



PGI Accelerator™ C Compiler

for Microsoft Visual Studio

Technical Preview

The Portland Group®

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The Portland Group®
Two Centerpointe Drive
Lake Oswego, OR 97035
www.pgroup.com

ID: 1469

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1 Introduction

This document provides a brief overview of the PGI Accelerator C Compiler Technical Preview Release and how to begin using it within Microsoft Visual Studio.

You must have the C++ language in Microsoft Visual Studio 2008 installed on your system prior to installing the PGI Accelerator C Compiler plug-in. The plug-in is not currently supported on Visual Studio 2010.

The PGI Accelerator C Compiler plug-in includes the PGI Accelerator C compiler and the NVIDIA CUDA Toolkit. It does not include the CUDA driver which you must download and install separately if you intend to run applications compiled with the PGI Accelerator C compiler.

1.1 Structure of This Document

This document has four chapters:

- Chapter 1 provides an overview.
- Chapter 2 is how to get started using the PGI Accelerator C Compiler plug-in.
- Chapter 3 contains restrictions and limitations.
- Chapter 4 is contact information.

Details about the capabilities and hardware in NVIDIA GPUs are available in the appropriate NVIDIA documentation.

1.2 Licensing

The software is licensed under the PGI Technical Preview Program. Licensing terms are outlined in the documents describing that program.

1.3 References

- PGI Accelerator programming model information and general information about the accelerator is available online at: www.pgroup.com/resources/accel.htm.
- *PGI Compiler User's Guide* and *PGI Reference Guide*, included with this release.
- *NVIDIA CUDA™ Programming Guide*, NVIDIA, Version 2.1, 12/8/2008. Available online at www.nvidia.com/cuda.
- *NVIDIA CUDA Compute Unified Device Architecture Reference Manual*, NVIDIA, Version 2.0, June 2008. Available online at www.nvidia.com/cuda.

2 Using the PGI Accelerator C Compiler

This chapter contains an outline of the steps to follow to enable and use the PGI Accelerator C compiler in a VC++ project. The process involves five steps:

- 1) Enable the Custom Build Rule.
- 2) Set the Tool property to PGI Accelerator C Compiler.
- 3) Set the PGI Accelerator C properties.
 - a. Enable Accelerator compilation.
 - b. Set the Target Architecture property.
- 4) Add Libraries for Linking.
- 5) Build.
- 6) Enable Runtime DLLs for Execution.
- 7) Run.
- 8) Debug.

For examples that demonstrate this process, refer to the Samples section.

2.1 Enable the Custom Build Rule

Access to the PGI Accelerator C compiler in a VC++ project is available by using a custom build rule. To enable this custom build rule within Visual Studio:

1. Right-click your project in the solution explorer and select "Custom Build Rules..."
2. In the Available Rule Files box, look for "PGI Accelerator C Compiler."
3. Check the box next to this rule.

Note. You must do this process for every project in which you want access to the PGI Accelerator C compiler.

2.2 Set the PGI Accelerator C Compiler as the Tool

You have to set the compiler on a file-by-file basis. Once the custom build rule is enabled, you will be able to select the PGI Accelerator C Compiler as the tool to use to compile a given file. To do this, follow these steps:

1. Select the file you wish to compile with the PGI Accelerator C compiler.
2. Right-click on this file in the solution explorer and select "Properties."
3. Look for the Tool property on the file's General property page.
4. In the Tool property's drop-down box, select PGI Accelerator C Compiler.
5. Click Apply.

Important: The PGI Accelerator C compiler only accepts C code. It will not process C++.

2.3 Set the PGI Accelerator C Properties

To set the PGI Accelerator C properties to enable accelerator compilation, use the PGI Accelerator C Compiler property pages.

2.3.1 Enable Accelerator Compilation

A good way to start is to enable the following two properties on the Target Accelerators property page:

- Enable PGI Accelerator Directives
- NVIDIA: Accelerate

2.3.2 Select Target Architecture

Make sure that the Target Architecture property on the General property page is set to a value that matches that of the current Visual Studio Platform.

For example, if the current platform is Win32, then the Target Architecture property should be set to “Compile for 32-bit target.”

2.4 Add Libraries for Linking

The PGI runtime libraries are required to enable linking. There are two steps to adding libraries:

1. Add the library path to the Linker | General | Additional Library Directories property. This path looks similar to this:

OS	VS Platform	Library path
x86	Win32	C:\Program Files\PGI\win32\11.0\lib
x64	Win32	C:\Program Files (x86)\PGI\win32\11.0\lib
x64	x64	C:\Program Files\PGI\win64\11.0\lib

2. Add the actual PGI libraries to the Linker | Input | Additional Dependencies property. To do this, you might use something similar to the following:

	CPU	GPU (-ta)	GPU + OpenMP (-ta -mp)
All Platforms	libpgmg.lib libpgc.lib	libacc1.lib libpgmg.lib libpgc.lib ws2_32.lib	libacc1mp.lib libpgmg.lib libpgc.lib ws2_32.lib
For Win32 Add	libpgsse1.lib libpgsse2.lib	libpgsse1.lib libpgsse2.lib	libpgsse1.lib libpgsse2.lib

2.5 Build

Build the Solution as you normally would. For example, Build | Build Solution.

