```
************************************************************
*   PROGRAMMED BY : Andrew Gharios
*   STUDENT ID    : 1449366
*   CLASS         : M-Th 5-7:20p
*   LAB #12       : Intro to OOP
************************************************************

1 - Initialize Animals
0 - Exit
Enter selection: 2

**** The number 2 is an invalid entry     *****
**** Please input a number between 0 and 1 *****

Enter selection: a

**** Please enter a NUMBER between 0 and 1 ****

Enter selection: 1

Initializing Fluffy, Maa, & Babe...

1 - Initialize Animals
2 - Change Age
3 - Change Value
4 - Display
0 - Exit

Enter selection: 5

**** The number 5 is an invalid entry     *****
**** Please input a number between 0 and 4 *****

Enter selection: 4

ANIMAL     NAME           AGE       VALUE
---------- -------------- ---    -----------
Sheep      Fluffy         1         15000.00
Sheep      Maa            3         16520.35
Pig        Babe           2         10240.67

Enter selection: 2

1 - Fluffy
2 - Maa
3 - Babe

Select the animal you'd like to change: 4

```

```
**** The number 2 is an invalid entry     *****
**** Please input a number between 0 and 3 *****

Select the animal you'd like to change: a

**** Please enter a NUMBER between 0 and 3 ****

Select the animal you'd like to change: 1

NEW AGE: 2
Changing Fluffy's age to 2 ...

Enter selection: 2

1 - Fluffy
2 - Maa
3 - Babe

Select the animal you'd like to change: 2

NEW AGE: 4
Changing Maa's age to 4 ...

Enter selection: 2

1 - Fluffy
2 - Maa
3 - Babe

Select the animal you'd like to change: 3

NEW AGE: 11

**** The number 2 is an invalid entry     *****
**** Please input a number between 0 and 10 *****

NEW AGE: 3
Changing Babe's age to 3 ...

Enter selection: 4

ANIMAL     NAME           AGE       VALUE
---------- -------------- ---    -----------
Sheep      Fluffy         2         15000.00
Sheep      Maa            4         16520.35
Pig        Babe           3         10240.67


Enter selection: 3
```

```
 99
100  1 - Fluffy
101  2 - Maa
102  3 - Babe
103
104  Select the animal you'd like to change: 4
105
106  **** The number 3 is an invalid entry     *****
107  **** Please input a number between 0 and 3 *****
108
109  Select the animal you'd like to change: 1
110
111  NEW VALUE: 154154.51
112  Changing Fluffy's value to 154154.52 ...
113
114  Enter selection: 3
115
116  1 - Fluffy
117  2 - Maa
118  3 - Babe
119
120  Select the animal you'd like to change: 2
121
122  NEW VALUE: 651651.61
123
124  **** The number 3 is an invalid entry     *****
125  **** Please input a number between 0 and 400000 *****
126
127  NEW VALUE: 165165.61
128  Changing Maa's value to 165165.61 ...
129
130  Enter selection: 3
131
132  1 - Fluffy
133  2 - Maa
134  3 - Babe
135
136  Select the animal you'd like to change: 3
137
138  NEW VALUE: 123123.12
139  Changing Babe's value to 123123.12 ...
140
141  Enter selection: 4
142
143  ANIMAL     NAME           AGE       VALUE
144  ---------- -------------- ---    -----------
145  Sheep      Fluffy         2         154154.52
146  Sheep      Maa            4         165165.61
147  Pig        Babe           3         123123.12
```

