

1. Create a loop for input validation. This will run until the user inputs a valid input (fewer than 19 characters). The `input_valid` variable is set to false to trigger the loop and switches to true when valid input is detected.

```
bool input_valid = false;

while (!input_valid)
{
    // Input handling and validation
    // Put the remaining steps here.
}
```

2. Collect user input using `cin.getline`. Unlike `cin >>`, `cin.getline` ensures that the input will not exceed the size of `user_input`. The second argument, `sizeof(user_input)`, limits input to the array size of 20 bytes. This means it can hold 19 characters plus the C++ null terminator.

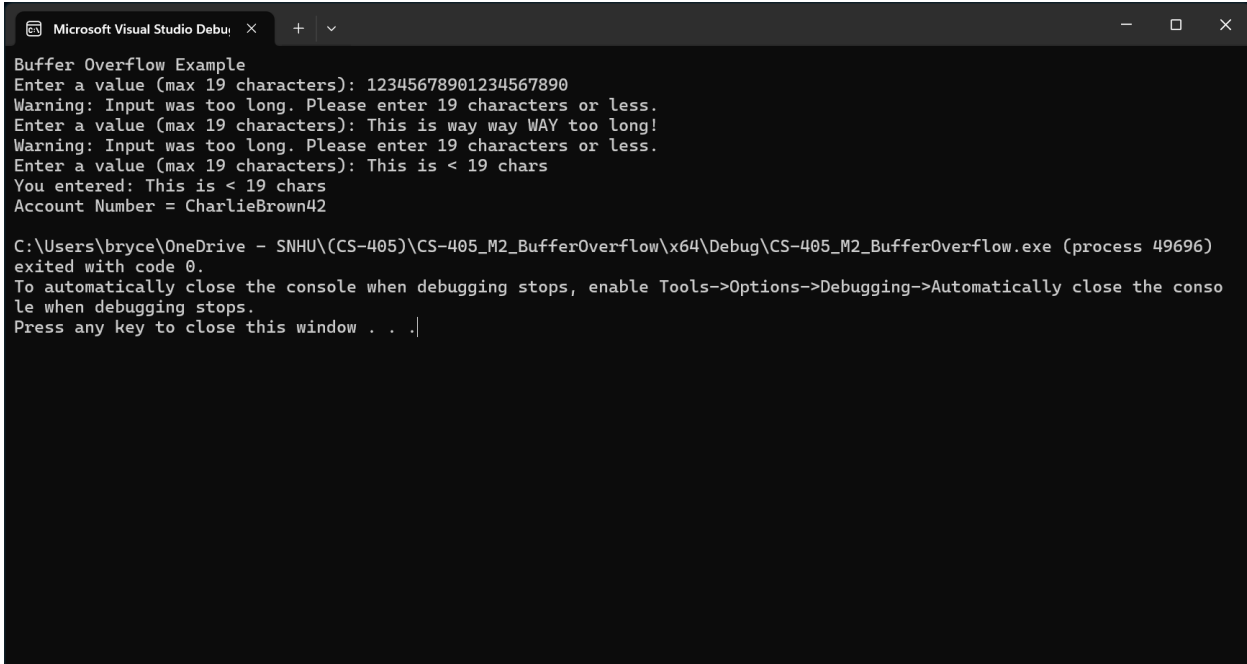
```
std::cin.getline(user_input, sizeof(user_input));
```

3. Detect the input overflow by checking if `cin.fail` is true, which will happen if the user inputs more than 19 characters. When this occurs, clear the error state, ignore and discard the characters past the limit (until the next new line, the `\n` acts as a delimiter). Print a warning to the user that they input too many characters. If everything was successful, change the `input_valid` to true so the loop will end.

```
if (std::cin.fail())
{
    std::cin.clear(); // Clear the error flag
    std::cin.ignore(std::numeric_limits<std::streamsize>::max(),
'\n'); // Discard the rest of the input
    std::cout << "Warning: Input was too long. Please enter 19
characters or less." << std::endl;
}
else
{
    input_valid = true; // Valid input was entered
}
```

I initially couldn't figure out how to get past the null terminator. I assumed that `user_input` was 20 characters, but it wouldn't accept it if I put in 20 characters, only 19 or less. I didn't know about the C++ null terminator. That took some research.

Output to the console:



```
Microsoft Visual Studio Debug Console
Buffer Overflow Example
Enter a value (max 19 characters): 12345678901234567890
Warning: Input was too long. Please enter 19 characters or less.
Enter a value (max 19 characters): This is way way WAY too long!
Warning: Input was too long. Please enter 19 characters or less.
Enter a value (max 19 characters): This is < 19 chars
You entered: This is < 19 chars
Account Number = CharlieBrown42

C:\Users\bryce\OneDrive - SNHU\CS-405\CS-405_M2_BufferOverflow\x64\Debug\CS-405_M2_BufferOverflow.exe (process 49696)
exited with code 0.
To automatically close the console when debugging stops, enable Tools->Options->Debugging->Automatically close the console when debugging stops.
Press any key to close this window . . .|
```