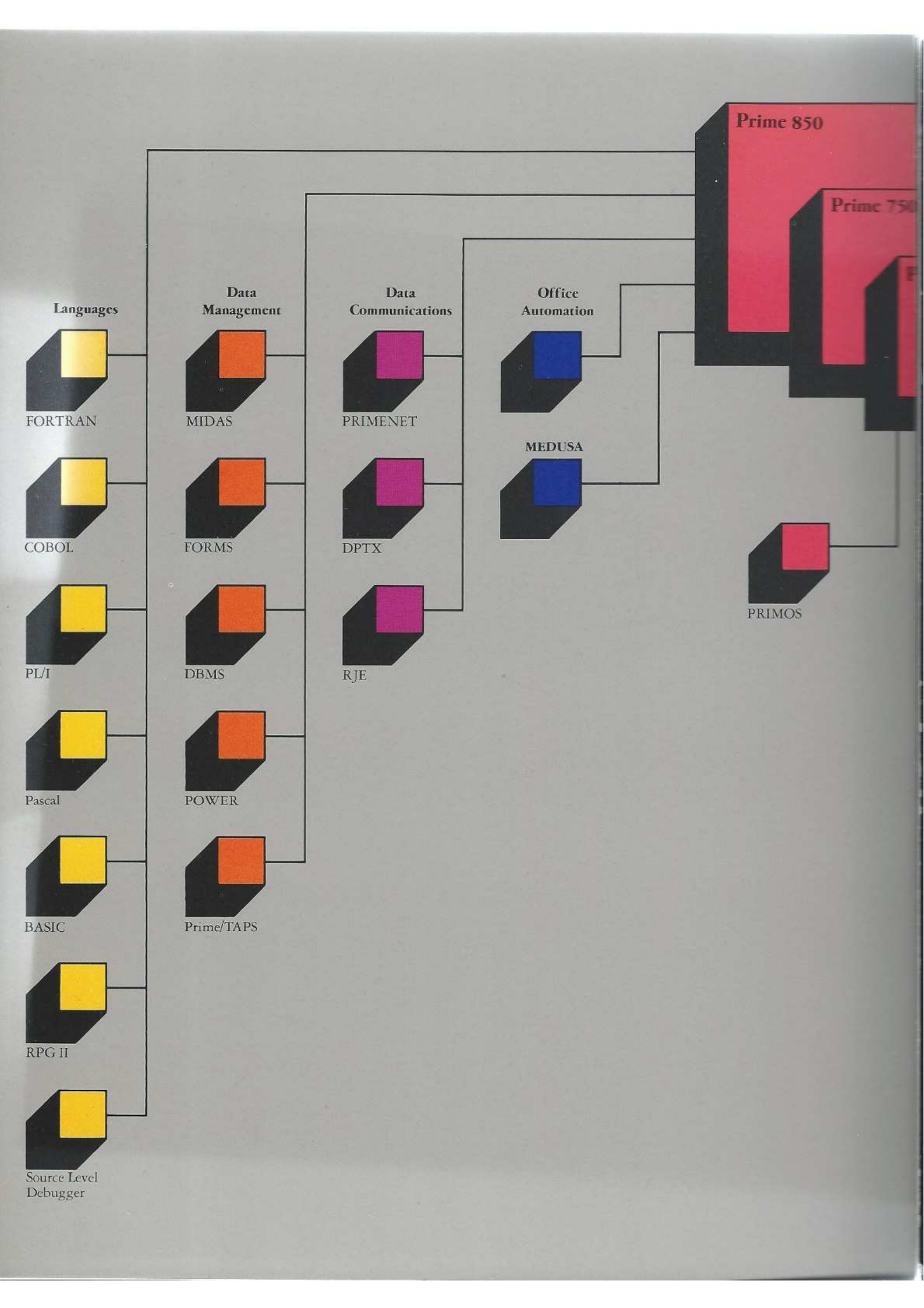
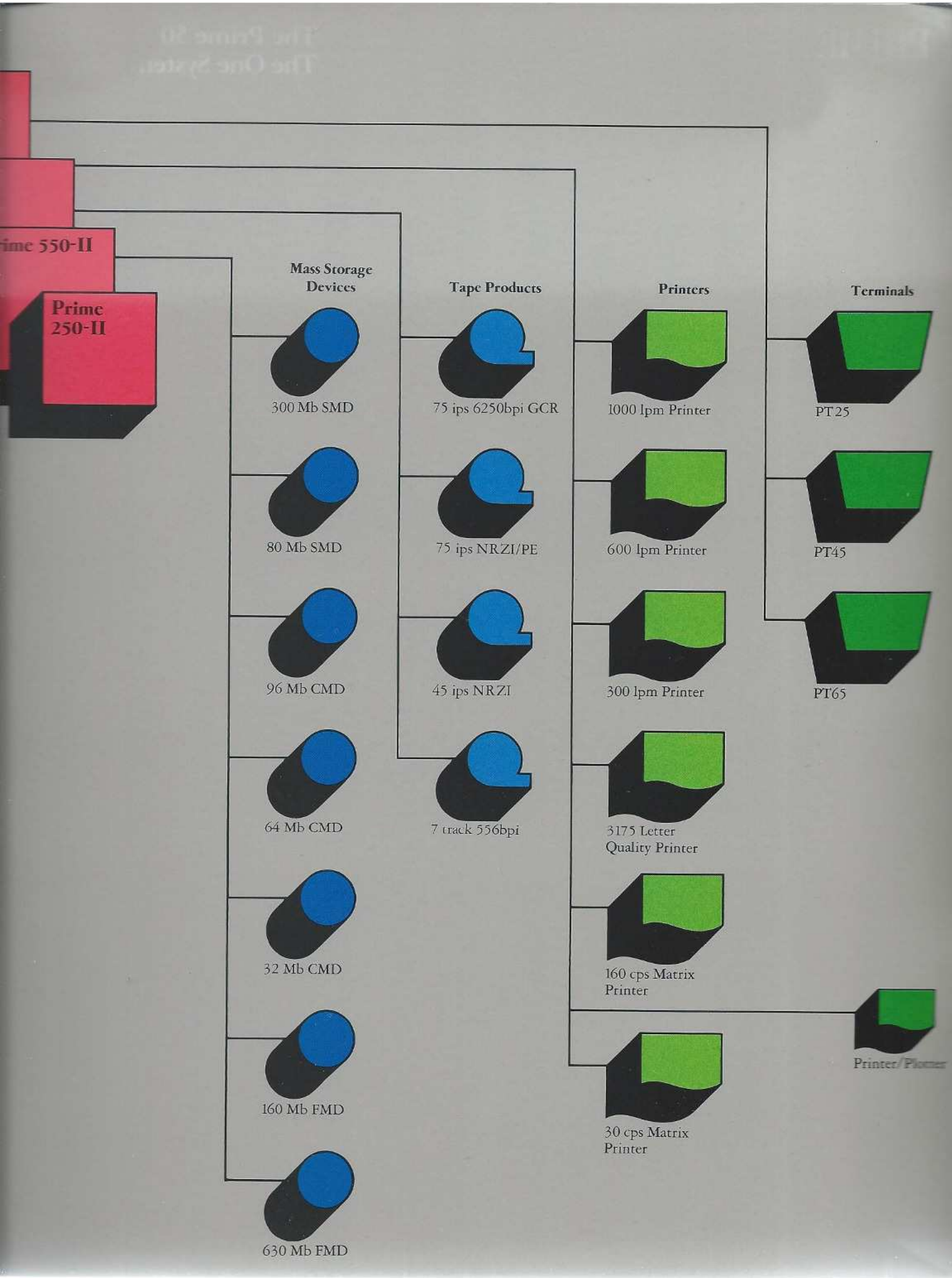
PRIME

