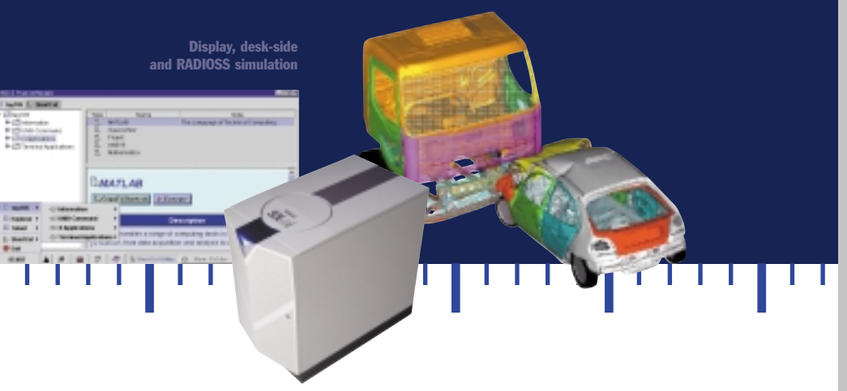

SOFTWARE

Operating System and Applications

With traditional NEC reliability and the SUPER-UX operating system, now in its 12th year, the SX-6 series is designed for production sites that require a reliable platform. All the functions other systems promise, like checkpoint restart or a robust batch environment, are available today.

All third party applications relevant to parallel vector supercomputers are available and provide industry-leading performance. Turn around time for solutions is minimized. Complex analysis streams can be completed overnight instead of taking a week. All application software available for the larger SX models is also available on the SX-6i. This includes applications for vehicle crash analysis, computational fluid dynamics, structural analysis and others.

Applications development is made easy through the simplicity of vector programming and the support of NEC's optimizing compilers. NEC's PSUITE Integrated Development Environment provides all of the tools and utilities necessary under a single package for project management, editing, compiling, testing, debugging and performance optimization. The cross development environment PSUITE is available on all popular workstation class products as well as Linux personal computers to maximize accessibility and development efficiency. The languages, libraries and tools available include Fortran90, Fortran95, C and C++.

SX-6

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CONFIGURATION TABLE

Hardware		
Processor	CPU	One NEC single-chip vector processor
	Peak performance	8 GLFOPS
Main Memory	Capacity	4 GB or 8 GB
	Bandwidth	32 GB/sec
I/O interface	Max. channels	Max. 6 channels inclunding system channel
	Interfaces	Gigabit Ethernet, Ethernet, FC-AL, SCSI, ...
Software		
Operating System	Standard Unix OS	NEC SUPER-UX (64 bit)
Languages	FORTRAN	FORTRAN90/SX (FORTRAN95)
	C/C++	C/SX and C++/SX
Operation	Batch system	NQS
	Debugger	dbx, xdbx

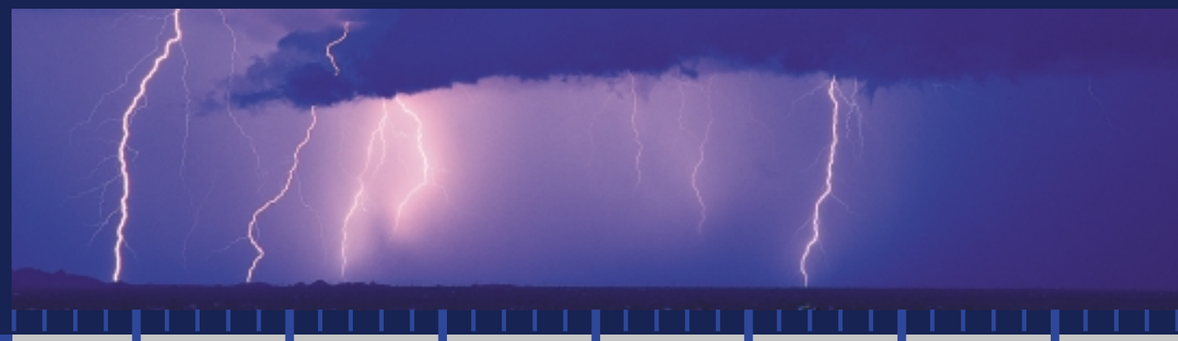
Operating Conditions		
Floor layout	Size	Desk-side 445(W) x 730(D) x 700(H) mm
		Rack mount (25U) 600(W) x 1000(D) x 1265(H) mm
		Rack mount (37U) 600(W) x 1000(D) x 1800(H) mm
	Weight	100 kg desk-side, 310 kg 25U rack,
		410 kg 37U rack
Power	AC Input	Single phase 100 V or single phase 200 V
	Consumption	2 kVA
	Heat dissipation	7100 kJ/h
Climate	Temperature	5 ~ 38 °C (recommended are 16 ~ 28 °C
		for cooling air entering the chassis)
	Humidity	10 ~ 80 %

