How to write a simple Programs in FORTRAN using Cygwin?

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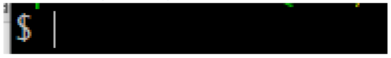
Note: These instructions are written for Cygwin in a Windows computer. If you are using a mac or Linux computer, you can still use these steps. Just open the command line terminal and type the same commands. Instead of the Notepad editor, use your own editor.

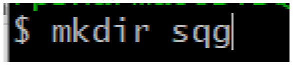
1. Open the Cygwin program. This will open a Cygwin terminal. A terminal is the window which allows you to type your commands. Commands are instructions given to the computer. We will see several commands below. In a normal state, the Cygwin terminal will display yourusername $. The dollar sign $ at the end is called the prompt. When you see $ on the terminal, everything is good and the terminal is waiting for your command. In the examples below, the screen shots will only have the $ sign without any user name. A screen shot of the Cygwin terminal with a prompt $ is shown below.



```
$ |
```

2. Let’s create a new directory named sqg. (If you have already created this directory, skip this step. To check if you have this directory in the system, type the command: ls and it will list all the files and directories in the path.

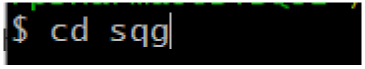
mkdir sqg



```
$ mkdir sqg
```

3. Next, let’s go inside the newly created directory.

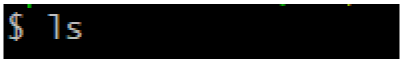
cd sqg



```
$ cd sqg
```

4. List all the files and directories in the current directory:

ls

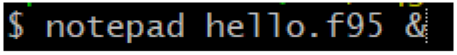


```
$ ls
```

This directory/folder is empty. There are no files yet.

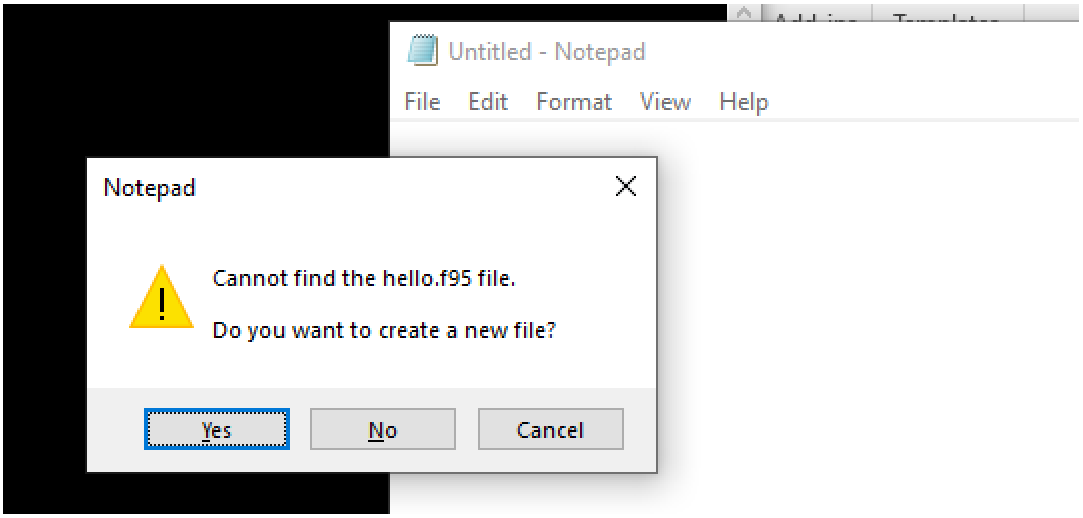
5. Let’s create a new file hello.f95. The & sign is optional. If you already have already this file, your ls command should list this. In this case you will open the existing file, but the following message “Cannot find the hello.f95 file. Do you want to create a new file?” will not appear.

notepad hello.f95



```
$ notepad hello.f95 &
```

Click OK when asked about the new file.

