# Welcome to Programming Fundamentals with C++

This course is designed to teach you the fundamental concepts of programming using C++. We'll explore problem-solving methodologies and build a solid foundation for your programming journey. Get ready to design, analyze, and decompose complex problems!

# Course Overview: Mastering C++ Fundamentals

This course aims to master fundamental programming concepts using C++. We'll cover key topics, grading, and the schedule. There are helpful resources such as textbooks and online platforms like tutorials point and w3schools.

## Versatility

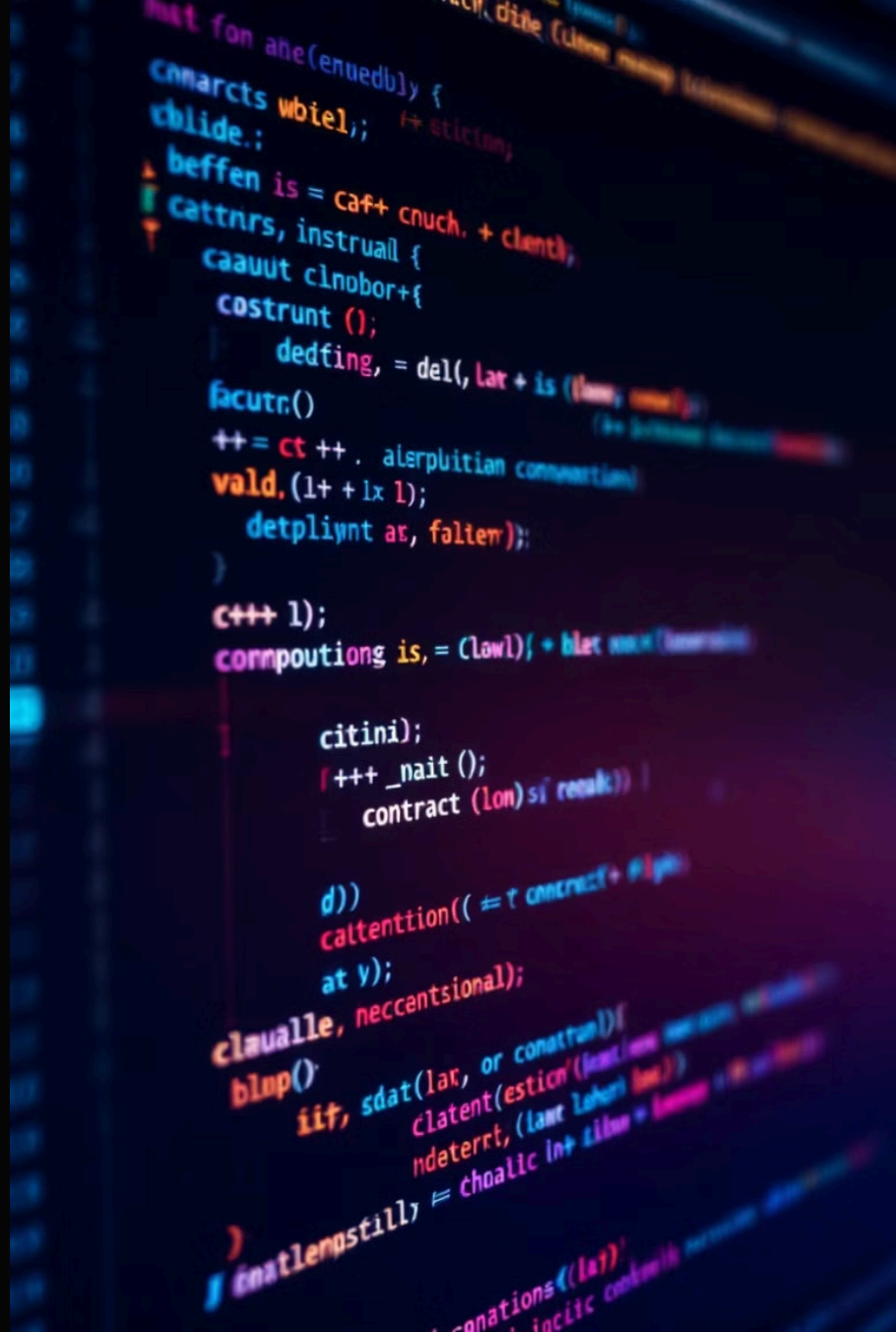
Highly versatile language

## Performance

Excellent performance

## Relevance

Industry relevance



# The Problem-Solving Methodology

A step-by-step guide to solve any problem.