The Prime 50 Series: The One System Solution


Prime 850
Prime 750
Languages
Data Management
Data Communications
Office Automation
FORTRAN
MIDAS
PRIMENET
MEDUSA
COBOL
FORMS
DPTX
PRIMOS
PL/I
DBMS
RJE
Pascal
POWER
BASIC
Prime/TAPS
RPG II
Source Level Debugger


ime 550-II
Prime
250-II
Mass Storage
Devices
300 Mb SMD
80 Mb SMD
96 Mb CMD
64 Mb CMD
32 Mb CMD
160 Mb FMD
630 Mb FMD
Tape Products
75 ips 6250bpi GCR
75 ips NRZI/PE
45 ips NRZI
7 track 556bpi
Printers
1000 lpm Printer
600 lpm Printer
300 lpm Printer
3175 Letter
Quality Printer
160 cps Matrix
Printer
30 cps Matrix
Printer
Terminals
PT25
PT45
PT65

A Spectrum of Prime Solutions

The Prime 50 Series systems deliver solutions for a broad spectrum of user needs. One family of compatible hardware, software and peripherals. Systems that work for you today, and work with you in the future. Systems that can be upgraded or expanded to meet changing needs, increasing business growth, or new and complex challenges. A total system solution that colors your business with gold.

Prime has taken a unique approach to system design. The PRIMOS® operating system was designed first, the system hardware is designed around the software. This uniformity of system design guarantees complete upward system compatibility. The PRIMOS operating system also makes the software accessible and allows you to concentrate on your applications, while the operating system manages the system resources and the activities of users. With Prime, you get system reliability, easy migration paths, and maximum protection of system and software investments.

All Prime 50 Series systems use 32-bit architecture for enhanced system efficiency and a large capacity address space capability. Each user has a virtual memory address space of 32 million bytes for applications requiring large memory capacity.

Business and technical concerns are easier to resolve with the software flexibility and ease of use of Prime's industry-standard languages. The friendly programming environment and language breadth meet a range of user needs and problem specific applications. You can select languages that offer the best solutions to your needs, programming experience and existing application software. The PRIMOS operating system efficiently controls all system functions.

The Prime communications software gives you computing power, where and when you need it. Linking Prime systems together with other remote systems and with mainframe systems, adds new system resources.

The system spectrum works together to give unique problem solving tools. The Hardware Solution: Prime 250-II through Prime 850 systems. The Software Solution: One operating system, a range of industry-standard languages and data-management facilities. The Communications Solution: Prime Distributed Processing products. The Productivity Solution: The MEDUSA™ Computer Aided Design System and the Office Automation System. The Peripheral Solution: A complete line of peripheral devices.

Examples of system configurations are also given. The chart at the left shows the full capabilities available on all Prime end-user systems. Comparable systems will run applications such as computer aided design, financial modelling, inventory control, general accounting, and office automation.

These combined elements – the Prime 50 Series systems, the advanced software and wide range of peripherals, form an exciting array of power, speed, and efficient operation. With Prime you buy one system that satisfies your needs now. That same system can be broadened to meet future requirements. The Prime 50 Series spectrum is your one system solution.

