



VisualAge PL/I

Getting Started on Windows

Version 2.1



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Note!

Before using this information and the product it supports, be sure to read the general information under "Notices" on page iv.

Second Edition (April 1998)

This edition applies to Version 2.1 of VisualAge PL/I Enterprise (part number 04L7217) and to any subsequent releases and modifications until otherwise indicated in new editions. Make sure you are using the correct edition for the level of the product.

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About this book

This book is divided into two chapters. The first chapter introduces you to VisualAge PL/I and provides a brief outline of the tasks you can perform using the product. Besides providing information about how to get started with your PL/I compiler, you will find instructions on how to access online information and obtain service. The second chapter is designed to help you install VisualAge PL/I.

The VisualAge PL/I manuals are provided in two formats on the product CD-ROM:

1. INF online files
2. PDF files, viewable with Adobe Acrobat

The .INF files are installed if you select the documentation component in the selective install process. The PDF files are not installed but can be accessed on the CD-ROM.

If you would like to order printed copies of the books listed below, you can get them (at an additional charge) through your regular IBM ordering channel, or by calling 1-800-879-2755. The books are identified by their corresponding order numbers:

- Language Reference, GC26-9178-01
- Programming Guide, GC26-9177-01
- Messages and Codes, GC26-9179-01

The Language Reference, Programming Guide, and Messages and Codes book are designed to accompany VisualAge PL/I on both OS/2 and Windows since much of the information is common to both platforms. Differences between the platform information are identified where they occur in the text.

A short practice exercise

Chapter 1. Introducing VisualAge PL/I

VisualAge PL/I provides a PL/I development environment on Windows NT that is designed to allow you to create applications that can run on mainframe, workstation, or client/server systems with access to DB2 and other data systems.

VisualAge PL/I provides an optimizing compiler that contains a rich implementation of the PL/I language as well as support to provide compatibility with mainframe PL/I. The compiler also includes the power of the macro facility, include preprocessor, and SQL preprocessor.

The remaining sections in this chapter introduce you to:

- How to compile, link, and run a simple practice exercise
- Tools available for use with VisualAge PL/I
- How to use the information packaged with the product
- How to get product support

A short practice exercise

Try compiling, linking, and running a simple program to get an idea of how to use PL/I in the Windows environment.

The HELLO program

Here are the steps to make a program that displays the character string "Hello!" on your computer screen.

1. Create the source program

Create a file, HELLO.PLI, with the following PL/I statements.

```
Hello: proc options(main);  
        display('Hello!');  
end Hello;
```

Leave the first space of every line blank: by default, the compiler only recognizes characters in columns 2-72. (Additional information is in the Programming Guide.)

Save the file to disk.

2. Compile the program

In a window or full-screen session, go to the directory that contains the HELLO.PLI file and enter the following command:

```
pli hello
```

The compiler displays information about the compilation on your screen, and creates the object file (HELLO.OBJ) in the current directory.

3. Link the program

Without changing directories, enter the following command:

```
ilink hello.obj
```

Tasks you can perform using VisualAge PL/I

This combines the file HELLO.OBJ with needed library files (as specified by the LIBS compile-time option), producing the file HELLO.EXE (the executable program) in the same directory.

Since no parameters are specified with the link command, the defaults are used. The options available with the link command are described in the Programming Guide.

4. Run the program

Without changing directories, enter the following command:

```
hello
```

This invokes the HELLO.EXE program, which displays He1lo! on your monitor.

To make things easier, programmers often put the commands for compile, link, and run together in a command (CMD) file.

Using compile-time options

As you prepare to compile programs, consider using a subset of the available compile-time options. A complete description of the compile-time options, including their optional abbreviated forms is in the Programming Guide.

The following example illustrates how to specify options as part of the compilation command:

```
pli filename (source attributes(full))
```

source

This option causes your source code and compiler messages to be saved in a compiler listing file (for example, HELLO.LST).

attributes(full)

This option causes a listing of all the attributes in effect for each programmer-defined identifier to be included in the compiler listing.

Using the sample programs provided with the product

Several sample programs have been included with the product and are included in the \IBMPLI\SAMPLES directory.

