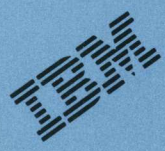
Customer Center

IBM 9370 Information System Performance Perspective Presentation Guide

IBM Confidential



IBM 9370 Information System Performance Perspective Presentation Guide

IBM Confidential
ZZ60-2879

Preface

The purpose of this presentation is to demonstrate the high performance levels of the IBM 9370 Information System in representative environments where it is being marketed and to position the product performance against other IBM systems and competitive products.

This presentation is intended to be used as part of the branch announcement package, but can be used as a standalone presentation to IBM audiences (classified IBM Confidential). Excluding the IBM Confidential foils, it can be used by IBM marketing and systems engineering personnel for tailoring unique presentations of IBM 9370 Information System's performance.

Please review the presentation and tailor it to meet your local requirements.

This presentation contains, among other things, data relating to the performance capabilities of various competitive products. This information, with the exception of Foil 18 which contains publicly available competitive data, is not intended for use in customer presentations or in any other non-IBM context.

While the data pertaining to performance is believed to be correct, it should be understood that there is no guarantee that the same or similar results could be obtained in other environments.

This performance data, unless otherwise noted, was determined by IBM in a controlled environment and, therefore, the results, which may be obtained in other operating environments, may vary significantly.

First Edition (September 1986)

Changes are periodically made to the information herein; any such changes will be reported in subsequent editions.

References in this publication to IBM products, programs, or services do not imply that IBM intends to make these available in all countries in which IBM operates.

You may communicate your comments about this publication, its organization or subject matter with the understanding that IBM may use or distribute whatever information you supply in any way it believes appropriate without incurring any obligation to you. Address your comments to IBM Corporation, Department 63W, 1133 Westchester Avenue, White Plains, New York 10604.

Contents

Introduction 1

IBM 9370 Information System Performance Perspective – Narrative 3

Foil 1. IBM 9370 Information System: The Balanced Performer 5
Foil 2. IBM 9370 Information System: Attributes 5
Foil 3. IBM 9370 Information System: Performance Measurement 5
Foil 4. IBM 9370 Information System: The Balanced Performer Views 6
Foil 5. System/370 Compatible Growth 6
Foil 6. System/370 Entry Price Performance 7
Foil 7. System/370 Entry and Mid-Range Performance – The Balanced Performers 7
Foil 8. IBM 9370 Information System: Distributed/Departmental Environments 8
Foil 9. IBM 9370 Information System: Application Description – VM Interactive 9
Foil 10. IBM 9370 Information System: VM Interactive – Application Development 9
Foil 11. IBM 9370 Information System: Application Description – VM/PROFS 9
Foil 12. IBM 9370 Information System: Office Workload Environment – VM/PROFS 10
Foil 13. IBM 9370 Information System: Application Description-RAMPC 10
Foil 14. IBM 9370 Information System: Representative Competitive RAMPC Commercial Interactive 10
Foil 15. IBM 9370 Information System: Compute-Intensive Environment 11
Foil 16. Characteristics of Compute-Intensive and Commercial Environments 11
Foil 17. IBM 9370 Information System: Application Description – Compute-Intensive 12
Foil 18. IBM 9370 Information System: Compute-Intensive Performance Comparison – LINPACK Full Precision 12
Foil 19. IBM 9370 Information System: Whetstone Benchmark 12
Foil 20. IBM 9370 Information System: Whetstone Analysis – Single Precision Compute-Intensive Environment 13
Foil 21. IBM 9370 Information System: Compute-Intensive Performance Positioning Guide 13
Foil 22. IBM 9370 Information System: Versatility and Balanced Performance 14

Appendix A. IBM 9370 Information System Performance Perspective – Foils A-1

Introduction

Objective

The objective of this presentation is to demonstrate the high performance levels of the IBM 9370 Information System in representative environments where it is being marketed and to position the product performance against the other IBM systems and competitive products.

Audience

This presentation is intended for IBM branch and area marketing and systems engineering personnel and management. It is designed to be part of the Branch Announcement Package for the IBM 9370 Information System.

Presenter

The presenter should be familiar with IBM 4361 and 4381 Systems and System/370 architecture and major competitors in the low-end distributed and departmental System/370 marketplace.

Time required

The estimated time to give this presentation is 20-30 minutes, depending upon audience participation. Anticipate the larger number due to extensive examples shown and excellent performance levels for this product.

Preparation

This presentation requires a foil projector. It is also suggested that the presenter use a room where the audience is close to the screen due to the large amounts of data on the foils.

Notes to the presenter

On the IBM 9370 Information System announcement day, this presentation should be given after completion of Product Excellence, Strategy, and Positioning presentations.

This presentation is classified IBM Confidential due to the classification of some foils (Foil 14, 20, and 21) that contain competitive information.

Prior to Foil 1, show the General Information disclaimers relating to the performance data in this presentation. These disclaimer paragraphs are as follows:

This presentation contains, among other things, data relating to the performance capabilities of various competitive products. This information, with the exception of Foil 18 which contains publicly available competitive data, is not intended for use in customer presentations or in any other non-IBM context.

While the data pertaining to performance is believed to be correct, it should be understood that there is no guarantee that the same or similar results could be obtained in other environments.

This performance data, unless otherwise noted, was determined by IBM in a controlled environment and, therefore, the results, which may be obtained in other operating environments, may vary significantly.

IBM 9370 Information System Performance Perspective – Narrative

Foil 1. IBM 9370 Information System: The Balanced Performer

The IBM 9370 Information System Processors are truly balanced performers. They are able to perform exceptionally well with both commercial and compute-intensive workloads, as well as in different computing environments.

The ability of the IBM 9370 to accommodate multiple workloads makes it an ideal single architectural solution for implementation in large distributed networks, especially those environments with anticipated:

- Need for System/370 affinity
- Requirements for growth
- Changes in application mixes

The IBM 9370 Information System Processors also show balance in the varied computing environments.

Foil 2. IBM 9370 Information System: Attributes

The IBM 9370 Information System achieves new flexibility of use as a result of system attributes that enable expanded application justification and significantly reduce total system costs. These attributes include:

- Physical Size
  - Compactness
  - Integrated Input/Output Units (I/O)
- Reduced Environmental and Operating Costs
  - Minimize use of power, air conditioning, and space
- Reduced Systems Costs
  - New levels of price/performance
  - Low maintenance costs
  - New Graduated Charges software licensing option
- Implementation Enhancements
  - VM/IS software offering
  - Remote Systems Programming Support
- Configuration Flexibility
  - Open system design via integrated and external I/O
  - Connectivity to non-IBM systems/devices

With these capabilities, the IBM 9370 Information System Processors can perform in a variety of application environments.

Foil 3. IBM 9370 Information System: Performance Measurement

There are a variety of IBM 9370 Information System uses in numerous customer environments. Capacity sizing and performance issues are important considerations for both customers and IBM'ers. Consideration must be given to:

- Current and projected workload requirements: Sets minimum systems criteria and identifies potential upgrade requirements
- Response time requirement for productivity: Establishes a common performance threshold to equalize system evaluation

- Number of active terminals to be supported: Focuses performance measurements on the number of users that are active during a given time versus the number of logged on, or supported, or the number of terminals that can be physically attached.
- The relevancy of workload examples being compared: Performance results or ratios in one environment, such as half precision compute-intensive, do not necessarily hold true in other environments, such as commercial interactive or full precision compute-intensive.

For end-user satisfaction and productivity, performance expectations are an important consideration.

Foil 4. IBM 9370 Information System: The Balanced Performer Views

To better understand and demonstrate the capabilities of the IBM 9370 Information System series, we will view this new entry System/370 product line from three vantage points: The System/370 tradition, the new application uses, and the growing compute-intensive workloads.

First, we will view the IBM 9370 Processors in light of System/370 tradition in entry level systems, namely:

- The System/370 family characteristics
- The new levels of price/performance
- The expanded performance range over entire series
- The increased levels of balanced performance.

Secondly, we will compare the 9370 to other IBM and competitive systems as an application solution for distributed and departmental end-user implementation:

- VM/CMS interactive application development
- VM PROFS application
- A comparison of competitive offerings in commercial interactive

Finally, as we compare the 9370's capabilities in a compute-intensive environment, we will see results from independent benchmarks, as well as IBM internal comparisons using representative customer environments.

Foil 5. System/370 Compatible Growth

The IBM 9370 Information System joins the rest of the System/370 family of processors, which range in power from the smallest IBM 9370 model at the low end to the 3090 Series at the high end, a range of performance of over 1:100. This performance range is one of the largest of any computer architecture in existence.

Like the other System/370 family members, the 9370 represents a variety of technological implementations of the base System/370 architecture while using common system attributes and software. With its four models, the IBM 9370 meets the application needs of multiple user environments and enhances our customers' investment in System/370's application and systems programming due to the portability and compatibility with other members of the System/370 family.

As one of IBM System/370 processors, the new IBM 9370 allows for compatible software growth from the smallest 370 system to the largest. This compatibility spans both application code and most of the System Control Program operating environments. The new Graduated Charges software licensing option allows VM and VSE operating systems and more than 90 related software packages to be priced according to host processor size.

Foil 6. System/370 Entry Price Performance

Like its predecessor products at the entry level of the System/370 product line, the IBM 9370 series continues the ever-improving level of price performance. Since the introduction of the IBM 4300 series in 1979, the price performance ratios of subsequent iterations and new models have greatly improved via reduced product costs and increasing levels of performance. These improvements result from implementations of new technologies and packaging techniques, and have led to placing applications closer to the ultimate end-user or work group.

Note that the slope of this improvement is greater for compute-intensive workloads due to the incorporation of software assists, microcode enhancements and special hardware features.

