



# Technical Specifications

## PCI Software Development Kit (SDK)

### PCI SOFTWARE DEVELOPMENT KIT

#### OVERVIEW

The PCI Software Development Kit (SDK) is an essential reference for developers and includes important technical programming information, sample code and documentation in a set of compiled HTML books.

The SDK is an add-on package to Geomatica Prime, PCI Geomatics' complete software solution. The SDK adds new Visual Basic and Java programming capabilities. The SDK also includes the traditional PACE Toolkit. The SDK allows programmers to write programs which access PCI's GeoGateway technology providing seamless access to multiple file formats.

EASI is PCI Geomatics' proven scripting language and the new Visual Basic and Java additions now offer the same EASI intrinsic functions within Java and Visual Basic environments. In addition, programmatic access to Geomatica Focus is available through EASI, Visual Basic and in a later release, Java.

The PACE Toolkit, with a collection of over 150 subroutines, provides new and experienced users with the flexibility to customize and communicate with their database, the Geomatica interface and any supported peripherals that they require. The PACE Toolkit allows users to develop their own PACE programs and integrate these directly into the Geomatica software environment.

GeoGateway, provides users with seamless and direct geospatial data capabilities that permit access to more than 100 data formats without the need for conversion utilizing PCI Geomatics' Generic Database Technology (GDB).

#### SDK DEVELOPMENT TOOLS

PCI Geomatics offers a range of solutions for those wanting to develop customized applications and write their own algorithms. The SDK development tools fall into three broad categories:

1. CSE programming using EASI, EASI for Visual Basic and EASI for Java
2. Programmatic access to Geomatica Focus
3. PACE programming in C and FORTRAN

#### Common Scripting Environment (CSE)

The CSE refers to the "Common Scripting Environment". The CSE is based upon the intrinsic API's originally exposed within EASI. The goal of the CSE is to expose these API's to Visual Basic and to Java and ensure a symmetric programming experience.

Members of the CSE include:

- EASI
- EASI for Visual Basic
- EASI for Java

**EASI Scripting Environment** - EASI, the Engineering Analysis and Scientific Interface is the scripting language of PCI Geomatics. It can be used to build batch scripts using PACE and built-in capabilities. With its interpreted, BASIC-like command language, a user can set and examine values in the parameter file, read online help and execute application programs. The programming capabilities of the EASI language also allow the user to develop automated systems that combine these activities. It is the customization language of Geomatica Focus.

The EASI scripting environment is available to all users licensed at or above Geomatica Prime. It is the founding member of the CSE. It includes support for:

- structured control flow (IF-THEN-ELSE, WHILE, FOR)
- subroutines (DEFINE, FUNCTION)
- user defined classes with methods (DEFINE CLASS, DEFINE METHOD)
- standard variable types (e.g. int, float, string)
- output (PRINT, PRINTF)
- the ability to run external PACE programs (RUN), and to execute system commands (SYSTEM)

EASI also includes a wealth of built-in (intrinsic) functions. These include:

- simple string and numeric manipulation functions
- access to system facilities like the time, date, and environment
- interprocess communication
- access to text files, binary files, and magnetic tapes
- it also includes a broad set of functions for accessing geomatics data files using GeoGateway technology (raster and vector files).

In the following example, the EASI print command *p* and EASI intrinsic functions *GetPCIHome* and *GetEnv* are shown:

```
p GetPCIHome
p GetEnv("PCILIC")
```

For a typical v8.2.1 Windows installation, this might output the following to the console window:

```
C:\pci_v821
C:\pci_821\etc\license.dat
```

**EASI for Visual Basic** - EASI for Visual Basic, as a member of the CSE, exposes many of the intrinsics found in EASI. It allows you to access familiar EASI intrinsics and leverage them in the rich Visual Basic programming environment.

In EASI for Visual Basic, the example given for EASI would be written in Visual Basic as:

```
Dim ez As PCISCRIPINGLib.EASI
Set ez = New PCISCRIPINGLib.EASI
MsgBox ez.GetPCIHome + vbCrLf + _
ez.GetEnv("PCILIC")
```

*Notice that in this example, the output is being sent to a message box rather than to the console window as was done in the EASI example.*

**EASI for Java** - EASI for Java, the next member of the CSE family, allows you to program familiar EASI intrinsics within the Java programming environment.

