# Bubba Hotep Moving and Storage, Inc.

## Background

Bubba Hotep's Moving and Storage, Inc. (BHMSI) has grown from a small 1 truck company to a medium-sized multi-service mover. Bubba has done the pricing for years, just using his intuition and savant-like memory, but the fleet of vans is getting big and Bubba can't cover it all any more. BHMSI desperately requires automation to store their pricing structure and manage moving estimates and contracts. Bubba has written down the following structure that he uses to price a move. You are required to write a program that all move technicians can use to prepare move estimates.

| Possible types of moves | services | Price/pound for packing and loading | Price per pound per mile |
|---|---|---|---|
| **B**asic | Just pick up and deliver, client must pack (except big furniture, BHMSI does that when loading) | $0.065 | $0.0011 |
| **W**all Pack | Basic plus BHMSI packs paintings and mirrors | $0.256 | $0.0011 |
| **C**omplete | BHMSI packs everything | $0.459 | $0.0012 |

## Program Input

- The type of move [B, W, C]
- The driving distance in miles from origin to destination [1, 3200]
- The weight in pounds of all items to be moved [1200, 18000]
- The number of pianos that need to be moved [0, 3]
- Are there more than 15 stairs at the move origin [y,n]
- Are there more than 15 stairs at the move destination [y, n]

## Processing

If all input values pass validation, the software shall accurately calculate the cost of each component of the move.

## Program Output

- Echo the values that were input (for weight and miles use adjusted values if applicable)
- Print the cost each component of the move (packing cost, moving cost, piano surcharge, stair surcharge)
- Print the total cost for the move, also neatly aligned upon the decimal point below the component costs

## Additional Business Rules

Note that weight and mile values can be stored as integers.  If a floating-point number is entered for weight or miles the fractional part shall be truncated.  Cost values are all stored as floating point (Bubba counts every cent!).

The minimum distance for a move is 1 mile and the maximum distance for a move is 3200 miles.  If a value less than 1 mile is entered, then the software shall adjust the distance to the minimum of 1 mile and continue processing.  If a value more than 3200 miles is entered, then the software shall output an appropriate error message and terminate.

The minimum weight allowed is 1200 pounds or twice the distance of the move, whichever is greater.  For example, if the distance is 400 miles, the minimum weight is 1200 pounds, but if the distance is 680 miles, the minimum weight is 1360 pounds.  If a value less than the minimum is entered, then the software shall adjust the weight to the minimum value and continue processing.  The maximum weight allowed is 18000 pounds.  If a value more than 18000 miles is entered, then the software shall output an appropriate error message and terminate.

Moves over 18000 pounds or over 3200 miles are referred to Bertha Bartholomew's Moving and Storage, Inc. (BBMSI).  Bertha is a distant cousin of Bubba's.  She specializes in large estate, commercial, and international moves.

There is a 3-piano maximum.  If a value greater than 3 pianos is entered, then the software shall output an appropriate error message and terminate.  Not even Bertha wants to move a music store!

If there is a set of stairs having more than 15 stairs, then there is a $132.00 charge.  This applies to each such set of stairs (at origin, or destination, or both).

There is a $275.00 surcharge for each piano if there are no stairs at either end of the move.  There is a $575.00 surcharge for each piano if there are more than 15 stairs at either origin or destination.  There is a $1075.00 surcharge for each piano if there are more than 15 stairs at both origin and destination.

## Data Validation

Each item of input requires validation.  After each value is entered, the value shall be tested to ensure that it is valid and/or within the appropriate numeric range.  If any entry is invalid an error message shall be displayed and the program will exit.

You are not required to test for data type errors.  This means that if a character value is expected you may assume that the user entered a character, if a number is expected, you may assume that the user entered a number.  For character values (such as the first letter of move type names) your software shall accept both upper case and lower case letters as valid.  Your software shall also disregard any extraneous information typed after a valid entry.  For example, the lower-case letter **b** would be valid for `Basic`, the upper-case letter **B** would also work, as would the entire name `Basic` (all characters after the **B** are ignored).  If all values entered are valid, then your software shall make the required calculations and output the results specified below.

## Also Note…

Your software shall have "smart prompts" that inform the user of acceptable entries.

Your software shall accept upper-case and lower-case for character data entry.  It shall also ignore any extraneous characters entered after a valid value is entered.
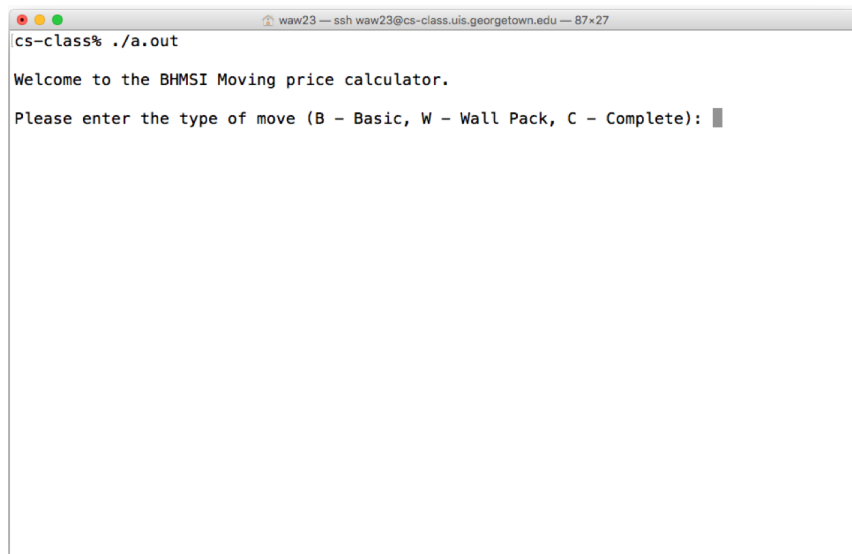
Your software shall display clear error messages for any invalid entries.  If an invalid value is entered, the program should exit after displaying the error message.

