

A review paper of comparative analysis of C and C++ language and its applications

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Abstract - As C is such a compelling and most useful programming language in PC. It is a fundamental of the various elevated level dialects and created by Mr. Dennis Ritchie in the mid 1970s. It is a framework execution language for the incipient UNIX working framework. It is gotten from the sort less language BCPL. The expansion in standard ANSI C i.e., including idea of classes, object, and so forth built up another dialect known as Objective-C. Following hardly any year's C adjusts a few highlights of Objective-C and a language appear known as C with classes, later it is known as C++. This paper is a survey of C and C++ dialects, intensity of one language to another and similar investigation of the dialects and its applications utilized in different field.

Keyword: ANSI, iOS, API, PHP, ADA, JAVA

I. INTRODUCTION

There are 2 types of languages in computers such as HLL and LLL. HLL can be termed as high level language and other of low level language. Examples of high level languages are C, C++, BASIC, FORTRAN, COBOL, ADA, LISP, PROLOG, PASCAL etc. All these languages are based upon compiler and in other LLL are based upon Assembler. This paper is about the examination of the C, Objective C and C++ programming language, the impacts of one language on another and the conditions under which they were made. C is a broadly useful programming language at first created by Dennis Ritchie somewhere in the range of 1969 and 1973 at Bell labs. Its structure gives develops that map proficiently to common machine guidelines, and along these lines it discovered enduring use in applications that had in the past been coded in low level computing construct, most prominently framework programming like the Unix PC working framework. In 1989 the Institute distributed the standard ANSI X3.159-1989 "Programming Language C" (by and large called "ANSI C" or "C89"). The Objective-C language is a basic scripting language intended to empower complex article situated programming. Objective-C is characterized as a little however incredible arrangement of augmentations to the standard ANSI C language. Its increments to C are generally founded on Smalltalk, one of the primary item situated programming dialects. Objective-C is intended to give C full item arranged programming capacities, and to do as such in a basic and direct manner. It is the fundamental programming language utilized by Apple for the OS X and iOS working frameworks and their individual APIs, Cocoa and Cocoa Touch. Initially created in the mid 1980s, it was chosen as the principle language utilized by NeXT for its

NeXTSTEP working framework, from which OS X and iOS are inferred. Nonexclusive Objective-C programs that don't utilize these libraries can likewise be arranged for any framework upheld by GCC or Clang. C++ is a statically composed, freestyle, multi-worldview, assembled, universally useful programming language. It is viewed as a moderate level language, as it involves a mix of both elevated level and low-level language highlights. Created by Mr. Bjarne Stroustrup Beginning in 1979 at Bell Labs, it includes object arranged highlights, for example, classes, and different improvements to the C Programming language and the target c programming language. Initially named C with Classes, the language was renamed C++ in 1983.[1]

II. HISTORY

The underlying improvement of C happened at Bell Labs AT&T Bell, USA 1973; as per Ritchie, the most imaginative period happened in 1972. It was named "C" since its highlights were gotten from a prior language called "B", which as indicated by Ken Thompson was a stripped-down rendition of the BCPL programming language. [9] K&R C In 1978, Brian Kernighan and Dennis Ritchie distributed the main version of The Language.

2.1 OBJECTIVE-C

Objective-C was made principally by Brad Cox and Tom Love in the mid 1980s at their organization Stepstone. Both had been acquainted with Smalltalk while at ITT Corporation's Programming Technology Center in 1981. Cox was charmed by issues of genuine reusability in programming plan and programming. He understood that a language like Smalltalk would be priceless in building improvement conditions for framework designers at ITT. [2] Cox started composing a pre-processor for C to include a portion of the abilities of Smalltalk. He before long had a working execution of an article situated expansion to the C language, which he called "OOPC" for Object-Oriented Pre-Compiler.[3] Love and Cox in the long run shaped another endeavor, Productivity Products International (PPI), to market their item, which coupled an Objective-C compiler with class libraries. In 1986, Cox distributed the fundamental portrayal of Objective-C in its unique structure in the book Object-Oriented Programming, An Evolutionary Approach.

