IBM 3090 Series

PRODUCT DESCRIPTION

IBM ended months of speculation about its long-rumored new line of top-end processors with the announcement of the 3090 Processor Complex. The first installments in the much-awaited processor series—dubbed Sierra in press reports—are the 3090 Models 200 and 400, two processor complexes designed to meet the computing needs of organizations with extremely large and ever growing computing requirements. The Model 200 will be available for delivery in November 1985 and the Model 400 will be available by the second quarter of 1987.

The new processors could prove to be the most powerful IBM has offered to date. The processors achieve a cycle time of 18.5 nanoseconds and use Emitter Coupled Logic and Thermal Conduction Modules packaging. The Model 200 is a dyadic processor that comes with 64 megabytes of shared central storage and up to 128 megabytes of what IBM is calling "expanded storage." This expanded storage facility functions similarly to a high-speed cache memory. The expanded storage concept reduces paging from 70 to 80 percent, according to IBM measurements, and improves average response time by 5 to 25 percent. The Model 400 comes with four processors that can be optionally partitioned to act as two dyadic processors. The Model 400 comes with 128 megabytes of shared central storage and up to 256 megabytes of shared expanded storage.

In conjunction with the 3090 announcments, IBM also introduced related operating system software enhancements, including a facility for running Interactive Executive, IBM's version of Unix System V, as a guest under VM/XA. IBM is calling its Unix System V an alternative for IBM customers with PC/IX compatibility. Other software-related announcements centered around IBM's re-

PRODUCT ANNOUNCED: IBM launched a new top-of-the-line processor series with the introduction of the 3090 Models 200 and 400. The processors are designed to meet the capacity needs of large-scale computer users with extremely large growth requirements. The 3090 Series is positioned to provide an extended growth path for IBM 308X users. Innovations include an "expanded storage" facility similar in characteristic to a cache memory. The expanded storage feature can go up to 256 megabytes on the Model 400 and up to 128 megabytes on the Model 200. The series also makes use of IBM's new 288K-bit memory chip. The Model 200 uses two central processors and a minimum of 64 megabytes of shared central storage. The Model 400 comes with four central processors and a minimum of 128 megabytes of shared central storage. The Model 400 will only be available as a field upgrade from a Model 200. In addition to the new processor series, IBM also announced enhancements to operating system software, and introduced the 3820, a new 20-page-per-minute laser printer.

COMPETITION: Amdahl 580 Model 5868 and 5880, Burroughs B 7900 H and B 7900 K, Honeywell DPS 88/82T, Sperry 1100/90, and Control Data Corp. Cyber 180 Model 860.

DATE ANNOUNCED: February 12, 1985.

SCHEDULED DELIVERY: Model 200 scheduled for November 1985; Model 400 scheduled for 2nd quarter of 1987.

The IBM 3090 Model 200 dual processor, shown here, and the 3090 Model 400 four-way processor are IBM's newest top-of-the-line, large-scale computer systems. They feature Emitter Coupled Logic and Thermal Conduction Modules, and achieve a cycle time of 18.5 nanoseconds.

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newed interest in scientific and engineering applications. The VS Fortran Program Multitasking Facility provides a performance boost for customers using the new 3090 processors, or for those running applications on an IBM 4381 Model Group 3, 3081, and 3084.

RELATIONSHIP TO CURRENT PRODUCT LINE: The 3090 Series is positioned to extend the growth path of the 308X Series. The Model 200 has 1.7 to 1.9 times the internal throughput rate of the 3081 Model KX operating in a commercial environment under MVS/XA, and 1.9 to 2.9 times the internal throughput rate of the 3081 Model KX operating under the same operating system in an engineering/scientific environment.

The more powerful Model 400 comes with 1.7 to 1.9 times the instruction execution rate of the 3090 Model 200 in single image mode. When partitioned, the Model 400 approximates the performance of two Model 200s.

If IBM's target delivery date for the Model 400 holds, this expanded processor performance won't be available for another two years. An IBM spokesperson explained at a press briefing the wait was necessary to give IBM the required time to thoroughly field test and evaluate the performance of the Model 200. The Model 400 will be available only as an upgrade from a Model 200.

