

# VIRTUAL MACHINE/EXTENDED ARCHITECTURE (VM/XA) SYSTEMS FACILITY

## Contents

[Announcement Letter Number 285-044 dated February 12, 1985](#)

[US - Last Revised on February 12, 1985](#)

### **Brief Description of Announcement, Charges, and Availability.**

The VM/XA Systems Facility is a strategic new VM product for the XA environment that supersedes the VM/XA Migration Aid. It incorporates all existing VM/XA Migration Aid functions, offers additional capabilities, and provides new processor and device support. Additionally, the VM/XA Systems Facility offers significant performance benefits through exploitation of the XA Start Interpretive Execution (SIE) assist.

The VM/XA Systems Facility dramatically extends the range of Multiple Virtual Storage/Extended Architecture (MVS/XA) environments supported by VM, with emphasis on guest production, migration, test and maintenance. The VM/XA Systems Facility delivers new virtual machine capability that yields increased flexibility for guest systems.

### **Customer Letter Section**

#### HIGHLIGHTS

The VM/XA Systems Facility licensed program incorporates all the functions of VM/XA Migration Aid Release 2 and offers additional function and device support.

New processor and device support in VM/XA Systems Facility include:

- o Support of the IBM 3090 Processor complex

- o Support of the Start Interpretive Execution (SIE) assist for the IBM 308X and 3090 Processors
- o Dedicated-only support of IBM 3090 expanded storage
- o Full support of the IBM 3800-1 Printer
- o Dedicated support of the IBM 3880-23 DASD Control Unit
- o Dedicated support of the IBM 3380-AE4, BE4 DASD
- o Dedicated support of the IBM 3370 DASD
- o Dedicated support of the IBM 3430 Tape

Significant functions of VM/XA Systems Facility include:

- o Full dyadic\* utilization for V=R dyadic\* guests
- o Concurrent virtual and real Reserve/Release Support for shared DASD
- o A priority scheduler
- o Improved availability via the incorporation of a Missing Interrupt Handler
- o Spooling enhancements including a spool-to-tape program
- o A subset of the VM/SP Inter-User Communication Facility (IUCV)
- o Support for Named Saved Systems
- o Additional command compatibility with VM/SP(370)
- o Support of SMSG and MSGNOH commands
- o Dump Viewing Facility Enhancements
- o CMS 3.1 for installation and maintenance

\* In describing software facilities, the term 'dyadic' applies to both dyadic processors and the IBM 4381-3 dual processor.

#### DESCRIPTION

The VM/XA Systems Facility provides new capability allowing users to run multiple IBM System/370 and IBM System/370 Extended Architecture operating systems in a uniprocessor or dyadic processor. The VM/XA Systems Facility has value in a wide variety of customer installations including:

- o Test and Maintenance

The VM/XA Systems Facility provides a comprehensive and flexible environment for maintaining IBM System/370 and IBM System/370 Extended Architecture systems. The multiple virtual machine capability of the VM/XA Systems Facility allows the creation and testing of a wide variety of simulated environments including loosely coupled multiprocessor guest configurations. Aided by extensive debugging and trace facilities, the VM/XA Systems Facility can provide significant improvements in system programmer productivity and resource utilization.

- o Guest Production and Migration

For the migrating customer, the VM/XA Systems Facility

allows continued production (normally as a V=R preferred guest) for the current operating system (MVS, VSE, VS1) and concurrent installation and test of MVS/XA. The VM/XA Systems Facility reserve/release support enhances the migration and production environments by allowing the V=R production guest to share DASD with other test guests and other real processors. By allowing both production and MVS/XA installation during normal working hours, overall efficiency and productivity may be increased.

The improved V=R guest performance provided by the 370-XA SIE Assist, coupled with the ability of a V=R guest to fully utilize a dyadic processor, make the VM/XA Systems Facility effective for guest production.

Full CMS support can be obtained by running VM/SP or VM/SP HPO as a V=R or V=V guest of the VM/XA Systems Facility. The new scheduler facilities provide the capability to favor particular V=R or V=V guests. This facility can be used to tune the Systems Facility, as required, to potentially improve the responsiveness of CMS users running under a VM/SP or VM/SP HPO virtual machine. The CMS component of the VM/XA Systems Facility is supported only for installation and maintenance.

The diagrams attached to this announcement depict typical processor configurations and show the enhancements made to dyadic support. (SEE HARD COPY FOR ATTACHMENTS.)

