

Winter 2016.  
OOP244 Assignment

# Aid Management Application (AMA)

V6.2

(6.1 added submission instructions for ms6)  
(6.2 Bonus submission and ms5 submission for 70%)

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 Product specifications can be displayed on screen or read from keyboard.

## Product

A class inherited from 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 AmaProduct 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:

<code>TAX (0.13)</code>	The tax value for the AmaProduct items
<code>MAX_SKU_LEN (7)</code>	The maximum size of a SKU
<code>DISPLAY_LINES (10)</code>	Product lines to display before each pause
<code>MIN_YEAR (2000)</code>	The min and max for year to be used for date validation
<code>MAX_YEAR (2030)</code>	
<code>MAX_NO_RECS (2000)</code>	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

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

Reads the date in 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.

`ostream&` `write(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](https://github.com/Seneca-244200/OOP-FP_MS1.git)

and implement the `Date` class.

Compile and test your 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](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 return `*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.

## MILESTONE 3: THE STREAMABLE INTERFACE

The Streamable class is provided to enforce inherited classes to implement functions to work with fstream and istream objects.

Code the Streamable class in the Streamable.h file provided in OOP-FP\_MS3 repository (No CPP file) on github: [https://github.com/Seneca-244200/OOP-FP\\_MS3.git](https://github.com/Seneca-244200/OOP-FP_MS3.git)

You do not need the Date or ErrorMessage class for this milestone.

### Pure virtual member functions (methods):

Streamable class, being an interface, has only four pure virtual member functions (methods) with following names:

- 1- `fstream& store(fstream& file, bool addNewLine = true) const`  
 Is a constant member function (does not modify the owner) and receives and returns references of fstream.  
*In future milestones children of Streamable will implement this method, when they are to be stored in a file.*
- 2- `fstream& load(fstream& file)`  
 Receives and returns references of fstream.  
*In future milestones children of Streamable will implement this method, when they are to be read from a file.*
- 3- `ostream& write(ostream& os, bool linear) const`  
 Is a constant member function and returns a reference of ostream.  
 write() receives two arguments: the first is a reference of ostream and the second is a bool argument called linear.  
*In future milestones children of Streamable will implement this method when they are to be printed on the screen in two different formats:*  
*Linear: the class information is to be printed in one line*  
*Form: the class information is to be printed in several lines like a form.*
- 4- `istream& read(istream& is)`  
 Returns and receives references of istream.  
*In future milestones children of Streamable will implement this method when their information is to be received from console.*

As you already know, these functions only exist as prototypes in the class declaration in the header file.



After implementing this class, compile it with Myfile.cpp, MyFile.h and StreamableTester.cpp. The program should compile with no error and using the tester program you will be able to read and append text to the streamable.txt file.

