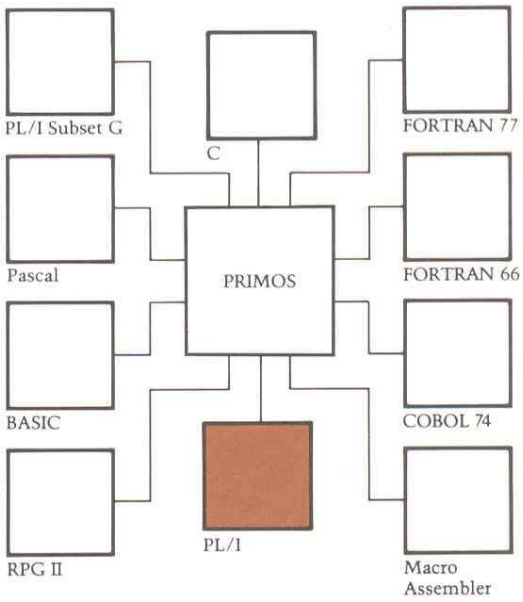
Product Bulletin

PRIME

PL/I

Features

- Full language version supports full ANS PL/I, X.3.53-1976, plus extensions for IBM PL/I compatibility
- Global optimization speeds program execution
- Exploits high-level instruction set and virtual memory architecture of 50 Series™ systems
- Supports programs up to 32Mb in size
- Interactive program development facilities include support for the Prime Source-Level Debugger
- Object compatible with other Prime software
- Compiler is shared and re-entrant, and generates shared and re-entrant code for improved memory utilization in a multiprogramming environment
- Run-time library supports code created by either PL/I or PL/I Subset G compilers
- Fast compilation
- Extensive and comprehensive error diagnostics
- File compatibility with all Prime languages including FORTRAN 77, V-MODE RPG, COBOL-74, Pascal, C and BASIC/VM
- Support for Prime FORMS and MIDASPLUS™ data management packages
- Fully compatible across all 50 Series systems



Description

Prime's PL/I is a general purpose, high-level language ideal for a variety of scientific, business and specialized systems programming applications. The full language PL/I is fully compliant with specifications for American National Standard X3.53–1976, except for keypunch support. IBM SELECT and LEAVE statements are also supported.

Prime's PL/I provides features and capabilities commonly found only in mainframe versions. It fully exploits the sophisticated 32-bit architecture of Prime's multiuser 50 Series systems and the virtual memory capabilities of the PRIMOS® operating system. Additionally, PL/I supports programs up to 32 million bytes in length.

PL/I incorporates a new performance feature called "constant folding." With this compiler function, expressions in the source code that evaluate to be constants are directly compiled as constants. Constant folding spares the system costly, inefficient re-evaluation at run-time.

Application Flexibility

Prime's PL/I combines the foremost capabilities of languages such as FORTRAN and COBOL-74 yet handles applications beyond the scope of either of these languages. The language supports features that permit construction of efficient, well-structured programs. These features include powerful control structures such as IF-THEN-ELSE, DO-WHILE, DO-UNTIL and SELECT, as well as block structure, scope rules and other capabilities designed to improve program modularity.

For scientific applications, PL/I provides arrays, real and complex floating-point data, list-directed and edit-directed I/O, and a comprehensive set of mathematical functions. For business applications, PL/I provides picture data, scaled decimal data, character string data, structures similar to COBOL-74 records, and keyed and sequential record-oriented I/O.

Prime's PL/I is also ideal for systems programming applications or offering bit string data, pointers, based variables and other features that provide explicit control over storage allocation. PL/I is particularly well suited to the development of large, sophisticated applications, without requiring the use of assembly language.

Total System Language Integration

As a direct result of the Prime "software first" design philosophy, Prime's PL/I is fully integrated into a complete language/operating system environment. It implicitly uses system facilities for virtual memory management, procedure sharing and protection. These facilities are the result of close interaction between the processors' ring protection, segmentation, demand paging hardware and PRIMOS operating system software, giving users enhanced performance and greater application flexibility.

For example, PL/I programs can include modules written in other Prime languages. This is because the same call conventions and libraries used by other Prime software apply also to PL/I. An immediate benefit of the object-compatible environment is that application packages developed in other languages are available to PL/I programmers, thus maximizing program development efforts.

The PRIMOS operating system also employs the same calling mechanism to interface with the operating system as is used to interface between user routines, so PL/I programs can gain direct access to the PRIMOS operating system and the Prime File Management System (FMS). Access to the operating system and the file management service does not incur the overhead of interrupts and supervisor calls typical of other systems. PL/I further provides access to other Prime software, such as MIDASPLUS, the Multiple Index Data Access System and FORMS, the Forms Management System.

Interactive Development and Debugging

PL/I offers many features that simplify interactive program development and increase programmer productivity. The compiler can produce a full range of program listings, including annotated source program listings, generated code listings, cross-reference and storage map listings, and summary compilation statistics. Other features include comprehensive compiler and run-time diagnostics produced in self-explanatory English phrases.

EMACS, Prime's programmable full-screen source editor and DBG, Prime's interactive debugger, are also available to support PL/I productivity.

Source-Level Debugger Support

In conjunction with the Prime Source-Level Debugger and the interactive capabilities of the PRIMOS operating system, PL/I provides a truly interactive environment for program development. From a timesharing terminal, an interactive user can create and edit source files on-line using the Prime text editor. The user then can immediately compile, execute and test these programs interactively under the control of the Source Level-Debugger. Debugger commands enable a user to dynamically set and clear breakpoints on source statements, examine and modify variables, step-through a program, trace statement execution, restart or proceed from a breakpoint, display source statements and trace back procedure activation history. As a result, the test and debugging time associated with program development is dramatically reduced.

Performance

The Prime PL/I compiler performs extensive global and local optimization to significantly reduce the execution time and space requirements of PL/I object programs.

PL/I object program efficiency is further enhanced by an instruction set and processor architecture designed to support high-level language constructs. The instruction functionality of Prime central processors includes integer and floating point operations, character manipulation and editing operations, and decimal arithmetic operations augmented by stack-oriented and register-oriented addressing modes. Many instructions correspond directly to PL/I constructs such as SELECT and CALL with argument transfer. As a result, the compiler is often able to translate a statement into a single machine language instruction, where other processors would require several instructions to perform the same function. In addition, other architectural features reduce operating system overhead in a multi-programming environment.

PL/I compile and run-time performance frequently exceeds that of its predecessor, the Prime PL/I Subset G compiler, for programs within PL/I subset G syntax. Where the ability to employ constant folding is present in large measure, PL/I run-time performance relative to PL/I Subset G can become substantially faster.

Easy Program Migration

PL/I runs on all 50 Series systems. Programs developed on one Prime system can be run without modification on another. In this way, a large system can be used for software development and to create programs that can compile or execute directly to other Prime systems.

Through a variety of software products for communication application, PL/I programs are transferable to other Prime systems and to other manufacturers' systems in distributed data processing networks. The PRIMENET™ distributed network facility allows PL/I program communication over low-cost packet switching networks. Users can also interface Prime systems to a variety of terminals and communications lines with multiple protocols and remote job entry options: IBM BISYNC for HASP and 2780; High-level Data Link Control (HDLC) protocol for X.25 packet switching networks; Control Data 200UT; Univac 1004; and ICL7020. The Prime Distributed Processing Terminal Executive (DPTX) software conforms to the protocols used for IBM 3271/3277 display systems.

This easy migration of PL/I programs – whether to another Prime system or another manufacturers' system – saves programming efforts and money.

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PRIME®

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