



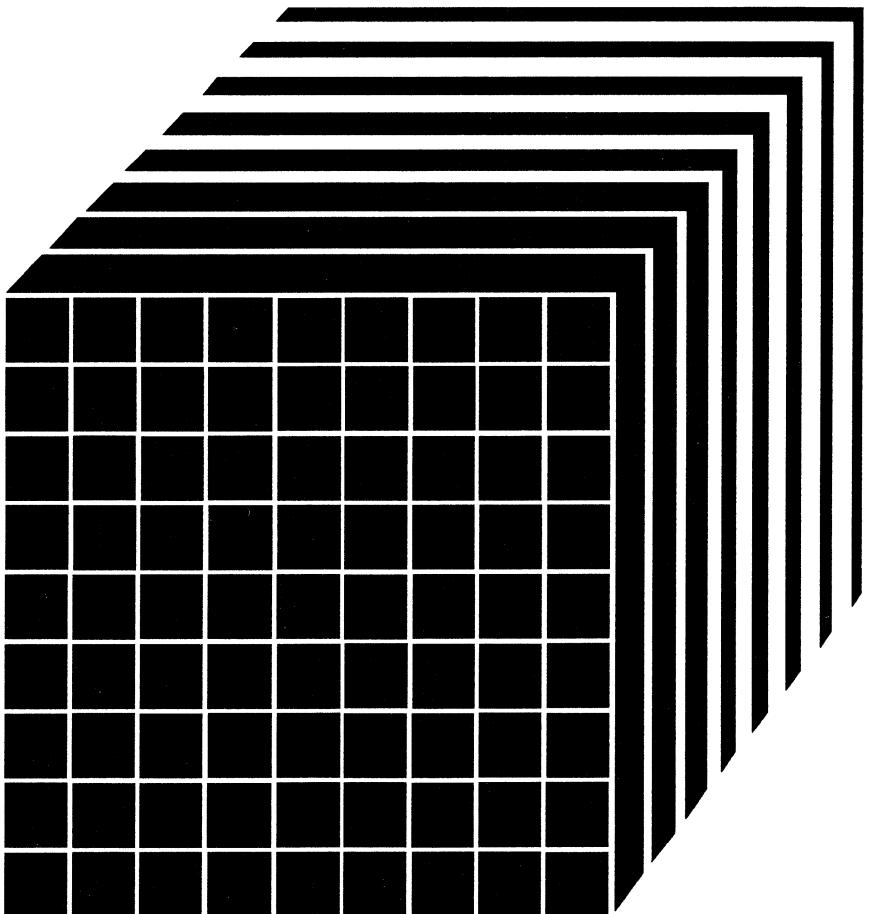
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# **Virtual Machine/ System Product**

## **General Information**

**Release 5**

**GC20-1838-5**



## **Sixth Edition (October 1986)**

This edition, GC20-1838-5, is a revision of GC20-1838-4 and applies to Release 5 of Virtual Machine/System Product (VM/SP), program number 5664-167, and to all subsequent versions and modifications until otherwise indicated in new editions or Technical Newsletters. Changes are made periodically to the information herein; before using this publication in connection with the operation of IBM systems, consult the latest *IBM System/370, 30xx, and 4300 Processors Bibliography*, GC20-0001, for the editions that are applicable and current.

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# Preface

## Who Should Read this Book

The executive, data processing manager, installation manager, system analyst, and anyone who is interested in understanding Virtual Machine/System Product (VM/SP) and its applicability to their business environment.

## What You Should be Able to Do after Reading This Book

- Have a basic understanding of what VM/SP is and what it can do.
- Understand how VM/SP can help your organization.

## How this Book is Organized

This book is divided into five chapters.

- Chapter 1, “What is VM/SP” provides a short introduction to VM/SP and its basic components: Control Program (CP), Conversational Monitor System (CMS), and Group Control System (GCS).
- Chapter 2, “The System Environment” describes some available products within the VM/SP family that can enhance and expand your installation—whether yours is an entry-level, intermediate, or large system environment.
- Chapter 3, “The Application Environment” describes some solutions that can help you extend the application capability of VM/SP to meet your daily office needs.
- Chapter 4, “Connectivity” describes some facilities that can help you expand your communication capability under VM/SP.
- Chapter 5, “Configuration” gives an overview of processors and devices that work with VM/SP, as well as virtual machine and hardware considerations.

## Preface (continued)

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### VM/SP Publications

You can find additional information about VM/SP in the *VM/SP Introduction*, GC19-6200, or the *VM/SP Release 5 Guide*, SC24-5290.

You can find more information about VM/SP publications in the *VM/SP Library Guide, Glossary, and Master Index*, GC19-6207.

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# Chapter 1. What is VM/SP

# What is VM/SP

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## A Short Introduction to VM/SP

This chapter provides you with a short introduction to VM/SP and its basic components: Control Program (CP), Conversational Monitor System (CMS), and Group Control System (GCS).

### Overview

VM/SP is an interactive, multiple-access operating system. Interactive means that there is two-way communication between users and VM/SP. Multiple-access means that many people can use a VM/SP system at the same time, making your computing system more productive.

With VM/SP, users have a functional simulation of a real computer and its associated devices at their fingertips. This functional equivalent of a computing system is called a virtual machine.

Control Program (CP) and Conversational Monitor System (CMS) are components of VM/SP. Each component provides its own types of services.

### CP Creates Virtual Machines and Manages Resources

CP creates a virtual machine when a user logs onto VM/SP. A virtual machine consists of a real terminal (virtual console), direct access virtual storage, virtual input and output devices, and an operating system.

CP manages system resources and gives each person using the system an individual working environment. Each virtual machine user has access to a share of the real system resources. The resources that CP manages include:

- Processor functions
- Processor storage
- Input and output devices.

CP is the one part of VM/SP that is always required for system use. This is because CP creates the system work environment. CP controls the system resources that are available to the user during a work session on VM/SP.

To some extent, CP lets the user manage the portion of system resources it assigns to that user. For example, a user can get a resource status report from CP that shows such things as the direct access storage assigned to that user. CP can also make some changes to the resources it has allocated to a user.

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CP lets many people share the use of real system resources. It allocates resource usage in such a way that each person works independently of other users on the system. In other words, CP manages one physical system so that it seems to give each of the users a separate and independent system. Figure 1 on page 4 shows how each person has the impression of being the only system user. Users often do not have visual contact with other users and may never see the real system they use.

When a user first logs onto VM/SP, only CP controls the working environment. Many of VM/SP's facilities are immediately available to the user. For example, the system operator does many system management tasks under control of CP. However, most of the work done on VM/SP requires the use of an operating system in the working environment to help with data processing tasks and to manage work flow. There are many operating systems that can run on VM/SP.