## MILESTONE 3 SUBMISSION

If not on matrix already, upload [Streamable.h](#), [MyFile.h](#), [MyFile.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 ms3 <ENTER>
Section SCC and SDD:
~fardad.soleimanloo/submit ms3 <ENTER>
Section SEE and SFF:
~eden.burton/submit ms3 <ENTER>
```

and follow the instructions.

## MILESTONE 4: THE PRODUCT CLASS

Create a class called Product. The class Product is responsible for encapsulating a general Streamable Product.

Although the class Product is a Streamable (inherited from Streamable), it will not implement any of the pure virtual member functions, therefore it remains abstract.

The class Product is implemented under the sict namespace. Code the Product class in the Product.cpp and Product.h files provided in OOP-FP\_MS4 repository on github:

[https://github.com/Seneca-244200/OOP-FP\\_MS4](https://github.com/Seneca-244200/OOP-FP_MS4)

You do not need the Date class for this milestone.

### Product Class specs:

Private Member variables:

**sku\_:** Character array, **MAX\_SKU\_LEN** + 1 characters long  
This character array holds the SKU (barcode) of the items as a string.

**name\_:** Character pointer

This character pointer points to a dynamic string that holds the name of the Product

**price\_:** Double

Holds the Price of the Product

**taxed\_:** Boolean

This variable will be true if this Product is taxed

**quantity\_:** Integer

Holds the on hand (current) quantity of the Product.

**qtyNeeded\_:** Integer

Holds the needed quantity of the Product.

## Public member functions and constructors

### No argument Constructor;

This constructor sets the Product to a safe recognizable empty state. All number values are set to zero in this state.

### Five argument Constructor;

Product is constructed by passing 5 values to the constructor:

the SKU, the Name, if the Product is taxed or not, , the Price and the Needed Quantity.

The constructor:

- Copies the SKU into the corresponding member variable up to **MAX\_SKU\_LEN** characters.
- Allocates enough memory to hold the name in the name\_ pointer and then copies the name into the allocated memory pointed to by the member variable name\_.
- Sets quantity on hand to zero.
- Sets the rest of the member variables to the corresponding values received by the arguments.
- If value for Product being taxed is not provided, it will set the taxed\_ flag to the default value "true"

### Copy Constructor;

See below:

### Dynamic memory allocation necessities

Implement the copy constructor and the operator= so the Product is copied from and assigned to another Product safely and without any memory leak. Also implement a virtual destructor to make sure the memory allocated by name\_ is freed when Product is destroyed.

## Accessors

### Setters:

Create the following setter functions to set the corresponding member variables:

- **sku**
- **price**
- **name**
- **taxed**
- **quantity**

### - qtyNeeded

All the above setters return void.

### Getters (Queries):

Create the following constant getter functions to return the values or addresses of the member variables: (these getter methods do not receive any arguments)

- **sku**, returns constant character pointer
- **price**, returns double
- **name**, returns constant character pointer
- **taxed**, returns boolean
- **quantity**, returns integer
- **qtyNeeded**, returns integer

Also:

- **cost**, returns double

Cost returns the cost of the Product after tax. If the Product is not taxed the return value of cost() will be the same as price.

- **isEmpty** returns bool

isEmpty return true if the Product is in a safe empty state.

All the above getters are constant methods, which means they CANNOT modify the owner.

### Member Operator overloads:

**Operator==** : receives a constant character pointer and returns a Boolean.

This operator will compare the received constant character pointer to the SKU of the Product, if they are the same, it will return true or else, it will return false.

**Operator+=** : receives an integer and returns an integer.

This operator will add the received integer value to the quantity of the Product, returning the sum.

**Operator-=** : receives an integer and returns an integer.

This operator will reduce the quantity of the Product by the integer value returning the quantity after reduction.

### Non-Member operator overload:

**Operator+=** : receives a double reference value as left operand and a constant Product reference as right operand and returns a double value;

This operator multiplies the cost of the Product by the quantity of the Product and then adds that value to the left operand and returns the result.

Essentially this means this operator adds the total cost of the Product on hand to the left operand, which is a double reference, and then returns it.

## Non-member IO operator overloads:

After implementing the Product class, overload the operator<< and operator>> to work with ostream (cout) to print a Product to, and istream (cin) to read a Product from, the console. Use the write() and read() methods of Streamable class to implement these operator overloads.

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

## MILESTONE 4 SUBMISSION

If not on matrix already, upload [general.h](#), [Streamable.h](#), [Product.h](#), [Product.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 ms4 <ENTER>  
Section SCC and SDD:  
~fardad.soleimanloo/submit ms4 <ENTER>  
Section SEE and SFF:  
~eden.burton/submit ms4 <ENTER>
```

and follow the instructions.

## MILESTONE 5: THE AMAPRODUCT AND AMAPERISHABLE CLASSES

### AmaProduct Class

Implement the `AmaProduct` class in `AmaProduct.h` and `AmaProduct.cpp` as a class derived from a `Product` class.

Essentially, `AmaProduct` is a `Streamable Product` class that is not abstract.

An `AmaProduct` is a `Product` designed to work with the Aid Management Application.

#### Private member variables

```
char fileTag_;
```

Holds a single character to tag the records as Perishable or non-Perishable product in a file.

```
char unit_[11];
```

Unit of Measurement (i.e. Kg, Liters, ...)

#### Protected member variables

`AmaProduct` class has only one protected member variable of type `ErrorMessage`, called `err_`.

#### Constructor:

`AmaProduct` has only one constructor that receives the value for the `filetag_` member variable and if this value is not provided, it will use the character 'N' as the default value for the argument.

