

Creating FORTRAN 77 DLLs for *R* on a Windows PC

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Everything you need, including a suitable Fortran compiler, is freely available on-line. There is a single web site <http://www.murdoch-sutherland.com/Rtools/> that makes obtaining the necessary software more convenient.¹ To set up a personal (IBM compatible) computer running any of the *Windows NT*, *Windows 2000* or *Windows XP* operating systems

0. **Preliminaries.** Be sure you have the most recent version of *WinZip* installed and running properly on your machine. If you do not have *WinZip*, you can download an evaluation copy from <http://www.winzip.com>. You will also need a web browsing program like *Netscape* or *Internet Explorer* and internet access.
1. All of the necessary files should be downloaded and stored in the same place. For this purpose, create a new folder called `Rdlls` on the `C:` drive.
2. **Obtaining and installing necessary software.** Use your web browser and go to the web site

<http://www.murdoch-sutherland.com/Rtools/>

(hereafter referred to as the “Murdoch site”). Using the links on that site, download and install the following.

- (a) *Gnu Unix tools*: Click on the link

<http://www.murdoch-sutherland.com/Rtools/tools.zip>

and save the file `tools.zip` in the folder `Rdlls`. After the file has downloaded, double click on the filename `tools.zip`. Extract the contents of that file into `C:\Program Files\`.

- (b) *Perl*: Click on the link

¹At the time of the writing of this document, the most current versions of the software cited in this document are (1) WinZip 9.0, (2) Tools.zip (README file created 01/20/2005), (3) ActivePerl 5.8, (4) *R* 2.0.1, and (5) MinGW 3.1.0. This version of MinGW FORTRAN compiler will require (a) binutils 2.15.91, (b) MinGW runtime 3.7, and (c) w32api 3.2.

<http://www.activestate.com/Products/ActivePerl/Download.html>.

Complete the required information to register before downloading *Perl*. Clicking on the **Next** button takes you to a new site containing several versions of *Perl*. Click on the link **MSI** under **Windows**. Save the file in the **Rd11s** folder on your hard drive. Once the file has downloaded, double click on that file name and follow the directions to install *Perl* in the **C:\Perl** folder on your computer.

(c) *FOTRAN 77 compiler*: Go back to the “Murdoch site.” Click on the link

MinGW-3.1.0-1.exe.

This will take you to a web site with a list of mirror sites for downloading **MinGW-3.1.0-1.exe**. Click on an icon on the right side of the page that corresponds to a close geographic location. Save the file you download on your hard drive in the **Rd11s** folder. Once this file has downloaded completely, double click on it and install the MinGW fortran compiler in the **C:\MinGW** folder.

There are certain files for MinGW that will require updating. Click on the <http://www.mingw.org/downloads.shtml> link. Click on the **Download** link on the top left side of the page. Scroll down to the bottom of the page where there is a large table containing a list of files available for download. From that list, download the following three files following the same process as you did for downloading **MinGW-3.1.0-1.exe**.

- i. **binutils-2.15.91-2004.0904-1.tar.gz**
- ii. **mingw-runtime-3.7.tar.gz**
- iii. **w32api-3.2.tar.gz**

Once these have downloaded, double click on each file (one at a time), and extract the contents into the **C:\MinGW** folder.

3. **Setting the computer’s path.** You will need the “short version” of names of the directories of the complete paths of *R*, *Perl*, *MinGW*, and the files extracted from **tools.zip**². To determine the “short version” name of a directory, open a **Command** prompt and issue the command **dir /x**. The short version of the name of the directory will appear to the immediate left of the long version. For example, in the **C:** directory, typing **dir /x** results in

06/27/2004	08:08p	<DIR>		Perl
01/22/2005	10:33a	<DIR>	PROGRA~1	Program Files
01/21/2005	11:40a	<DIR>		research
01/07/2005	12:16a	<DIR>		teaching
01/22/2005	08:23p	<DIR>		timeslab

²The path any executable file needed by *R*, including *R* itself, cannot contain spaces.

Since the **Program Files** folder has a space between **Program** and **Files**, the name **Program Files** has `PROGRA~1` as its “short version.” The remaining folders names do not have a space, and so their short version name is the same as the original folder name.

To set up the computer’s path so that it will automatically access the necessary software,

- (a) Right click on **My Computer**
- (b) Select **Properties** at the bottom of the drop down menu.
- (c) Click on the **Advanced** tab.
- (d) Click on the **Environment Variables** button.
- (e) Under **System Variables** scroll down to **PATH**, click on it, and then click on the **Edit** button.
 - Add as the first entry in the computer’s path `C:\Perl\bin;`
 - At the end of the path, add a semicolon followed by
`c:\mingw\bin;c:\mingw\;c:\progra~1\r\rw2001;`
`c:\progra~1\r\rw2001\bin;c:\progra~1\tools\bin;`
 - Click ”OK”, click ”OK”, click ”OK”.

4. **Setting *R* compiler parameters.** Use a text editor (for example, *Notepad*) to open the file `MkRules` in `C:\Program Files\R\rw2001\src\gnuwin32`. Scroll down to line 49, and replace that line with

```
HEADER=C:/mingw/include
```

Save the file and exit the editor.

5. Reboot your computer.
6. Open a **Command** prompt. Assuming the source Fortran code resides in the directory `C:\timeslab`, go to that directory and at the prompt issue the command

```
R CMD SHLIB -o tslabinR timeslab.f
```

This is case sensitive. The result is that the files `timeslab.o`, `tslabinR.a`, and `tslabinR.DLL` are created.

7. Start *R*. Issue the commands

```
dyn.load("C:/timeslab/tslabinR.dll")  
source("C:/timeslab/timeslab.r")
```