

gcc Fortran External Element

This example shows how to use an External Element to call a DLL to perform calculations outside of GoldSim. The DLL in this case was compiled using the gcc compiler suite from source code which is mainly written in Fortran. The Fortran portion of the source code is compiled using gfortran.

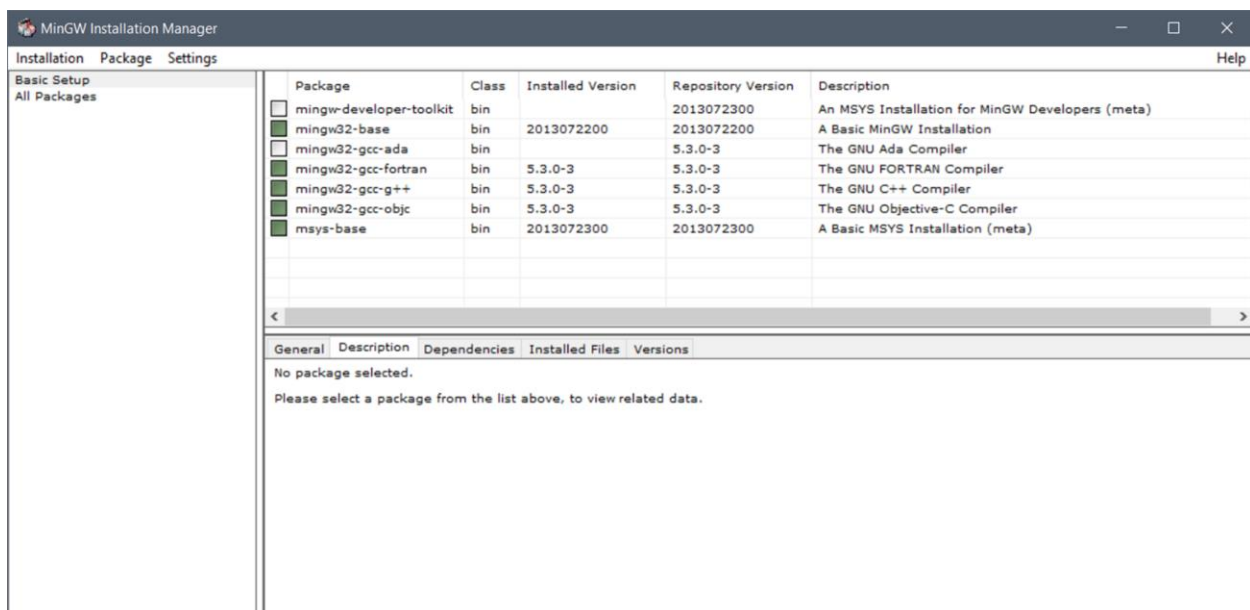
The DLL contains three exposed functions, CustomFortranDLLSum (calculates the sum of two input arguments), CustomFortranDLLProdSum (calculates the sum and the product of two input arguments) and CustomFortranDLLHalf (divides an input argument by 2).

The exposed functions in the DLL are C language wrapper functions and are contained within the source code file GTGExternWrapper.c. These exposed, C language functions call the underlying Fortran subroutines. The Fortran subroutines are in the source code file CustomFortranCode.F08.

The gcc compiler suite allows the compilation of code written in different languages to object files using different compiler suite members and then the linkage of these object files (mainly machine language code with some additional metadata for linking) into a single, binary output file. In this example, gcc is used to compile the c language wrapper file and gfortran is used to compile the Fortran language subroutines and then the compiled object files are linked together into one binary DLL file.

The steps for creating the compiled DLL, Test.dll, from the two source code files are provided below.

1. Obtain the gcc compiler suite by installing MinGW: Minimalist GNU for Windows (<http://www.mingw.org/>).
 - a. The primary download site for the installer was <https://sourceforge.net/projects/mingw/files/> on 24 January 2017.
 - b. Run the installer and install the packages shown below.



- -
 - c. Add the bin sub-directory of the MinGW installation directory to your path.

2. Open a command prompt and change to the directory where the two source code files (GTGExternWrapper.c and CustomFortranCode.F08) are located.
3. Run the following compilation commands in order to create the Test.dll file.
 - a. `gcc -Wall -c GTGExternWrapper.c`
 - Creates GTGExternWrapper.o
 - b. `gfortran -Wall -c CustomFortranCode.F08`
 - Creates CustomFortranCode.o and gs_parameters.mod
 - c. `gcc -Wall -shared -o Test.dll CustomFortranCode.o GTGExternWrapper.o`
 - Creates the Test.dll binary file from the two object files.