This programming project is due on Thursday, August 4, 2022.

Inventory Application Program

This project involves designing and creating a C++ program that will utilize the **InventoryItem** class, which is described in Section 13.10 (pages 771-775) and Section 13.12 (pages 777-780) of the Gaddis textbook. (The `InventoryItem.h` source code for this class is provided on Moodle.)

The program must create an array of 100 **InventoryItem** objects (or a *vector* of **InventoryItem** objects). The program must support the following interactive commands:

a	**A**dd parts: increase the **units** value for an existing inventory item.
h	print **H**elp text.
i	**I**nput inventory data from a file.
n	create a **N**ew inventory Item.
o	**O**utput inventory data to a file.
p	**Print** inventory list.
q	**Q**uit (end the program).
r	**R**emove parts: reduce the **units** value for an existing inventory item.

(Specific requirements for each command are stated in the **Requirements for Interactive Commands** section of this document.)

Requirements for Interactive Commands

Command	**Requirement**
a	**Add Parts:** 1. Output a prompt, asking the user to specify the desired *item number*. - If the user specifies an *item number* that is not in use (no item present in the data), output an error message. 2. Output a prompt, asking the user to specify *how many* units to add. - If the input specified by the user is negative, or if the input specified by the user *would* modify the quantity to a value that it is larger than the stated maximum (30 units), output an error message.
h	**Print Help Text:** Output a brief summary of the user commands.
i	**Input Inventory Data from File:** 1. Output a prompt, asking the user to specify the name of the input file. 2. Read the data from the file into the **InventoryItem** array (or vector). Refer to the **Data File Format** section of this document. (Feel free to use the **splitLineToArray** function that we discussed in class and is available on *Moodle*. See **Ch10_sample_code_SplitLineToArray_demo**…)
n	**Create a New Inventory Item:** 1. Input (from the keyboard) values for the description, unit cost and initial quantity (units) for a new **InventoryItem**. 2. Be sure to use suitable prompts, so the user knows what input is expected.

Command	**Requirement**
o	**Output Inventory Data to File:** 1. Output a prompt, asking the user to specify the name of the output file. 2. Write the data from the **InventoryItem** array (or vector) to the output file, following the required file format.
p	**Print Inventory Data to Screen:** Output the contents of the **InventoryItem** array (or vector) to the screen. (Refer to the **Sample Output** section of this document for formatting examples.)
q	**Quit (exit) the Program**
r	**Remove Parts from Existing Inventory Item:** 1. Output a prompt, asking the user to specify the desired *item number*. • If the user specifies an *item number* that is not in use (no item present in the data), output an error message. 2. Output a prompt, asking the user to specify *how many* units to remove. 3. If the input specified by the user is *negative*, or if the input specified by the user is *greater than* the **units** variable of the **InventoryItem** object, output an error message.

Data File Format

The “input” / “output” commands read / write data that is in a “pipe-delimited” text file.

The format of each line of text, in the data file, is described below:

File Format
inventory item number | *description* | *cost* | *units*

Explanation of Data Fields	
Field name	**Explanation**
inventory item number	For the *output* file, this number can be the same as the array (or vector) index. For the *input* file, the contents of this field will be **ignored**, because the input data will be appended to the end of the “populated” portion of the *InventoryItem* array (or vector).
description	Description of the inventory item
cost	Cost per unit for the inventory item
units	Number of units present for the inventory item (must be greater than or equal to zero and less than or equal to 30).

When reading the data file, your program needs to read one line of text from the file at a time, break each line of text into separate fields, and convert each field to the correct data type. Feel free to use the **splitLineToArray** function that we discussed in class and is available on *Moodle*. The **Sample Code** section of *Moodle* includes this resource: **Ch10_sample_code_SplitLineToArray_demo**…)

Important Design Requirements

- The **output** file format must be the same as the **input** file format. That is, any file that your program creates with the "**o**" command must be readable with the "**i**" command.
- The **units** member variable of any **InventoryItem** object must *never* be negative and also must *never* be greater than the value of 30.

