NETB171 Computer programming labs

Homework 3

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Variant 11. Define a class Date that stores day, month and year in a dynamically allocated array of integers.
Supply the "big three" memory management functions. Use this class to demonstrate
(a) the difference between initialization

```
Date s;
Date t = s;
```

and assignment operation

```
Date s;
Date t;
s = t;
```

(b) the fact that all constructed objects are automatically destroyed
(c) the fact that the copy constructor is invoked if an object is passed by value to a function
(d) the fact that the copy constructor is not invoked when a parameter is passed by reference
(e) the fact that the copy constructor is used to copy a return value to the caller.
Supply get and set member functions for day, month and year.
Overload ++ and -- operators (prefix and postfix forms) to set a new date - a day later or before the argument (current) value, and the stream operators<< and >>. Demonstrate all these functions and operators.

Solution

We define a class Date in the header file Date.h. Its implementation is in Date.cpp and we have also a main.cpp file.

Date.h
The class Date has two private data fields: *arr* - a dynamic array, containing the day, month and year; SIZE - the size of the array, which is 3. It has a standard constructor, copy constructor, destructor and predefined assignment operator. We also implement set and get member functions for day, month and year and overload ++ and -- operators (prefix and postfix forms) and the stream operators << and >>.

Data.cpp

The constructor dynamically allocates an array of integers with length 3.
The copy constructor checks if the object which we want to copy is the same as ours and if not we make a new array and assign it with the corresponding values.
The destructor frees the memory, deleting the dynamic array if it hasn't been deleted.
In the assignment operator predefinition we first check if we will assign one object to itself. If not we delete the current object and make a new one, assigning it with the corresponding values. Finally we return the new object.
Set functions – set the day, month and year.
Get functions – return the day, month and year.
Overloading ++ operators: we increment the day by one and check the specific cases when the day is the last in the month. In the prefix operator we directly return the Date object, while in the postfix operator we make a new temporary object equal to ours which will be returned and change the other.
Analogically we do the same with the -- operators but there we check the cases where the date is at the beginning of the month.
We overload the stream operator << to print a Date object in the correct format: DD.MM.YYYY. The overloaded >> operator reads three integers and arranges them in a Date object.

main.cpp

In the main we demonstrate all Date functions and operators using appropriate messages and two additional functions to show what happens when an object is passed by value or by reference to a function.