COMPETITIVE POSITION: The 3090 Series competes with other high-end multiprocessor systems featuring maximum main memory sizes of at least 64 to 128 megabytes. For the moment, however, no competing vendors are offering anything approaching 256 megabytes of expanded storage as IBM defines the phrase, or the 288K-bit capacity memory chip. The Model 200 can be configured with up to 128 megabytes of expanded storage in 64-megabyte increments and the Model 400 can be configued with 256 megabytes of shared expanded storage in 128-megabyte increments. At least for now, the Model 400 is without peer. The two-year delivery schedule, however, could give the Japanese and competing plug-compatible vendors, such as Amdahl, plenty of time to match or exceed the Model 400.

Many of these same competing vendors have enough processing power on the market right now to give the Model 200 a run for its money. The Model 200 competes with the Amdahl 580 Models 5868 and 5880, a pair of dual-processor systems that can have up to 128 megabytes of main memory. A price/performance comparison between the Amdahl and IBM processors shows IBM establishes a higher performance edge delivered at a competitive price. The 3090 Series achieves a processor time of 18.5 nanoseconds as compared to 23.25 nanoseconds on the Amdahl models. An Amdahl 5868 outfitted with a maximum 128 megabytes of main memory sells for $5,250,000, and an Amdahl 5880 with the same maximum memory size sells for $5,820,000. By comparison, an IBM Model 200 with its maximum 128 megabytes of main storage sells for roughly $5,832,880. The Model 200 also competes with the Burroughs B 7900 H and the B 7900 K, the Honeywell DPS 88/82T, and the Sperry 1100/90. □

BASIC SPECIFICATIONS

MANUFACTURER: International Business Machines Corporation, Old Orchard Road, Armonk, New York 10504. Contact your local IBM representative. In Canada, 1150 Eglington Avenue, Don Mills, Ontario. Telephone (416) 443-2111.

MODELS: IBM 3090 Model 200, dual-processor model; and Model 400, four-processor model.

CONFIGURATION

The 3090 Model 200 Processor Complex consists of two central processors, a 3092 Processor Controller Model 1, and a 3097 Power and Coolant Distribution Unit. It also requires two 3089 Power Unit Model 3s or other appropriate 400 Hz source of power, two IBM 3370 Direct Access Storage Device Model A2s with string switch (#8150), two IBM 3180 Model 145 display stations, and an IBM 3864 Modem Model 2 equipped with Automatic Calling Unit (#5801).

The Model 400 Processor Complex consists of four central processors, a 3092 Processor Controller Model 2, and two 3097 Power and Coolant Distribution Units. It also requires four power units (3089 Model 3), or other appropriate 400 Hz source of power, two 3370 Model A2s with String Switch (#8150), three 3180 Model 145 display stations, and two 3864 Model 2s, each equipped with Automatic Calling Unit. (#5801).

CENTRAL PROCESSORS AND MEMORY

The central processors feature Emitter Coupled Logic and Thermal Conduction Modules to enhance performance. Processor cycle time is 18.5 nanoseconds, according to IBM. Both systems support System/370 and System/370 Extended Architecture. To enhance system throughput, IBM devised a large high-speed expanded storage facility, which assumes the characteristics of a cache memory. The expanded storage feature improves system throughput by reducing the paging and swapping load to channel-attached paging devices. To determine the effectiveness of the expanded storage fearure, IBM measured system performance under MVS/SP 2.1.3. Using standard IBM workloads and methodologies, IBM compared the performance of a 3090 Model 200 without the expanded storage feature, using 48 channels and 3380 DASD for paging and application I/O, and compared it to the performance of a Model 200 using 64 to 128 megabytes of expanded storage. Measurements showed the expanded storage concept reduces paging 70 to 80 percent. Average response time is improved by 5 to 25 percent, and trivial response times by 20 to 45 percent. According to IBM, the feature provides some throughput benefits in TSO dedicated and TSO/Batch environments. This feature is especially useful in processing environments where storage may be constrained and paging routinely heavy. Expanded storage transfers 4K-byte page segments of system programs to and from central storage synchronously with processor operations. Using this option, pages of data can automatically transfer to and from central storage at speeds that significantly exceed I/O access rates. The expanded storage feature handles only system software, not application software. To further enhance performance, IBM makes use of a new 288K-bit memory chip for the first time. IBM achieved the 288K-bit structure by making use of extra room on the 256K bit chip.