Taking inflation into account, the cost of an IBM 9370 Information System Processor is less than 20 percent of the equivalent processor power in 1979.

Foil 7. System/370 Entry and Mid-Range Performance – The Balanced Performers

The performance range of the entry System/370 product families has improved over the years, offering and expanding potential for increased growth.

The IBM 9370 Information System extends the low end System/370 performance coverage to provide better granularity with the smaller models of the IBM 4381 processors.

In addition, the performance range from smallest to largest models, within the IBM 9370 System series, is expanded to a ratio of greater than 1:5, that is larger than any previous entry System/370 products, and spans both commercial and compute-intensive modes of operation. These attributes provide a computing capability ideally suited as a single architectural solution for most organizations, especially those application environments that are highly susceptible to growth in volumes and changes in application mixes.

Besides the value that accrues to an asset having a variety of uses, there are significant economies resulting from the support of a single architectural solution for large distributed environments; namely, in support personnel and network management software.

This provides a flexible, vertical growth alternative to the clustering approach of other system architectures.

Foil 8. IBM 9370 Information System: Distributed/Departmental Environments

The price and performance range of the IBM 9370 series, when combined with its compact size, minimum use of environmentals, the new Graduated Charges software licensing option, and Remote Systems Programming Support for the VM/IS software offering, is an exceptional vehicle for expanded use at the departmental application level. In addition to its use as a departmental system, it becomes an ideal organization-wide distributed solution if other host Data Processing resources have a strong System/370 affinity and compatibility.

It offers high levels of function and performance at a relatively low price, maintenance, and overall operating cost.

The IBM 9370 Information System remote facilities suit it for use as a distributed system. Programs in VM and VSE operating environments provide remote IMPL, automated operation, and remote data transmission capabilities.

Coupled with easy-to-install software packages, like VM/IS Base, and the new Graduated Charges software licensing options, the IBM 9370 System is a solution for budget-conscious customers who cannot sacrifice function or performance.

Foil 9. IBM 9370 Information System: Application Description – VM Interactive

A representative example of the distributed/departmental implementation in a commercial interactive environment would be a VM/CMS workload portraying the Data Processing Professional activities. It was developed from customer survey data and consists of APL computations, and programs that assemble/compile and execute COBOL, PL/1, BASIC, FORTRAN, and ASSEMBLER, as well as creation and editing of files, and user interchange using messages and notes.

The performance data to be shown is expressed in numbers of active users and will include the IBM 9370 and 4381 series of processors at 70 and 90 percent CPU utilization, and at external response time ranges for the measured IBM 9370 Systems averaging from 1 to 1.4 seconds (at 70 percent) and 1.5 to 2.0 seconds (at 90 percent).

Foil 10. IBM 9370 Information System: VM Interactive – Application Development

As reflected in the results displayed, in end-user and work-group environments, the IBM 9370 Information System and 4381 Processors provide powerful application solutions in support of a broad range of interactive users and diverse application complexities, given application environments with the traits demonstrated by the workload referenced.

The large numbers of users supported are **active** users (presumed continuous use) and not necessarily the number of users that might be supported in a working environment. Users actively working may interact with people and, periodically, may be involved in other non-system activities. Users may actually use the system 50 percent of the time or some other percentage depending upon the application and actual environment. In some cases, the number of "supported" users in these environments could be greater than the numbers shown here.

In addition, the response time data referenced presumes to be locally attached workstations and is measured at the end-user level (internal response time plus estimated line time of .25 seconds).

Foil 11. IBM 9370 Information System: Application Description – VM/PROFS

The IBM 9370 Processors can be a powerful tool in the office environment. A representative workload would be a Professional Office System (PROFS)/DisplayWrite profile. It is reflective of common administrative functions performed by diverse end-users in differing application areas.

The PROFS workload referenced has been designed such that in one hour each active user in this office environment creates and files one DisplayWrite document, creates, sends, and files five notes, updates the calendar twice, and opens the mail twice.

The results displayed are in numbers of active users and reflects CPU utilization of 70 and 90 percent, and ranges of average response time for the measured IBM 9370 Processors from 1.3 or 1.8 seconds (at 70 percent) and 2.5 to 2.7 seconds (at 90 percent).

Foil 12. IBM 9370 Information System: Office Workload Environment – VM/PROFS

Given the results shown here, the IBM 9370 Information System and 4381 Processors can support a broad range of professional and administrative personnel and handle departments from the very small to large entities. As of this time, exact benchmark data for this particular profile is not available for the IBM 9370 System Model 90, at 90 percent CPU utilization and the 4381 Processors, Model Groups 12, 13, and 14, at both 70 and 90 percent CPU utilization.

Foil 13. IBM 9370 Information System: Application Description – RAMPC

One vehicle used by IBM for comparing system performance is a measurement workload called RAMPC. It is an interactive COBOL-written commercial synthetic application used by IBM to compare computer systems (both IBM and non-IBM) with differing architectures. It is a measurement workload developed specifically to evaluate and compare systems, and is not representative of a specific customer environment. It represents an environment typically more comprehensive than most customer environments. With System/370 architectures, it uses VSE as the System Control Program and CICS as the Data Communications Facility.

The performance data displayed is in numbers of active users supported given the same 70 percent CPU utilization and average response times across measured systems varied from 1.9 to 2.5 seconds for IBM 9370 Processors.

Foil 14. IBM 9370 Information System: Representative Competitive RAMPC Commercial Interactive

Using the same RAMPC test workload, the IBM 9370 series compares favorably in performance to other vendor processors with the same processor load and set levels of response time. The analysis used presumes 70 percent CPU utilization. The measured IBM 9370 System average response times range from 1.9 to 2.5 seconds.

In this analysis, note the unannotated solid lines indicate actual tested performance, and the results annotated with an (E) are IBM estimates based upon actual measurements taken on one machine and factored to other machines based upon vendor claims of relative performance.

You should feel confident in your ability to compete and win. Establish a common base of analysis that stresses active versus supported users and response time thresholds. Only then can you evaluate the cost per active user on a common basis of comparison and make an informed choice based on current and projected workloads.

Foil 15. IBM 9370 Information System: Compute-Intensive Environment

As mentioned earlier, in today's business community, there is an increasing demand for data processing systems that can satisfy a wide variety of computing needs. Recent industry trends highlight the growing importance of applications involving mathematical computations, known as compute-intensive applications, to support business decision making. These needs range from spread sheet analyses to econometric modeling, in addition to the traditional compute-intensive applications for scientific and technical disciplines.

The more traditional compute-intensive application users are engineers, scientists, and technicians who perform problem solving in research and engineering disciplines in commercial, educational, and government organizations.

Foil 16. Characteristics of Compute-Intensive and Commercial Environments

Compute-intensive and commercial environments vary greatly.

Compute-intensive workloads have a high content of floating point calculations. These workloads spend most of the computer resources executing instructions in repetitive number-solving loops. These loops require little I/O or interaction with the end-user until the final results are obtained. This results in minimum supervisor services for the operating system.

Commercial workloads tend to contain very little floating point calculations and have more interaction with end-users and online data bases. This results in higher I/O activity, which, in turn, results in a need for more supervisor services.

Given the diverse requirements of these two workload types, one of the greatest strengths of the IBM 9370 Information System is its ability to perform well in both environments.

Foil 17. IBM 9370 Information System: Application Description – Compute-Intensive

One measure of processor computational speed is provided by LINPACK, a benchmark developed by the Argonne National Laboratory. Coded in FORTRAN, the version of LINPACK used here solves dense systems of linear equations using full precision.

These equations are characteristic of many mathematical modeling algorithms used today. They are based on IBM's studies of diverse customer workloads, and represent approximately 70 percent of the compute-intensive workload that exists today. This workload has full precision calculations with accuracy to 14 decimal digits.

Foil 18. IBM Information System: Compute-Intensive Performance Comparsion – LINPACK Full Precision

The IBM Systems Performance Center in Endicott, New York, and Boeblingen, West Germany, executed the LINPACK benchmark on all the IBM 9370 System Processors. The performance ratings are stated in MFLOPS (Millions of Floating Point Operations Per Second), and compare favorably with performance data (not fully verified by IBM) for similar representative competitive systems as published by the Argonne National Laboratory.

Foil 19. IBM 9370 Information System: Whetstone Benchmark

Another measurement of performance frequently used by the industry is the Whetstone, a synthetic benchmark program that serves as a measure of performance in compute-intensive environments. It was developed in the United Kingdom more than a decade ago.

It is not a controlled standard, so many versions are currently in existence. The result is that it is risky to compare Whetstone performance data from different sources.

IBM studies indicate that this type of workload (single precision) represents the other 30 percent of most compute-intensive applications that exist today.

While we believe there are other measurements that are more representative of today's compute-intensive environments, it does appear to be the basis for many performance claims in the industry. For this reason, we do use it internally in IBM. This allows us to better understand the performance information of other manufacturers and vendors.

Foil 20. IBM 9370 Information System: Whetstone Analysis – Single Precision Compute-Intensive Environment

This chart is an example of how a Whetstone analysis can distort the true performance relationship between representative processors, as shown with the IBM 4381 versus the IBM 9370 and DEC VAX[1].

The 4381 was designed to optimize commercial interactive and full precision compute-intensive workload, and to be evaluated properly should be compared in those environments. Whetstone data used here does not reflect that application base.

It is very important that your customer understand his workload requirements in the compute-intensive area because it has a dramatic impact on system performance.

[1]DEC VAX is a product of Digital Equipment Corporation.

Foil 21. IBM 9370 Information System: Compute-Intensive Performance Positioning Guide

In compute-intensive environments, it is important to be able to size the IBM System/370 offerings versus the multitude of representative competitive offerings.