#### Public member functions

```
const char* unit()const;
```

returns a constant pointer to the `unit_` member variable.

```
void unit(const char* value);
```

Copies the incoming value string into the `unit_` string.

Make sure copying does not pass the size of the `unit_` array.

`AmaProduct` implements all four pure virtual methods of the class `Streamable` (the signatures of the functions are identical to those of `Streamable`).

```
fstream& AmaProduct::store(fstream& file, bool addNewLine)const:
```

Using the operator<< of ostream first writes the `fileTag_` member variable and a comma into the `file` argument, then without any formatting or spaces writes all the member variables of `Product`, comma separated, in following order:

sku, name, price, taxed, quantity, unit, quantity needed

and if `addNewLine` is true, it will end them with a new line. Then it will return the file argument out.

Example:

```
N,1234,box,123.45,1,1,kg,5<Newline>
```

```
fstream& AmaProduct::load(fstream& file)
```

Using the operator>>, ignore and getline methods of istream, `AmaProduct` reads **all the comma separated fields form the current record in the file** and sets the member variables using the setter methods. When reading the **fields**, load assumes that the record does not have the **"N," (the filetag\_)** at the beginning, so it starts the reading from the `sku`.

No error detection is done.

At the end the file argument is returned.

*Hint: create temporary variables of type double, int and string and read the fields one by one, skipping the commas. After each read, set the member variables using setter methods.*

```
ostream& AmaProduct::write(ostream& os, bool linear)const.
```

If the `err_` member variable is not clear (use `isClear` member function). It simply prints the `err_` using `ostr` and returns `ostr`. If the `err_` member variable is clear (No Error) then depending on the value of `linear`, `write()`, prints the Product in different formats:

**Linear is true:**

Prints the Product values separated by Bar "|" character in following format:

```
1234 | Box | 139.50 | 1 | kg | 5 |
```

**Sku:** left justified in MAX\_UPC\_LEN characters

**Name:** left justified 20 characters wide (truncated if longer than 20 chars)

**Cost:** (not the price) right justified, 2 digits after decimal point 7 chars wide

**Qty on hand:** right justified 4 characters wide

**Unit:** left justified 10 characters wide

**Quantity needed:** right justified 4 characters wide

**NO NEW LINE**

### Linear is false:

Prints one member variable per line in following format:

```

Sku: 1234
Name: box
Price: 123.45
Price after tax: 139.50
Quantity On Hand: 1 kg
Quantity Needed: 5
NO NEW LINE

```

Or the following is the product is not taxed:

```

Sku: 1234
Name: box
Price: 123.45
Price after tax: N/A
Quantity On Hand: 1 kg
Quantity Needed: 5
NO NEW LINE

```

Afterwards, write returns the ostr argument.

### istream& AmaProduct::read(istream& istr):

Receives the values using istream (the istr argument) exactly as the following:

```

Sku: 1234<ENTER>
Name: box<ENTER>
Unit: kg<ENTER>
Taxed? (y/n): y<ENTER>
Price: 123.45<ENTER>
Quantity On hand: 1<ENTER>
Quantity Needed: 5<ENTER>

```

if **istr** is in a **fail** state, then the function exits doing nothing other than returning istr.

When entering the Taxed field, check the character entered, if it is one of 'Y','y','N' or 'n' then clear (flush) the keyboard, otherwise set the message of **err\_** object to **"Only (Y)es or (N)o are acceptable"** and the rest of the entry is skipped.

Also to make the error handling is consistent with istream's fail flag, call the following function:

```
istr.setstate(ios::failbit);
```

This will manually put the istream in failure state. By doing this, the error handling will be consistent with istream's error detection.

If at any stage **istr** fails (cannot read), **err\_** should be set to the proper error message and the rest of the entry is skipped and nothing is set in the **Product** (also no error message is

displayed).

Here are the possible error messages:

fail at Price Entry:	<b>Invalid Price Entry</b>
fail at Quantity Entry:	<b>Invalid Quantity Entry</b>
fail at Quantity Needed Entry:	<b>Invalid Quantity Needed Entry</b>

Since the rest of the member variables are text, `istr` cannot fail on them, therefore there are no error messages designated for them. Make sure at the end of the Entry you do not read the last new line or flush the keyboard.

