Winter 2016.

OOP244 Assignment

Aid Management Application (AMA)

V2.0

When disaster hits an area, the most important thing is to be able provide the people affected with what they need as quickly and as efficiently possible.

Your job for this project is to prepare an application that manages the list of goods needed to be shipped to the area. The application should be able to keep track of the quantity of items needed and quantity in hand, and store them in a file for future use.

The types of goods needed to be shipped in this situation are divided into two categories;

- Non-Perishable products, such as blankets and tents, that have no expiry date, we refer to these type of products as AMA_product.
- Perishable products, such as food and medicine, that have an expiry date, we refer to these products as AMA_Perishable.

To accomplish this task you need to create several classes to encapsulate the problem and provide a solution for this application.

CLASSES TO BE DEVELOPED

The classes needed for this application are:

Date

A class to be used to hold the expiry date of the perishable items.

ErrorMessage

A class to keep track of the errors occurring during data entry and user interaction.

Streamable

This interface (a class with "only" pure virtual functions) enforces the classes that inherit from it to be *streamable*. Any class derived from "Streamable" can read from or write to the console, or can be saved to or loaded from a text file.

Using this class the list of items can be saved into a file and retrieved later, and individual item specifications can be displayed on screen or read from keyboard.

Product

A class inherited form Streamable, containing general information about an item, like the name, Stock Keeping Unit (SKU), price etc.

AMA_Product

A class for non-perishable items that is inherited from the “Product” class and implements the requirements of the “Streamable” class (i.e. implements the pure virtual methods of the Streamable class)

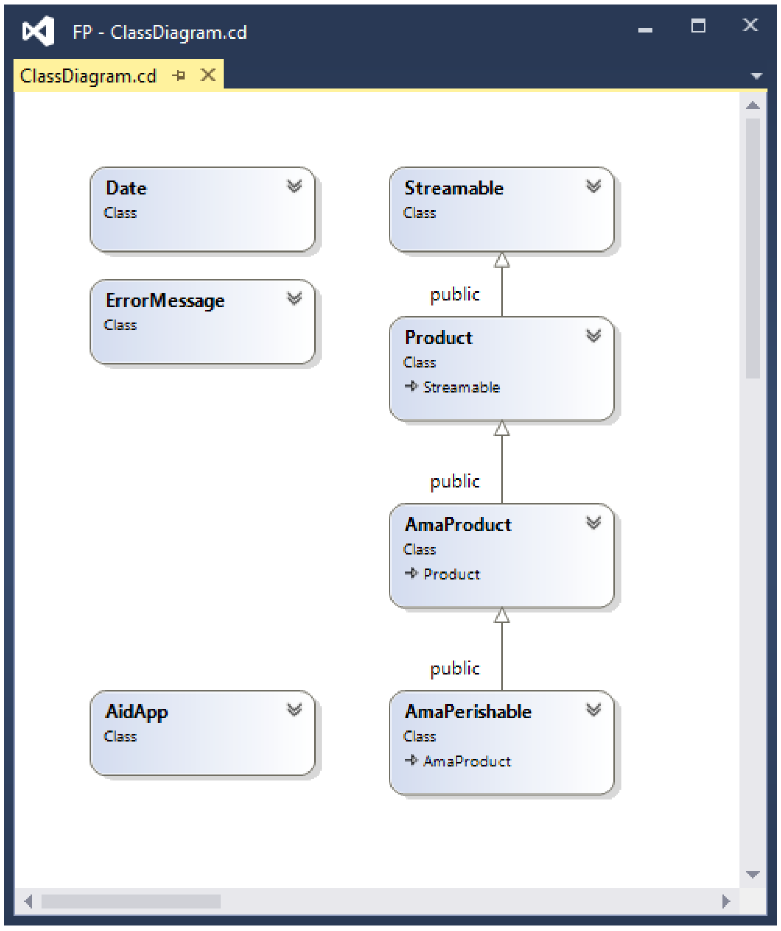
AMA_Perishable

A class inherited from the “AMA_Product” that provides expiry date for Perishable items.

AidApp

The main application class that is essentially the manager class for the NFI and Perishable items. This class provides the user with a user-interface to list, add and update the items saved in a data file.

