C++ Programming Language

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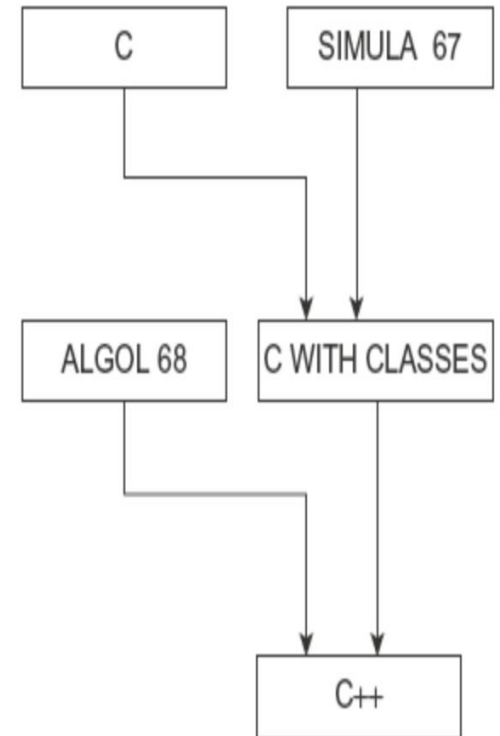-Ryan Buraus
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Agenda

- The history and the evolution, paradigms
- TIOBE index and Google Trends
- Use of C++ and programming problems
- Main features of C++
- Features specific to C++
- Code and the output
- References

History and Evolution

- The Stimula 67 language[1979]
- C with classes
- Cfront - a self hosting compiler
- C++[1983]
- Commercial product, Book.[1985]
- Borland's Turbo C++ launch['90]
- C++98/ISO std published[1998] and C++03 Respond queries['03]
- Released Technical Report['05]
- New C++ std[mid-2011]
- C++14[2014]
- C++17[2017]
- C++20… Being developed!!!!

Evolution of C++

Paradigms of C++

- What are paradigms??
- A multi-paradigm language
- C++ Programming Paradigms:
    1. Procedural
        - Procedure in terms of underlying machine model
    2. Object Oriented
        - Classes + Object
    3. Parallel Processing
        - Use of processors

TIOBE Index for C++

TIOBE Index for C++

Source: www.tiobe.com

Interest by Region – Google Trends

Interest by region ⓘ

Use of C++ in the Industry

- *Compilers*:

  - Compilers used to develop languages such as Java and C# are mainly written in C++

- *Databases*:

  - Used to develop database software such as MySQL and Postgres

- *Graphics*:

  - Used in building real-time, image processing, mobile sensor applications, as well as visual effects

- *Libraries*:

  - ML libraries, such as Tensorflow, use C++ in the backend because of its speed

- *Web browsers*:

  - Used to develop rendering engines of various web browsers

Programming Problems

It's intended for programming problems that require:

- scalability
- exception handling
- compatibility with C
- function overloading
- classes and inheritance
- control over the memory
- reusable and maintainable code

Important Features of C++

- ***Object-oriented***:
  - It follows the concepts of OOP such as polymorphism, inheritance, encapsulation, abstraction

- ***Rich library support***:
  - Through C++ (STL) many functions are available like sets, maps, hash tables, etc. that help in quickly writing code

- ***DMA (Dynamic Memory Allocation)***:
  - Since C++ supports the use of pointers, it allows us to allocate memory dynamically

Important Features of C++

- *Compiled*:
  - C++ compiles directly to a machine's native code

- *Portable*:
  - C++ has a wide range of compilers that run on many different platforms that support it
  - Code that exclusively uses C++'s standard library will run on many platforms with few to no changes

- *Compiler-based and speed*:
  - C++ is compiler-based, hence, it is much faster than other programming languages

Features specific to C++ –Auto

```cpp
#include <bits/stdc++.h>
using namespace std;

int main()
{
    auto x = 4;
    auto y = 3.37;
    auto ptr = &x;
    cout << typeid(x).name() << endl
        << typeid(y).name() << endl
        << typeid(ptr).name() << endl;
    return 0;
}
```

Code

- Let's take an example of insertion sort!!
- IDE used: repl.it
- **CODE**:

```cpp
#include<iostream>
using namespace std;
int main()
{
    int i,j,n,temp,a[30];
    cout<<"Enter the number of elements:";
    cin>>n;
    cout<<"\nEnter the elements\n";
    for(i=0;i<n;i++)
    {
        cin>>a[i];
    }
    for(i=1;i<=n-1;i++)
    {
        temp=a[i];
        j=i-1;
        while((temp<a[j])&&(j>=0))
        {
            a[j+1]=a[j];    //moves element forward
            j=j-1;
        }
        a[j+1]=temp;    //insert element in proper place
    }
    cout<<"\nSorted list is as follows\n";
    for(i=0;i<n;i++)
    {
        cout<<a[i]<<" ";
    }
    return 0;
}
```

References

- DATAFLAIR, T. (2019). *Features of C++ | How Programmers use C++ in 10 Unbelievable ways - DataFlair*. [online] DataFlair. Available at: https://data-flair.training/blogs/features-of-c-plus-plus/ [Accessed 20 Sep. 2019].
- A. Goel, "C Language: Features, Uses, Applications & Advantages," Hackr.io, 2019. [Online]. Available: https://hackr.io/blog/features-uses-applications-of-c-plus-plus-language. [Accessed: 20-Sep-2019].
- "Introduction of Programming Paradigms," *GeeksforGeeks*, 12-Oct-2018. [Online]. Available: https://www.geeksforgeeks.org/introduction-of-programming-paradigms/. [Accessed: 17-Sep-2019].
- "Insertion Sort in C & C - Program & Algorithm," *The Crazy Programmer*, 17-Aug-2015. [Online]. Available: https://www.thecrazyprogrammer.com/2014/12/insertion-sort.html. [Accessed: 18-Sep-2019].
- "History of C ," *cplusplus.com*. [Online]. Available: http://www.cplusplus.com/info/history/. [Accessed: 20-Sep-2019].