At end, read will return the `istr` argument.

## AmaPerishable Class

Implement the `AmaPerishable` class in `AmaPerishable.h` and `AmaPerishable.cpp` to be derived out of an `AmaProduct` class. Essentially, `AmaPerishable` is an `AmaProduct` class that with an expiry date.

### Private member variables

`AmaPerishable` class has one private member variable:

- A `Date`, called `expiry_`

### Constructor:

`AmaPerishable` has only one default constructor invokes the `AmaProduct` constructor passing the value 'P' for the `fileTag` argument.

## Public member functions

### Public Accessors (setters and getters)

```
const Date& expiry()const;
```

returns a constant reference to `expiry_` member variable.

```
void expiry(const Date &value);
```

Sets the `expiry_` attribute to the incoming value.



## Virtual method implementations

`AmaPerishable` re-implements all four virtual methods of the `AmaProduct`.

**`fstream& store(fstream& file, bool addNewLine = true)const:`**

Calls the `parent's store` passing the file and “false” as arguments and then writes a comma and the `expiry date` into the file. If the `addNewLine` argument is true, it will write a newline into the file.

The outcome will be something like this being written to the file:

P,1234,water,1.5,0,1,liter,5,2017/10/12<NEWLINE>

**`fstream& load(fstream& file)`**

Calls the `parent's load` passing the file as the argument and then calls the read method of the `expiry_` object passing the file as the argument and then ignores one character (reads one character from the file and dumps it).

**`ostream& write(ostream& ostr, bool linear)const:`**

Calls the `write of the parent` passing `ostr` and `linear` as arguments. Then if `err_` is clear and product is not empty:

if `linear` is true, it will just print the `expiry` otherwise it will first go to new line and then print:

“Expiry date: ” and then print the expiry date.

The outcome will be like this:

1234 |water | 1.50| 1|liter | 5|2017/10/12

OR:

Sku: 1234

Name: water

Price: 1.50

Price after tax: N/A

Quantity On Hand: 1 liter

Quantity Needed: 5

Expiry date: 2017/10/12

NO NEW LINE

Afterwards, write returns the `ostr` argument.

**`istream& read(istream& istr):`**

It will call `parent's read` passing `istr` as argument.

Then if `err_` is clear it will print:

Expiry date (YYYY/MM/DD):

then it will read the date from the console into a `temporary Date object`.

If Expiry (Date) Entry fails then, depending of the error code stored in the Date object, set the error message in `err_` to:

**CIN\_FAILED:**        **Invalid Date Entry**

**YEAR\_ERROR:**      **Invalid Year in Date Entry**

**MON\_ERROR:**        **Invalid Month in Date Entry**

**DAY\_ERROR:**        **Invalid Day in Date Entry**

Then to be consistent with istream failure, manually sets the `istr` to failure mode by calling this function:

```
istr.setstate(ios::failbit);
```

If nothing has failed, then it will set the `expiry date of the object` to the `temporary Date object` read from the console.

At end, read will return the `istr` argument.

## MILESTONE 5 SUBMISSION

If not on matrix already, upload [general.h](#), [Date.h](#), [Date.cpp](#), [ErrorMessege.h](#), [ErrorMessege.cpp](#), [Streamable.h](#), [Product.h](#), [Product.cpp](#), [AmaProduct.h](#), [AmaProduct.cpp](#), [AmaPerishable.h](#), [AmaPerishable.cpp](#) and the tester files 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 ms5 <ENTER>
Section SCC and SDD:
~fardad.soleimanloo/submit ms5 <ENTER>
Section SEE and SFF:
~eden.burton/submit ms5 <ENTER>
```

and follow the instructions.

## MILESTONE 6: THE AID MANAGEMENT APPLICATION

For your final milestone for this project, create a class call "AidApp".

AidApp is a class that uses the previously created classes in this project to give the user capability to store and retrieve Non-Perishable and Perishable product information within a file.

AidApp have several private member functions and only two public ones.

When describing the functions, first there will be a description of what the function does, and then for some of the more complicated functions there will be a suggested pseudo code for how to implement the function. You are free either to use your own logic or follow the pseudo code, OR follow the pseudo code and then modify and better the logic.

Code your classes in AidApp.cpp and AidApp.h.

### AidApp class

---

#### Private member variables:

**char filename\_[256];**

holds the name of the text file to store the products' information.

**Product\* product\_[MAX\_NO\_RECS];**

An array of Product pointers, MAX\_NO\_RECS long. (i.e. Each element of this array is a product pointer)

**fstream datafile\_;**

A fstream instance to create and access a file.

**int noOfProducts\_;**

Number of Products (Non-perishable or Perishable) pointed by product\_ array elements.

## The Constructor

The `AidApp` constructor receives a constant char string called `filename` and then:

- 1- Copies `filename` to `filename_` member variable
- 2- Sets all the `product_` elements to `nullptr`
- 3- Sets `noOfProducts_` to zero
- 4- Loads the Records (calls the member function doing this)

## Private member functions:

### *Copy and assignment prevention*

Make sure `AidApp` cannot get copied or assigned to another `AidApp`.

