

COP3014-Foundations of Computer Science

Assignment #9

Objectives:

1. Develop and use an ADT's to define a class to manage a dynamic array;
2. Use a default constructor to initialize the state of your class;
3. Use a destructor to de-allocate memory allocated using the new operator;

This assignment is an extension of Programming Assignment 8 (Module 9's Programming Assignment). **You will implement class called "order_class".** The class will manage a dynamic array of purchase order records. **Called the program for this assignment "nursery_orders9.cpp".** I have provided a skeleton (driver) of "nursery_orders9.cpp" to help you implement this program.

Your input data will be in the file "nursery_stock.txt". The descriptions of the functions you will implement are as follows:

1. the default constructor to initialize the state of your class. The default constructor will read the data from the file "nursery_stock.txt" into the dynamic array STR. If STR becomes full, the function should call the function "double_size" to double the size (capacity) of STR. Remember, count, size, and STR are private members of your class and do not need to be passed to a member function of your class.
2. is_Empty is a Boolean public member function of the class. It has no formal parameters because count is a member of the state of the class (private member) and does not need to be passed to it because the state of the class is known to all member functions of the class. If count == 0 then true is returned; otherwise false is returned.
3. is_Full is a Boolean public member function of the class. It has no formal parameters because count and size are members of the state of the class (private members) and they do not need to be passed to it because the state of the class is known to all member functions of the class. If count == size then true is return; otherwise false. The size is the capacity which is the total number of cells allocated to STR.
4. search is an integer public member function that has only one formal parameter, the key. key is the plant name for the record you are searching for. The array of records, STR and count are members of the state of the class and do not need to be passed to a member function of the class; The function will return the location of key in STR if it is there; otherwise -1 is returned.
5. add is a void public member function that inserts information for an order record into STR. Duplicates plant names are okay; add will prompt the user for the plant name (pname), county name (cname), plant cost (plant_cost), and the quantity (quantity). You may call process record to re-process STR when you add a new record. add has no formal parameters. Remember, to call the function double_size if STR is full before you add a new order record.

6. remove is a void public member function that deletes all records with the plant name that matches the value stored in key. If duplicate records exist with the same plant name they must all be deleted. “remove” has only one formal parameter, the key.
7. double_size is a void public member function that doubles the size (capacity) of STR. “double_size” has no formal parameters because size, count and STR are all members of the state of the class, order_class. First, size is multiplied by two; second, memory is allocated using the statement “order_record *temp = new order_record[size]; third the records in STR are copied into temp with the statement “temp[i]=STR[i]” using a for loop. Forth, the old memory for STR is de-allocated using “delete [] STR”; Finally, STR is set to point to the new memory pointed to by temp using “STR = temp”.
8. process has no formal parameters because they are already declared in the state of the class. The function will calculate the net cost of the purchase (net_cost), the taxrate (tax_rate), the tax on the purchase (purchase_tax), the discount on the purchase (discount), and the total cost (total_cost). Please consider the following information to help you implement the necessary calculations:

- a. The tax rate (in percent) on a purchase is based on the county where the purchase was made. If the county was dade, the tax rate is 6.5%; if the count is broward, the tax rate is 6%; if the county was palm, the tax rate is 7%.
- b. The net cost of an order (net_cost), which does not include tax, is calculated by the following:

$$\text{net_cost} = (\text{quantity} \times \text{plant_cost})$$

- c. The discount is based on the quantity of plants in the purchase. The discount is determined as follows:
 - If quantity equals 0, then the discount percentage is 0% of the net cost;
 - If $1 \leq \text{quantity} \leq 5$ then discount percentage of the net cost is 1%;
 - If $6 \leq \text{quantity} \leq 11$ then discount percentage of the net cost is 3%;
 - If $12 \leq \text{quantity} \leq 20$ then discount percentage of the net cost is 5%;
 - If $21 \leq \text{quantity} \leq 50$ then discount percentage of the net cost is 8%;
 - If quantity > 50 then discount percentage is 13%;