## What is VM/SP

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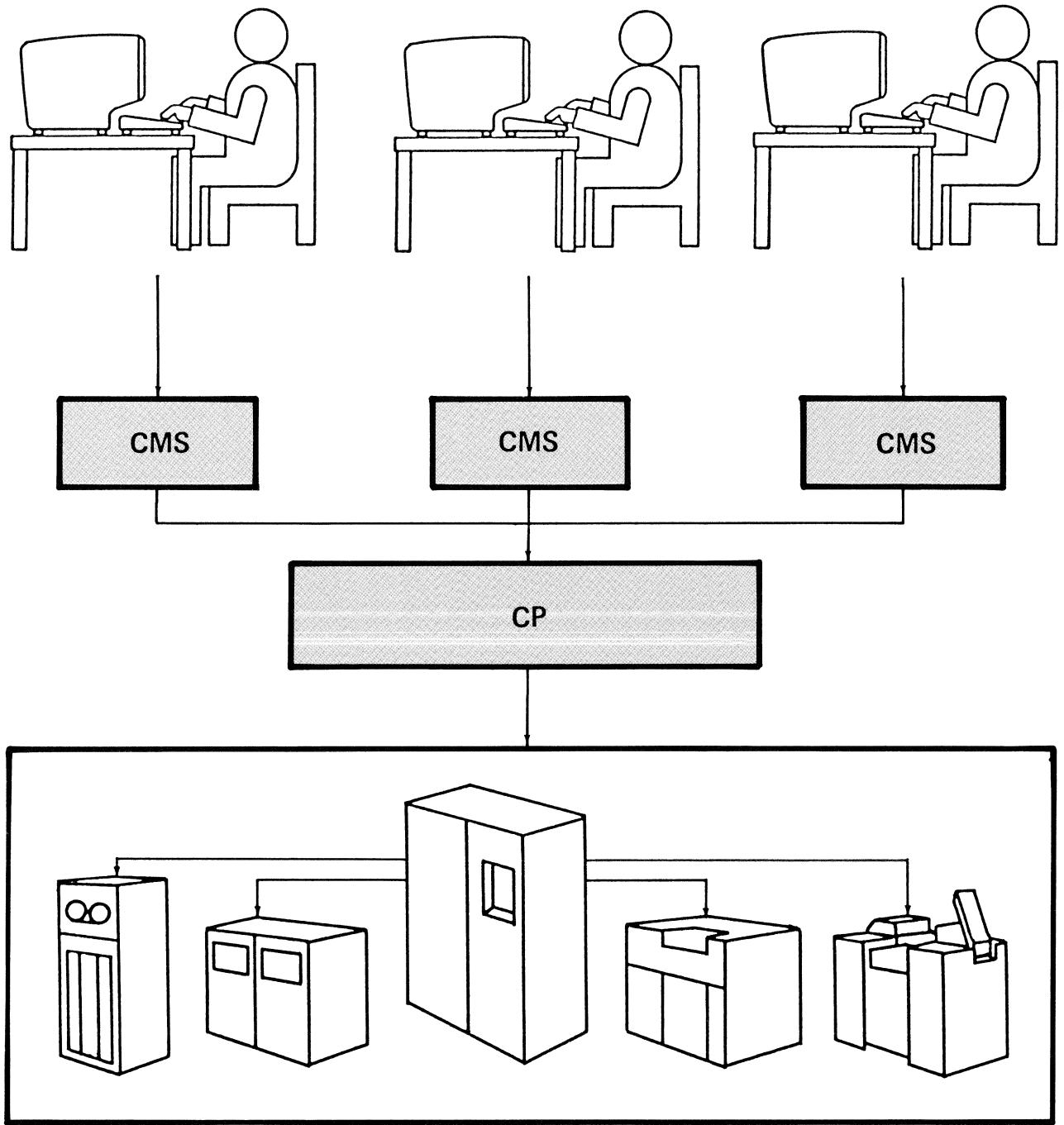


Figure 1. CP and CMS Allow Multiple VM/SP Users to Share One System

## CMS Manages Work Flow

CMS, although a component of the VM/SP operating system, is itself an operating system. Every VM/SP system includes CMS. CMS runs only under CP. As the name “conversational” implies, there is two-way communication between system users and CMS. Users talk to CMS with commands; CMS uses system messages to talk to users.

CMS can help users do a wide variety of tasks. For example, users can:

- Write, test, and debug application programs
- Create and edit information files
- Execute application programs
- Process jobs in batch mode
- Manage the CMS working environment
- Communicate with other users of the VM/SP system.

As shown in Figure 1 on page 4, each user works with a separate copy of CMS.

## Editing CMS Files

The System Product editor (XEDIT) gives users a wide range of functions to process text and develop programs. With XEDIT, users can create files, make changes to files, and transfer data between files.

When a user edits a file it is displayed on the terminal either as a full screen, on display terminals, or as a single line, on typewriter-type terminals.

With XEDIT, users can:

- Customize the full-screen layout to their own needs
- Utilize a wide variety of powerful subcommands and macros for improved text processing
- Divide the screen horizontally or vertically to look at multiple views of the same file or of different files
- Call the HELP facility, which provides online information about any XEDIT subcommand, macro, or any command in the CMS HELP facility
- Associate various colors and extended highlighting features with fields on the XEDIT screen.

# What is VM/SP

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For more information about XEDIT, see *VM/SP System Product Editor User's Guide*, SC24-5220.

## Customizing Applications and CMS Commands

The System Product Interpreter is a command and macro processor that helps improve your organization's productivity. With the System Product Interpreter, users can write customized application programs and/or tailor CMS commands. Users can also run the System Product Interpreter as a desk calculator or mathematical problem solver.

The System Product Interpreter runs in both the CMS and GCS environments. The Restructured Extended Executor (REXX) language is the English-like programming language that the System Product Interpreter uses.

For more information about the System Product Interpreter, see *VM/SP System Product Interpreter User's Guide*, SC24-5238.

## National Language Support

With National Language Support, you can order and install languages other than American English on your VM/SP system. This lets users interact with VM/SP – enter CMS commands, see productivity aid panels (like FILELIST), and receive system messages – in their own national language, if it is available on their system.

*Note:* Be sure that your terminals can properly display the character set of any language you order.

For more information about National Language Support, see *VM/SP CMS for System Programming*, SC24-5286.

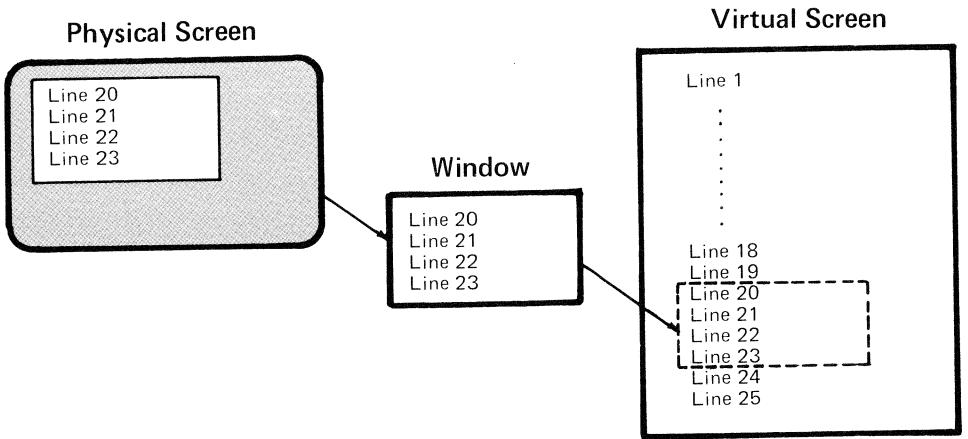
## Full-screen CMS

The CMS full-screen environment lets users use the entire screen to enter input and display output. Users can manage several pieces of information on the physical screen at the same time. With full-screen CMS, users can enter CMS commands from any line on the physical screen. Users can also specify extended attributes for output and define Program Function (PF) keys.

*Note:* The full-screen capability for CMS is available for 3270-type terminals.