Sample Test Data

Four sample input files are provided: **electrical.txt**, **fasteners.txt**, **miscellaneous.txt** and **plumbing.txt**. The data files that your program creates must obey the same file format as these sample files. The program must work correctly with these files, as well as general files of similar format.

electrical.txt

```
0|Cable|5.00|18
1|Extension Cord (14/3, 25 ft)|27.95|6
2|Light switch (15 amp)|2.79|10
3|Ceiling Fan (52 inch)|79.95|3
4|Vinyl Electrical Tape (20 ft roll)|0.79|30
5|GFI Tester|9.35|5
```

fasteners.txt

```
0|Turnbuckle|3.80|25
1|Siding nails (box of 100)|4.00|20
2|Flat washer (box of 100)|2.80|30
3|Machine screw (box of 100)|3.20|10
4|Hex bolt (box of 100)|6.50|23
5|Hex nut (box of 100)|3.80|15
6|Sheet Metal Screw (qty 100)|1.50|28
```

miscellaneous.txt

```
0|Door Hinges (3-pack)|6.30|10
1|Rubber work boots (1 pair)|28.00|5
2|Leather Work Gloves (1 pair)|12.00|8
3|Long Handle Grass Shear|30.00|5
```

plumbing.txt

```
0|Pump|39.00|20
1|Gasket|1.50|29
2|Water Level Guage|12.99|30
3|Faucet Repair Kit|4.89|8
4|Teflon Thread Seal Tape (50 ft roll)|3.30|12
5|shutoff valve|6.50|10
```

Sample Interactive Session

In the sample data on the next several pages, what the user types is shown in **bold**. In actuality, what the user types would have the same text format as the rest of the output.

Sample Interactive Session

```
Command: h
Supported commands:
                a               Add parts.
                h               print Help text.
                i               Input inventory data from a file.
                n               New inventory Item.
                o               Output inventory data to a file.
                p               Print inventory list.
                q               quit (end the program).
                r               Remove parts.

Command: i
Enter name of input file: plumbing.txt
6 records loaded to array.
Command: p

Item Num    Description                                     Cost    Quantity
_______     ___________                                     ____    ________
   0        Pump                                           39.00          20
   1        Gasket                                          1.50          29
   2        Water Level Guage                              12.99          30
   3        Faucet Repair Kit                               4.89           8
   4        Teflon Thread Seal Tape (50 ft roll)            3.30          12
   5        shutoff valve                                   6.50          10
6 records.
Command: i
Enter name of input file: electrical.txt
6 records loaded to array.
Command: p

Item Num    Description                                     Cost    Quantity
_______     ___________                                     ____    ________
   0        Pump                                           39.00          20
   1        Gasket                                          1.50          29
   2        Water Level Guage                              12.99          30
   3        Faucet Repair Kit                               4.89           8
   4        Teflon Thread Seal Tape (50 ft roll)            3.30          12
   5        shutoff valve                                   6.50          10
   6        Cable                                           5.00          18
   7        Extension Cord (14/3, 25 ft)                   27.95           6
   8        Light switch (15 amp)                           2.79          10
   9        Ceiling Fan (52 inch)                          79.95           3
   10       Vinyl Electrical Tape (20 ft roll)              0.79          30
   11       GFI Tester                                      9.35           5
12 records.
```

Sample Interactive Session

```
Command: a

Choose a Item Number: 7
How many parts to add? 5
Command: p

Item Num    Description                                     Cost    Quantity
_______     ___________                                     ____    ________
   0         Pump                                          39.00          20
   1         Gasket                                         1.50          29
   2         Water Level Guage                             12.99          30
   3         Faucet Repair Kit                              4.89           8
   4         Teflon Thread Seal Tape (50 ft roll)           3.30          12
   5         shutoff valve                                  6.50          10
   6         Cable                                          5.00          18
   7         Extension Cord (14/3, 25 ft)                  27.95          11
   8         Light switch (15 amp)                          2.79          10
   9         Ceiling Fan (52 inch)                         79.95           3
   10        Vinyl Electrical Tape (20 ft roll)             0.79          30
   11        GFI Tester                                     9.35           5
12 records.
Command: r

Choose a Item Number: 9
How many parts to remove? 5

Error:  You are attempting to remove more parts than the Item currently holds.
Command: r

Choose a Item Number: 9
How many parts to remove? 3
Command: p

Item Num    Description                                     Cost    Quantity
_______     ___________                                     ____    ________
   0         Pump                                          39.00          20
   1         Gasket                                         1.50          29
   2         Water Level Guage                             12.99          30
   3         Faucet Repair Kit                              4.89           8
   4         Teflon Thread Seal Tape (50 ft roll)           3.30          12
   5         shutoff valve                                  6.50          10
   6         Cable                                          5.00          18
   7         Extension Cord (14/3, 25 ft)                  27.95          11
   8         Light switch (15 amp)                          2.79          10
   9         Ceiling Fan (52 inch)                         79.95           0
   10        Vinyl Electrical Tape (20 ft roll)             0.79          30
   11        GFI Tester                                     9.35           5
12 records.
```

