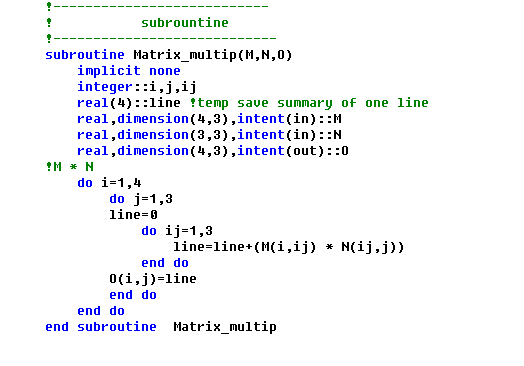
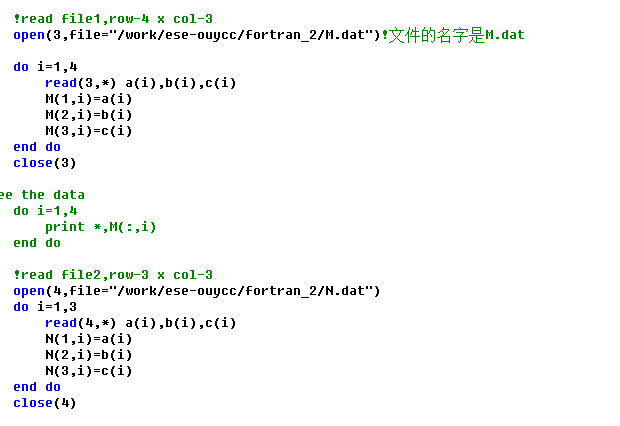
# Assignment 06

## 1. Matrix multiplication

* 1. ****[5 points]**** Write a subroutine Matrix\_multip.f90 to do matrix multiplication.

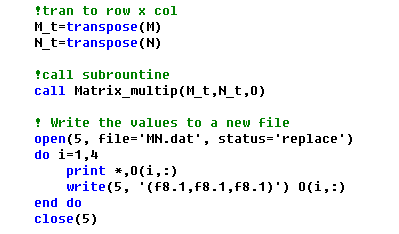


****1.2 [5 points]**** Write a program Main.f90 to read /work/ese-ouycc/fortran\_2/M.dat as the matrix M, and /work/ese-ouycc/fortran\_2/N.dat as the matrix N.

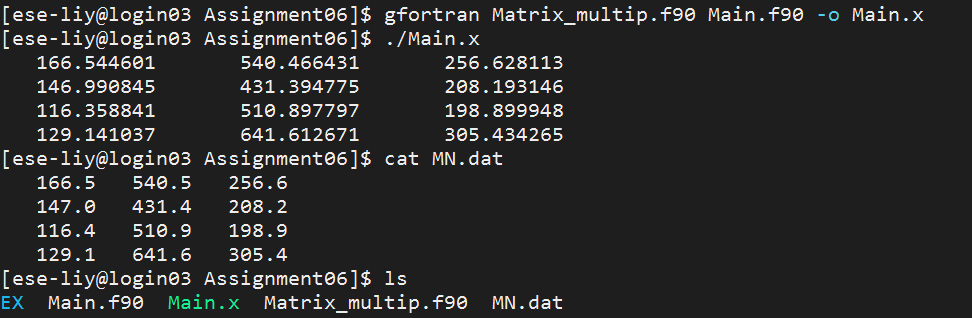


* 1. ****[5 points]**** Call subroutine Matrix\_multip() from Main.f90 to compute M\*N; write the output to a new file MN.dat, values are in formats of f8.1.

