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TX7

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Design: JUNG-Kommunikation, Stuttgart, Germany

THE NEC TX7 SERIES

32 CPU SCALAR SERVER BASED ON ITANIUM2 PROCESSOR

SOFTWARE

Refined program development environment

The TX7 series offers an advanced program development environment running on Linux.

Fortran95 compiler, C/C++ compiler: NEC's compilers are based on the ANSI/ISO language standard, with some additional enhancements. These compilers have been developed by NEC to maximize the performance of the TX7 series, and they support the following high-level optimization functions:

- Command-level parallel scheduling
 - Loop-level optimization, software pipelining etc.
 - Inline procedural expansion and interprocedural analysis
 - Optimization of cache usage via prefetch instructions
- In addition, the TX7 series supports 64-bit memory addressing,

automatic parallelization, as well as shared memory parallel processing up to 32 CPUs through Open MP. It therefore can respond to the demands of large-scale programs.

MPI: MPI (Message Passing Interface) is a standard library for message communication-based parallel programming. The TX7 series offers a high-performance MPI library that can be invoked either by Fortran or C/C++ language.

HPF: HPF (High Performance Fortran) is an extension of the Fortran language designed for parallel processing. The TX7 series HPF compiler is based on the standard HPF 2.0 specification, and also supports HPF/ JA1.0 specifications.

CONFIGURATION TABLE

		i9510	i9010	i6510	i6010			i9510	i9010	i6510	i6010																									
CPU	Processor	Intel Itanium2				Power Supply	Power	Single phase 200V X4	Single phase 200V X4	Single phase 200V X2	Single phase 200V X1																									
	Clock	1GHz / 900MHz					Heat value (kJ/h)	36,400	23,400	22,600	12,700																									
	Cache	1GHz: 3MB / 900MHz: 1.5MB (on-chip L3 cache)					ES* Temp	In operation +5 ~ +32 °C																												
Max. Number of CPUs	32	16	16	8		Idle	+5 ~ +45 °C																													
Max. Memory	128 GB	64 GB	32 GB	16 GB	Humidity	In operation	20 ~ 80% RH (without condensation)																													
Max. Number of I/O slots (including standard I/O section)	112	56	54	26		Idle	8 ~ 80% RH (without condensation)																													
Internal peripheral devices	DVD-ROM (standard), DAT (optional)					* ES = Environmental Specifications																														
Supported Operating System	Linux / HP-UX11i v.16					<table border="1"> <tr> <td>Specifications</td> <td>Housing Type</td> <td>Separate Housing</td> <td>Rack mounted (14U)</td> <td>Rack mounted (8U)</td> </tr> <tr> <td></td> <td>Width</td> <td>600 mm</td> <td>483 mm**</td> <td>483 mm**</td> </tr> <tr> <td></td> <td>Depth</td> <td>1040 mm</td> <td>960 mm**</td> <td>960 mm**</td> </tr> <tr> <td></td> <td>Height</td> <td>1800 mm</td> <td>623 mm**</td> <td>356 mm**</td> </tr> <tr> <td></td> <td>Weight</td> <td>528 kg</td> <td>160 kg**</td> <td>100 kg**</td> </tr> </table>						Specifications	Housing Type	Separate Housing	Rack mounted (14U)	Rack mounted (8U)		Width	600 mm	483 mm**	483 mm**		Depth	1040 mm	960 mm**	960 mm**		Height	1800 mm	623 mm**	356 mm**		Weight	528 kg	160 kg**	100 kg**
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** Device stand-alone dimensions and weight



NEC HPC SERVER: RELIABILITY, SCALABILITY AND SPEED

NEC joined its successful leading-edge supercomputer technology and its experience with very dependable mainframes with enhanced mainstream features like the 64-bit version of the Linux operating system and the cutting-edge Intel Itanium2 pro-

