Topics : Data types In C++

Week 2

Tokens and Variable

- Tokens
  - A program statement when compiler is compiling a source code of C++ , each group of characters separated by white spaces are tokens.
  - A program statement consists of variables names , keywords, constants punctuation marks, operators etc are called tokens. E.g. int , a, b, main, etc
- Variable
  - A quantity whose value may change during execution of the program is called variable . A variable represent a storage and memory location in the computer. It is represented by a symbol or a name.
  - A variable is also known as object in C++ and it can be consists of alphabets and digits but the rules for writing variables is same as identifier.

Cont’d

- Difference between identifier and variable:

  Both an identifier and a variable are the names allotted by users to a particular entity in a program. The identifier is only used to identify an entity uniquely in a program at the time of execution whereas, a variable is a name given to a memory location, that is used to hold a value.

Data types in C++

- The variable type specifies the type of data that can be stored in it. Each variable is declared by its type.
- C++ has five basic data types;

1. Int
2. Float
3. Char
4. Double
5. Bool

- The first four data types are also available in C and bool data type is new addition to C++
- The data type specifies the size and type of information the variable will store

Cont'd (1)

- **The int Data Type**
  - The int represent the integer data . Its used to declare integer type variables.
  - It is a whole number . A number without a fraction or a decimal point.
  - Example: 123, 456, -6,
  - The range of values that can be stored in int data type is computer system dependant. In MS-DOS, an integer data type takes two byte in the memory and range of values stored is from -32768 to 32767.
  - The storage capacity for integer type variable can be changed by applying the integer qualifier.
  - These are : 1) short int , 2) long int and 3) unsigned int

Cont'd (2)

The short int

- The storage capacity of short int data type is two byte. Range: -32768 to 32767

The long int

- its storage capacity is four bytes and range from -2147483648 to 2147483647

The unsigned int

- It can only store positive whole no with storage capacity two byte and range from 0 to 65,535.

- **The float Data Type**
  - It represent real or floating type data.
  - The real type data is represented in decimal or exponential notation.
  - It can be signed or unsigned.
  - Examples : 23.34 , 16.2 , -7.3

Cont'd

- The storage capacity for float data type is four bytes and it can store real values from 3.4*10exp-38 to 3.4*10exp+38

The long float

- The storage capacity gets twice the storage capacity of float type variable. Its storage capacity is 8 bytes.

- **The double data type**
  - The double is real or floating type data.
  - Its storage capacity is 8 byes.
  - Store real values from 1.7*10exp-308 to 1.7*10exp+308

The long double Data type

- Its is used to store very large real data values. Its storage capacity is 10 bytes.
- Range from 3.4*10exp-4932 to 1.1*10exp+4932

Cont'd

- **The char Data Type**
  - The char stands for character
  - In character type variable , alphabet characters , numeric digits, and special characters can be stored.
  - The storage capacity for single character is 1 byte or8 bits.
  - A char type variable can hold from 1 byte to 65535bytes .
  - Arithmetic operations can be performed under it too.
- **The bool data type**
  - The word bool stands for Boolean.
  - It is used to declare logical type variables.
  - Only two values true / false can be stored.
  - The true is equivalent to 1 and false to 0.

Assignment #1

Q 1:Add the correct data type for the following variables:

- _____ myNum = 9;
- _____ myDoubleNum = 8.99;
- _____ very = 'A';
- _____ sentence= false;
- _____ age = 5;
- _____ addition = 5.99;
- _____ myNum = 9.98;
- _____ myLetter = 'D';
- _____ option = true;

Q 2: Write in simple words the difference of variable and identifier?

Q 3: Define : Token

How to solve an assignment

- Assignment should be submitted this way:
- Student name:
- Student roll no.:
- Assignment no.:
- Solved assignment.
- Note: any assignment without above mention information will not be accepted.

Modifiers

- In C++ programming, **type modifiers** are used to change the meaning of the fundamental data types.
- There are four type modifiers in C++:
- short
- Long
- Signed
- Unsigned
- Double
- Long double

Cont’d

1. short type Modifier
- We can use short for small integers (in the range −32,767 to 32,767). For example,

  //small integer short a = 12345;
- Here, a is a short integer variable.

2. long Type Modifier
- If we need to store a large integer (in the range -2147483647 to 2147483647), we can use the type specifier long. For example,

  // large integer long b = 123456;
- Note: long is equivalent to long int.

Cont'd

3.The double data type

- The double is real or floating type data.
- Its storage capacity is 8 byes.
- Store real values from 1.7*10exp-308 to 1.7*10exp+308

4.The long double Data type

- Its is used to store very large real data values. Its storage capacity is 10 bytes.
- Range from 3.4*10exp-4932 to 1.1*10exp+4932

Cont’d

5. signed and unsigned Modifiers

- Signed variables can hold both **positive and negative** integers including **zero**. For example,
- // positive valued integer

  signed int x = 23;

  // negative valued integer

  signed int y = -13;

  // zero-valued integer

  signed int z = 0;Here,
- x holds a **positive-valued** integer
- y holds a **negative-valued** integer
- z holds a **zero-valued** integer

Cont’d

- **Note:**
- By default, integers are signed. Hence instead of signed int, we can directly use int.
- signed and unsigned can only be used with int and char types.

Data-Type Table

Data Type	Use	Length	Range
char	Single character	8 bits	From -128 to +128
Unsigned int	Integer, lower value	16 bits	From -0 to 65535
int	Higher value integer	16 bits	From -32768 to +32768
unsigned long	Larger integer	32 bits	0 to 4.3E9
long	Signed Larger integer	32 bits	-2.15E9 to +2.15E9
float	Number with decimal point	32 bits	3.4E-38 to 3.4E+38
double	Larger number with decimal point	64 bits	1.7E-308 to 1.7E+308