This positioning guide details the performance measurements of the low-end and mid-range processors based on the full precision LINPACK data referenced earlier.

Within the performance ranges of the IBM 9370 or 4381, there is significant opportunity in the "supermini" and intermediate system environments.

Given these performance ranges, it is evident that IBM can successfully compete in this environment and, if required, can confidently benchmark. It is also evident that these results are contrary to some public perceptions about rated MIPS and its relationship to actual throughput.

Foil 22. IBM 9370 Information System: Versatility and Balanced Performance

Today, the IBM 9370 Information System has been viewed from many perspectives. As you have seen, it has:

- Extended the System/370 tradition of balanced performance systems (commercial and compute-intensive workloads); it has a broad range of performance from the smallest to the largest models in the family; and it has full System/370 software compatibility with application and operating system programs.
- The 9370 makes new System/370 inroads and justification in the distributed and departmental end-user application areas due to its compact size, integrated I/O, reduced costs for hardware, maintenance and operating expenses, as well as the new Graduated Charges software licensing option.
- The 9370 makes low end System/370 offerings competitive in both performance and total system cost for both commercial and compute-intensive environments.

With the right focus, emphasis, and resources, the IBM 9370 Information System will be a successful and versatile performer in your territory.

IBM 9370 Information System Performance Perspective – Foils

IBM 9370 Information System Performance Perspective

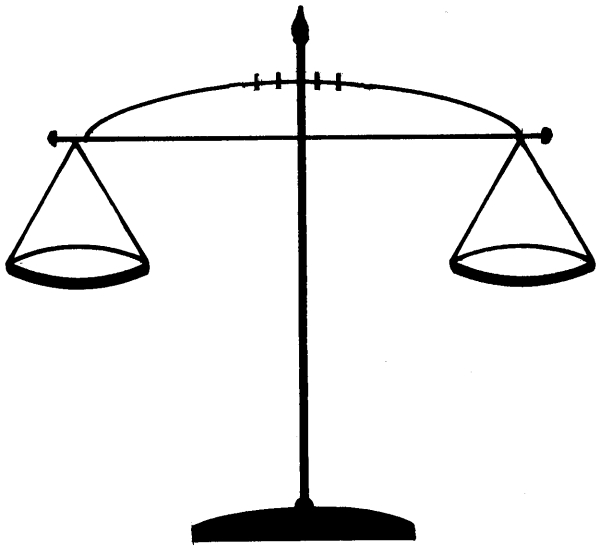
General Information Disclaimer

This presentation contains, among other things, data relating to the performance capabilities of various competitive products. This information, with the exception of Foil 18 which contains publicly available competitive data, is not intended for use in customer presentations or in any other non-IBM context.

While the data pertaining to performance is believed to be correct, it should be understood that there is no guarantee that the same or similar results could be obtained in other environments.

This performance data, unless otherwise noted, was determined by IBM in a controlled environment and, therefore, the results, which may be obtained in other operating environments, may vary significantly.

IBM 9370 Information System: The Balanced Performer



Workloads

- Commercial
- Compute – Intensive
- Mixed

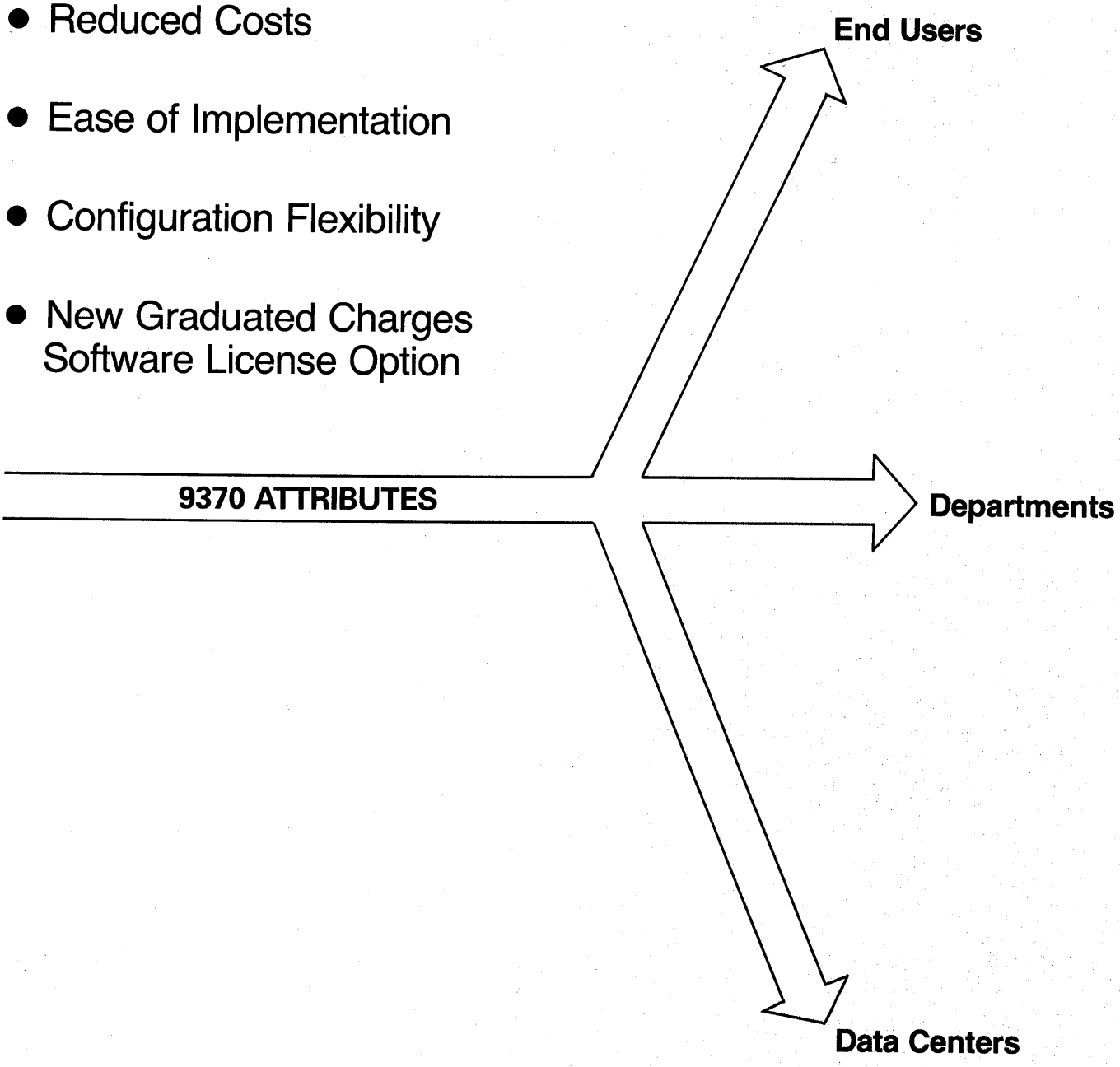
Environments

- Distributed End-User
- Departmental End-User
- Data Center

Foil 1

IBM 9370 Information System: Attributes

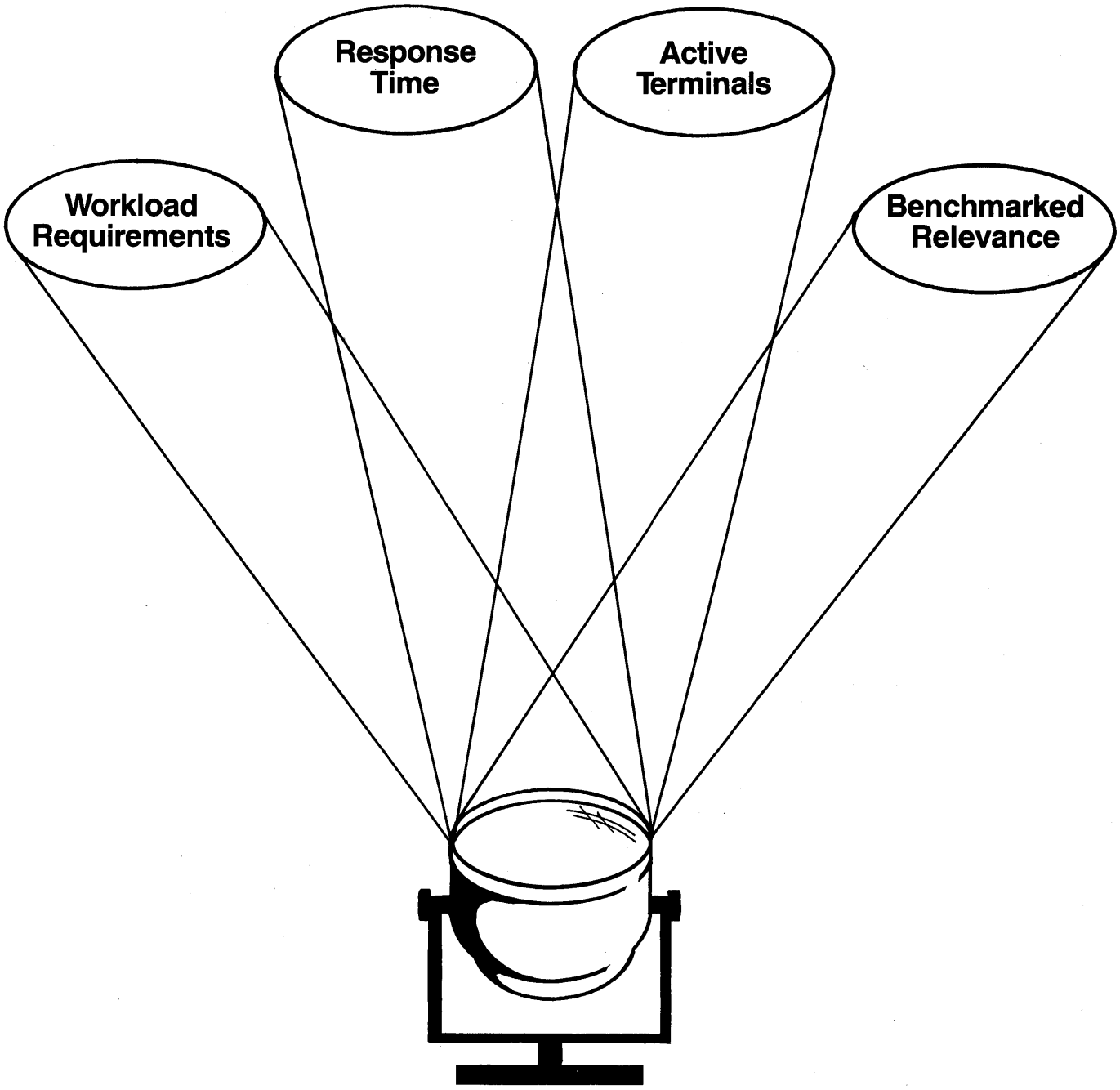
- Physical Size
- Minimum Environments
- Reduced Costs
- Ease of Implementation
- Configuration Flexibility
- New Graduated Charges Software License Option