1

## Define

Clearly state the problem

2

## Analyze

Understand constraints

3

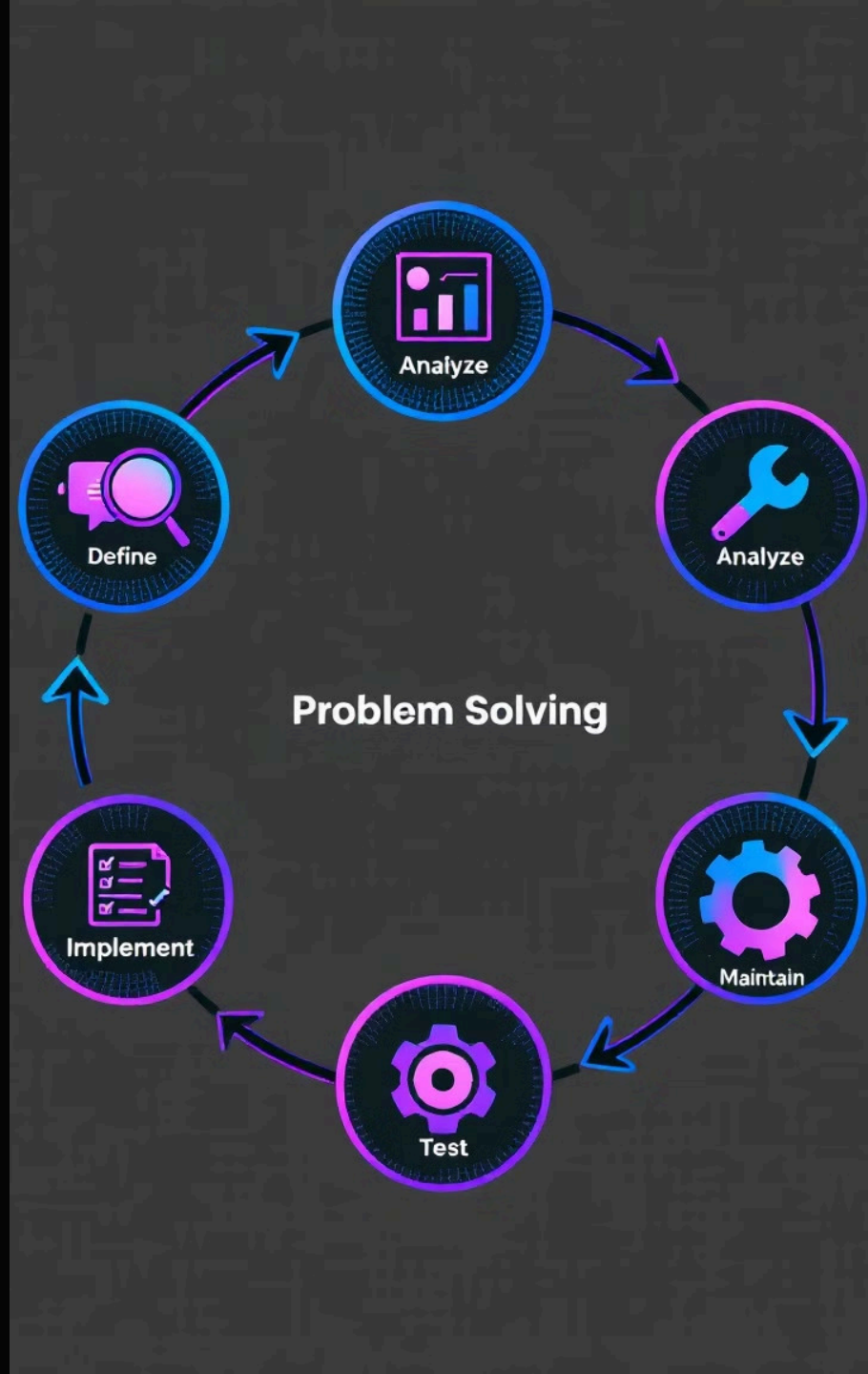
## Design

Develop a logical plan

4

## Implement

Translate into C++ code



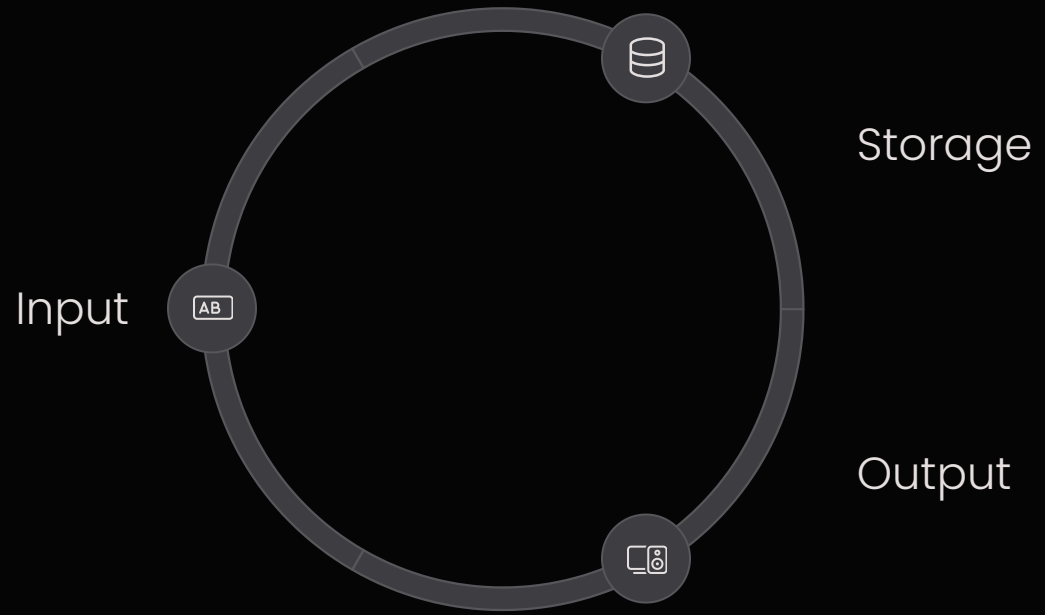

# Design: Crafting Solutions with Algorithms

An algorithm is a step-by-step procedure for solving a problem. A good algorithm