The full-screen CMS mode uses windowing support to define virtual screens and windows. Through windows, users can manipulate information in much the same way that pieces of paper can be rearranged on a desktop. Users can scroll backward and forward through data and log data into CMS files.

A window is an area on the physical screen where users can display and manipulate data. Data is maintained in virtual screens. A virtual screen can be thought of as a “presentation space” or a functional simulation of a physical screen. It simulates a physical screen but it is not confined to the physical screen’s size. When users enter input or view output through a window, they are really looking into the virtual screen data. Figure 2 illustrates the relationship between the physical screen, a window, and a virtual screen.



**Figure 2. A window into a virtual screen**

For more information about full-screen CMS and windowing functions in VM/SP, see the *VM/SP CMS User’s Guide*, SC19-6210.

## GCS Manages Subsystems

The Group Control System (GCS) is a virtual machine supervisor that manages multiple tasks. Like CMS, GCS is shipped as a part of every VM/SP system. However, an installation may or may not choose to install GCS. Its main purpose is to manage subsystems that support a Systems Network Architecture (SNA) network.

SNA is a description of the rules and formats for sending data through a network. SNA lets devices in the network do work previously done by the main processor. For instance, devices can:

- Manage communication lines
- Control other devices
- Format data, and, in some cases,
- Execute application programs.

For more information about GCS, see *VM/SP Group Control System Command and Macro Reference*, SC24-5250.



## Chapter 2. The System Environment

# The System Environment

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## The VM/SP Family

This chapter describes the base VM/SP system and some other systems and programs that make up the VM/SP family. You will find that VM/SP provides many options for your installation—whether yours is an entry-level, intermediate, or large system environment.

### The Base VM/SP System

VM/SP is an operating system that allows multiple users to share the system resources so your computing system can be more productive. VM/SP is an interactive system that provides file management, an English-like command language, and a full-screen editor. A wide range of application programs can complement VM/SP's basic functions.

VM/SP provides a stable environment for new users who have never worked on a computing system and whose jobs don't allow them to spend a lot of time learning the system. Inexperienced professionals and non-professionals can quickly learn how to use VM/SP for their personal job needs.

Your installation can do any of the following applications with VM/SP:

- Problem solving
- Editing and text creation
- Program development
- Application testing
- System program testing
- Online training for users, system operators, and system programmers
- Configuration simulation
- Conversion and testing of operating systems such as MVS and VSE
- Release-to-release transition
- System maintenance verification.

Because you can use VM/SP for such a wide variety of purposes, VM/SP makes computing systems available to many people in your organization. There is no typical user of VM/SP, which is one of VM/SP's most valuable qualities—many types of computing environments can use VM/SP.

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The rest of this chapter discusses some computing systems and programs, which are all members of the VM/SP family, that can help enhance and expand your installation. Whether yours is an entry-level, intermediate, or large system environment, VM/SP has a solution for all of your computing needs.

## **The VM/Integrated System**

The VM/Integrated System (VM/IS) provides a powerful and responsive computing system for Engineering/Scientific and Business professionals. It is a general purpose system designed to help improve the productivity in many of your organization's daily operations.

VM/IS is a VM/SP-based system composed of a rich assortment of IBM software products that you can apply to areas such as:

- Business Administration
- Engineering and Science
- Finance
- Manufacturing
- Marketing.

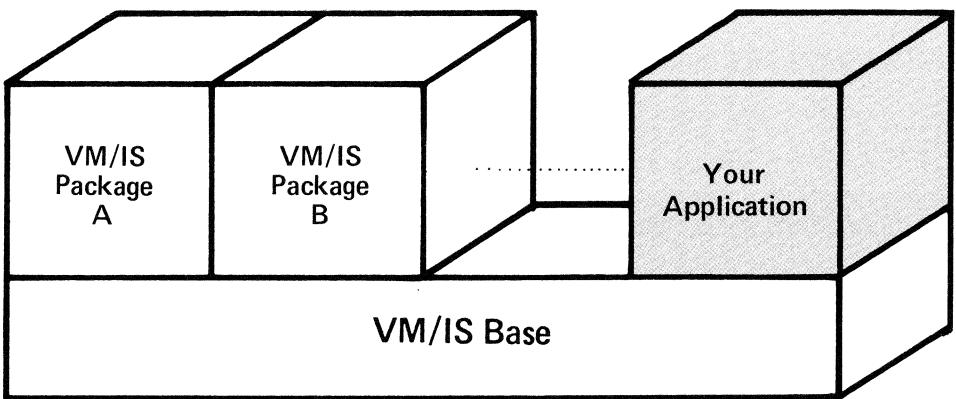
VM/IS is designed to be installed by a system administrator with little or no system programming skills. VM/IS reduces the complexity of the installation process through the use of :

- A preconfigured system
- Step-by-step documentation
- Optional packages.

VM/IS optional packages contain related products that can assist you in completing your daily tasks. You can also expand or change your VM/IS system by adding other IBM or non-IBM software products. For example, you might have an existing application, or plan to develop an application, that you would like to run in a VM/IS environment. You can very easily add your application to VM/IS. Figure 3 on page 12 illustrates how your application fits into VM/IS.

# The System Environment

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**Figure 3. Adding Your Own Applications to VM/IS**

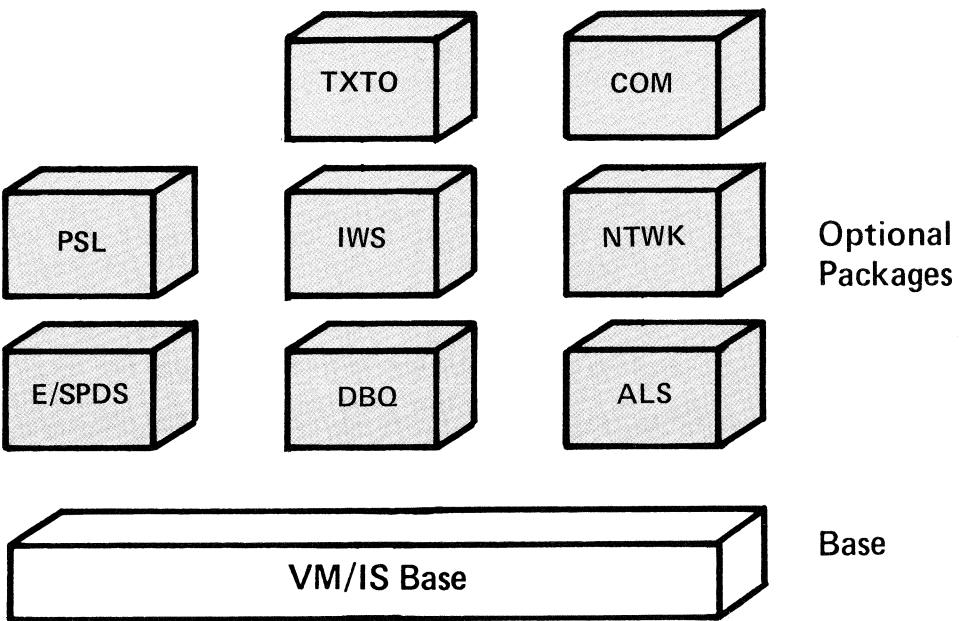
The VM/IS base acts as the foundation for your VM/IS system. You use the base to build the computer system you need. It provides the tools you need to keep your system running as efficiently as possible. The VM/IS base also provides a set of functions, including VM/SP, that you can use to create documents, produce graphics, manage your files, and submit and monitor batch jobs. Without the base you could not install and use the optional packages.