Tasks you can perform using VisualAge PL/I

VisualAge PL/I provides a set of tools to edit, compile, and debug your programs, integrated in a project environment. VisualAge PL/I remote functions let you work with host applications from your workstation, providing a seamless workstation environment for the development of host programs. From the workstation, you can edit and compile PL/I applications on the host, even applications with DL/I calls. Files are directly loaded from the host to the workstation without the need for explicit downloading and workstation naming and mapping. Communication to the host is provided using TCP/IP or APPC.

Tasks you can perform using VisualAge PL/I

VisualAge PL/I offers you the tools you need to efficiently develop new applications and migrate existing applications as needed. Using VisualAge PL/I, you can analyze your applications to develop migration plans, study your program code to find potential trouble spots, and develop detailed reports identifying potential year-2000 problems.

Working in a Project Environment

With the VisualAge PL/I project environment, your tools and files are integrated into a single development environment, where you can work with your files directly rather than accessing them through individual tools. A VisualAge PL/I project is the complete set of data and actions you need to build a single target, such as a dynamic link library (DLL) or executable (EXE).

Performing Remote Edit and Compile

VisualAge PL/I provides a workstation environment for editing and compiling host PL/I applications. Application parts and components are kept in PDS or PDSE data sets on the host. You access and work with these files through an MVS project.

Using Remote Edit and Compile, you can:

- Access host data sets in MVS projects
You can connect to PDS or PDSE data sets on the host and access your host files as if they were workstation files
- Edit host files with the LPEX editor
You can edit remote files using the VisualAge PL/I editor, which enables you to use the language-sensitive editing capability of the editor on host PL/I programs.
- Compile on the workstation to check syntax
From the workstation, you can run a syntax-check compile on your source files to ensure they compile error-free before submitting them for compile on the host.
- Submit batch jobs to the host
You can submit jobs directly from your project without logging on to the host.
- Monitor the status of batch jobs on the host
You can monitor the status of host batch jobs from your workstation
- Execute TSO commands on the host
You can open a TSO command prompt window from your project, allowing TSO commands to be submitted to the host.

If you keep your source, copy files, or JCL in a library system on the host, you must copy them from the host library to a PDS to make them available for MVS project actions.

For information about configuring your system for performing Remote Edit and Compile, see the system configuration information in README.WIN.

Tasks you can perform using VisualAge PL/I

Editing source code using the LPEX editor

The VisualAge PL/I language-sensitive editor is fast, simple to use, helpful, and easily modified to meet your personal preferences. Different types of language constructs are highlighted in different fonts and colors. The editor provides basic cut-and-paste text editing features, customization features and an application programming interface. You can customize LPEX with editing features and functions specific to PL/I files or many other document types.

The editor helps you to review and understand code by presenting several views of the source code. In addition, you can record a sequence of keyboard events as an editor macro command and then modify it to be reused as an external command.

Using Millennium Language Extensions (MLE)

MLE is IBM's patent-pending technology that provides support for automated date windowing to help you address the year 2000 challenge. MLE uses a windowing approach to identify and convert date data from a two-digit year to four-digit year. Provided through IBM extensions to the PL/I language, MLE gives you a mechanism to indicate to the compiler which dates should be windowed. It's a compiler-assisted solution for your windowed dates.

Accessing Distributed Data

VisualAge PL/I also provides a set of functions that enable your applications to handle data across distributed environments. The services include:

- Local VSAM record file system
- Access to remote VSAM record files using the file processing capabilities of PL/I
- Copy, sort, and merge functions for both record and byte files
- Access to local and remote DB2 and CICS databases using native SQL support
- Access to local and remote databases that support ODBC
- Btrieve** support which allows you to use PL/I I/O statements to access CICS files
- Local sequential, relative, and indexed files using the STL (a VisualAge PL/I access method) file system that supports full ANSI 85 PL/I standard file I/O language

These services enable you to create client/server and cooperative processing applications using the IBM PL/I language. Your applications can also call the utilities directly using the application programming interface (APIs) that come with the utilities.