**#Call subroutine:**



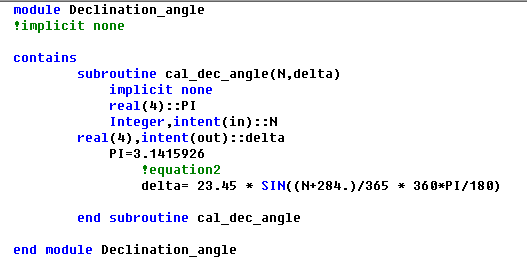
**#execute the program and view the output file**



## 2.Calculate the solar zenith angle

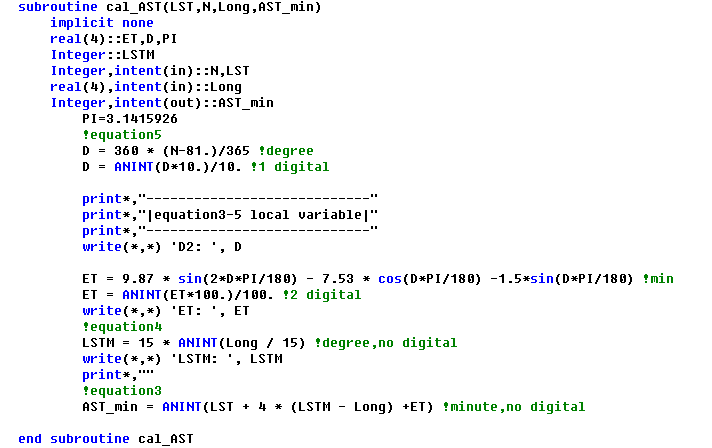
****2.1 [5 points]**** Write a module Declination\_angle to calculate the declination angle on a certain date.

[****Hint:**** using equation 2]



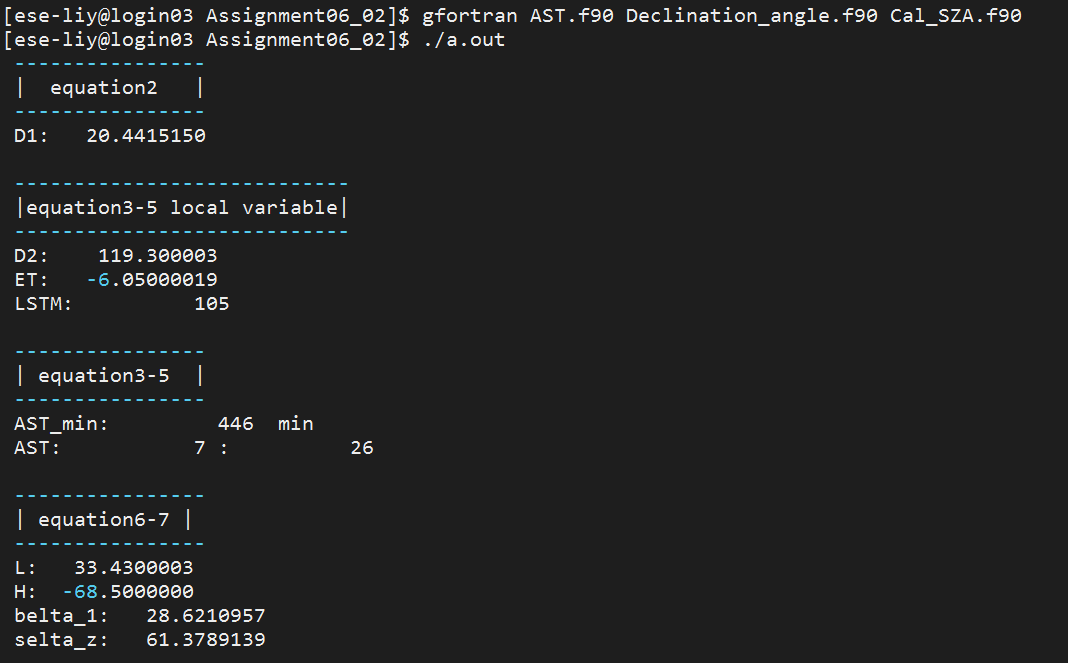
****2.2 [10 points]**** Write a module AST to calculate the apparent solar time (AST; or local solar time) in a certain location for a certain date and time.

