C++

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Quiz

Which data type is used to create a variable that should store text?

- ○ String
- ○ Txt
- ○ myString
- ○ string

The value of a string variable can be surrounded by single quotes.

- ○ True
- ○ False

How do you create a variable with the numeric value 5?

- ○ num x = 5
- ○ int x = 5;
- ○ double x = 5;
- ○ x = 5;

How do you create a variable with the floating number 2.8?

- ○ byte x = 2.8
- ○ x = 2.8;
- ○ double x = 2.8;
- ○ int x = 2.8;

Intro

- a high level language developed by Bjarne Stroustrup, as an extension to the C language.

- a cross-platform language that can be used to create high-performance applications.

- updated 3 major times in 2011, 2014, and 2017 to C++11, C++14, and C++17.

- C++ is an object-oriented programming language which gives a clear structure to programs and allows code to be reused, lowering development costs.

- s C++ is close to C# and Java, it makes it easy for programmers to switch to C++ or vice versa
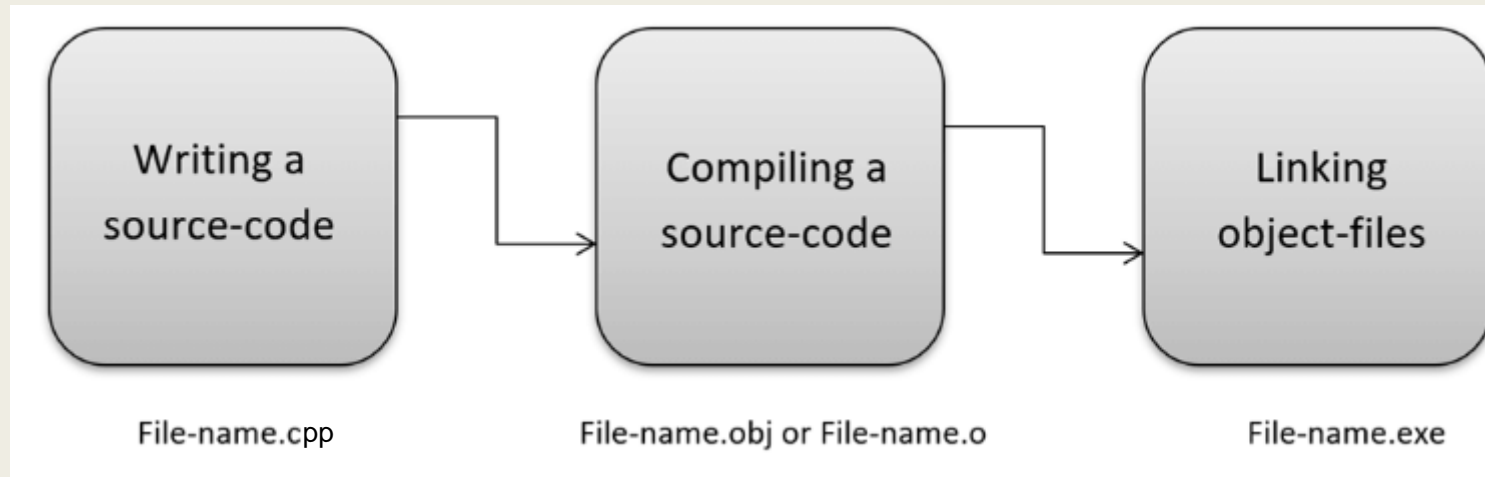
IDE for C++ programming language
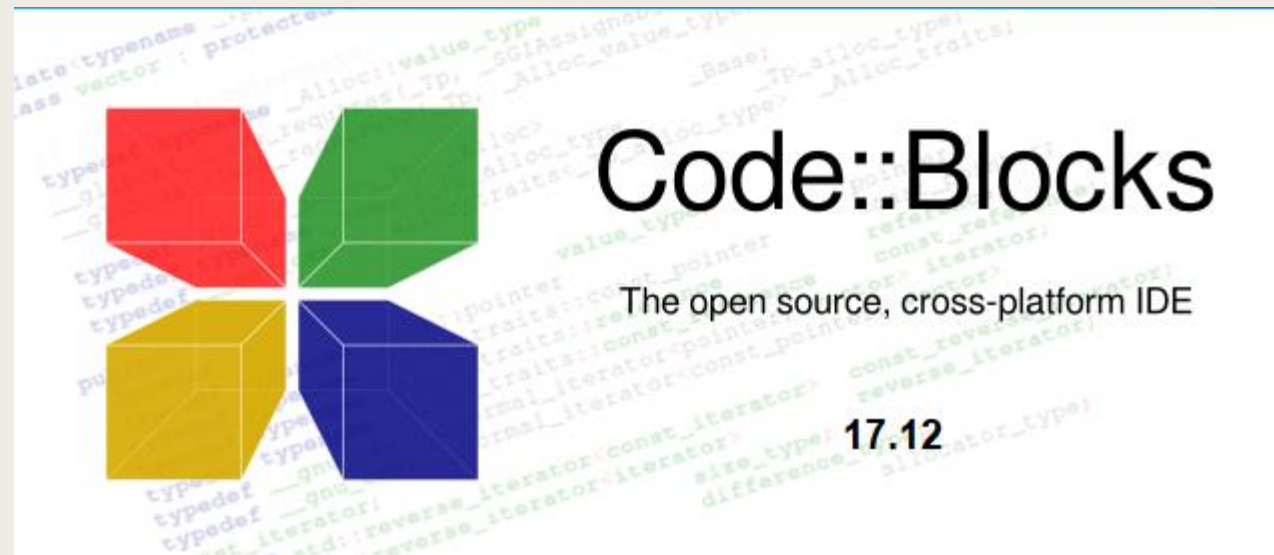
http://www.codeblocks.org/
http://www.codeblocks.org/docs/manual_en.pdf

