

SUPERCOMPUTER SX-3 OVERVIEW

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1. System Configuration

In February 1992 National Institute for Environmental Studies(NIES) installed the SX-3 system, a SX-3/14 with the operating system SUPER-UX. NIES's SX-3 provides a peak vector performance of 5.5 GFLOPS, and has the following features:

- 1 Gbytes of main memory
- 3 Gbytes of extended memory
- 53 Gbytes of magnetic disk capacity
- 28 Gbytes of high speed magnetic disk capacity
- Ultra Net operated at 800 Mbps.

Fig.1 shows the system configurations with the SX-3 and the other central machines; SUN Server490, SGI Power 4D/310GTX, SGI Power 4D/35TG. The network is based on a FDDI backbone ring connecting the UltraNet with CISCO router. A LANP and Ultra Hub are used to attach the SX-3 to the FDDI.

The NIES-NET is connected to the TISN (Todai International Science Network) by a router, so everyone can get access to the SX-3 upon obtaining authorization together with a password and user-id.

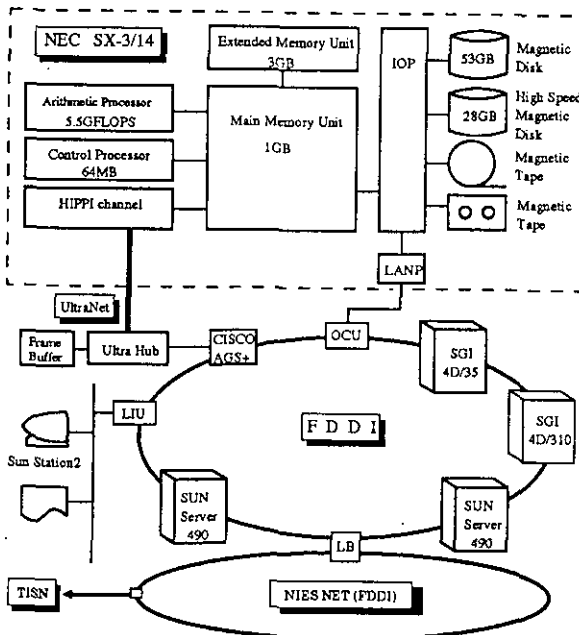


Fig.1 System Configuration

2. SX-3 Hardware

1. Arithmetic Processor

The arithmetic processor is divided into two

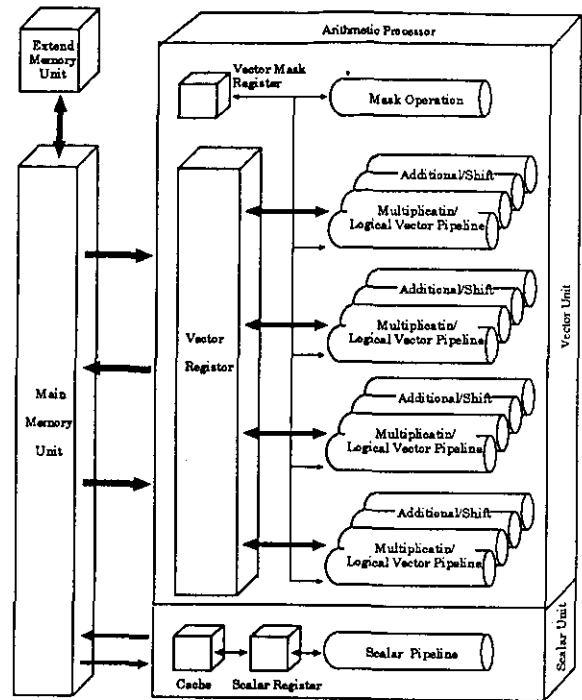


Fig.2 Arithmetic Processor Configuration

functional units, a vector unit and a scalar unit. The vector unit has four sets of vector arithmetic pipelines and 144 KB of vector registers for vector operation. The vector arithmetic pipeline set consists of two addition/shift and two multiplication/logical pipelines. A total pipelines (16 pipelines) can operate simultaneously. The scalar unit has a 64 KB cache memory for high-speed access to instructions and operands. To speed up scalar operations, the scalar unit has 128 scalar registers and a pipelined arithmetic unit. The pipelined unit consists of a fixed-point adder, multiplier/divider, a floating-point adder, a logic unit and a shifter.

2. Main Memory Unit

The main memory unit has a storage capacity of 1 GB and an interlace of 512 ways.