2.2 C++

C++ is simply founded on Oops Concept and created Mr. Bjarne Stroustrup at Bjarne slope, California and found that Simula had highlights that were exceptionally useful for

enormous programming improvement; however the language was excessively delayed for functional use, while BCPL was quick yet too low-level to be reasonable for enormous programming advancement. When Stroustrup began working in AT&T Bell Labs, he had the issue of breaking down the UNIX part regarding appropriated figuring. Recalling his Ph.D. experience, Stroustrup set out to upgrade the C language with Simula-like highlights. C was picked on the grounds that it was universally useful, quick, compact and broadly utilized. Other than C and Simula, some different dialects that enlivened him were ALGOL 68, Ada, CLU and ML. In 1983, the name of the language was changed from C with Classes to C++ (++ being the augmentation administrator in C). New highlights were included including virtual, work name and administrator over-burdening, references, constants, client controlled free-store memory control, improved sort checking, and BCPL style single-line remarks with two forward slashes like this // and multiple lines may be used as /*.....*/ for the purpose of remarks.

III. INFLUENCES

Language of CC is impacted by dialects like Assembly, B (BCPL, CPL), ALGOL68, FORTRAN i.e., these dialects helped in creating C. C is the parent language of numerous different dialects or for the most part of the considerable number of dialects. Numerous later dialects have obtained straightforwardly or in a roundabout way from C, Counting: C#, D, Go, Java, Java Script, Limbo, LPC, Perl, PHP, Python, and Unix's C Shell. The most inescapable effect on these dialects has been grammatical, and they will in general consolidate the conspicuous articulation and explanation language structure of C with hidden kind frameworks and information models that can be drastically extraordinary. Objective-C is affected by C, Smalltalk. It is an incredible arrangement of augmentations to the Standard ANSI C Language. It is planned and created to give C full article arranged programming capacities and to do as such in a basic and clear way. JAVA, Objective-J and different dialects have a few highlights of it. C++ is impacted by C, Simula, Ada, and so on. C adjusts the highlights of classes, legacy, and so forth from Objective-C. C++ is right off the bat known as C with classes, later it gets its name C++. JAVA, ADA, PHP, C99, C# dialects are impacted by it.

IV. COMPARATIVE ANALYSIS

In early occasions programming or coding is finished with the assistance of twofold digits. All the characters have their parallels. In those days coding is troublesome in light of the fact that all the coding is done on twofold or in low level computing constructs. In these dialects memory register is straightforwardly utilized so recollecting all the register names and orders and paired qualities isn't a simple work. On the off chance that any progressions a software engineer needs to do in that program, at that point doing changes is considerably more upsetting from making another program. So developers require a language which limits their undertaking and make coding simpler for them. After some time C Language was

inferred in 1970's the motivation behind finding this language is to make programming simpler for developer. In C Language basic English is utilized for coding. No pairs just as no compelling reason to recall the name of register. In C Language linguistic uses are written in basic language which is straightforward just as to recollect. C Language is gotten from or affected structure the Assembly Language so it is machine arranged or machine subordinate i.e., the program can just spat that framework on which it is plan. It can't be port to whatever other framework which is having diverse arrangement from the framework on which it is structure. Other issue is that C Language is procedural language i.e., it has its set principle for characterizing and announcing all the factors, capacities, and so on... For instance first line of void primary () is constantly utilized for variable presentation. All the factors are just proclaimed in this line just not else anyplace in the program. By creating C Language issue of composing language is tackled yet now some new issues are emerges. To defeat these issues another dialect is determined in 1980's that are Objective-C Language. Objective-C Language is object situated language. In this language no guidelines are portrayed. In this language there are no principles for name of variable, for announcing factors or for carrying out any responsibility. In this language printing is done just by composing the sentence in square sections. In this language all the work is done in classes that why it an article situated language. Be that as it may, this language isn't anything but difficult to learn or comprehend in light of the act that in this there are no set rules for characterizing any factor or capacity. In any case, the benefit of this language is that it gives the idea of items. By utilizing programming turns out to be simple. To conquer issues of Objective-C language new dialect is determined in 1980's. With an idea of item arranged and some predefined rules or functionalities a language is structured known as C with classes.

