Programming for Unix, MACINTOSH and Windows

R. Ghosh, October 2003
Minor changes, A. Filhol, July 2007

Multi-platform program development at the ILL

Many program changes were performed in 1994/5 to enable all scientific activities to transfer principally SGI-IRIX systems from OpenVMS.

Now, in 2003, the SGI era is passing to be replaced by Intel-Linux and MAC-OS-X, both with basic unix and X11 capabilities, and PC-Windows. Many scientists now travel with laptops, however dual-booting with Windows and Linux requires some skills, and the RedHat/Cygwin emulation of unix under Windows too comes with penalties. The compilers running on Windows systems can be linked with standard Windows components implementing GUI features. This however is not portable to unix and X11; one solution is to resort to Tk/Tcl as a platform independent scripting language driving a calculation written in standard C or Fortran. This too can be used to hide the different environments of unix/Xll and Windows. A routine "prop" at the ILL serves to simplify Windows running DOS and GUI programs derived from Unix origins. A short example of easy Fortran program development using ILL libraries and MinGW programs an a PC is intended to persuade new users to try their hand at programming!

This note summarises programming tools generating programs which can be exported to run outside the ILL to continue data treatment and analysis. In an ideal case the tools would lead to high-performance calculations, together with an easy-to-program graphical interface, with identical source code for all platforms and be cost-free, allowing developments to be shared within the community. At present there is no such solution.

The tables below summarise a number of compilers, systems and packages used at the ILL, and for which members of the Scientific Computing Group can offer some advice.

Basic features * generally useful ** fully featured ***

Freely available software				
	SGI	Linux-i386	MAC-OSX	Windows
Compilers/simple graphics				
GNU gcc c,c++ compiler	***	***	***	MinGW(1) Cygwin(2) *** **
GNU g77 F77 compiler	***	***	***	MinGW(1) Cygwin(2) *** **
X11 Graphics	***	***	***	MinGW(1) Cygwin(2) --- **
PGPLOT Graphics	***	***	***	MinGW(1) Cygwin(2)

				** **
Packages				
scilab (Matlab calcs+graphics)	***	***	***	***
GNUPlot graphics	*	*	*	*
Python	**	**	**	**
Tk/tcl/expect GUI scripting	**	**	**	**
Octave (Matlab calcs)		*		

Notes:
1. MinGW uses the native Windows Dynamic Link Libraries (DLLs)for accessing the system; Executable programs are directly exportable.
2. Cygwin programs access the Windows system via a Cygwin library which must be provided with the exported .exe program. To run graphical applications the Cygwin environment (X11 emulation) must be installed.
3. PGplot for Mac OS X: versions available from Caltech (v5.2) or the ILL http://www.ill.fr/Computing/pgplotSS.html have bugs in their rarely used keyboard data input routines. A modified version solves most of the problems. See: http://www.ill.fr/Computing/AF/PkFit_Filing/PkFit-Filing-MacOSX.html

Commercial software				
	SGI	Linux-i386	MAC-OSX	Windows
High-Performance Compilers/simple graphics				
F90/F95 Compilers(1)	IRIX **	Portland(cluster) ** Intel(ex Digital) ***	ABSoft **Intel **	ABSoft ** Lahey ** Intel(Visual Fortran) ***
Packages(2) **Graphics/GUI - modest performance**				
Matlab	**	**	**	**
RSI-IDL	**	**	**	**
Excel			**	**
Origin			*	**
Igor			**	**

Notes:
1. Executable programs can be exported freely, though sometimes it may be necessary to distribute specific libraries with certain executable programs.
2. Matlab and IDL can be precompiled into "run-time" programs whch can be exported and run without buying and installing the package