Sample Interactive Session

```
Command: o
Enter name of output file: testData01.txt
12 records written to file.
Command: i
Enter name of input file: testData01.txt
12 records loaded to array.
Command: p

Item Num    Description                                     Cost    Quantity
_______     ___________                                     ____    ________
   0        Pump                                           39.00          20
   1        Gasket                                          1.50          29
   2        Water Level Guage                              12.99          30
   3        Faucet Repair Kit                               4.89           8
   4        Teflon Thread Seal Tape (50 ft roll)            3.30          12
   5        shutoff valve                                   6.50          10
   6        Cable                                           5.00          18
   7        Extension Cord (14/3, 25 ft)                   27.95          11
   8        Light switch (15 amp)                           2.79          10
   9        Ceiling Fan (52 inch)                          79.95           0
   10       Vinyl Electrical Tape (20 ft roll)              0.79          30
   11       GFI Tester                                      9.35           5
   12       Pump                                           39.00          20
   13       Gasket                                          1.50          29
   14       Water Level Guage                              12.99          30
   15       Faucet Repair Kit                               4.89           8
   16       Teflon Thread Seal Tape (50 ft roll)            3.30          12
   17       shutoff valve                                   6.50          10
   18       Cable                                           5.00          18
   19       Extension Cord (14/3, 25 ft)                   27.95          11
   20       Light switch (15 amp)                           2.79          10
   21       Ceiling Fan (52 inch)                          79.95           0
   22       Vinyl Electrical Tape (20 ft roll)              0.79          30
   23       GFI Tester                                      9.35           5
24 records.
Command: n
Enter description for new Item: Broom
Enter unit cost for new Item: 9.99
Enter initial quantity for the new Item: 12
Announcing a new inventory Item: Broom
We now have 25 different inventory Items in stock!
Command: p

Item Num    Description                                     Cost    Quantity
_______     ___________                                     ____    ________
   0        Pump                                           39.00          20
   1        Gasket                                          1.50          29
   2        Water Level Guage                              12.99          30
   3        Faucet Repair Kit                               4.89           8
```

Sample Interactive Session

```
   4        Teflon Thread Seal Tape (50 ft roll)             3.30          12
   5        shutoff valve                                    6.50          10
   6        Cable                                            5.00          18
   7        Extension Cord (14/3, 25 ft)                    27.95          11
   8        Light switch (15 amp)                            2.79          10
   9        Ceiling Fan (52 inch)                           79.95           0
   10       Vinyl Electrical Tape (20 ft roll)               0.79          30
   11       GFI Tester                                       9.35           5
   12       Pump                                            39.00          20
   13       Gasket                                           1.50          29
   14       Water Level Guage                               12.99          30
   15       Faucet Repair Kit                                4.89           8
   16       Teflon Thread Seal Tape (50 ft roll)             3.30          12
   17       shutoff valve                                    6.50          10
   18       Cable                                            5.00          18
   19       Extension Cord (14/3, 25 ft)                    27.95          11
   20       Light switch (15 amp)                            2.79          10
   21       Ceiling Fan (52 inch)                           79.95           0
   22       Vinyl Electrical Tape (20 ft roll)               0.79          30
   23       GFI Tester                                       9.35           5
   24       Broom                                            9.99          12
25 records.
Command: n
Enter description for new Item: Dust Pan
Enter unit cost for new Item: 5.99
Enter initial quantity for the new Item: 5
Announcing a new inventory Item: Dust Pan
We now have 26 different inventory Items in stock!
Command: p

Item Num    Description                                      Cost    Quantity

_______     ___________                                      ____    ________
   0        Pump                                            39.00          20
   1        Gasket                                           1.50          29
   2        Water Level Guage                               12.99          30
   3        Faucet Repair Kit                                4.89           8
   4        Teflon Thread Seal Tape (50 ft roll)             3.30          12
   5        shutoff valve                                    6.50          10
   6        Cable                                            5.00          18
   7        Extension Cord (14/3, 25 ft)                    27.95          11
   8        Light switch (15 amp)                            2.79          10
   9        Ceiling Fan (52 inch)                           79.95           0
   10       Vinyl Electrical Tape (20 ft roll)               0.79          30
   11       GFI Tester                                       9.35           5
   12       Pump                                            39.00          20
   13       Gasket                                           1.50          29
   14       Water Level Guage                               12.99          30
   15       Faucet Repair Kit                                4.89           8
   16       Teflon Thread Seal Tape (50 ft roll)             3.30          12
   17       shutoff valve                                    6.50          10
   18       Cable                                            5.00          18
```