```
148
149 Enter selection: 1
150
151 Are you sure you want to reinitialize (Y/N)? x
152
153 **** X is an invalid entry ****
154 **** Please input Y or N   ****
155
156 Are you sure you want to reinitialize (Y/N)? n
157 Animals have not been re-initialized!
158
159 Enter selection: 4
160
161 ANIMAL     NAME           AGE       VALUE
162 ---------- -------------- ---    -----------
163 Sheep      Fluffy         2         154154.52
164 Sheep      Maa            4         165165.61
165 Pig        Babe           3         123123.12
166
167 Enter selection: 1
168
169 Are you sure you want to reinitialize (Y/N)? Y
170 Initializing Fluffy, Maa, & Babe...
171
172 Enter selection: 4
173
174 ANIMAL     NAME           AGE       VALUE
175 ---------- -------------- ---    -----------
176 Sheep      Fluffy         1         15000.00
177 Sheep      Maa            3         16520.35
178 Pig        Babe           2         10240.67
179
180 Enter selection: 0
```

```
1  #ifndef ANIMAL_H_
2  #define ANIMAL_H_
3
4  #include "Header.h"
5
6  class Animal
7  {
8  public:
9      Animal();
10     ~Animal();
11
12     /*********************
13      **    MUTATORS    **
14      *********************/
15
16     void SetInitialValues(string aName, string aType, int aAge, float aValue);
17     void ChangeAge(int aAge);
18     void ChangeValue(float aValue);
19
20
21     /*********************
22      **    ACCESSORS    **
23      *********************/
24     void Display() const;
25     string GetName() const;
26     string GetType() const;
27     int GetAge() const;
28     float GetValue() const;
29
30 private:
31     string   name;  // IN & OUT - Animal name.
32     string   type;  // IN & OUT - Animal type.
33     int       age;  // IN & OUT - Animal age.
34     float    value; // IN & OUT - Animal value.
35 };
36
37 #endif
38
39
```

```
1  #ifndef HEADER_H_
2  #define HEADER_H_
3
4
5  #include <iostream> // cin, cout.
6  #include <string>   // string datatype variables.
7  #include <fstream>  // Fstream files.
8  #include <iomanip>  // fixed, setw, setprecision.
9  #include <ostream>  // Ostream data type.
10 #include <ctype.h>
11
12 using namespace std;
13
14 const int ANIMAL_SIZE = 11;
15 const int NAME_SIZE = 15;
16 const int AGE_SIZE = 7;
17
18
19 /*****************************************************************************
20  * PrintHeaderFile
21  *   This function will output the header information
22  *
23                                                                              ↵
   *****************************************************************************/
24 void PrintHeaderFile(ostream& output,      // IN  - output datatype.
25     string asName,        // IN  - assignment name
26     int asNum,             // IN  - assignment number
27     string studentName,   // IN  - student's name
28     string classInfo,     // IN  - class that is being taken
29     char asType,          // IN  - assignment type
30     long long studentID); // IN  - student ID
31
32
33 #endif
34
```

```
1  /*****************************************************************************
2  * AUTHOR     : Andrew Gharios
3  * STUDENT ID : 1449366
4  * LAB #12    : Intro to OOP
5  * CLASS      : CS1B
6  * SECTION    : M-TH: 5-7:20p
7  * DUE DATE   : 7/23/21
8  *****************************************************************************/
9  #include "Header.h"
10 #include "Animal.h"
11
12 /*****************************************************************************
13 * Intro to OOP
14 *----------------------------------------------------------------------------
15 * This program will allow the used to initialize and manipulate and animal
16 * class, the used will have the option to initialize, change age or value, and
17 * display the class through user interface.
18 *----------------------------------------------------------------------------
19 * INPUT:
20 * input        - Main menu input.
21 * inp          - Selection of which animal to modify.
22 * reinitialize - If user wants to re-initialize animals
23 * ageInp       - New age for animal.
24 * valueInp     - New value for animal.