The Model 200, a dyadic or dual processor, uses 64 megabytes of shared central storage, expandable to 128 megabytes of expanded storage. Each processor also comes with a 64K character buffer to help speed up internal processor performance. The Model 400, a four-processor system, comes with 128 megabytes of shared central storage that can be expanded to 256 megabytes using the expanded storage facility. The four-processor complex can be partitioned to run as two dyadic systems. Expanded storage can be added to the Model 200 in 64-megabyte increments, and to the Model 400 in 128-megabyte increments.

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To improve performance in engineering and scientific applications, IBM enhanced arithmatic-logic functions. The processors use high-speed multiply, faster floating point add/subtract instructions, faster loop control execution time, and 64-bit wide data paths.

As part of the announcement, IBM also introduced the following new hardware components:

- a 3092 Processor Controller Models 1 and 2;
- a 3097 Power and Coolant Distribution Unit;
- a 3089 Power Unit Model 3; and
- a 3180 Model 145 Display Station.

Two additional hardware components that are not new include the 3370 Direct Access Storage Model A2 and the 3864 Model 2 Modem.

The 3092 Processor Controller Models 1 and 2 perform many key monitoring and control functions for the Model 200 and 400. When Model 200 users upgrade to a Model 400, they must also upgrade from a 3092 Controller Model 1 to a Model 2. Each controller model includes two processor elements and associated I/O devices, plus connections to the rest of the processor complex. Processor activities include power sequence control and initialization; manual controls, monitoring and control of power supplies, temperatures and coolant flows, and system activity displays. Other functions include: local and remote alarm capabilities, error recovery, execution of error analysis routines for isolation of failing field replaceable units and diagnostic capabilities. The controller provides support: for S/370 or 370-XA mode of operation; switch-over to backup processor controller hardware facilities in the event of certain failures, and concurrent maintenance of either processor element or DASD unit connected to the processor controller while customer operation continues. Other activities and features include enhancements to automate the reporting of problems and remote support access to assist with problem resolution.

The 3097 Power and Coolant Distribution Unit contains the power distribution functions, heat exchanger, pumps and controls necessary to cool the liquid-cooled portion of the processor complex. Other features include an I/O Power Sequence Control capability for power on and off control of up to 128 I/O control units.

The 3089 Power Unit Model 3 supplies 400 Hz power to the 3090 Processor Complex. The unit contains a motor generator housed in a noise-suppressing frame and was designed for machine-room environments.

The 3180 Display Station Model 145 is used as either a system or maintenance console. The 3090 Model 200 requires a system console for interaction with the processor complex and the two 3092 processor elements. A second console is dedicated to service support. This console must be placed within 33 feet of the 3092 controller, while the system display can be placed 4,921 feet from the 3092.

Both processor models require a pair of 3370 Direct Access Storage Model A2s, each coming with String Switch (#8150). One of the units records essential information, while the second operates in a standby mode. Should the active DASD fail during operation, functions automatically switch over to the standby unit without system interruption.

A 3864 Modem Model 2 is required to obtain service for the 3090 Processor Complex. A unit comes equipped with an Automatic Calling Unit (#5801) and a dedicated telephone line for remote service facilities.

I/O CHANNELS

The 3090 Model 200 comes with 32 standard integrated channels. Two optional eight-channel increments can be added, and up to four channels may be optionally configured as byte multiplexer channels in the field. The 3090 Model 400 has 64, 80, or 96 integrated channels. Up to 8 channels can be optionally configured as byte multiplexer channels in the field. Both data streaming and nondata streaming devices can be attached to any block multiplexer channel on an intermixed basis.

In data streaming mode, a block multiplexer channel can transfer at up to 3.0 megabytes per second, and 1.5 megabytes per second in high-speed transfer or DCI mode. Each byte multiplexer channel is capable of operating with an aggregate data rate in the range of 90K to 300K bytes per second for data transfer burst sizes of four bytes or more. Configurations consisting of control units with faster I/O interface tags and larger data transfer burst sizes can achieve the higher performance.

Channels may operate in either System/370 Extended Architecture (370-XA) mode or System/370 Mode. In 370-XA mode, all channels are accessible by all central processors in the system. In System/370 mode, channels are organized into two sets, one per central processor. Operating under the MVS/System Product, Version 1 Release 3.5, up to 16 channels can be assigned to a channel set, while the maximum is 32 channels per channel set when operating under the VM/High Performance Option Release 3.6. Channel set switching is available on this processor.

