**Sulaiman Abdulrahman**

**4094**

* User shall input the year with 4 digits 1900
* The system shall output the given year is a Leap Year or Not.
* **Your Code Shall Print the 400 Year Calendar as well.**
* **See the attachment Leap Year February Date Shall be Highlighted.**
* Firstly, Follow Code Optimization as Discussed in the Class.
* Secondly, Reduce the Code Complexity by the two methods.

**400 Calender Project In C++**

#include <iostream>

#include <iomanip>

#include <vector>

using namespace std;

bool is\_leap\_year(int year) {

if (year % 4 != 0) return false;

if (year % 100 != 0) return true;

if (year % 400 != 0) return false;

return true;

}

vector<int> get\_month\_days(int month, int year) {

int days\_in\_month;

switch (month) {

case 2:

days\_in\_month = is\_leap\_year(year) ? 29 : 28;

break;

case 4:

case 6:

case 9:

case 11:

days\_in\_month = 30;

break;

default:

days\_in\_month = 31;

break;

}

return vector<int>(days\_in\_month, 0);

}

vector<vector<vector<int>>> generate\_calendar(int start\_year, int end\_year) {

vector<vector<vector<int>>> calendar(400, vector<vector<int>>(12));

for (int year = start\_year; year <= end\_year; year++) {

int year\_index = (year - start\_year) % 400;

for (int month = 0; month < 12; month++) {

calendar[year\_index][month] = get\_month\_days(month + 1, year);

}

}

return calendar;

}

void print\_calendar(int month, int year, vector<vector<vector<int>>> calendar) {

vector<int> month\_days = calendar[(year - 1) % 400][month - 1];

// Print month and year

cout << "Month: " << month << ", Year: " << year << endl;

// Print calendar header

cout << "Su Mo Tu We Th Fr Sa" << endl;

// Compute day of the week of the first day of the month

int year\_code = ((year - 1) % 400) / 100 \* 5;

int century\_code = (year\_code + (year - 1) % 100 - (year - 1) % 100 / 4) % 7;

int month\_code = is\_leap\_year(year) && month == 2 ? 6 : ((month + 1) \* 26 - 2) / 10 % 7;

// Print calendar

int day = 1;

int days\_in\_month = month\_days.size();

for (int day\_of\_week = (1 + century\_code + month\_code) % 7; day <= days\_in\_month; day\_of\_week = 0) {

for (int i = 0; i < day\_of\_week; i++) {

cout << " ";

}

for (int i = 0; i < 7 - day\_of\_week; i++) {

cout << setw(2) << day << (is\_leap\_year(year) && month == 2 && day == 29 ? "\*" : " ");

day++;

if (day > days\_in\_month) {

break;

}

}

cout << endl;

}

cout << endl;

}

int main() {

int start\_year = 1600;

int end\_year = start\_year + 399;

vector<vector<vector<int>>> calendar = generate\_calendar(start\_year, end\_year);

// Print calendar for a specific year entered by user

int year;

cout << "Enter a year with 4 digits (between " << start\_year << " and " << end\_year << "): ";

cin >> year;

if (year < start\_year || year > end\_year) {

cerr << "Error: Invalid year entered." << endl;

return 1;

}

print\_calendar(1, year, calendar);

print\_calendar(2, year, calendar);

print\_calendar(3, year, calendar);

return 0;

}

**THE OUTPUT**

Enter a year with 4 digits (between 1600 and 1999): 1900

Month: 1, Year: 1900

Su Mo Tu We Th Fr Sa

1 2 3 4 5 6 7

8 9 10 11 12 13 14

15 16 17 18 19 20 21

22 23 24 25 26 27 28

29 30 31

Month: 2, Year: 1900

Su Mo Tu We Th Fr Sa

1 2 3 4 5

6 7 8 9 10 11 12

13 14 15 16 17 18 19

20 21 22 23 24 25 26

27 28

Month: 3, Year: 1900

Su Mo Tu We Th Fr Sa

1 2

3 4 5 6 7 8 9

10 11 12 13 14 15 16

17 18 19 20 21 22 23

24 25 26 27 28 29 30

31