Assignment 6

1. Matrix multiplication

1.1 [5 points] Write a program Main.f90 toread fortran_demo1/M.dat as the matrix M, and fortran_demo1/N.dat as the matrix N.

1.2 [5 points] Write a subroutine Matrix_multip.f90 to do matrix multiplication.

1.3 [5 points] Call the subroutine Matrix_multip() from Main.f90 to compute M*N; write the output to a new file MN.dat, values are in formats of f9.2.

首先写出两个程序 createM.f90 和 createN.f90 来生成两个随机数字的矩阵

然后运行两个程序 createM.f90 和 createN.f90 随机的把生成的两个矩阵存在 M.dat 和 N.dat

矩阵乘法通过循环矩阵里的元素相乘再加和。经查 Fortran 提供一个直接的函数 matmul(A,B) 来计算矩阵 AB。详情请在 Matrix_multip.f90 和 Main.f90 中查看细节

2. Calculate the Solar Elevation Angle

2.1 [5 points] Write a module Declination_angle that calculates the *declination angle* on a given date

2.2 [10 points] Write a module Solar_hour_angle that calculates the *solar hour angle* in a given location for a given date and time

2.3 [5 points] Write a main program (Solar_elevation_angle.f90) that uses module Declination_angle and Solar_hour_angle to calculate and print the SEA in a given location for a given date and time

2.4 [5 points] Create a library (libsea.a) that contains Declination_angle.o and Solar_hour_angle.o. Compile Solar_elevation_angle.f90 using libsea.a. Print the SEA for Shenzhen (22.542883N, 114.062996E) at 10:32 (Beijing time; UTC+8) on 2021–12–31

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[ese-zhangchjy@login03 fortran_demo1]$ gfortran Solar_evevation_angle.f9
0 -o Q2.x -L. -lsolar
/usr/bin/ld: 找不到 -lsolar
collect2: 错误： ld 返回 1
[ese-zhangchjy@login03 fortran_demo1]$ ar rcvf libsolar.a Solar_hour_ang
le.o Declination_angle.o
a - Solar_hour_angle.o
a - Declination_angle.o
[ese-zhangchjy@login03 fortran_demo1]$ gfortran Solar_evevation_angle.f9
0 -o Solar_evevation_angle.x -L. -lsolar
[ese-zhangchjy@login03 fortran_demo1]$ chmod 777 ./Solar_evevation_angle
.x
[ese-zhangchjy@login03 fortran_demo1]$ ./Solar_evevation_angle.x
 SEA for Shenzhen (22.542883N, 114.062996E) at 10:32 (Beijing time; UTC+
8) on 2021-12-31:   36.635054661771022
[ese-zhangchjy@login03 fortran_demo1]$
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将此输出结果与网站查询结果相对比

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.