PERIPHERALS

The IBM 3820 Page Printer is the latest addition to the 3800 family of high-speed laser printers using Advanced Function Printing software. The printer can produce cut-sheet output of various sizes and weights at speeds of up to 20 pages per minute. It can be linked to mid-range and large computer systems via phone lines for use in distributed processing business environments.

The 3820 prints on one side, or, in duplex mode, two sides of a cut sheet. Duplex printing cuts output speed to 10 pages per minute. Features include the capability of generating electronic forms at the host and the ability to merge text and data with the form. Other features include image printing, including signatures and logos, the ability to print electrophotographically tolerant preprinted forms, pressure-sensitive labels, and prepunched paper with standard 2-, 3-, or 4-hole punches. An additional feature includes the ability to orient print 0, 90, 180, and 270 degrees.

Typographically, the printer features all-points-addressable printing at 240 by 240 picture elements (pels) per square inch. All fonts previously available on the 3800 Model 3 are available. Up to 10 fonts may be stored at the printer with standard control storage and up to 32 fonts may be stored at the printer if the optional Control Storage feature (#3035) is installed. The number of fonts which may be stored is dependent upon the number of characters in the font, the point size (4 to 36) and the amount of pattern storage features installed.

Another new product relating to peripherals is the IBM 3044 fiber optic channel extender link. The product allows peripherals to be placed up to 6,600 feet (2 kilometers) farther away from IBM processors. According to IBM, remote printer displays and other low- to medium-speed peripherals using the fiber optic link can run at speeds almost matching the speeds of devices locally connected to a central processor.

SOFTWARE

In conjunction with the 3090 Series announcements, IBM introducted new software products for scientific and engineering applications and many enhancements to existing operating system products. The new series will run under MVS/XA and VM. In addition, IBM announced a facility for running the Interactive Executive, IBM's own version of Unix System V, as a guest under VM.

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MVS/System Product-JES2 Version 1 Release 3.6 and MVS/System Product-JES2 Version 2 Release 1.5 updates the JES2 components of MVS/System Product-JES2 Version 1 and MVS/System Product-JES2 Version 2. Enhancements include virtual storage constraint relief in an MVS/XA environment, SPOOL restructuring and constraint removal, and improved SPOOL offload facility. Other improvements include reduction in planned outages through operator-modifiable intialization parameters; changes to JES2 initialization-definition statements; improved user extension services and a new user exit; plus enhancements to the $SCAN facility, and to RAS (reliability, availability, and serviceability).

MVS/SP-JES3 Version 2 Release 1.5 is a new release for the JES3 component. Enhancements include virtual storage constraint relief through MVS/XA exploitation, expanded trace facilities, more flexibility in initialization statement definition, improved usability for job networking, and two new JES3 user exits.

MVS/SP Version 2 Release 1.3 provides support for the new 3090 expanded storage facility. Features include support for the 3090 processor in 370-XA mode and the RAS facility.

Information Management System/Virtual Storage (IMS/VS) Version 2 Release 1 is a new licensed program that operates under MVS/XA and MVS/370. It provides support for Extended Recovery Facility, and virtual storage constraint relief for the Fast Path, security tables, and IMS/VS resource lock manager. Additional data availability enhancements are provided for DL/I I/O error processing, dynamic backout, DL/I scheduling changes, and data sharing.

The MVS/SP Version 2 Release 1.3 Availability Enhancement to the Base Control Program component brings operating system support to the Extended Recovery Facility.

The Extended Recovery Facility running under MVS/XA and SNA increases the availability of IMS/VS Version 2 DB/DC transaction processing. The enhancement improves system availability and diminishes the impact of system disruption through the use of additional resources.

MVS/SP Version 1 Release 3.5 is an enhancement to MVS/SP Version 1 Release 3.4, a product that provides support for the 3090 processors in System/370 mode. The JES2 component of MVS/SP 1.3.5 is functionally equivalent to the JES2 component of the previous release, MVS/SP-JES2 1.3.4, and the JES3 component of the lastest release is functionally equivalent to the JES3 component of the previous release, MVS/SP-JES3 1.3.4. The new expanded storage facility is not supported in System/370 mode.

The Resource Measurement Facility Version 3 Release 3, operating under MVS/XA, incorporates all the previous functions of RMF 3.2.0 and 3.2.1. Functions provided for System/370 Extended Architecture system include support for I/O configurations, expanded storage support and monitor III usability enhancements.