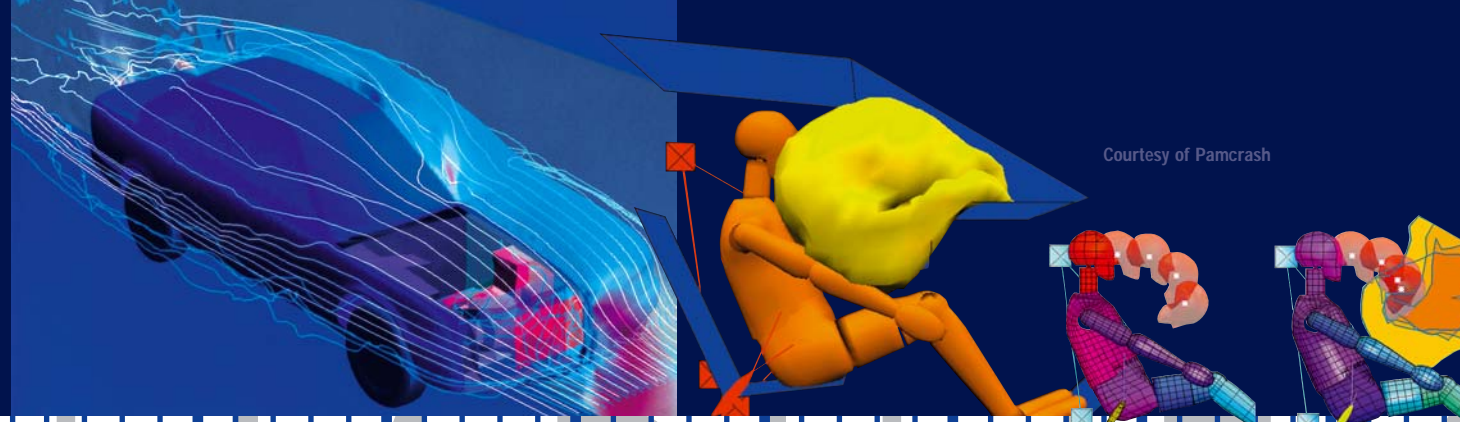
cessor to create a high-performance, high-scalability and highly reliable next generation scalar server.

The TX7 series combines the power of up to 32 processors which can access a maximum of 128 gigabytes of shared main

memory to reach the performance of a supercomputer. An enhanced 64-bit version of Linux, which has gained the support of many users worldwide, serves as operating system. Alternatively, HP-UX with its strong track record is also available.

TX7

TX7



RELIABILITY

HARDWARE FEATURES

Intel Itanium2 Processor

The TX7 series employs the Itanium2 Processor, the second-generation processor from the Intel Itanium processor family with the latest 64-bit architecture.

The performance of the Itanium2 Processor shows dramatic improvement over the first generation Itanium processor, through improved operation frequency, reduced latency and enlarged on-chip cache.

In addition, the TX7 series can be upgraded to incorporate future Itanium processor families, making it extremely future-proof. The technical specifications of the processors are:

- 1 GHz / 900 MHz clock
- 6.4 GB/s system bus
- 3 MB / 1.5 MB on-chip L3 cache
- large-volume memory addressing capability
- simultaneous execution of 6 instructions
- stand-alone peak performance 4.0 / 3.6 GFLOPS floating point arithmetic capability

Advanced System Architecture

In order to maximize the performance of the Itanium2 Processor, NEC has developed a high-performance chipset and crossbar switch that is based on supercomputer mainframe technology. In using these, the TX7 Series not only demonstrates high performance, but also realizes high scalability and high reliability.

High Scalability: Up to four CPUs can be installed in a single cell. The TX7 systems connect these cells via a high-speed crossbar switch. The i9510 is an outstanding system that can be configured for up to 32 CPUs, more than required to meet the needs of large-scale calculations.

High Performance: The crossbar switch has low latency as well as high data bandwidth. While comprising cc-NUMA architecture (Cache Coherent Non-Uniform Memory Access), it employs a chipset and crossbar switch developed in-house by NEC and achieves near uniform high-speed memory access. In addition, the I/O sub-system employs the advanced PCI-X bus and supports high-speed input and output capability that will be able to meet future increases in high-speed I/O demand.

Highly Reliable: Each data bus has error detection and single bit error correction. In addition to the redundant power supply and fan structure, duplication of the service processor which controls and manages the server is also possible (i9000 series only). This achieves a high-level reliability which is equal to that of a mainframe.

TECHNOLOGY

Flexible Operation

The TX7 partitioning feature allows the system to be subdivided at cell boundaries, i.e. partitioning is possible in units of four CPUs. This gives a maximum of 8 sub-systems on the model i9510. Each sub-system operates as a wholly autonomous system. Different operating systems can be used in parallel, since each OS works separately and allows for independent boots, reboots and power management.

Latest Linux Operating System

Linux has continued to develop rapidly, focused on the Open Source community. Having already secured a strong track record in the Internet server field, Linux has gained the support of advanced users worldwide.

With the IA-64 Linux Project, Linux has been developed for the Itanium processor family, and NEC offered its participation and support in this process. In addition, at present several functional enhancement projects for Itanium2 are underway as part of the Linux on Large Systems Foundry (Atlas Project). As a core member of OSDL (Open Source Development Lab), NEC has been active in helping to strengthen and develop Linux.

