Programming Fundamentals

Week 03 - Lab Manual

Introduction

Welcome to your favorite programming Lab. In this lab manual, we shall work together to learn and implement new programming concepts

Skills to be learned:

- Identifying the Variables and Datatypes for any given problem.
- Write a complete program that converts input into the required output.

Let's do some coding.

Skill: Identify the Variables and Datatypes for any given problem.

Introduction

Variables are the containers that are used to store different values. Recall the constraints of having valid variable names from the class.

- The names can not have spaces
- The names can not start with Numbers
- The names can not have any special Characters

Datatypes are the **labels** that are associated with **each container** that are used to store different values.

The following table lists the data types that are used to store different values.

Datatype	Description
int	This datatype is used to store integer values.
float	This datatype is used to store floating point values.
char	This datatype is used to store single-character values.
string	This datatype is used to store a string of character values.

Examples:

Valid Example	Invalid Examples Description

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```
#include<iostream>
using namespace std;
main()
{
    int number;
}
```

C++ is a case-sensitive language. **Int and int** are two different words and represent different things.

Spaces are not allowed in the variable names.

The variable names **can not start with numbers**.

Following are a few examples of how to declare, initialize, and assign values for different types of variables.

Declaring and initializing a string type variable

```
#include<iostream>
using namespace std;
main()
{
    char alphabet = 'a';
    cout << alphabet;
}
```

Declaring and initializing a character type variable

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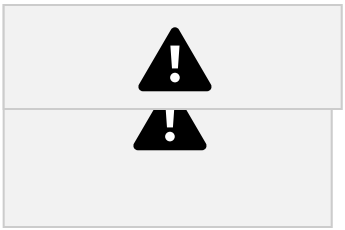
`#include<iostream>`
`using namespace std;`
`main()`
`{`
`  int number;`
`  number = 10;`
`  cout << number;`
`}`
	Declaring and printing an int type variable



Declaring and printing a float type variable

Skill: Identifying the Variables and Datatypes for any given problem.

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Skill: Write a complete program that converts input into the required output

In class, you have studied variable declaration that is used to declare a variable of fixed size in memory. Additionally, the assignment operator is used to assign a value to the declared variable.

Look at the attached example for recalling these concepts.

Variable declaration

Variable Initialization

Tasks

- Declare a string-type variable and assign it your name and print it on the screen. ● Declare an integer type variable and assign it your roll number and print it on the console screen
- Initialize a float type variable with your aggregate value and print it on the console screen.
- Initialize a character type variable with your section and print it on the screen. ● Now, write a program where you take all these values and print them on the screen like below.

Now, let's learn to take input from the user.

consider the following problem.

Task01(WP): Write a program that **takes a number from the user(console screen)** in dollars and converts it into rupees. 1 Dollar = 200 rupees

Let's code this one out.

We need the following:

- A variable for storing the value of one dollar
- A variable for storing the value of value entered by the user
- A variable to store the converted value in rupees
- An expression that converts the dollars into rupees and stores it into the third variable

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Can you point out ?? the problem for the above code?

