IBM Series/1

New Product Announcement

In April 1977, just five months after introducing the Series/1, IBM unveiled the systems software that was so obviously missing from its new minicomputer product line as originally announced. Simultaneously, IBM added four additional processor models, a printer, and a display station to the Series/1 hardware complement.

SOFTWARE: Software products announced in April include an operating system, FORTRAN IV, PL/1, and several system software and Control Program Support (CPS) program products.

The *Realtime Programming System (RPS)* provides an operating system through which a user can install, operate, and maintain systems programs, applications programs, and data. RPS controls and manages system resources—processor storage (up to 64K bytes) and I/O devices. It is a multiprogramming, multitasking, event-driven, disk-based system that provides the environment for both real-time and batch applications. The system program library and transients must reside on disk. User program libraries and application program overlays can reside on disk or diskette.

To handle multiprogramming, processor storage is divided into multiple fixed partitions, and collections of programs (called Task Sets) execute in the partitions. Task Sets are loaded into partitions in sequence according to their execution request priority. A program within a Task Set executes under a task, which is a single logic thread through a program or set of programs. Programs in two or more partitions can be processed concurrently. A batch program can share a partition with a real-time program on a roll-out/roll-in basis. Task sets are queued for execution in partitions based on external (process) interrupts, time of day, single or repetitive time intervals, or via operator or program requests. Task set libraries can be bound to the system when the task sets are installed, thus eliminating the overhead of locating them on disk when they are loaded. Task set load modules are in absolute format.

RPS allows multiple concurrent task operations in the same partition with synchronization and communication between them. In addition, re-entrant resources can be used by more than one task. All programs compete for processor cycles based on their task priority.

Data management directs the transfer of data between programs and I/O devices—either sensor-based I/O or data processing devices. Through the message-buffering option, an application program can send messages to a printer, communications device, or the operator station and have these messages intermediately stored on disk.

RPS also includes the necessary supervisory routines for communications applications. Communications facilities direct the transfer of data between programs and remote stations (either a terminal or another computer). Support is provided for the IBM 2740 Model 1 in point-to-point switched and non-switched connections, Teletype ASR 33/35 Data Terminals, and IBM System/370 computers using OS/VS1 or OS/VS2 BTAM in point-to-point switched or non-switched connections.

Included in the RPS software package is a set of utilities for installation and maintenance of application programs and data, including stand-alone utilities that are loaded from diskette and system utilities that reside on disk. The system utilities require a 16K-byte partition and can run concurrently with other applications. Application programs cannot run concurrently with stand-alone utilities. The license fee for RPS is $20 per month for 24 months, or a one-time charge of $1,200. Scheduled availability is October 1977.

The *Series/1 Program Preparation Subsystem* is a set of four programs that run as task sets under control of RPS. They provide the user with a batch processing facility for program preparation or general-purpose batch computing concurrent with real-time program execution. The Program Preparation Subsystem consists of a Job Stream Processor, a Text Editor, a Macro Assembler, and an Application Builder.

The Job Stream Processor facility provides a convenient method of invoking programs and defining the data sets that the programs use. This program, as well as the other three programs that make up the Program Preparation Subsystem, runs as a task set under control of RPS.

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The Text Editor runs in the batch partition and provides the capability to create and edit text modules. This text can be source modules for input to the language processors, job streams for batch processing, or data files for user-written programs.

The Macro Assembler processes the user source statements consisting of machine, assembler, and macro instructions coded in assembler language. Input can be from a job stream or a data file, and the object module output is stored on disk or diskette for further processing by the Application Builder. Program listings, symbol dictionaries, cross-reference tables, and diagnostic messages are printed out on the Series/1 printer.

The Application Builder program runs in the batch partition and converts one or more object programs into an executable load module or Task Set. The program creates load modules for the user's own control program, creates task sets for RPS, has an optional prebind feature for faster Task Set initiation, and generates a storage map and error listing.

The license fee for the Program Preparation Subsystem is $18 per month, or a one-time charge of $1,104. Scheduled availability is October 1977.

Also included in the April announcement were extensions to the *Series/1 Control Program Support (CPS)* facilities.

The 4978 and 4979 Display Station CPS provides READ/WRITE support for the 4978 and 4979. Features supported include scroll up/down, write full/part screen, read full/part screen, an interface to user routines for interrupting keys, screen formatting, and error logging to disk or diskette. The license fee for the 4979 CPS is $1.50 per month, and for the 4978 CPS, $6.00. The 4978 CPS is scheduled for release in January 1978, and the 4879 CPS in July 1977.

Binary Synchronous Communications CPS supports the Series/1 BSC single-line control, 8-line control, and 4-line adapter hardware. This software enables the Series/1 processor to appear as an IBM System/3 to other stations, provides error logging and TRACE facilities, and supports point-to-point communications, READ/WRITE level with transparency, and auto answer. The monthly license fee is $3.50. This CPS program is scheduled to be available in July 1977.

The Indexed Access Method CPS provides blocking and deblocking functions, generic key retrieval, error logging to disk or diskette, adding or retrieving of records by key, adding of records to data sets, and multiple index support and reorganization. The monthly license fee is $5.00. This CPS is scheduled for release in October 1977.