25 *****************************************************************************/
26 int main()
27 {
28     /*************************************************************************
29     * CONSTANTS
30     *
31     * OUTPUT - USED FOR CLASS HEADING
32     *
33     * PROGRAMMER : Programmer's Name
34     * CLASS   : Student's Course
35     * SECTION    : Class Days and Times
```

```
36      * LAB_NUM    : Lab Number (specific to this lab)
37      * LAB_NAME   : Title of the Lab
38      * ----------------------------------------------------------------------
39      * SetW Sizes
40      * ----------------------------------------------------------------------
41      * ANIMAL_SIZE
42      * NAME_SIZE
43      * AGE_SIZE
44      ************************************************************************
          /
45
46      const string AS_NAME = "Intro to OOP";
47      const int AS_NUM = 12;
48      const string STUDENT_NAME = "Andrew Gharios";
49      const string CLASS_INFO = "M-Th 5-7:20p";
50      const char AS_TYPE = 'L';
51      const long long STUDENT_ID = 1449366;
52
53      Animal fluffy;       // CALC & OUT - animal #1
54      Animal maa;          // CALC & OUT - animal #2
55      Animal babe;     // CALC & OUT - animal #3
56      int    input;        // IN & CALC  - Menu selection.
57      bool   invalid;      // CALC   - Input validation.
58      int    inp;          // IN & CALC  - Animal selection.
59      char   reinitialize; // IN & CALC  - If user wants to reinitialize.
60      int    ageInp;       // IN & CALC  - New age for selected animal.
61      float   valueInp;    // IN & CALC  - New value for selected animal.
62
63      invalid = false;
64
65
66      PrintHeaderFile(cout, AS_NAME, AS_NUM, STUDENT_NAME, CLASS_INFO,
67          AS_TYPE, STUDENT_ID);
68
69      cout << "\n1 - Initialize Animals\n";
70      cout << "0 - Exit";
71
72
73          do
74          {
75              invalid = false;
76              cout << "\nEnter selection: ";
77              if (!(cin >> input))
78              {
79                  cout << "\n**** Please enter a NUMBER between 0 and 1 ****\n";
80                  cin.clear();
81                  cin.ignore(numeric_limits<streamsize>::max(), '\n');
82                  invalid = true;
83              }
```

```
84              else if (input < 0 || input > 1)
85              {
86
87                  cout << "\n**** The number " << input << " is an invalid entry
                        *****\n";
88                  cout << "**** Please input a number between 0 and 1 *****\n";
89                  invalid = true;
90              }
91
92
93          } while (invalid);
94
95          cin.ignore(numeric_limits<streamsize>::max(), '\n');
96
97          if (input == 1)
98          {
99              cout << "\nInitializing Fluffy, Maa, & Babe...\n";
100             fluffy.SetInitialValues("Fluffy", "Sheep", 1, 15000.00);
101             maa.SetInitialValues("Maa", "Sheep", 3, 16520.35);
102             babe.SetInitialValues("Babe", "Pig", 2, 10240.67);
103
104             cout << "\n1 - Initialize Animals\n";
105             cout << "2 - Change Age\n";
106             cout << "3 - Change Value\n";
107             cout << "4 - Display\n";
108             cout << "0 - Exit\n";
109
110             do
111             {
112                 do
113                 {
114                     invalid = false;
115                     cout << "\nEnter selection: ";
116                     if (!(cin >> input))
117                     {
118                         cout << "\n**** Please enter a NUMBER between 0 and 4
                        ****\n";
119                         cin.clear();
120                         cin.ignore(numeric_limits<streamsize>::max(), '\n');
121                         invalid = true;
122                     }
123                     else if (input < 0 || input > 4)
124                     {
125
126                         cout << "\n**** The number " << input << " is an
                        invalid entry     *****\n";
127                         cout << "**** Please input a number between 0 and 4
                        *****\n";
128                         invalid = true;
```

```
129                     }
130
131
132                 } while (invalid);
133                 cin.ignore(numeric_limits<streamsize>::max(), '\n');
134
135                 switch (input)
136                 {
137                     //RE-INITIALIZE
138                 case 1:
139
140                     do
141                     {
142                         invalid = false;
143                         cout << "\nAre you sure you want to reinitialize (Y/
                    N)? ";
144                         cin >> reinitialize;
145                         reinitialize = toupper(reinitialize);