Foil 2

IBM 9370 Information System: Performance Measurement

Key Considerations



Foil 3

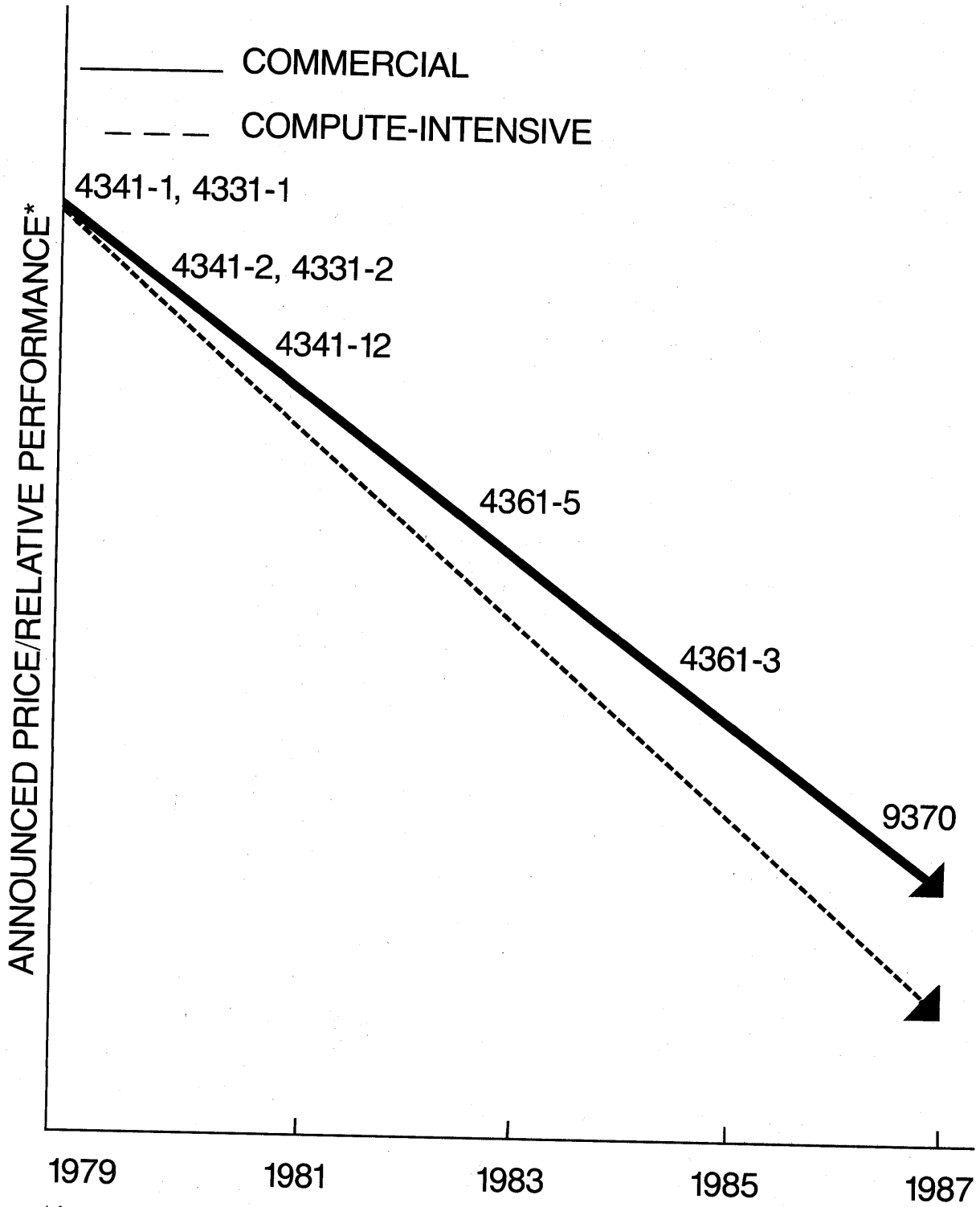
IBM 9370 Information System: The Balanced Performer Views

- System/370 Entry Tradition
  - System/370 Family Characteristics
  - New Levels of Price/Performance
  - Expanded Performance Range
  - Balanced Performance Capability
- The End-User Application Uses
  - VM/CMS Interactive Commercial
  - VM PROFS
  - Commercial Interactive Versus Competition
- Compute-Intensive – Growing New Requirement
  - Independent Benchmarks – IBM versus Competition
  - IBM Internal Benchmarks – IBM versus Competition

Foil 4

System/370 Compatible Growth

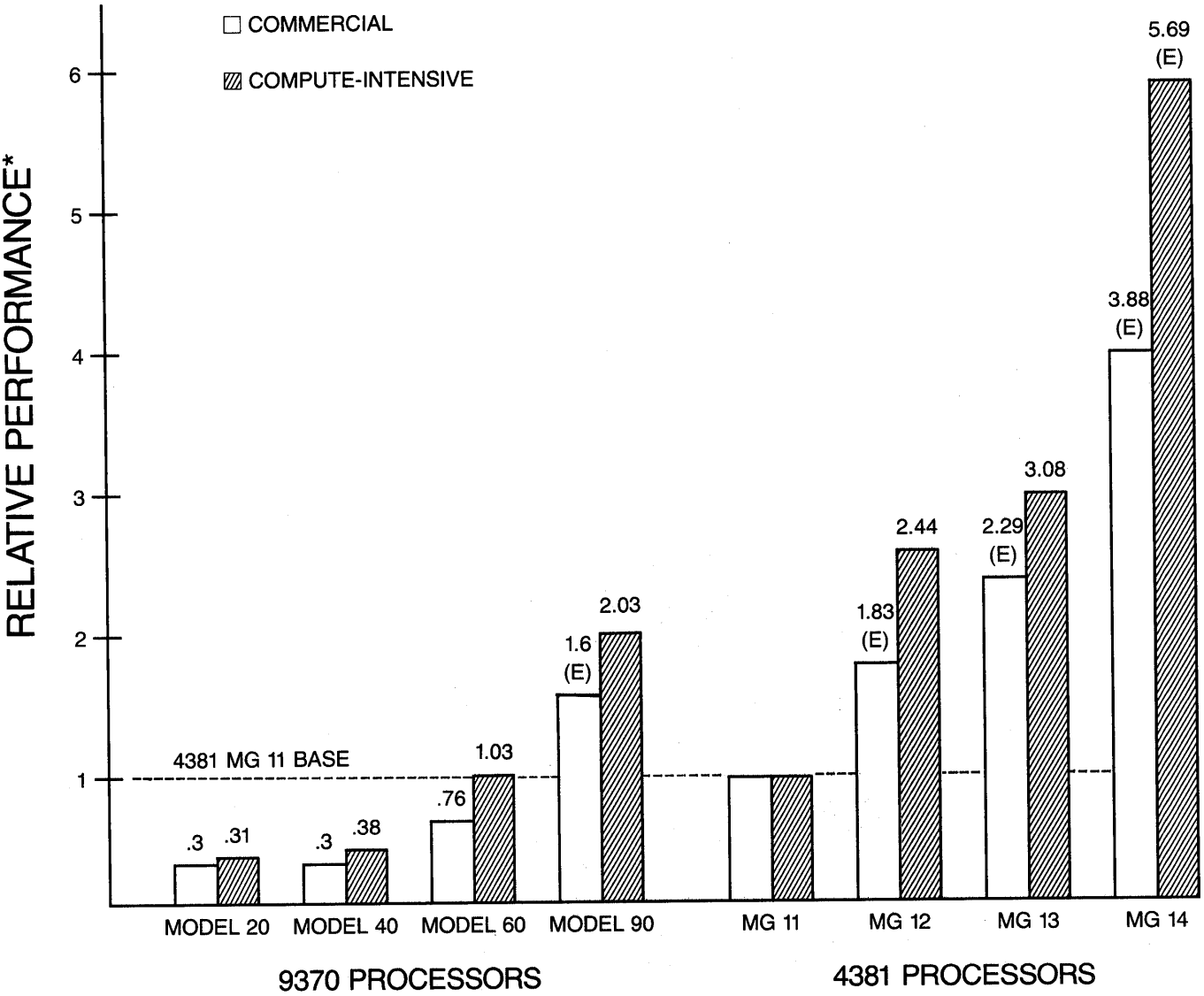
System/370 Entry Price Performance



*Announced price performance based on internal throughput rates (ITR). Evaluation based on CPU's only

