

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

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

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.

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

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

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

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")
```