146                         if (reinitialize != 'N' && reinitialize != 'Y')
147                         {
148                             cout << "\n**** " << reinitialize << " is an
                    invalid entry ****\n";
149                             cout << "**** Please input Y or N   ****\n";
150                             cin.clear();
151                             cin.ignore(numeric_limits<streamsize>::max(),
                    '\n');
152                             invalid = true;
153                         }
154
155                     } while (invalid);
156                     cin.ignore(numeric_limits<streamsize>::max(), '\n');
157
158                     if (reinitialize == 'Y')
159                     {
160                         fluffy.SetInitialValues("Fluffy", "Sheep", 1,
                    15000.00);
161                         maa.SetInitialValues("Maa", "Sheep", 3, 16520.35);
162                         babe.SetInitialValues("Babe", "Pig", 2, 10240.67);
163                         cout << "Initializing Fluffy, Maa, & Babe...\n";
164                     }
165                     else
166                     {
167                         cout << "Animals have not been re-initialized!\n";
168                     }
169                     break;
170
171                 //CHANGE AGE
172                 case 2:
173
```

```
174                     cout << "\n1 - Fluffy\n";
175                     cout << "2 - Maa\n";
176                     cout << "3 - Babe\n";
177
178                     do
179                     {
180                         invalid = false;
181                         cout << "\nSelect the animal you'd like to change: ";
182                         if (!(cin >> inp))
183                         {
184                             cout << "\n**** Please enter a NUMBER between 0 and 3 ****\n";
185                             cin.clear();
186                             cin.ignore(numeric_limits<streamsize>::max(), '\n');
187                             invalid = true;
188                         }
189                         else if (inp < 0 || inp > 3)
190                         {
191
192                             cout << "\n**** The number " << input << " is an invalid entry     *****\n";
193                             cout << "**** Please input a number between 0 and 3 *****\n";
194                             invalid = true;
195                         }
196
197                     } while (invalid);
198
199                     do
200                     {
201                         invalid = false;
202                         cout << "\nNEW AGE: ";
203                         if (!(cin >> ageInp))
204                         {
205                             cout << "\n**** Please enter a NUMBER between 0 and 10 ****\n";
206                             cin.clear();
207                             cin.ignore(numeric_limits<streamsize>::max(), '\n');
208                             invalid = true;
209                         }
210                         else if (ageInp < 0 || ageInp > 10)
211                         {
212
213                             cout << "\n**** The number " << input << " is an invalid entry     *****\n";
214                             cout << "**** Please input a number between 0 and 10 *****\n";
```

```
215                             invalid = true;
216                         }
217
218                     } while (invalid);
219
220                     switch (inp)
221                     {
222                     case 1:
223                         fluffy.ChangeAge(ageInp);
224                         cout << "Changing Fluffy's age to " << ageInp << " ... ↵
                    \n";
225                         break;
226                     case 2:
227                         maa.ChangeAge(ageInp);
228                         cout << "Changing Maa's age to " << ageInp << " ...    ↵
                    \n";
229                         break;
230                     case 3:
231                         babe.ChangeAge(ageInp);
232                         cout << "Changing Babe's age to " << ageInp << " ...   ↵
                    \n";
233                         break;
234                     }
235                     break;
236
237                 //CHANGE VALUE
238                 case 3:
239
240                     cout << "\n1 - Fluffy\n";
241                     cout << "2 - Maa\n";
242                     cout << "3 - Babe\n";
243
244                     do
245                     {
246                         invalid = false;
247                         cout << "\nSelect the animal you'd like to change: ";
248                         if (!(cin >> inp))
249                         {
250                             cout << "\n**** Please enter a NUMBER between 0    ↵