needs clarity, efficiency, and correctness. Here's the algorithm for calculating the area of a triangle given its base and height.

1. **Base Input**
   Get the base of a triangle
2. **Height Input**
   Get the height of a triangle
3. **Calculate**
   Multiply base by height then divide by 2

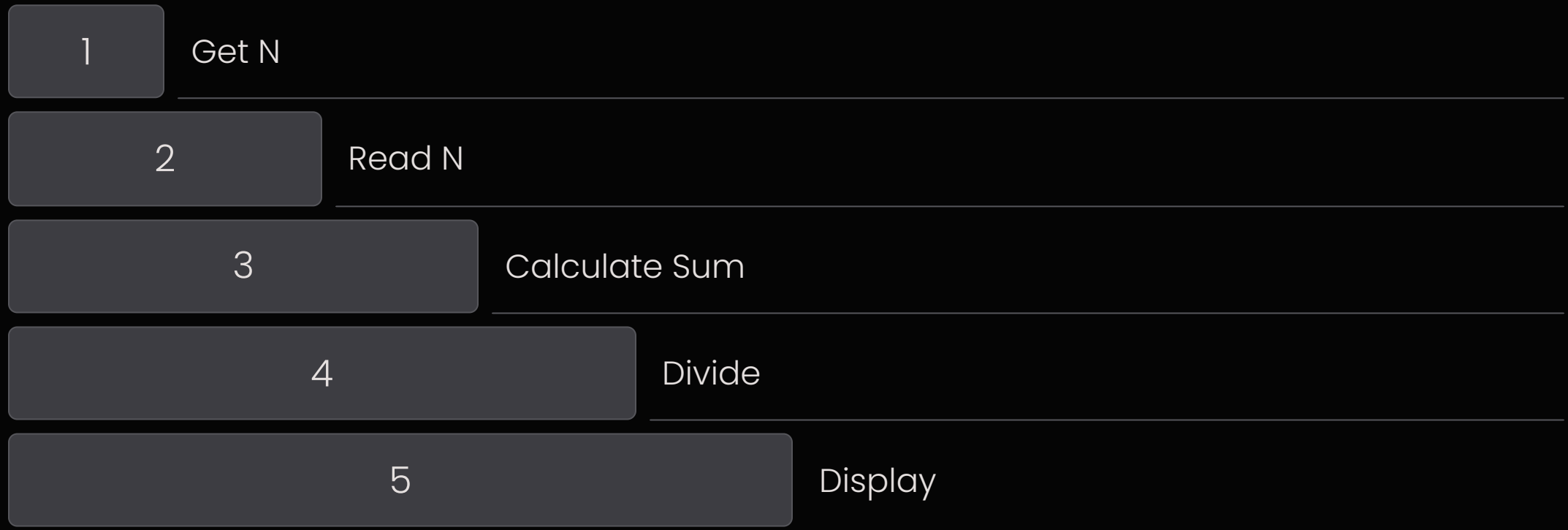
# Analyze: Breaking Down Complex Problems

