Ready-to-go with Ready-to-use

PRIMERGY x86 – HPC Simplicity
The Concept of HPC Simplicity

Ready-to-go HPC Platform
- Validated systems
  - Optimal configuration
  - Certified operation
  - HPC software stack

PRIMERGY HPC Portal
- Adapted for HPC
  - Application on-boarding
  - Pre-defined workflow catalogue
  - Collaboration and teamwork

HPC Ready-to-use Solution

Built-in expertise
Ready-to-go systems for HPC

- PRIMERGY x86 server configuration and delivery
Building Blocks of PRIMERGY HPC Ecosystem

PRIMERGY Server

Cluster Operation

PCM Edition

Windows HPC Server 2008

redhat

Consulting and Integration Services

Sizing, design

Proof of concept

Integration into customer environment

Ready to Go

ISV and Research Partnerships

PreDiCT Initiative

Open Petascale Libraries Network

PRIMERGY Server

Certified system and production environment

Complete assembly, pre-installation and quality assurance

Ready to operate delivery

EternusStorage
Modular HPC growth potential towards ....

Flexibility to address all kinds of customer requirements

- NEW: skinless server PRIMERGY CX400
  - Massive scale-out due ultra dense server
  - HPC GPU coprocessor support
- Latest generation Intel® Xeon® Processor E5 series
- Highest memory performance plus high reliability
- Low latency/high bandwidth InfiniBand infrastructure
- Industry leading blade server density
- Industry leading I/O bandwidth
Most energy efficient server in the world

- Fujitsu PRIMERGY achieves world record in energy efficiency and holds several best in class ratings
  - World record in SPECpower_ssj2008 by breaking the prestigious milestone of 6,000 overall ssj_ops/watt

- Reduce energy consumption and current carbon footprint
  - Up to 73% more performance per Watt compared to the previous generation means:
    - Up to 33% less energy for the same current performance level to better meet stringent environmental mandates for data centers
    - Up to 66% more workloads on current power budget without stressing current data center cooling
PRIMERGY CX400 - HPC Design

CX400 combines high performance with high density at lower overall investment

High Density / Scalability in 2U Chassis

- HPC requirements optimally fulfilled
  - Up to 4 nodes (1U) or 2 nodes (2U) per 2U chassis
  - 2x Intel® Xeon® E5-2600 processors / node
  - Intel® Xeon® processor E5-2400 node coming soon
  - 16 DIMMs, up to 1600MHz
  - Redundant, hot-plug PSUs for enhanced availability / lower servicing effort
  - Up to 24x HDD
  - **FDR Infiniband** interconnect option for highest, most efficient bandwidth and lowest latency
  - **GPU** Option (2U node)
  - Support of Intel MIC Q1/2013 planned

Main usage scenario

- Cloud
- HPC
The Future in High Performance Computing

Intel Xeon Processor
1 core, 2 threads

Intel Xeon E5 Processor
8 cores, 16 threads

Towards Many Core Architectures

A path towards Exascale enforces a deployment of parallelism at each level to the ultimate possible extent

- Node level (distributed memory)
- Multi socket (shared memory on nodes)
- CPU level (number of cores)
- Instruction level (SIMD)

Challenges

- Increasing parallelism within the CPU results in demand for higher memory bandwidth and thus greater complexity of the memory hierarchy
- Node parallelism enforce the development and deployment of ultra-high-speed interconnect
- Increasing parallelism towards millions of cores leads to increase in system errors
- Amdahl’s Law is more alive than ever and demonstrates that even the smallest portion of serial code dominates (negatively) the overall performance of a code
Many Core Architectures

CX400/CX270 and Floating Point accelerators address the core level parallelism

<table>
<thead>
<tr>
<th></th>
<th>Intel Sandy Bridge E5-2600</th>
<th>Intel MIC Knights Corner</th>
<th>Nvidia Fermi GPU  Tesla 2050</th>
</tr>
</thead>
<tbody>
<tr>
<td>Availability</td>
<td>Today</td>
<td>Q4/2012</td>
<td>Today (Kepler in Q4/2012)</td>
</tr>
<tr>
<td>Cores</td>
<td>8 (superscalar)</td>
<td>&gt; 50</td>
<td>Tesla 2050: 448</td>
</tr>
<tr>
<td>Programming</td>
<td>Standard languages</td>
<td>Standard languages and OpenCL</td>
<td>CUDA, OpenCL</td>
</tr>
<tr>
<td>Architecture*</td>
<td>Multicore</td>
<td>Manycore standalone (possibly) &amp; hybrid</td>
<td>Hybrid</td>
</tr>
</tbody>
</table>
Ready-to-use PRIMERGY HPC solutions

- PRIMERGY HPC Portal with expertise in-built
PRIMERGY HPC Portal total solution

- Application Catalogue
  - STAR
  - FLUENT
  - OpenFOAM
  - ABAQUS
  - NASTRAN
  - RADIOSS
  - PAM-WORLD
  - DL_POLY
  - GROMACS

- Standardised interface to run HPC applications

- Workflow automation for standardised processes

- Utilities
  - User scripts
  - Application monitors
  - Resource monitors

- Resource mediators
  - SGE/OGE
  - PBS
  - LSF
  - Direct

Unified access to PRIMERGY estate
Running an HPC Application

- Experiment inputs managed in job profiles
  - Systematic traceable approach over experiment lifecycle
  - Shareable – project team, between service designer and end-users
  - Reduced operations to submit

Usable with minimal learning
By end-users with little/no IT knowledge
For faster, more accurate setup
HPC Simplicity – In-built Expertise

- Make HPC easier to use
- Share and exchange more widely
- Use resources more effectively
- Broaden HPC access and process reuse

Point-click parameterisation and global file access
HPC Simplicity – In-built Expertise

- Make HPC easier to use
- Share and exchange more widely
- Use resources more effectively
- Broaden HPC access and process reuse

Team knowledge and project management
HPC Simplicity – In-built Expertise

- Make HPC easier to use
- Share and exchange more widely
- Use resources more effectively
- Broaden HPC access and process reuse

Project and application usage reporting
HPC Simplicity – In-built Expertise

- Make HPC easier to use
- Share and exchange more widely
- Use resources more effectively
- Broaden HPC access and process reuse

Catalogue of HPC application workflows
FUJITSU

shaping tomorrow with you