VM/IS offers you several optional packages. Each optional package contains a more specialized product set geared to a specific area of use. This modular design allows you to add any combination of these optional packages to your base. Thus the optional packages act as building blocks allowing you to select only those products you require.

The names of the packages are:

- The Engineering/Scientific Program Development Support (E/SPDS) package
- The Problem Solving Languages (PSL) package
- The APL Language Support (ALS) package
- The Text/Office Support (TXTO) package
- The Data Base Query (DBQ) package
- The Intelligent Workstation Support (IWS) package
- The Networking Support (NTWK) package
- The Communication Controller Support (COM) package.

Figure 4 on page 13 shows the package architecture of VM/IS.



**Figure 4. The Package Architecture of VM/IS**

As you can see, VM/IS is a very flexible, VM/SP-based system containing various products designed to help improve your productivity. With VM/IS, you can create a computer system suited to your specific needs.

AND... as your organization grows, VM/IS can grow with it, giving you more capabilities to help perform your daily tasks.

For more information about VM/IS, see *VM/Integrated System General Information*, GH24-5119.

### **VM/SP System Offering**

VM/SP System Offering is a program package consisting of the current release of VM/SP and a set of programs (program products and program offerings) called optional Feature Program Products (FPPs) that are supported in a VM environment.

VM/SP System Offering provides the following features to your installation:

- Performs all pre-installation setup, including pre-allocation of Direct Access Storage Device (DASD), thereby eliminating the need for your system programmer(s) to perform these tasks
- Provides a single ordering procedure through which you may order selected optional FPPs along with your VM system
- Reduces the cost of optional FPP distribution by stacking products on a single tape.

# The System Environment

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For more information about VM/SP System Offering, see the *VM/SP Installation Guide*, SC24-5237.

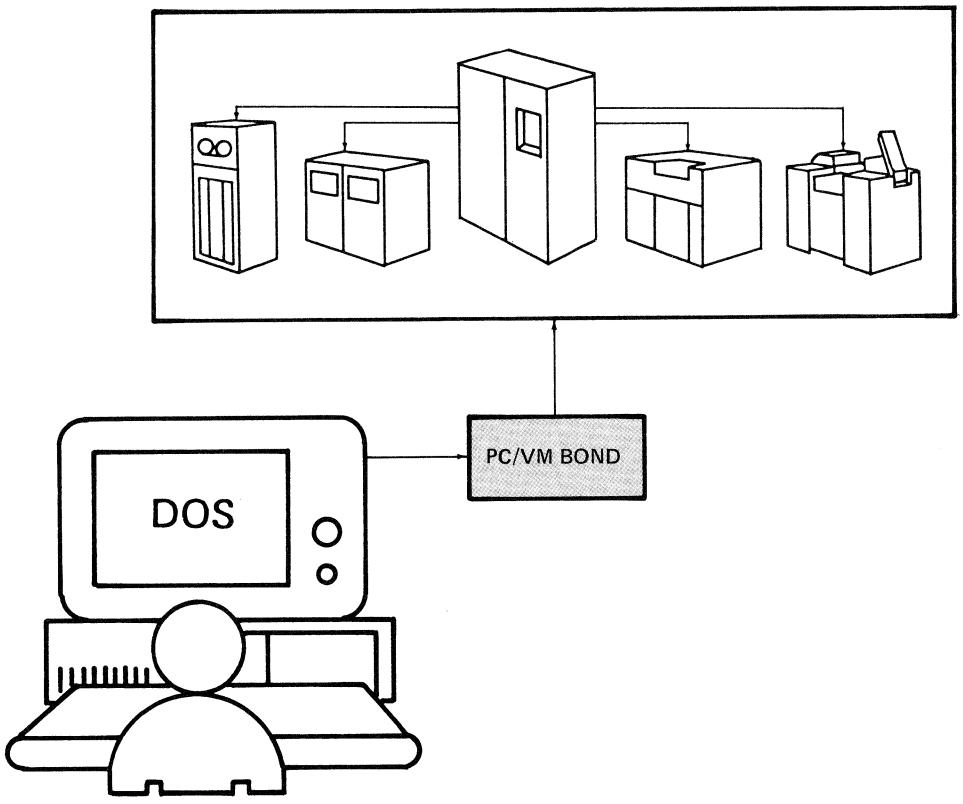
## PC/VM Bond

PC/VM Bond is a computer program made up of two parts: VM Bond and PC Bond. It is an easy-to-use tool that allows Personal Computer (PC) users with little or no VM experience to take advantage of many of the features of VM.

With PC/VM Bond you can:

- Use extra disk drives on VM, in addition to the personal computer disk drives that you normally use
- Share data (disks) with other users of PC/VM Bond
- Backup your diskettes and fixed disks and store the backup copies on VM
- Communicate with VM from Disk Operating System (DOS)
- Emulate an IBM 3278-2 terminal on your PC
- Use the REXX/PC command interpreter as a powerful alternative to the DOS batch facilities.

Figure 5 on page 15 shows the PC/VM Bond picture.



**Figure 5. This is PC/VM Bond**

If you want to add some of the features of VM to your PC(s), without losing any of the features that you normally use, PC/VM Bond may be the right solution for you.

For more information about PC/VM Bond, see the *PC/VM Bond User's Guide*, Part Number 6467022.

# The System Environment

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## Virtual Machine/Personal Computer

Virtual Machine/Personal Computer (VM/PC) is a computing system that runs on an IBM PC AT/370 or PC XT/370. With VM/PC, users can use their PC as a:

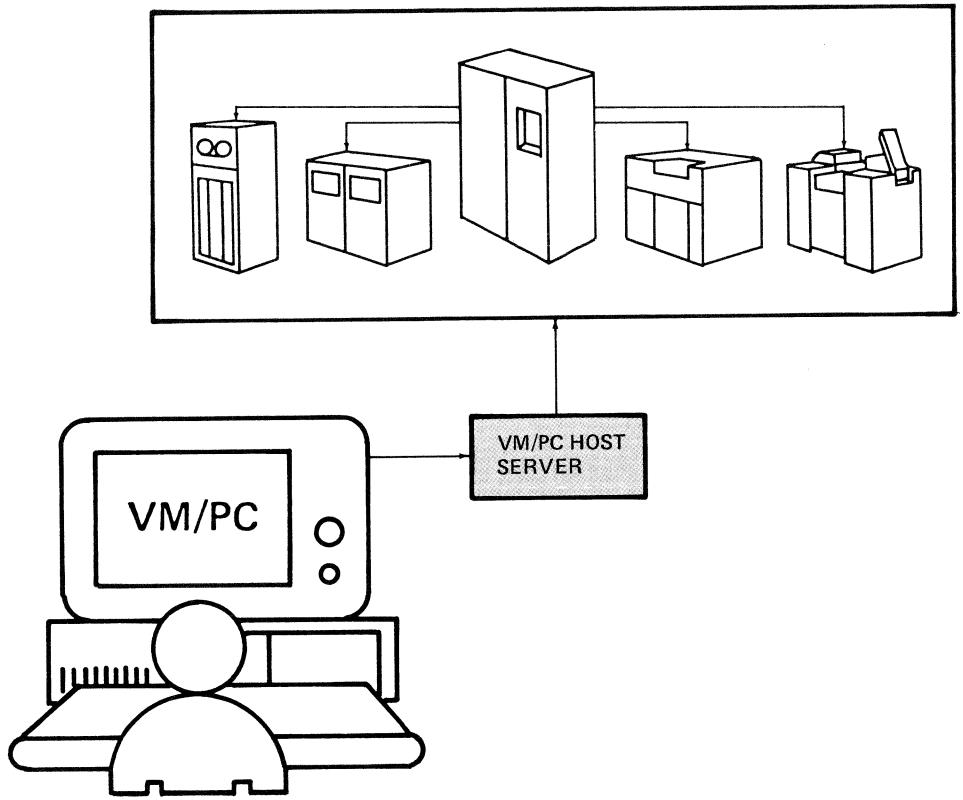
- Stand-alone VM system
- VM system connected to a VM/SP host
- Standard PC with PC DOS capability.

