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得分：40/40

1、

```
[ese-tiank@login02 ~]$ cd fortran_demo1/
[ese-tiank@login02 fortran_demo1]$ ls
[ese-tiank@login02 fortran_demo1]$ nano M.dat
[ese-tiank@login02 fortran_demo1]$ nano N.dat
[ese-tiank@login02 fortran_demo1]$ nano main.f90
[ese-tiank@login02 fortran_demo1]$ nano Matrix_multip.f90
[ese-tiank@login02 fortran_demo1]$ nano main.f90
[ese-tiank@login02 fortran_demo1]$ nano Matrix_multip.f90
[ese-tiank@login02 fortran_demo1]$ gfortran Matrix_multip.f90 main.f90 -o Matrix_m.x
[ese-tiank@login02 fortran_demo1]$ ./Matrix_m.x
```

```
[ese-tiank@login02 ~]$ ll
total 4
drwxr-xr-x 8 ese-tiank ese-ouycc 4096 Dec  3 16:33 data_demo
lrwxrwxrwx 1 ese-tiank ese-ouycc   9 Dec  2 21:33 data_demo_link -> data_demo
drwxr-xr-x 2 ese-tiank ese-ouycc 4096 Nov  2 18:47 exam
drwxr-xr-x 3 ese-tiank ese-ouycc 4096 Dec 17 16:40 fortran_demo1
drwxr-xr-x 2 ese-tiank ese-ouycc 4096 Dec 17 16:47 lab6
drwxr-xr-x 2 ese-tiank ese-ouycc 4096 Dec  3 17:57 mpi_demo
-rw-r--r-- 1 ese-tiank ese-ouycc  21 Dec  3 16:49 myname.bash_profile
[ese-tiank@login02 ~]$ cd fortran_demo1/
[ese-tiank@login02 fortran_demo1]$ ls
DoLoopTest.f90  HelloWorld.x  M.dat          TestArray.x      TestUndeclared.f90
DoWhileTest.f90  IfElseTest.f90  N.dat          TestLeapYear.f90  TestUndeclared.x
DoWhileTest.x    ImplicitTypeTest.f90  PrecisionTest.f90  TestLeapYear.x    VariableShowcase.f90
HelloWorld.f90   lab6          TestArray.f90   TestRelationalOps.f90  VariableShowcase.x
[ese-tiank@login02 fortran_demo1]$ nano M.dat
[ese-tiank@login02 fortran_demo1]$ nano N.dat
[ese-tiank@login02 fortran_demo1]$ nano main.f90
[ese-tiank@login02 fortran_demo1]$ nano Matrix_multip.f90
[ese-tiank@login02 fortran_demo1]$ nano main.f90
[ese-tiank@login02 fortran_demo1]$ nano main.f90
[ese-tiank@login02 fortran_demo1]$ gfortran Matrix_multip.f90 -o Matrix_multip.x
Matrix_multip.f90:13:16:

        do w = 1, 3
            1
Error: Symbol 'w' at (1) has no IMPLICIT type
[ese-tiank@login02 fortran_demo1]$ nano Matrix_multip.f90
[ese-tiank@login02 fortran_demo1]$ gfortran Matrix_multip.f90 -o Matrix_multip.x
/usr/lib/gcc/x86_64-redhat-linux/4.8.5/../../../../lib64/crt1.o: In function `_start':
(.text+0x20): undefined reference to `main'
collect2: error: ld returned 1 exit status
[ese-tiank@login02 fortran_demo1]$ nano Matrix_multip.f90
[ese-tiank@login02 fortran_demo1]$ gfortran Matrix_multip.f90 main.f90 -o Matrix_m.x
[ese-tiank@login02 fortran_demo1]$ ./Matrix_m.x
At line 10 of file main.f90 (unit = 50, file = 'Matrix_m.x')
Fortran runtime error: File './fortran_demo1/M.dat' does not exist
[ese-tiank@login02 fortran_demo1]$ nano main.f90
[ese-tiank@login02 fortran_demo1]$ gfortran Matrix_multip.f90 main.f90 -o Matrix_m.x
[ese-tiank@login02 fortran_demo1]$ ./Matrix_m.x
[ese-tiank@login02 fortran_demo1]$ ls
DoLoopTest.f90  HelloWorld.x  main.f90       MN.dat          TestArray.x      TestUndeclared.f90
```

```
GNU nano 2.3.1      File: M.dat
19.48 15.79 19.28
19.28 12.92 15.86
15.86 11.29 14.04
11.93 18.60 18.23
19.28 12.92 15.86

Read 5 lines
Get Help  WriteOut  Read File  Prev Page  Cut Text  Cur Pos
Exit      Justify    Where Is  Next Page  UnCut Text To Spell
```

```
GNU nano 2.3.1 File: N.dat
7.72 4.11 1.44 4.80 5.55
5.55 4.80 4.04 0.59 8.58
0.59 8.58 2.26 7.72 4.11

^G Get Help      ^O WriteOut      ^R Read File     [ Read 3 lines ]  ^Y Prev Page     ^K Cut Text      ^C Cur Pos
^X Exit          ^J Justify       ^W Where Is      ^V Next Page     ^U UnCut Text    ^T To Spell
```

```
GNU nano 2.3.1 File: MN.dat
249.40 321.28 135.42 251.66 322.83
229.90 277.34 115.80 222.61 283.04
193.38 239.84 100.18 191.18 242.60
206.09 294.73 133.52 208.97 300.72
229.90 277.34 115.80 222.61 283.04

^G Get Help      ^O WriteOut      ^R Read File     [ Read 5 lines ]  ^Y Prev Page     ^K Cut Text      ^C Cur Pos
^X Exit          ^J Justify       ^W Where Is      ^V Next Page     ^U UnCut Text    ^T To Spell
```

