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Expressions

CS 124 – Intro to Software Development

Macbeth – Lesson 3.1

Agenda

- Opening Prayer
- Scripture
- Q&A
  - Review Project
  - Review Assignment
- Expressions
- Looking Ahead

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Scripture

Moroni 7:47-48

But charity is the pure love of Christ, and it endureth forever; and whoso is found possessed of it at the last day, it shall be well with him.

Wherefore … pray unto the Father with all the energy of heart, that ye may be filled with this love, which he hath bestowed upon all who are true followers of his Son, Jesus Christ; that ye may become the sons [and daughters] of God; that when he shall appear we shall be like him, for we shall see him as he is.

Updated Grading for Assignments

- Grading for assignments will be as follows (previous assignment grades have already been updated):

Turned in time	Points
Before class	150% (6 points)
Before weekly project	100% (4 points)
After weekly project	No points

- The reason for the change is to encourage you to use assignments to ponder the new material each week and successfully implement the weekly project.
- Please do not turn in projects late. You need to keep moving and start on the next topic. We will review the project solution on Monday.

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Review Last Project

- 02 Ponder - Monthly Budget

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Review Last Assignment

- What was the hardest part?
- How did you solve it?

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Expressions

- Variables can be populated in 2 ways
  - Read from an input stream; or
  - Set by an expression using an equal sign

```
int main()
{
    float circleRadius;
    float circleArea;

    cout << "What is the radius of the circle? ";
    cin >> circleRadius;

    circleArea = 3.14 * circleRadius * circleRadius;

    cout << "The area is: " << circleArea << endl;
    return 0;
}
```

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Operations

- The use of the equal sign is similar to algebra equations.
- You can use variables in your equations. Need to make sure they have a value before you use them. Here is a bad example:

```
age = 2017 – birthYear;
birthYear = 1976;
```

- Operators of highest order are evaluated first, going from left to right, as follows:

Operator	Description
( )	Parentheses
++ --	Increment, Decrement
* / %	Multiply, Divide, Modulo (Remainder after Dividing)
+ -	Add, Subtract
= += -= *= /= %=	Assign

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Division

- Dividing integers is different from dividing floats.
- Integer division will always round down.

Integer Division	Float Division

`int x = 5;`
`int y = 4;`
`cout << x/y;`
 	
Output will be 1
	`float x = 5.0;`
	`float y = 4.0;`
	`cout << x/y;`
	
	Output will be 1.25

`int x = 1;`
`int y = 2;`
`cout << x/y;`
 	
Output will be 0
	`float x = 1.0;`
	`float y = 2.0;`
	`cout << x/y;`
	
	Output will be 0.5

Increment, Decrement

- Increment and Decrement allow you to add 1 or subtract one from a variable
- C++ provides a method to update the number before you evaluate the full expression and a method to update the number after you evaluate the full expression:

x++ (Update After)		++x (Update First)	
`y = x++ * 2;`	`y = x * 2;` `x = x + 1;`	`y = ++x * 2;`	`x = x + 1;` `y = x * 2;`
x-- (Update After)		**--x (Update First)**	
`y = x-- * 2;`	`y = x * 2;` `x = x – 1;`	`y = --x * 2;`	`x = x – 1;` `y = x * 2;`

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Assign

- There are several assignment statement (besides just =) which can provide a shorthand like the increment (++) and decrement (--) operators.
- These shorthand examples allow you to apply the operator to the result on the right hand side.

Shorthand Example	Represents
x += 3;	x = x + 3;
x -= y + 7;	x = x – (y + 7);
x *= x;	x = x * x;
x /= 1 – x;	x = x / (1-x);
x %= 2;	x = x % 2;

- What are the pros and cons of these shorthands?

Casting

- Casting will convert the contents of a variable from one type to another.
- Casting will not convert the data type of the variable.

```
float pi = 3.14;
cout << "pi as a float = " << pi << endl;
cout << "pi as an int = " << (int) pi << endl;
```

Will output 3.14 and 3.

- What are the dangers of casting?

Data Types

- Expressions are usually restricted to variables with data type of integer, float, and double.
- You can use other data types (a boolean or char is really just a number) but they are very uncommon.

```
char x = 'A';
cout << x;
x++;
cout << x;
```

Will output AB

Looking Forward

- Before Class on Wednesday
  - 1.4 Prepare
    - Read Chapter 1.4 Functions
    - Submit assign14
  - 03 Ponder – Start on your project that is due Saturday
    - You will be adding expressions and function calls to your 02 Ponder project
    - Read through the project and make sure you understand what its asking for
    - As you read chapter 1.4 Functions, consider how you will apply it to your project

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