Steps for execution C++ program

1. Creation
2. Building
3. Execution

Writing a source-code	Compiling a source-code	Linking object-files
File-name.cpp	File-name.obj or File-name.o	File-name.exe

C++ Hello World! Example

```
// include libraries

#include <iostream>
using namespace std;

int main()  // main function

{ // start code

    // Block of code for writing statements

    cout<<"Hello world!";

    return 0;

} // End
```

character set

■ A character set in 'C' is divided into,

- **Letters:** Uppercase and lower characters (A-Z), (a-z)

- **Numbers:** All the digits from 0 to 9

- **White spaces** :Blank space and New line

- **Special characters** : comma, semi- colon,…etc.

Comments

- Two types of comments:
  - *Single Line Comment: //*
  - **Multi Line Comment: start with /* and end with*/**

Identifier

Identifiers are names of variables. functions. and arrays. They are user-defined names. They are consisting sequence of letters and digits. with the letter as the first character. Use lowercase for variable names and uppercase for symbolic constants.

Rules for an Identifier

- An Identifier can only have alphanumeric characters(a-z , A-Z , 0-9) and underscore(_).

- The first character of an identifier can only contain alphabet(a-z , A-Z) or underscore (_).

- Identifiers are also case sensitive in C. For example name and Name are two different identifiers in C.

- Keywords are not allowed to be used as Identifiers.

- No special characters, such as semicolon, period, whitespaces, slash or comma are permitted to be used in or as Identifier.

Data types

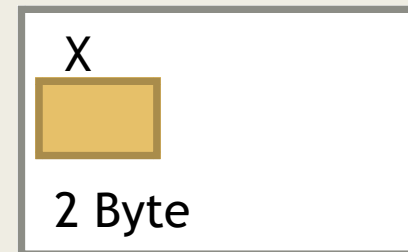**Data types** are used to declare identifiers, divide into :

1. **Primary types**: int, char, float, double, and void

2. **Derived types**: array and pointer.

Variable

- Variable name is a storage area in memory for storing data.

- The allocation variable size depend on it is type.

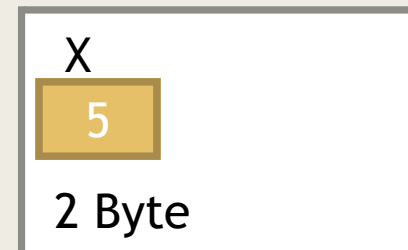- Variable declaration syntax: type variable_list;

Declaration   int x;

initialization   X=5;

X

2 Byte

X

5

2 Byte

Constants

- Used to define a variable whose value cannot be changed.

- Constant declaration syntax: const type constant_name;

- Must declare and initialize constant in same time.

- Constant can't reinitialize.
  const double PI = 3.14;
  PI = 2.9; //Error

C++ output

- The cout object, together with the << operator, is used to output values/print text:

cout<< "Hello World!";

cout<<"Hello world!"<<endl;

cout<<"Hello world!\n";

Examples

```
main()
{
    int    x;                      // declare a variable
    x=5;                           // initialize a variable
    int y, z;                       // initialize two variable in same line
    int a=1;                        //declaration and initialization in same line
    int b=a;                        // declare a variable and initialize it with value of other
    variable
    int v1=v2=8;            //declaration and initialization in same line
    char ch= 'B';
    string s = "Hello";
    cout<< x;              // output varaible

}
```

C++ input

- cin is a predefined variable that reads data from the keyboard with the extraction operator (>>).

    int value;
    cin >> value;
    cout << "Your number is: " << value;

Boolean Types

■ A boolean data type is declared with the bool keyword

■ can only take the values true or false.

