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PROGRAMMERS LIFE MADE EASY THROUGH SMART SOURCE CODE GENERATOR

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Abstract

Smart Source Code Generator is an application that allows the user to generate code for C language. In this paper we implement a tool that generates source code for C language automatically. It is specially introduced to make work simple for thedevelopers or learners. It can only be used by the developer or learner to generate a code. Theuserof this application need not remember the syntax for developing the program,rather the usercanconcentrate only on the logic for solving the problem.

Key terms: Source Code generation, Software Engineering, Tool development

1. Introduction

Being a Programmer is tough sometimes. May be you have to repeat the same thing over and over again. Remembering syntax of statements is a challenging task for a programmer especially when the programmer codes in non Integrated Development Environment. Languages like C, C++ always find a place both in learning and in the industries. Though they are considered to be pretty old, they still occupy the leading places in development, placement interviews and learning. The issue in using these languages is that the common editors used for coding these

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languages do not provide a comfortable Intellisense future. Most often this makes the developers and especially the learners who are beginners in programming to struggle a lot in coding. This makes many students to hate coding and give it up totally.This paper presents a smart source code generator which makes the life of a programmer or a student who learns programming easier by generating the source code in C language automatically. The smart source code generator generates the source code which the developer should otherwise have to write.

1.1. Statement of the Problem

Being a programmer is not easy; it is incredibly tricky for some people at least. Students who learn programming struggle so much in trying to cope up with critical thinking, developing the skills of problem solving and at the same time trying to master a language by learning its syntax and semantics. Concentrating on different areas at the same time makes the process of programming a challenging task for many students.The teething problems the students face while learning programming makes them feel so uncomfortable that they tend to drop out programming courses and try to find alternate careers. Most of the students learn C language as their first programming language. They use an editor without Intellisense features for developing the code. This makes them lose interest in programming. They lack their interest for practicing programs which in turn results as a bottleneck in their talent acquisition. Providing a comfortable and intelligent environment would help the students and programmers to concentrate entirely on problem solving and critical thinking. They can proceed with coding without worrying about the syntax. This paper aims toimplement a tool for programming C language that can be used for generating simple programs upto the level of basic file handling. The more complicated syntax and constructs are not within the scope of this project.

1.2. Scope and Limitations

The smart source code generator tool is used to automatically generate the code for C language programs on the click of buttons. This paper aims to implement tools that can be used for generating simple programs in C language upto the level of basic file handling. The more complicated syntax and constructs are not within the scope of this project.The application is a desktop application and cannot be used online. It can only generate code for C language programs.

1.3. Significance of the Study

The main significance of this study is that the code will be generated automatically and the developer does not have to waste his time by typing the source code. Moreover, the user need not remember the syntax for developing the program, rather the user can concentrate only on the logic for solving the problem.

1.4. Operational Definition of Terms in the Study.

Tools are used for accomplishing tasks that are impossible and for facilitating tasks that are difficult to be done. Software engineering tools can be used to facilitate the process of software development. Learning a computer language is a difficult task. It is more difficult than learning a foreign human language. A foreign language can be learnt even with imperfections and a person can manage to communicate with that. But a computer language should be learnt perfectly to do error free programming. The person has to learn not only the statements but also the punctuations. Precision is very important in spelling, case and even punctuations in a programming language. Integrated development environments with intellisense features try to help out these issues but for a student who learns a language, only simple editors are provided for coding. This makes it difficult for the student to learn the art of programming.

2. Review of Related Literature and Studies

2.1 Theoretical Framework of the study

Programming is an art. It is innovating new ideas for solving problems. Programming can never be learnt with any text book content. To learn programming, one has to master the art of problem solving with critical thinking, how to solve a problem logically and also the syntax and semantics of the language. Mastering the art of problem solving is the most critical issue in learning programming. Learning programming is difficult since the student has to concentrate on problem solving, syntax and semantics of the language at the same time. If syntax and semantics are automatically provided by a system, the developer or student can concentrate only on problem solving techniques and solve the problem efficiently. This also helps in removing the bottlenecks in mastering the art of programming.

