

Fortran Tutorial Instructions

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1. Create the program `convert_temp.f` which uses three real variables `t_F`, `t_C`, and `t_K` for temperatures in Fahrenheit, Celsius, and Kelvin. Assign `t_F` to your favorite temperature, and convert for `t_C` and `t_K`. Recall that $^{\circ}C = 5/9(^{\circ}F - 32)$ and $K = ^{\circ}C + 273$.
 - a. Add a comment line or two which describes the program.
 - b. Use a formatted write statement to print all three variables to the screen, with appropriate text labels. Compile and run.
 - c. Let `t_F=212`, and write all variables with 20 digits after the decimal place. How many digits are correct?
 - d. Use the double precision flag (`-r8`) while compiling to promote 4 byte reals to 8 byte reals. How many digits of precision do you have now?
 - e. Change your variables to double precision and compile without the `-r8` flag. Do you get 16 digits of precision?
 - f. Use implicit typing (i.e. don't have `implicit none` before the declarations). Misspell one of your variables in the write statement and see what happens. Now repeat using explicit typing (include `implicit none` before declarations). What happens now?
 - g. Add a write statement that writes your temperatures to the ASCII text file `output.txt`. Compile and run your code, and verify that `output.txt` contains what you expect.

- 2. Resave your code as temperature_chart.f
 - a. Change t_C, t_F, and t_K to arrays. Assign t_F to have values 0, 5, 10, ... 100 in a do loop, and calculate the corresponding values in Celsius and Kelvin.

 - b. Have your program write a three column chart of results to the text file temperature_chart.txt. Include appropriate text headings.

- 3. Resave your code as main.f.
 - a. Change t_C and t_F to 15 by 15 arrays. We no longer need t_K.

 - b. Read t_F from the binary file temperature_F.dat, which contains a 15 by 15 data field of 8 byte reals. Write t_F to the screen.

 - c. Create a subroutine F_to_C(a,b,n,m) which converts a(n,m), an array of temperature values in Fahrenheit, to b(n,m), an array of temperatures in Celsius.

 - d. Write the result back to a binary file named temperature_C.dat

- 4. From part 3, save your main problem in main.f and the subroutine F_to_C in subs.f. Create a make file to compile and link these codes.