And, all of these environments can be active at the same time.

VM/PC gives your users an individual, space-saving VM system with:

- Host-like computing power on their desktop
- A CMS environment common to both VM/PC and VM/SP
- Consistent response time
- Full control of the computing resource of your VM system.

Figure 6 on page 17 shows the VM/PC picture.



**Figure 6. This is VM/PC**

For more information about VM/PC, see the *VM/PC User's Guide*, SC24-5254.

### VM/SP High Performance Option

VM/SP High Performance Option (VM/SP HPO) is a separately orderable licensed program that operates in conjunction with VM/SP. VM/SP HPO extends the functional capabilities of the CP component of VM/SP in the following areas:

- Improves system management
- Provides additional processor support
- Provides additional I/O support
- Improves performance and functions for Multiple Virtual Storage (MVS) guests.

# The System Environment

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You should consider using VM/SP HPO if your installation:

- Supports a large or complicated system environment
- Migrates to a larger or high-end processor
- Supports large numbers of users
- Needs the extended capabilities described above.

For more information about VM/SP HPO, see *VM/SP HPO General Information*, GC19-6221.

## Guest Operating Systems

CP creates a virtual machine for each user who logs onto VM/SP. This virtual machine is of limited use until the user loads an operating system to control work flow. There are many operating systems that run in virtual machines. CMS is the most commonly used because it can be used for so many types of jobs. Other operating systems that run in a virtual machine include:

- VSE/SP, and some earlier versions of this DOS-based family of products
- MVS/SP, and some earlier versions of this OS-based family of products
- VM/SP itself.

Operating systems that run in a virtual machine are called “guest” operating systems. Running an operating system in a virtual machine is a way to allow a VM/SP user to work in that operating system’s environment. For example, a VM/SP user might load an MVS operating system into a virtual machine, then operate in the MVS environment while sharing the VM/SP system with other users.

Because each virtual machine running under VM/SP is independent of other virtual machines, a virtual machine can use:

- The same release of an operating system that another virtual machine is using
- Different releases of the same operating system that another virtual machine is using
- A different operating system than another virtual machine is using.

Your IBM marketing representative can give you a complete list of available guest operating systems.

## IBM Interactive Executive for System/370

IBM Interactive Executive for System/370 (IX/370) is the IBM implementation of the UNIX<sup>1</sup> System V operating system for the VM/SP environment. IX/370 runs as a guest operating system under VM/SP Release 3.0 or later, with or without VM/SP HPO Release 3.4 or later.

IX/370 provides UNIX System V-based application execution, program development, and text processing environments for VM/SP. This includes:

- A variety of programming tools
- A flexible command language
- A hierarchical file system
- A text processing and document preparation facility
- A system for controlling and tracking document and source code changes.

For more information about IX/370, see *IX/370 General Information Manual*, GC33-6208.

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<sup>1</sup> UNIX is a trademark of AT&T Bell Laboratories.



# Chapter 3. The Application Environment

# The Application Environment

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## Extending the Application Capability of VM/SP

This chapter describes some solutions that can help you extend the application capability of VM/SP to meet your daily office needs.

### The IBM Professional Office System

The IBM Professional Office System (PROFS) can help you manage all of your office and administrative tasks. PROFS also helps you manage your most valuable resource—your time.

PROFS is designed to help:

- Executives,
- Managers,
- Secretaries,
- Technical personnel, and
- Clerical personnel

perform daily office jobs.

Major PROFS tasks include:

- Processing calendars
- Adding automatic reminders
- Opening mail
- Processing notes and messages
- Preparing documents
- Proofreading notes and documents
- Searching for documents.

You'll find PROFS a good solution to help you meet your daily office needs.

For more information about PROFS, see *Introducing the Professional Office System*, GH20-6795.

## DisplayWrite/370

DisplayWrite/370 is a licensed program that provides word processing functions for end users. It is designed to work with PROFS Version 2 Release 2, on VM/SP or VM/SP HPO.

DisplayWrite/370 includes a full-screen, interactive text editor/formatter that provides basic and advanced text functions for document creation and revision. The text editor/formatter supports the IBM 3270 Information Display System<sup>2</sup> and the IBM 3270-PC display terminal. In addition, DisplayWrite/370 provides multi-language linguistic support for automatic hyphenation, spelling verification, and spelling correction assistance.

DisplayWrite/370, operating as a VM/SP application, can be invoked by any VM/SP application or from the CMS command line.

DisplayWrite/370 is easy-to-learn and easy-to-use, even for end users who are unfamiliar with text processing.

For more information about DisplayWrite/370, please contact your IBM marketing representative.

## The Structured Query Language/Data System

The Structured Query Language/Data System (SQL/DS) is a relational data base management system designed for both end users and data processing professionals. SQL/DS makes it possible for any user to access data in interactive and non-interactive systems.

SQL/DS improves the productivity of people who work with data. This is done by:

- Requiring minimum planning
- Requiring minimum skills
- Reducing program maintenance caused by changes in data arrangement.

SQL/DS simplifies the task of handling data. It is designed to be easy to install and use. SQL/DS provides facilities for querying data, manipulating data, and writing reports. It also contains data recovery and data security measures.

The language used to handle the data is called the Structured Query Language (SQL). SQL is easy to use, not only for programmers, but also for personnel who are not involved with data processing.

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<sup>2</sup> The term "IBM 3270 Information Display System" refers to the family of IBM 3270-type display stations.

## The Application Environment

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SQL/DS presents data in a tabular form. All data appears in simple row and column format. For example:

SERIAL	NAME	DEPT.	TELEPHONE
<hr/>			
111	BAKER, A.	ABCD	1111
222	JONES, B.	EFGH	2222
333	SMITH, C.	IJKL	3333

**Figure 7. A sample SQL/DS table with three rows and four columns**

You'll find SQL/DS a good solution to help you meet your end use, application programming, administration, and computer operations needs.

For more information about SQL/DS, see *SQL/Data System General Information for VM/System Product*, GH24-5064.

## Application System

Application System (AS) is a powerful software product that puts information at users' fingertips to help them make decisions and turn their decisions into action. (See Figure 8 on page 26.)

