

Introduction to C and C++

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Thinking like a Computer Scientist

Computer Scientists...

- Use formal languages to denote ideas
- Design things, assembling components into systems
- Observe the behaviour of complex systems, form hypotheses, and test predictions

Thinking like a Computer Scientist

What's the most important skill
for a Computer Scientist?

Algorithms

- Step-by-step lists of instructions to solve a problem
- Can be represented in a specific notation (programs)
- Can be executed automatically by a computer

Programs

- Sequences of instructions that describes a computation
- Basic instructions include:
 - Input/output
 - Mathematical and logical operations
 - Conditional execution (if-then)
 - Repetition

Let's write an algorithm!

Compute the sum
of all even numbers
in a given list

Our algorithm... in C++

```
1  const int n = 10;  
2  int x[n] = {0, 1, 1, 2, 3, 5, 8, 13, 21, 34};  
3  
4  int result = 0;  
5  for (int i = 0; i < n; i++)  
6  {  
7      if (x[i] % 2 == 0)  
8      {  
9          result += x[i];  
10     }  
11 }
```

What is C++?

C++ is...

- A general-purpose programming language
- Imperative (like C) but also object-oriented
- Designed for performance and flexibility
- Standardised by ISO

Why C++?

- Widely used
- Fast and portable
- Many libraries (especially for scientific computing)
- Full access to existing C and FORTRAN code

Compiling and running

You'll need...

1. A **text editor** (or **IDE**) to write code in
2. A **compiler** to turn what you write into machine code

Hello world!

```
1  #include <iostream>
2
3  using namespace std;
4
5  int main()
6  {
7      // Print "Hello world" to standard output
8      cout << "Hello world!" << endl;
9      return 0;
10 }
```

Semicolons everywhere

Don't forget the semicolon;

- Semicolons denote the end of a statement;
- If you wanted, you could put all your code on a single line;
- That's why the compiler needs semicolons;