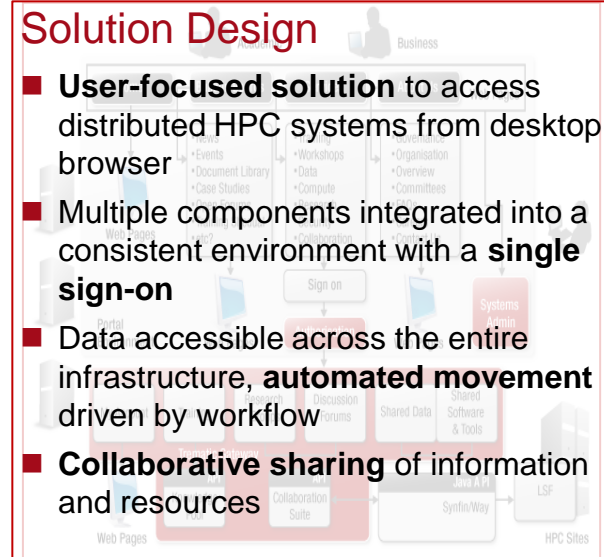
### Performance & Technology

- >1400 nodes **PRIMERY** BX922S2
- **Westmere**, X5650 and X5680
  - Roadmap for upgrade
- **190 TFlops** aggregated peak performance
- **Infiniband**, 10 / 1 Gb Ethernet, FCS
- **Eternus** DX online SAN (home FS)
- **Parallel File System** (up to 10 GB/s)
  - DDN Lustre
- **Backup & Archiving**
  - Symantec, Quantum

