Assignment1 Report

SID: 11910718 Name: 陆彦青

Introduction

1. This simple calculator can multiply 2 intergers.
2. If the user input some non-integer characters, the program can tell the user that the input is invalid and prompt he/she to input again.
3. If the user input some big intergers that will make the results out of bounds, the program can tell the user that the input is out of bounds and prompt he/she to input again.

Part 1. Source Code

```
#include <iostream>
#include <limits>
#include <limits.h>

using namespace std;

int overflow(int a, int b)
{
    if (a > 0)
    {
        if (b > 0)
        {
            if ((INT_MAX/a) < b)
            {
                return 1;
            }
        } else
        {
            if ((INT_MIN/a) > b)
            {
                return 1;
            }
        }
    } else
    {
        if (b > 0)
        {
```

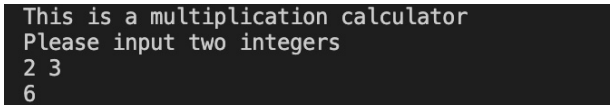
```
28                      if ((INT_MIN/a) < b)
29                      {
30                          return 1;
31                      }
32                  } else
33                  {
34                      if ((INT_MAX/a) > b)
35                      {
36                          return 1;
37                      }
38                  }
39              }
40              return 0;
41          }
42
43          int main()
44          {
45              int a,b;
46
47              while (true)
48              {
49                  cout << "This is a multiplication calculator" << endl;
50                  cout << "Please input two integers" << endl;
51                  cin >> a >> b;
52
53                  if (cin.rdstate() != 0)
54                  {
55                      cin.clear();
56                      cin.ignore(numeric_limits<streamsize>::max(),'\n');
57                      cout << "The input is invalid, please input again" <<
                            endl;
58                  }else if (overflow(a,b))
59                  {
60                      cin.clear();
61                      cin.ignore(numeric_limits<streamsize>::max(),'\n');
62                      cout << "The output will overflow, please input again"
                            << endl;
63                  }else
64                  {
65                      cout << a*b << endl;
66                      break;
67                  }
68              }
69
70              return 0;
71          }
```

Part 2. Result & Verification

Test case #1:

```
1        2  3
```

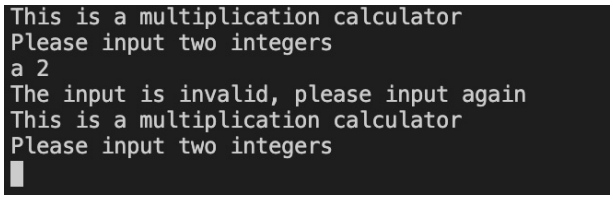
Screen-shot for case #1:



Test case #2:

```
1        a  2
```

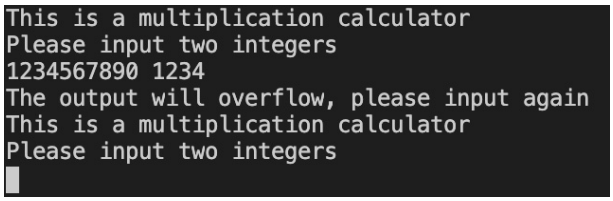
Screen-shot for case #2:



Test case #3:

```
1        1234567890  1234
```

Screen-shot for case #3:



Part 3. Difficulties & Solutions

1. The first difficulty is to determine whether the input is valid. My solution is to use **cin.rdstate()**.
2. The second difficulty is to determine whether the output will overflow. My solution is to construct a function named **overflow** which containing a series of if/else. The function uses the division to prevent the overflow.