Charles River Data Systems

MANAGEMENT SUMMARY

UPDATE: *Charles River has dropped its Universe 32 and 68 product families and has restructured the Universe 2400 Family. The Universe 2400 Family now consists of three models: the Universe/200, Universe/400, and Universe/600.*

Charles River Data Systems has a visibility problem. Since introducing new models to its Universe Family in July of 1986, the company has gone virtually unnoticed in the trade papers. Just what has Charles River been up to in the past year?

Charles River is concentrating its efforts on marketing just three models—the Universe/200, Universe/400, and Universe/600. The installed base figures for its former offerings, the Universe 32 and 68 families, are even too small to appear on market survey tabulations for Unix-based small systems. How, then, can Charles River survive in this highly competitive, Unix-based supermicro market?

To exist in this market, the vendor's strategy is to restrict its systems to OEM sales in four general areas: nonfinancial transaction processing, realtime process control, telecommunications, and data imaging. However, Charles River ▷

Charles River Data Systems' family of supermicrocomputers uses the Motorola MC680XX family of microprocessors. The family includes the Universe/200 (right), the Universe/400 (left), and the Universe/600 (center).

Charles River Data Systems supermicro-computers are based on the Motorola MC680XX family of microprocessors and a 32-bit VMEbus. The three models are Unix based and are targeted for transaction processing, telecommunications, data imaging, and manufacturing process control applications.

MODELS: Universe/200, Universe/400, Universe/600.
MEMORY: 1MB to 16MB.
DISK CAPACITY: 26MB to 3.2GB.
WORKSTATIONS: Up to 96.
PRICE: $8,000 to $35,200 (base systems).

CHARACTERISTICS

VENDOR: Charles River Data Systems, 983 Concord Street, Framingham, Massachusetts 01701. Telephone (617) 626-1000.

DATA FORMAT

BASIC UNIT: 32-bit word.

INTERNAL CODE: ASCII.

MAIN STORAGE

Universe/200 base memory consists of one or two megabytes of on-board RAM.

Universe/400 and Universe/600 base memory consist of 1MB of on-board RAM, with a system capacity of 16MB.
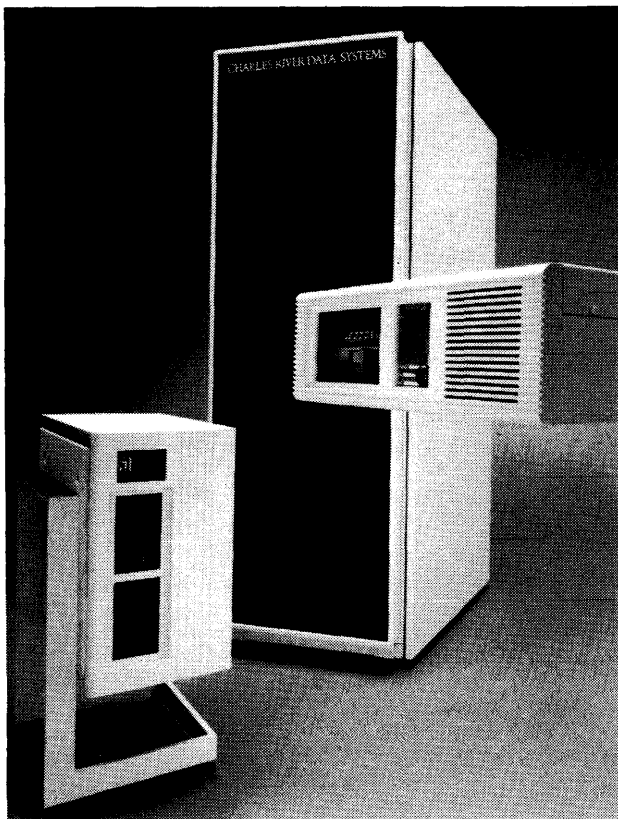
PROCESSING COMPONENTS

The processing differences among the three Universe models are based on expansion capability and the central processors they support.

The Universe/200 contains a two-board computer, the VCP-1000, which is based on a 10MHz Motorola MC68000 processor. The VCP-1000 memory segmentation logic and direct interface path to memory are designed to provide zero wait states for high-speed performance levels.