Decompose complex problems into smaller, manageable sub-problems, such as building a calculator app with components like input, storage and output. Simplifies development, enhances maintainability, and facilitates teamwork.



# Decompose: Calculating the Average

Write a program to calculate the average of N numbers.



# Algorithms: The Heart of Programming Logic

A finite sequence of well-defined instructions to solve a specific problem. They must be unambiguous, feasible, and produce the correct output.

## Sorting

- Bubble sort
- Insertion sort

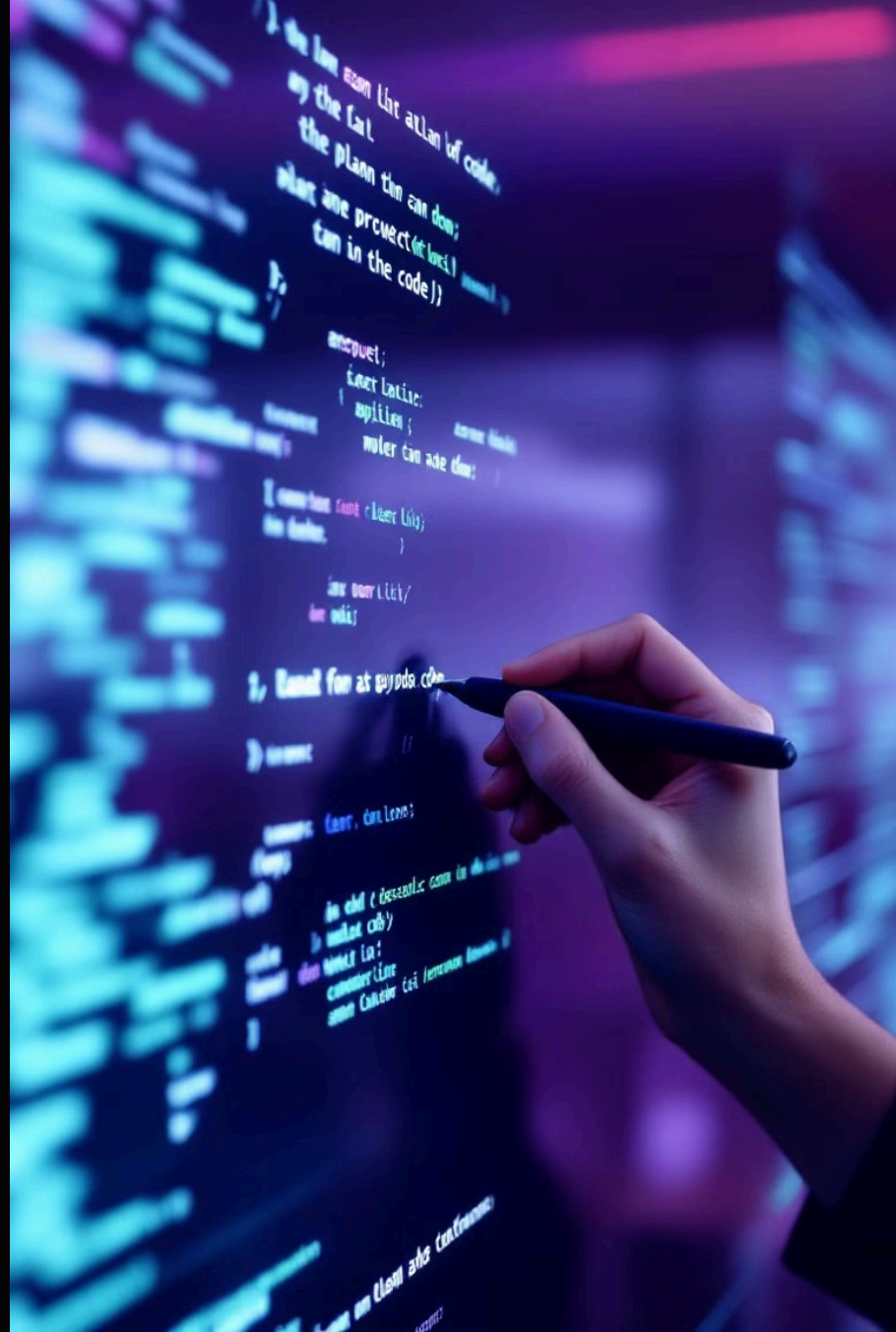
## Searching

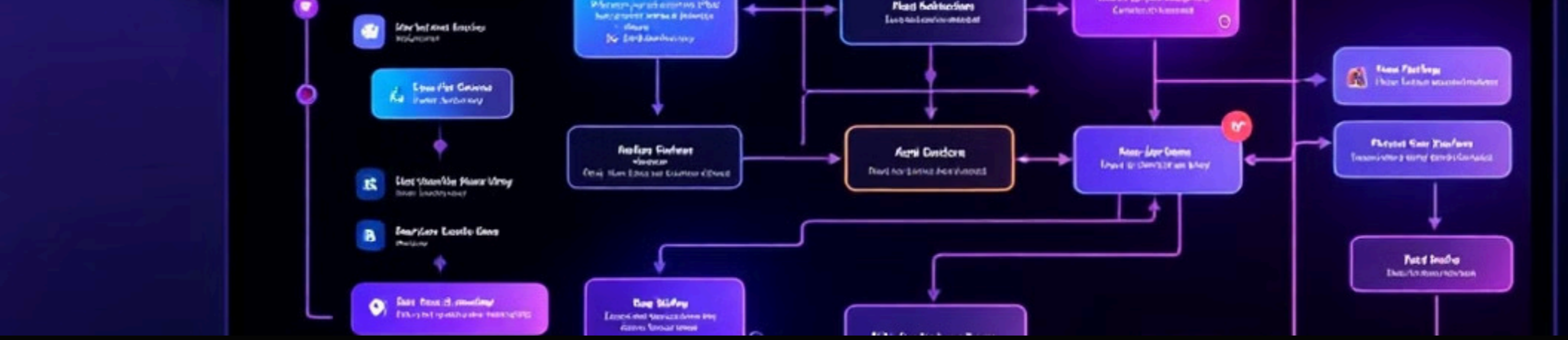
- Linear search
- Binary search

# Pseudocode: Bridging the Gap to Code

An informal, high-level description of an algorithm. It outlines the logic of a program before writing actual code, making it easier to understand, facilitate communication, and helps in debugging.

```
Input: array A of numbers
max = A[0]
for each element in A:
    if element > max:
        max = element
Output: max
```





# Flow Charts: Visualizing the Process

A diagram that uses symbols to represent the steps of an algorithm. It's easy to visualize the flow of control and helps in identifying logical errors.

Start/End

Process

Decision

# Week 1 Recap & Looking Ahead

Key takeaways: Problem-solving methodology, algorithms, pseudocode, and flow charts. Next up are the C++ basics: Variables, data types, and operators. Implement simple algorithms in C++ to reinforce concepts.