The Hardware Solution: The Prime 50 Series Family

The primary band in the spectrum is the Prime 50 Series. These unique systems spread unmatched power and performance across your application spectrum. Prime's 50 Series family includes the Prime 250-II, 550-II, 750, and 850 systems. One of these systems can meet your present price and memory capacity requirements with the capability for later expansion.

All Prime 50 Series processors have 32-bit architecture for large address space capabilities, data transfer efficiency, and numerical precision. Prime's 32Mb-per-user virtual address space is managed by PRIMOS with complete user transparency. Prime's 32-bit architecture and Virtual Memory Management provide users with the flexibility to use programs that require more memory than is physically configured on a system.

All Prime 50 Series systems include such features as interleaved error correcting MOS main memory, integer arithmetic unit, standard instruction set, multi-segment environment, stack architecture, high throughput register sets, system integrity, and a virtual control panel for maintenance diagnostics.

In addition, each Prime 50 Series system offers unique architectural features. The Prime 250-II includes 2Kb of cache memory for accelerated instruction execution and minimized processor overhead. The Prime 550-II has 8Kb of cache memory to further accelerate the effective memory cycle time; and hardware-implemented decimal arithmetic, floating point arithmetic and character string manipulation for enhanced run time efficiency. The Prime 750 has an Instruction Preprocessor Unit for instruction queueing, and burst mode I/O for higher data transfer efficiency. The top-of-the-line Prime 850, an advanced multi-stream processor, utilizes parallel instruction stream technology, and 32 Kb cache memory for a high level of performance for multi-user, multi-functional applications. The Prime 750 and 850 processors can support as much as 8Mb of central MOS memory.

The array of these unique features on a minicomputer make Prime's total system solution an outstanding price/performance value.

32-Bit Architecture

The 50 Series systems' 32-bit internal architecture uses microcode routines on the Prime 250-II, and hardware on the other members of the family to implement single- or double-precision floating-point instructions. The single-precision (32 bit) format maintains accuracy to seven significant digits, the double-precision (64 bit) format to 14 significant digits.

All Prime 50 Series processors use parallel logic to manage exponential and fractional calculations while increasing execution speed. Separate parallel logic simultaneously performs binary multiplication in four bits, division in three bits and addition in 48 bits.

Virtual Memory Management

Virtual memory management provides individual address spaces far in excess of the system's physical memory. Each user can access a 512 million byte virtual address space of which 32 million bytes are reserved for private use programs and data. The remaining address space is allocated to shared programs, data, libraries and PRIMOS. Because PRIMOS is embedded in each user's virtual memory space, system overhead is reduced and all operating system functions are immediately available to each user.


PRIME
Computer

High Speed Memory

The central memory of every Prime 50 Series system uses highly efficient MOS with storage density as high as 64Kb per chip. Memory board logic includes error-correcting code for system integrity and interleaving for rapid data transfer. Cache memory stores frequently used data and instructions in high speed bipolar memory (80 nanosecond access). Cache memory greatly promotes processor speed by reducing central memory overhead. The Prime 750 and 850 further benefit from preprocessed instruction queueing that accelerates sequential instruction execution. The Instruction Preprocessor Unit pre-fetches, decodes, and resolves effective addresses for four anticipated instructions that are placed in an instruction queue for rapid processor access. A "WRITE THROUGH" algorithm speeds up memory writes by accessing memory via cache. The Prime 750 and 850 systems have a 32-bit memory bus that speeds processor operation through high-volume data transfers. With each memory transfer, 32 bits of data can be loaded into the cache. With interleaving, 64 bits of data can be transferred in a single memory cycle.

All Prime systems include a low overhead scheduling or process exchange mechanism. This facility automatically transfers the computer's attention from one user to another with complete system protection. CPU resources are allocated to the highest priority process as maintained in a two dimensional queue. The facility manages the activation of processes ready for execution, or waiting for a specific instruction to occur. This firmware-implemented facility automatically dispatches a process for execution, then reorders remaining processes without software intervention.

Arithmetic Unit

A 32-bit-wide arithmetic unit performs integer arithmetic and logical operations. The unit controls complex address formations such as base-plus-displacement and indexing. The Prime 50 Series systems support COBOL and PL/I and other business oriented languages with microcoded or hardware instructions for decimal arithmetic, character field manipulation, and editing operations. COBOL and PL/I decimal arithmetic operations support up to 18-digit packed or unpacked signed numbers. Other features include operand handling, rounding on numeric operations, and instructions for binary-to-decimal/decimal-to-binary conversions.

Instruction Set

The Prime 50 Series standard instruction set provides over 500 instructions for enhanced operating system communications, data handling and compiler flexibility. Address formation techniques use any of four user-accessible base registers, up to seven index registers, and 32-bit indirect words in any combination.

Multi-Segment Environment

Prime 50 Series programs operate in a multi-segment environment which includes a stack segment for local variables, an instruction or procedure segment, and a linkage segment for statically allocated variables and linkage to common data. Addressing modes provide access to stack and linkage variables. Hardware-implemented procedure CALL and RETURN instructions eliminate the overhead of software stack management routines.

Stack Architecture

Stack Architecture optimizes the efficiency of operations such as parameter passing subroutine calls, arithmetic expression evaluation and dynamic allocation of temporary storage. This is the supporting mechanism for re-entrant and/or recursive procedures.