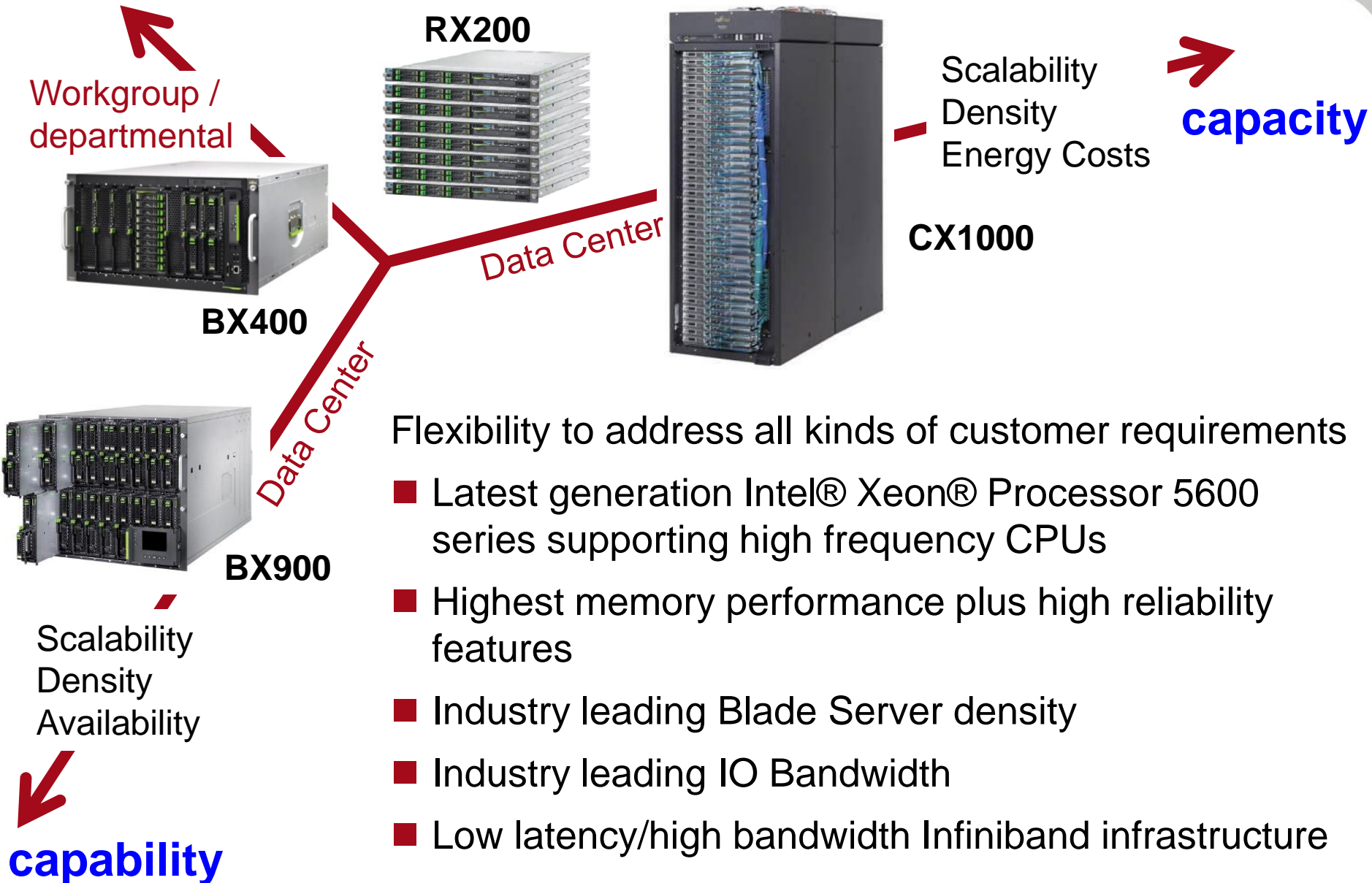


### Solution Design

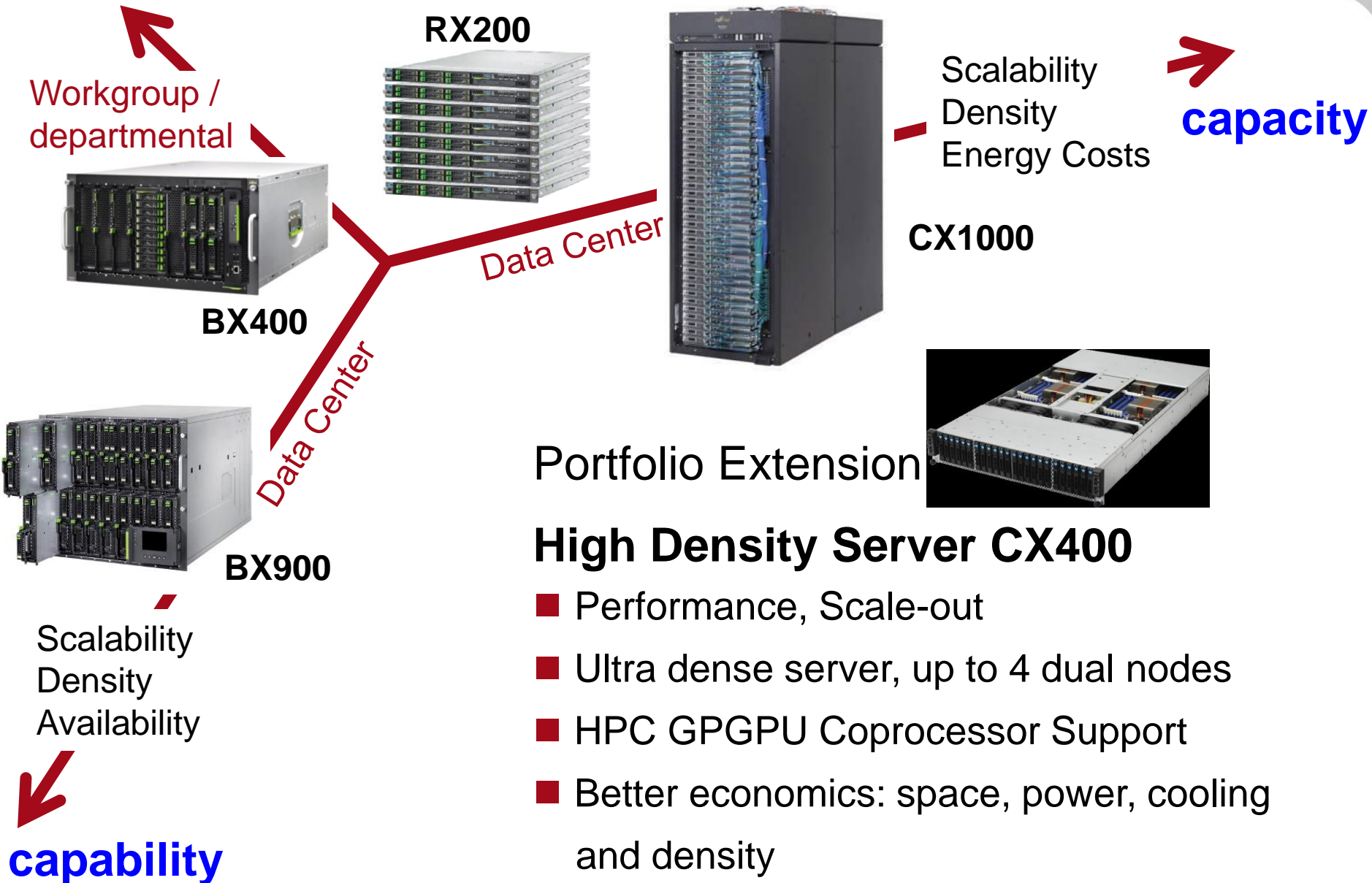
- **User-focused solution** to access distributed HPC systems from desktop browser
- Multiple components integrated into a consistent environment with a **single sign-on**
- Data accessible across the entire infrastructure, **automated movement** driven by workflow
- **Collaborative sharing** of information and resources