#### SUPPORT OF THE IBM 3090 PROCESSOR COMPLEX

The VM/XA Systems Facility will provide support for the IBM 3090 Processor including 48-channel support and the expanded storage facility (dedicated only). IBM System/370 mode guests may now define and use up to 32 channels. Guests that also support the expanded storage facility can use this facility as a dedicated-only resource under the VM/XA Systems Facility.

#### FULL DYADIC UTILIZATION

The VM/XA Systems Facility will exploit the full dyadic capabilities of the IBM 4381-3 (dual processor), IBM 3081, IBM 3090 Model 200 and the IBM 3084 and IBM 3090 Model 400 (in partitioned mode). Specifically, support is provided to allow V=R guests that support dyadics, such as MVS/XA or VM/SP HPO, to simultaneously run on both instruction processors in full dyadic mode. This enhancement, combined with the scheduler facilities in the VM/XA Systems Facility, allows a production dyadic V=R guest to utilize all of the available CPU resources. Additionally, V=V guests may be run on both CPUs of the dyadic when there is no dedicated V=R guest. This enhancement allows for better balancing of workloads between the two

processors and for better dyadic utilization.

#### SUPPORT OF THE START INTERPRETIVE EXECUTION (SIE) ASSIST

This enhancement is provided to improve the performance of V=R preferred guests. In a laboratory test environment on an IBM 3081 running as a preferred guest, MVS/XA achieved an internal throughput rate of 90-92% relative to the native rates on the same processor. MVS/370 running as a preferred guest achieved an internal throughput rate of 86-88% when tested in this same environment. This represents an internal throughput rate improvement of up to 14% over that attainable on the VM/XA Migration Aid for the same workload. This improvement is due to a reduction in the number of instructions VM/XA Systems Facility is required to execute in support of I/O instructions for dedicated devices attached to either System/370 or System/370-XA preferred guests. Most I/O instructions and associated interrupts are normally handled entirely by the processor in interpretive execution mode.

Detailed performance information will be provided in the fourth quarter of 1985.

#### INCORPORATION OF A PRIORITY SCHEDULER FOR GUESTS

The new scheduler will allocate processor time based on a user's given "share" of processor power. This facility affords several production management benefits. Coupled with other paging related commands, the user can now allocate system resources (storage and CPU) to potentially allow for multiple production environments, or potentially improve CMS responsiveness by favoring a VM/SP or VM/SP HPO virtual machine. Since these commands can be entered at any time, the user can dynamically tune the VM/XA Systems Facility to best support changing requirements.

#### RESERVE/RELEASE SUPPORT

The VM/XA Systems Facility now allows guest operating systems to issue Reserve/Release commands to DASD devices such that they may be concurrently shared among both virtual machines and other processors during migration and production.

#### FULL SUPPORT OF THE IBM 3800-1 PRINTER

The IBM 3800-1 Printer is supported as both a real and a virtual device, including full error recovery and image library support. This support allows the 3800 printer to be used by the Systems Facility as a spooling device. Additionally, guest operating systems may define the 3800 as a virtual printer in order to utilize the special printing facilities of the 3800.

#### DEDICATED-ONLY SUPPORT OF THE IBM 3880-23 DASD CONTROL UNIT

VM/XA Systems Facility will provide dedicated only support

for the 3880-23 Control Unit and attached devices.

#### DEDICATED-ONLY SUPPORT OF THE IBM 3380 MODELS AE4 AND BE4

The recently announced 3380 Models AE4 and BE4 DASD can be used as dedicated-only devices.

#### DEDICATED-ONLY SUPPORT OF THE IBM 3370

The 3370 DASD can be used as dedicated-only devices by VS1, VSE, VM/SP, and VM/SP HPO.

#### DEDICATED-ONLY SUPPORT OF THE IBM 3430 TAPE

The 3430 tape support for VM/XA Systems Facility will allow the device to be attached to a user's virtual machine as a dedicated-only device.

#### NAMED SAVED SYSTEMS

This support allows a user to IPL a virtual machine and when the IPL is complete, the virtual machine status can be saved and given a name via the SAVESYS command. Subsequently, this saved system can be invoked simply by entering an IPL command specifying the name used in the SAVESYS command. This facility can reduce guest IPL times which can be beneficial to productivity during installation, maintenance, and testing of guest operating systems.

#### ADDITIONAL COMMAND COMPATIBILITY WITH VM/SP

Changes will be made to the external characteristics of VM/XA Systems Facility that make it more compatible with the externals of VM/SP Release 3 and the corresponding VM/SP HPO release with respect to commands and command responses.

