

Computer Programming

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Session: Sequential Execution in C++ Programs





- Structure of a simple C++ program
- Variables and type declarations
- Assignment statements
- Arithmetic and logical expressions



- Simple C++ programs with sequential execution
- Programming to solve problems



- Program: sequence of compiler directives, declarations, instructions
- Compiler directives used during compilation
- Declarations tell what variables (mostly) to be used
 - How much memory to allocate for variables
 - How to interpret stored sequence of bits
- Instructions tell what computer (or Mr. Dumbo) should do
 - By sequencing instructions carefully, we can get computer to do highly non-trivial tasks efficiently
 - Art of Programming !!!





- Simplest programs: linear sequence of instructions
 - Computer executes instructions in linear order

; used to separate one executable statement from next



- Simplest programs: linear sequence of instructions
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- All variables must be declared before being used
- Executable statements executed in sequence from "top" to "bottom"
- If a statement changes value of a variable, and a "later"/"below" statement refers to the variable, it sees the changed value
- Executing a "return" statement returns control back to the caller (function/OS)
 - Subsequent statements not executed



• Given a problem:

"Given two integers A and B, find if B divides A?"

- Think of sequence of steps you would take if solving by pencil-and-paper
 - Find the remainder of A on division by B
 - If remainder is 0, then B divides A, otherwise not
- Think in terms of program statements seen so far
 - Can we sequence them in a linear order to do the same thing as we did on pencil-and-paper?
 - We didn't learn to conditionally execute "If then ...", have we?



- We haven't learnt to conditionally execute instructions
 - But could there be a way to solve our problem by a linear sequence of instructions?
- How about
 - Calculate remainder R of A divided by B
 R = A % B
 - Set a boolean flag to true if R equals 0 and to false otherwise flag = (R == 0);
 - Output flag

flag is true if and only if B divides A

A Simple C++ Program



```
#include <iostream>
                                 Note the importance of the sequence:
using namespace std;
                                 What happens if we swap the order of
// Program to find if B divides A
                                R = A%B and dividesFlag = (R == 0)?
int main() {
 int A, B, R; // Variable declarations
 bool dividesFlag; // Variable declarations
 cout << "Give A and B: " << endl;
 cin >> A >> B;
 R = A % B; // Remainder of A divided by B
 dividesFlag = (R == 0); // Is the remainder 0?
 cout << "Does B divide A? " << dividesFlag << endl;
 return 0;
```





- Sequential execution of statements in C++ programs
- Problem solving by programming
 - Without conditional execution of statements, we are handicapped
 - Still, some interesting problems can be solved by sequential execution of programs