2、

```
[ese-tiank@login02 fortran_demo1]$ nano Declination_angle.f90
[ese-tiank@login02 fortran_demo1]$ nano Solar_hour_angle.f90
[ese-tiank@login02 fortran_demo1]$ nano Solar_elevation_angle.f90
[ese-tiank@login02 fortran_demo1]$ gfortran -c Declination_angle.f90
[ese-tiank@login02 fortran_demo1]$ gfortran -c Solar_hour_angle.f90
[ese-tiank@login02 fortran_demo1]$ ar rcvf libsubs.a Declination_angle.o Solar_hour_angle.o
a - Declination_angle.o
a - Solar_hour_angle.o
[ese-tiank@login02 fortran_demo1]$ gfortran Solar_elevation_angle.f90 -o
Solar_elevation_angle.x -L. -lsubs
[ese-tiank@login02 fortran_demo1]$ ./Solar_elevation_angle.x
the SEA for Shenzhen (22.542883N, 114.062996E) at 10:32 (Beijing time; UTC+8) on 2021-
12-31: 36.635054661771022
```

## Solar elevation angle calculator

Select the date & time and your timezone, enter your longitude & latitude to calculate the solar elevation angle (or solar latitude angle) and zenith angle.

Select date:

Enter time:

Select time zone:

Enter latitude (e.g. Los Angeles: 34.052° N):

Enter longitude (e.g. Los Angeles: 118.24° W):

Solar elevation angle:

Solar zenith angle:

```
[ese-tiank@login02 fortran_demo1]$ nano Declination_angle.f90
[ese-tiank@login02 fortran_demo1]$ nano Declination_angle.f90
[ese-tiank@login02 fortran_demo1]$ nano Solar_hour_angle.f90
[ese-tiank@login02 fortran_demo1]$ nano Solar_elevation_angle.f90
[ese-tiank@login02 fortran_demo1]$ nano Solar_hour_angle.f90
[ese-tiank@login02 fortran_demo1]$ nano Declination_angle.f90
[ese-tiank@login02 fortran_demo1]$ nano Solar_elevation_angle.f90
[ese-tiank@login02 fortran_demo1]$ nano Solar_elevation_angle.f90
[ese-tiank@login02 fortran_demo1]$ gfortran -c Declination_angle.f90
[ese-tiank@login02 fortran_demo1]$ gfortran -c Solar_hour_angle.f90
[ese-tiank@login02 fortran_demo1]$ ar rcvf libsubs.a Declination_angle.o Solar_hour_angle.o
a - Declination_angle.o
a - Solar_hour_angle.o
[ese-tiank@login02 fortran_demo1]$ gfortran Solar_elevation_angle.f90 -o Solar_elevation_angle.x -L. -lsubs
/tmp/cctEx9mJ.o: In function 'MAIN':
Solar_elevation_angle.f90:(.text+0x5d): undefined reference to '__declination_angle_MOD_declin_angle'
Solar_elevation_angle.f90:(.text+0x85): undefined reference to '__solar_hour_angle_MOD_solarhour_angle'
collect2: error: ld returned 1 exit status
[ese-tiank@login02 fortran_demo1]$ gfortran Solar_elevation_angle.f90 -o Solar_elevation_angle.x -L. -lsubs
[ese-tiank@login02 fortran_demo1]$ ./Solar_elevation_angle.x
the SEA for Shenzhen (22.542883N, 114.062996E) at 10:32 (Beijing time; UTC+8) on 2021-12-31: 36.635054661771022
```