PROJECT CLASS DIAGRAM



PROJECT DEVELOPMENT PROCESS

The Development process of the project is divided into 6 milestones and therefore six deliverables. Shortly before the due date of each deliverable a tester program and a script will be provided to you to test and submit each of the deliverables. The approximate schedule for deliverables is as follows

- Due: Kickoff (KO) + 35 days

• The Date class.	Due: KO + 5 days
• The ErrorMessage class	Due: KO + 8 (3 days)
• The Streamable class	Due: KO + 9 (1 day)
• The Product class	Due: KO + 15 (6 days)
• The AMA product classes	Due: KO + 25 (10 days)
• The AidApp class.	Due: KO + 35 (10 days)

FILE STRUCTURE OF THE PROJECT

Each class will have its own header file and cpp file. The names of these files should be the same as the class name.
Example: Class **Date** has two files: **Date.h** and **Date.cpp**

In addition to header files for each class, create a header file called “general.h” that will hold the general defined values for the project, such as:

```
TAX (0.13)           The tax value for the NFI items
MAX_SKU_LEN (7)      The maximum size of a SKU

DISPLAY_LINES (10)   Product lines to display before each pause

MIN_YEAR (2000)      The min and max for year to be used for date validation
MAX_YEAR (2030)

MAX_NO_RECS (2000)   The maximum number of records in the data file.
```

This header file should get included were these values are needed.

Note that all the code developed for this application should be in `sict` namespace.

MILESTONE 1: THE DATE CLASS

The Date class encapsulates a date value in three integers for year, month and day, and is readable by istreams and printable by ostream using the following format for both reading and writing: YYYY/MM/DD

Complete the implementation of Date class using following information:

Member Data:

`int year_;`	Holds the year; a four digit integer between MIN_YEAR and MAX_YEAR, defined in “general.h”
`int mon_;`	Month of the year, between 1 to 12
`int day_;`	Day of the month, note that in a leap year February is 29 days, (see mday() member function)

`int readErrorCode_;` This variable holds an error code with which the caller program can find out if the date value is valid or not, and which part is erroneous if so. The possible error values should be defined in date header-file as follows:

```
NO_ERROR   0  -- No error the date is valid
CIN_FAILED 1  -- istream failed when entering information
YEAR_ERROR 2  -- Year value is invalid
MON_ERROR  3  -- Month value is invalid
DAY_ERROR  4  -- Day value is invalid
```

Private Member functions:

`int value()const;` (this function is already implemented and provided)

This function returns a unique integer number based on the date. This value is used to compare two dates. (If the value() of date one is larger than date two, then date one is after date two).

`void errCode(int errorCode);`

Sets the readErrorCode_ member-variable to one of the values mentioned above.

Constructors:

No argument (default) constructor: sets year_, mon_ and day_ to "0" and readErrorCode_ to NO_ERROR.

Three argument constructor: Accepts three arguments to set the values of year_, mon_ and day_ attributes. It also sets the readErrorCode_ to NO_ERROR. *No validation required.*

Public member-functions and operators

Comparison Logical operator overloads:

```
bool operator==(const Date& D)const;
bool operator!=(const Date& D)const;
bool operator<(const Date& D)const;
bool operator>(const Date& D)const;
bool operator<=(const Date& D)const;
bool operator>=(const Date& D)const;
```

These operators return the comparison result of the return value of the value() function applied to left and right operands (The Date objects on the left and right side of the operators).
For example `operator<` returns true if `this->value()` is less than `D.value()` or else it returns false.

`int mdays()const;` (this function is already implemented and provided)

Returns the number of days in a month.

Accessor or getter member functions:

`int errCode()const;`   Returns the readErrorCode_ value.
`bool bad()const;`   Returns true if readErrorCode_ is not equal to zero.

IO member-funtions

```
std::istream& read(std::istream& istr);
```

Reads the date is following format: YYYY?MM?DD (e.g. 2016/03/24 or 2016-03-24) from the console. This function will not prompt the user. If the istream `(istr)` fails at any point, it will set the `readErrorCode_` to `CIN_FAILED` and will NOT clear the istream object. If the numbers are successfully read in, it will validate them to be in range, in the order of year, month and day (see general header-file and mday() method for acceptable ranges for years and days respectively. Month can be between 1 and 12 inclusive). If any of the numbers is not in range, it will set the `readErrorCode_` to the appropriate error code and stop further validation. Irrespective of the result of the process, this function will return the incoming istr argument.

```
std::ostream& write(std::ostream& ostr)const;
```

Writes the date using the ostr argument in the following format: YYYY/MM/DD, then returns the ostr.