Foil 6

System/370 Entry and Mid-Range Performance
The Balanced Performers

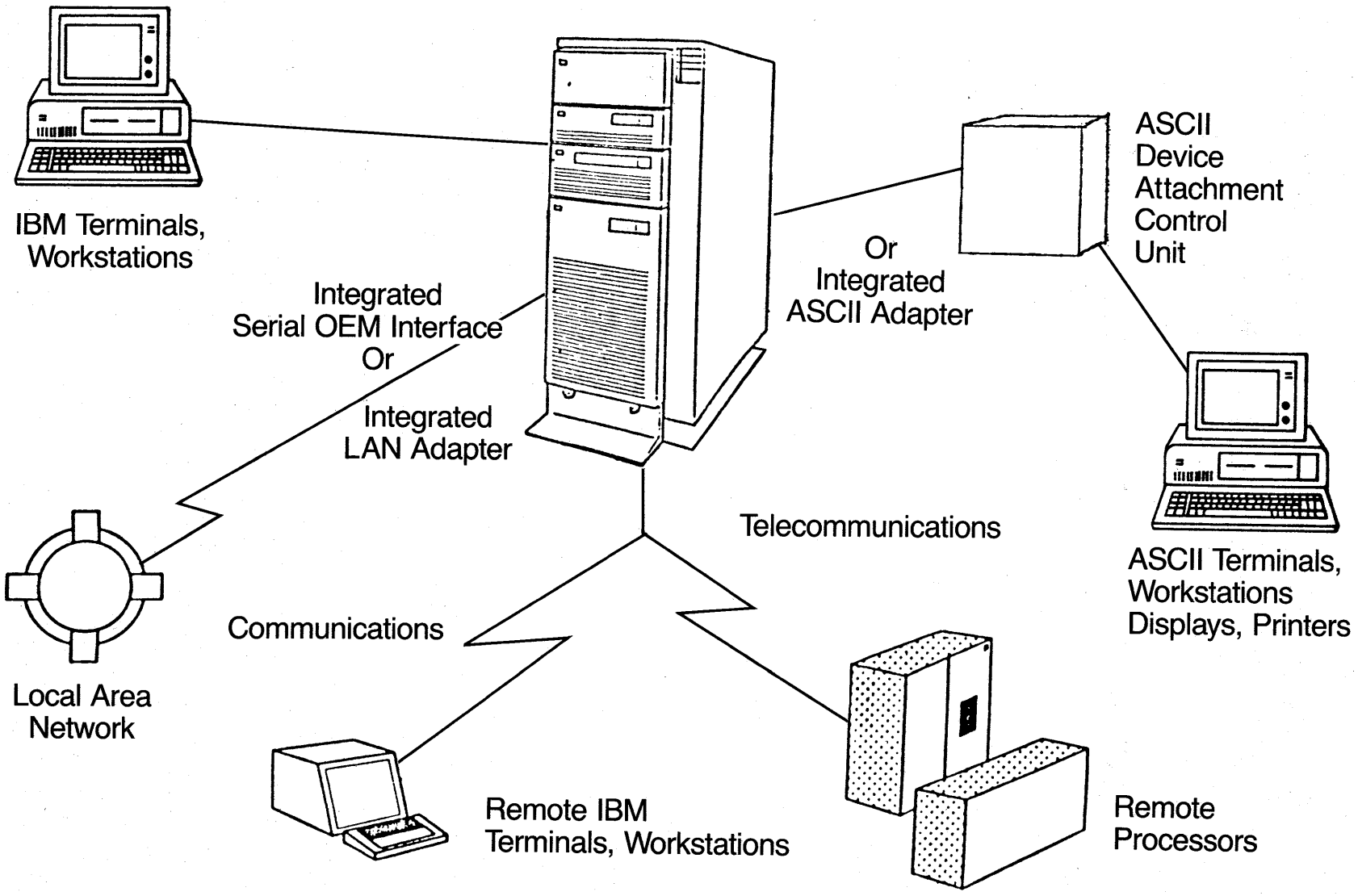


*Internal Throughput Rates (ITR): Number of completed jobs or transactions per processor busy; second is used for commercial ratios.

(E) – Estimates

Foil 7

IBM 9370 Information System: Distributed/Departmental Environments



Foil 8

IBM 9370 Information System: Application Description – VM Interactive

Performance Measurement: VM Interactive – Application Development

Description:

- VM/CMS Workload
- Data Processing Professional Workload
- Developed From Customer Survey Data

Content:

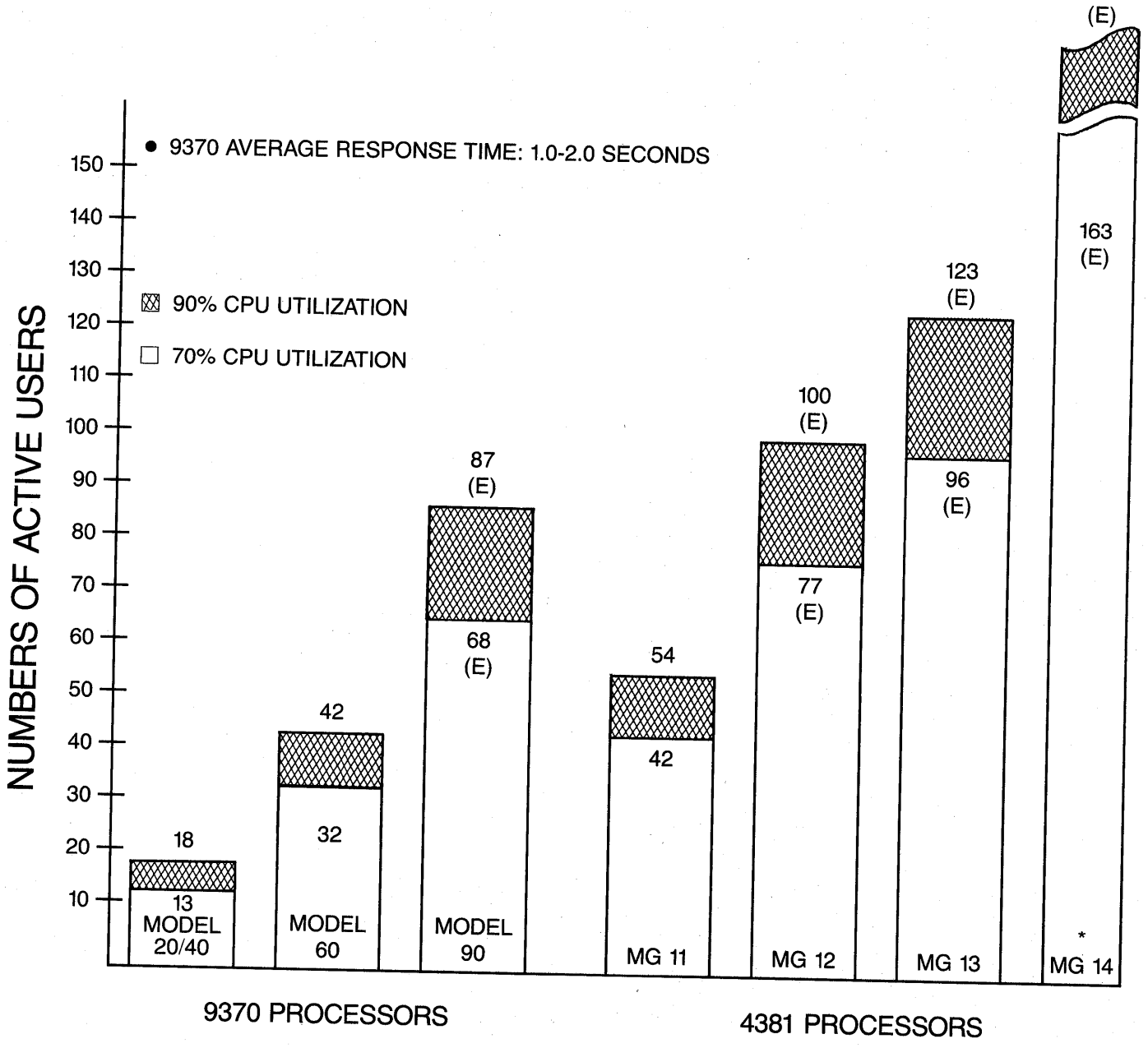
- APL Computations
- Programs That Assemble/ Compile:
  - COBOL
  - PL/1
  - BASIC
  - FORTRAN
  - ASSEMBLER
- Create/Edit Files
- User Notes And Messages

Processor Utilization: 70% And 90%

9370 Average Response Time: 1.0 – 1.4 Seconds (70%)
1.5 – 2.0 Seconds (90%)

Foil 9

IBM 9370 Information System: VM Interactive – Application Development



(E) - ESTIMATES

*4381 Model Group 14 requires HPO

NOTE: Active users presumes continuous use but not necessarily the total number of users that could be supported.