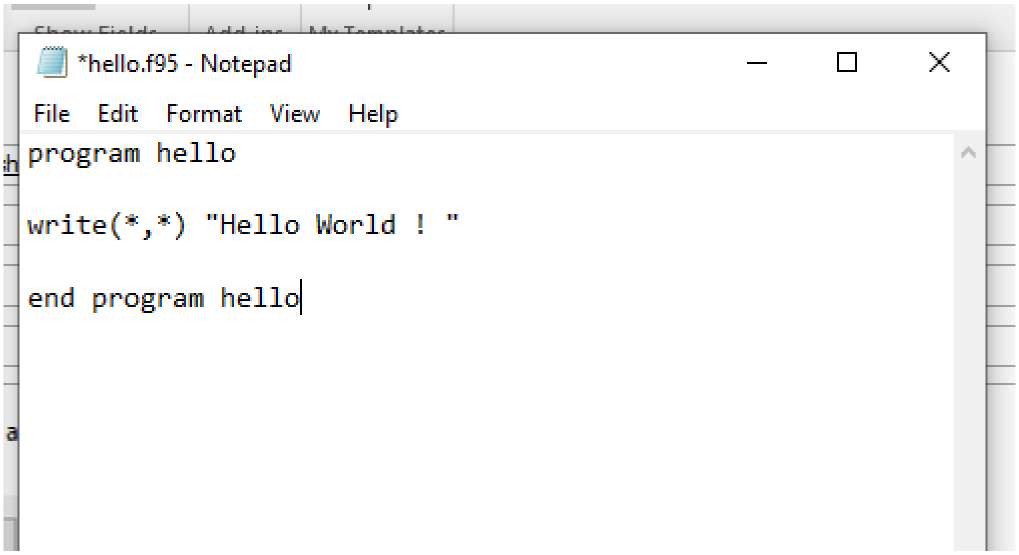


Cannot find the hello.f95 file.

Do you want to create a new file?

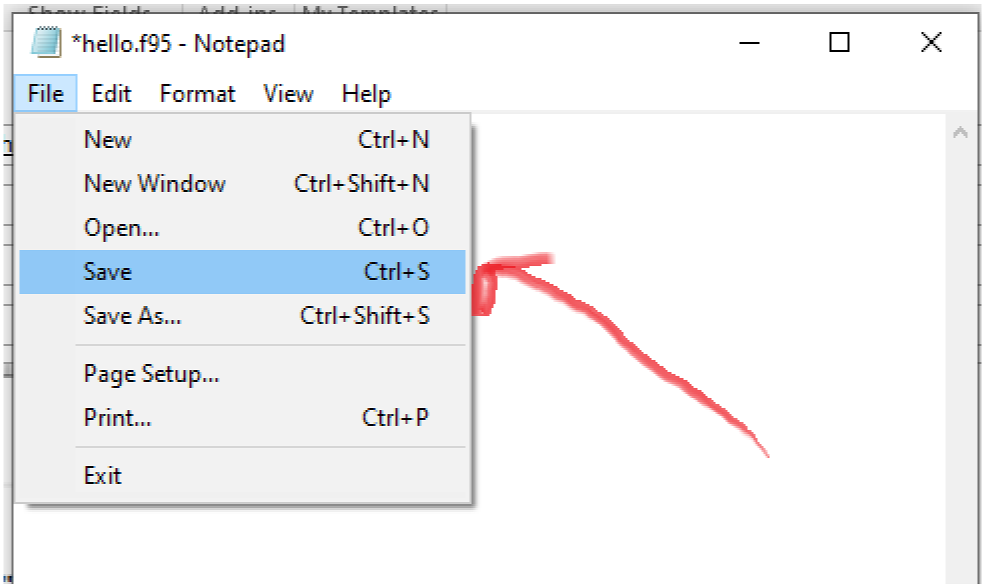
6. Let’s write a simple program that prints the message “Hello World !” on the screen. Almost every program leans programming writing the hello world program. If you can do this, you can do any complex program later. After the notepad opens the new file hello.f95, type the following codes in the file and save the file. DO NOT type these codes in the in the Cygwin terminal. This is the main program file which will be saved in the computer even after you close the Cygwin terminal.