Sample Interactive Session

```
   19       Extension Cord (14/3, 25 ft)                 27.95         11
   20       Light switch (15 amp)                         2.79         10
   21       Ceiling Fan (52 inch)                        79.95          0
   22       Vinyl Electrical Tape (20 ft roll)            0.79         30
   23       GFI Tester                                    9.35          5
   24       Broom                                         9.99         12
   25       Dust Pan                                      5.99          5
26 records.
Command: o
Enter name of output file: testData02.txt
26 records written to file.
Command: n
Enter description for new Item: Gasoline Can
Enter unit cost for new Item: 8.99
Enter initial quantity for the new Item: 34
ERROR: initial quantity must be >= zero and <= 30.
Enter initial quantity for the new Item: 29
Announcing a new inventory Item: Gasoline Can
We now have 27 different inventory Items in stock!
Command: p

Item Num    Description                                   Cost    Quantity
________    ___________                                   ____    ________
   0        Pump                                         39.00         20
   1        Gasket                                        1.50         29
   2        Water Level Guage                            12.99         30
   3        Faucet Repair Kit                             4.89          8
   4        Teflon Thread Seal Tape (50 ft roll)          3.30         12
   5        shutoff valve                                 6.50         10
   6        Cable                                         5.00         18
   7        Extension Cord (14/3, 25 ft)                 27.95         11
   8        Light switch (15 amp)                         2.79         10
   9        Ceiling Fan (52 inch)                        79.95          0
   10       Vinyl Electrical Tape (20 ft roll)            0.79         30
   11       GFI Tester                                    9.35          5
   12       Pump                                         39.00         20
   13       Gasket                                        1.50         29
   14       Water Level Guage                            12.99         30
   15       Faucet Repair Kit                             4.89          8
   16       Teflon Thread Seal Tape (50 ft roll)          3.30         12
   17       shutoff valve                                 6.50         10
   18       Cable                                         5.00         18
   19       Extension Cord (14/3, 25 ft)                 27.95         11
   20       Light switch (15 amp)                         2.79         10
   21       Ceiling Fan (52 inch)                        79.95          0
   22       Vinyl Electrical Tape (20 ft roll)            0.79         30
   23       GFI Tester                                    9.35          5
   24       Broom                                         9.99         12
   25       Dust Pan                                      5.99          5
   26       Gasoline Can                                  8.99         29
```

