Computer Programing [Lab]

Lab#01: Basic Elements

Agenda

- Basic Elements
- Header file
- Libraries
- Identifiers or Variables
- Reserved words
- Data types
- Arithmetic operators, Logical operators, Relational operators
- Order of Precedence (unary operators, binary operators)
- Escape Sequences
- IF-Else Conditions

What is Programming

Set of instructions to achieve a specific objective.
Programming is breaking a task down into small steps.
Programming is a process of planning and creating a program.

Programming language

A set of rules, symbols, and special words i.e. C, C++, C#, Java, Python etc.

Programming Methodologies

Structured Programming

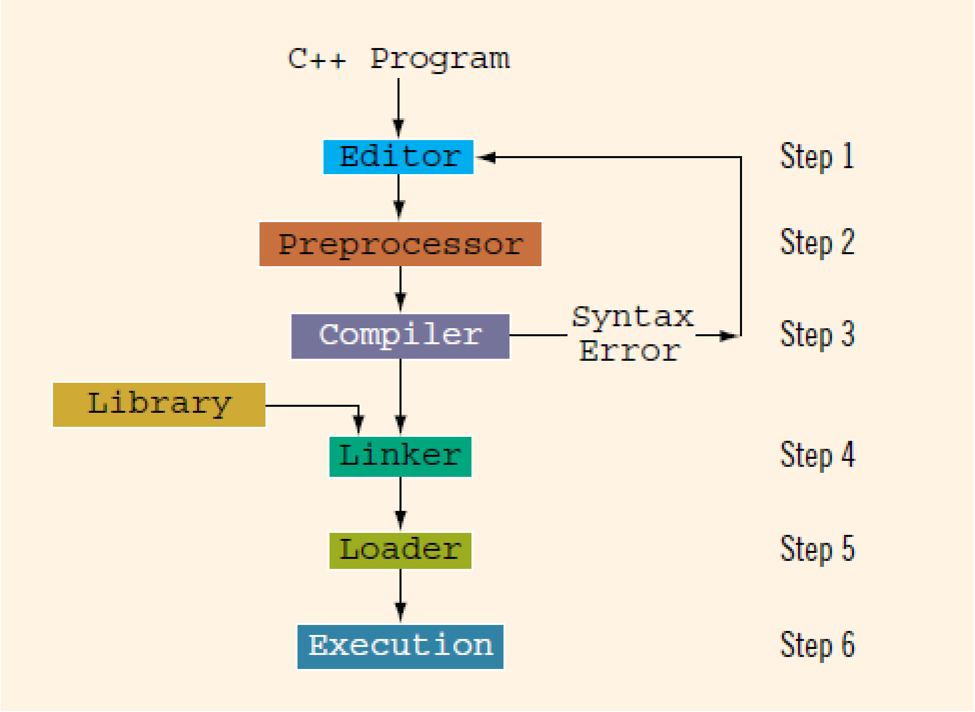
Dividing a problem into smaller sub problems is called structured design. Each sub problem Is then analyzed, and a solution is obtained to solve the sub problem. This process of implementing A structured design is called structured programming. The structured-design approach is also known as top-down design, bottom-up design, stepwise refinement, and modular programming.

Object Oriented Programming

Object-oriented design (OOD) is a widely used programming methodology. In OOD, the First step in the problem-solving process is to identify the components called objects, which Form the basis of the solution, and to determine how these objects interact with one another.

Processing of C++ Program

Steps required to process a C++ program are as follows;



Library vs. Header Files

Header File:

A header file is something which shows the external functionality of a program while omitting the technical implementation details.

Library:

A library is code, compiled into a set of object files. The object files contain the compiled machine code and the data declarations used by the code.

- Library contains function body whereas header file contains function prototype.

Example:

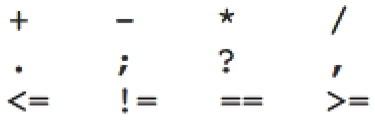
- The header file is like a phone number you can make call, while...
- The library is the actual person you can reach there!
- math.h is a header file which includes function prototype for function calls like sqrt(),pow() etc. {libm.dll is the library file used for these type of functions.}

Comments

In computer programming, a comment is a programmer-readable annotation in the source code of a computer program. They are added with the purpose of making the source code easier to understand, and are generally ignored by compilers and interpreters.

- Single Line Comment i.e. //
- Double Line Comment i.e. /* ----- */

Special Symbols



+	-	*	/
.	;	?	,
<=	!=	==	>=

Reserved Words (Keywords)

int, **float**, **double**, **char**, **const**, **void**, **return**

Identifiers

Identifiers are names of things that appear in programs, such as variables, constants, and functions. A C++ identifier consists of letters, digits, and the underscore character (_) and must begin with a letter or underscore i.e. **first ,conversion, payRate, counter1** etc.