Foil 10

IBM 9370 Information System: Application Description – VM/PROFS

Performance Measurement: Office Workload Environment

Description:

- Professional Office System (PROFS)
- DisplayWrite/370

Content:

- During One Hour, User:
  - Creates/Files One DisplayWrite Document
  - Creates, Sends And Files Five Notes
  - Updates Calendar Twice
  - Opens The Mail Twice

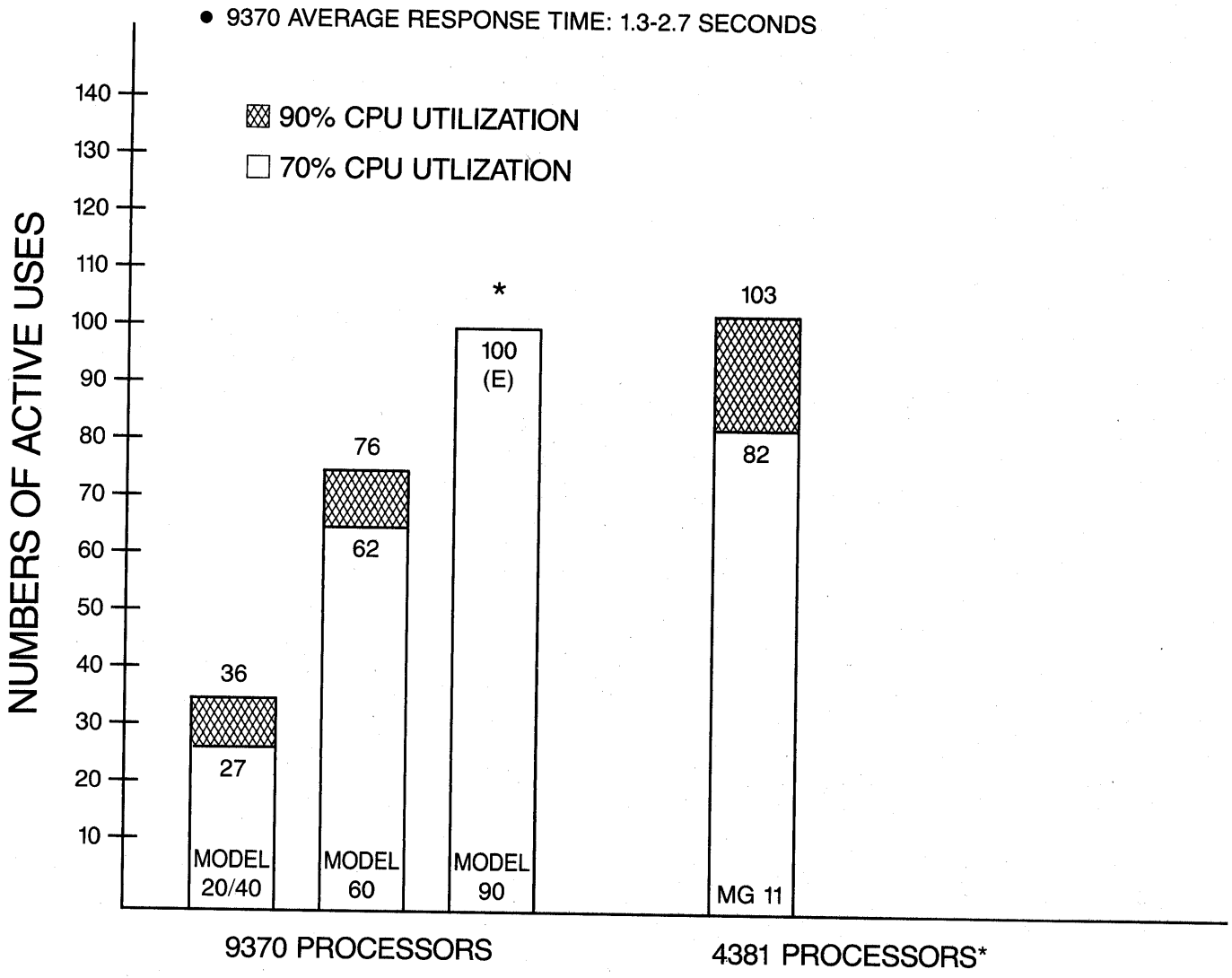
Processor Utilization: 70% And 90%

9370 Average Response Time: 1.3 to 1.8 Seconds

2.5 to 2.7 Seconds

Foil 11

IBM 9370 Information System: Office Workload Environment – VM/PROFS



(E) - ESTIMATES

*Data not available at this time for the IBM 9370 System Model 90, at 90% utilization and 4381 Processors, Model Groups 12, 13, and 14 at both 70 and 90% utilization.

Note: Active users presumes continuous use but not necessarily the total number of users that could be supported.

IBM 9370 Information System: Application Description – RAMPC

Performance Measurement: Commercial Interactive – RAMPC

Description:

- Used To Compare Systems With Different Architectures
- More Demanding Than Most Customer Environments

Content:

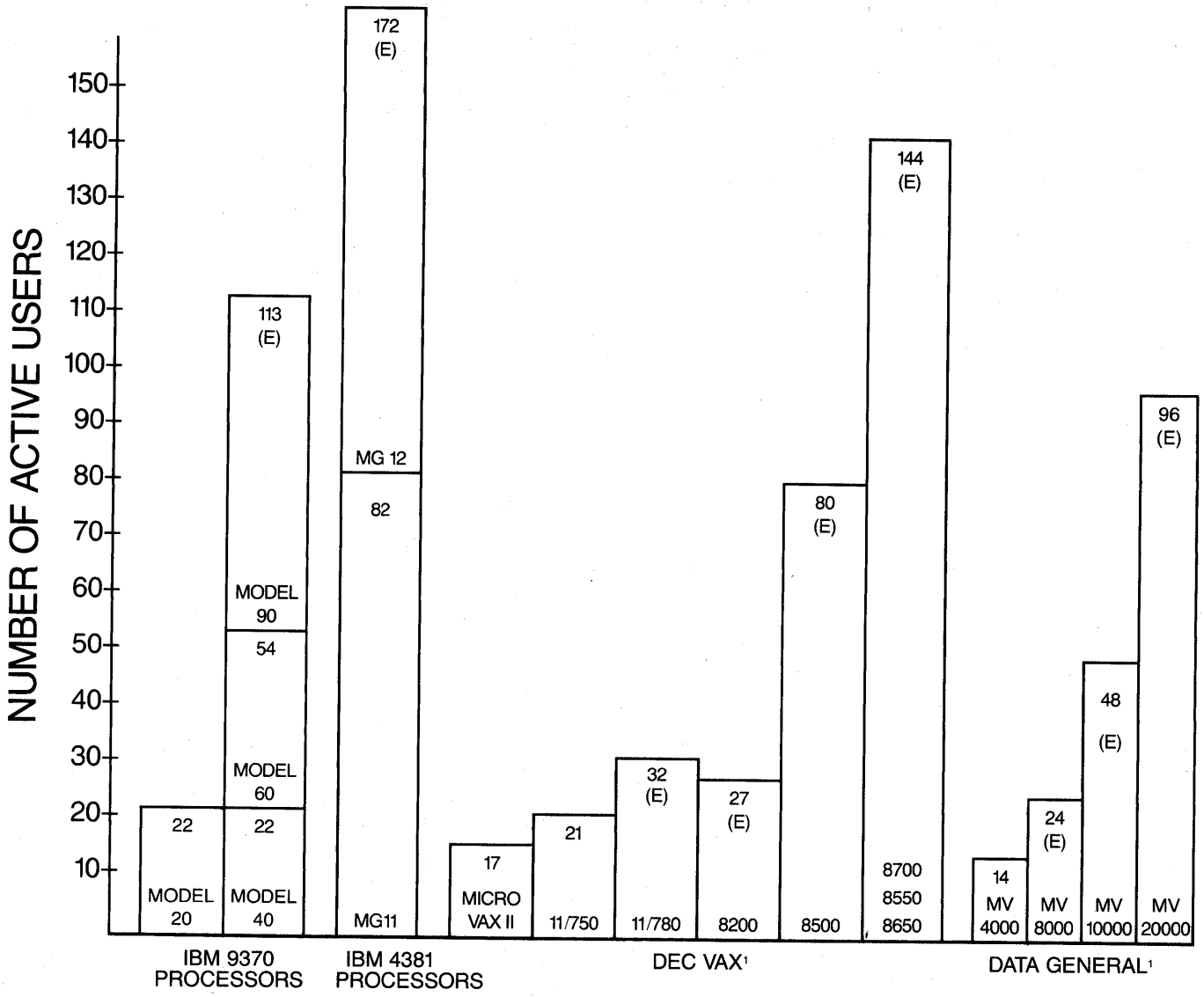
- VSE/SP Operating System
- CICS Transaction Driver
- Synthetic COBOL Application

Processor Utilization: 70 Percent

9370 Average Response Time: 1.9 to 2.5 Seconds

Foil 13

IBM 9370 Information System: Representative Competitive RAMPC Commercial Interactive



[1]MicroVAX and VAX are products of Digital Equipment Corporation; DG/MV is a product of Data General Corporation