The Universe/400 VCP-2000 central processor is based on a Motorola MC68000 microprocessor and operates at a cycle time of 12.5MHz. The memory segmentation logic and cache of the VCP-2000 are designed to permit the processor to run without wait states, while the interface to memory uses a full 32-bit data path. The 4KB cache memory takes data from memory in 32-bit transfers and provides access for both instruction and data accesses from the processor. Cache access time is 45 nanoseconds. The cache uses write-through logic for processor memory modifications. The processor operates at an 80 percent cache hit rate, depending on the instruction mix.

The Memory Protection and Logical Allocation (MAP) logic provides two functions for multiprocessing operations. First, it allocates memory on a logical basis, permitting ▶

Charles River Data Systems

CHART A. SYSTEM COMPARISON

MODEL	Universe/200	Universe/400	Universe/600
SYSTEM CHARACTERISTICS			
Date of introduction	June 1986	April 1985	June 1986
Date of first delivery	November 1986	July 1985	December 1986
Microprocessor type	MC68000	MC68000	MC68020
Microprocessor cycle time	10MHz	12.5MHz	16.7MHz
Operating system	Unos	Unos	Unos
Upgradable from	Not applicable	Not applicable	Universe/400
Upgradable to	Not applicable	Universe/600	Not applicable
Number of serial/parallel I/O ports	4 to 24 serial	4 to 64 serial	4 to 96 serial
Number of expansion slots	3	8	16
MEMORY			
Minimum capacity (bytes)	1M	1M	1M
Maximum capacity (bytes)	2M	16M	16M
DISK STORAGE			
Minimum capacity (bytes)	26M	26M	26M
Maximum capacity (bytes)	3.2G	3.2G	3.2G
NUMBER OF WORKSTATIONS	24	64	96
COMMUNICATIONS PROTOCOLS	UniverseNet 3.0, Ethernet, SNA/3270, IBM PC connect, TCP/IP, X.25, TOP, MAP	UniverseNet 3.0, Ethernet, SNA/3270, IBM PC connect, TCP/IP, X.25, TOP, MAP	UniverseNet 3.0, Ethernet, SNA/3270, IBM PC connect, TCP/IP, X.25, TOP, MAP

Note: A dash (—) in a column indicates that the information is unavailable from the vendor.

▷ needs a shot in the arm right about now—that injection needs to be in the form of a multimillion dollar contract from a system integrator for a larger order of Universe models. However, unless Charles River can close a few deals like that in the near future, it is unlikely that the vendor can increase its market share.

COMPETITIVE POSITION

It is hard to believe that a base entry-level Charles River system, the Universe/200, can be purchased for about the price of a compact automobile—roughly $8,000. (One reason that Charles River offers the Universe/200 at this price may be so that it can advertise it has a system for under $10,000—a selling point used by leading vendors like Digital Equipment Corporation with the Micro-VAX 2000.) The Universe/200 executes at 1.0 MIPS and, fully configured, supports up to 32 users. Obviously, with 32 users on the system and memory and disk capacities at their limits, the price of the Universe/200 could approach the $40,000 mark. This would make the cost-per-user ratio approximately $1,250, certainly a respectable to excellent price in the 32-bit, Unix-based supermicrocomputer market. However, it must be remembered these are OEM prices, and an end-user price tag could be significantly higher.

A typical application for the mid-range Universe/400 is nonfinancial transaction processing. An example of this is data entry on a shop floor. Charles River is certainly not alone, though, in marketing a machine for the manufacturing market, for that segment of the computer industry is overflowing with competitors. However, the Universe/400 does offer substantial advantages in the manufacturing market. For instance, the Universe/400 is ruggedized, making it vibration resistant; it is also designed to repel liquid contaminants from accidental spills and is encased in sheet metal. This ruggedized system is also attractively priced at ▷

▶ programs to load and/or swap into any area of physical memory for programs. Eight segments of 2MB each are available for each process. This permits sharing and/or local access of instructions and data. Second, MAP logic provides protection between segments of various processes. The protection includes write protection for pure (shared) instruction space, as well as invalid processing for references outside the logical address space of a user. An additional set of eight segments is provided for system operations, permitting protection of system data structures and providing logical windows between system and user address spaces.