# Modular HPC growth potential towards



# Modular growth potential towards



# Overview on x86 HPC Eco System

Fujitsu is shipping **integrated and certified** HPC solution stack:  
**PRIMERGY HW** is complemented by **SW** and **Services** offering

## Fujitsu x86 HPC ECO system

**FJ managed  
& operational  
Services  
(planned)**

HPC as a Service

HPC managed Services

**Application  
Layer  
from HPC ISV's**

Flow  
Simulation

Financial  
Simulation

Crash  
Simulation

Other  
Apps  
Areas

**FJ MW  
Stack AND  
WinHPC**

Scheduler

System  
op. tools

File  
System

Other  
Modules

**PRIMERGY  
HW**

Rack  
Server

Blade  
Server

High  
Density  
Server

Compo-  
nents

Consulting and Integration Services

Ready-to-Go & Intel Cluster Ready Certification

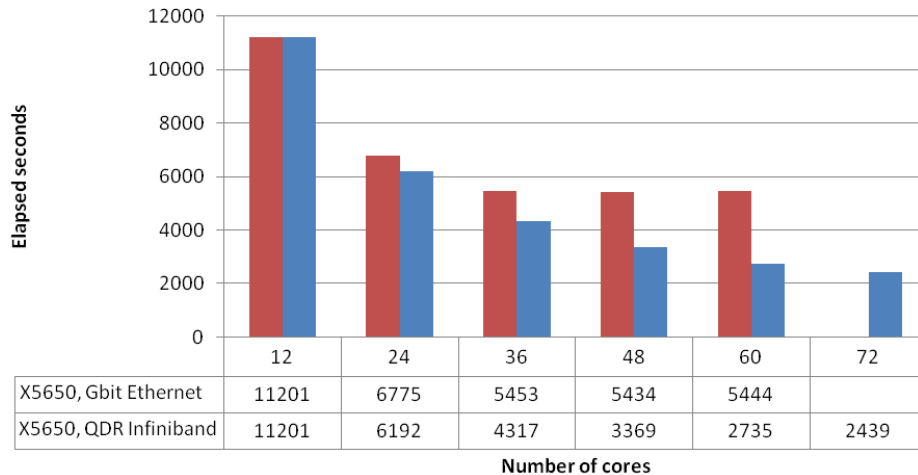




# That's all well, but...

## ...does it meet my demands?

LS-DYNA 3-Car collision  
GbE vs Infiniband



- Benchmark services
  - Standard ISV benchmarks, custom benchmarks
  - Tuning and optimization
- Sizing and design services
  - Predefined building blocks
  - Customer specific sizing and design
- Proof of concepts
- IT investment decision support services

**Confidence in  
solution design,  
sizing**

**Consulting and  
Design Services**

# The Ecosystem for HPC turn-key solutions

## PRIMERGY Hardware



## Cluster Operation

PCM  
**FUJITSU**  
Edition

  
Windows  
HPC Server 2008



## ISV and Research Partnerships

**ANSYS**

**DS**  
SIMULIA

**MSC** Software



**ESI GROUP**



**Altair**

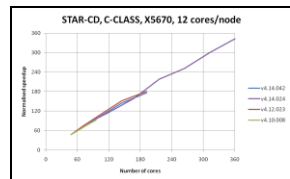
**Exa**

**MAGMA**

*PreDiCT Initiative*

*Open Petascale Libraries Network*

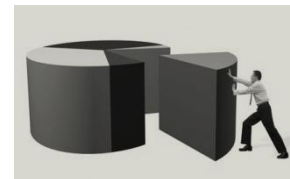
## Consulting and Integration Services



Sizing,  
design



Proof of  
concept



Integration into  
customer environment



Certified system  
and production  
environment

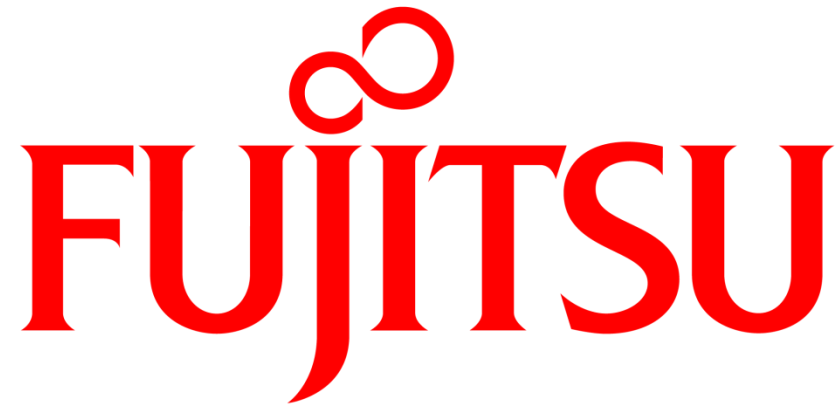


Complete assembly,  
pre-installation and  
quality assurance



"Ready to  
Operate"  
delivery

**Ready to Go**



shaping tomorrow with you