### C++ Basics

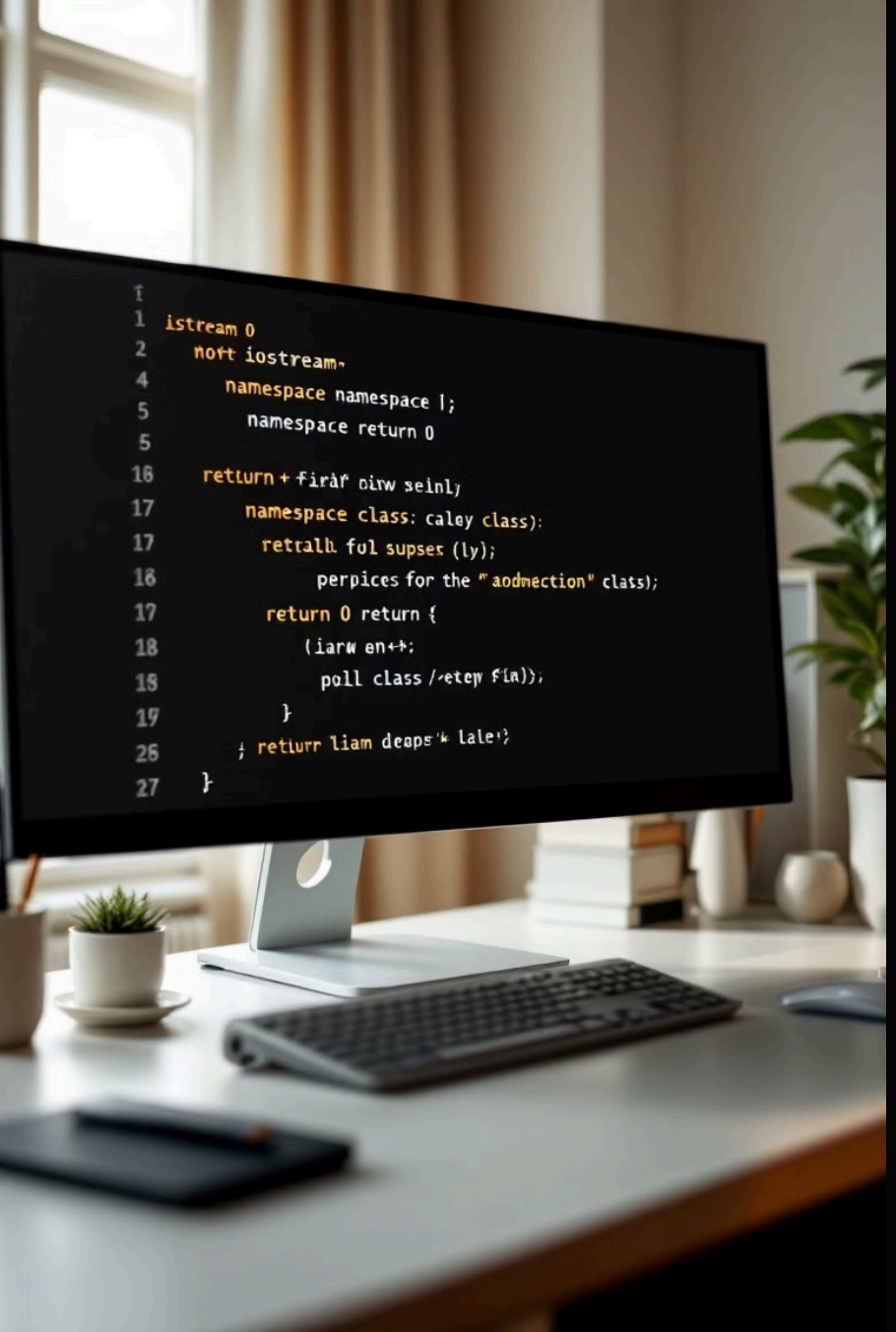
Variables, data types

### Practice

Implement algorithms in C++

### Next Week

Diving into C++ syntax



# Programming Fundamentals: C++

Welcome to Programming Fundamentals! This presentation covers the history of C++, basic program structure, and essential elements like directives and comments. We'll also explore output methods and manipulators. Let's begin our journey into the world of C++.

# The History of C++

C++ evolved from "C with Classes" in 1983. Bjarne Stroustrup sought efficiency and flexibility. The language added object-oriented features. It had its first ISO standard in 1998. C++ continues to evolve with new standards.

