# **CS 410 C++ to Assembly Activity Template**

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# **1/8/24 SNHU CS410**

**Step 1:** Explain the functionality of the C++ code.

## C++ Code Functionality

| **C++ Line of Code** | **Explanation of Functionality** |
| --- | --- |
| #include<iostream> | Will include the input/output of the c++ stream library |
| using namespace std; | Declares namespace where std has many standard c++ libraries and will be used in this program |
| int main() | Starts the definition of the main function |
| { | Syntax purposes start of function |
| int width=10; | Variable defined and what they will be set as |
| int height=5; | “ “ ^ |
| int area; | Area variable is not set to specific value but needs to be stated so can be called |
| area = width \* height; | Logic implementation and where calculation occurs |
| cout<<endl<< area; | Output where the result of computation above ^ will be displayed on to the terminal |
| return 0; | The program has ended |
| } | Syntax purposes end of function |

**Step 2:** Convert the C++ file into assembly code.

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**Step 3:** Align each line of C++ code with the corresponding blocks of assembly code.

## C++ to Assembly Alignment

| **C++ Line of Code** | **Blocks of Assembly Code** |
| --- | --- |
| #include<iostream> | N/A |
| using namespace std; | N/A |
| int main() | N/A |
| { | N/A |
| int width=10; | movl $10, -12(%rbp)  movl $5, -8(%rbp) |
| int height=5; | movl $10, -12(%rbp)  movl $5, -8(%rbp) |
| int area; | ? |
| area = width \* height; | movl -12(%rbp), %eax  imull -8(%rbp), %eax  movl %eax, -4(%rbp) |
| cout<<endl<< area; | movq \_ZSt4endlIcSt11char\_traitsIcEERSt13basic\_ostreamIT\_T0\_ES6\_@GOTPCREL(%rip), %rax  movq %rax, %rsi  leaq \_ZSt4cout(%rip), %rdi  call \_ZNSolsEPFRSoS\_E@PLT  movq %rax, %rdx  movl -4(%rbp), %eax  movl %eax, %esi  movq %rdx, %rdi  call \_ZNSolsEi@PLT |
| return 0; | movl $0, %eax  leave  ret |
| } | N/A |

**Step 4:** Explain how the blocks of assembly code perform the same tasks as the C++ code.

## Assembly Functionality

| **Blocks of Assembly Code** | **Explanation of Functionality** |
| --- | --- |
|  |  |
| movl $10, -12(%rbp)  movl $5, -8(%rbp) | Sets the variables values and what they will be |
| movl $10, -12(%rbp)  movl $5, -8(%rbp) | ^ “ “ |
|  |  |
| movl -12(%rbp), %eax  imull -8(%rbp), %eax  movl %eax, -4(%rbp) | Calculates the computation of the equation |
| movq \_ZSt4endlIcSt11char\_traitsIcEERSt13basic\_ostreamIT\_T0\_ES6\_@GOTPCREL(%rip), %rax  movq %rax, %rsi  leaq \_ZSt4cout(%rip), %rdi  call \_ZNSolsEPFRSoS\_E@PLT  movq %rax, %rdx  movl -4(%rbp), %eax  movl %eax, %esi  movq %rdx, %rdi  call \_ZNSolsEi@PLT | Produces the output and shows answer to displayed |
| movl $0, %eax  leave  ret | Program is completed and ret means return ! |
|  |  |
|  |  |
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