Analyzing program performance

VisualAge PL/I offers execution trace analysis and performance tuning. This enables you to time and tune your applications, analyze program hangs and deadlocks, view multithread interactions, and better understand your code. Performance Analyzer can provide information on:

- **Timing and tuning:** The trace file contains a detailed record of function calls and returns. Performance Analyzer can display the trace in a chronologically-scaled

Tasks you can perform using VisualAge PL/I

format. This helps you find the “hot spots” in the code *and* the cause of those hot spots.

- **Program hangs and deadlocks:** Performance Analyzer provides a complete history of the events leading up to the point the program stopped. You can view the function call stack any place in the application.
- **Multithread interactions:** You can look at the sequencing of procedures across threads, which can make problems with critical sections visible.

Accessing IMS Databases

VisualAge PL/I's Remote DL/I support enables you to use your workstation environment to develop and test host PL/I programs that use DL/I calls in IMS batch applications to access IMS full function databases and GSAM databases. Using the Remote IMS DL/I support, you can develop, compile, and test PL/I programs that run in an IMS batch environment that use PLITDLI calls.

Redeveloping legacy code

VisualAge PL/I can help you analyze, understand, and maintain legacy PL/I programs and applications. With VisualAge PL/I, you can redevelop existing programs to produce applications better suited for future tasks.

VisualAge PL/I supports:

- Application and Program Understanding to help you understand the resource allocation, structure, and control flow of a program or an application in your current MVS or VSE inventory
- Year 2000 Analysis, to help you locate two-digit date fields that might cause you trouble when processing dates later than 1999.

Understanding your applications

The analysis and maintenance process often begins with an evaluation of existing applications to find the most suitable choice for redevelopment.

VisualAge PL/I extracts key information from your existing inventory of JCL and presents this information in easy to understand graphic windows to help you understand how applications are constructed. Using this function, you can see the content of your applications and the resources they use. For example, you can view all the jobs and the job steps that process a particular file or execute a particular program. You can see all the jobs that make up an application, expand the view to see the job steps, and then expand it again to see the DD statements of a job step.

Once you've used VisualAge PL/I to help focus your redevelopment effort, you can use VisualAge PL/I to perform a year 2000 analysis to identify, locate, and understand year 2000 challenges within existing applications.

Using information packaged with the product

Understanding program structure and control flow

VisualAge PL/I helps you explore various graphical views of the physical design of a program. At the highest level, you can discover the relationships between programs within an application. A mid-level view displays the calling structure between the routines within a program or executable, including routines external to a program. At the lowest level, you can examine the control flow of each program.

In addition, you can access hypertext cross-reference information that details program usage, data structures, symbol usage, and INCLUDE library usage.

Analyzing the year 2000 impact

VisualAge PL/I helps you tackle the year 2000 challenge by locating occurrences of two-digit date fields in your programs. Using the Cross Compilation Unit Analysis, you can propagate impact analysis information between programs.

Impact analysis results are reported and can be filtered to narrow the scope of program elements that are inspected and changed in order to help correct a year 2000 problem. Reports are generated in both flat text and HTML format. The HTML format allows the report to be more readily shared between team members on a common intranet and HTML reports use color, highlighting, and formatting to optimize the report design.

Using an interactive debugger

The debugger offers source-level debugging built around a set of core functions designed to let users quickly and efficiently control execution and analyze data, including these features:

- Display and change storage
- Display and change the processor registers
- Display the call stack
- Add and delete simple and complex breakpoints
- Control the execution of multiple threads
- Access source, disassembly, or mixed views of your code

Using information packaged with the product

Your VisualAge PL/I CD contains publications in two formats:

1. INF format—Once you install the documentation component, you can access these viewable documents by double clicking on the documentation icons that appear in the product folder.
2. PDF format—PDF versions of the books are provided on the product CD, they are not installable. You can view these files with the Adobe Acrobat Reader which is also provided on the CD.

Online help is available from the **Help** pull-down menus for components like the debugger, LPEX, and the Performance Analyzer.

Getting product support

Getting product support

There are several ways for you to get product support for your PL/I product.