Declaring and Initializing Variables:

Declaration:

```
int a;

float mynumber;

string name;

char ch;
```

```
int a;
int b;          // (1)
int c;
```

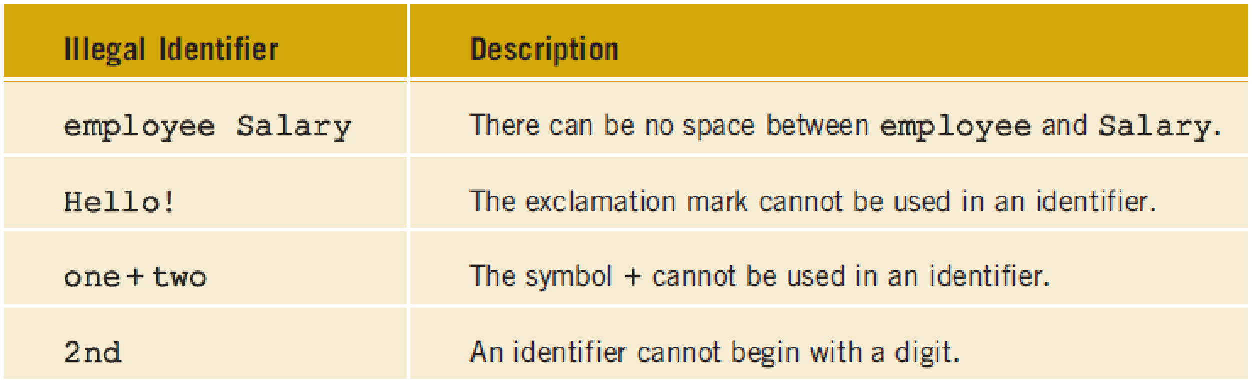
```
int a, b, c;   // (2)
```

Initialization

```
int a = 77;

float mynumber = 5.78;

string name = "Muhammad Yousaf";

char ch = 'Y';
```

```
int a = 0;

int b = 7;

int c = 555;
```

First and second boxes have same meaning of declaring three variables a,b,c of type int.

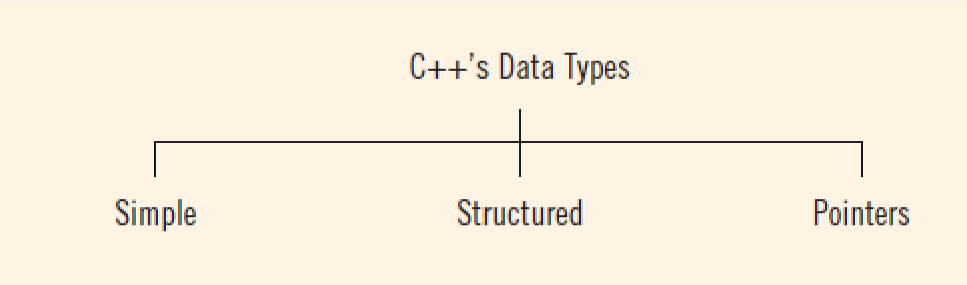


Illegal Identifier	Description
employee Salary	There can be no space between employee and Salary.
Hello!	The exclamation mark cannot be used in an identifier.
one+two	The symbol + cannot be used in an identifier.
2nd	An identifier cannot begin with a digit.

Data Types

A set of values together with a set of operations.

- Simple data type
- Structured data type
- Pointers



Simple Data Types:

int, **float**, **double**, **char**, **string**

Arithmetic Operators

+ (addition),
- (subtraction or negation),
* (multiplication),
 / (division),
% (mod, (modulus or remainder))

i.e. **x + 2 *5 + 6 / y**

Relational Operators

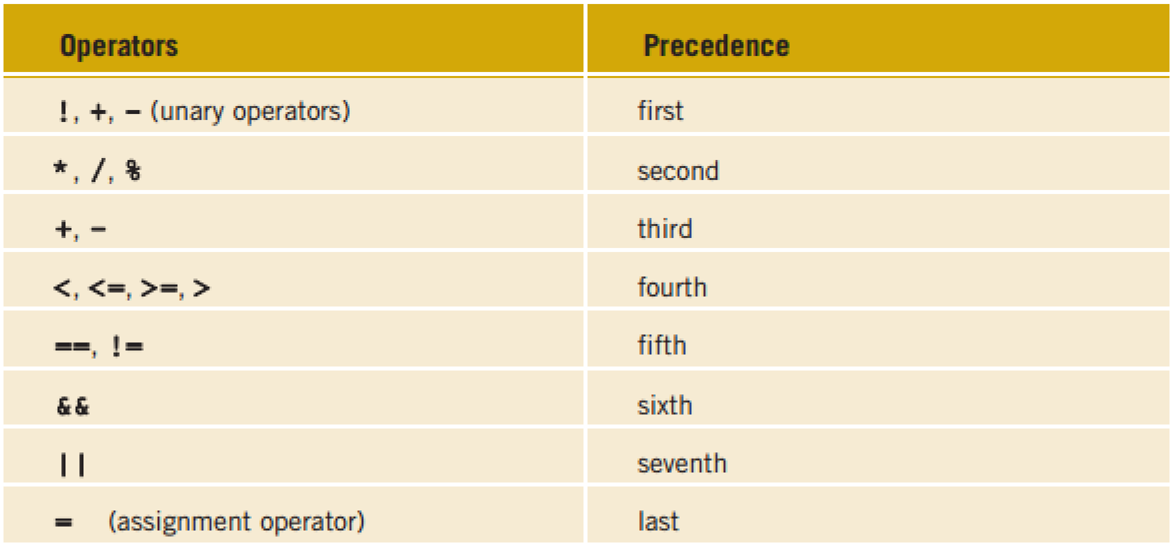
[>, >=] greater, greater than or equal to,
[<, <=] less than, less than or equal to,
[!=, ==] not equal to, equality operator,

