



Programming Languages and Paradigms Spring 2022

Assignment 1

Submission Details

You can submit your solutions to this assignment in the PLP OLAT course Sunday, Mar 20, 2022, at 11:59pm. Submit a single zip file that includes all relevant files.

Note the following:

1. Source code files you submit should compile/run without errors.
2. Also include compiled binaries if there are any.
3. For each task, also submit screenshots of the task compiling and then running in your command line, IDE, or programming environment. For small tasks, feel free to include a single screenshot showing multiple tasks running one after another.
4. It's up to you how exactly you implement the programs internally, as long as you're using the assigned programming language. The tasks only describe the expected behavior of the programs.

1. Task: Hello, World!

Write a command line program that prints the string "Hello, World!" including a line break (new-line) at the end.

2. Task: Gregorian to IFC

The "International Fixed Calendar" (IFC)¹ propose to replace the common Gregorian Calendar with a more regularly-paced alternative. The IFC works like this:

- Every month has exactly 28 days (exactly 4 weeks). Every week and month starts on a Sunday and ends on a Saturday.
- There are 13 months in a year ($13 \times 28 = 364$). The additional month is called "Sol" and it is the 7th month of the year, sitting between June (the 6th month) and July (the 8th month). All the other months keep their names.
- The year ends with a special "Year Day", which does not belong to any month or week, bringing the total number of days to 365.
- In leap years, an additional "Leap Day" is inserted between June 28th and Sol 1st, for a total of 366 days. It, too, does not belong to any month or week.
- Leap years are the same as in the Gregorian Calendar, i.e., there is a leap day in every year whose number is divisible by 4, but not if the year number is divisible by 100, unless it is also divisible by 400. So although the year 2000 was a leap year, the years 1700, 1800, and 1900 were non-leap years.

Implement an interactive command line program that converts a Gregorian date into an IFC date. If your programming language has date facilities, feel free to use them; but you don't have to and you may not need to.

The program should behave as follows:

1. When first run, it should print the following sentence: "Please enter three positive integer numbers (year month day) separated by one or more blank spaces or type quit."
2. The program should then wait for a line of user input. The user is now expected to enter three positive integers followed by a newline (hitting return/enter). Here are some examples of valid input:
 - 2021 12 25
 - 2021 12 25 (any number of spaces between numbers is permitted)
 - 2012 2 29 (a leap day in the Gregorian Calendar)
 - 2012 02 29 (the program should probably be able to handle leading zeroes)
 - quit (this ends the program)
3. When the user has entered a line, the program should perform the following sanity checks.
 - Anything other than three positive integers or the word "quit" should be rejected.
 - The date must exist (i.e., something like 2021 12 32 is not a valid date). You don't need to handle dates before year 0.

¹https://en.wikipedia.org/wiki/International_Fixed_Calendar

If a sanity check fails, the program should print "Invalid input, please try again". Feel free to give more accurate error messages depending on which sanity check fails – but you don't have to.

4. If valid input has been entered, the program should print the matching IFC date on a single line. Feel free to include the weekday as well.
5. The program should then expect another line of input.
6. If the user types "quit", the program should terminate.

Please try the following dates and include a screenshot in your submission (2020 was a leap year):

- 2021 01 01 should be 2021 January 01 (Sunday)
- 2021 01 28 should be 2021 January 28 (Saturday)
- 2021 01 29 should be 2021 February 01 (Sunday)
- 2021 03 01 should be 2021 March 04 (Wednesday)
- 2020 02 29 should be 2020 March 04 (Wednesday)
- 2020 06 17 should be "Leap Day"
- 2021 12 30 should be 2021 December 28 (Saturday)
- 2020 12 30 should be 2020 December 28 (Saturday)
- 2020 12 31 should be "Year Day"
- 2021 12 31 should be "Year Day"

You can use an online converter² to check any date.

Implementation hint: With regard to the algorithm for converting the date, it is rather straightforward:

1. Given the Gregorian date, figure out the day number within the year and whether or not it's a leap year.
2. Using the day number, find the appropriate month and day in the IFC. Watch out for the leap day if necessary.

²<https://faerymonarch.tripod.com/wikka.html>