Input and Output

All Prime 50 Series systems support direct-to-memory input/output operations with Direct Memory Access (DMA), Direct Memory Control (DMC), Direct Memory Transfer (DMT) and Direct Memory Queue (DMQ) access modes. High speed peripherals use DMA channels with a 960K-byte transfer rate, supporting medium-speed I/O transfer. DMT channels handle high-speed device controllers at throughput rates of 2.5 megabytes-per-second. DMQ channels provide circular queues for communication devices. This reduces operating system overhead by eliminating interrupt handling on a character-by-character basis.

In addition, the Prime 750 and 850, have a burst mode I/O facility that allows an eight megabyte-per-second data transfer rate between the processor and peripheral controllers. The burst mode I/O facility increases system throughput by reducing the processor's I/O workload, and enhances high speed peripheral performance.

Register Sets

Each Prime system has at least 128 hardware registers of 32-bits divided into four sections. One register section controls firmware and operating system functions. Another controls the processor's thirty-two high-speed Direct Memory Access channels. The remaining two sections contain the machine phases of active processes. The process exchange facility automatically manages register assignment to the processors.

System Integrity Features

Prime's 50 Series systems have user transparent integrity features to ensure reliability. Automatic microverification routines test the validity of the CPU logic and indicate malfunction causes through a diagnostic status test. Parity checking ensures data integrity throughout the processor's internal busses, registers, arithmetic unit, I/O, and other data paths. Error-correcting codes automatically detect and correct all single-bit errors to the operating system.

A comprehensive hardware controlled memory protection system has a "multi-ring" hierarchy that assigns programs to any of several security levels. Multiple users have full access to specified programs. Other programs and databases within the system are protected from unauthorized access.

Virtual Control Panel

Fast, effective troubleshooting is provided when identifying a hardware problem or installing a new operating system revision. All Prime 50 Series systems include an integrated Virtual Control Panel (VCP) that lets a diagnostic specialist locally or remotely control any system.

Summary of Features	250-II	550-II	750	850
32-bit architecture	■	■	■	■
Simultaneous active processes	128	128	128	128
Direct connect terminal users	32	64	96	128
512Mb virtual address space per user	■	■	■	■
Bipolar cache memory	2KB	8KB	16KB	32KB
Instruction preprocessor unit			■	■
I/O bandwidth (Mb/sec)	2.5	2.5	8	8
Multi-stream architecture				■
Hardware instructions for floating point arithmetic, decimal arithmetic, and character string manipulations		■	■	■
Single and double precision floating point arithmetic	■	■	■	■
32-bit integer arithmetic	■	■	■	■
Microprocessor control unit with process exchange facility	■	■	■	■
Internal parity checking	■	■	■	■
Hardware Protection	■	■	■	■

The Communications Solution: Distributed Processing Capabilities

Communication among remote systems in several locations is now a reality with Prime's 50 Series. The Prime array of distributed processing solutions allows you to access computer power where you need it, when you need it. PRIMENET,™ networking software, provides low cost communication with systems through packet switching networks. Prime's Remote Job Entry (RJE) options allow communications from several mainframe models. Prime's Distributed Processing Terminal Executive software conforms to the protocol used by IBM 3271/3277 display systems. Prime's communication solution combines a colorful range of hardware, software, and the latest proven communications capabilities to meet your present and future requirements.

PRIMENET Networking Software

Prime's distributed processing capabilities are implemented by a range of hardware and software products. PRIMENET networking software is the nucleus, supporting network communications with a variety of services and transmission methods. With PRIMENET, systems can be linked via RINGNET,™ or by local area network via leased or dial-up synchronous telephone lines or via Public Data Networks (PDNs).

All PRIMENET services for terminal users or programs operate transparently over all types of connections – no knowledge of network links or system location is required, no new commands are needed. A simple, interactive network configuration session guides the administrator in defining the systems and links in the network and in specifying which services are to be enabled and the security passwords needed for access.

The *remote login* service allows terminal users to log in to any system in the network and run programs exactly as if they were locally logged in. The *remote file access* service allows users or programs to access any file in the network regardless of where they are located. There is no need to specify where the file is – the file system will find it for you. The *inter-process communications* service allows programs in one or more systems to communicate with each other. This allows a user to implement fully distributed applications in any high level language. *FTS,* the *File Transfer Service,* will send or fetch files across the network on behalf of users. FTS can inform the user when a file has arrived and automatically maintains a log of all transfers.

Because PRIMENET uses the international standard X.25 protocol internally, it can easily connect up to X.25 Packet Switched Networks to give national and international access to both Prime systems and other vendors systems. With the NETLINK program, a Prime user has full access to the wide range of time share and information services available in these networks; PRIMENET can connect to TELENET, TYMNET, DATAPAC, TRANSPAC, PSS and a growing number of other PDNs through the world.