With AS, users can:

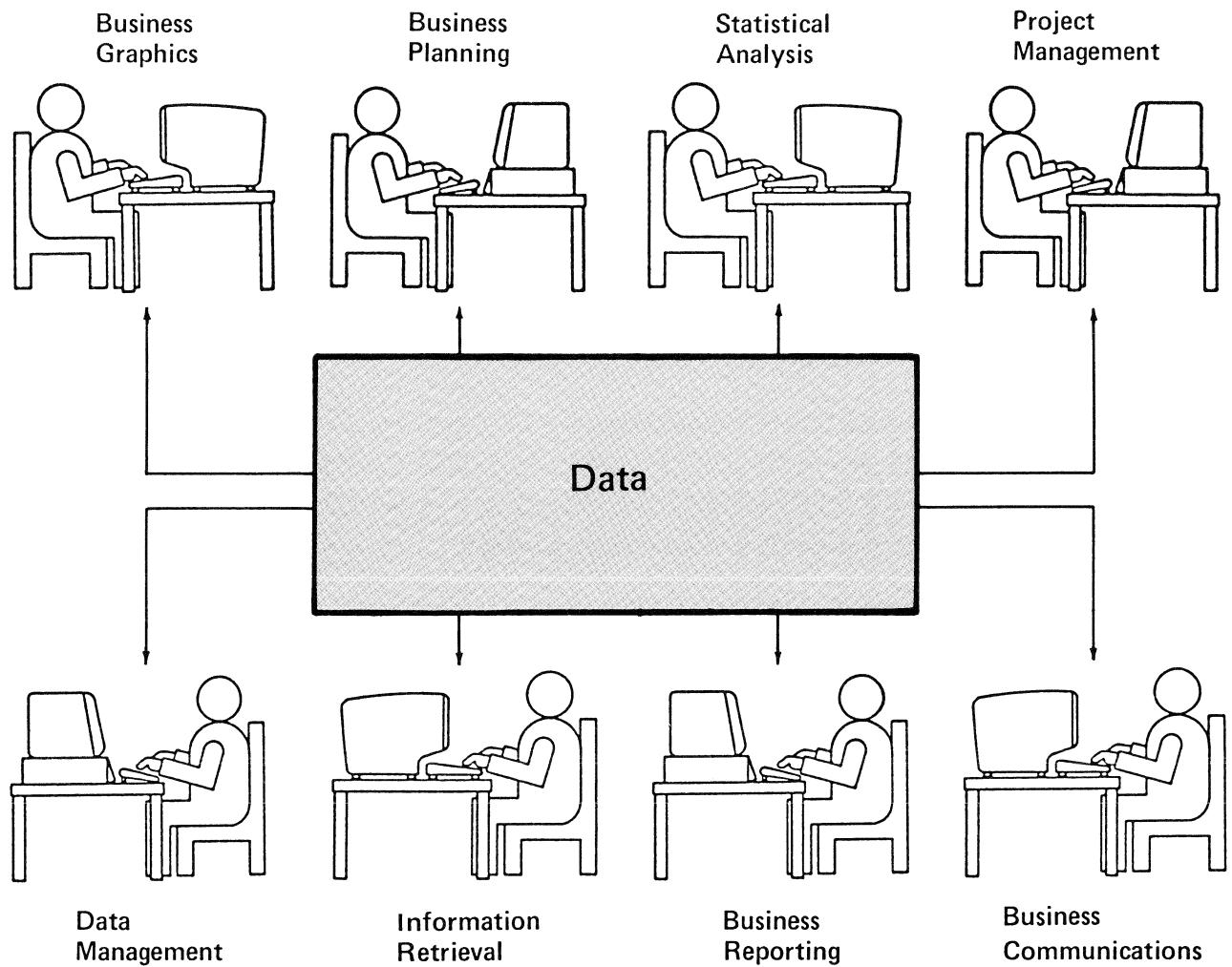
- Gather facts and store them as data
- Organize data in the way it is needed
- Find and extract information
- Analyze the information
- Communicate information
- Update the information as needed.

It is useful to think of AS as many integrated sets of business and data processing tools.

Tools for:

- Data management
- Information retrieval
- Business reporting
- Business communications
- Project management
- Statistical analysis
- Business planning
- Business graphics.

# The Application Environment



**Figure 8. You can think of AS as many sets of tools**

No matter how familiar users are with computers, they can quickly use AS to become more productive. Inexperienced users will find that AS guides them step by step, with help provided if it is needed. Experienced users will find that AS has the breadth and depth of function that they need, when they need it.

When you have AS on your VM system:

- The SQL interface allows users to read, write, and update SQL/DS data bases from within AS.
- The PROFS interface allows users to file and electronically mail final form documents produced in AS.

As you can see, AS is a software product that benefits many kinds of users—managers, secretaries, programmers, specialists, or any other

business professional. AS can help all the users in your organization work together effectively.

For a complete list of AS publications, see *The AS Library*, GH45-5001.

## **The Information Facility**

The Information Facility (TIF) is an interactive program, running in the VM/CMS environment, that enables users to manage information and create applications. Its users can have little or no data processing knowledge:

- Secretaries,
- Clerks,
- Managers,
- Programmers,
- Engineers, and
- Scientists might all be TIF users.

TIF has many uses. For example, there are a number of routine tasks that end users can perform with TIF:

- Storing their own data or accessing existing data
- Reviewing, updating, deleting, and adding to the data
- Producing reports or charts from the data.

Any of these can be done easily with TIF menu and prompt screens. Figure 9 on page 28 shows the TIF Home Menu, the screen where beginners choose what they want to do.

# The Application Environment

```
S$SCRN4.1          TIF HOME MENU          03/03/86 10:53:13
                                         In Execution =
1 Define a table
2 Build, update, or review a table
3 Prepare a report or chart from a table
4 Run a saved "Build, Update, or Review"
5 Run a saved report or chart
6 Miscellaneous functions

1=Help   2=Last message   3=End Execution   4=
7=       8=Last command   9=End TIF         10=
                                         5=           6=
                                         11=End TIF   12=

MENU SELECTION or COMMAND ===>
```

Figure 9. The TIF Home Menu

TIF is also a tool for a more advanced task: creating an application system. An application system is a combination of the applications that TIF generates when you ask to manipulate data or produce a report or chart. An application system can have its own menu screen from which the applications are selected. Users of the system need not be aware of TIF at all.

TIF was designed with ease-of-use in mind. It comes with two sets of menu and prompt screens: one for beginning users and the other for experienced users. Experienced users can also customize all of TIF's menu, prompt, and help screens.

TIF has extensive help information. Moreover, if users make a mistake on a prompt screen and get an error message, TIF offers help information for the message.

You'll see that TIF is easy to use, that it makes data shareable and secure, and that it lets you customize screens, reports, and charts, and even connect them into application systems. All of these features help make TIF a complete and attractive information-management and application-creation system for your installation.

For more information about TIF, see *The Information Facility: General Information*, GC26-4198.

---

## Program Development

In addition to the licensed programs discussed above, there are many more applications available that can enhance your VM/SP system. Some are designed for programmers, while others are designed for people with little or no data processing experience.

This section discusses some facilities and licensed programs that were designed to provide additional application capability for your VM/SP users. These applications run under CMS. Although not all facilities and licensed programs that run on VM/SP are discussed, those included provide a good sample of the different types of applications that are available. They are grouped according to the environment in which they can be used:

- Application development
- Engineering/scientific
- Office, text preparation, and graphics
- Data base administration.

Use of the programs is not restricted to the environment under which they are discussed. For example, FORTRAN is used in the application development environment as well as the engineering/scientific environment under which it is discussed.

### The Application Development Environment

If your end user environment is *application development*, the following may be useful to you:

- Assembler
  - is a low-level, symbolic language that gives your system programmers more program control than using high-level languages.
- Display Management System for CMS (DMS/CMS)
  - helps your installation design, program, and use displayed panels in an interactive environment.
- Interactive System Productivity Facility (ISPF)
  - manages and controls dialogs (interactive applications) and users during a terminal session.
- OS/VS COBOL
  - is an English-like, business-oriented programming language that provides advanced programming facilities to reduce program development time, thus increasing programmer productivity.

