Algorithms Level 4

PROGRAMMING ADVICES
LEARN THE RIGHT WAY

26+ Years of Experience

Mohammed Abu-Hadhoud

MBA, PMOC, PgMP®, PMP®, PMI-RMP®, CM, ITILF, MCPD, MCSD

ProgrammingAdvices.com

```cpp
#include <iostream>
using namespace std;

struct stDate
{
    short Year;
    short Month;
    short Day;

};

bool isLeapYear(short Year)
{
   return (Year % 4 == 0 && Year % 100 != 0) || (Year % 400 == 0);
}

short NumberOfDaysInAMonth(short Month, short Year)
{

    if (Month < 1 || Month>12)
        return  0;

    int days[12] = { 31,28,31,30,31,30,31,31,30,31,30,31 };
    return (Month == 2) ? (isLeapYear(Year) ? 29 : 28) :
days[Month - 1];

}

bool IsLastDayInMonth(stDate Date)
{

    return (Date.Day == NumberOfDaysInAMonth(Date.Month,
Date.Year));

}

bool IsLastMonthInYear(short Month)
{
    return (Month == 12);
}
```

```cpp
stDate IncreaseDateByOneDay(stDate Date)
{
    if (IsLastDayInMonth(Date))
    {
        if (IsLastMonthInYear(Date.Month))
        {
            Date.Month = 1;
            Date.Day = 1;
            Date.Year++;
        }
        else
        {
            Date.Day = 1;
            Date.Month++;
        }
    }
    else
    {
        Date.Day++;
    }

    return Date;
}

stDate IncreaseDateByOneWeek(stDate Date)
{

    for (int i = 1; i <= 7; i++)
    {
        Date = IncreaseDateByOneDay(Date);
    }

    return Date;
}

stDate IncreaseDateByXWeeks(short Weeks, stDate Date)
{

    for (short i = 1; i <= Weeks; i++)
    {
        Date = IncreaseDateByOneWeek(Date);
    }
    return Date;
}
```

```cpp
stDate IncreaseDateByOneMonth(stDate Date)
{

    if (Date.Month == 12)
    {
        Date.Month = 1;
        Date.Year++;
    }
    else
    {
        Date.Month++;
    }

    //last check day in date should not exceed max days in the
current month
    // example if date is 31/1/2022 increasing one month should
not be 31/2/2022, it should
    // be 28/2/2022
    short NumberOfDaysInCurrentMonth =
NumberOfDaysInAMonth(Date.Month, Date.Year);
    if (Date.Day > NumberOfDaysInCurrentMonth)
    {
        Date.Day = NumberOfDaysInCurrentMonth;
    }

    return Date;
}

stDate IncreaseDateByXDays(short Days, stDate Date)
{

    for (short i = 1; i <= Days; i++)
    {
        Date = IncreaseDateByOneDay(Date);
    }
    return Date;
}

stDate IncreaseDateByXMonths(short Months, stDate Date)
{

    for (short i = 1; i <= Months; i++)
    {
        Date = IncreaseDateByOneMonth(Date);
    }
    return Date;
}
```

```cpp
stDate IncreaseDateByOneYear(stDate Date)
{

    Date.Year++;
    return Date;
}

stDate IncreaseDateByXYears(short Years, stDate Date)
{

    for (short i = 1; i <= Years; i++)
    {
        Date = IncreaseDateByOneYear(Date);
    }
    return Date;
}


stDate IncreaseDateByXYearsFaster(short Years, stDate Date)
{

    Date.Year += Years;
    return Date;
}


stDate IncreaseDateByOneDecade(stDate Date)
{
    //Period of 10 years
    Date.Year += 10;
    return Date;
}

stDate IncreaseDateByXDecades(short Decade, stDate Date)
{

    for (short i = 1; i <= Decade * 10; i++)
    {
        Date = IncreaseDateByOneYear(Date);
    }
    return Date;
}