[****Hint:**** using equation 3-5]



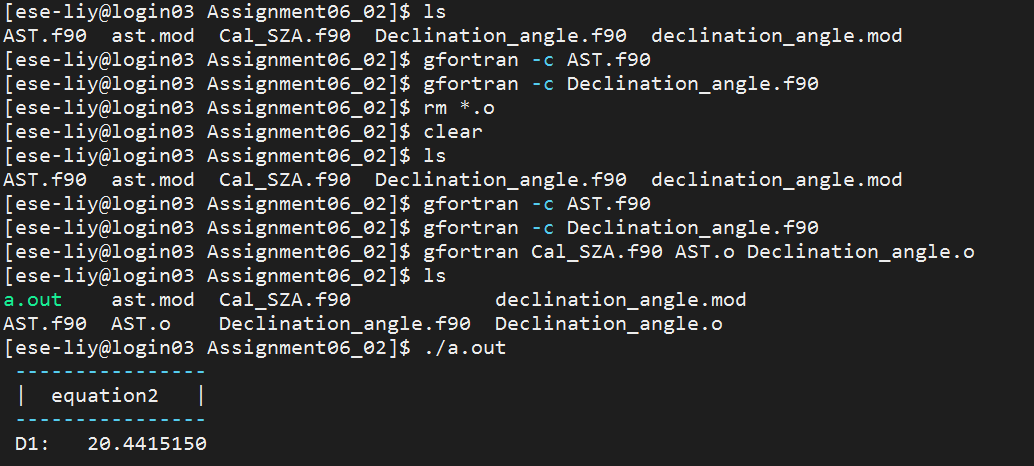
****2.3 [10 points]**** Write a main program (Cal\_SZA.f90) that uses module Declination\_angle and AST to print the SZA in a certain location for a certain date and time.

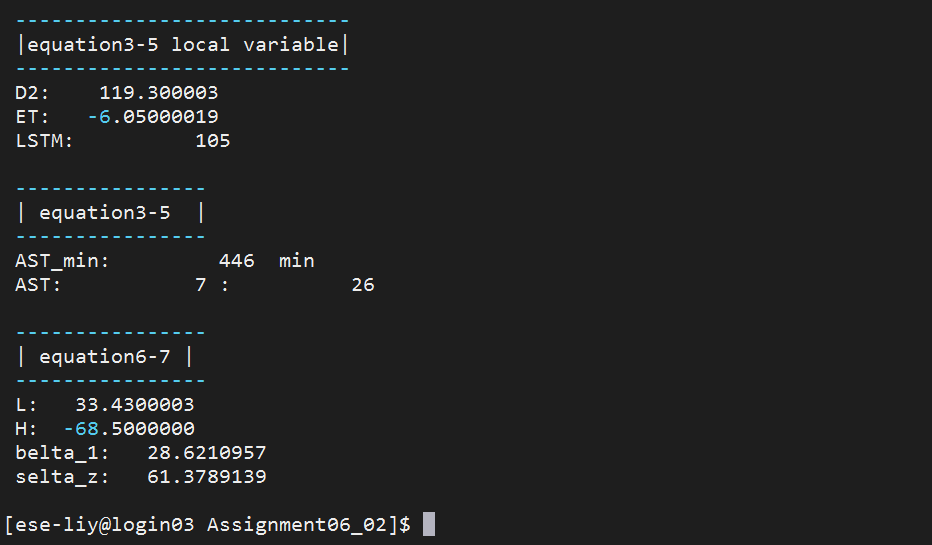
[****Hint:**** using equation 6-7]



