IBM 3090 Series

Product Enhancement

With the February announcement of the new Enterprise Systems Architecture/370 (ESA/370), the IBM mainframe enters a new era and assumes an even greater role for companies moving towards corporate-wide networking, distributed processing, and numeric-intensive computing. That, at least, appears to be some of the thinking behind IBM's new operating system environment. ESA/370 brings total virtual memory spaces to 16 trillion bytes, 8,000 times the previous MVS/XA limit of 2 gigabytes.

This dramatically larger address space will allow users to run larger applications faster and more efficiently at the mainframe level. The operating system advances are designed to accommodate the growth needs of IBM's biggest customers and provide a platform for IBM mainframe products of the future. At the moment, however, most IBM customers don't need such a large address space.

With the emergence of the Enterprise Systems Architecture, IBM is clearly legitimizing a special role for the mainframe as a repository of data and storage resources for the entire company or enterprise. Data management involving memory-consuming relational data bases, network management, distributed processing involving PC-to-mainframe links, and engineering/scientific applications come immediately to mind. To accommodate such applications, IBM has provided an enormous virtual memory capacity, coupled with an enhanced expanded storage option, a large on-line memory reservoir designed to reduce input/output (I/O) bottlenecks that would otherwise degrade performance. Reducing time-consuming seeks to channel-attached storage devices is particularly beneficial for these kinds of applications.

In addition to ESA and related software, IBM introduced two new 3090 mainframe models, the two-processor Model 280E and the five-way Model 500E, and also introduced Processor Resource/Systems Manager (PR/SM), a hardware feature that allows 3090 E model users to set up logical partitions under ESA/370. It replaces a previous product that only ran under Virtual Machine/Extended Architecture System Product (VM/XA SP).

To implement ESA/370, IBM introduced Multiple Virtual Storage/System Product (MVS/SP) Version 3 and MVS/Data Facility Product (DFP) Version 3. ESA/370 is not so much a new architecture as it is the latest evolutionary incarnation of System/370 architecture, first introduced in 1970.

ESA introduces two new operating system concepts: data spaces, which accept only user data, and high-performance spaces (hiperspaces), which reside in expanded storage.

Data spaces are hardware controlled and can hold up to 2 gigabytes of data at a time. Separate address spaces can also contain up to 2 gigabytes of code and data. Within a data space, all addresses are contiguous and available to the application, because virtual storage is not divided into a system and private area as it is in an address space. Data spaces can reside anywhere in processor storage or on auxiliary storage.

Hiperspaces, designed for reading or writing data in 4-kilobyte blocks, come in two varieties: the first type functions as an internal direct access storage device residing in expanded storage. It can only be accessed by authorized programs. This eliminates paging and contention associated with seeks to channel-attached devices. Data spaces, on the other hand, are subject to the usual storage contention and paging activity.

The second hiperspace type is available to all applications and can be referenced from high-level languages through new data windowing services. This hiperspace type can also be backed up by auxiliary devices. Data windowing services allow high-level language applications to access and scroll through large permanent data objects and large temporary data objects. This data is seen through virtual storage windows in an application program. A window is a user-defined area in the application that maps portions of the data object.

MVS/DFP Version 3 is installed with MVS/SP Version 3 to establish the ESA environment. MVS/DFP Version 3 allows users to take advantage of ESA/370's data space and hiperspace enhancements. DFP and related products make up the Data Facility Storage Management Subsystem (DFSMS). DFSMS improves storage management, simplifies device additions and migrations, and enhances hardware exploitation. Additionally, it provides centralized control over external storage resources and a common interactive interface for the use of storage management functions. Finally, it satisfies a user need to move from user-managed to system-managed storage.

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At the hardware level, the two new 3090 processor models provide additional power and upgrade options. The 280E, previously available only as a special order, can operate as a single-system image or can be physically partitioned to approximate the performance of a Model 180E on each side of the partition. Previously, physical partitioning of multiple processor systems began at the Model 400E level.

In power terms, Model 280E is positioned between Models 180E and 200E. The 280E is rated at 28 million instructions per second (MIPS), compared to Model 200E, rated at 31.2 MIPS. It features 64 megabytes of main memory, expandable to 128 megabytes, and 128 megabytes of optional expanded storage, expandable to a maximum of 512 megabytes. The 280E complex can be configured with 32 channels, expandable to 64 channels in 16-channel increments. Additionally, a Vector Facility (VF) can be attached to each central processor. (Model 200E memory and channel specifications are identical to the 280E, but 200E expanded storage capacity goes up to 1 gigabyte, rather than the 512 megabytes available for the 280E.) A single-image configuration is expected to have 1.7 to 1.9 times the instruction execution rate of a single-processor 180E.