■ When the value is returned, true = 1 and false = 0.

bool t= true;
bool f = false;
cout << t; // Outputs 1 (true)
cout << f; // Outputs 0 (false)

Testing and Debugging

- A mistake in a program is usually called a **bug,** and the process of eliminating bugs is called **debugging.**

- A **debugger** is a computer program that allows the programmer to control how a program executes and examine the program state while the program is running.

- **Kinds of Program Errors:**
  - *syntax errors*: *omitting a semicolon*
  - *run-time errors*: *divide a number by zero*
  - *logic errors*: *use the addition sign + instead of the multiplication sign ***

Code block debugger

- Setting the beginner of the debugger by adding break point by press F5 or
  - *Right-click on the line code*
  - *from the menu select Add break point*

- Debug: Start debugger = F8

- Continue: resumes the program execution, up to the next breakpoint, or till the end of the program.

- Next line :execute *single-step* thru your program. Single-stepping thru a loop with a large count is time-consuming. You could set a breakpoint at the statement immediately outside the loop (e.g., Line and issue "Continue" to complete the loop.

- Step-Into, Step-Out ,Next instruction and Step into instruction used with functions and loops
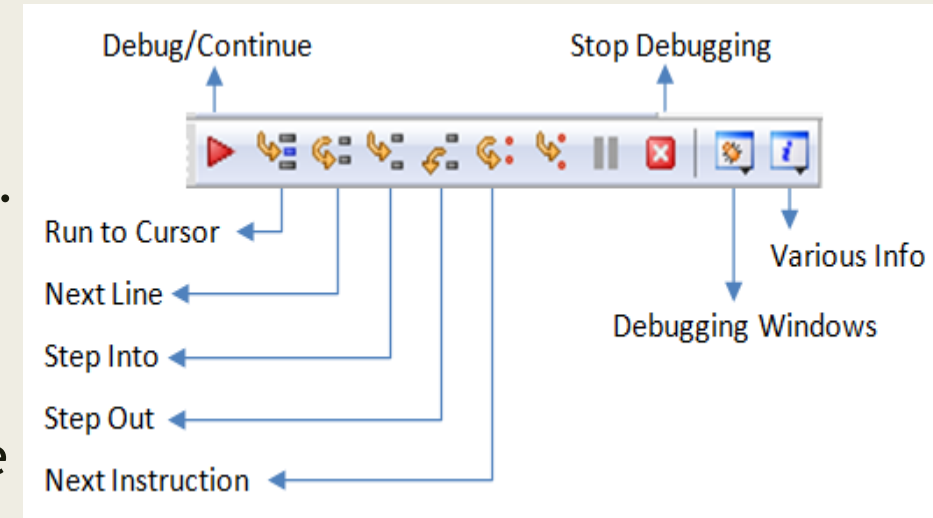
- **Step-Into and Step-Out:** To debug a *function*, you need to use "Step-Into" to step into the *first* statement of the function. ("Step-Over" runs the function in a single step without stepping through the statements inside the function.) You could use "Step-Out" to return to the caller, anywhere within the function. Alternatively, you can set a breakpoint inside a function.

- Next instruction and Step into instruction

- **Watching a Variable:** To add a variable into the "Watches" panel, go to "Debug" ⇒ "Edit Watch..." ⇒ "Add" ⇒ Enter the variable name ⇒ You can select the format, or "watch as array".

Simple debugger steps

- F5: set break point

- F8: start debugger

- From debugging windows select watches to be active

- F7: execute next line behind the debugger pointer

- F4: execute the line behind the mouse curser

- Shift + F8: stop debugger

EX

```cpp
#include<fstream>
using namespace std;
int main()
{
    cout << "Hello  in debuger" << endl;
    int x = 0;
    int x1 = 3;
    cout << " x1="<<x1 ;
    int sum = x+x1;
    //int y = 1/x;
    //cout<< y;
    int x7 = 7;
    cout << " The end \n" ;
    return 0;
}
```

Lab

- Create c++ program.

- Debug c++ program.

- Write c++ program that ask the user to enter his/her name and age then print them in same line.

Task 2

■ Write c++ program that ask the user to enter his/her name and age then print them in same line.