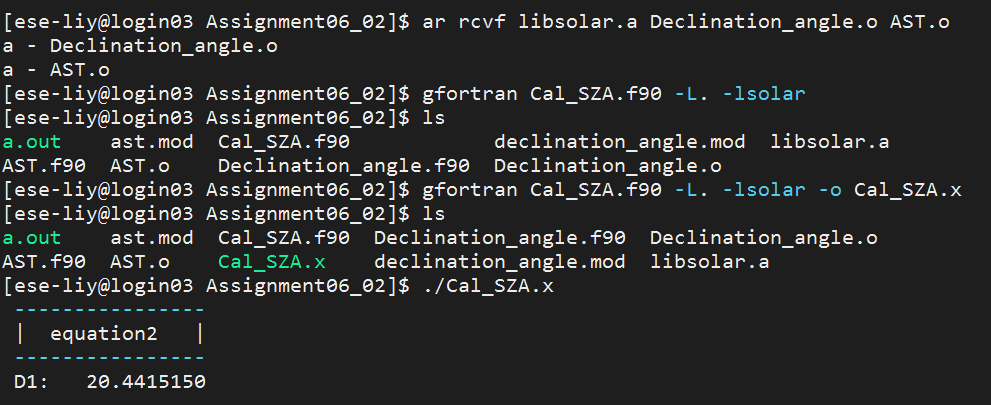
****2.4 [5 points]**** Create a library (libsolar.a) that contains Declination\_angle.o and AST.o. Compile Cal\_SZA.f90 using libsolar.a.

#execute the program with .o file



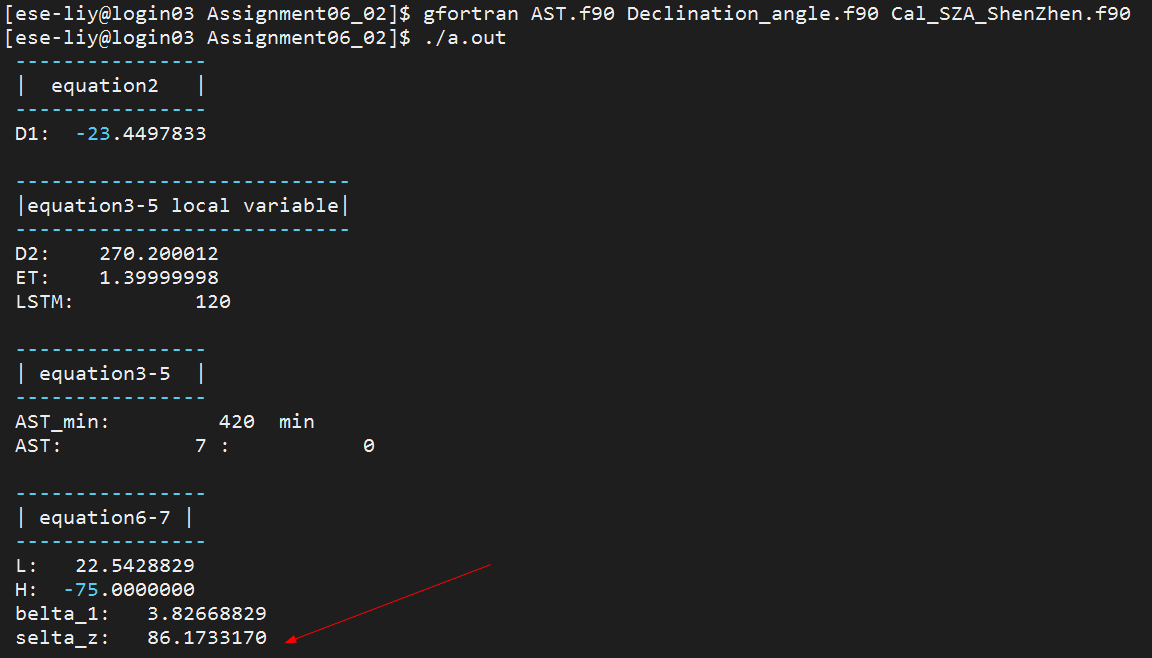


#execute the program with library



****2.5 [5 points]**** Print the SZA for Shenzhen (22.542883N, 114.062996E) at 14:35 (Beijing time; UTC+8) on 2020-12-20.

#work flow of the script wrote in Fortran



SZA; θZ = 86.2