

- 1.– Create two folders on the hard drive named C and Fortran.

Access the website

http://caminos.udc.es/info/asignaturas/grado_itop/503 ,

follow the route

→ **Software**,
→ **1_Ejemplos_C-Fortran**,
→ **1-1_Hola/**

and download the contents of each of the two existing folders (**C/** and **Fortran/**) into the corresponding newly created folder.

You are asked to:

- a) Examine, analyze, and compare the programs **hola.c** and **hola.f**.
- b) Run both programs **hola.exe** and verify that they are functioning correctly.
- c) Delete the two executable programs **hola.exe**. Open a window in command mode, regenerate the executable for each folder using the instructions

```
$ gcc hola.c -O2 -o hola.exe
```

```
$ gfortran hola.f -O2 -o hola.exe
```

and check that they work correctly.

- d) Delete the two executable programs **hola.exe**. Open a window in command mode, regenerate the executable for each folder using the instructions

```
$ gcc hola.c -O2 -c -o hola.o
```

```
$ gcc hola.o -O2 -o hola.exe
```

```
$ gfortran hola.f -O2 -c -o hola.o
```

```
$ gfortran hola.o -O2 -o hola.exe
```

and check that they work correctly.

- e) Analyze the content of command programs **make.bat**.
Run these command programs in command mode and graphical mode and verify that the newly generated executables work correctly.

Note: Sections **b)** and **e)** only apply if you are working in Windows, since both the executables (files ***.exe**) and command programs (files ***.bat**) provided on the course website are specific to this type of system.

2.— Create a folder called Fortran on your hard drive.

Go into the folder and create the text files `prog.f`, `sub1.f`, `sub2.f` and `sub3.f`.

Observe the FORTRAN program listed on the following pages.

Using a Wordpad-type application or an editor such as Geany, SciTe, Emacs, or Vim, write the main program in the file `prog.f` and the subroutines Generate, Alter, and Print will be written to the files `sub1.f`, `sub2.f` and `sub3.f` respectively.

You are asked to:

- a) Examine, analyze, and explain the operation of the main program and each of the subroutines.

- b) Build the executable program `prog.exe` using the instructions

```
$ gfortran prog.f sub1.f sub2.f sub3.f -O2 -o prog.exe
```

and check that it works correctly.

- c) Delete the executable program `prog.exe` and rebuild it using the instructions

```
$ gfortran sub1.f -O2 -c -o sub1.o
```

```
$ gfortran sub2.f -O2 -c -o sub2.o
```

```
$ gfortran sub3.f -O2 -c -o sub3.o
```

```
$ gfortran prog.f -O2 -c -o prog.o
```

```
$ gfortran prog.o sub1.o sub2.o sub3.o -O2 -o prog.exe
```

```
$ del prog.o sub1.o sub2.o sub3.o
```

and check that it works correctly.

- d) Borrar el programa ejecutable `prog.exe` and rebuild it using the instructions

```
$ gfortran sub1.f -O2 -c -o sub1.o
```

```
$ ar r libsubs.a sub1.o
```

```
$ del sub1.o
```

```
$ gfortran sub2.f -O2 -c -o sub2.o
```

```
$ ar r libsubs.a sub2.o
```

```
$ del sub2.o
```

```
$ gfortran sub3.f -O2 -c -o sub3.o
```

```
$ ar r libsubs.a sub3.o
```

```
$ del sub3.o
```

```
$ gfortran prog.f -O2 -c -o prog.o
```

```
$ gfortran prog.o libsubs.a -O2 -o prog.exe
```

```
$ del prog.o
```

and check that it works correctly.

C Primitive style program

```
implicit real*8 (a-h,o-z)
parameter(MX=1000)
dimension v(MX)

1 write(6,100) ' Enter the number of components: '
100 format(/a,$)
   read(5,*) n
   if (n.lt.1.or.n.gt.MX) goto 1

   call Generate(n,v)
   call Alter(n,v)
   call Print_sol(n,v)

   read(5,'( )')
   call exit(0)

end
```

```

C
C   Generate subroutine, difficult to understand and whose
C   purpose is unknown.
C
C   Uses intrinsic functions:
C       srand(iseed)
C           -> uses iseed (non-negative integer) as the seed for a
C               sequence of pseudo-random numbers
C       rand( )
C           -> returns a pseudo-random number
C               (real*4) in the range 0.0 - 1.0
C

```

```

Subroutine Generate(n,v)
implicit real*8 (a-h,o-z)
dimension v(n)

1 write(6,100) ' Enter the seed (integer number > 0): '
100 format(/a,$)
   read(5,*) iseed
   if (iseed.lt.0) goto 1

   call srand(iseed)
   i=1
2  v(i)=dble(rand( ))
   i=i+1
   if (i.le.n) goto 2

   return
end

```

C
C Subroutine Alter, difficult to understand and whose purpose is unknown
C

```
Subroutine Alter(n,v)
implicit real*8 (a-h,o-z)
dimension v(n)

  i=1
1  j=n
2    if (v(i).le.v(j)) goto 3
      vc =v(i)
      v(i)=v(j)
      v(j)=vc
3    j=j-1
      if(j.gt.i) goto 2
      i=i+1
  if (i.lt.n) goto 1

  return
end
```

C
C Subroutine Print_sol, difficult to understand and
C whose purpose is unknown
C

```
Subroutine Print_sol(n,v)
implicit real*8 (a-h,o-z)
dimension v(n)

write(6,100) ' RESULT:'
100 format(/a/)

i=1
1 write(6,200) i, v(i)
200 format(' v(',i5,') = ',f20.9)
i=i+1
if (i.le.n) goto 1

return
end
```