Non-member IO operator overloads:

After implementing the Date class, overload the operator<< and operator>> to work with cout to print a Date, and cin to read a Date, respectively, from the console.

Use the read and write methods and DO NOT use friends for these operator overloads.

Make sure the prototype of the functions are in Date.h.

Preliminary task

To kick-start the first milestone clone/download for milestone 1 from
https://github.com/Seneca-244200/OOP-FP_MS1.git

and implement the Date class.

Compile and test you code with the four tester programs starting from tester number 1 up to 4.

MILESTONE 1 SUBMISSION

If not on matrix already, upload **general.h, Date.h, Date.cpp** and the four testers to your matrix account. Compile and run your code and make sure everything works properly.

Then run the following script from your account:

```
Sections SAA and SBB:
~edgardo.arvelaez/submit ms1 <ENTER>
Section SCC and SDD:
~fardad.soleimanloo/submit ms1 <ENTER>
Section SEE and SFF:
~eden.burton/submit ms1 <ENTER>
```

and follow the instructions.

MILESTONE 2: THE ERRORMESSAGE CLASS

Clone/download milestone 2 from https://github.com/Seneca-244200/OOP-FP_MS2.git

and implement the ErrorMessage class.

The ErrorMessage class encapsulates an error message in a dynamic C-style string and also is used as a flag for the error state of other classes.

Later in the project, if needed in a class, an ErrorMessage object is created and if an error occurs, the object is set a proper error message.
Then using the **isClear()** method, it can be determined if an error has occurred or not and the object can be printed using **cout** to show the error message to the user.

Private member variable (attribute):

ErrorMessage has only one private data member (attribute):

```
char* message_;
```

Constructors:

No Argument Constructor, (default constructor):

```
ErrorMessage();
```

Sets the **message_** member variable to **nullptr.**

Constructors:

```
ErrorMessage(const char* errorMessage);
```

Sets the **message_** member variable to **nullptr** and then uses the **message()** setter member function to set the error message to the **errorMessage** argument.

```
ErrorMessage(const ErrorMessage& em) = delete;
```

`A deleted copy constructor to` prevent an ErrorMessage object to be copied.

Public member functions and operator overloads (methods):

```
ErrorMessage& operator=(const ErrorMessage& em) = delete;
```

`A deleted assignment operator overload to` prevent an ErrorMessage object to be assigned to another.

`ErrorMessage& operator=(const char* errorMessage);`

Sets the message_ to the **errorMessage** argument and returns the current object (*this) by:

- De-allocating the memory pointed by **message_**
- Allocating memory to the same length of **errorMessage + 1** and keeping the address in **message_** data member.
- Copying **errorMessage** c-string into **message_.**
- Returning *this.

You can accomplish this by reusing your code and calling the following member functions: Call **clear()** and then call the setter **message()** function and retrun *this.

`virtual ~ErrorMessage();`

de-allocates the memory pointed by **message_.**

`void clear();`

de-allocates the memory pointed by **message_** and then sets **message_** to **nullptr.**

`bool isClear()const;`

returns true if **message_** is **nullptr.**

`void message(const char* value);`

Sets the **message_** of the ErrorMessage object to a new value by:

- de-allocating the memory pointed by **message_.**
- allocating memory to the same length of **value + 1** keeping the address in **message_** data member.
- copying **value** c-string into **message_.**

`const char* message()const;`

returns the address kept in **message_**.

Helper operator overload:

Overload **`operator<<`** so the ErrorMessage can be printed using **`cout`**.

If ErrorMessage **isClear,** Nothing should be printed, otherwise the c-string pointed by **message_** is printed.

MILESTONE 2 SUBMISSION

If not on matrix already, upload **ErrorMessage.h, ErrorMessage.cpp** and the tester to your matrix account. Compile and run your code and make sure everything works properly.

Then run the following script from your account:

```
Sections SAA and SBB:
~edgardo.arvelaez/submit ms2 <ENTER>
Section SCC and SDD:
~fardad.soleimanloo/submit ms2 <ENTER>
Section SEE and SFF:
~eden.burton/submit ms2 <ENTER>
```

and follow the instructions.