- **Voice Support:** To report a problem, call 1-800-237-5511 or 1-800-992-4777. These phone numbers are available Monday through Friday, 8:00 a.m. to 5:00 p.m., your time zone.
- **Fixes:**
 - For AIX, call 1-800-237-5511 to request the latest PTFs for PL/I Set for AIX.
 - For OS/2 and Windows, you can ftp fixes from *ftp.software.ibm.com* (look in the */ps/products/pli/fixes* directory).
- **Mail:** Mail your comments to:
IBM Corporation
Personal Systems Support Family
Internal Zip 2901
11400 Burnett Road
Austin, TX 78758
- **World Wide Web:** If you have access to the World Wide Web, you can access the **IBM PL/I Family** page as follows:
 1. Enter the Uniform Resource Locator (URL):
http://www.software.ibm.com/ad/pli/
 2. Click on **Support**.

For support in other countries, contact your local IBM-authorized sales representative.

Installing VisualAge PL/I

Chapter 2. Installing VisualAge PL/I

Before you install IBM VisualAge PL/I, make sure that your workstation meets the hardware and software requirements described in "Hardware and software requirements."

You must uninstall any previous version of VisualAge PL/I before you install VisualAge PL/I Version 2.1.

VisualAge PL/I Version 2.1 is available on CD-ROM only,

— **Don't forget the readme file** —

If you have other VisualAge products installed, review the **readme** file. Once you have installed the product, make sure you review the information in the readme file. It contains the very latest product information that might not appear in any other documentation.

If you will be running CICS for Windows NT on this machine, or if you are installing VisualAge PL/I as an Administrator for one other user account, you must select the **Common** installation choice.

Note: If installing VisualAge CICS Enterprise Application Development, you can choose either the **Common** or the **Personal** installation choices.

Hardware and software requirements

This section includes information on hardware and software requirements for VisualAge PL/I.

Processor

486-based 66MHz processor (minimum) Pentium-based processor or higher (recommended)

If you select Program Understanding tools:
Pentium-based 100MHz processor (minimum) or higher (recommended)

Operating System:

For application development:

Microsoft Windows NT** Version 4.0 (Service Pack 3 is recommended)

For application execution:

Microsoft Windows NT** Version 4.0 (Service Pack 3 is recommended)
Microsoft Windows 95**

Hardware and software requirements

Memory

24 megabytes (MB) (minimum) 32 MB or higher (recommended)

If you select Program Understanding tools:
64 MB or higher (recommended)

Hard Disk Space

- Full product: 150 MB
- Swap space: 30 MB

You can reduce the space required by selectively installing components. The Installation Utility displays the amount of disk space required for the components you select.

For host communications

A communications adapter supported by the operating system is required

Other Software

This section lists the software required for specific applications. It also includes requirements for VisualAge PL/I components that require other software.

Hardware and software requirements

Table 1 (Page 1 of 3). Software Requirements

Application	Requirements
DB2	<ul style="list-style-type: none"> • For stand-alone DB2 workstation applications, one of the following: <ul style="list-style-type: none"> – DB2 Universal Developer's Edition V5.0 (comprised of the DB2 SDK plus the developer licenses and media for DB2 Universal Database Personal Edition, Workgroup Edition, and Enterprise Edition, and DB2 Connect Personal Edition and Enterprise Edition) – DB2 Personal Developer's Edition V5.0 (comprised of the DB2 SDK plus the developer licenses and media for the DB2 Personal Edition plus DB2 Connect Personal Edition on OS/2 and Win95/NT) – DB2 for Windows NT, V2.1.2 Server plus the DB2 SDK for Windows 95 and Windows NT, V2.1 – DB2 for Windows 95 and Windows NT, V2.1.2 Single-User plus FixPak 8115 plus the DB2 SDK for Windows 95 and Windows NT V2.1 – Database Server for Windows NT Version 4 plus FixPak 8117 (comprised of DB2 for Windows 95 and Windows NT, V2.1.2 and the DB2 SDK for Windows 95 and Windows NT V2.1) • For remote access or LAN-based DB2 applications, see README.WIN for system configuration information. <p>For more information, use one of the following addresses:</p> <ul style="list-style-type: none"> • World Wide Web: <ul style="list-style-type: none"> http://www.software.ibm.com/data/ http://www.software.ibm.com/data/db2/library/ • CompuServe <ul style="list-style-type: none"> GO IBMDB2 • Anonymous FTP Site <ul style="list-style-type: none"> ftp.software.ibm.com in the directory ps/products/db2
To use the Java DclGen tool on Windows	<p>One of the following:</p> <ul style="list-style-type: none"> • Java Runtime Environment Version 1.1 or later • Java Software Development Kit Version 1.1 or later
CICS Server (Windows NT)	For developing and running host production applications on Windows NT you will need VisualAge CICS Enterprise Application Development (provided with VisualAge PL/I Enterprise)
CICS Client	CICS Clients Version 2.0 or later
MQSeries (Windows NT)	<p>One of the following:</p> <ul style="list-style-type: none"> • MQSeries for Windows NT Version 5.0 • MQSeries for Windows NT Version 2.0 • MQSeries Client for Windows NT (shipped with the above product) <p>In addition, if you are using MQSeries for Windows NT Version 2.0, you must apply the appropriate MQSeries for Windows Software Developer Kit SupportPac, available from:</p> <p>http://www.software.ibm.com/ts/mqseries/txppacs</p>

