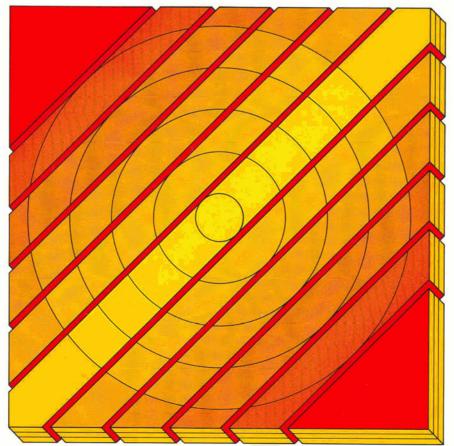
## Honeywell Level 68





To computer users the scene is a familiar one: organizations snowballing in size and complexity; data processing workloads doubling...tripling. And still the challenge is to increase productivity, relying on expanded data storage capacities, larger system configurations, faster processing.

For the most part, we've kept up. Computer manufacturers have generally succeeded in meeting users' expansion requirements. Many large systems can now store billions of characters; the largest configurations can readily handle many central system components and peripherals; processing speeds and capabilities are increasing.

However, the productivity problem can't be solved simply by adding more hardware to a system or making it run faster. New concepts must be developed and new systems designed which focus not only on users' data processing concerns, but on their business concerns as well! Productivity, administrative control, investment protection, security and data integrity are now—more than ever—critical to the overall efficiency of any organization. And computer systems that address these requirements are certain to set design and operational standards for years to come.

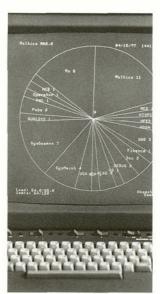
Honeywell again takes the lead in making such

systems a reality. This time, with our Level 68 Multics systems, the largest and most powerful of our Series 60 products. In the past, we pioneered features in network communications and multidimensional processing. Today, with Multics, we offer capabilities and tools that may not be available on other systems for years!

The Multics Concept. Multics is a complete largescale data processing system with functions which span the full spectrum of user needs. This interactive system puts you and your employees in touch with powerful transaction processing, time sharing, program development, word processing, and data base management capabilities. But, Multics is especially unique because it can help meet the needs of anyone in your organization-not just those with computer expertise. Based on the concept that the computer is only as productive as it is accessible, Multics is a tool to be used by all levels of personnel—from managers, to sales people, to engineers. Unlike other systems that require users to master many different interfaces-Multics offers a simplified and uniform dialog for all processing modes. This common interface shortens the problem solving cycle and enables your people to use the computer in their own working situationswithout having to become data processing experts. The bottom line is increased productivity.







Productivity is also related to the allocation and management of the resources of your organization. As an integral part of your operations, the computer itself demands administration. Multics makes it surprisingly easy!

Multics is service-oriented. Its administrative approach allows the degree of control required to simultaneously serve the diverse needs of multiple user groups. Thus, the workload of any user can be controlled so it doesn't adversely affect that of others. For example, it's possible to add terminal users to a system's workload and not impact the response times of other users. This functional separation not only provides a more stable operational environment, but also one that can be dynamically tuned to meet users' changing needs.

The administrative controls available with Multics range from guaranteed resource allocations, to priority and deadline scheduling, to flexible service pricing, to automatic or on-demand billing...features that are only in the design stage on other systems.

Data Integrity and Security Mechanisms. For many computer users and manufacturers, growing privacy regulations—while certainly necessary—are adding to the complexity of computer operations. Having to implement cumbersome data and system security procedures, users often experience an adverse impact on productivity. For Multics users, security is an asset, not a hindrance. In fact, because of its comprehensive built-in security mechanisms, more of your people can use Multics—without having to concentrate on timeconsuming security procedures and programming requirements. As a result, your overall productivity is higher than it would be if you used another system.

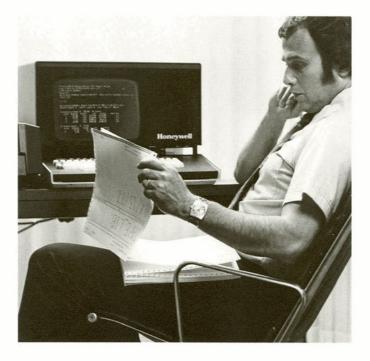
We can back that up! First, with results from a study of Multics' security offerings conducted for the U.S. Government<sup>1</sup>, and second, with evidence of the effectiveness of each security system.