```
void pause()const;
```

Prints: "Press Enter to continue..."<NEWLINE> and then waits for the user to hit enter. If user hits any other key, the key is ignored. Only ENTER will terminate this function.

```
int menu();
```

Menu() displays the menu as follows and waits for the user to select an option.

```
Disaster Aid Supply Management Program
```

- ```
1- List products
2- Display product
3- Add non-perishable product
4- Add perishable product
5- Add to quantity of purchased products
0- Exit program
```

```
> _
```

^ here is where the cursor stands when menu is printed

- If the selection is valid, `men()` will return the selection otherwise it will return -1
- This function makes sure there are no characters left in keyboard and wipes it before exit.

```
void loadRecs();
```

Opens the file for reading, if it does not exist, it will create an empty file and exits.

Otherwise:

Loads the records from the file overwriting the old ones pointed by product.

This function makes sure that each product element is deleted before loading the records into them, preventing memory leak.

Finally it closes the file

Pseudo code:

Set readIndex to zero

Open the file for reading (use ios::in)

if the file is in fail state it means there is no file on the disk, then

clear the failure

close the file

open the file for writing (ios::out) to create the file

close the file

otherwise

until reading fails loop

deallocate the memory pointed by product pointer at readIndex

read one char character to identify type of Product into Id character

if Id character is P

Dynamically create a Perishable product and hold it in product pointer at

readIndex

if Id character is N

Dynamically create a Non-perishable product and hold it in product pointer at

readIndex

if either P or N is read

skip the comma in the file

load the product from the file (using its load method)

add one to read index

continue the loop

set number of products to readIndex

close the datafile

**void saveRecs();**

- Opens the file for writing

- Loops through the `product_` array up to `noOfProducts_` and stores them in the `datafile_`

- Closes the file

**void listProducts()const;**

- First it will print the following title :

| Row  | SKU   | Product Name | Cost  | QTY  | Unit  | Need | Expiry |
|------|-------|--------------|-------|------|-------|------|--------|
| ---- | ----- | -----        | ----- | ---- | ----- | ---- | -----  |

- Then it loops through the `products_` array up to `noOfProducts_` and prints the Row number in four spaces right justified

- Afterwards it prints a Bar character (|) surrounded by two spaces and then prints the current `product` in the loop followed by a newline
- If the number of printed items reaches to 10, it will pause.
- Meanwhile in the loop it will calculate the total cost of the `products` in a `double` value using the `operator+=` implemented for the `Product` class.
- After the list is done it will close the list with:

-----

- Then print the total cost like this at the bottom:

Total cost of support: \$9999.99

The total cost value is printed with a Dollar sign at left and two digits after decimal point

**`int SearchProducts(const char* sku)const;`**

Loops through the `product_` up to `noOfProducts_` and checks each of them for the same SKU as the incoming argument using the `operator==` implemented for `Product` class. If a match is found it will return the index of the found `Product` in the `product_` array, otherwise it will return -1.

**`void addQty(const char* sku);`**

Updates the quantity on hand for a `product`.

`updateQty()` searches for the `Product` with the same `sku` as incoming argument. If not found it will display:

"Not found!"<NEWLINE>

If found, it will display the `Product` in non-linear format and then asks for an integer for quantity purchased:

"Please enter the number of purchased items: "

If it cannot read the integer it prints:

"Invalid quantity value! "<NEWLINE>

If it can read the integer, it makes sure the amount is less than or equal to the amount required (i.e. less than `qtyNeeded()` - `quantity()`). If it is less than or equal, it will add the value to the quantity on hand of the product using `operator+=` overloaded for `Product`. If the value is not less than or equal the amount needed, then it will only accept the amount required and prints message to return the extra:

"Too many items; only 999 is needed, please return the extra 99 items. "< NEWLINE >

then it will save all the records back to the file and print:

```
"Updated!" <NEWLINE>
```

Make sure after the entry the keyboard is flushed.