High-speed vector processing requires successive, high-speed transfer of the required vector data from main memory to the processor. In addition to the scalar load/store path, an arithmetic processor has two paths that load up to four vector data items (8 bytes each) per machine cycle (2.9ns) and one path that stores up to four vector data items. Each path operates

concurrently with pipeline units.

3. Extended Memory Unit

The extended memory unit is a semiconductor memory unit with a storage size of 3 GB. Data read/write is performed at high-speed in 1 KB blocks. The maximum transfer rate is 3.2 GB per second.

4. Mass Data Processing System

The mass data processing system (MDPS) has 525 optical disk units, a storage capacity of 790 GB. It connects to super-high-speed HIPPI channels and achieves a sustainable data transfer rate of over 8 MB per second. This system will be installed in March 1994.

3.SUPER-UX and Applications

SUPER-UX is based on UNIX System V and incorporates numerous Berkeley Software Distribution 4.3 (BSD4.3) features. SUPER-UX adds a number of extensions for supercomputers. SUPER-UX produces optimum system performance by providing:

- multiprocessor support
- high-speed input/output
- high-speed swapping using the extended memory unit
- priority scheduling

SUPER-UX also provides efficient operation management through powerful batch processing, large-scale file support and system freeze/restart.

Table1 shows the software packages supported by NIES's SX-3 system.

Table1 Software Packages (* = available)

Applications	SX3	490	490	310	35	S2
IMSL	*					
BLAS	*					
ASL	*					
MATHLIB	*					
CONVERTER	*					
GKS	*	*	*			
PHIGS+	*					
SXview/IMG	*					
SXview/GWS	*			*		
UNIRAS	*	*				*
ARC/INFO			*			
ERDAS			*			
FIGARO				*	*	
XGL		*	*			
GL				*	*	
SUNvision		*	*			
NCARG	*	*				
CCN	*					
GAUSSIAN90	*					

4.Usage of the SX-3

The usage of the SX-3 resources is monitored and controlled through user administration activities like account application processing, user accounting, etc.

Fig.3 and Fig.4 show the session time and cpu time usage from October 1992 to September 1993.

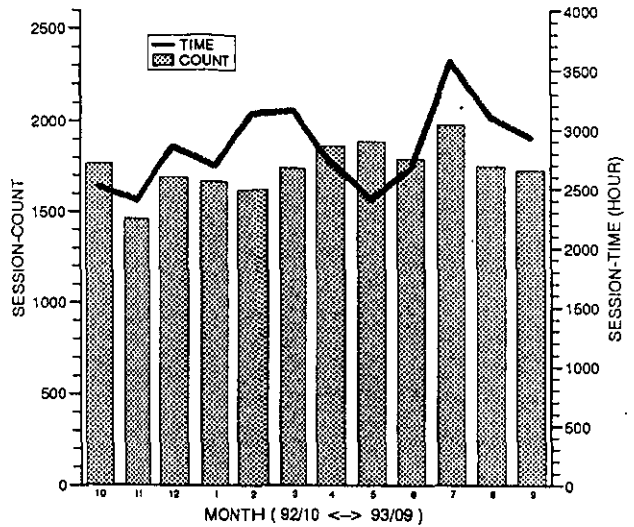


Fig.3 Usage of Session

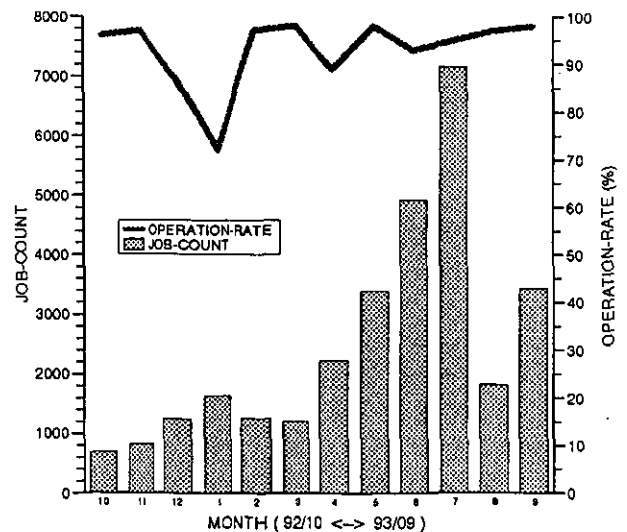


Fig.4 Usage of Job