Take Multics' passwords, access control lists, and access isolation mechanisms, for example. They're the underpinnings of a security architecture that was designed into Multics, not added as an afterthought. Working together, they control access not only to your system, but also to your files, programs, and processes efficiently and consistently.

Then there's Multics' ring structure—the most sophisticated of our security features. It combines with access control lists, audit trail mechanisms, and passwords, to form a series of information safeguards unparalleled in the computer marketplace today.

The ring structure lets you group your system users according to privilege. The system provides eight states —or rings—of execution, and users can access information only in those segments of your data base which are equal to or less privileged than the state in which these users are allowed to execute.

<sup>1</sup>The MITRE security study, conducted for the U.S. Air Force, rated Multics number 1 in security architecture.







## nvestment Protection and Operational Stability.

When you acquire a Multics system—and develop applications specific to your operations—you're naturally concerned with the protection of that investment. Multics can ensure that protection. Unlike some other systems, Multics is designed for easy, step-by-step growth. You implement the processing capabilities you need now, and grow modularly, adding only the required resources, without hardware swapouts or changes to the operating software.

An inherent advantage of Multics' modularity is the stability it brings to your operation. When you implement Multics—even a basic entry configuration—the functions, procedures, and operating characteristics you and your users learn remain the same, no matter what size configuration you grow into. And that's an added plus for productivity. Without having to reimplement and retrain each time you increase or change your system, you and your people can spend more time using the system's problem-solving capabilities to improve your operations.

Multics Features, Technically Speaking. Multics' technical features can mean added benefits for your organization.

Processing Capabilities for a Diversity of Needs. Multics offers you and your users problem-oriented tools to match specific processing needs and to maintain high levels of productivity. These Multics processing tools include local and remote batch, remote job entry, time sharing, transaction processing, word processing, graphics, and real time processing. **Unique User Orientation.** Multics aims at maximum accessibility and utility through its uniform user interface, total online orientation, and secure sharing features.

A uniform user interface makes our full processing repertoire available via <u>consistent</u> procedures. There are no format or execution differences between usage types. A program written in the interactive environment will also run in batch without conversion or modification; and vice versa. Data and programs associated with one processing dimension are totally accessible from any other. As a result, you benefit from outstanding consistency and flexibility.

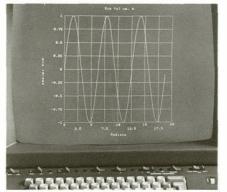
Multics is ideally suited to online applications. Unlike other systems, which provide online capabilities through executive packages, Multics is completely interactive... from its basic architecture upward.

Resource sharing is also fundamental to Multics. The controlled sharing of operating system software, libraries, language processors, data bases, and even user code and data makes more of Multics available to those people in your organization who need it.

Ease of Use Throughout Multics. With Multics, ease of use is a tangible reality—not just a promise. Multics' total online orientation spans its processing capabilities, making everything from language processors, to data base management facilities, to metering and tuning capabilities available to you at the touch of a terminal key!

And you can count on additional ease-of-use features such as: programming abbreviation capabilities; command-level programming mechanisms; and online quick-reference facilities.







Virtual Memory for Controlled Information Sharing. Multics' virtual memory automatically controls the information shared among your system's users, while managing the size of object programs. This lets your users concentrate on problem solving rather than memory considerations. The controlling factors are segmentation and paging—techniques which extend Multics' memory safeguards far beyond those offered on other systems.

Segmentation is the organization of your data and programs into a uniform storage system available to all users. Required data is retrieved from this storage system and transferred to main memory automatically ...transparently.

Data is transferred through memory in pages—each with a fixed size of 4096 bytes. Since only those pages required for execution of a program are called into memory at a given time, use of valuable main memory space is optimized. This contributes to outstanding system performance... performance that can improve your business operations and overall productivity.

**Software/Applications Development Made Simpler.** Multics eliminates many of the roadblocks which typically stall software and applications development. Its powerful source code manipulation tools, online debugging capabilities, and a wide variety of programming languages give your users development strength and scope unattainable on other systems today.

The user can concentrate on creative program development instead of internal concerns such as terminal control, data base management, data security, and I/O interfaces. The result: a shorter, simpler development cycle.

Two Techniques for Managing Your Data Base. Multics Integrated Data Store (MIDS) and Multics Relational Data Store (MRDS) are innovative data base management techniques which ensure that your system users have interactive access to the most up-to-date, meaningful data base information. These data base managers reduce the duplication and redundancy in data base creation and maintenance, eliminate the opportunities for entering inconsistent data, and reduce the chances of inaccuracy. Together, they make Multics appealing as a tool for new efficiency and productivity, one that's beneficial to large numbers of people, in all types of jobs.

