Basic Structure of C++

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Basic Components of a C++ Program

- **1. Preprocessor Directives**
  - ⋆ A preprocessor reads your program before it is compiled and only executes those lines beginning with a # symbol. The #**include directive** causes the preprocessor to include the contents of another file, known as header file, in the program.
  - ⋆ The preprocessor inserts the entire contents of the header file into the program at the point it encounters the #include directive.
  - ⋆ e.g.: #**include<iostream>** will include the contents of the <iostream> file in the program, which allows a C++ program to display output on the screen and read input from the keyboard.
- **2. Namespace**
  - ⋆ C++ uses namespace to organize the names of program entities.
  - ⋆ The statement **using namespace std** declares that the program will be accessing entities whose names are part of the namespace called **std**.
  - ⋆ The reason the program needs access to the std namespace is because every name created by the iostream file is part of that namespace. In order for a program to use the entities in iostream, it must have access to the std namesapce.

Basic Components of a C++ Program

- **3. main function**
  - ⋆ Every C++ program must have exactly one main function.
  - ⋆ It is the starting point of the program execution.
  - ⋆ When a C++ program executes, the main function is called by the operating system.
- **4. Console I/O**
  - ⋆ cout
    - * standard output stream
    - * console
  - ⋆ cin
    - * standard input stream
    - * keyboard
- **5. Statements**
  - ⋆ A statement is a complete instruction that causes the computer to perform some action.
  - ⋆ The body of any function is a sequence of statements.
  - ⋆ Statements can be a combination of key words, operators, and program-defined symbols.
  - ⋆ They always end with a semicolon (;)
- **6. Comments**
  - ⋆ Single-line Comments:
    - * two forward slash **//**
  - ⋆ Multi-line Comments:
    - * start with **/*** and end with ***/**

Basic Structure of C++

```
/*************************************************************************
*This program will calcualte the area of a room in square feet
*CSCI-2170 Computer Science II
*Author: Xin Yang
*Date: Aug 10, 2020 (Monday)
*************************************************************************/
#include <iostream>
using namespace std;

int main()
{   //variable declaration
    int room_width = 0, room_length = 0, room_area;
    //display a message to terminal using cout
    cout << "Enter the width of the room: " << endl;
    cin >> room_width; //get an input from keyboard using cin

    cout << "Enter the length of the room: " << endl;
    cin >> room_length;
    //calculate the area of a room
    room_area = room_width*room_length;
    //display the area to the terminal
    cout << "The area of the room is " << room_area << " square feet." << endl;
    return 0;
}
```

multi-line comments

preprocessor directive

namespace

main function : starting point of program execution

single-line comment

declaration statement

console output

console input

expression statement

return 0 indicates successfull program execution

Common elements in Programming languages

- **Key words**
  - ⋆ Keywords are predefined words that have special meanings to the compiler. Keywords are reserved words and cannot be used for anything other than their designated purposes. This means that the programmer cannot redefine their meaning. In C++, key words are written in all lowercase.
- **Programmer-Defined Identifiers**
  - ⋆ Identifiers are the unique names given to variables, classes, functions, or other entities by the programmer.
- **Operators**
  - ⋆ Operators are used to perform operations on piece of data, known as operands. An operand is usually a variable or a value.
  - ⋆ arithmetic operators, assignment operators, relational operators, logical operators, stream extraction/insertion operators, Compound assignment, increment/decrement
- **Punctuation**
  - ⋆ Punctuation characters that mark the beginning or ending of a statement, or separate items in a list.

Character(s)	Name	Description
//	pair, double slashes	marks the beginning of an inline comment
/*...*/	double slash/asterisk	mark the beginning and end of a comment with multiple lines
#	pound sign	marks the beginning of a preprocessor directive
< >	opening/closing angle brackets	encloses the filename when used in a preprocessor directive
( )	opening/closing parentheses	used in naming a function, e.g. int main ( )
{ }	opening/closing curly braces, grouping symbols	encloses a group of statements, as in a function definition
' '	pair opening/closing single quotation marks	encloses a single character, e.g. 'A'
" "	pair opening/closing double quotation marks	encloses a string of characters, as a msg to be printed to the screen
,	comma	separates items in a list
;	semicolon	marks the end of a complete programming statement

Common elements in Programming languages

- **Syntax**
  - ⋆ When we put all of these elements together in a program, it is called syntax. Syntax is a set of rules that must be followed when constructing a program. Syntax dictates how key words, identifiers and operators may be used, and where punctuation symbols must appear.

Key words

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    return 0;
}
```

Programmer-Defined Identifiers

```
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Operators

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Punctuation

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