The Universe/600 VCP-4000 central processor is based on an MC68020 microprocessor and operates at a cycle time of 16.7MHz. The memory segmentation logic and cache of the VCP-4000 are designed to permit the processor to run without wait states, while the interface to memory uses a full 32-bit data path. The VCP-4000 includes 32KB of EPROM for system initialization and diagnostics. The 8KB, 35-nanosecond access time cache memory takes data from memory in 32-bit transfers and provides access for both instruction and data from the processor. The cache uses write-through logic for processor memory modifications, so the data in the cache never needs to be flushed to memory. A cache validity array ensures that cache accesses return only valid results.

The VCP-4000 also uses the MAP logic; however, an additional set of 16 segments is provided for systems operations.

An MC68881 floating-point co-processor running at 16.7MHz is available as an option on the MC68020-based Universe/400 and Universe/600.

INPUT/OUTPUT CONTROL

The Universe/400 and Universe/600 additionally contain two or more dedicated MC68000 processors. One MC68000 functions as a dedicated disk channel controller, supporting the ANSI-standard Small Computer System Interface (SASI/SCSI) for hard disk, tape, and diskettes. Up to four controllers, each of which can support four storage devices, can be connected to this MC68000 controller. The second dedicated MC68000 is an I/O processor that provides enhanced character I/O processing for operations such as communication line handling. ▶

Charles River Data Systems

▷ $18,000. Thus, with these reinforcements made to the hardware, the Universe/400 can handle applications in the factory, on the shop floor, and on-board ships and vehicles.

Another manufacturing application that Charles River is pushing, for the Universe/400 and its other two models, is realtime process control. One of Charles River's first large Universe orders was to Honeywell, for process control use at its plant in Phoenix, Arizona. While this sales order to Honeywell was certainly a boon to the vendor, Charles River must sell many more of its Universe models in large quantities before it can gain market share in the manufacturing environment.

Charles River faces steep competition in the manufacturing market. Established vendors like Digital Equipment Corporation, Hewlett-Packard, Harris Corporation, and Modcomp already have a strong foothold in this market. Charles River must also compete with workstation vendors like Sun Microsystems and Apollo Computer, whose systems can operate as standalone machines or be linked on a network.

ADVANTAGES AND RESTRICTIONS

Whereas Charles River has its work cut out in trying to gain market share in the manufacturing area, the Universe/400 is a bona fide competitor. What makes the Universe/400 viable is its communications network and its adherence to manufacturing industry standards. The Charles River network product, UniverseNet 3.0, supports the Technical Office Protocol (TOP) local area network and all levels of Manufacturing Automation Protocol (MAP) specifications. TOP and MAP protocols allow various vendors' computers to communicate over a high-speed local area network. That network, UniverseNet 3.0, allows Charles River users to print files remotely, to transfer files on a multivendor network, and to send electronic mail.

Another advantage of the systems is that the vendor designed them around the industry-standard 32-bit VMEbus. Charles River is adhering to a nonproprietary bus, allowing configuration of a range of third-party peripherals and providing greater freedom of reconfiguration.

Another advantage of the Charles River systems is their compatibility. Charles River designed all VME family members with compatible CPU boards, peripheral controllers, and system software. Thus, programs developed for one Universe model will run on any other Universe system—with no modification or recompilation. □

▶ CONFIGURATION RULES

The Universe/200 consists of a main CPU, 1MB of memory, four serial I/O ports, battery-powered calendar clock, realtime clock, 26MB Winchester disk drive, a 5.25-inch diskette drive, and a desktop enclosure with six VMEbus slots. The Universe/200 can be expanded to support 2MB of memory, 3.2GB of disk storage, and 24 workstations.

The Universe/400 consists of a main CPU, 1MB of memory, four serial I/O ports, calendar and realtime clocks, 26MB Winchester disk drive, a 5.25-inch diskette, and 12 VMEbus slots. The Universe/400 can be expanded to support up to 16MB of memory, 3.2GB of disk storage, and 64 workstations.

The Universe/600 consists of a main CPU, 1MB of memory, four serial I/O ports, battery powered calendar clock, realtime clock, 26MB Winchester disk drive, diskette, all housed in a rack mount cabinet with 20 VMEbus slots. The expanded system supports up to 16MB of memory, 3.2GB of disk storage, and 96 workstations.

INPUT/OUTPUT UNITS

See Chart B for disk and diskette drives.

Charles River Data Systems offers neither workstations nor printers and recommends that prospective users contact third-party vendors for those peripherals.

