C++ Programming

Declaring variables

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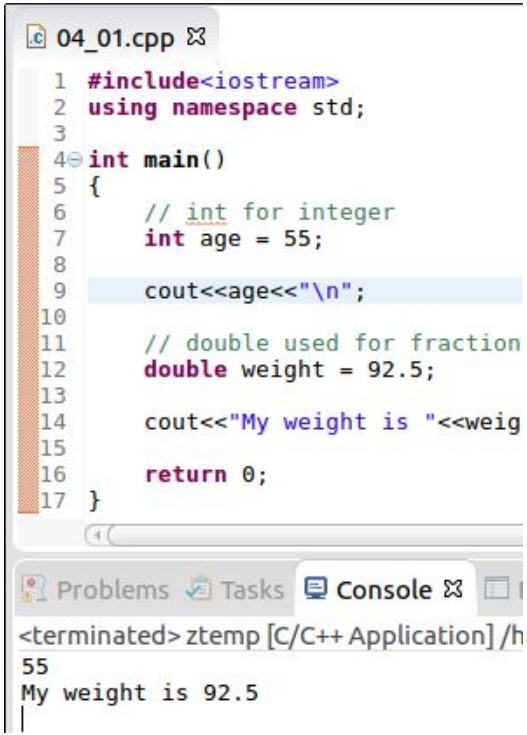
Let’s define 2 variables: age and weight



- 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

- 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

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

int main()
{
    double weight = -92.5;

    char group = 'd';

    bool is_male = true;
    bool like_football = false;

    int age = 55;
    string name = "mostafa";

    cout<<"I am "<<age<<" years old\n";
    cout<<"My weight is "<<weight<<"\n";

    cout<<"my name is "<<name
        <<" and group "<<group<<"\n"
        <<is_male<<" "<<like_football<<"\n";

    return 0;
}
```

Problems Tasks Console Properties Cal

```
<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: -128 to 127 [**there was a typo**]
- 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."