The Model 500E five-way processor is positioned between a Model 400E four-way system and Model 600E six-way system. Rated at 70.4 MIPS, the Model 500E features 128 megabytes of memory, expandable to 256 megabytes; 128 megabytes of optional expanded storage, expandable to 2 gigabytes; and 64 channels, expandable to 128 channels. An optional VF can be attached to each processor within the complex. The five-way system is configured with three processors on the A side and two processors on the B side. It can operate as a single image or can be physically partitioned to approximate the performance of a 300E on the A side and 200E on the B side. A single-image configuration is expected to have 1.5 times the internal execution rate of a three-way Model 300E.

The introduction of the Model 500E combines with new upgrade possibilities to make hardware performance jumps less problematic in certain situations. Model 300E customers, for instance, can now upgrade to a Model 400E, a Model 500E, or a Model 600E. Prior to the February 15 announcements, Model 300E users contemplating a performance upgrade could only go to a Model 600E, a processor complex twice the size and twice the cost of a 300E. Model 400E customers can also upgrade to a Model 500E and Model 600E, and Model 500E users can upgrade to a Model 600E. At the lower end, Model 180 and 180E users can upgrade to a Model 280E and Model 280E users can upgrade to a Model 400E.

A final product, Processor Resource/System Manager (PR/SM), enhances logical partitioning capabilities. PR/SM extends the functions of the Multiple High Performance Guest Support (MHPGS) feature. While MHPGS only operates under VM/XA SP, PR/SM operates under the new ESA/370 operating environment, eliminating the need for an additional VM/XA license.

PR/SM lets users set up four logically partitioned and independent operating environments on a single 3090 E processor complex and up to eight logical partitions on 280E, 400E, 500E, or 600E multiple processors operating in a physically partitioned configuration. PR/SM is a hardware feature that lets users run a single processor as if it were four separate computers with different operating environments. PR/SM may be particularly useful for migrating applications from MVS/XA to ESA/370.

PR/SM can operate in S/370 mode, ESA/370 mode (supporting both MVS/XA and ESA/370), and Logically Partitioned (LPAR) mode. In LPAR mode, the operator can define what system resources, including memory and channel paths, will be specifically assigned to each partition.

PR/SM appears to be a competitive response to Amdahl's Multiple Domain Feature. Similar to PR/SM, the Amdahl product lets users establish four independent operating environments or domains on any 580/5890 processor and up to eight domains on partitioned multiple processors. Amdahl manufactures IBM-compatible mainframes. (For more information on Amdahl and its Multiple Domain Feature, please refer to Report 70C-035MM-101 under this tab.)

MVS/SP Version 3 will be available in staged deliveries beginning in August. New functions available after August but before the end of the year will be shipped automatically with the then-current MVS/SP Version 3. MVS/DFP Version 3 will be available in December. The Model 280E will be available during the second quarter and the Model 500E will be available during the third quarter. Various upgrade options will be available during either the second or third quarters. Upgrades from Models 180/180E to Model 280E and from Model 300E to 400E will be available during the second quarter. Upgrades from Model 280E to 400E; 300E to 500E; 400E to 500E; and 500E to 600E will be available during the third quarter.

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PR/SM will be generally available in August. The feature will be available for the Model 500E during the third quarter. Additionally, the new Logically Partitioned mode will have a staged availability on selected 3090 E models with selected operating environments beginning in June. Effected models include the 180E, 200E, 300E, and 400E and 600E (both operating in physical partition mode). □

