Sequent Symmetry S27 and Symmetry S81
Parallel Bus Architecture

Architecture: Two products, Symmetry S27 and Symmetry S81, employing same system components and differentiated only by capacity.
The S81 has from 2 to 30 32-bit INTEL 80386 microprocessors (2 to 10 on the S27), each with an INTEL floating-point coprocessor, 64 Kbyte two-way associative cache, memory management unit, sharing a global memory via a 64-bit wide pipelined packet bus supporting multiple, overlapped memory and I/O transactions with a sustained data transfer rate of up to 53.3 Mbyte/sec (Peak rate is 80 Mbyte/sec). Optionally, each processor can be fitted with a floating-point accelerator based on the Weitek 1167 chip. The cache uses a copy back control scheme implemented in custom designed VLSI. Each CPU board contains 2 Intel 80386 and 80387 microprocessors per board running at 16 MHz with plans to increase rate to 20 MHz.

It is possible to upgrade from the earlier Sequent machines simply by swapping boards. A buy-back scheme for the old boards is currently in operation.

Each memory controller has either 8 or 16 Mbytes of memory, while expansion boards contain 24 Mbytes each. 1 Mbyte DRAM devices are used and the maximum physical memory is 240 Mbytes. Each process has a maximum virtual address space of 256 Mbytes. Processor and memory boards can go in any slot on the bus.

A Sequent-designed IC chip (SLIC, System Link, and Interrupt Controller) resides on each board to manage interprocessor communication, synchronization, interrupts, diagnostics, and configuration control. There is an extensive diagnostic subsystem.

Configuration: Industry-standard I/O, interfaces:

MULTIBUS - has terminal multiplexor and other controllers and provides a link for up to four IEEE 796 standard MULTIBUS systems. Also MULTIBUS-based controllers for connecting RS-232 terminals, 1/2" 1600 and 6250/1600 bpi tape drives and parallel line printer controllers.

Ethernet - at 10 Mbits/sec. Connection to PC as virtual disk through Ethernet.

SCSI - at 2.5 Mbyte/sec. Offers 5-1/4 in. disk drives (72 and 150 Mbytes formatted) and streamer tape drives with adaptor boards for the SCSI bus.

DCC - a very high performance SMD and SMD-E disk controller supporting up to 8 disks allowing two simultaneous data transfers at up to 3 Mbyte/sec and overlapped seeks on all drives. Performance enhanced by rotational position sensing and slip sector bad block handling.

NFS - a version of SUN Microsystem's Network File System. TCP/IP - a standard network protocol. X-Windows, X.25, Colored book software available by 2Q 1988.

Peripherals include 1/2" 1600 and 6250 bpi tape drives and 396, 264, and 540 Mbyte disk drives.

Other features:
Dimensions 30.5"h x 23.3"w x 26.8"d (S27)
67.0"h x 38.0"w x 27.5"d (S81)
S27 16 amps max at 60Hz 115VAC.
8 amps max at 50Hz 220VAC.
Maximum configuration dissipates 1500 Watts
S81 15 amps max at 50Hz 415 VAC three phase.

Software: The operating system, called DYNIX 3, is a version of UNIX supporting a dual universe for System V.2 and BSD 4.2 UNIX applications, enhanced for application-transparent multiprocessing and user-controlled parallel processing. Among the enhancements are a completely reentrant kernel, tunable virtual memory, user-level shared memory, and synchronization services. All processors run a shared copy of the operating system. The configuration is symmetric, and load balancing is automatic and dynamic.

Languages: C, Fortran, and Pascal are fully supported and have support for parallel programming. A parallel programming library is callable from any language. There are extensions to Fortran, C, and Pascal to allow shared common blocks. There is a preprocessor for Fortran to parallelize DO-loops. Pdbx, a version of the dbx source level debugger that has been enhanced to support the debugging of parallel programs, is available.

Performance: From 8 to 108 mips. The S27 runs at 5 Mflops (single precision) on the LINPACK benchmark (with a one-line compiler directive), and the S81 at 13 Mflops (single precision) when configured with the Weitek floating-point accelerator.

Status: Symmetry machines being delivered since December 1987. By January 1988, over 50 Sequent Symmetry machines had been delivered.

Cost: Cheapest system is $60,000, and smallest increment is an 8 mips board at $21,000.

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