The VS Fortran Program Multitasking Facility permits a single VS Fortran application program to use all the processors in a multiprocessor environment at the same time. The facility improves job turnaround time, and may improve system throughput when a large job dominates memory at the expense of other jobs.

The Virtual Machine/Extended Architecture System Facility is a new VM product for the XA environment that supersedes the VM/XA Migration Aid, and provides new processor and device support. Also, performance is improved through the use of the XA Start Interpretive Execution assist. Program functions include full dyadic utilization for V=R dyadic guests; concurrent virtual and real reserve/release support for shared DASD, a priority scheduler; improved availability through the incorporation of a Missing Interrupt Handler; and spooling enhancements including a spool-to-tape program. Other functions include a subset of the VM/SP Inter-User Communiction Facility; support for Named Saved Systems; additional commmand compatibility with VM/SP (370); support of SMSG and MSGNOH commands; dump viewing facility enhancements, and CMS 3.1 for installation and maintenance.

The IBM Interactive Executive for System/370 implements Unix, which runs as a guest under VM/SP Release 3.0, or a later release with or without the VM/SP High Performance Option Release 3.4 or later. IX/370 is based on Unix System V (V.0.2) with the addition of IBM enhancements. It's offered with full IBM support through the System/370 processor line.

The IBM Unix functions support IBM and other full-duplex ASCII terminals. It uses a command structure called Bourne shell that can be customized to specific applications and needs; and also a hierarchical file system. Other functions include execution of interactive, sequential, asynchronous, and background processes, text processing and document preparation, a system for controlling and tracking documents and source code changes, the ability to copy files to other Unix systems, and a "desk calculator" package.

Pricing for MVS/SP-JES2 1.3.6, MVS/SP-JES2 2.1.5, and VM/XA Systems Facility is the same as pricing for previous versions.

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EQUIPMENT PRICES

		Purchase Price ($)	Monthly Maint. ($)	Monthly Rental ($)
PROCESSORS & FEATURES				
Model				
200	Processor Complex; consists of CPU, 64 megabytes of main memory, 64K-byte buffer, and 32 integrated channels; requires 3092-1 Processor Controller, 3097 Power & Coolant Distribution Unit, two 3089-3 Power Units, two 3180-145 System Consoles, and a 3864-2 Automatic Call Unit	4,600,000	5,900	383,350
385X	First and Second Additional Channel Group, each consisting of eight channels	130,000	145	10,830
5064	Expanded Storage 64 megabytes	475,000	500	39,580
5128	Expanded Storage 128 megabytes	830,000	900	69,170
6128	Expansion of 64 megabyte storage capacity to 128 megabytes	355,000	400	29,580
400	Processor Complex; consists of CPU, 128 megabytes of main memory, 64K-byte buffer, and 64 integrated channels; requires 3092-2 Processor Controller, two 3097 Power & Coolant Distb. Units, four 3089-3 Power Units three 3180-145 System Consoles, and two 3864-2 Automatic Call Units	—	11,910	728,650
385X	First and Second Additional Channel Groups	130,000	145	10,830
5064/7064	Expanded Storage, 64 megabytes, A side & B side are priced separately; 5064/7064 are corequisite or prerequisite	475,000	500	39,580
5128/7128	Expanded Storage, 128 megabytes, A side & B side are priced separately; 5128 or 7128 requires 128 megabytes on the other side	830,000	900	69,170
6128/8128	Expansion of 64 megabytes storage capacity to 128 megabytes; A side & B side are priced separately; 6128 or 8128 requires 128 megabytes on the other side	355,000	400	29,580
3092-1	Processor Controller for the 3090-200	200,000	1,125	16,670
3092-2	Process Controller for 3090-400	—	1,295	19,580
3097-1	Power and Coolant Distribution Unit for 3090-200 and 400	121,000	220	10,080
4560	I/O Power Sequence Control for the 3090-200 and 400	8,000	50	667
3089-3	Power Unit; 3090-200 requires two 3089-3s, 3090-400 requires four 3089-3s	38,000	90	3,165
PERIPHERALS				
3180-145	Console Display Station; two required on the 3090-200, and three on the 3090-400	2,395	300	—
3820-1	Page Printer; 20 pages per minute	28,350	310	1,680
5801	Automatic Call Unit for the 3864-2 Modem	1,090	192	—
3044-C01	Fiber Optic Channel Extender Link; channel unit	8,500	25	—
3044-D01	Fiber Optic Channel Extender Link; downstream unit	8,500	25	—