OTHER PERIPHERALS: Two tape drives support the Universe models. A 1600/3200 bpi half-inch streaming tape and a 6250 bpi half-inch streaming tape are supported. Both tapes are available with or without controllers. The models with the controllers support up to four tape drives.

COMMUNICATIONS

The VCP-2000 and VCP-4000 central processors incorporate four serial ports, providing terminal and printer interfaces. Each port can be programmed for speed (50 to 38,400 bps), number of bits, parity, and modem control signals. One port can be strapped for either RS-232-C or RS-422 operation. Additional ports are controlled by a separate, 12.5MHz MC68000 microprocessor.

The Universe/200 data communications are controlled by two serial communications controllers that interface the four RS-232-C serial ports to the system. The Universe/200 can be expanded to 24 ports using optional VME I/O processors (VIOPs).

The Universe/400 and Universe/600 have four built-in RS-232-C ports. System connectivity can be expanded to 64 ports on the Universe/400 and 96 ports on the Universe/600 using optional VIOPs and serial line multiplexers.

SOFTWARE

OPERATING SYSTEM: Charles River Data Systems' supermicrocomputers are supported by the *Unos* operating system, Charles River Data Systems' proprietary realtime operating system which has passed AT&T Unix System V.2 Certification Suite.

A common kernel implementation is used and files are transportable between systems, as are object code, device drivers, and network connections. Unos complies with system calls and subroutines as defined in the IEEE 1003 POSIX Standard. Unos realtime functions include priority scheduling, resident process locking, direct I/O control, shared data, user device driver support, contiguous files, IPC, and eventcount synchronization. Unos is suited for independent, Unix-compatible runtime and development environments.

Unos supports its command shell as well as popular shells such as Korn, Bourne, and C, which are languages as well as interpreters. Thus, the system integrator has the option of implementing tasks with shell commands of choice. Unos performs memory and CPU sharing, program swapping, file security control, I/O, and process synchronization. ▶

Charles River Data Systems

CHART B. DISK/DISKETTE DEVICES

MODEL	Floppy	20	40	140	520
Type	Diskette	Winchester	Winchester	Winchester	Winchester
Size (inches)	5.25	5.25	5.25	5.25	9
Number of surfaces	2	—	—	—	—
Formatted capacity per drive (bytes)	1.2M	20M	40M	140M	520M
Interface/controller	Q1	SCSI	SCSI	SCSI	SCSI
Number of drives per interface/controller	—	—	—	—	2
Average access time	—	—	—	—	—
Data transfer rate	—	—	—	—	—
Sectors/tracks per surface	—	—	—	—	—
Bytes per sector/track	—	—	—	—	—
Comments	Supported by all models	Supported by all models	Supported by all models	Supported by all models	Supported by all models

Note: A dash (—) in a column indicates that the information is unavailable from the vendor.

▶ Unos offers a set of utilities that provide manipulation of text files. The Unix line editor (ed), Berkeley line editor (ex), and an interactive, screen-oriented editor (vi, ted) allow entry and editing of text files.

A software package of Unos with the Unix tool set is available as UN/System V which requires an AT&T license.

DATA BASE MANAGEMENT: Charles River Data Systems offers the Relational Database Systems, Inc. Informix Relational Database System.

LANGUAGES: Available languages include C, Fortran 77, Pascal, RM/Cobol, and Basic II.

COMMUNICATIONS: Expansion is provided through the *UniverseNet 3.0* networking facilities. This IEEE 802.3 Ethernet-based connection can link multiple products in the Universe family. The International Standards Organization (ISO) standard protocols implemented by Charles River with UniverseNet 3.0 also provide connection into multivendor networks. Networking facilities supported by UniverseNet 3.0 include process-to-process connection, file transfer, remote execution, remote printing, remote device mounting and access, eventcounts to synchronize processes, virtual terminal connections, and distributed file access and distributed processing. Support for SNA 3270 is also available.

UniverseNet 3.0 also allows for wide area networks, LANs, and gateways to other networks. UniverseNet 3.0 allows users in a Unix-compatible environment to share resources and information among other systems, communicate among themselves, work within a distributed environment, and add different network protocol and media types. UniverseNet 3.0 contains a range of application facilities that enlarge user interaction within network applications, including messaging, electronic mail, printer resource sharing, and file transfer.

