Programming Fundamental

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 integers 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**

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

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*test.cpp - Notepad
File Edit Format View Help
`#include <iostream>`
`using namespace std;`
 	
`int main(){`
`int number;`
 	
`return 0;`
`}`
	*test.cpp - Notepad
	File Edit Format View Help
	`#include <iostream>`
	`using namespace std;`
	
	`int main(){`
	`Int number;`
	
	`return 0;`
	`}`
		C++ is a case-sensitive language. **Int and int** are two different words and represent different things.

`#include <iostream>`
`using namespace std;`
 	
`int main(){`
`int roll_no;`
 	
`return 0;`
`}`
	`#include <iostream>`
	`using namespace std;`
	
	`int main(){`
	`int roll no;`
	
	`return 0;`
	`}`
		Spaces are not allowed in the variable names.

`#include <iostream>`
`using namespace std;`
 	
`int main(){`
`string fall2020;`
 	
`return 0;`
`}`
	`#include <iostream>`
	`using namespace std;`
	
	`int main(){`
	`string 2020fall;`
	
	`return 0;`
	`}`
		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.		

`#include <iostream>`
`using namespace std;`
 	
`int main(){`
`string name = "irzam";`
`cout << name;`
`return 0;`
`}`
	`D:\PF codes>c++ test.cpp -o test.exe`
	
	`D:\PF codes>test.exe`
	`irzam`
	`D:\PF codes>`
		Declaring and initializing a string type variable

`#include <iostream>`
`using namespace std;`
 	
`int main(){`
`char aplhabat = 'a';`
`cout << aplhabat;`
`return 0;`
`}`
	`D:\PF codes>c++ test.cpp -o test.exe`
	
	`D:\PF codes>test.exe`
	`a`
	`D:\PF codes>`
		Declaring and initializing a character type variable

`#include <iostream>`
`using namespace std;`
 	
`int main(){`
`int number;`
`number = 10;`
`cout<< number;`
 	
`return 0;`
`}`
	`D:\PF codes>c++ test.cpp -o test.exe`
	
	`D:\PF codes>test.exe`
	`10`
	`D:\PF codes>`
		Declaring and printing an int type variable

`#include <iostream>`
`using namespace std;`
 	
`int main(){`
`float number;`
`number = 2.5;`
`cout<< number;`
 	
`return 0;`
`}`
	`D:\PF codes>c++ test.cpp -o test.exe`
	
	`D:\PF codes>test.exe`
	`2.5`
	`D:\PF codes>`
		Declaring and printing a float type variable

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

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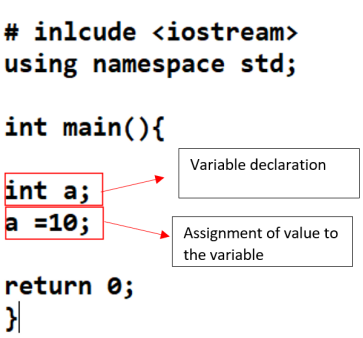
Skill: Write a complete program that converts input into the required output

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.	

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.

```
Microsoft Windows [Version 10.0.19045.2251]
(c) Microsoft Corporation. All rights reserved.

C:\Users\HP>D:

D:\>cd "PF codes"

D:\PF codes>c++ test.cpp -o test.exe

D:\PF codes>test.exe
My Name is: Irzam
My Roll Number is: 92
My Aggregate is: 83.5
My section is: A

D:\PF codes>
```

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

```
# include <iostream>
using namespace std;

int main(){
int dollar = 200;
int inputValue = 10;
int convertedValue;

cout<< "$1= "<<dollar<<" rupees"<<endl;
convertedValue = dollar * inputValue;
cout<< convertedValue;

return 0;
}
```

Variable initialization

Variable declaration

Expression for multiplication

```
D:\PF codes>c++ coverter.cpp -o convert.exe

D:\PF codes>convert.exe
$1= 200 rupees
2000
D:\PF codes>
```

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

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.

```
# include <iostream>
using namespace std;

int main(){
int dollar = 200;
int inputValue;
int convertedValue;

cout<< "$1= "<<dollar<<" rupees"<<endl;
cin >> inputValue;
convertedValue = dollar * inputValue;
cout<< convertedValue;

return 0;
}
```

Variable declaration

```
D:\PF codes>c++ coverter.cpp -o convert.exe

D:\PF codes>convert.exe
$1= 200 rupees
5
1000
D:\PF codes>
```

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.

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

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

Note: The user enters weights in lbs and the program prints it in kgs.

Task 03(OP): Write a 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 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)

Task 05(CP): Write a 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 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

Good Luck and Best Wishes !!

Happy Coding ahead :)

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