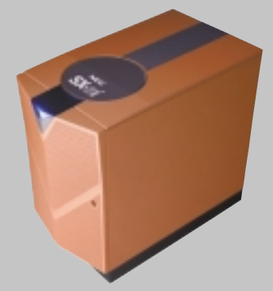
Design: Zimmermann & Jung, Stuttgart, Germany

Empowered by Innovation NEC

THE NEC SX-6i

DESK-SIDE SUPERCOMPUTER WITH SINGLE-CHIP VECTOR PROCESSOR





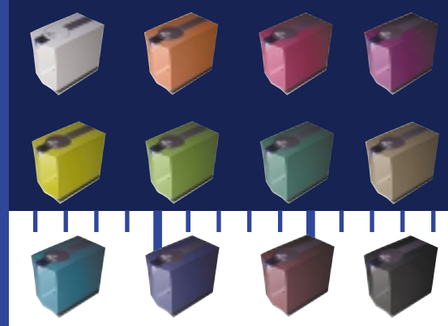
VECTOR SUPERCOMPUTING: RIGHT BESIDE YOUR DESK

"A vector supercomputer that you can utilize freely in your laboratory in your department, just like your personal computer." This is the main concept of the NEC SX-6i, the smallest member of the NEC SX-6 series. With a choice of desk-side or rack-mountable chassis, the SX-6i is the supercomputer that fits right next to your desk or in every departmental computer room.

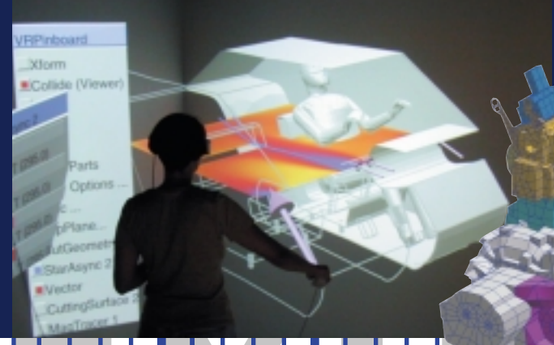
Vector supercomputers have always provided the absolute highest performance available, with high-performance high-bandwidth memory, powerful processors and commercial robustness for production sites.

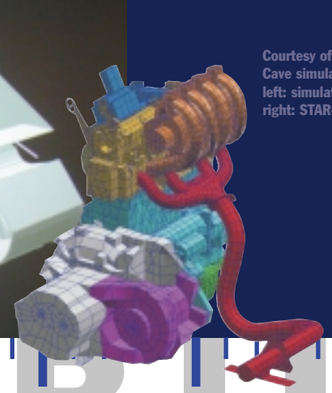
NEC has now substantially lowered the entry level to this technology with the introduction of the cost effective SX-6i server. With attractive pricing and flexible installation requirements, the combination of world's fastest single chip processor and its unmatched high performance memory subsystem is now accessible to a much wider audience. Its superior UNIX-based development environment makes it an outstanding tool for researchers and software developers, while the wide range of available application software turns it into a powerful workbench for engineers.

SX-6

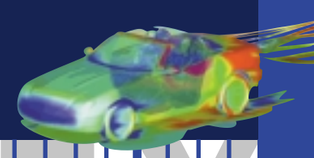


Large (right) and
small (left) rack-mount chassis.





Courtesy of HRLS, Stuttgart/Germany
Cave simulation
left: simulation renault engine
right: STAR-CD simulation.



FLEXIBILITY

HARDWARE FEATURES

Model Configuration

A SX-6i is a complete vector system consisting of one vector processor with 8 GFLOPS peak performance. The processor is connected to an uniform main memory with a capacity of 4 GB or 8 GB. The SX-6i comes in three different types of frames: One desk-side and two rack-mounted variants. The desk-side and the smaller rack-mounted version hold one processor configuration, while two systems can be installed in the larger rack. The SX-6i is binary compatible to the other SX-6 series systems, as well as to its predecessor the SX-5 series. It excels in the total balance of processing performance, memory bandwidth, input/output throughput in much the same way as the former SX series systems did. Existing applications and resources can be easily migrated to the SX-6i.

Larger systems of the SX-6 series are built from the SX-6 node, which holds up to eight processors and up to 64 GB of uniform shared main memory. These nodes may be clustered in order to form even bigger configurations: Up to 128 SX-6 nodes can be connected via NEC's proprietary Internode Crossbar Switch (IXS).

Desk-side System

The NEC SX-6i in its desk-side chassis is the smallest vector supercomputer available today. The system holds one SX-6 processor and 8 GB or 4 GB of main memory. The I/O subsystem supports up six channels, which can be equipped with various interfaces for disks, network and other peripherals. The SX-6i desk-side chassis is available in several different colours. This system is the ideal tool for a researcher, an engineer or a software developer, who needs the power of a vector supercomputer and needs to utilize it freely and independently.