#### SUPPORT OF SMSG AND MSGNOH COMMANDS

These facilities allow the system operator to send messages to other virtual machines and is commonly used to query and control service machines such as RSCS and PVM.

#### ADDITIONAL RAS VIA THE INCORPORATION OF A MISSING INTERRUPT HANDLER

The Missing Interrupt Handler enhances the availability of virtual machines by detecting missing interrupts of supported devices. Once detected these conditions are corrected or passed to the guest operating system. This facility can minimize deadlocks and system hangs. Commands are provided to set timing parameters, turn the function on and off and to display status.

#### SPOOLING ENHANCEMENTS

There are three new functions provided by the spooling enhancements.

- o The spool-to-tape function allows spool files and system data files to be saved on tape. This function may be used to migrate spool files between VM/SP Release 3.0 and VM/XA Systems Facility.

- o Printer Separators have been made compatible, although not identical, with those in VM/SP.
- o Forms support, allowing spool files to be manipulated based on the form name or form number, has been made compatible with the existing support in VM/SP.

#### INCORPORATION OF A SUBSET OF THE VM/SP IUCV FACILITY

The Inter-User Communications Vehicle (IUCV) is a communications facility that enables a virtual machine to communicate with other virtual machines and can be used to enhance testing capabilities by allowing test cases and data to be passed between machines.

#### DUMP VIEWING FACILITY ENHANCEMENTS

The following enhancements are provided:

- o A HELP facility has been added to assist the user with dump viewing facility commands and subcommands.
- o TRACE scrolling allows a user to scroll forward and backward through the TRACE entries.
- o Formatted TRACE print formats the printed TRACE entries in the same format as the displayed TRACE entries under DUMPSCAN.

#### CMS 3.1 FOR INSTALLATION AND MAINTENANCE

CMS 3.1 is provided for installation and maintenance and allows system programmers to use the System Product Interpreter.

#### SCHEDULE

Planned availability is November 1985.

#### TECHNICAL INFORMATION

##### SPECIFIED OPERATING ENVIRONMENT

**HARDWARE REQUIREMENTS:** The VM/XA Systems Facility is supported on all models of the following processors operating in System/370-XA mode:

- o IBM 4381 Model Group 1 (Requires System EC #993078)
- o IBM 4381 Model Group 2 (Requires System EC #866904)
- o IBM 4381 Model Group 3 (Requires System EC #329507)
- o IBM 3081
- o IBM 3083
- o IBM 3084 (in partitioned mode)
- o IBM 3090 Model 200
- o IBM 3090 Model 400 (in partitioned mode)

**SOFTWARE REQUIREMENTS:** Assembler H Version 2 is required to:

- o Generate extended architecture instruction streams
- o Generate VM/XA Systems Facility
- o Service VM/XA Systems Facility

The current version of EREP must be ordered and installed.

The VM/XA Systems Facility is designed to support the

following operating systems as virtual machines, either in a V=V or a V=R preferred area:

- o MVS/SP Version 1 Release 1 with Release 1 enhancement
- o MVS/SP Version 1 Release 3 and later (MVS/370)
- o MVS/SP Version 2 Release 1 and later (MVS/XA)
- o VM/SP Release 2.1 and later
- o VM/SP HPO Release 3.0 and later
- o OS/VS1 Release 7 with BPE Release 3 and later
- o VSE/Advanced Function Release 3 with service level 8205 and later
- o VM/XA System Facility (V=V only)
- o VM/XA Migration Aid Release 1 and later (V=V only)

The following licensed programs are supported by the VM/XA Systems Facility:

- o Assembler H Version 2 (5668-962)
- o VM/XA Migration Aid Remote 3270 Display Option (5664-183)
- o RSCS Networking Version 1 Release 3 (5748-XP1)
- o VM/Pass-through Facility Release 2 (5748-RC1)

COMPATIBILITY: The VM/XA Systems Facility is upwardly compatible from Release 2 of the VM/XA Migration Aid, with the following exceptions:

- o Release 2 spool files cannot be processed by VM/XA Systems Facility. Refer to the VM/XA Systems Facility Installation Manual (which will be available at general availability) for migration requirements and procedures.
- o Some commands have been changed in order to make them more compatible with VM/SP and VM/SP HPO. Consult the VM/XA Systems Facility CP Command and Diagnose Code Reference for details.

STORAGE ESTIMATES: The resident nucleus for the VM/XA Systems Facility will be approximately one megabyte, and the minimum supported storage size will be four megabytes.

