

C++ Programming

Declaring variables

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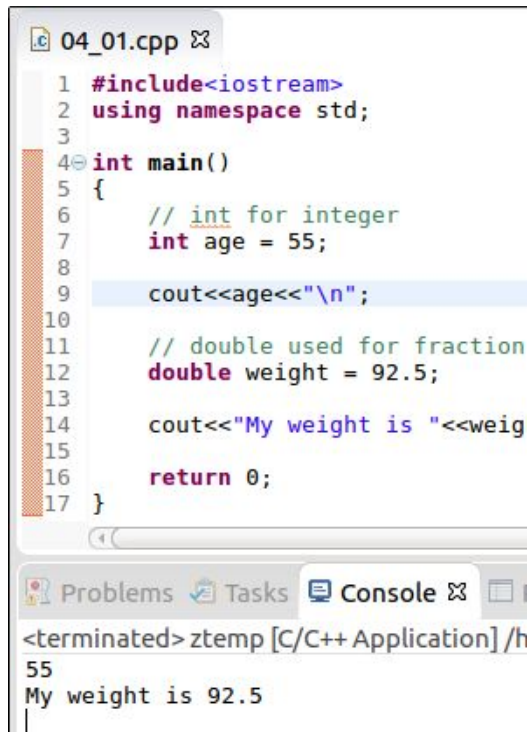
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Let's define 2 variables: age and weight



```
04_01.cpp
1 #include<iostream>
2 using namespace std;
3
4 int main()
5 {
6     // int for integer
7     int age = 55;
8
9     cout<<age<<"\n";
10
11     // double used for fraction
12     double weight = 92.5;
13
14     cout<<"My weight is "<<weight;
15
16     return 0;
17 }
```

Problems Tasks Console

<terminated> ztemp [C/C++ Application] /h
55
My weight is 92.5

- How to define a variable in memory?
- **int age = 55;**
 - int: type of this variable
 - age: name of variable (identifier)
 - = please assign value
 - 55: please put in memory this value! (literal)
- Notice we can now print the weight!
- Same for weight variable
 - double weight = 92.5;

Declare, Assign, Get

```
04_02.cpp
1 #include<iostream>
2 using namespace std;
3
4 int main()
5 {
6     // Declare variable in memory. Garbage value
7     int number1;
8     int number2;
9
10    // Assign values (in memory)
11    number1 = 30;
12    number2 = 10;
13
14    // Get values
15    cout<<number1 + number2<<"\n";
16    cout<<number1 - number2<<"\n";
17
18    // Reassign value
19    number1 = 50;
20    cout<<"2n+1 = "<<number1 * 2 + 1<<"\n";
21
22    return 0;
23 }
24
```

Problems Tasks Console Properties 1010 0101 Call Graph

<terminated> ztemp [C/C++ Application] /home/moustafa/workspa

40
20
2n+1 = 101
|

- We can also declare variable and later put values
- We can use them for operations

Location	Name/Value	Type
1	number1 = 30	Integer
2	number2 = 10	Integer

Identifier (variable name)

- Identifier: Variable name
 - `int sum = 10;` => `sum` is identifier
- Identifier consist of: letters, digits, `_`
 - `iNumber`, `status1`, `status2`, `mostafa_saad`, `_valid`
- Can't start with digit
 - `7Core` [wrong]
- Case sensitive: `sum` != `SUM`
- Shouldn't use reserved keyword
 - `int return = 6;`
 - Reserved words: `int`, `float`, `double`, `return`, `void`, `if`, `while`, `break`, `false`, `bool`, `operator` and more

Initialization: Several ways

```
int age1;      // uninitialized: Garbage. DON'T  
int age2 = 52; // C-style, popular  
int age3 (52); // Constructor initialization  
int age4 {52}; // Modern initialization: preferred
```

Other important data types

```
04_03.cpp
1 #include<iostream>
2 using namespace std;
3
4 int main()
5 {
6     double weight = -92.5;
7
8     char group = 'd';
9
10    bool is_male = true;
11    bool like_football = false;
12
13    int age = 55;
14    string name = "mostafa";
15
16    cout<<"I am "<<age<<" years old\n";
17    cout<<"My weight is "<<weight<<"\n";
18
19    cout<<"my name is "<<name
20        <<" and group "<<group<<"\n"
21        <<is_male<<" "<<like_football<<"\n";
22
23    return 0;
24 }
25
```

Problems Tasks Console Properties

```
<terminated> ztemp [C/C++ Application] /home/moustafa/w
I am 55 years old
My weight is -92.5
my name is mostafa and group d
1 0
|
```

- Notice the 0/1 values for the bool
 - So it is eventually a number
- Also char is a number

The right datatype....the right way

```
int a = 10;
int b = 21;

int i1 = a + b / 2;    // 20
int i2 = (a + b) / 2;  // 15

double x = 10.0;
double y = 21;

double d1 = x + y / 2.0;    // 20.5
double d2 = (x + y) / 2.0;  // 15.5
```

- What is the average of 10 and 21?
 - $(10 + 21) / 2 = 15.5$
- I1 and I2 are wrong as data types
 - We need to use double as result is fraction!
 - So d1 and d2 as double are good
- But why d1 is still wrong?
 - Compiler do the following
 - $10 + 21/2 = 10 + 10.5 = 20.5$
 - To force priority for sum, we use ()
 - $(10 + 21) / 2 = 21/2 = 11.5$

Datatypes has **min** and **max** values to store

- int: -2147483648 to 2147483647
- char: -127 to 127
- bool: 0 to 1
- If you tried lower value => underflow
- If you tried bigger value => overflow
 - int val = 2147483647 + 1;
 - We are adding 1 more than the max value!
 - Compiler msg: warning: integer overflow in expression



“Acquire knowledge and impart it to the people.”

“Seek knowledge from the Cradle to the Grave.”