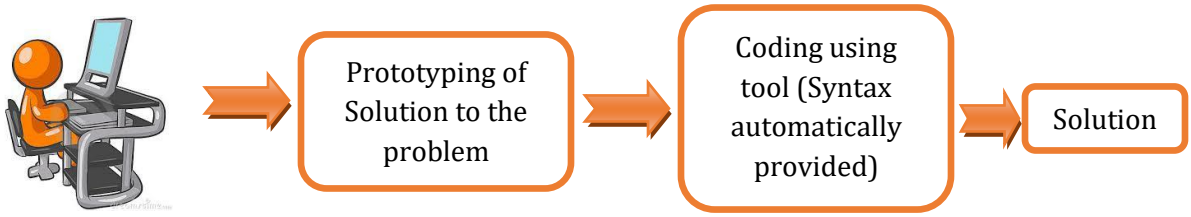

Figure 2.1 Implementation of the Framework

2.2 Implementation of the Framework

The framework is implemented in C#.Net. Developing a programming tool requires a careful analysis of the constructs. Therefore, the constructs of the C programming language are analyzed. The tokens are identified and the constructs or the control structures of the language are also identified. Then the identified tokens and constructs are subject to syntax analysis. The syntax of each of the identified tokens and constructs are considered for the command name, punctuations, the number of parameters and the positions. Then the interface was designed to get input from the developers. The developer just have to choose the tools for the required constructs from the tool box and provide the required input for each of the constructs. After selecting the required constructs the source code will be automatically generated at the click of a button.

2.3 Research Synthesis

3. Methodology

3.1 Research Design

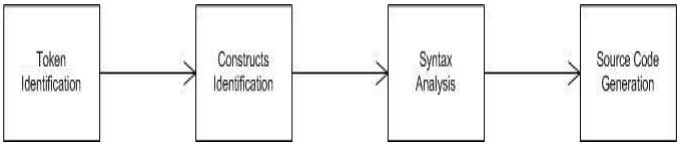

Figure 3.1 Architecture Diagram

A. Tokens Identification

C tokens are building blocks in C language which are constructed together to write a C program. Tokens are the smallest individual unit in a C program.

The different types of tokens are :

1) Identifiers

In C programming language, an identifier is collection of alphanumeric characters, the first will bea letter of the alphabet or an underline, and the remaining any lettersin the alphabet, any numeric digit, or the underline.

2) Constants

Constants are fixed values that the program may not alter during its execution. Constants can fall under any of the basic data types like an integer constant, a floating constant, a character constant, or a string literal.

3) Keywords

Keywords are commands. There are keywords in every programming language that cannot be used as variable names.

4) Variables

Variables are names used to refer to some memory location a place that holds a value with which we are working. It is a placeholder for a value.

5) Data types

Data types are used for declaring variables different types depending upon the values. The type of a variable will determine how much space it occupies in storage

6) Operators

Operators are symbols that tells the compiler to perform specific mathematical or logical functions. C language has many built-in operators.

7) Delimiter

A delimiter is a sequence of one or more characters used to specify the boundary between separate, independent regions in plain text or other data streams. An example of a delimiter is the comma character, which acts as a field delimiter in a sequence of comma-separated values.

8) Arrays

An array is a group of elements having the same data types.

9) Pointers

A Pointer is an address of the data stored in memory.

10) Functions

A function is a group of statements that performs a particular task together. Every C program has one or more functions.

11 Structure

Structure is combination of different variables of different datatypes under a single name for better handling.

11) Union

Unions are the same as structures in C which is also a derived data type. The only difference is in union the keyword is union.

12) Files

In C a file is a place on the disk where a group of related data items are stored.

B. Construct Identification [3] [6]

Construct is a syntactical allowable part of a program that are formed from one or more lexical tokens in accordance with the rules of a programming language.

The types of constructs are:

1) If…else Statement

The if…else statement makes decisions in C programming that is to execute some code and ignore some code depending upon the test expression.

2) Switch case

Switch case is used to move the control to the respective case as per the given condition.

3) break statement

Break statements are used to break the loop and come out of the loop instantly. Whenever compiler finds a break statement inside a loop, the control directly comes out of loop and moves the control to the statement following the loop.