Logical Operators

[&&, and] And operators,
[||, or] OR operators,
[!] Not operator,

Order of Precedence

When more than one arithmetic operator is used in an expression, C++ uses the operator precedence rules to evaluate the expression



Operators	Precedence
!, +, - (unary operators)	first
*, /, %	second
+, -	third
<, <=, >=, >	fourth
==, !=	fifth
&&	sixth
||	seventh
= (assignment operator)	last

Unary operator:

An operator that has only one operand i.e. x++, x— etc.

Binary operator:

An operator that has two operands i.e. x+y, x-y, x*y, x/y etc.

Increment operator, ++:

```
int x;

x = x + 1;
```

Decrement operator, —:

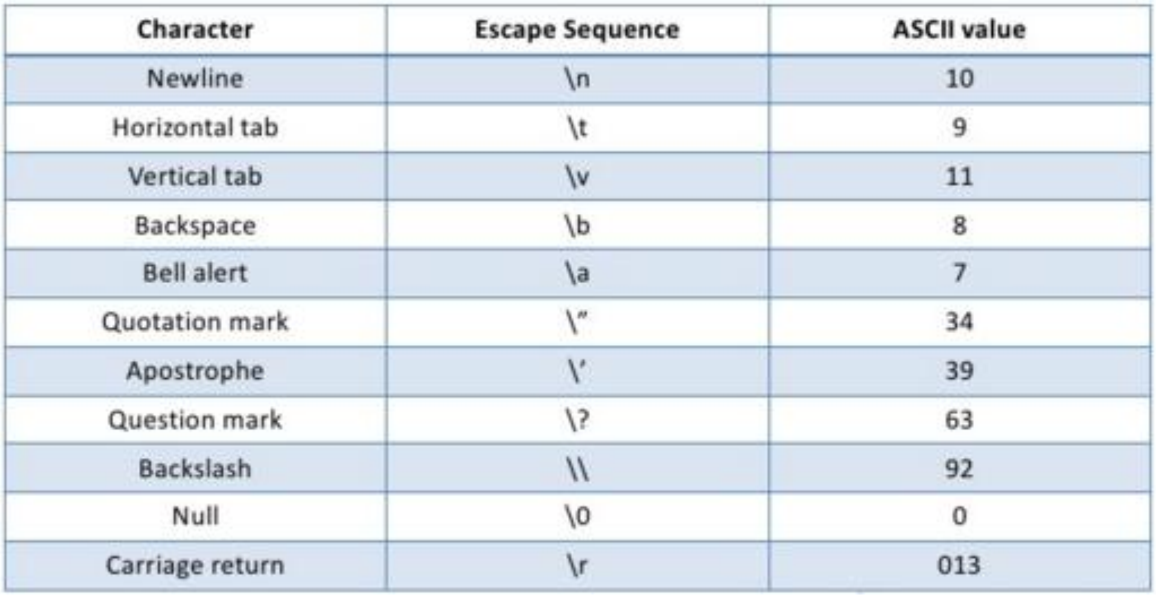
```
int x;

x = x - 1;
```

Escape codes or Escape Sequences

In C++, an escape sequence refers to a more than one characters or combination of characters beginning with a back slash (\) followed by letters or digits.

The compiler converts the sequence of characters into a single escaped character in the compiled program. For example, the compiler converts \n in the source code into a single character (code 10), which represents the new line in the program. Escape codes are used to represent characters that are difficult to express otherwise in the source code.

For instance a tab (\t). Escape codes all start with a backslash (\).



Character	Escape Sequence	ASCII value
Newline	\n	10
Horizontal tab	\t	9
Vertical tab	\v	11
Backspace	\b	8
Bell alert	\a	7
Quotation mark	\”	34
Apostrophe	\’	39
Question mark	\?	63
Backslash	\\	92
Null	\0	0
Carriage return	\r	013