DPTX

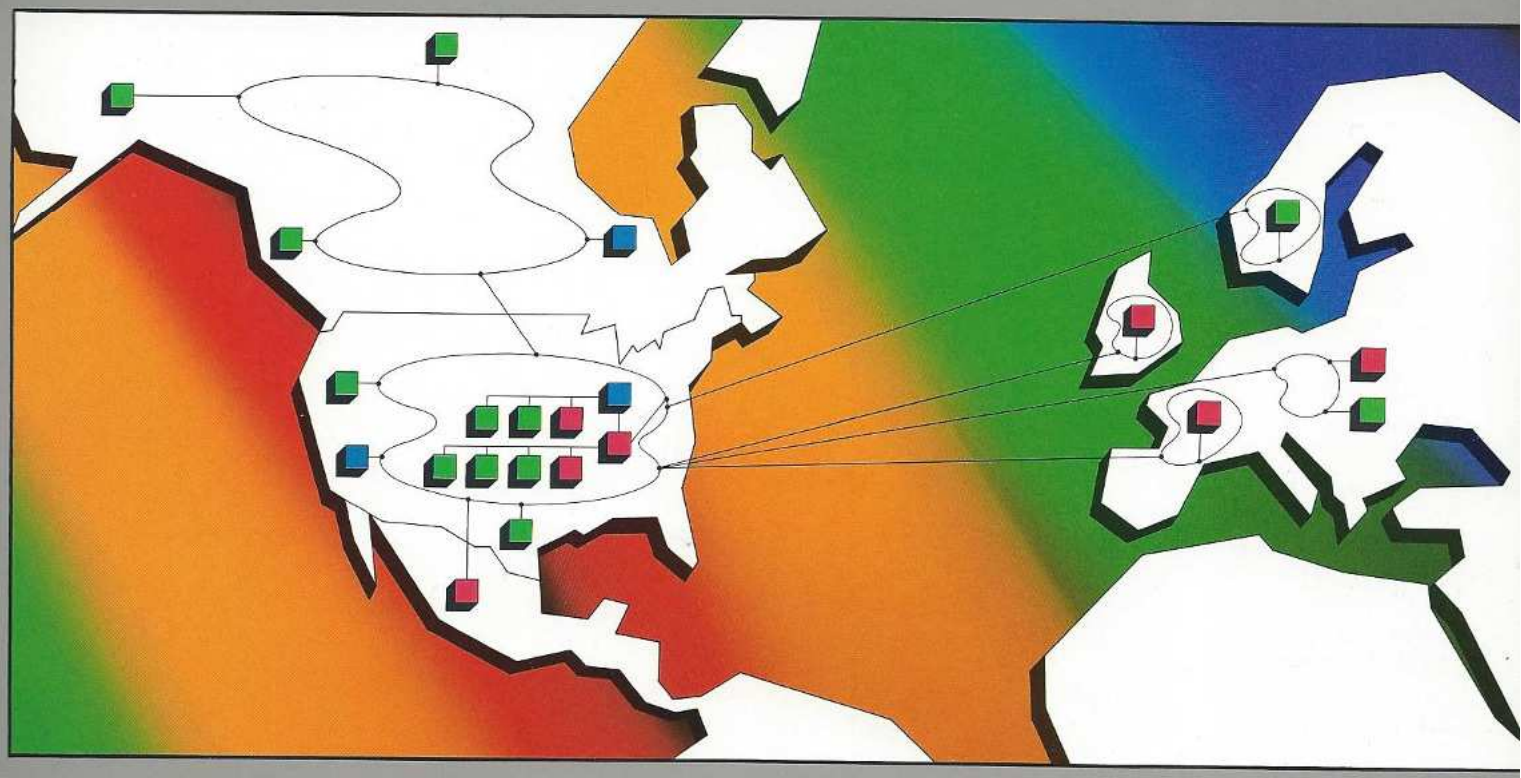
Prime's Distributed Processing Terminal Executive (DPTX) lets users configure Prime systems with IBM systems and 3270 terminals. DPTX works with all major IBM telecommunications monitors and access methods – including IMS/VS, CICS/VS, TSO, BTAM, TCAM and VTAM. DPTX lets 3270 terminal users maintain IBM applications execution while gaining Prime's interactive capabilities. The DPTX software translates data and command formats automatically, so both IBM and Prime systems can exchange data.

