Warlocks 1507

FRC Programming in C++

Class 2

Lockport Robotics
September 2023

FIRST

Basic Variable Data Types

int	integer number, 32-bits	Ex. 1, 5, 0, 100, -1, -20
float	rational number, 32-bit precision	Ex. 3.14, -2.765
double	rational number, 32-bit precision	Ex. 3.14, -2.765
bool	1 bit (True/False)	Ex. 1, 0
char	integer number, 8 bits	Ex. 2, 0, -1, -10

Math Operators

+	Add
-	Subtract
*	Multiply
/	Divide
%	Modulus (division remainder)
++	increment (+1)
--	decrement (-1)

No Magic Numbers

Constants

```
//Old style
#define PI  3.14


//C++ Prefered
const float PI = 3.14;
```

```
#include <iostream>

#define NUM_SLICES      24

const int NUM_STUDENTS = 8;


int main()
{

    std::cout << "Number of Pizza Slices = " << NUM_SLICES   << std::endl;
    std::cout << "Number of Students     = " << NUM_STUDENTS << std::endl;

    std::cout << "Each Studnent gets " << NUM_SLICES / NUM_STUDENTS;
    std::cout << " slices!" << std::endl;

    return 0;
}
```

Conditionals

IF-Then

```
if(  <test>  )
{
    //Runs if true
}
```

IF-Then-else

```
if(  <test>  )
{
    //Runs if true
}
else
{
    //Runs if False
}
```

Nested IF

```
if(  <test1>  )
{
    //Runs if true
}
else if( <test2> )
{
    //Runs if test1 false
    //but test2 true
}
else
{
    //Runs if all tests False
}
```

Conditionals

Logical Operators

- Results are always Boolean (True/False)

==	Equal
!=	Not Equal
>	Greater Than
>=	Greater Than or Equal
<	Less Than
<=	Less Than or Equal
&&	Logical AND
||	Logical OR
!	Logical NOT

Conditionals

IF-Then Examples

```
if( onTarget == true )
{
    Shoot();
}
```

```
if( timer ==  5 )
{
    Stop();
}
else
{
    Drive();
}
```

Assignment vs Comparison

Symbol	Meaning	Example	Results
=	Assignment	x = 2;	var x contains value 2
==	Comparison	x == 2	True if x is 2 else False

Conditionals

Switch (case statement)

```
switch ( <test_var> )
{
    case 1:
        //Run if test_var == 1
        break;

    case 2:
        //Run if test_var == 2
        break;

    case default:
        //Run if no cases match
}
```

Homework

- Ask for 2 integers, add them together and output answer
- Multiply 2 float constants together and output answer
- Ask for another integer
  - Output if it is even or odd (hint: use modulus ‘%’ operation)
  - Output if it is greater than, less than, or equal to zero
  - Output “True” if value is greater than 10 and even, else “False”
  - Multiply by the number of seconds in a minute and output answer