4) Continue statement

Continue statement is mostly used inside the loops. Whenever it is encountered inside a loop, control directly goes to the beginning of the loop for next iteration, skipping the execution of statements inside loop's body for the current iteration.

5) while loop

A while loop in C programming repeats a target statement as long as the given condition is true.

6) do… while loop

A do...while loop is similar to a while loop, except the fact that it is guaranteed to execute at least one time.

7) for loop

A for loop is a repetition control structure that allows you to efficiently write a loop that needs to execute a specific number of times.

Syntax Analysis [2]

1) Variables

Variables are names used to refer to some location in a memory. It is used to print the values. Syntax: type variable_name;

2) Operators

Operators are used to perform certain mathematical and logical operations. The input will be certain values or operations and the output will be the result.

3) Arrays

Array is a collection of homogeneous elements of the same data type with the same name. Input can be in the form of a one dimensional, two dimensional or multi-dimensional matrix. Syntax:

One Dimensional: int array[size];

Two Dimensional: type array_name[row-size][col-size];

4) Pointers

Pointers are used to point to the address of another variable. Input for a pointer will be address of a variable and the output will be the location of the variable. Syntax:

data-type *ptrvar;

5) Functions [6]

A function is a group of statements that together perform a task. The input will be data types and variables. In the output it will perform the operations and give the result. Syntax:

data type name(type1 arg1, ---, type n arg n)

6) Structure

Structure is a collection of variables of different types. It is used for better handling. The input will be structure name and the output will be the details. Syntax:

struct name

```
{       member1;
        member2;
        member n;}
```

7) Union

Union is similar to structure. It is also used for better handling. The only difference is here instead of structure the union name will be used. Syntax:

```
union name
{       member1;
        member2;
        member n;}
```

8) File

File is a place on disk where a group of related data is stored. The input for file will be certain file operations like file read or write. Syntax:

```
FILE *ptrvar;
```

9) If…else

If…else is a statement mainly used for decision making. The input will be some conditions and the output will be the true condition. Syntax:

```
if(expression)
{
}
else(expression)
{
}
```

10) Switch case

Switch case is similar to if but it consists of various cases. The input is two or more cases and the output will be one of the cases. Syntax:

```
switch(expression)
{
case1:
statement(s);
break;
```

```
default:
statement(s);
break;
                }
```

11) While loop

A while loop executes the target statement as long as the given condition is true. The inputs are certain condition statements and the output will be the repeated statements. Syntax:

```
while(condition)
{
                statement;
                variable  increment/decrement;
}
```

12) Do…while loop

Do…while loop is an exit control loop. The input and output are the same as a while loop. Syntax:

```
do
{
                -----
                -----
}
while(condition)
```

13) for loop

A for loop is a control structure for repetition purpose. It allows the code to be repeatedly executed given number of times.

Syntax:

```
for (expression1;expression2;expression3)
{
                 Statement;
}
```

4. Findings of the Study

4.1 Implementations with Screen shots

The application has been developed using C#. It has been used for designing the user interface and developing business logic.

Smart source code generator consists of certain buttons, on the click of those buttons code will be generated and can be executed. It makes work easy for the developer and a learner as they will be able to generate the code easily. The syntax of the code need not be remembered and only the logic has to be known