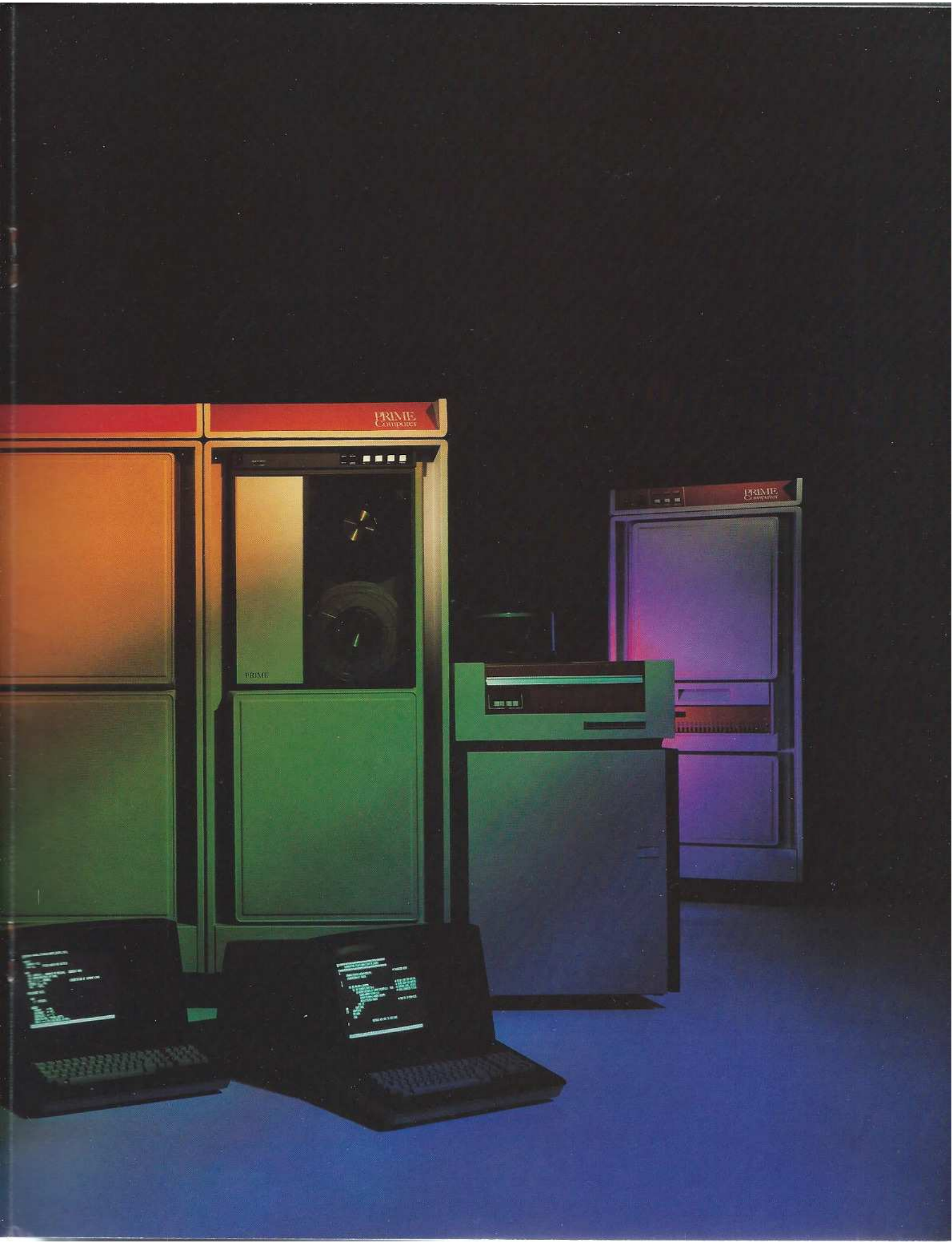
One DPTX service lets Prime terminals and programs look like 3270 terminals to a remote host. Another connects 3270 terminals to Prime Systems, so 3270 users can access Prime system resources. A third DPTX service lets 3270 terminals, attached to a Prime system but operating as if part of the IBM system, access both Prime and IBM systems.

RJE

Prime offers a variety of mainframe Remote Job Entry (RJE) emulation packages. They provide an interactive workstation to supplement local processing power, offload a central mainframe, or expand a distributed processing network. The packages support IBM 2780/3780, IBM HASP, CDC 200 UT, ICL 7020, Honeywell GRTS and UNIVAC 1004.

All Prime RJE emulators use the high speed Multiple Data Link Controller (MDLC), which concurrently supports up to four RJE emulators. With the consistent user interface, the MDLC lets Prime systems operate as multiple mainframe terminals.




PRIME
Computer
PRIME
PRIME
Computer

The Software Solution: One Operating System; An Array of Industry Standard Languages

The PRIMOS operating system is the basis on which Prime's band of software solutions is built. PRIMOS supports a diverse community of users in a secure, yet highly productive and personal environment.

PRIMOS is a single operating system that runs on all Prime 50 Series hardware in both stand alone and network configurations. It supports up to 128 concurrent interactive, phantom, or batch processes, supplying a consistent set of basic services to all types of users. These services provide reliability, performance, control, security, ease of use, and compatibility.

Because PRIMOS performs resource management, application programs are easier to write and computer time is better utilized. Working with the hardware, PRIMOS provides a highly reliable system. Problems are automatically detected and, when possible, corrected without disruption to the users.

The user is also assisted in the control and monitoring of the system by PRIMOS. The degree of control over the system can be selected, letting PRIMOS assume the remaining functions. Using PRIMOS' monitoring facilities, the state of the system can be observed and adjusted as desired.