Note: Apply discount percentage after the net cost has been calculate

$$\text{discount} = \text{net_cost} * (\text{discount_percentage}) / 100;$$

(drop / 100 if you converted the discount_percentage to a decimal)

- d. The tax on a purchase (order_tax) is calculated by the following formula:

$$\text{purchase_tax} = (\text{net_cost} * \text{tax_rate} / 100 \text{ (drop/100 if you converted the rate from a percentage)})$$

- e. The total cost of a purchase (**rounded to the nearest hundredth**) is calculated by the following formula:

$$\text{total_cost} = \text{net_cost} + \text{purchase_tax} - \text{discount}.$$

Note: All tax and cost calculations should be rounded to the nearest hundredths.

9. print is a void public member function that has no formal parameters because count and STR are members of the state of the class. The function will also have one static local integer variable called "run". The function will print the value of run every time print is executed. The value of "run" should be incremented after you print its value the file. The function will print every field of every order_record in STR to the file "nursery_results30.txt". You will open and close the ofstream inside the function. Remember to delete the file after each execution of the program. Because the ofstream was opened in append (app) mode, it will add the results of each execution to the end the of file.
10. the destructor to de-allocate all memory allocated to STR. This function has no formal parameters because STR is a member of the state of the class; the destructor will be called automatically by the compiler.

You may implement more member functions if you find it necessary. Please start the assignment ASAP, and ask questions to make sure you understand what you must do. It is always good to start with the skeleton program (**nursery_orders9.cpp**) I provided. Remember to follow all style rules and to include all necessary documentation (consistent, indentation, proper variable names, pre/post conditions, program header, function headers, and so forth.) .

Output Format for the Function "print":

1. Use the following format information to print the variables:

Field	Format
=====	
Plant Name	string
County Name	string
Plant Cost	XXXX.XX
Quantity of Plants	XXXX
Net Cost of Purchase	XXXXX.XX
Tax Rate	X.XXX
Purchase Tax	XXXXX.XX
Discount on Purchase	XXXX.XX
Total Cost of Purchase	XXXXXXXX.XX

2. Consider the following sample output table when designing and implementing the function **"print"**:

(The output is in the following order: plant name, county name, plant cost, quantity, net cost, tax rate, purchase tax, discount, total cost).

owl	dade	10.55	100	1055.00	0.065	68.58	126.60	996.98
hibiscus	broward	15.82	15	237.30	0.06	14.24	11.87	239.67
rose	dade	9.99	45	449.55	0.065	29.22	35.96	442.81
carnation	palm	7.99	32	255.68	0.07	17.90	20.45	253.12

3. Input Stream

In the assignment you will declare one ifstream to bind your input to the file **"nursery_stock.txt"** to an input file stream. Whenever a program performs file i/o you must include the **"fstream"** library. **Add the following statements to your program:**

For source file, **"nursery_porders9.cpp"**

- Add **"#include <fstream>"** to your #include statements in your source file.
- Add **"#include <string>"** to your #include statement in your source file.
- Add **"#include <iomanip>"** all formatting of output

4. Copy of Nursery_stock.txt:

```

owl    dade    10.55 100
hibiscusbroward    15.82 15
rose   dade    9.99  45
carnation    palm  7.99  32
rose   palm    7.99  60
widow  palm    25.75  5
carnation    dade  12.55 10
carnation    dade  12.55  8
lilly   broward    6.92 150
xerabtgemum  palm  13.63 50
yarrow  dade    22.85 20
zenobiapalm  37.19 32
zephyranthes broward    62.82 40
daisy   broward    15.99 80
aconitum    dade  30.02 72
amaryllis   dade  16.14 65
bogonia    broward    18.45 3
bellflowbroward    2.96 200
bergenia    palm  85.92 10

```