Hardware and software requirements

Table 1 (Page 2 of 3). Software Requirements

Application	Requirements
MQSeries (Windows 95)	<p>MQSeries Client for Windows 95, available as a Software Developer Kit SupportPac, from:</p> <p>http://www.software.ibm.com/ts/mqseries/txppacs</p> <p>In addition, you must apply the appropriate MQSeries for Windows Software Developer Kit SupportPac, available from:</p> <p>http://www.software.ibm.com/ts/mqseries/txppacs</p>
Host Data Access (via APPC) using SMARTdata Utilities (SdU)	<ul style="list-style-type: none"> • On the workstation, one of the following: <ul style="list-style-type: none"> – IBM Personal Communications AS/400 and 3270 Version 4.11 for DOS, Windows, Windows 95, Windows NT, and OS/2 – Microsoft SNA Server Version 2.11 or later – IBM eNetwork Communications Server for Windows NT Version 5.0 • On the host: <ul style="list-style-type: none"> – DFSMS/MVS Version 1.2 (5695-DF1) is required on your host
Application Understanding, Program Understanding, or Year 2000 Analysis Tool	<p>One of the following:</p> <ul style="list-style-type: none"> • DB2 for Windows 95 and Windows NT, Version 2.1 plus FixPak 8115 • DB2 SDK for Windows 95 and Windows NT Version 2.1 plus FixPak 8115 • Database Server for Windows NT Version 4 plus FixPak 8117 • DB2 Universal Database Version 5 <p>Note: For Application Understanding to interact with your host from the workstation you must install the VisualAge PL/I Remote Edit/Compile component.</p>
Remote Edit/Compile/Debug Function	<p>Remote edit/compile/debug is available between your host (OS/390 or MVS) and Windows NT using TCP/IP. You need the following:</p> <ul style="list-style-type: none"> • On the MVS host: <ul style="list-style-type: none"> – IBM PL/I for MVS & VM Release 1.1 (5688-235) plus PTFs for APAR 13300 – IBM Language Environment for MVS & VM Release 5 (5688-198) – TCP/IP Version 3 Release 2 for MVS/ESA (5655-HAL) (TCP/IP Version 3 Release 3 is not recommended) – DFSMS/MVS Version 1.2.0 (5695-DF1) with the Network File System Feature (minimum) or DFSMS/MVS Version 1.3.0 (5695-DF1) with the Network File System Feature and the PTF for APAR OW25973 (recommended) • On the Windows NT workstation, one of the following NFS products: <ul style="list-style-type: none"> – NetManage Chameleon NFS/X for Windows 7.0 – NetManage UnixLink 97 – Hummingbird NFS Maestro Version 6 Release 0