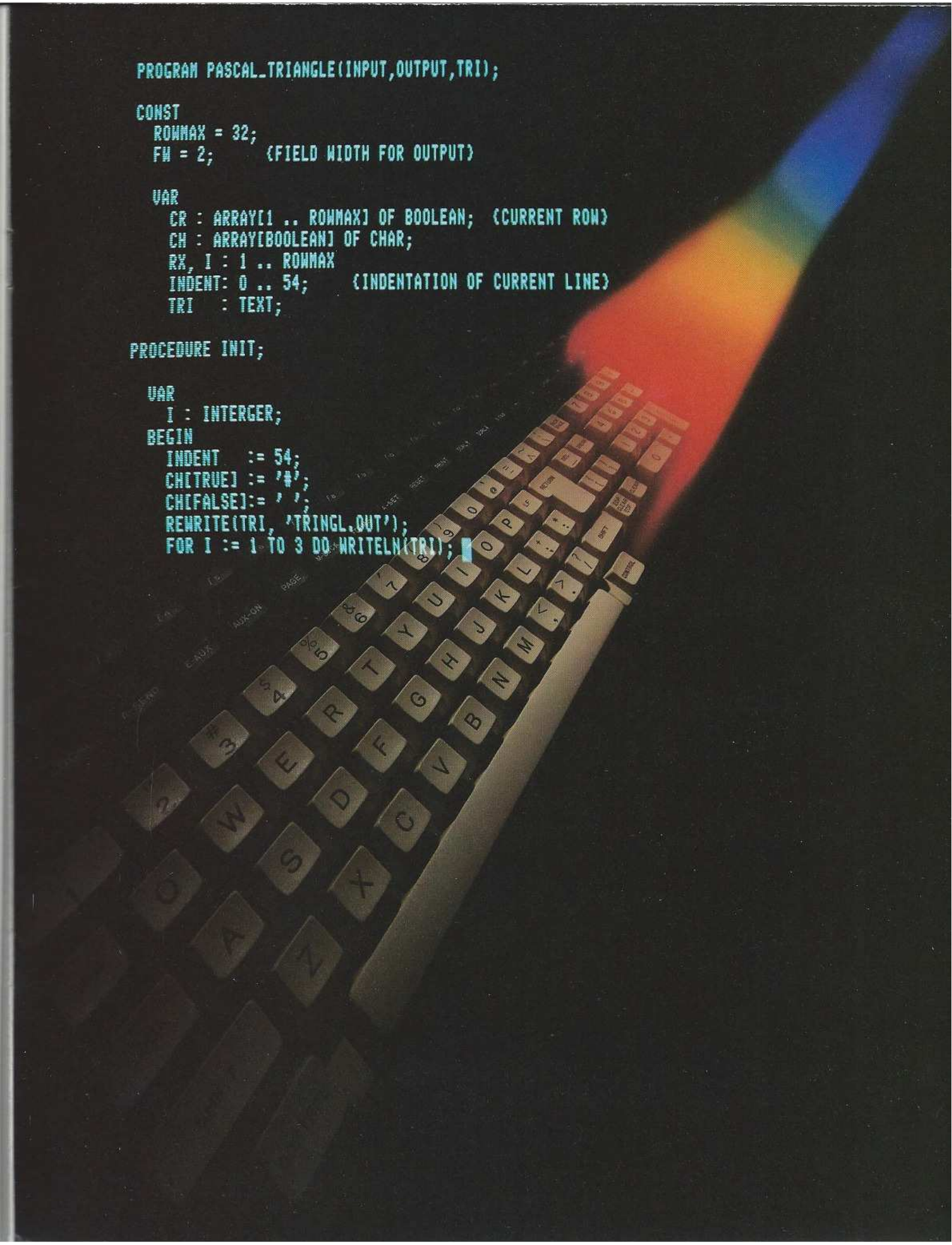
In any multi-user environment, security is a critical service that must be provided by the operating system. PRIMOS, in conjunction with the Prime 50 Series hardware, protects users, programs, and data. It ensures that only authorized users are allowed on the system. Through virtual memory management, PRIMOS supports the concurrent running of shared and private programs without conflicts. And data stored on disks is protected by a secure, flexible mechanism called Access Control Lists (ACLs). ACLs allow users to control who uses their files and how they may be used.

The most important service PRIMOS provides is an environment in which jobs can be accomplished quickly and easily. Powerful PRIMOS features such as CPL (Command Procedure Language) and ABBREV (user command abbreviations) aid the developer by performing more work with less input. The PRIMOS condition mechanism supports application subsystems that can totally isolate an application user from PRIMOS altogether. PRIMOS further promotes ease of use by ensuring the compatibility of PRIMOS and user programs across the entire Prime 50 Series and from one revision to the next.

In addition to these basic services, PRIMOS supports the full range of Prime's industry standard languages such as FORTRAN, FORTRAN '77, COBOL, PL/I Subset G, Pascal, BASIC/VM, RPG II and the Source Level Debugger for programmer productivity. All languages are object-code compatible. This enables programs to call routines and procedures written in any other Prime language. File compatibility ensures common access to data regardless of the programming language. In addition, languages are compatible across the entire 50 Series.

Also supported are several data management facilities developed by Prime. These include: MIDAS, the Multiple Index Direct Access System, the various levels of query facilities provided by PRIME/POWER, Prime's MIDAS query and report language, DBMS, Prime's Database Management System, DISCOVER, Prime's DBMS query and report writer, and FORMS, the Forms Management System. These products are effective tools in helping to develop, operate, and change your data management systems.

Prime's blending of software tools, data management products, and the PRIMOS, operating system work together to provide a comprehensive software solution.



```
PROGRAM PASCAL_TRIANGLE(INPUT,OUTPUT,TRI);

CONST
  ROWMAX = 32;
  FW = 2;      {FIELD WIDTH FOR OUTPUT}

  VAR
    CR : ARRAY[1 .. ROWMAX] OF BOOLEAN;  {CURRENT ROW}
    CH : ARRAY[BOOLEAN] OF CHAR;
    RX, I : 1 .. ROWMAX
    INDENT: 0 .. 54;     {INDENTATION OF CURRENT LINE}
    TRI   : TEXT;

PROCEDURE INIT;

  VAR
    I : INTERGER;
  BEGIN
    INDENT   := 54;
    CH[TRUE] := '#';
    CH[FALSE]:= ' ';
    REWRITE(TRI, 'TRINGL.OUT');
    FOR I := 1 TO 3 DO WRITELN(TRI);
```

MEDUSA Computer Aided Design

MEDUSA from Prime is an advanced computer aided design package available on all Prime systems. It is designed to speed the product development cycle for increased manpower efficiency, improved product quality and reduced production costs.

MEDUSA incorporates the latest technology for 2- and 3-dimensional design, drafting and documentation. It features a unique solid modelling facility, allowing the user to completely design complex objects and then automatically produce multi-view drawings for annotation and dimensioning.

MEDUSA is intended for use in multi-user, interactive environments. All input is stored in a common data base for access by all individuals involved in a project. Sharing the data reduces the time spent performing repetitive tasks and locating current data. It also provides a file on the entire history of a product's development for management review and analysis. MEDUSA features five modules – with each module isolated from program changes in other modules – making it easy to use for the beginner while providing sophisticated functions for the more experienced engineer.