1. 1979
   C with Classes
2. 1983
   Becomes C++
3. 1998
   C++98 Standard
4. 2011 Onward
   Modern Updates

# Compilers vs. Interpreters

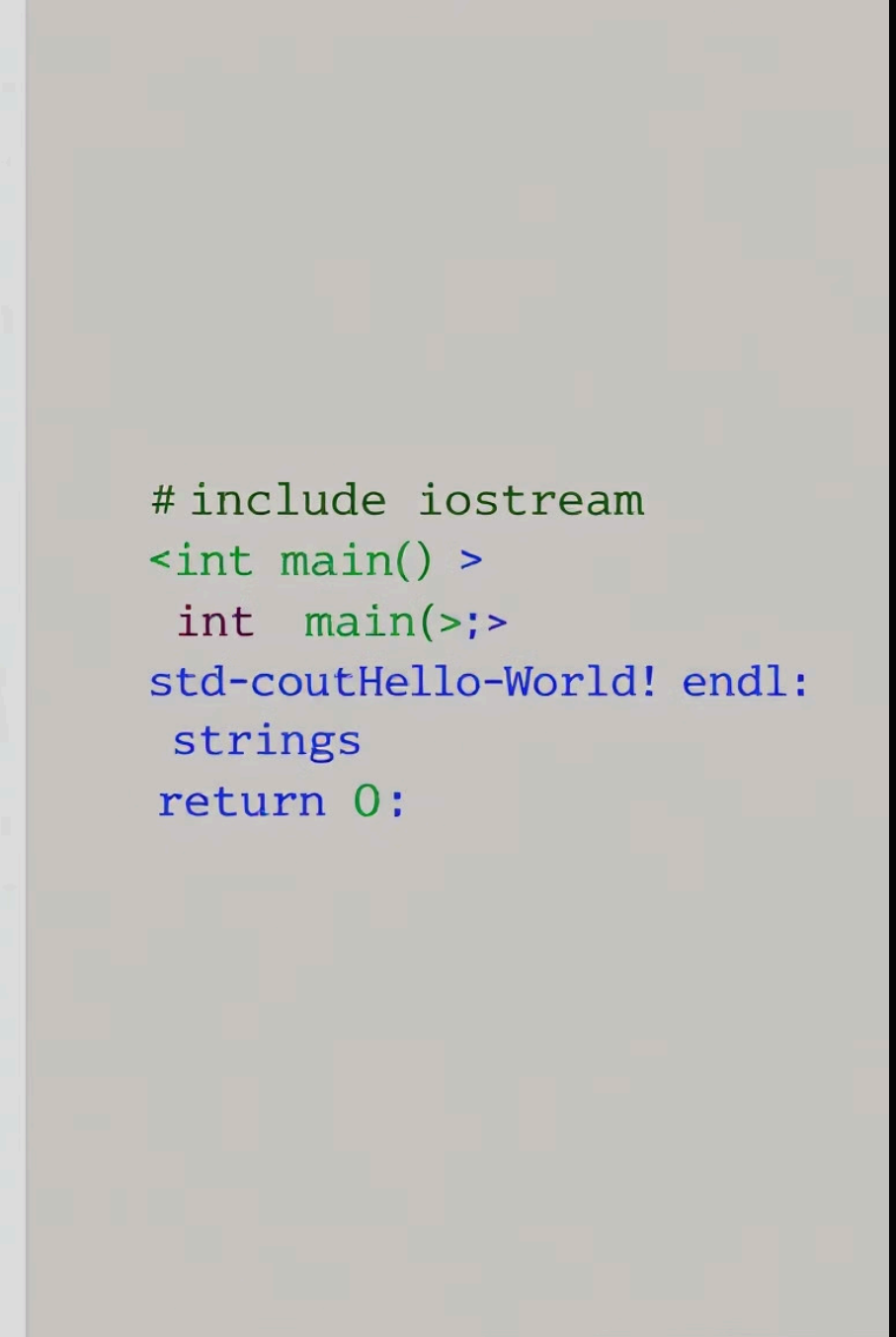
C++ employs compilers to translate code into machine code before execution. This leads to faster execution speeds. Interpreters translate and execute code line by line. C++ is typically a compiled language.

## Compilers

- Translates the entire code at once
- Faster execution
- Examples: g++, Clang

## Interpreters

- Translates line by line
- Easier debugging




# Basic C++ Program Structure

Let's explore the structure of a simple C++ program. This structure includes directives, comments, output using "cout", escape sequences, setw, endl, and manipulators. Understanding this structure is crucial for writing C++ code.

```
#include <iostream>

int main() {
  // This is a comment
  std::cout << "Hello, World!" << std::endl;
  return 0;
}
```