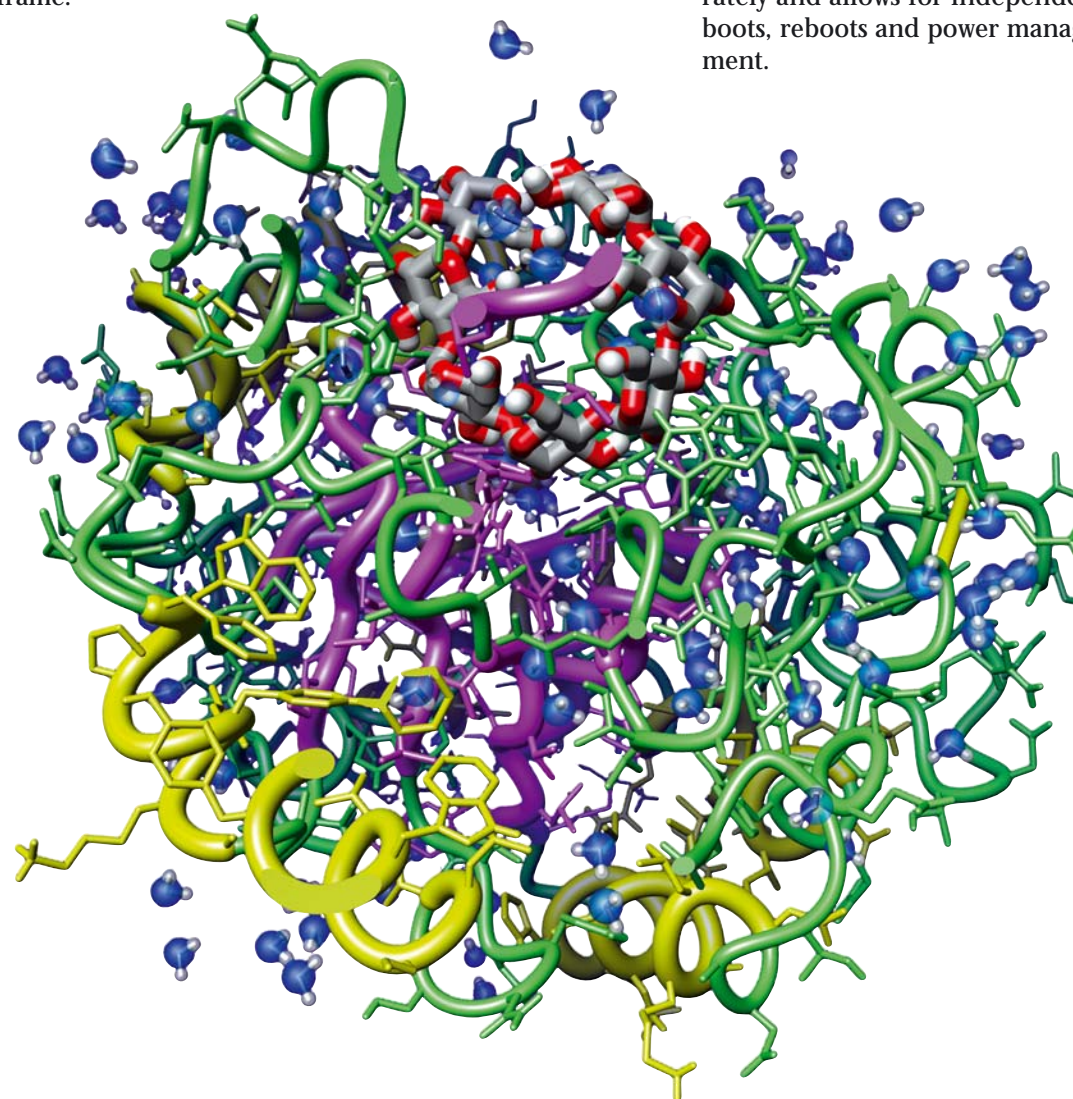
NEC works with numerous communities worldwide to strengthen Linux. The results of this process have been incorporated within the TX7 series. We are also implementing future kernel enhancements in kernel functionality which are required by large-scale servers such as

- Support for cell architecture
- Support for large-scale storage systems
- High-speed networking through support for Gigabit Interface (Jumbo Frame etc.)
- Incorporation of dump function during downtime
- Based on the latest stable version of the kernel (version 2.4)

Connectivity with the SX series

High-speed File Sharing: The TX7 can act as high-performance file server for an NEC SX supercomputer system. This enables high-speed file sharing between several nodes within a SAN (Storage Area Network) environment.

Cross development environment for SX series: The TX7 can also act as a front-end to a SX series supercomputer. As such, it hosts cross-development environment for developing programs for the SX series. Furthermore, it can submit batch jobs to the SX and also to the TX7 system. A productive development environment can be constructed in this way by bringing together the SX and TX7 series.



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