MIDS is an implementation of Honeywell's Integrated Data Store/II (I-D-S/II) system. It addresses your designers' and programmers' needs for schema/subschema data base definition capabilities, and the development of sequential, hierarchical, or network data base structures.

MRDS brings to your Multics system users the first fully implemented relational data base capability...a real payoff in increased productivity. With a highly simplified record selection capability, MRDS permits data base access through high-level expressions which simplify programming effort and help your people to develop new applications more rapidly, and perform their jobs more efficiently.

At the end-user level, MRDS gives both technical and non-technical people access to information in your data base without having to know how or where that data is actually stored. Taking advantage of simple data definitions as well as file access features such as LINUS (Logical INquiry and Update System), users can solve their particular problems without programming staff support. A comprehensive Report Generator Language (RGL) translates retrieved information into meaningful reports.

**Operational Ease Built Into Multics.** Because Multics is service-oriented, it is easy to operate. For example, an operator can start Multics simply by typing one command at the console. There is no time-consuming system or library generation or edit. In addition, system software and libraries can all be updated online. So, if you wish to increase your software repertoire, you can do so simply and easily... without shutting down your system... without affecting other users who may be working with existing software.

Your operations and system staff will appreciate some of the other ease-of-operation features of Multics: unattended operation, file update journalization, automatic recovery/restart, online administration and billing, and dynamic control of the priority scheduler.





**Compatibility With GCOS a Significant Option.** An outstanding feature of Multics is its ability to interact directly with the standard GCOS (General Comprehensive Operating Supervisor) used by other Honeywell large-scale systems. A special subsystem—called the GCOS Environment—allows Multics to run Level 66 GCOS jobs and handle GCOS tapes without change. Together, Multics and the GCOS Environment can offer the advantages of added flexibility and processing backup.

Multics' Distributed Systems Orientation. The distributed systems approach offers many attractive benefits for Multics users, especially in the areas of coexistence and resource sharing among diverse systems. With this approach, you can connect multiple computer systems in a common network in order to exchange data or share your organization's workloads. Multics offers proven hardware and software to simplify and reduce the problems associated with the development of these networks and the implementation of networking and resource sharing procedures. Our state-of-theart network processors combine with sophisticated protocols for network communication, data exchange, and remote resource access, to help you develop the networking capabilities for your specific needs. Multics can also be configured in a network of other vendors' systems. Thus, you make the best use of these systems and maximize the productivity of those who use them.

What Multics Can Mean to You. Greater accessibility, increased productivity, better resource management, unparalleled security and integrity—these and many other Multics benefits can dramatically impact the efficiency of your operations, and can mean a fresh approach to dealing with the many challenges you face every day.

Competition, inflation, technological change, limited resources, and government regulations...those are the challenges you know all too well. They call for the implementation of new and creative management policies and operating procedures. Multics can be such a response...one that can have a profound impact on your success.

When you implement Multics, you're making the most comprehensive and usable form of computer power available throughout your organization—power that can eliminate time-consuming procedures, promote effective job performance, and make the most of costly resources. The end result can be the increased productivity and profitability you've been looking for.

1	Multics System Requirements	
1	Typical Entry-Level Configuration	
	Central Processors	1 Model 68/60
	Memory	256K words
	System Control Units	1
	Input/Output Multiplexers	1
	Front-End Network Processor	1 DATANET 6600
	Mass Storage Units	2 MS(10402s
	Magnetic Tape Units	2 (minimum) MT(10400/0500s
1	Maximum Configuration	
	Central Processors	7 Model 68/80s
	Memory	16 million words
	System Control Units	8
	Input/Output Multiplexers	4ª
	Front-End Network Processors	4 DATANET 6600s
	Mass Storage Units	512 MSU0402/0451/0500s
	Magnetic Tape Units	16 МТЦ0500s <sup>ь</sup>
	<ul> <li><sup>a</sup> Total number of IOMs and processors cannot exceed eight</li> <li><sup>b</sup> With fewer mass storage subsystems, number of tapes can be increased proportionally</li> </ul>	

## Honeywell

Honeywell Information Systems In the U.S.A.: 200 Smith Street, MS 486, Waltham, Massachusetts 02154 In Canada: 2025 Sheppard Avenue East, Willowdale, Ontario M2J 1W5 In Mexico: Avenida Nuevo Leon 250, Mexico 11, D.F. 18258, 2677, Printed in U.S.A.