Sample Screen Shots

Figure 4.1 Toolbar

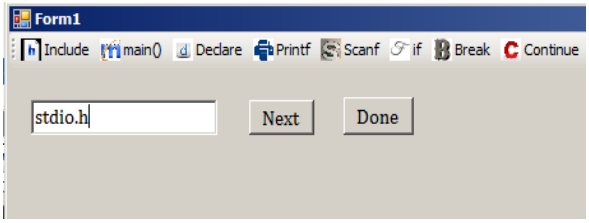

Figure 4.2 Including header file

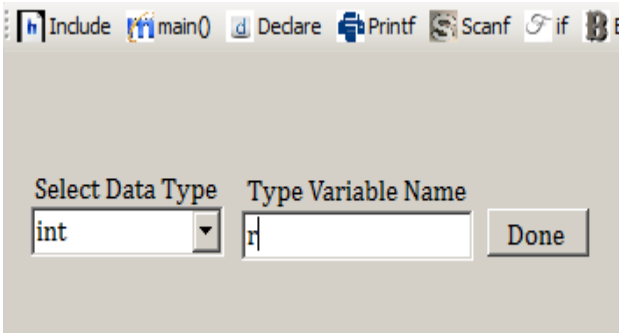

Figure 4.3 Declaration

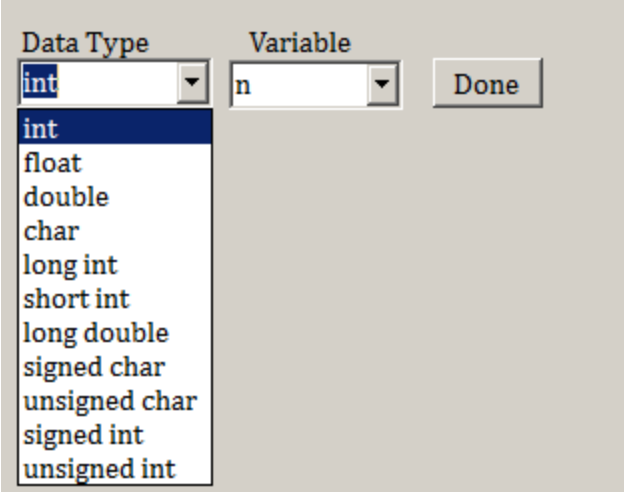

Figure 4.4 scanf

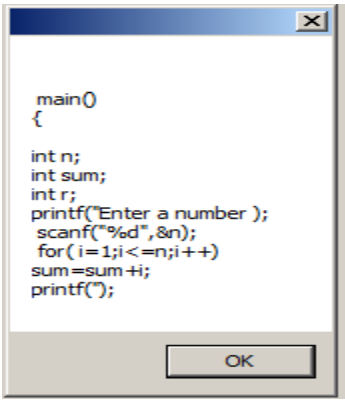

Figure 4.5 Output

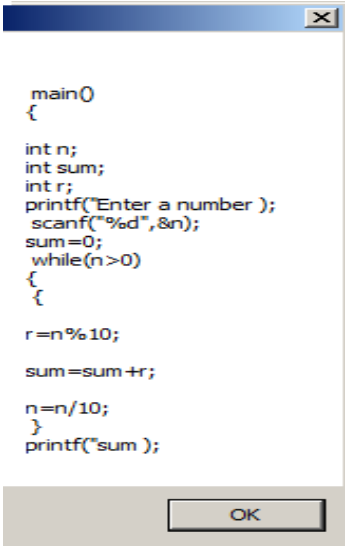

Figure 4.6 Output

5. Conclusions

In this research paper the programmer's life is made easier by just applying the logic without going in depth of the language the Code is generated automatically. This will be very interesting and innovative for the new programmers to understand logic and implement them.

6. Recommendations

The smart source code generator tool is used to automatically generate the code for C language programs on the click of buttons. The primary intended end user of this tool is a software developer or a beginner who learns programming using C language. The user need not type the source code.

This paper aims to implement tools that can beused for generating simple programs in C language up to the level of basic file handling. The more complicated syntax and constructs may be considered as a future enhancement for this work.

References

Websites referred

[1]http://www.tutorialspoint.com/ansi_c/c_introduction.htm

[2] http://perldoc.perl.org/perlsyn.html

[3]http://www.tutorialspoint.com/cprogramming/cprogramming_tutorial.pdf

Research papers

[4] Eman K Elsayed1 and Enas El-Sharawy, Mathimatical and Computer Science Department, Faculty of Science(girls),Al-Azhar University, Cairo, Egypt "High quality implementation for automatic generation c# code by event-b pattern".

[5] Andrew J. Kornecki, SonaJohri, Embry Riddle Aeronautical University, Computer & Software Engineering, "Automatic Code Generation: Model –Code Semantic Consistency".

Books

[6] "The C Programming Language", Brian W.Kernighan, Dennis M. Ritchie, Prentice Hall, (ISBN13: 9780131103627.