



Object-Oriented Programming in C++

Textbook



- ▶ C++ How to Program (Early Objects Version) (9th Edition) (Deitel, How to Program) by Paul Deitel and Harvey Deitel





Procedural Programming

- Computer languages deal with two concepts—**data** and **algorithms**.
 - The **data** constitutes the information a program uses and processes.
 - The **algorithms** are the methods the program uses.
- In procedural languages such as C
 - Data and algorithms are separated.





► Example:

```
struct StackType  
{int StackEntries[20];  
  int StackPointer = 0;  
};
```

```
StackType stack;
```

```
void push(stackptr)  
{... access stack ...}
```

```
void pop(stackptr)  
{... access stack ...}
```

- The stack is merely a collection of data.
- Any program unit accessing the stack would have to contain the algorithms for performing the required manipulations.

=> Pool software-reusability, especially for large systems!





Object-Oriented Programming

- A software system is viewed as a collection of objects of different abstract data types (or classes).
- The stack example

```
define abstract data type StackType to be  
{int StackEntries[20];  
  int StackPointer = 0;  
  procedure push(value)  
    {StackEntries[StackPointer] ← value;  
     StackPointer ← StackPointer + 1;  
    }  
  procedure pop . . .  
}
```





Objects and Classes

- ▶ **Object:** Active program unit containing both data and procedures
- ▶ **Class:** A template from which objects are constructed

An object is called an **instance** of the class.





C++ Language

- ▶ Bjarne Stroustrup designed and implemented the C++ programming language at Bell Labs.
- ▶ The name C++ comes from the C increment operator ++, which adds one to the value of a variable.
 - Stroustrup added **OOP features** and **generic programming** support to C without significantly changing the **C component**.
 - Thus C++ is a superset of C, meaning that any valid C program is a valid C++ program, too.