# The Application Environment

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- PL/I  
is a powerful, general-purpose programming language that helps solve both scientific and business problems.
- Restructured Extended Executor language (REXX)  
is an easy-to-use, high-level programming language that can be used to write CMS EXEC procedures or programs.

## The Engineering/Scientific Environment

If your end user environment is *engineering/scientific*, the following may be useful to you:

- VS FORTRAN  
is a mathematically-oriented high-level programming language, useful for applications ranging from simple problem-solving to large-scale numerical systems using optimization techniques.
- FORTRAN Interactive Debug  
runs under CMS and enables users to debug FORTRAN programs conversationally.
- IBM BASIC  
is an easy-to-use, problem-solving language that lets users write programs in English-like statements.

## The Office, Text Preparation, and Graphics Environment

If your end user environment is oriented toward *office, text preparation, and graphics* tasks, the following may be useful to you:

- Document Composition Facility (DCF)  
helps people who have little text formatting experience produce many kinds of formatted documents, such as specifications, manuals, or proposals.
- Graphical Data Display Manager (GDDM)  
is used for graphic applications by several graphic and non-graphic IBM licensed programs, such as the Interactive Chart Utility.

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## The Data Base Administration Environment

If your end user environment is oriented toward *data base administration*, the following may be useful to you:

- Cross-System Product/Application Development (CSP/AD)  
is an application generator used to define and execute applications.
- Structured Query Language (SQL)  
is the language that handles data for the SQL/DS data base.
- Query Management Facility (QMF)  
provides an easy-to-use, interactive means of accessing and manipulating data in a SQL/DS data base.

For more information about programs that run on VM/SP, see:

- *Software Directory*, GB21-9949
- *The Software Catalog*, G320-6531
- *IBM Engineering and Scientific Application Programs Available from Non-IBM Sources*, G320-6739
- *VM Application Programs Available from Non-IBM Sources*, GY33-6951.



## Chapter 4. Connectivity

# Connectivity

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## Communication Facilities

This chapter describes some facilities that can help you expand your communication capability under VM/SP.

### Transparent Services Access Facility

The Transparent Services Access Facility (TSAF) is a facility that allows users access to local or remote server virtual machines within a collection of VM systems.

TSAF provides your installation with the following:

- Advanced Program-to-Program Communication/VM (APPC/VM)
  - which is the program interface.
- The TSAF virtual machine
  - which provides VM to VM communications capability over Binary Synchronous Communication (BSC) lines or Channel-to-Channel (CTC) connectors.
- CP System Services
  - which allow TSAF to communicate with CP.

TSAF provides the following benefits to your VM/SP system. It:

- Makes more data available to your system
- Is easy to program
- Is easy to install
- Is easy to operate
- Is easy to use.

## The APPC/VM Function

APPC/VM is a means of communication between two virtual machines. It is an interface that allows users to:

- Establish and sever paths
- Send and receive messages
- Determine the presence of and describe pending messages.

APPC/VM, with the TSAF virtual machine component, provides these services within a single system and throughout a collection of VM systems.

## The TSAF Virtual Machine

The TSAF virtual machine handles communication between systems by allowing APPC/VM paths to span more than one system. Each system must have its own TSAF virtual machine. The TSAF virtual machine runs on CMS, but is controlled by using TSAF commands. It communicates to other VM/SP systems via BSC or CTC connection. Figure 10 shows TSAF running in two VM/SP systems.

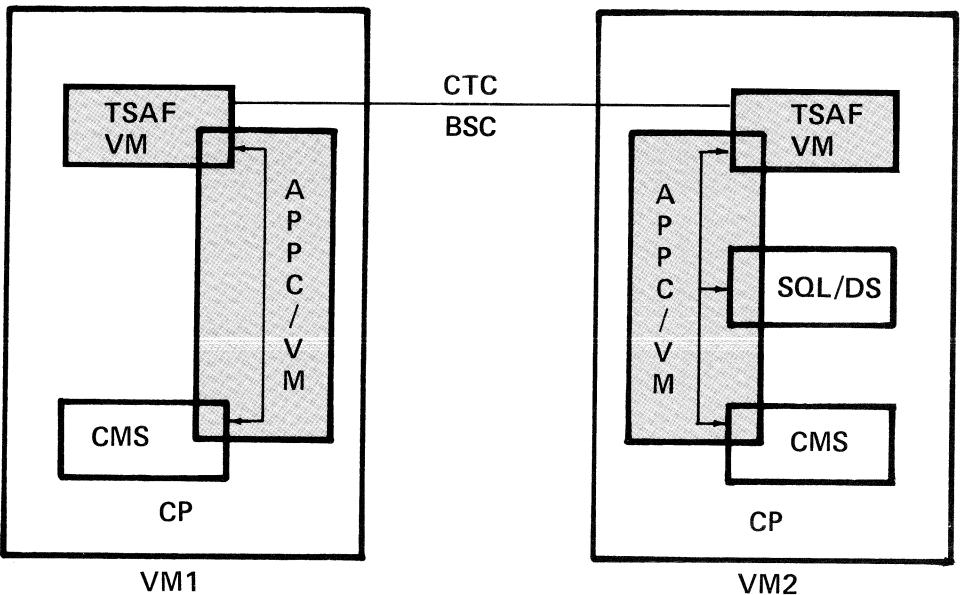


Figure 10. TSAF Running in Two VM/SP Systems

For more information about TSAF, see *VM/SP Transparent Services Access Facility Reference*, SC24-5287.

# Connectivity

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## IBM System/370 to IBM Personal Computer Enhanced Connectivity Facilities

The IBM System/370 to IBM Personal Computer Enhanced Connectivity Facilities (Enhanced Connectivity Facilities) enable work stations (for example, IBM Personal Computers) and IBM host mainframe computers to work together. For data processing management, Enhanced Connectivity Facilities offer:

- A consolidated host attachment solution to which work stations can connect and use IBM-supplied Value-Added programs, user-written applications, and independent software vendor programs
- Applications shielded from work station-to-host communication layers
- A simple method to distribute work station data and host data to work station applications.

For application programmers, Enhanced Connectivity Facilities offer:

- The Server-Requester Programming Interface (SRPI), which provides a way for work station programs to request services from other operating systems.

For the work station user, Enhanced Connectivity Facilities offer:

- An easy-to-use screen interface with prompts and help facility
- Extended work station resources that exist on the host but are transparent to the user
- Access to any of the host's resources
- A command interface for more experienced work station users.

For more information about Enhanced Connectivity Facilities, see *Introduction to IBM System/370 to IBM Personal Computer Enhanced Connectivity Facilities*, GC23-0957.

## Advanced Communications Functions for the Virtual Telecommunications Access Method

Advanced Communications Function for the Virtual Telecommunications Access Method (ACF/VTAM), running under GCS, allows VM/SP to function in an SNA network. Following are some benefits that ACF/VTAM support has for VM/SP:

- Other application programs, like Remote Spooling Communications Subsystem (RSCS), can share the SNA network to transmit and receive data.
- ACF/VTAM supports program products, such as NETVIEW, that help manage communications networks.
- VM/SP users can use SNA networks to reach other VM/SP systems and ACF/VTAM application programs running in other processors.
- Terminals that a different ACF/VTAM controls may reach VM/SP and be used as virtual machine consoles.
- ACF/VTAM offers alternate routes from terminals to the processor. These alternate routes can make access to virtual machines or other programs more reliable.
- Error recovery support is improved.

