CTEC 12073 - Structured Programming II
Coursework

Utility application title – Leap year checker

Introduction

The "Leap Year Checker" is a C program that checks if a year is a leap year or not. Leap years have an extra day (February 29) and are calculated based on specific rules. A year is considered a leap year if it is divisible by 4, except for years that are divisible by 100, unless they are divisible by 400. The program will provide a clear and informative response about the leap year status of the input year.

Project Objective

The main objective of this project is to create a Leap Year Checker that can:

- Welcome users and explain the program's purpose.
- Ask users to input a year.
- Verify that the input is a valid positive number.
- Use a leap year checking function to determine if the year is a leap year or not.
- Display the result to the user.

Implementation

- **leapyear() Function**

The core of the Leap Year Checker is the leapyear function. It takes a year as input and returns 1 if it's a leap year, otherwise 0. The function checks if the year is divisible by 4 and, if so, whether it is divisible by 100 but not by 400. If these conditions are met, it's not a leap year; otherwise, it is.

```c
int leapyear(int year) {
    // Check if the year is divisible by 4
    if (year % 4 == 0) {
        // Check if the year is divisible by 100 but not by 400
        if (year % 100 == 0 && year % 400 != 0) {
            return 0; // Not a leap year
        }
        return 1; // Leap year
    }
    return 0; // Not a leap year
}
```

```
Enter a year: 2024
2024 is a leap year.
```

```
Enter a year: 2025
2025 is not a leap year.
```

- **error() Function**

To handle invalid input, an error function is used. If the user provides a non-positive number as a year, the error function displays an error message, notifying the user to input a positive integer.

```c
void error(int year){

    if (year <= 0) {
        printf("Invalid year. Please input a positive integer.\n");
        return 1;
    }

}
```

```
Enter a year: -1265
Invalid year. Please input a positive integer.
```

- **main() function**

The program starts by greeting the user and explaining its purpose. Then it asks the user to input a year using scanf. The input is validated using the error function to ensure it's a positive integer. If the input is invalid, an error message is displayed, and the program ends. Otherwise, the leapyear function is called to check if the year is a leap year, and the result is shown to the user.

```c
int main() {
    printf("Welcome to the Leap Year Checker!\n");
    printf("This program will determine whether a given year is a leap year or not.\n\n");

    int year;

    printf("Enter a year: ");
    scanf("%d", &year);

    if (year <= 0) {
        error(year);
        return ;
    }

    if (leapyear(year)) {
        printf("%d is a leap year.\n", year);
    } else {
        printf("%d is not a leap year.\n", year);
    }

    return 0;
}
```

```
Welcome to the Leap Year Checker!
This program will determine whether a given year is a leap year or not.

Enter a year: 2028
2028 is a leap year.
```

```
Welcome to the Leap Year Checker!
This program will determine whether a given year is a leap year or not.

Enter a year: 2025
2025 is not a leap year.
```

```
Welcome to the Leap Year Checker!
This program will determine whether a given year is a leap year or not.

Enter a year: -2541
Invalid year. Please input a positive integer.
```

Conclusion

The Leap Year Checker is a straightforward and useful C program that allows users to check whether a given year is a leap year or not. The code is well-structured and easy to understand. It demonstrates input validation, error handling, and basic programming concepts in C.

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