EQUIPMENT PRICES

		Purchase Price ($)	Monthly Maint. ($)	Monthly Rental ($)
Model 280E	Processor Complex consists of two CPUs, 64MB of central storage, and 32 integrated channels	4,344,000	6,175	387,340
Model 500E	Processor Complex consists of five CPUs, 128MB of central storage, and 64 integrated channels	9,049,000	14,025	806,870
Expansion Frames				
7330	Expansion frame for Model 280E on A side	45,000	50	4,330
7331	Expansion frame for Model 280E on B side	45,000	50	4,330
7330	Expansion frame for Model 500E on A side; 7330 feature is required	45,000	50	4,330
7331	Expansion frame for Model 500E on B side	45,000	50	4,330
Channel Groups: Model 280E				
	—A side			
3848	First additional channel group; 8 channels	130,000	145	11,580
3849	Second additional channel group; 8 channels	130,000	145	11,580
	—B side			
3858	First additional channel group; 8 channels	130,000	145	11,580
3859	Second additional channel group; 8 channels	130,000	145	11,580
Channel Groups: Model 500E				
	—A side			
3850	First additional channel group; 8 channels	130,000	145	12,500
3851	Second additional channel group; 8 channels	130,000	145	12,500
3854	Third additional channel group; 16 channels	260,000	290	25,010
	—B side			
3852	First additional channel group; 8 channels	130,000	143	12,500
3853	Second additional channel group; 8 channels	130,000	145	12,500
3856	Third additional channel group; 16 channels; requires 7331	260,000	290	25,010
Additional Central Storage				
	Model 280E			
4064	Additional 32 megabytes for A side	270,000	250	24,070
4264	Additional 32 megabytes for B side	270,000	250	24,070
	Models 500E			
4128	Additional 64 megabytes for A side	540,000	500	48,150
4228	Additional 64 megabytes for B side	540,000	500	48,150
Expanded Storage: Model 280E				
5064	First 64 megabytes	370,000	500	45,730
5128	First 128 megabytes	595,000	900	79,920
5192	First 192 megabytes	820,000	1,300	105,650
5256	First 256 megabytes	1,045,000	1,700	137,300
6128	Expansion from 64 megabytes to 128 megabytes	225,000	400	34,170
6192	Expansion from 64 megabytes to 192 megabytes	450,000	800	63,300
6256	Expansion from 64 megabytes to 256 megabytes	675,000	1,200	94,950
6193	Expansion from 128 megabytes to 192 megabytes	225,000	400	31,650
6257	Expansion from 128 megabytes to 256 megabytes	450,000	800	63,300
6258	Expansion from 192 megabytes to 256 megabytes	225,000	400	31,650
	—B side			
7064	First 64 megabytes	370,000	500	45,730
7128	First 128 megabytes	595,000	900	79,920
7192	First 192 megabytes	820,000	1,300	105,650
7256	First 256 megabytes	1,045,000	1,700	137,300
8128	Expansion from 64 megabytes to 128 megabytes	225,000	400	34,170
8192	Expansion from 64 megabytes to 192 megabytes	450,000	800	63,300
8256	Expansion from 64 megabytes to 256 megabytes	675,000	1,200	94,950
8193	Expansion from 128 megabytes to 192 megabytes	225,000	400	31,650
8257	Expansion from 128 megabytes to 256 megabytes	450,000	800	63,320
8258	Expansion from 192 megabytes to 256 megabytes	225,000	400	31,650

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		Purchase Price ($)	Monthly Maint. ($)	Monthly Rental ($)
Expanded Storage: Model 500E				
	—A side			
5064	First 64 megabytes	370,000	500	45,730
5128	First 128 megabytes	595,000	900	79,920
5192	First 192 megabytes	820,000	1,300	105,650
5256	First 256 megabytes	1,045,000	1,700	137,300
5512	First 512 megabytes	1,945,000	3,300	285,100
5024	First gigabyte	3,745,000	6,500	558,650
6128	Expansion from 64 megabytes to 128 megabytes	225,000	400	34,170
6192	Expansion from 64 megabytes to 192 megabytes	450,000	800	63,300
6256	Expansion from 64 megabytes to 256 megabytes	675,000	1,200	94,950
6512	Expansion from 64 megabytes to 512 megabytes	1,575,000	2,800	239,200
6193	Expansion from 128 megabytes to 192 megabytes	225,000	400	31,650
6257	Expansion from 128 megabytes to 256 megabytes	450,000	800	63,300
6513	Expansion from 128 megabytes to 512 megabytes	1,350,000	2,400	205,050
6258	Expansion from 192 megabytes to 256 megabytes	225,000	400	31,650
6514	Expansion from 192 megabytes to 512 megabytes	1,125,000	2,000	170,850
6515	Expansion from 256 megabytes to 512 megabytes	900,000	1,600	136,700
6028	Expansion from 512 megabytes to 1 gigabyte	1,800,000	3,200	273,400
	—B side			
7064	First 64 megabytes	370,000	500	45,730
7128	First 128 megabytes	595,000	900	79,920
7192	First 192 megabytes	820,000	1,300	105,650
7256	First 256 megabytes	1,045,000	1,700	137,300
7512	First 512 megabytes	1,945,000	3,300	285,100
7024	First gigabyte	3,745,000	6,500	558,650
8128	Expansion from 64 megabytes to 128 megabytes	225,000	400	34,170
8192	Expansion from 64 megabytes to 192 megabytes	450,000	800	63,300
8256	Expansion from 64 megabytes to 256 megabytes	675,000	1,200	94,950
8512	Expansion from 64 megabytes to 512 megabytes	1,575,000	2,800	239,200
8193	Expansion from 128 megabytes to 192 megabytes	225,000	400	31,650
8257	Expansion from 128 megabytes to 256 megabytes	450,000	800	63,320
8513	Expansion from 128 megabytes to 512 megabytes	1,350,000	2,400	205,050
8258	Expansion from 192 megabytes to 256 megabytes	225,000	400	31,650
8514	Expansion from 192 megabytes to 512 megabytes	1,125,000	2,000	170,850
8515	Expansion from 256 megabytes to 512 megabytes	900,000	1,600	136,700
8028	Expansion from 512 megabytes to 1 gigabyte	1,800,000	3,200	273,400
Processor Resource/Systems Manager				
	—For 3090 E Models			
6851	CP-1 for A side; required for Models 120E, 150E, 180E, 200E, 280E, 300E, 400E, 500E, and 600E	60,000	170	5,350
6852	CP-2 for A side; required for Models 200E, 300E, 400E, 500E, and 600E	20,000	55	1,785
6853	CP-0 for A side; required for Models 300E, 500E, and 600E	20,000	55	1,785
7851	CP-3 for B side; required for Models 280E, 400E, 500E, and 600E	60,000	170	5,350
7852	CP-4 for B side; required for Models 400E, 500E, and 600E	20,000	55	1,785
7853	CP-5 for B side; required for Model 600E	20,000	55	1,785
	—For Model 280E; requires 6851 and 7851			
6851	CP-1 for A side	60,000	170	5,350
7851	CP-3 for B side	60,000	170	5,350
	—For Model 500E; requires 6851, 6852, 7851, and 7852			
6851	CP-1 for A side	60,000	170	5,350
6852	CP-2 for A side	20,000	55	1,785
6853	CP-0 for A side	20,000	55	1,785
7851	CP-3 for B side	60,000	170	5,350
7852	CP-4 for B side	20,000	55	1,785
VECTOR FACILITY				
	—For Model 280E			
1545	Vector Facility for A side; feature 7330 is a corequisite	325,000	300	31,280
1546	Vector Facility for B side; feature 7331 is a corequisite	325,000	300	31,280
	—For Model 500E			
1545	First Vector Facility on A side	325,000	300	31,280
1550	Second Vector Facility on A side	230,000	175	22,140
1555	Third Vector Facility on A side	230,000	175	22,140
1546	First Vector Facility on B side; requires 7331	325,000	300	31,280
1551	Second Vector Facility on B side	230,000	175	22,140