                    and 3 ****\n";
251                             cin.clear();
252                             cin.ignore(numeric_limits<streamsize>::max(),      ↵
                    '\n');
253                             invalid = true;
254                         }
255                         else if (inp < 0 || inp > 3)
256                         {
257
258                             cout << "\n**** The number " << input << " is an   ↵
```

```
                    invalid entry     *****\n";
259                         cout << "**** Please input a number between 0 and
                    3 *****\n";
260                         invalid = true;
261                     }
262
263                 } while (invalid);
264
265                 do
266                 {
267                     invalid = false;
268                     cout << "\nNEW VALUE: ";
269                     if (!(cin >> valueInp))
270                     {
271                         cout << "\n**** Please enter a NUMBER between 0
                    and 400000 ****\n";
272                         cin.clear();
273                         cin.ignore(numeric_limits<streamsize>::max(),
                    '\n');
274                         invalid = true;
275                     }
276                     else if (valueInp < 0 || valueInp > 400000)
277                     {
278
279                         cout << "\n**** The number " << input << " is an
                    invalid entry     *****\n";
280                         cout << "**** Please input a number between 0 and
                    400000 *****\n";
281                         invalid = true;
282                     }
283
284                 } while (invalid);
285
286
287                 cout << fixed << setprecision(2);
288                 switch (inp)
289                 {
290
291                 case 1:
292                     fluffy.ChangeValue(valueInp);
293                     cout << "Changing Fluffy's value to " << valueInp <<
                    " ...\n";
294                     break;
295                 case 2:
296                     maa.ChangeValue(valueInp);
297                     cout << "Changing Maa's value to " << valueInp <<
                    " ...\n";
298                     break;
299                 case 3:
```

```
300                         babe.ChangeValue(valueInp);
301                         cout << "Changing Babe's value to " << valueInp <<
                        " ...\n";
302                         break;
303                     }
304
305                     cout << setprecision(6);
306
307                     break;
308
309                     //DISPLAY
310                 case 4:
311
312                     cout << endl;
313                     cout << left;
314                     cout << setw(ANIMAL_SIZE) << "ANIMAL" << setw(NAME_SIZE)
                        << "NAME";
315                     cout << setw(AGE_SIZE) << "AGE" << "   VALUE" << endl;
316                     cout << setw(ANIMAL_SIZE) << string(ANIMAL_SIZE - 1, '-');
317                     cout << setw(NAME_SIZE) << string(NAME_SIZE - 1, '-');
318                     cout << setw(AGE_SIZE) << string(AGE_SIZE - 4, '-');
319                     cout << string(11, '-') << endl;
320                     fluffy.Display();
321                     maa.Display();
322                     babe.Display();
323                     break;
324                 }
325
326             } while (input != 0);
327
328
329         }
330
331
332
333     return 0;
334
335 }
```

```cpp
#include "Header.h"
#include "Animal.h"

Animal::Animal()
{
    age   = 0;
    value = 0.0;
}

Animal ::~Animal() {}

//MUTATORS
void Animal::SetInitialValues(string aName,
                              string aType,
                              int aAge,
                              float aValue)
{
    name  = aName;
    type  = aType;
    age   = aAge;
    value = aValue;
}

void Animal::ChangeAge(int aAge)
{
    age = aAge;
}

void Animal::ChangeValue(float aValue)
{
    value = aValue;
}


//ACCESSORS
void Animal::Display() const
{

    cout << setw(ANIMAL_SIZE) << type;
    cout << setw(NAME_SIZE) << name;
    cout << setw(AGE_SIZE) << age;
    cout << setprecision(2) << fixed;
    cout << "    " << value << endl;
    cout << setprecision(6);
}

string Animal::GetName() const
{
    return name;
```

```
50  }
51
52  string Animal::GetType() const
53  {
54      return type;
55  }
56
57  int Animal::GetAge() const
58  {
59      return age;
60  }
61
62  float Animal::GetValue() const
63  {
64      return value;
65  }
66
67
68  /*****************************************************************************
    **
69  * SetInitialValues
70  *   This function will set all the initial value for the animal object.
