

## SOME NOTES ON PROGRAMMING IN FORTRAN

A free FORTRAN compiler/ linker is available at: <http://gcc.gnu.org/fortran/>  
And notes about it are available at: <http://gcc.gnu.org/wiki/GFortran>  
And the compiler download link is at: <http://gcc.gnu.org/wiki/GFortranBinaries>  
click on the INSTALLER link

The compiler is about 14mb, and is a compiler and a linker, based on command line options.

A good language manual is available at:  
<http://h21007.www2.hp.com/dspp/files/unprotected/Fortran/docs/lrm/dflrm.htm>

Place the source in "C:\Documents and settings\user name" otherwise the RUN, COMMAND will not be able to access the directory, unless placed in the drive's root folder, such as C:\ZFTN

In windows XP do RUN, COMMAND, and do a compile first, the following .BAT file is a poor man's IDE:-

```
edit program.txt           [allows you to edit the code]
gfortran -c -x f95 program.txt [compiles an object file .o]
pause                      [lets you see compiler notes]
gfortran -o executable program.o [makes executable from .o]
program                    [run it]
edit fort.1                 [look at the output]
```

The program output for a certain dial was:-

The program output that was tested was in a file called "fort.1" and is shown below:-

```
Latitude:      32.75
Longitude:     108.20
Reference:     105.00
hour.corr:     0.21

hour   hr.ang  line.angle
morning hours
-6     -93.20   84.10
-5     -78.20  -68.88
-4     -63.20  -46.96
-3     -48.20  -31.18
-2     -33.20  -19.49
-1     -18.20  -10.09
noon
0      -3.20   -1.73
noon
1      11.80   6.45
2      26.80  15.28
3      41.80  25.81
4      56.80  39.58
5      71.80  58.71
6      86.80  84.10
afternoon hours
```

www.illustratingshadows.com

```

! *** simple FORTRAN program for a horizontal sundial ***
!   web site:                               www.illustratingshadows.com
!   uses a free gfortran from:              http://gcc.gnu.org/fortran/

real rlat, rlng, rref                               ! dial location
real radlat, radhra                                ! radian versions
real hrcorr, hra                                   ! hr corr and hour angle
real sinlat, tanhra, atanhla, datanhla, tempshr   ! working variables
integer i, j, k, iref                             ! integer ref.long due to type
character pause

write (*,70) "Enter latitude      as nn.n "      ! real latitude      eg 32.75
read  80, rlat

write (*,70) "Enter longitude     as nnn.n "     ! real longitude     eg 108.2
read  80, rlng

write (*,70) "Enter legal meridian as nnn "     ! easier data entry eg 105
read  81, iref
rref = iref                                       ! convert legal to real
! because of data type
hrcorr = 4 * (rlng - rref) / 60                  ! deduce corr in hours

!   get some common material computed
radlat = (rlat * 2 * 3.1416) / 360              ! radians of latitude
sinlat  = sin(radlat)                          ! sine of latitude
radlng  = (rlng * 2 * 3.1416) / 360            ! radians of longitude

write (1,71) "Latitude: ", rlat
write (1,71) "Longitude: ", rlng
write (1,71) "Reference: ", rref
write (1,71) "hour.corr: ", hrcorr
write (1,70) " "

write (*,71) "Latitude: ", rlat
write (*,71) "Longitude: ", rlng
write (*,71) "Reference: ", rref
write (*,71) "hour.corr: ", hrcorr
write (*,70) " "

write (1,70) "hour   hr.ang  line.angle"
write (1,70) "morning hours"
write (*,70) "hour   hr.ang  line.angle"
write (*,70) "morning hours"

i = -6                                           ! start at 0600 or 6 am
do while ( i .lt. 7)                             ! repeat until 6 pm

    call noon (i)                                 ! have a noon separator

    tempshr = i                                  ! get hour to REAL

    hra     = (tempshr*15) - (rlng-rref)          ! hour angle of the sun
    radhra  = ( hra * 2 * 3.1416 ) / 360         ! radian version
    tanhra  = tan(radhra)                       ! tan of sun's hour angle

    datanhla= (atan ( tanhra * sinlat )) * 360 / ( 2 * 3.1416)

    write (1,50) i, hra, datanhla                ! btw: write 1 is a file
    write (*,50) i, hra, datanhla               ! and write * is the console

    call noon (i)                                 ! have a noon separator

    i = i + 1                                    ! bump up the hour

end do

write (1,70) "afternoon hours"
write (1,70) " "
write (1,70) ("www.illustratingshadows.com March 25, 2007")
write (*,70) "afternoon hours"
write (*,70) " "
write (*,70) ("www.illustratingshadows.com [enter to end]")
read  70, pause
return

50 format (i4, f10.2, f8.2)
60 format (f8.2)
70 format (A)
71 format (A, f8.2)
80 format (f8.2)
81 format (i3)
end

subroutine noon (i)                               ! sub routine process
    if ( i .eq. 0 ) then                          ! have a noon separator
        write (1,700) "noon"
        write (*,700) "noon"
    end if
    return
700 format (A)
end subroutine noon

```