

Northern University, Nowshera

Programming Fundamentals

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(Week 2) Lecture 3 and 4

Objectives: Learning objectives of this lecture are

- **Arithmetic operators**
 - **Unary operator**
 - **Binary operator**
- **Read input from user**



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Lecture # 3 Arithmetic Operators

Arithmetic operators are of two types 1) Binary Operators 2) Unary operators.

Binary Operators: Binary operators requires two operands for their applicability. Following is the list of binary operators and their compatibility with data types.

Operator	Compatible				Description
	int	Float	char	string	
+	Yes	Yes	Yes	Yes	Add two values (if numeric) and concatenate two strings.
-	Yes	Yes	Yes	No	Subtract two values.
*	Yes	Yes	Yes	No	Multiple two values
/	Yes	Yes	Yes	No	Divide two values.
%	Yes	No	Yes	No	Remainder of two values

Explanation of +, - and * Operator

Statement	Explanation
int num1 = 5 + 2 ;	num1= 5 + 2; $\rightarrow 5+2=7 \rightarrow$ num1 =7; memory block of num1 is assigned 7 as value.
int num2 = num1 + 6 ;	num2= num1 + 6; as value of num1=7 according to previous statement num2=7+6; $\rightarrow$ num2 =13;
num2 = num1 + num2 ;	num2= num1 + num2 ; place value of num1 and num2 on right hand side equation become as num2=7+13; $\rightarrow$ num2=20; num2 is assigned 20 as value.

Similar way – and * can be applied

/ and % Operator

While solving / operator data type of numerator and denominator is checked. If both are integer than result is an integer value (quotient). If one of the operand has float data type than result will be a float value. Table given below provides complete description about / and % operators.

Statement	Explanation
5/2	Normally we think $5/2 = 2.5$ but it is not the case while doing programming in C++. Before solving / data type of both numerator and denominator is checked. In above figure 2 is quotient and 1 is remainder. Answer is not further computed into points because numerator and denominator are of integer type.

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| If numerator, denominator or both have float data type than |



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	answer of / operator will be in floating number.
<pre>int num1=9; int num2 = 2 ; float num3; num3=num1/num2;</pre>	
<pre>float num4; num4=num1/num3;</pre>	
<pre>int num5; num5 = num1 / num3;</pre>	This statement is similar to above one but the difference in these statements is the value computed on right hand side is being assigned to integer data type. <u>E12334H (num5)</u> num5 = num1 / num3 ; → 9 / 4.0 → 2.25 → num5 =2.25 can num5 stores 2.25. No because its data type is integer as we have studied earlier $2.25 = 2 + 0.25$ than value 2 will be stored in num5. <u>E12334H (num5)</u> 2

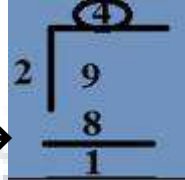
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<pre>num5 = num1% num2; ;</pre>	% is applied on integer values only. As we discussed earlier about / operator that on dividing two integers it doesnot returns answer in floating number and quotient is returned. If we want to get remainder of two values than we will have to use % operator. num5 = num1 % num2; is 1 → num5 = 1; E12334H (num5) 1 → 9 % 2  → remainder
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Unary Operators: There are two unary operators ++ (increment) and -- (decrement). Purpose of ++ is to add 1 in a number and -- is to subtract one from a number.

Example

Let's say we have an identifier **num** that has value 23.

num++; → num = num + 1; → num=23+1; → num=24;
++num; → num=num+1; → num=24+1; → num=25;

In the same way – subtracts 1 from an identifier.

Pre increment (++num) and Post increment (num++). Purpose of both statement is to add 1 in an identifier, but what is difference between these statements the difference between these statements will be explained in coming lectures.