```
void addProduct(bool isPerishable);
```

Depending on the value of the argument being true or false, create a Perishable or Non-perishable `Product` and get the values from the user and add it to the end of the `product_` array and save the records (call `saverecs()`). If there is an error, display the `Product` and exit the function (this will show the error message).

```
int run();
```

Display the menu and depending on the user's selection, do the actions requested and pauses (the pause function), then it will redisplay the menu until user selects zero to exit.

#### 1- List products

List the products.

#### 2- Display product

Ask for a sku using this prompt

"Please enter the SKU: "

and get it from console and then search for it.

If found, display it in non-liner format

Otherwise display:

"Not found!"

#### 3- Add non-perishable product

Add a Non-Perishable product to the to the system using the  
addProduct function

Load the records.

#### 4- Add perishable product

Add a Perishable product to the to the system using the  
addProduct function

Load the records.

#### 5- Add to quantity of purchased products

Ask for a sku using this prompt

"Please enter the SKU: "

and get it from console and then add to the quantity using  
addQty() function.

#### 0- Exit program

The program will terminate printing:

"Goodbye!!"

In case of invalid menu selection the program will print:

"===Invalid Selection, try again.==="

Then it will pause before redisplaying the menu.

Run function returns 0 at the end.

## MILESTONE 6 SUBMISSION

You have 3 choices for your project submission, Exact Format, Open Format or MS5 for 70%

- 1- Exact Format compares your output to the original output and make sure you are doing everything correctly. This can get 100% of the mark for final project.
- 2- You can choose to submit using the open format. This will not compare the output to the original and your output format may be slightly different with what is requested. As long as your calculations and values are 100% correct you can submit your project and this will cost you 10%, the highest mark for this will be 90%.

You must still go through the test data below and demonstrate your output.

*Please understand that if your calculations are incorrect or you have irregularities in your printouts, your project may have to be resubmitted.*

*If your project is rejected to be resubmitted you can only get up to 55% of your mark when you resubmit your working project in a later date set by promotion meeting.*

- 3- You can choose to not do MS6 and submit a working MS5 and receive 70% for your project mark.



### Exact Format Submission:

If not on matrix already, upload **all your files** 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 ms6 <ENTER>
Section SCC and SDD:
~fardad.soleimanloo/submit ms6 <ENTER>
Section SEE and SFF:
~eden.burton/submit ms6 <ENTER>
```

Follow instructions and use the following data to test your application:

```
1 <ENTER>
<ENTER> pass pause
2 <ENTER>
2345 <ENTER>
<ENTER> pass pause
4<ENTER>
Sku: 1111<ENTER>
Name: Milk<ENTER>
Unit: bag<ENTER>
Taxed? (y/n): n<ENTER>
Price: 3.99<ENTER>
Quantity On hand: 10<ENTER>
Quantity Needed: 100<ENTER>
Expiry date (YYYY/MM/DD): 2016/4/26<ENTER>
5<ENTER>
1234<ENTER>
10<ENTER>
5<ENTER>
2345<ENTER>
40<ENTER>
1<ENTER>
<ENTER> pass page break pause
<ENTER> pass pause
0<ENTER>
```

### Open Format Submission:

If not on matrix already, upload **all your files** 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 ms6open <ENTER>
Section SCC and SDD:
~fardad.soleimanloo/submit ms6open <ENTER>
Section SEE and SFF:
~eden.burton/submit ms6open <ENTER>
```

Follow instructions and use the following data to test your application:

```
1 <ENTER>
<ENTER> pass pause
2 <ENTER>
2345 <ENTER>
<ENTER> pass pause
4<ENTER>
Sku: 1111<ENTER>
Name: Milk<ENTER>
Unit: bag<ENTER>
Taxed? (y/n): n<ENTER>
Price: 3.99<ENTER>
Quantity On hand: 10<ENTER>
Quantity Needed: 100<ENTER>
Expiry date (YYYY/MM/DD): 2016/4/26<ENTER>
5<ENTER>
1234<ENTER>
10<ENTER>
5<ENTER>
2345<ENTER>
40<ENTER>
1<ENTER>
<ENTER> pass page break pause
<ENTER> pass pause
0<ENTER>
```

### MS5 for 70% Submission:

If not on matrix already, upload **all your files up to and not including MS6** to your matrix account. Assuming that you compiled and ran your code and submitted your MS5 and everything works properly.

Then run the following script from your account:

```
Sections SAA and SBB:
~edgardo.arvelaez/submit ms5for70 <ENTER>
Section SCC and SDD:
~fardad.soleimanloo/submit ms5for70 <ENTER>
Section SEE and SFF:
~eden.burton/submit ms5for70 <ENTER>
```

*If your ms5 submission was successful and you get compile errors when submitting **ms5for70**, most likely you forgot to declare some function arguments as constants when they are not to be modified logically. Correct those declarations and the submission should be successful*

Follow the submission instructions and use the following data to test your application:

```
1 <ENTER>
<ENTER> pass pause
2 <ENTER>
2345 <ENTER>
<ENTER> pass pause
4<ENTER>
Sku: 1111<ENTER>
Name: Milk<ENTER>
Unit: bag<ENTER>
Taxed? (y/n): n<ENTER>
Price: 3.99<ENTER>
Quantity On hand: 10<ENTER>
Quantity Needed: 100<ENTER>
Expiry date (YYYY/MM/DD): 2016/4/26<ENTER>
5<ENTER>
1234<ENTER>
10<ENTER>
5<ENTER>
2345<ENTER>
40<ENTER>
1<ENTER>
<ENTER> pass page break pause
<ENTER> pass pause
0<ENTER>
```

## MILESTONE 6: BONUS MARKS

You can add the following features to the projects to get bonus marks.

Add three options to the menu:

- 1- List products
- 2- Display product
- 3- Add non-perishable product
- 4- Add perishable product
- 5- Add to quantity of purchased products
- 6- Update product quantity
- 7- Delete product
- 8- Sort Products
- 0- Exit program
- >

### Update product quantity:

Get the SKU like update quantity section and search for the item, if not found print "Not found!", otherwise display the product in form format.

Then prompt the user: "Please enter the new item quantity: " and then receive the new quantity on hand value. If the value entered is not a valid integer print "Invalid Quantity value!". If the integer entered is greater than quantity needed value, print "Invalid Quantity value, please enter a value between 0 and 999.". Replace 999 with the actual quantity needed value.

When a valid integer value is entered, overwrite the quantity on hand of the product and save the records back to data file and print the message: "Item quantity is set to 999.". Replace 999 with the new quantity value.

### Delete Product:

Get the SKU like update quantity section and search for the item, if not found print "Not found!".

Delete the product as follows:

Open the data file to overwrite the current values. Go through each element of the product array up to number of products, and compare it to the SKU you received; if not a match store it in the file, if not skip it.

If the SKU was found, (i.e the product deleted successfully) update the number of products.

When done, close the file. If successful print "Deleted!" otherwise print "Failed!".

### Sort Products:

Use the template provided in sort.h and add a method to the sort the products. In this method call the sort function template and pass the product array and number of items.

Save product in the file to update the sort and print "Sorted!".

## MILESTONE 6; BONUS SUBMISSION

If not on matrix already, upload **all your files** 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 ms6extra <ENTER>
Section SCC and SDD:
~fardad.soleimanloo/submit ms6extra <ENTER>
Section SEE and SFF:
~eden.burton/submit ms6extra <ENTER>
```

Follow instructions and use the following data to test your application:

```
1 <ENTER>
<ENTER> pass pause
6 <ENTER>
123 <ENTER>
100<ENTER>
7<ENTER>
124<ENTER>
8<ENTER>
1<ENTER>
<ENTER> pass pause
0<ENTER>
```