The following example shows how the original EASI example would be written in EASI for Java:

```
import com.pcigeomatics.ntv.easi.*;
EASI ez;
ez = new EASI();
System.out.println (ez.GetPCIHome());
System.out.println (ez.GetEnv("PCILIC"));
```

*Notice that in this example, the output goes to the console window as in the original EASI example.*

## Programmatic Access to Geomatica Focus

Geomatica Focus version 8.2.1 can now be registered as a COM server and can be programmatically accessed through Visual Basic. You can now write Visual Basic programs that can access several services within Geomatica Focus.

The following presents an example using Visual Basic of the "Zoom In" JOLTAction:

```
Dim jaZoomIn As PCIFOCUSLib.JOLTAction
Set jaZoomIn = New PCIFOCUSLib.JOLTAction

'Get ZoomIn object
Call jaZoomIn.GetAction("ZoomIn")

'Do the ZoomIn
Call jaZoomIn.Invoke
```

In addition, cross platform scripting support to services in Geomatica Focus is provided by the addition of new EASI intrinsics within Geomatica Focus or from EASI scripts loaded from the command line.

The following presents an example EASI script which, when loaded and run in the Focus modelling window, creates and RGB layer from the first three channels of the demo irvine.pix database file:

```
local string ezEnhancement
local JOLTMapRGBLayer ptr poMapRGBLayer
local int file_spec

file_spec = DBOpen("Irvine.pix"), "r")

poMapRGBLayer =
CreateJOLTMapRGBLayer("Demo Map RGB Layer",
File_spec, 3,2,1)
```

## PACE Programming in C and FORTRAN

PACE (Picture Analysis, Correction, and Enhancement) is a set of application programs for image processing and analysis of remotely sensed data.

The PACE Developers Toolbox is designed for those wanting to build their own PACE programs to extend Geomatica. The PACE Developers Toolbox is a subset of the API's and libraries used by PCI Geomatics to develop its software.

The PACE Developers Toolbox includes a collection of C and FORTRAN subroutines that allow the user to communicate with the database, the PCI Geomatics interface, and supported peripherals.

The following example shows how to double the image values in a GeoGateway supported file format:

```
FILE          *fp;
int           line,pix,lins,chns,i;
unsigned int  pix;
unsigned char imagry[10000];
char          dbname[64];
int           inchan, outchan;
. . .

fp = GDBOpen (dbname, "r+");      // Open the PCIDSK file
GDBSizeInfo (fp,&pix,&lins,&chns); // Get database size

inchan = 3;
outchan = 4;
/* Loop through each line: read, process and write */
for (line = 1; line <= lins; line++)

{
    GDBByteChanIO (fp,GDB_READ,0,line-1,pix,1,
                  imagry,pix,1,1,&inchan);
    for (i = 0; i < pix; i++)
    {
        pix = imagry[i];
        pix *= 2;
        if (pix > 255) pix = 255;
        imagry[i] = pix;
    }
    GDBByteChanIO (fdb_fp,GDB_WRITE,0,line-1,pix,1,
                  imagry,pix,1,1,&outchan);
}
```

## TECHNICAL REQUIREMENTS

### Prerequisites:

Installation of Geomatica Prime with valid user license.

### PACE Toolkit Programming:

i) Microsoft Windows Systems (NT, 2000, XP)

#### Compilers:

- C/C++: Microsoft Visual Studio C++ V6.0
- FORTRAN: Digital Visual Fortran V5 or (latest)

ii) UNIX Systems (Sun Solaris V2.7-2.8, SGI, Irix V6.5, Red Hat Linux V6.2)

#### Compilers:

- C/C++: GNU GCC/G++ 3.1
- FORTRAN: G77

### CSE Toolkit:

*EASI* - support provided by Geomatica Prime installation

*EASI for Visual Basic* - requires Microsoft Visual Basic 6.0 or any COM aware development environment.

*EASI for Java* - requires J2SDK 1.4 or later, Apache Ant and suitable Java development environment.



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