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SYSTEM UPGRADES				
—	3090 Model 180 to Model 280E; requires upgrade of installed 3092 Processor Controller and additional 3097 Power and Coolant Distribution Unit; Model 280E requires two, three, or four 3089 Power Units, depending on configuration	2,344,000	—	—
—	3090 Model 180E to Model 280E; requires upgrade of installed 3092 and additional 3097; Model 280E requires two, three, or four 3089s, depending on configuration	2,144,000	—	—
—	3090 Model 280E to Model 400E; upgrade requires 3848, 3849, 3858, 3859, 4064, and 4264 as prerequisites; the Model 400E requires four 3089 Model 3s	2,415,000	—	—
—	3090 Model 300E to Model 400E; requires 3090 upgrade, additional 3097, and four 3089s	2,264,000	—	—
—	3090 Model 300E to Model 500E; requires 3092 upgrade, additional 3097, and four 3089 Model 3s	3,494,000	—	—
—	3090 Model 400E to Model 500E; requires 7330	1,230,000	—	—
—	3090 Model 500E to Model 600E; requires 7331	1,205,000	—	—

SOFTWARE PRICES

		Basic Monthly License Charge ($)	DSLO Monthly License Charge ($)	Basic Graduated Onetime Charge ($)	DSLO Graduated Onetime Charge ($)
Operating Systems					
5685-001	MVS/SP Version 3; Enterprise Systems Architecture/370 (ESA/370) with JES2				
	Graduated Charge: Processor Group 30	4,800	3,600	163,200	122,400
	Graduated Charge: Processor Group 40	4,800	3,600	259,200	194,400
5685-002	MVS/SP Version 3; Enterprise Systems Architecture/370 (ESA/370) with JES3				
	Graduated Charge: Processor Group 30	5,400	4,050	183,600	137,700
	Graduated Charge: Processor Group 40	4,800	4,050	291,600	218,700
5665-XA3	MVS/Data Facility Product (MVS/DFP) Version 3				
	Graduated Charge: Processor Group 20	1,800	1,350	54,000	40,500
	Graduated Charge: Processor Group 30	1,800	1,350	54,000	40,500
	Graduated Charge: Processor Group 40	1,800	1,350	86,400	64,800
5740-SM1	Data Facility Sort (DFSORT) Release 10.0				
	Graduated Charge: Processor Group 20	247	—	8,400	—
	Graduated Charge: Processor Group 30	247	—	8,400	—
	Graduated Charge: Processor Group 40	247	—	13,340	—
5664-325	DFSORT/CMS Release 1				
	Graduated Charge: Processor Group 10	—	—	475	—
	Graduated Charge: Processor Group 20	—	—	825	—
	Graduated Charge: Processor Group 30	—	—	1,200	—
	Graduated Charge: Processor Group 40	—	—	1,900	— ■