PACKAGING: The VM/XA Systems Facility will be shipped with the combined components of:

- o VM/XA Systems Facility control program (CP)
- o VM/XA Systems Facility CMS at the VM/SP Release 3.1 level (for installation and service of VM/XA Systems Facility and for the operation of licensed programs supported by VM/XA Systems Facility)
- o Dump viewing facility

RELIABILITY, AVAILABILITY, AND SERVICEABILITY (RAS)

In addition to the several RAS facilities provided by virtual machines, such as individual machine error isolation and extensive debugging services, the VM/XA Systems Facility offers significant

availability features for preferred guests and for central storage machine-check recovery.

The VM/XA Systems Facility preferred guest recovery capability allows preferred guest machines to resume operation without a re-IPL after certain control program and hardware failures. This can improve the availability of production environments.

The missing interrupt handler in VM/XA Systems Facility is used to detect and correct or pass missing I/O interrupt conditions to guest machines.

The VM/XA Systems Facility supports and utilizes the double-bit central storage error detection capabilities of IBM processors. When a double-bit central storage error is detected, if not corrected by the hardware, the VM/XA Systems Facility will perform frame deallocation for pageable storage frames. At next reference, a new frame will be allocated for the deallocated frame. For preferred guests running V=R, this error condition is detected and passed to the guest for handling by the guest SCP. This capability can minimize abnormal termination of guest SCP on certain central storage failures.

#### SECURITY, AUDITABILITY, AND CONTROL

The VM/XA Systems Facility includes several facilities to ensure the security and integrity of the system. Each guest and CMS user runs in a unique virtual machine definition which, in combination with IBM 370-XA features, prohibits one user from accessing another's data in storage (unless specifically allowed through shared segments). Additionally, the VM/XA Systems Facility and IBM 370-XA channel facilities provide protection against channel programs accessing another user's virtual addresses. Minidisk security is provided by a password facility to control both read-only and read-write access. Both LOGON ID and PASSWORD checking are provided to minimize unauthorized system access. User management is

responsible for the selection, application, adequacy, and implementation of these features and for the appropriate application and administrative controls.

#### ORDERING INFORMATION

Ordering information will be provided at availability.

#### CHARGES, TERMS, AND CONDITIONS

##### CHARGES

The initial license charge is due and the monthly charge commences for each basic license upon completion of the applicable testing period. The initial license charge is due and the monthly

charge commences for each DSLO license on the effective date of additional licenses.

**INITIAL LICENSE CHARGE:**

Basic License       \$10,500

DSLO                 7,875

**MONTHLY CHARGE:**

Basic License       \$3,500

DSLO                 2,625

Note: At availability of VM/XA Systems Facility, current licensees of the VM/XA Migration Aid will not be charged an additional initial license charge when ordering the VM/XA Systems Facility to replace the VM/XA Migration Aid.

**TERMS AND CONDITIONS**

**WARRANTED:**

Basic License - Yes, in accordance with the Agreement for IBM Licensed Programs.

DSLO - Not applicable.

**LICENSED PROGRAM MATERIALS AVAILABILITY:** Restricted Materials - Yes.

This licensed program will be available with some licensed program materials designated as RESTRICTED MATERIALS OF IBM. In addition, some modules will be available without source licensed program materials. These modules will be available in object code.

**TESTING PERIOD:**

Basic License - Two months

DSLO - Not applicable

**PROGRAM SERVICES:** Central service, including the IBM support center, for the basic license will be available until discontinued by IBM upon 12 months' written notice. For DSLO licenses, central service, including the IBM support center, will be provided only through the customer location designated for the basic license.

Local licensed program support will be available under the terms and conditions of the Agreement for Local Licensed Program Support for IBM Licensed Programs at the monthly licensed program support charge, or the monthly multiple licensed program support charge, or will be provided at the applicable IBM hourly service rate. Local licensed program support will be provided by the IBM National Service Division.

**PROGRAM CURRENCY:** Program services, previously announced for the VM/XA Migration Aid Release 2, will be available for 12 months after the availability of this release of VM/XA Systems Facility.

**MONTHLY LICENSED PROGRAM SUPPORT CHARGE:** \$583

**MONTHLY MULTIPLE LICENSED PROGRAM SUPPORT CHARGE:** \$933

INSTALLATION LICENSE OR LOCATION LICENSE APPLIES: No. A separate license is required for each machine on which the licensed program materials will be used, except as otherwise provided by IBM.