Prime's Office Automation System

Prime has a solution to integrated information management requirements – The Office Automation System. The Office Automation System can improve management productivity and information handling for professional, as well as administrative personnel. Prime's approach to office automation is based on proven leadership in interactive data processing, networking and compatible, multi-function systems. The Office Automation System will spread information through your business spectrum with speed and ease.

The Prime Office Automation System totally integrates word processing, management communication and support, as well as personal computing, information access and data processing on a Prime 50 Series CPU. By combining the Office Automation System with PRIMENET networking software, there is a potential for thousands of users. The system incorporates both management and administrative workstations. The Office Automation System is implemented in phases with each software module extending the capabilities of the previous phase. New modules can be added to broaden the spectrum of system/company capabilities.

Prime's Office Automation System delivers all of the functions managed by other smaller, individual office combined products. Rapid access and distribution of information is standard. The Office Automation System reduces paper flow by replacing letters, memos, documents and internal notes with video screens. The system is menu driven and easy to use.

The Prime Office Automation System's spectrum of capabilities can help solve your entire corporation's integrated information management requirements.

The Peripheral Solution

Prime offers an array of fully compatible products to support and complement the performance of Prime's 50 Series systems. Compatibility ensures easy system upgrades and expansions. Upgrades never obsolete peripherals. Future performance and capacity requirements are satisfied with additional peripherals installed on the existing controllers within configuration guidelines. Prime's peripherals are grouped into three areas: mass storage devices, printers, and terminals.

Mass Storage Devices

Prime offers large capacity removable media storage module devices (SMDs), and large capacity non-removable fixed module devices (FMDs), as well as lower cost, medium capacity, fixed/removable cartridge module devices (CMDs). Customers can choose the level of storage required to meet specific application needs. SMD devices are available in 80 or 300 Mb (million character) sizes. FMDs are available in 630 or 160 Mb sizes. CMDs come in three sizes – 32, 64, and 96 Mb. One controller type supports all of these devices in any combination. Since four devices can be controlled by one controller, and since two controllers are configurable on any of Prime's 50 Series CPUs, a maximum of 5.0 billion bytes may be on-line to any system. This configuration flexibility, together with broad support by PRIMOS, ensures that customer investment in storage equipment is protected.

CMDs and controllers can be packaged into Prime's 250-II systems. This allows a large amount of storage to be located in the same floor space as the CPU.

Prime's line of tape products is one of the most complete in the industry. Customers may choose from four types of tape equipment including an advanced state-of-the-art 75 ips 6250 bpi GCR/PE unit, a 75 ips or 45 ips vacuum column NRZI/PE (800/1600 bpi) unit, a low cost 45 ips vacuum column NRZI only (800 bpi) unit, or a 7 track 556 bpi device. Up to 8 tape transports may be included on any Prime 50 Series system. Since all tape types and controllers are supported by all 50 Series systems and PRIMOS, a customer may expand and upgrade a system without purchasing new tape devices or controllers.

Printers

The 1000 lpm line printer is ideally suited for applications which require high quality printing, high volume throughput and heavy duty cycle. The printer is rated at 1000 lpm with a 64 character set and 750 lpm with a 96 character set. Other features include vertical forms control, static eliminator and off-line testing.

High quality, medium throughput requirements are satisfied with line printer models that operate at 600 or 300 lpm with 64 character sets and 450 or 200 lpm, with 96 character sets. All line printers include full length cabinets for quieter operation.

The 300 lpm matrix line printer/plotter is ideal for low to medium output printing and plotting. Parallel and serial interface models are available with a 96 character ASCII upper and lower case characters set standard. The serial model can be used as a remote printer.

The 3175 letter quality printer is a microprocessor controlled, serial input character printer that provides the quality of standard electric office typewriters. The letter quality printer provides 55 characters/second with a standard 96 character ASCII upper and lower case character set. It supports a variety of stylized and international character fonts.

The 160 character per second matrix printer is ideal for low cost, low output printing needs.

The Prime 50 Series: The One Solution

The Prime solution oriented approach is unique. A total spectrum of solutions is, in fact, a combination of Prime's industry unique resources. Prime hardware. Prime operating system and languages. Prime communications products. The Prime Office Automation system. The Prime line of peripheral devices.

Prime's 50 Series systems are fully compatible. System upgrades are possible without loss of initial investment. These systems meet today's needs, and grow easily as your business expands. *The total hardware solution.*

PRIMOS, Prime's one operating system, allows quick system access and automatically manages all system resources. It supports up to 128 simultaneous processes. PRIMOS, operating system executes the full array of industry standard languages and data management facilities, *The total software solution.*

MEDUSA, the computer aided design system from Prime, improves product quality, reduces production costs and increases manpower efficiency. Prime's Office Automation system incorporates word processing, management communications and support together with advanced text management, as well as data processing on Prime 50 Series systems. *The total productivity solution.*

Prime 50 Series systems are supported by a line of plug-compatible peripheral devices. Each manages multiple functions and minimizes system overhead. *The total peripheral solution.*

Prime's one-system array incorporates vivid features – speed, flexibility, performance, power and an unmatched price. The Prime 50 Series: *The gold at the end of the spectrum.*

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International Offices

PRIME®

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Irvine
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San Francisco
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Worthington

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Philadelphia
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PRIME®
Prime Computer, Inc.
Prime Park
Natick, Massachusetts 01760

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