Yes, in this program, **the input value is not entered by the user** rather it is set by the programmer just like the dollar value.

We need the user to enter the value of dollars that he wants to convert into rupees. We have just the right command for this.

Syntax:
cin >> variablename;

Let's put this into code.

We have slightly modified the code and made the above-mentioned changes and now it is working according to our requirements.

Great Work Students! You have added another skill to your skillset

Conclusion

Variable	Variables are the containers that are used to store different values
Data Type	Datatype defines the label according to the type of data that is stored in the variables.

cin >> variable; It is used to take input from the console.

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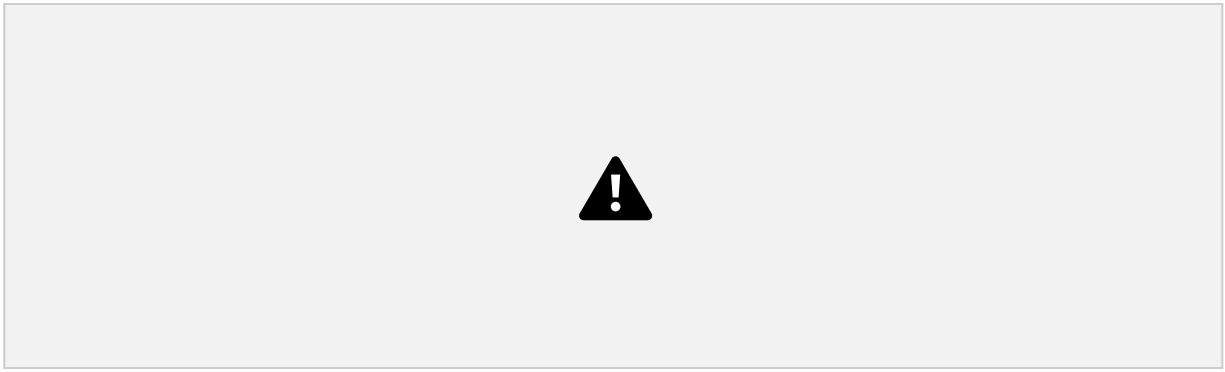
Task 01(CL): Write a C++ program that inputs from the user his name, roll number, aggregate, and section and prints it on screen.



Task 02(OP): Write a C++ program that converts the weights from lbs (Pounds) to kgs (Kilograms). 1lb = 0.45 Kgs
Note: The user enters weights in lbs and the program prints it in kgs.

Task 03(OP): Write a C++ program that takes the length and width of the rectangle from the user and prints its area. Area = length * width

Task 04(CP): Write a C++ program that takes charge (Q) and time (t) as input from the user and prints the current (I) on the console. Current(I) = Charge (Q)/Time(t)

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Task 05(CP): Write a C++ program that takes the name, matric (out of 1100), intermediate(out of 550), and Ecat (out of 400) marks of the student and print their aggregate score for UET. Ecat = 50% & intermediate = 40% & Matric = 10%

Task 06(OP): Write a C++ program that takes the megabytes from the user and converts them into bits and prints the value on the screen. 1MB = 1024 Kb & 1KB = 1024 Bytes & 1Bytes = 8 Bits

Task 07(OP): You are developing a C++ program for a time-tracking application. The program needs to take an integer input representing hours and convert it to seconds to accurately record the time in seconds.

Task 08(OP): You are developing a C++ program for an electrical engineering application. The program needs to calculate power (in watts) given voltage (in volts) and current (in amperes) as input.

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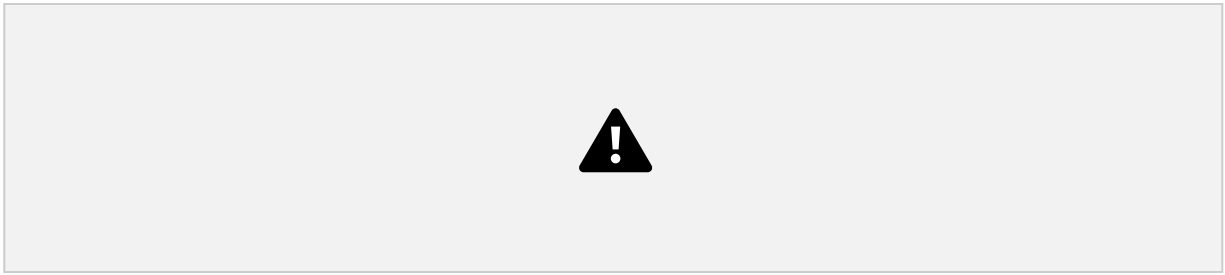
Task 09(OP): You are building a C++ program for a health and wellness application. To calculate certain health-related statistics, you need to take a user's age in years as input and convert it into their age in days.

Notes

- Use **365 days** as the length of a year for this challenge.
- Ignore leap years and days between last birthday and now.

Task 10(OP): You are developing a C++ program to keep track of a cricket team's performance in the Asia Cup tournament. The program needs to take the number of wins, draws, and losses as input and calculate the number of points the cricket team has obtained so far, based on the following rules:

- Wins get 3 points.
- Draws get 1 point.
- Losses get 0 points.



Task 11(OP): Scientists have discovered that in four decades, the world will EXPLODE! It will also take three decades to make a spaceship to travel to a new planet that can hold the

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entire world population.

You must calculate the number of people there will be in three decades from now.

Make a variable **population** and take input from the user that is the world population now. Assume that every month, someone gives birth to n more people. Also take **n** from the user as input. Calculate the number of people there will be when the spaceship is created.

Good Luck and Best Wishes !!

Happy Coding ahead :)

Skill: Write a complete program that converts input into the required output