program hello
write(*,*) “Hello World !”
end program hello



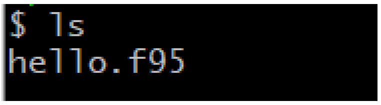
```
program hello

write(*,*) "Hello World ! "

end program hello
```

7. Save the contents of the file by clicking on File and Save or simply press Ctrl+S.



8. Go back to the Cygwin terminal. Type the ls command and you will see the file hello.f95 that we just created.

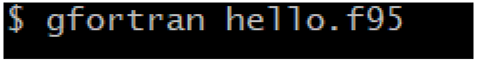
ls



```
$ ls
hello.f95
```

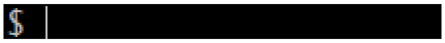
9. Next, let's compile and run the file. We will use the gfortran compiler here. There are other compilers that you can use later. If the file is compiled without any error, the terminal will return to its original prompt $. If there are errors, then you will have to know what the errors mean, fix those errors and recompile the file (Something will discuss along the way.).

gfortran hello.f95



```
$ gfortran hello.f95
```

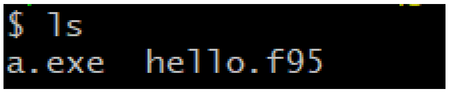
In this scenario, there are no errors, so the terminal window returns back to normal.



```
$ |
```

10. The compilation process must make an executable file a.exe. The file name a.exe is by default. You can change the name of the executable during the compilation process later. For example, if you compile using the command: gfortran hello.f95 –o hello, then it will create hello.exe instead of a.exe. Let's not worry about this now. Check this by typing the ls command in the terminal.

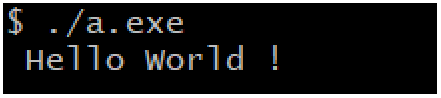
ls



```
$ ls
a.exe   hello.f95
```

11. Finally, let's run the a.exe file by typing the command: ./a.exe. Our output should be the message Hello World ! printed on the screen.

./a.exe



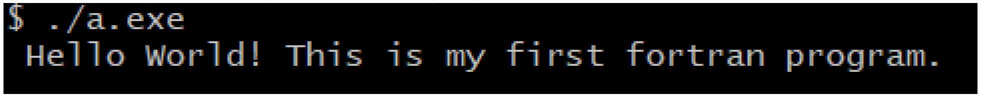
```
$ ./a.exe
 Hello World !
```

We are using the external windows Notepad editor to edit the codes of our fortran program. This is OK for now, but later you will learn about the inline editors such as vi and emacs.

Exercise 1:

Close the notepad file. Open the hello.f95 file from the Cygwin terminal using the Notepad editor again. Change your codes so that the output will be the following message on the terminal screen.

Hello World! This is my first fortran program.



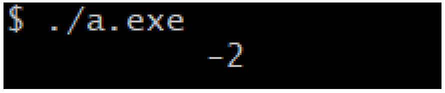
```
$ ./a.exe
 Hello World! This is my first fortran program.
```

Exercise 2:

Write a simple program that prints the sum of two integers x and y. Test your codes with the following values of x and y.

$x = 2, y = -4$

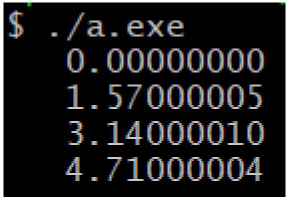
The output should look like the following.



```
$ ./a.exe
          -2
```

Exercise 3 (Space Discretization):

Consider the interval [0, 2 pi]. Write a program that divides the interval into n subintervals and prints the left end points on the screen. Test your codes with n=4 and pi=3.14. Your output should be the following:



```
$ ./a.exe
   0.00000000
   1.57000005
   3.14000010
   4.71000004
```