stDate IncreaseDateByXDecadesFaster(short Decade, stDate Date)
{

    Date.Year += Decade * 10;
    return Date;
}
```

```cpp
stDate IncreaseDateByOneCentury(stDate Date)
{
    //Period of 100 years
    Date.Year += 100;
    return Date;
}

stDate IncreaseDateByOneMillennium(stDate Date)
{
    //Period of 1000 years
    Date.Year += 1000;
    return Date;
}

short ReadDay()
{
    short Day;
    cout << "\nPlease enter a Day? ";
    cin >> Day;
    return Day;
}

short ReadMonth()
{
    short Month;
    cout << "Please enter a Month? ";
    cin >> Month;
    return Month;
}

short ReadYear()
{
    short Year;
    cout << "Please enter a Year? ";
    cin >> Year;
    return Year;
}

stDate ReadFullDate()
{
    stDate Date;

    Date.Day = ReadDay();
    Date.Month = ReadMonth();
    Date.Year = ReadYear();
    return Date;
}
```

```cpp
int main()
{
    stDate Date1 = ReadFullDate();

    cout << "\nDate After: \n";

    Date1 = IncreaseDateByOneDay(Date1);
    cout << "\n01-Adding one day is: "
        << Date1.Day << "/" << Date1.Month << "/" << Date1.Year;

    Date1 = IncreaseDateByXDays(10, Date1);
    cout << "\n02-Adding 10 days is: "
        << Date1.Day << "/" << Date1.Month << "/" << Date1.Year;

    Date1 = IncreaseDateByOneWeek(Date1);
    cout << "\n03-Adding one week is: "
        << Date1.Day << "/" << Date1.Month << "/" << Date1.Year;

    Date1 = IncreaseDateByXWeeks(10, Date1);
    cout << "\n04-Adding 10 weeks is: "
        << Date1.Day << "/" << Date1.Month << "/" << Date1.Year;

    Date1 = IncreaseDateByOneMonth(Date1);
    cout << "\n05-Adding one month is: "
        << Date1.Day << "/" << Date1.Month << "/" << Date1.Year;

    Date1 = IncreaseDateByXMonths(5, Date1);
    cout << "\n06-Adding 5 months is: "
        << Date1.Day << "/" << Date1.Month << "/" << Date1.Year;

    Date1 = IncreaseDateByOneYear(Date1);
    cout << "\n07-Adding one year is: "
        << Date1.Day << "/" << Date1.Month << "/" << Date1.Year;

    Date1 = IncreaseDateByXYears(10, Date1);
    cout << "\n08-Adding 10 Years is: "
        << Date1.Day << "/" << Date1.Month << "/" << Date1.Year;

    Date1 = IncreaseDateByXYearsFaster(10, Date1);
    cout << "\n09-Adding 10 Years (faster) is: "
        << Date1.Day << "/" << Date1.Month << "/" << Date1.Year;

    Date1 = IncreaseDateByOneDecade(Date1);
    cout << "\n10-Adding one Decade is: "
        << Date1.Day << "/" << Date1.Month << "/" << Date1.Year;
```

```cpp
        Date1 = IncreaseDateByXDecades(10, Date1);
        cout << "\n11-Adding 10 Decades is: "
            << Date1.Day << "/" << Date1.Month << "/" << Date1.Year;

        Date1 = IncreaseDateByXDecadesFaster(10, Date1);
        cout << "\n12-Adding 10 Decade (faster) is: "
            << Date1.Day << "/" << Date1.Month << "/" << Date1.Year;

        Date1 = IncreaseDateByOneCentury(Date1);
        cout << "\n13-Adding One Century is: "
            << Date1.Day << "/" << Date1.Month << "/" << Date1.Year;

        Date1 = IncreaseDateByOneMillennium(Date1);
        cout << "\n14-Adding One Millennium is: "
            << Date1.Day << "/" << Date1.Month << "/" << Date1.Year;


        system("pause>0");
        return 0;
}
```