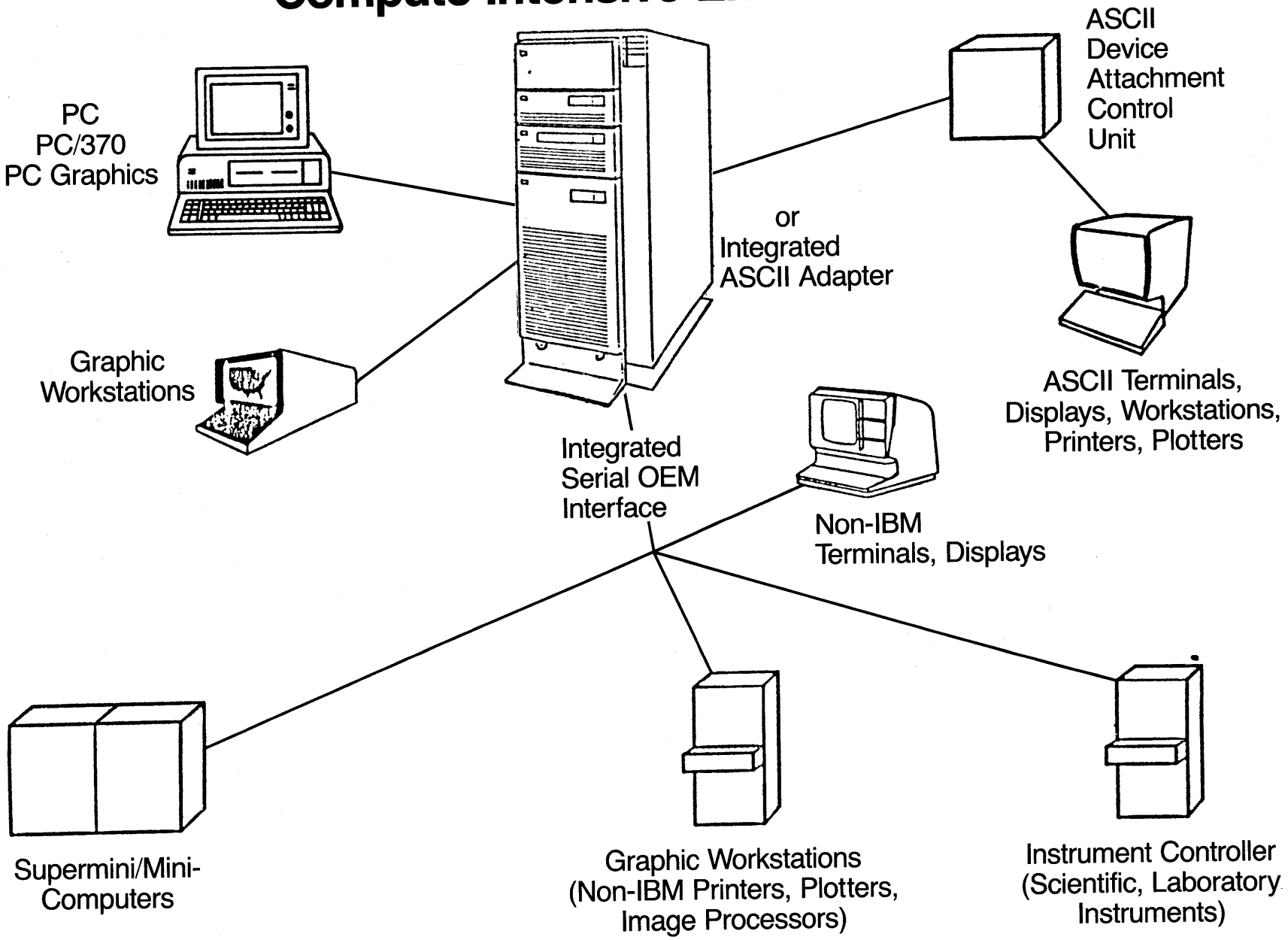
Note:

- Above data is based upon IBM laboratory measurements. Results in other environments may vary significantly.
- CPU utilization is 70 percent.
- Active users presumes continuous use but not necessarily the total number of users that could be supported.

(E) IBM Estimates are based on actual measurements taken on one machine and factored to other machines based upon vendor claims of relative performance.

Foil 14

IBM 9370 Information System: Compute-Intensive Environment



Foil 15

Characteristics Of Compute-Intensive And Commercial Environments

- Compute-Intensive
  - High Content Of Floating Point Calculations
  - High Amount Of Application Execution Time
  - Low Amount Of Supervisor Execution Time
  - Low Amount of I/O Activity
  - Low Data Base Activity
  - Low Interactive Activity
- Commercial
  - Low Amount Of Floating Point Calculations
  - Medium Amount Of Application Execution Time
  - Medium Amount Of Supervisor Execution Time
  - High Amount Of I/O Activity
  - High Amount Of Data Base Activity
  - High Interactive Activity

Foil 16

IBM 9370 Information System: Application Description – Compute-Intensive

Performance Measurement: Compute-Intensive

Description:

- LINPACK Benchmark
- Developed And Published By Argonne National Laboratory
- Measures Processor Computational Speed Only

Content:

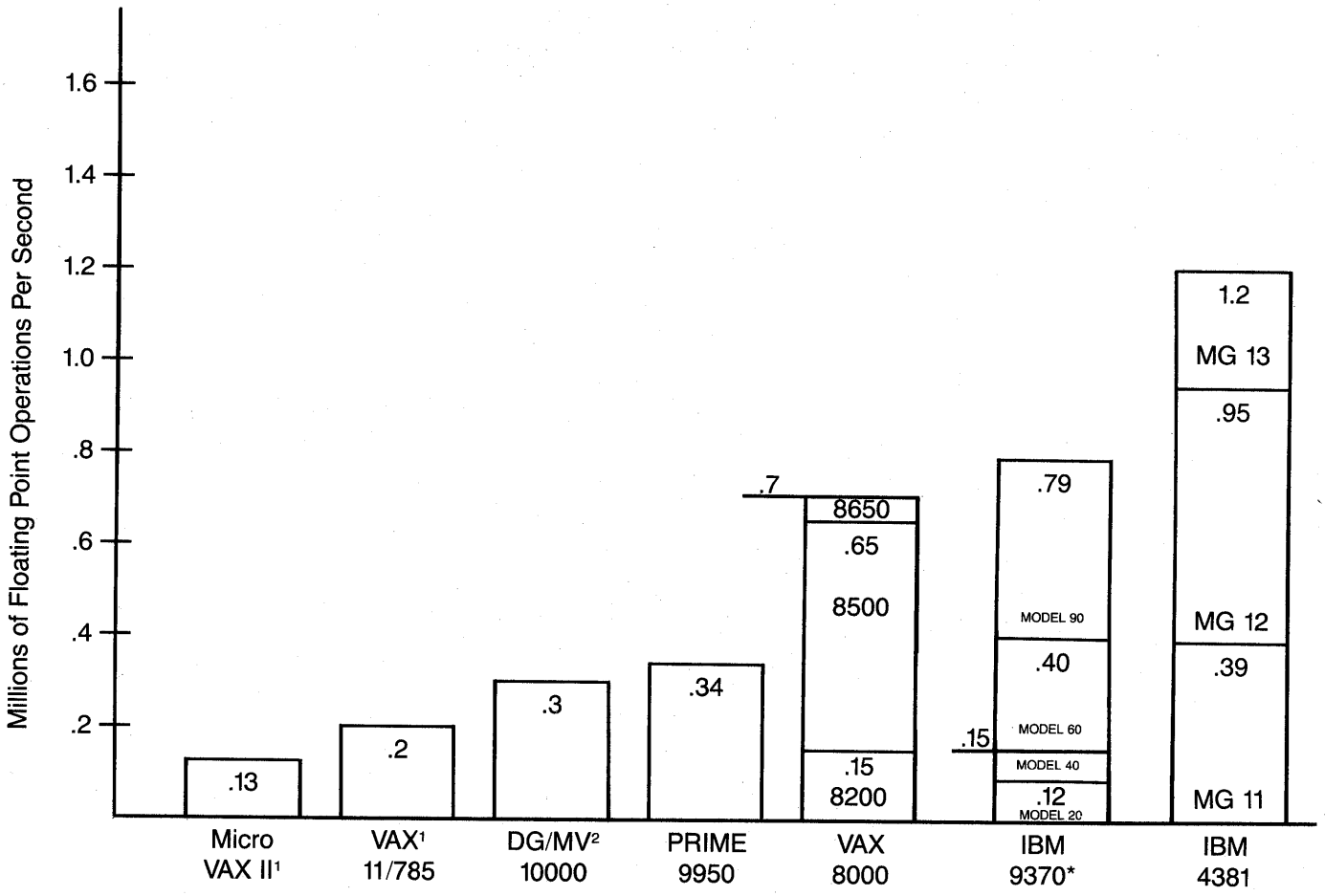
- Coded In FORTRAN
- Solves Dense Systems Of Linear Equations Using Half And Full Precision
- Results Stated In Millions Of Floating Point Operations Per Second (MFLOPS)

Results Here:

- Full-Precision Results
- Reflective Of Much Of The Compute-Intensive Environments Today

Foil 17

IBM 9370 Information System: Compute-Intensive Performance Comparison LINPACK Full Precision



[1]MicroVAX and VAX are products of Digital Equipment Corporation
[2]DG/MV is a product of Data General Corporation.
Source: Argonne National Laboratory, "Performance of various computers using standard linear equations software in a FORTRAN environment." Technical Memorandum No. 23 (July 1986).

Note:
- The standard multiply add assist of the IBM 9370 System Models 20, 40, 60 and 4381 Systems can further assist performance.
- This graph is designed to compare the IBM 9370 Information System with representative competitive systems.

*The IBM 9370 data have not been published in the Argonne National Laboratory technical memorandum, but are based on IBM measurements and will be submitted to the Argonne National Laboratory for publication.