2.6 Enable Runtime DLLs for Execution

When executing, the application containing accelerator kernels uses the PGI runtime accelerator DLLs. In order to use these DLLs, the application must be able to find them first.

To enable execution from within Visual Studio, add the path to the PGI runtime DLLs to the startup project's Debugging | Environment property. For example, you would use:

OS	VS Platform	Path to the PGI runtime DLLs
x86	Win32	Path=C:\Program Files\PGI\win32\11.0\bin;%Path%
x64	Win32	Path=C:\Program Files (x86)\PGI\win32\11.0\bin;%Path%
x64	x64	Path=C:\Program Files\PGI\win64\11.0\bin;%Path%

If the PGI runtime DLLs are not found during execution, you will see a message to that effect.

2.7 Run

Once the solution has built successfully and the PGI runtime is accessible, execute the application as usual from within Visual Studio. For example, Debug | Start Without Debugging or Ctrl+F5.

2.8 Debug

There are two choices for debugging a solution built using VC++ and the PGI Accelerator C compiler. The first option is to use the VC++ debugger which is invoked as usual via Debug | Start Debugging or F5. The second option is to use the PGI debug engine which is invoked using Debug | Start PGI Debugging.

The VC++ debugger supports debugging in VC++ compiled code. It does not support debugging in PGI compiled code or code running on a GPU.

The PGI debugger supports debugging in both VC++ compiled code and PGI compiled code. It does not, however, support debugging code running on a GPU. Only host code debugging is supported at this time.

2.8.1 Compile for Debugging

The best debugging experience is typically obtained when an application is built with debug information enabled. The PGI Accelerator C Compiler | General property page contains a Debug Information Format property. By default, this property is set to Disabled. Two other options are available that enable the generation of debug information. Using one of these options should improve the debugging experience when using the PGI debug engine.

2.8.2 Link for Debugging

The VC++ Linker | Advanced | Randomized Base Address property should be set to Disable Image Randomization when creating an application to be debugged by the PGI debug engine. This release of the PGI debug engine does not provide consistent debugging support for images with randomized base addresses.

2.9 Samples

The installation of the PGI Accelerator C compiler plug-in contains a sample Visual Studio solution containing a VC++ project using the PGI Accelerator programming model directives.

To use the samples, follow these steps:

1. Locate the sample directory for your OS:

OS	Sample Directory
x86	C:\Program Files\PGI\win32\11.0\samples
x64	C:\Program Files\PGI\win64\11.0\samples

2. Open the Solution corresponding to the version of Visual Studio with which you are working:

VS	Solution Directory
2008	PGIAccelC_08

Tip. You may want to copy the directory containing the solution to a working area of your choice.

3. Select Build | Solution to build the solution.
4. Set the Debugging | Environment properties for each Platform and Configuration in your solution as specified in Section 2.6.

Note. If you skip this step, the application you build will not run correctly.

5. Select Debug | Start Without Debugging to run the application.

Important. The sample does not run in the Win32 | Debug configuration in this release.

3 Limitations and Additional Information

This chapter contains limitations of and additional information related to the Technical Preview version of PGI Accelerator C Compiler for Visual Studio.

3.1 Co-Installation

Installation of the Technical Preview software with PGI Visual Fortran and/or PGI Workstation is supported.

3.2 File Dependencies

The PGI Accelerator C Compiler custom build rule does not calculate dependency information automatically.

For example, if file.c includes file.h and file.h is changed, file.c will not be rebuilt unless file.c has also changed.

3.3 Debugging

The PGI debug engine supports debugging code running on the host but does not currently support debugging code running on the device (GPU).

3.4 Additional Resources

The latest version, 1.3, of the *PGI Fortran & C Accelerator Programming Model* specification is available online in the Additional Resources section of www.pgroup.com/resources/accel.htm.

The PGI Accelerator C compiler can only compile files containing ANSI C99 source code. It cannot process C++ code. This limitation and other porting considerations are outlined in the *Accelerating Visual C++ Applications on GPUs* article published as part of the September 2010 version of the *PGInsider* newsletter and can be found online at www.pgroup.com/resources/articles.htm#pginsider.

4 Contact Information

You can contact The Portland Group at:

The Portland Group
STMicroelectronics, Inc.
Two Centerpointe Drive
Lake Oswego, OR 97035 USA

The PGI User Forum is monitored by members of the PGI engineering and support teams as well as other PGI customers. The forum newsgroups may contain answers to commonly asked questions. Log in to the PGI website to access the forum:

www.pgroup.com/userforum/index.php

Or contact us electronically using any of the following means:

Fax +1-503-682-2637

Sales sales@pgroup.com

Support trs@pgroup.com

WWW www.pgroup.com

All technical support is by email or submissions using an online form at www.pgroup.com/support.

Phone support is not currently available.

Many questions and problems can be resolved at our frequently asked questions (FAQ) site at www.pgroup.com/support/faq.htm.

PGI documentation is available at www.pgroup.com/resources/docs.htm.

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