Table 1: Comparison of Different Languages with Objectives

BASIC	C	Objective C	C++
Paradigm	Procedural language	Class based Object Oriented and Reflective	Multi-paradigm, Procedural, Object Oriented
Appeared in	1972	1983	1985
Designed by	Mr. Dennis Ritchie	Brad Cox & Tom Love	Bjarne Stroustrup
Approach used	Top Down Approach	-----	Bottom Up approach
Extension in File name	.c, .h	.h, .m, .mm	.h, .hh, .cpp, .hpp, .cxx, .c++

Later this language gets its first name i.e., C++. C++ is a language which is semi-reliant on machine and which is straightforward. C++ is unique in relation to C in terms of sentence structures, header documents, a few principles and a lot more things. For instance: - In C on the off chance that arrival kind of primary () is proclaimed whole number (int) at that point return watchword must be utilized to restore a worth however in C++ no compelling reason to utilize bring catchphrase back. C++ utilizes the protested situated ideas that why it is otherwise called Object Situated Programming Language. In this language all the work is done in classes so making changes are a lot simpler from C language.

V. APPLICATIONS

There are various applications of C and C++ used in different areas, out of which few applications are listed below:

- **Games:** C++ is close to the hardware, can easily manipulate resources, provide technical programming over CPU intensive functions and is fast. It is also able to override the complexities of 3D games and provides multilayer networking. All these reimbursement of C++ make it a primary choice to develop the gaming systems as well as game expansion suites.
- **GUI Based Applications:** C++ may be used to develop most of the GUI based and desktop applications easily as it has got the required features. **Some examples of GUI based applications, written in C++, are as follows:**

a) Adobe Systems



Most of the applications of the Adobe systems including Illustrator, Photoshop, etc. are developed using C++.

b) Win Amp Media Player



Win amp media player from Microsoft is well-liked software that has been catering to all our audio/video needs for decades now. This software is developed in C++.

c) **Database Software:** C++ is also used in writing database management software. The two most popular databases MySQL and Postgres are written in C++.

d) **MYSQL Server:** MySQL, one of the mainly popular database software i.e. used extensively in a lot of real-world applications is written in C++. This is the world's most popular open-source database. This database is written in C++ and is used by most of the organizations.



e) **Operating Systems:** The fact that C++ is a sturdily typed and fast programming language makes it an ideal candidate for writing operating systems. In addition to this, C++ has a wide composed works of system-level functions that also help in writing low-level programs.

f) **Apple OS:** Apple Operating System has a little of its parts written in C++. Similarly, some parts of the iPod are also written in C++.



g) Microsoft Windows OS



Most of the software from Microsoft is developed using C++. Applications like Windows 95, ME, 98; XP, etc. are written in C++. Apart from this, the IDE Visual Studio, Internet Explorer, Microsoft Office are also written in C++.

h) **Browsers:** Browsers are mostly used in C++ for rendering purposes. Rendering engines need to be faster in execution as most people do not like to wait for the web page to be loaded. With the fast performance of C++, most browsers have their rendering software written in C++. [8]

i) **Mozilla Firefox :** Mozilla internet browser Firefox is an open-source project and is developed entirely in OOPs based language like C++.



J) **Thunderbird:** Just like the Firefox browser, the email client from Mozilla, Thunderbird is also developed in C++. This is also an open-source project.



k) **Google Applications**



Google applications like Google File System and Chrome browser are written in C++.

L) **Compilers:** Compilers of various high-level programming languages are written either in C or C++. The reason is that both C and C++ are low-level languages that are close to hardware and are able to program and manipulate the underlying hardware resources

M) **Embedded Systems:** Various embedded systems like smartwatches, medical equipment systems use C++ to program as it is closer to the hardware level and can provide a lot of low-level function calls when compared to the other high-level programming languages.

N) **Enterprise Software:** C++ is used in developing many enterprise software as well as advanced applications like flight simulation and radar processing.

C++ is faster than most of the other programming languages and also supports multithreading with concurrency. Thus in Applications where the speed along with concurrency is required, C++ is the most sought-after language for development. Apart from speed and performance, C++ is also close to hardware and we can easily manipulate hardware resources using C++ low-level functions. Thus C++ becomes the obvious choice in the applications that require low-level manipulations and hardware programming.

In above we have studied about the various applications of C++ language as well as software programs that are written in C++ that we as software professionals use every day. Though C++ is a tough programming language to learn, the range of applications that can be developed using C++ is simply astonishing. [8]

VI. CONCLUSION

This paper studies about the languages, their history, and influence of one language to another. The purpose of developing C Language is to give programmer a coding friendly language. But this language has some drawbacks also. To overcome these drawbacks new language Objective-C is derived. It is influenced by C. Objective-C also has some issues to overcome these issues C++ is derived. It has features of C and Objective-C both. Since all these languages are derived from one another but they have some dissimilarity also.

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