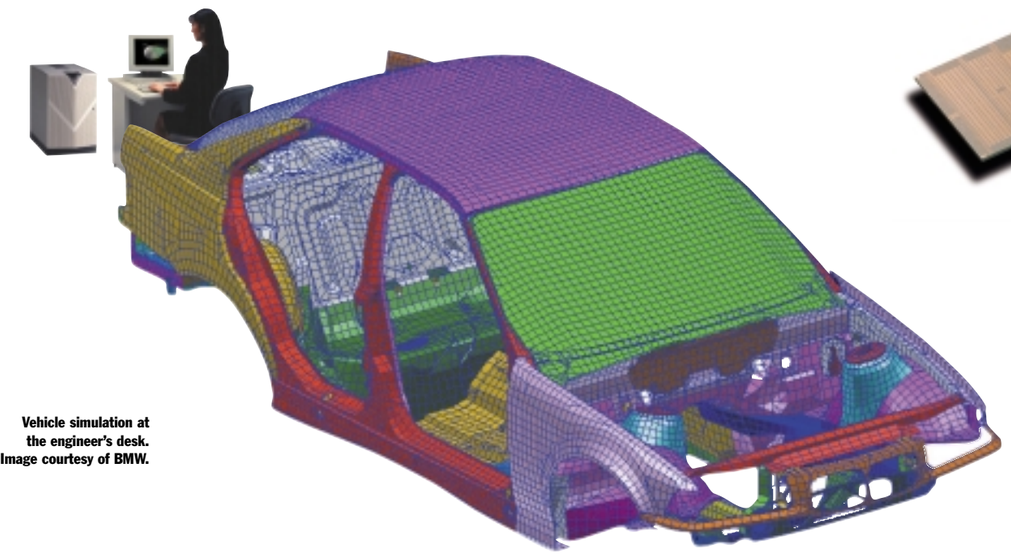
Rack-mounted System

The rack-mounted version of the SX-6i comes in two different sizes: The 25U rack can hold one SX-6i system and has more space for internal peripherals than the desk-side version. The 37U rack-mount version holds two independent SX-6i systems. The processor and memory specifications are the same as for the desk-side version. Both rack-mounted variants are meant to serve in departmental or laboratory computer rooms.

The colourful supercomputer:
The desk-side case is available
in different colours.

Ultrahigh-speed Vector and Scalar Unit

The vector unit of the SX-6 series processor consists of vector registers and eight sets of pipelines for logical operations, multiplication, add/shift operations, division, masked operations and load/store. The scalar unit realizes ultrahigh-speed performance through a four-way superscalar design. The integration of the processor in just on chip facilitates a reduced clock cycle when compared to the SX-5. This leads to a decreased processing time for each instruction and a superior performance on short vectors and scalar operations.

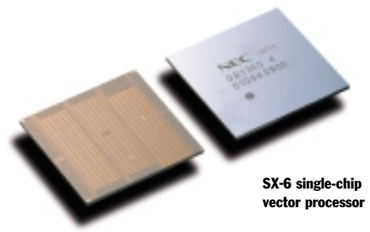


Vehicle simulation at
the engineer's desk.
Image courtesy of BMW.

TECHNOLOGY

The Worlds first Single-chip Vector Processor

The high gate density possible for the state-of-the-art CMOS technology and LSI design enabled NEC to implement the vector processor on just one chip. This LSI and packaging technology provides a performance of 8 GFLOPS on a single LSI. This ultrahigh integration leads to improved internal latencies and performance in comparison with former generation designs, which used dozens of chips to implement a processor, as well as highly reduced memory latencies by drastically narrowing the distance between memory and processors.



SX-6 single-chip
vector processor

Main Memory Unit

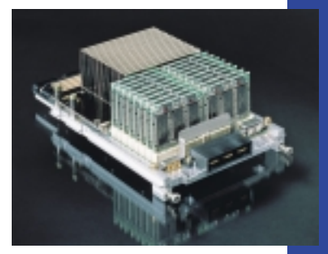
The SX-6 series utilizes ultra-high-speed double-data rate synchronous DRAM. SX-6i systems have a memory capacity of 4 GB or 8 GB and a memory bandwidth 32 GB per second. A large memory bandwidth turns out to be most important for the successful and fast solution of large-scale numerical problems.

Ease of Installation

The SX-6 series power consumption and space requirements have been reduced by 80 % when compared with the previous generation of the SX series. The low power consumption allows all models to be fully air-cooled. These two elements contribute to a great reduction of installation costs and complexities, and they have allowed the development of the SX-6i as a desk-side system.

High Reliability

The usage of highly integrated CMOS technology has led to greatly reduced number of components in a single system. This, in turn, leads to a greatly improved hardware reliability.



SX-6 Memory module