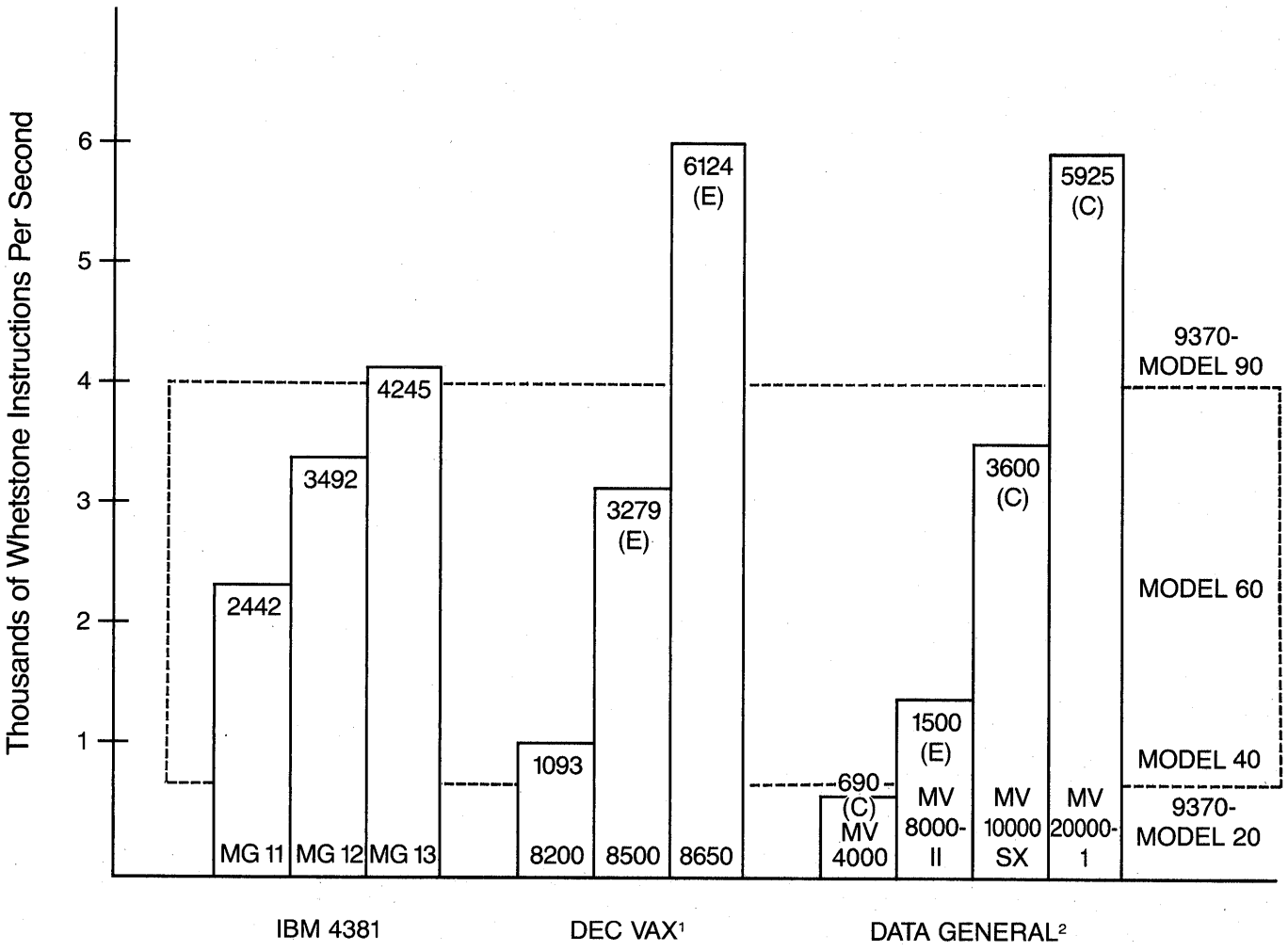
Foil 18

IBM 9370 Information System: Whetstone Benchmark

- Not A Controlled Standard
- Exists In Multiple Versions With Varying Degrees Of:
  - Array/Matrix Content
  - Arithmetic Content
  - Floating Point Content
- Available In Long And Short Precision
- Short Precision Whetstones Appear To Be The Basis For Many Industry Performance Claims, Although Other Benchmark Programs Are Available That, We Believe, Are More Representative Of Today's Compute-Intensive Workloads.

Foil 19

IBM 9370 Information System: Whetstone Analysis – Single Precision Compute-Intensive Environment



[1]VAX is a product of Digital Equipment Corporation
[2]DG/MV is a product of Data General Corporation

Note:

- Except where marked (C), which are vendor claims, the above data is based on IBM laboratory measurements or estimates. Results in other environments may vary significantly.
- This graph is designed to compare the IBM 9370 Information System with representative competitive systems.

(E): IBM Estimates are based on actual measurements taken on one machine and factored to other machines based upon vendor claims of relative performance.

Foil 20

IBM 9370 Information System: Compute-Intensive Performance* Positioning Guide

*Argonne Benchmark for solving a system of linear equations with LINPACK in full precision

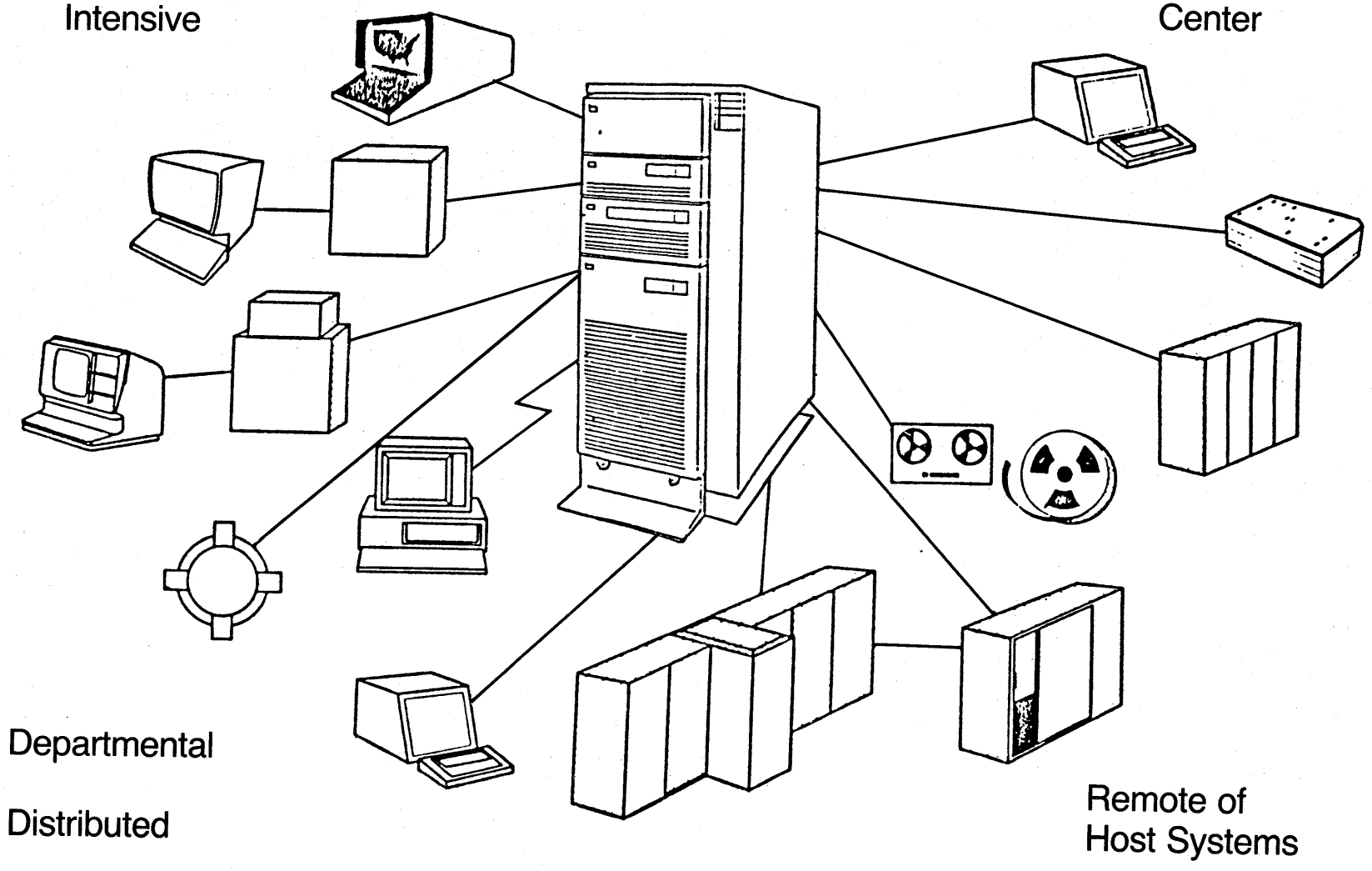
[1]MicroVAX and VAX are products of Digital Equipment Corporation; DG/MV is a product of Data General Corporation.

Source: Argonne Technical Memorandum Number 23 (July 9, 1986).

(E) Projections are based on vendor claims and IBM data regarding dual processor relative performance.

Note: This graph is designed to compare the IBM 9370 Information System with representative competitive systems.

IBM 9370 Information System: Versatility And Balanced Performance



Foil 22

IBM 9370 Information System
ZZ60-2879

READER'S COMMENT FORM

You may use this form to communicate your comments about this publication, its organization or subject matter, with the understanding that IBM may use or distribute whatever information you supply in any way it believes appropriate without incurring any obligation to you. Your comments will be sent to the author's department for whatever review and action, if any, are deemed appropriate.

Note: *Copies of IBM publications are not stocked at the location to which this form is addressed. Please direct any requests for copies of publications, or for assistance in using your IBM system, to your IBM representative or to the IBM branch office serving your locality.*

Possible topics for comment are:

Clarity Accuracy Completeness Organization Quality Format Usefulness

Comments:

Name _____
Company _____
Address _____
Date _____

Do you wish a reply? ☐ yes ☐ no

Thank you for your contribution. No postage stamp is necessary if mailed in the U.S.A. (Elsewhere, an IBM office or representative will be happy to forward your comments or you may mail directly to the address in the Edition Notice on the back of the title page.)

Note: Staples can cause problems with automated mail sorting equipment.
Please use pressure sensitive or other gummed tape to seal this form.

IBM Internal Use Only

Fold and tape

Please Do Not Staple

Fold and tape

IBM
Internal
Mail
(For U.S. Mail, mail
in sealed envelope)

International Business Machines Corporation
Department 63W
1133 Westchester Ave.
White Plains, N.Y. 10604

Fold and tape

Please Do Not Staple

Fold and tape