UniverseNet 3.0 fully supports the Technical Office Protocol (TOP) LAN standards and addresses defined levels of the Manufacturing Automation Protocol (MAP) 2.1 specification. The TOP protocol allows computers from different manufacturers in an integrated office network to exchange data and files with one another over an Ethernet-compatible network. TOP and MAP protocols allow different vendors' computers to communicate over a high-speed LAN. Additionally, UniverseNet's Unicluster facility lets Charles

River systems in a MAP or TOP network share resources and support distributed file access and transfer, remote process execution, and virtual terminal connection.

UniverseNet 3.0 also supports X.25 protocols.

APPLICATIONS: Over 200 application packages are available for the Universe systems, including word processing, spreadsheets, and a variety of focused application packages. These packages are contained in a Charles River software catalog.

OPERATING ENVIRONMENT

The Universe/200 stands 5.5 inches high, 16.5 inches wide, and 20 inches deep. The Universe/400 is 10.5 inches high, 17.5 inches wide, and 21 inches deep; the system is available in desktop, upright, and wall units and is 19-inch rack compatible. The Universe/600 is 72 inches high, 22.5 inches wide, and 31.5 inches deep.

Operating temperatures for the three systems range from 32 to 104 degrees Fahrenheit at relative humidity up to 80 percent noncondensing. Line voltage required is 90 to 240 VAC, with a line frequency of 47 Hz to 440 Hz. The Universe/200 requires a 300-watt power supply, the Universe/400 requires a 500-watt power supply, and the Universe/600 requires a 650-watt power supply.

SUPPORT SERVICES

DOCUMENTATION: Hardware and software manuals are supplied with all systems.

TRAINING/EDUCATION: Training is available through Charles River Data Systems.

MAINTENANCE: Full-service maintenance is available.

SUPPORT: On-line customer support is offered by Charles River Data Systems' Customer Engineering.

PRICING

POLICY: Systems are available for OEMs through Charles River. Lease terms are available through third parties. Warranties are on a 90-day basis. Software prices are based on a one time charge schedule, with annual update services available. ▶

Charles River Data Systems

EQUIPMENT PRICES

		Purchase Price ($)
BASIC SYSTEMS		
Model 200	Model 200 with 2MB of main memory, 20MB internal disk drive, and 24-user license	8,000
Model 400	Model 400 with 12MB of main memory, 20MB internal disk drive, and 64-user license	18,000
Model 600	Model 600 with 12MB of main memory, 20MB internal disk drive, and 96-user license	35,000
MEMORY		
CM-1024/VCM	1MB parity memory board	1,500
CM-2MB/VCM	2MB parity memory board	2,500
CM-4MB/VCM	4MB parity memory board	4,000
MASS STORAGE		
DK-520	520MB nine-inch Winchester disk with controller	22,100
DK-520	520MB nine-inch Winchester disk add-on, no controller	17,100
TAPE DRIVES		
—	1600/3200 bpi ½-inch streaming tape drive with controller	12,000
—	1600/3200 bpi ½-inch streaming tape drive, no controller	10,600
—	6250 bpi ½-inch streaming tape drive with controller	23,000
—	6250 bpi ½-inch streaming tape drive, no controller	21,600
COMMUNICATIONS		
TP-308/7	8 serial ports, parallel port	1,400
NC-1/VNC-1	802.2/802.3 (Ethernet) controller	3,600

SOFTWARE PRICES

		Purchase Price ($)
OPERATING SYSTEM SOFTWARE		
UN/SystemV-01	Operating system derived from Unix System V, with C development, 1-16 users	4,000
UNOS-01	Unos operating system kernel and utilities	3,000
UN/IX-Tools-01	Unix System V tool set and utilities (for Unos)	1,200
LANGUAGES		
UN/FORT-01	Initial Fortran 77 development license	950
UN/Pas-01	Initial Pascal development license	950
UN/BasII-01	Initial Basic II license	950
RM/Cobol-01	Initial RM/Cobol development license	950
UN/C-01	Initial C language development license (Unos)	500
Green C	Green Hills C compiler (requires 68020-based models with 68881 floating-point co-processor)	500
COMMUNICATIONS		
UniverseNet 3.0	UniverseNet 3.0, requires Unos 7.0	1,500
3270	3270 emulator	2,500
DATA BASE MANAGEMENT		
—	Informix-SQL	1,600
—	Informix-ESQL/C	1,200
—	C-ISAM	495
—	File-it!	450 ∎