Extension 1 is an enhancement to the Series/1 Control Program Support that provides a set of functional modules for I/O queuing, data file integrity, and buffer pooling. This program has a macro call to effect I/O requests; queues multiple requests to a device; provides file protection via a LOCK option; operates on a FIFO basis unless a disk or diskette request is made to a locked data file; has an unconditional option to bypass fill protection; provides dynamic storage allocation via a macro call for temporary storage requirements; and handles multiple buffer pools, allowing the user to define the block size and number. The monthly license fee is $1.50. Extension 1 is scheduled for July 1977 release.

Extension II is an enhancement to CPS that provides a set of functional modules for data editing, EBCDIC/binary conversion, time/date reference, and task scheduling. Extension II provides for commercial editing of EBCDIC character strings, including insertion of dollar signs, commas, decimal points, slashes, and minus or credit symbols; includes a test option to check input data against edit words; converts single- or double-word binary values to decimal EBCDIC character strings or vice versa; initializes and supports a time of day clock and calendar, providing data in several formats; allows scheduled activation and deactivation of selected tasks by time of day, with provisions for 24-hour rollover and leap year checking; and enable dynamic modification of schedule data under program control to ENABLE, DISABLE, or DELETE a task. The monthly license fee is $1.50. Extension II is scheduled for release in July 1977.

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The *Series/1 FORTRAN IV* package consists of two programs: the FORTRAN IV Compiler and Object Support Library for compilation and execution, and the FORTRAN IV Realtime Subroutine Library for execution of real-time FORTRAN IV programs. Series/1 FORTRAN IV with the prerequisite Mathematical and Functional Subroutine Library meets most of the criteria of American National Standard FORTRAN, X3.9-1966. The language has also been enhanced with IBM extensions to support multi-tasking and program communication. In addition, FORTRAN IV together with the FORTRAN IV Realtime Subroutine Library meets the Instrument Society of America ISA S61.1 1967 standard. Monthly license fees are $14 for the compiler and $5 for the subroutine library, and the one-time charges are $864 and $288, respectively. The FORTRAN IV programs are scheduled for release in October 1977.

The *Series/1 PL/1* package consists of two programs: the PL/1 Compiler and Resident Library for compilation and building of user programs, and the PL/1 Transient Library for execution of user programs. Series/1 PL/1 is a subset of ANS Programming Language PL/1 (ANSI X3.53-1976) with real-time language functions added. These functions are built directly into PL/1, rather than implemented as subroutine CALLs. With the inclusion of the real-time extensions, PL/1 allows the user to more fully utilize the Series/1 hardware and operating system environment. With these enhancements, PL/1 is capable of generating multitasking software. All code is re-entrant, and tasks can share or have private data areas; these features, together with the real-time extensions, provide a basis for efficient task control and interaction. They simplify the planning and writing of application programs that respond to Series/1 external events. The monthly license fees are $46 for the compiler (one-time charge, $2784) and $5 for the transient library (one-time charge, $288). The scheduled availability date for these products is April 1978.

The *Series/1 Mathematical and Functional Subroutine Library* is a set of commonly used subroutines that aid in developing application programs. MFSL provides mathematical functions including sine, cosine, logarithms and exponentiation functions, maximum and minimum functions, modular arithmetic, and others; conversion routines to convert numerical data between EBCDIC format and a Series/1 internal data format that is suitable for mathematical operations; error checking routines to detect error conditions during the processing of mathematical and conversion routines; and subroutine library services for assembly language users. Used with FORTRAN IV or the Macro-Assembler language provided with the Program Preparation Subsystem, MFSL routines are re-entrant and, through the Application Builder, can be linked into the auto-call area of a user's Task Set or into a shared Task Set. The MFSL routines are modular in design and can be easily replaced by user-written routines. The monthly license fee is $7, and the one-time charge is $408. MFSL is scheduled for availability in October 1977.

Also included among the new software enhancements are error logging facilities for the Standalone Utilities (SCP) package which enable the logging of execution-time errors. The user is able to format a printable error record for processor errors, device I/O request errors, and device interrupt errors. The user supplies the record build area and his own I/O routine to display the record on a console or printer, or write it to a disk or diskette for intermediate storage. When the log is on disk or diskette, SCP provides the facilities for printing the log on the console or printer.

HARDWARE: The new hardware introduced in April includes four additional processor models, a printer, and a display station. All of the new hardware is scheduled for release in September 1977 except the 4978 Display Station. The schedule for the release of the 4978 is to be established after receipt of the first order.

The new processors are:

- The 4953 Model C, consisting of a 32K-byte or 64K-byte processor and 4 I/O feature or storage slots in a one-half-width unit. Purchase price is $5,870.

- The 4953 Model D, consisting of a 32K-byte or 64K-byte processor and 13 I/O feature or storage slots in a full-width unit. Purchase price is $6,700.

- The 4955 Model C, consisting of a 32K-byte or 64K-byte processor with 10 I/O features slots in a full-width unit. Purchase price is $7,915.