Sample Interactive Session

```
27 records.
Command: i
Enter name of input file: fasteners.txt
7 records loaded to array.
Command: i
Enter name of input file: miscellaneous.txt
4 records loaded to array.
Command: p

Item Num    Description                                      Cost    Quantity
_______     ___________                                      ____    ________
   0        Pump                                           39.00          20
   1        Gasket                                          1.50          29
   2        Water Level Guage                              12.99          30
   3        Faucet Repair Kit                               4.89           8
   4        Teflon Thread Seal Tape (50 ft roll)            3.30          12
   5        shutoff valve                                   6.50          10
   6        Cable                                           5.00          18
   7        Extension Cord (14/3, 25 ft)                   27.95          11
   8        Light switch (15 amp)                           2.79          10
   9        Ceiling Fan (52 inch)                          79.95           0
   10       Vinyl Electrical Tape (20 ft roll)              0.79          30
   11       GFI Tester                                      9.35           5
   12       Pump                                           39.00          20
   13       Gasket                                          1.50          29
   14       Water Level Guage                              12.99          30
   15       Faucet Repair Kit                               4.89           8
   16       Teflon Thread Seal Tape (50 ft roll)            3.30          12
   17       shutoff valve                                   6.50          10
   18       Cable                                           5.00          18
   19       Extension Cord (14/3, 25 ft)                   27.95          11
   20       Light switch (15 amp)                           2.79          10
   21       Ceiling Fan (52 inch)                          79.95           0
   22       Vinyl Electrical Tape (20 ft roll)              0.79          30
   23       GFI Tester                                      9.35           5
   24       Broom                                           9.99          12
   25       Dust Pan                                        5.99           5
   26       Gasoline Can                                    8.99          29
   27       Turnbuckle                                      3.80          25
   28       Siding nails (box of 100)                       4.00          20
   29       Flat washer (box of 100)                        2.80          30
   30       Machine screw (box of 100)                      3.20          10
   31       Hex bolt (box of 100)                           6.50          23
   32       Hex nut (box of 100)                            3.80          15
   33       Sheet Metal Screw (qty 100)                     1.50          28
   34       Door Hinges (3-pack)                            6.30          10
   35       Rubber work boots (1 pair)                     28.00           5
   36       Leather Work Gloves (1 pair)                   12.00           8
   37       Long Handle Grass Shear                        30.00           5
38 records.
```

Sample Interactive Session

```
Command: o
Enter name of output file: testData03.txt
38 records written to file.
Command: q
Exit.
```

Project Deliverables:

The project source file(s) must be submitted to *Moodle*, using the *Moodle* Activity:

CSC237_Project3

Submit your **.cpp** file(s) and any **.h** file(s) that you create. I will need to compile your code on my home computer in order to grade it. If you are submitting more than one file (**.cpp** and/or **.h**), do **not** enclose the files in a ZIP file. *Moodle* will allow you to submit multiple source files.
Do ***not*** submit the entire *Visual Studio* project.
Do ***not*** include the *Visual Studio* project folders, or any binary files.

Grading Criteria

The project will be graded according to the following grading criteria:

Feature	Portion of grade
1. The program functions correctly.	65%
2. In the **main** function of the program, there is a loop that contains code to support the following input commands: a Add parts. h print Help text. i Input inventory data from a file. n New inventory Item. o Output inventory data to a file. p Print inventory list. q quit (end the program). r Remove parts.	3%
3. The "command loop" in the **main** function must continue until the user enters a '**q**' command.	2%

Feature	Portion of grade
4. Each of the commands (except the ‘**q**’ command) must call a separate function. That is, the “**main**” function must not be excessively long. The **main** function must be primarily a loop that inputs each user command and calls other functions to implement those commands. Each user command (inside the “main” function) must call a function that implements that particular command. Do **NOT** put an excessive amount of code in the **main** function or any other function. Each function must be designed to perform one task, and to perform it well. **For example:** the ‘**i**’ and ‘**o**’ commands must each call another function that asks the user to specify the name of the input or output file. The program must work for data files with any name.	5%
5. The program is clearly organized and **commented** so that it is easy to read and understand. At a minimum, there must be a comment at the beginning of each function that explains what that function does. Use your judgement regarding any additional comments that may be needed to make the program easy to understand, without over-commenting the program. (As you get more experience, your judgement about this will improve.)	10%
6. Use good variable names and function names: • A variable name or function name must indicate something about what that variable or function does in the program. • Variable names and function names must be not too short and not too long.	5%
7. Place a brief summary of the program in comments at the beginning of the source file(s). Also be sure these comments have your name and the due-date for the project.	5%
8. Cleanup any unused portions of code, such as “failed attempts” that you later replaced.	3%
9. Cleanup any irrelevant comments	2%
Total:	100%