71  *
72  * INPUTS:
73  *   aName  : choice of name.
74  *   aType  : choice of type.
75  *   aAge   : choice of age.
76  *   aValue : choice of value.
77  *
78  * No outputs.
79  *****************************************************************************
    **/
80
81  /*****************************************************************************
    **
82  * ChangeAge
83  *   This function will set the age of the animal object.
84  *
85  * INPUTS:
86  *   aAge : selected age to change to.
87  *
88  * No outputs.
89  *****************************************************************************
    **/
90
```

```
91  /*****************************************************************************
    **
92  * ChangeValue
93  *   This function will set the value of the animal object.
94  *
95  * INPUTS:
96  *   aValue : selected value to change to.
97  *
98  * No outputs.
99  *****************************************************************************
    */
100
101 /*****************************************************************************
    **
102 * Display
103 *   This function will display the object's full information.
104 *
105 * No Inputs.
106 * No outputs.
107 *****************************************************************************
    */
108
109 /*****************************************************************************
    **
110 * GetName
111 *   This function will return the name of the animal.
112 *
113 * No inputs.
114 *
115 *  OUTPUTS:
116 *   name : Animal's name.
117 *****************************************************************************
    */
118
119 /*****************************************************************************
    **
120 * GetType
121 *   This function will return the type of the animal.
122 *
123 * No inputs.
124 *
125 *  OUTPUTS:
```

```
126 *   type : Animal's type.
127 *                                                                       ↵
    ********************************************************************** ↵
    */
128
129 /                                                                       ↵
    ********************************************************************** ↵
    **
130 * GetAge
131 *   This function will return the age of the animal.
132 *
133 * No inputs.
134 *
135 *  OUTPUTS:
136 *   age : Animal's age.
137 *                                                                       ↵
    ********************************************************************** ↵
    */
138
139 /                                                                       ↵
    ********************************************************************** ↵
    **
140 * GetValue
141 *   This function will return the value of the animal.
142 *
143 * No inputs.
144 *
145 *  OUTPUTS:
146 *   value : Animal's value.
147 *                                                                       ↵
    ********************************************************************** ↵
    */
```

```cpp
#include "Header.h"

/*****************************************************************************
 * PrintHeaderFile
 *   This function will output the header information
 *
 * PRE-CONDITIONS
 *   The following parameters need to have a defined value prior to calling
 *   the function
 *          asName: The name of the assignment given in the course
 *          asNum: The number of the assignment given in the course
 *          studentName: The name of the student writing the code
 *          classInfo: The course name, date, and time of the class
 *          asType: Will either output as a lab or an assignment
 *          studentID: The Identification Number of the student
 *
*****************************************************************************/

void PrintHeaderFile(ostream& output,       // IN - output datatype.
                     string asName,      // IN - assignment name
                     int asNum,           // IN - assignment number
                     string studentName,  // IN - student's name
                     string classInfo,    // IN - class that is being taken
                     char asType,         // IN - assignment type
                     long long studentID) // IN - student ID
{
    output << left;
    output << "*************************************************************   \n";
    output << "*   PROGRAMMED BY : " << studentName << endl;
    output << "*   " << setw(14) << "STUDENT ID " << ": " << studentID << endl;
    output << "*   " << setw(14) << "CLASS " << ": " << classInfo << endl;
    output << "*   ";

    // PROCESSING - This will adjust setws and format appropriately based
    //              on if this is a lab 'L' or assignment

    if (toupper(asType) == 'L')
    {
        output << "LAB #" << setw(9);
    }
    else
    {
        output << "ASSIGNMENT #" << setw(2);
    }
    output << asNum << ": " << asName << endl;
    output << "*************************************************************";
    output << right << endl;
```

```
47
48      return;
49  }
```