Beginning the install process

Table 1 (Page 3 of 3). Software Requirements

Application	Requirements
Remote IMS DL/I on Windows NT via APPC	<p>Remote DL/I is available between your host (OS/390 or MVS) and Windows NT workstation. You need the following:</p> <ul style="list-style-type: none">• On the OS/390 host:<ul style="list-style-type: none">– IMS/ESA Database Manager Version 5 Release 1 (5695-176) plus enabling PTF, or, IMS/ESA Database Manager Version 6 Release 1 (5655-158)• One of the following:<ul style="list-style-type: none">– OS/390 Release 3 Language Environment feature (5645-001)– IBM Language Environment for MVS & VM Release 5 (5688-198)• On the MVS host:<ul style="list-style-type: none">– IMS/ESA Database Manager Version 5 Release 1 (5695-176) plus enabling PTF, or, IMS/ESA Database Manager Version 6 Release 1 (5655-158)– IBM Language Environment for MVS & VM Release 5 (5688-198)• On the Windows NT workstation:<ul style="list-style-type: none">• One of the following:<ul style="list-style-type: none">– IBM Personal Communications AS/400 and 3270 Version 4.11 for DOS, Windows, Windows 95, Windows NT, and OS/2– IBM eNetwork Communications Server for Windows NT Version 5.0
HTML-formatted information	<p>Use one of the following:</p> <ul style="list-style-type: none">• Netscape Navigator for Windows Version 3.01• Microsoft Internet Explorer Version 3.01

Beginning the install process

The VisualAge PL/I installation program creates the necessary subdirectories for you.

For **Windows NT**, the installation program sets environment variables in the user environment for the user logged on at the time of the installation. A different user logged on to the same machine will not see the VisualAge PL/I product unless they have the same environment variables set in their user environment.

You can view and set user environment variables by selecting the **System** icon in the **Control Panel** folder, which is accessed from the main folder.

For **Windows 95**, the installation program modifies your AUTOEXEC.BAT. A copy of your original, unmodified AUTOEXEC.BAT file is saved as the next unused file name in the ascending sequence of AUTOEXEC.001, AUTOEXEC.002, etc. A higher number in the file name extension indicates a more recent copy.

Installing VisualAge PL/I for Windows

If you have a previous version of VisualAge PL/I installed, you must uninstall it before installing VisualAge PL/I Version 2.1.

To install VisualAge PL/I Version 2.1, do the following:

Beginning the install process

1. From the command line, change to the directory where the installation program is located (the root directory for the CD-ROM or the target location where the VisualAge PL/I image resides).
2. To begin the installation, enter the following command: `setup`
3. Follow the prompts to proceed with the installation.

Note: The tools and information components are grouped into separate *component sets*. To deselect (or select) a component, position the cursor over the check mark next to the component name, and click once with mouse button 1. Some components are dependent on others (for example, the editor requires WorkFrame). The installation utility will automatically select any dependent components.

4. The **Setup Complete** window appears when the installation is complete.
5. Shutdown and restart your computer.

You can now begin using VisualAge PL/I. Refer to INSTALL.TXT on the CD-ROM for additional information regarding installation.

Deleting components and VisualAge PL/I

To delete, add, or reinstall a component, you must first delete the **entire** product. Refer to INSTALL.TXT on the CD-ROM for important information about deleting VisualAge PL/I before proceeding.

The VisualAge PL/I deletion program looks for and uses the user environment variables defined by the installation program. If you are deleting VisualAge PL/I immediately after installing it, you must first reboot your system to set those user environment variables.

To delete VisualAge PL/I, do the following:

1. Click on the **Uninstall** icon found in **VisualAge PL/I** window.
2. Click on the **Yes** push button to continue deleting the product from your disk drive.

The installation program begins deleting files from your target installation directory. All files in the target installation directory, whether they be your own or files from VisualAge PL/I, are deleted.

When complete, you will see a message that VisualAge PL/I has been successfully deleted.

3. Shut down and restart your system.

If VisualAge PL/I files are locked or in use during product deletion, the deletion process will fail, and a message displays.

To recover from a failed VisualAge PL/I product deletion, do the following:

1. Shut down and restart your system.
2. Go to the **File Manager** icon in the main window and manually delete the rest of the product.

Beginning the install process

If for any reason, you do not have the **Uninstall** icon:

- Go to the \winnt\ibmp1iun directory on the drive where you installed the operating system.
- Enter the following command to uninstall:
 setup

We'd Like to Hear from You

VisualAge PL/I
Getting Started on Windows
Version 2.1

Part Number 04L7724

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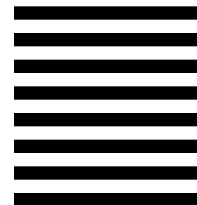
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