ACF/VTAM provides the following services to your installation:

- Manages network resources (such as lines, controllers, and terminals)
- Lets application programs share resources
- Permits use of resources without specific knowledge of their addresses
- Establishes, controls, and ends data flow between network elements, like programs and terminals
- Helps data move smoothly through the network
- Lets the ACF/VTAM operator monitor and alter the network
- Lets your installation change an active network's configuration
- Helps find and fix network problems.

ACF/VTAM can also be part of a network that is made up of more than one ACF/VTAM network and more than one processor.

For more information about ACF/VTAM, see *VM/SP ACF/VTAM General Information*, GC23-0108.

# Connectivity

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## Remote Spooling Communications Subsystem Networking

Remote Spooling Communications Subsystem (RSCS) Networking is a system that runs on GCS. RSCS uses the spooling facilities of VM/SP to store and retrieve data.<sup>3</sup> VM/SP handles data transfer *within* its system via spooling. RSCS extends VM/SP's spooling capabilities, handling data transfer *between* its VM/SP system and outside sources.

RSCS is a subsystem that can:

- Handle data being sent to, from, or through
  - Its own VM/SP system
  - Another VM/SP system
  - A VM/SP HPO system
  - An MVS system
  - A VSE system
- Store and retrieve input and output data files on the VM/SP system spool
- Use communications equipment to transfer data between its VM/SP system and remote users, devices, and other systems.

RSCS can move your business data between your system and its users, wherever they are. Users can send jobs to the system from off-site locations. RSCS gets the jobs for the system, then sends them on for processing – to its own VM/SP system or to another system. When processing is done, RSCS, if requested, returns the results. RSCS can send output files to printers it controls, to system-controlled printers, or to other systems, as directed by users.

What all of this means to you is flexibility – flexibility in the number and use of your resources. Your resources can be located anywhere – depending on the needs of your business and convenience to users. If users are remote from the system, RSCS handles the movement of data between the system and those remote resources. It also means greater efficiency – remote resources, like local resources, can be shared among several users.

For more information about RSCS, see *VM/SP Remote Spooling Communications Subsystem Networking Version 2 General Information*, GH24-5055.

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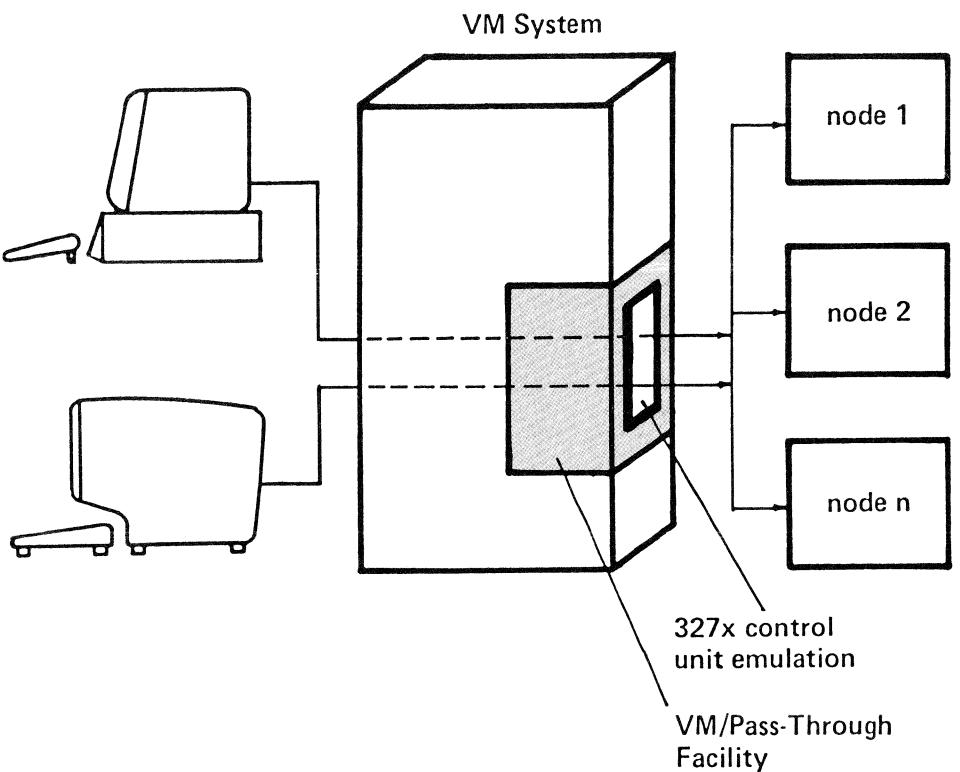
<sup>3</sup> The VM system spool is an auxiliary storage area used to hold data temporarily – input data awaiting processing and output data after processing. Data resides on the spool in units called spool files.

## VM/Pass-Through Facility

The VM/Pass-Through Facility (Pass-Through) allows VM users to interactively access remote system and processor nodes. These can be remote IBM 4300 processors, other VM systems (with or without this facility installed), or System/370-compatible non-VM systems. Pass-Through users interact with the target node as though their 3270 display stations are directly attached to that system.

*Note:* The term "3270 display station" is a generic term that encompasses the family of IBM 3270 Information Display System display stations. Refer to *VM/SP VM/Pass-Through Facility General Information*, GC24-5206, for a more definitive list of supported devices.

Figure 11 shows the Pass-Through access path.



**Figure 11. Accessing Remote Systems Through VM/Pass-Through Facility**

Pass-Through provides the following services to your installation:

- Attachment of IBM 3270 display stations to selected nodes
- Attachment of IBM 3270 Information Display System printers to target non-Pass-Through systems
- Routing information among distributed Pass-Through nodes.

## Connectivity

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Pass-Through is a communications vehicle which will give your VM users the capability of interactive access to other systems.

For more information about Pass-Through, see *VM/SP VM/Pass-Through Facility General Information*, GC24-5206.

# Chapter 5. Configuration

### Processors and Devices that Work with VM/SP



VM/SP runs on all System/370 architecture processors that are currently available from IBM. And it supports most of the currently available terminals, transmission control units, direct access storage devices, magnetic tapes, printers and printer subsystems.

Your IBM marketing representative can give you a complete list of the processors on which VM/SP can run and the devices that can currently work with VM/SP.

---

## Virtual Machine and Hardware Considerations

When determining the system configuration needs for your installation, consider the following virtual machine characteristics:

- Size of the virtual machines
- Configuration of the virtual machines
- Operating systems that users will run in the virtual machines
- Types of jobs that users will run in the virtual machines.

Also consider the system configuration that you have installed or will be installing. This includes:

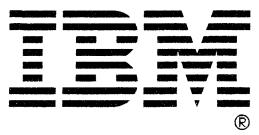
- Processor type and model
- Amount of real storage
- Number of channels
- Number and type of DASD devices
- Number and type of input/output devices.

The information that you need to accurately assess the system configuration for your installation is not listed here. Your IBM marketing representative can help you plan the best configuration for your installation.

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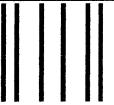
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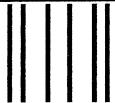
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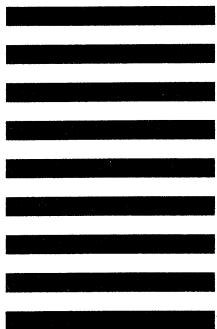
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