NEC Supercomputers

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Talk Outline

- NEC HPC Operations in Europe
- NEC Hardware Portfolio
- Services and Solutions
NEC HPC Europe

- Newly (in 2003) created NEC subsidiary
- Dedicated to HPC business
- Headquarters in Düsseldorf, Germany
- Serving the European Market
- Branch offices in France, Italy, The Netherlands, Switzerland and United Kingdom
- Application tuning & support centre in Stuttgart

NEC High Performance Computing Europe
Market Position

• Targeting technical a scientific computing market.
• Building on successful NEC history and expertise in the supercomputing area.
• Three way product portfolio:
  – SX-6 vector supercomputer
  – TX7 Itanium2 based 64bit Linux Server
  – 32bit Linux Clusters
• Offering services & solutions besides hardware:
  – System Integration
  – Application Tuning & Support
  – Full Application Solution Offering
Offices

Düsseldorf / Germany
Stuttgart / Germany
Amsterdam / The Netherlands
London / United Kingdom
Paris / France
Lugano / Switzerland
Milan / Italy
3 way portfolio

- SX-Series
  Capability Computing
- TX-Series
  64-bit Servers
- Parallel
  Linux Cluster
Market Development Strategy

Cluster System

SX-Series

Chemistry
Nano Technology
Meteorology
Real-time Local Weather Forecast
Fluid Dynamics
Engine Analysis
Simulation
Crash
Noise Analysis
EMD
Automotive EMD
Simulation

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Technology

A supercomputer is simply defined as the most powerful class of computers at any point in time.

We are proud that all hardware and software components of our SX-series rely on the technological competence of NEC.
SX-Series

- High productivity.
- Ease-of-use for application development.
- Ease-of-integration within application environments.
- Ease of achieving reliable results.
- Ease-of-scalability.
SX-Series  high-performance, core driving force

NEC vector supercomputers have been at the forefront of the world’s latest and best improvements in scientific research and engineering development. The SX series, with the entire vector processor implemented on a single chip, is NEC’s most powerful supercomputer and state-of-the-art technology. Their amazingly compact packaging allow the SX-6 series to achieve a new level of cost efficiency.
NEC’s SX-Series is a consistent innovation driver and today’s leading high performance platform.

NEC uses latest technology to build and develop new generations of supercomputers.
The SX architecture is not mainstream today, it's just 3-5 years ahead!

- Bandwidth is requested again!
- Memory-CPU-performance gap is realized by users, buyers and vendors!
- Vectorisation is the key to latency hiding!
- Clustered SMP is mainstream already today!
- Software development has to address the hardware issues $\rightarrow$ data parallel programming $\rightarrow$ vectorisation!
SX-6 Memory Bandwidth

Stream2--COPY: a(i) = b(i)

Data Size vs. GB/s for SX-6 (1CPU) and IBM p690 (1CPU)

Source: ORNL webpage
Scalable Memory Bandwidth

Stream Triad

MB/s

0 50000 100000 150000 200000 250000

20051 25501 27339 31982 213024

p690 (16 CPUs) p690 turbo (32 CPUs) SX-6i SX-6 (1 CPU) SX-6 (8 CPUs)
MM5 V3.5   6-hour forecast

****** Program Information ******
Real Time (sec) : 4979.666437
User Time (sec) : 4776.461378
Sys Time (sec) : 113.101447
Vector Time (sec) : 4730.900352
V. Element Count : 38459109019585.
FLOP Count : 17025664866477.
MOPS : 8121.675127
MFLOPS : 3564.493360
MOPS (concurrent) : 8121.675183
MFLOPS (concurrent) : 3564.493385
VLEN : 206.419590
Memory Size (MB) : 1984.000000
Max Concurrent Proc. : 1.
Conc. Time(>= 1)(sec): 4776.461345
Event Busy Count : 0.
Event Wait (sec) : 0.000000
Lock Busy Count : 0.
Lock Wait (sec) : 0.000000
Barrier Busy Count : 0.
Barrier Wait (sec) : 0.000000
MIPS : 108.882647
MIPS (concurrent) : 108.882647
I-Cache (sec) : 3.205337
O-Cache (sec) : 16.633047
Bank (sec) : 95.908582
Start Time (date) : 2002/10/08 20:30:36
End   Time (date) : 2002/10/08 21:53:36

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<td>244</td>
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<td>21 km</td>
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<td>109</td>
<td>244</td>
<td>60</td>
<td>7 km</td>
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LM Benchmark

Amdahl Fit:
- 99.3% parallel code
- 10.9 min serial time (on SX)
- 23.6 min wallclock time on 128 CPUs
TX-7 Series
64-bit Itanium² Server
**TX-Series** SX technology, equipped with CPUs from Intel

Their ease-of-use, speed, flexibility and high performance enable our customers to obtain unparalleled results, today and tomorrow. The NEC TX server series combines the power of Intel’s cutting-edge Itanium² CPU with NEC’s technology leadership in high-end computing. Outstanding reliability and scalability for supercomputing results.
Services

We are committed to creating an environment that brings out the best in people.

Our company philosophy focuses on the respect for the individual as well as on the recognition of each person’s contributions.

We are open to new ideas and foster diversity.
Planning Support

Site specification, capacity analysis, air conditioning, machine and cabling layout, manpower requirements for operation, security strategy.
Hardware Support

We built it and keep it up and running. The continuous training of our hardware specialists ensures optimum functionality without any downtime for your valuable hardware investments.
APPLICATION porting and tuning

This means for us how to reach optimal peak performance. Our programmers assist your developers and programmers in achieving superior efficiency out of NEC’s CPUs.

That is one of our assets for your best possible price-performance.
LINUX COMPETENCE CENTRE

Our team of Linux experts has the in-depth knowledge to allow a mission-critical usage of Linux together with IA-32 or IA-64 hardware. Superior efficiency at operational level is reached by actively contributing to the Linux platform, creating transparency by customised packaging and maintaining a very close cooperation with the EHPCTC "European High Performance Computing Technology Centre" in Stuttgart, Germany.
Service on call
We don't theorize

NEC – High Performance Computing Europe GmbH:

the unique solution provider for unique supercomputing power.
DKRZ Hamburg
DKRZ project

Comprehensive IT solutions
Compute server
Data Servers
System integration
Responsibility for entire system including hardware & software from 3rd parties and infrastructure
Operation services
MetOffice Installation
Thank you for your attention

Production terminated

New components

Available soon.