Alternative Arithmetic Statements:

Statement	Alternative
int num1=2;	
num1 = num1 + 8;	num1 += 8;
num1=num1-2;	num1-= 2;
num1=num1*10;	num1*=10;
num1=num1/3;	num1/=3;
num1=num1%4;	num1%=4;
Adding or Subtracting 1	
num1=num1+1;	num1+=1;
num1=num1+1;	num1++;
num1=num1+1;	++num1;
num1=num1-1;	num1-=1;
num1=num1-1;	num1--;
num1=num1-1;	--num1;

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Lecture # 4 Taking Input and Writing Program

In C++ cin statement is used to take input from

user. Syntax for cin is as follow. **cin >>**

identifiername ;

With cin statement identifier name is compulsory, that identifies the memory address where input value will be stored. Consider given piece of code.

```
int num;           → At execution of this statement memory will be created

cin >> num ;       → Will take input assume that user enters 21. This number is stored in num.

cout << "You have entered " << num << endl; → Will display Output
```

Program: Program actually is set of instruction to perform some specific task. For a programmer it is very necessary that he/she should know the behavior of each written, also he/she should be clear about the logics of program. For a beginner it's very important to understand what statement to be written and where is to be written. Let's practice it.

Exercise:

Program Number 1: Write a C++ program that takes two numbers as input, after taking input add both number and display the answer.

Steps	C++ code
1) Take two numbers as input, as we discussed for an input it's necessary to have memory. First we will declare two identifiers.	<pre>#include "iostream" using namespace std; void main() { int num1, num2 ;</pre>
2) Take input in both identifiers	<pre> cout << "Enter number 1 "; cin >> num1;</pre>
3) Add them.	<pre> cout << "Enter number 2 "; cin >> num2;</pre>
4) Display answer. Is statement number 3 storing answer for display? Answer is NO .	<pre> num1 + num2 ;</pre>
5) Modifying step 3 Add numbers and store it in some memory.	<pre> int answer = num1 + num2;</pre>
6) Display answer.	<pre> cout << "Sum = " << answer << endl; }</pre>

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Program Number 2: Suppose that you have to calculate bill of a product bought by a customer. You have to input quantity of a product purchased by user and price of 1 one product, after that display bill to be paid.

Steps	C++ code
Above statement clearly states about taking input which things to be input i) quantity ii) price. 1) For input of price and declare two identifiers one for storing price and other for quantity. 2) Take input in both identifiers. 3) Declare third identifier for storing bill. 4) Multiply quantity and price and assign it to bill. 5) Display bill;	<pre>#include "iostream" using namespace std; void main() { int quantity , unitprice ; cout << "Enter quantity purchased "; cin >> quantity; cout << "Enter price of one product "; cin >> unitprice; int bill; bill= quantity * unitprice ; cout << "Bill = " << bill << endl; }</pre>

Program Number 3: You are required to make an application for utility bill generator. You have to input units consumed from user along with cost per unit and display bill to be paid.

Steps	C++ code
Above program is similar to program number 2 1) Input unit consumed and price per unit. Before taking input declare two identifiers. 2) Multiply unit consumed and price per unit and assign it to third identifier and display it.	<pre>#include "iostream" using namespace std; void main() { int unitconsumed , unitprice ; cout << "Enter unit consumed "; cin >> unitconsumed; cout << "Enter price of one product "; cin >> unitprice; int bill=unitconsumed * unitprice ; cout << "Bill = " << bill << endl; }</pre>

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Program Number 4: In BIIT many students apply for BSCS program. You have to input their metric and inter percentage after that calculate average and display average percentage.

Steps	Code
1) As we have to input percentage of metric and inter we need to create two memories of float type.	<pre>#include "iostream" using namespace std; void main() { float metricper, interper;</pre>
2) Take input in both the memories.	<pre> cout << "Enter Metric Percentage "; cin >> metricper; cout << "Enter Inter Percentage "; cin >> interper;</pre>
3) Declare another memory for storing average percentage.	<pre> float avgper;</pre>
4) Compute Percentage and assign it to identifier declare in step 3.	<pre> avgper = (metricper + interper) / 2;</pre>
5) Display value of identifier declared in step 3.	<pre> cout << "Average Percentage : " << avgper; }</pre>