Your software shall display neatly formatted, accurately calculated output.  Money values are written with 2 decimal places.  Columns of floating pointing point numbers shall be aligned on the decimal point.

Your software shall make extensive use of global constants.  The six numbers in the table on page 1 above should all be global constants.  There are other candidates for global constants that you should identify and define as such in your design and in your code.

### Sample Executable

Below is a screen capture of a sample executable program immediately after It was run on the server.  This executable program is available for download from Canvas so that you can experiment with various input values to gain insight into how your program should perform.

```
cs-class% ./a.out

Welcome to the BHMSI Moving price calculator.

Please enter the type of move (B – Basic, W – Wall Pack, C – Complete): ▌
```

### Academic Integrity

This is an individual project and all work must be your own.  Refer to the guidelines specified in the *Academic Honesty* section of this course syllabus or contact me if you have any questions.

## Part A - Design Document

For the first part of this project you must submit a pseudocode design document showing the algorithm(s) you plan to implement.  Our pseudocode language for the project contains the following terms:

```
START
INPUT
OUTPUT
CALCULATE
IF condition, THEN statement
IF condition, THEN statement; OTHERWISE, statement
STOP
```

If you need to group multiple statements together, say in an **IF** statement, use

```
BEGIN
  statement
  …
  statement
END
```

Include the following comments at the start of your design document file:

```
/*
 * <netID>P1.pdf
 *
 *  COSC 051 Spring 2019
 * Project #1 (Design)
 *
 * Due on: JAN 29, 2019
 * Author: <your netID>
 *
 *
 * In accordance with the class policies and Georgetown's
 * Honor Code, I certify that, with the exception of the
 * class resources and those items noted below, I have neither
 * given nor received any assistance on this project.
 *
 * References not otherwise commented within the program source code.
 * Note that you should not mention any help from the TAs, the professor,
 * or any code taken from the class textbooks.
 */
```

## Part A - Submission Details

Post to Canvas a .pdf file containing your design using the language described above.  Locate the assignment `Project 1 (Design)` on Canvas and attach/upload your file.  Use the following file name for your file: `<netID>P1.pdf` (replace `<netID>` with your netID and remove the angle brackets).  The design part of this project is due by end-of-day (11:59pm) on January 29th.  Late submissions will be penalized 2.5% for each 15 minutes late.  If you are over 10 hours late you may turn in the project to receive feedback but the grade will be zero.  In general requests for extensions will not be considered.  The value for Part A is 100 points.  Your Part A grade is 35% of the overall Project #1 grade.

## Part B - Program Source Code

**Important:** Your output and input should be very similar to that shown in the sample output. Please ask for the input in **exactly** the same order shown and only request the same items shown - do not ask for any other input. This will assist in grading your program. Some content must also be included in your program **<u>exactly</u>** as specified.

Include the following comments at the start of your source code file:

```
/*
 *  main.cpp
 *
 *  COSC 051 Spring 2019
 *  Project #1 (Code)
 *
 *  Due on: February 12, 2019
 *  Author: <your netID>
 *
 *
 *  In accordance with the class policies and Georgetown's
 *  Honor Code, I certify that, with the exception of the
 *  class resources and those items noted below, I have neither
 *  given nor received any assistance on this project.
 *
 *  References not otherwise commented within the program source code.
 *  Note that you should not mention any help from the TAs, the professor,
 *  or any code taken from the class textbooks.
 */
```

These comments must appear **exactly** as shown above. The only difference will be values that you replace where there are "place holders" within angle brackets such as `<netID>` which should be replaced by your own `netID`. For example, I would replace `<netID>` on the "Author:" line with `waw23`.

## Part B - Submission Details

Post to Canvas a `.zip` file containing your source code the given Makefile. Locate the assignment `Project 1 (Code)` on Canvas and attach/upload your file. Do **not** post your executable file. You should ensure that your source file compiles on the server and that the executable file runs and produces the correct output. Use the following file name for your file: `submit.zip`. The code part of this project is due by end-of-day (11:59pm) on February 12th. Late submissions will be penalized 2.5% for each 15 minutes late. If you are over 10 hours late you may turn in the project to receive feedback but the grade will be zero. In general requests for extensions will not be considered. The value for Part B is 100 points. Your Part B grade is 65% of the overall Project #1 grade.

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