

CSE20 : Lab #5 - Expressions

Overview

This week we will practice writing Boolean expressions that express the logic we want. The result will be either true or false. First, let us cover the common mistakes people are doing in previous labs. You will be asked to spot these errors and fix them as part of this week's lab.

Variable Dependency

Last lab we talked about variables and their usage. Before we use a variable in any capacity we have to *declare* it with a name and a data type. Any attempt to use something before their declaration or definition is illegal as the compiler does not know what you are referring to when trying to figure out the meaning of a variable using its name.

Reuse – You can read and write to a variable many times after declaration. However there are several illegal operations and usage of variables:

- Declaring a variable more than once
- Declaring a variable with a new data type
- Using a variable before a declaration
- Assigning a value that is not the same data type as the variable

Type Casting

We have been introduced to several data types:

- Char – character literal (16-bits)
- Short – 16-bits integer
- Int – 32-bits integer
- Float – 32-bits float point number
- Double – 64-bits floating point number

Type casting is a way to make sure we assign the correct type to variables or how the compiler is interpreting the particular number. As we saw in previous lab, 90 can be printed as number 90 or character 'Z'. If we print 90 as a float then it comes out as 90.0. Also the math operation results depend on the data type of the inputs.

Association – type cast is applied to the nearest expression. General form is: (type) expression

- (int) 4.0 / 3.0 – int is applied to 4.0 only
- (int) (4.0 / 3.0) – int is applied to the result of the division

(Reading) Chapter 2.4

- Answer Participation Activity 2.4.1, 2.4.2, 2.4.3, 2.4.4, 2.4.5 & 2.4.6
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Getting started

After starting Eclipse, create a new project called Lab 5. Import from assignment page Errors4.java, Errors5.java, Errors6.java and BooleanOp.java files into the project and load them. Some errors this time are logical and not compile error. So even if your program runs, there might still be errors and things that are out of order from what they should be. Utilize your knowledge from previous lab exercises and make these programs behave in a way that makes sense to the user. Some errors require fixing the executable statements but the others require changing their order in the program.

(Assessment) Finding and Fixing Errors

Errors4.java – It should prompt the user for two integers to enter then outputs their sum as an int

Errors5.java – Short interview program that asks the user two questions. First it asks for their weight in kg and second it asks for their age. The program then outputs their age in dog years and weight in lbs as integers without any decimal.

Errors6.java – This program should ask the user for 2 ints, 2 floats and 2 shorts. Then it'll calculate their average and print it as corresponding data type of the inputs. It works very similar to Manipulate.java from last lab but now it calculates average.

(Reflection) Debugging Process

- How many types of errors were there?
- How do you know when you have found every error (bugs)?
- What was your testing strategy of the modified program after it runs?

(Exercise) BooleanOp

Complete the println statements with the appropriate expression as intended by the string output. Some examples to help you get started are given in the program:

```
System.out.println(a + " is greater than " + b + " : " + (a > b));
```

Your job is to change all the statement with UNKNOWN to their proper Boolean expression as implied by the printout:

```
System.out.println(a + " is less than " + b + " : " + " UNKNOWN");
```

All the Boolean operations you will need are:

- Greater than - >
- Less than - <
- Equal - ==
- Not equal - !=
- Greater than or equal to - >=
- Less than or equal to - <=
- AND - &&
- OR - ||

Operations Hierarchy or precedence:

- () – parentheses have highest precedence
- *, /, % are next in evaluation
- +, -
- <, <=, >, >=
- ==, !=
- &&, || are last to be evaluated
- Always evaluate left to right

(Assessment) Expressions Evaluation

State and explain the results of the following expressions (you may want to show each step of evaluation) :

- $4 + 5 * 6 + 7 / 8$
- $4 + 5 * 6 < 7 / 8$
- $4 + 5 > 6 \ \&\& \ 7 < 8$
- $1 \ \&\& \ 0$

What to hand in

When you are done with this lab assignment, you are ready to submit your work. Make sure you have done the following **before** you press Submit:

- ◆ Include answers to Reflection and Assessment questions
 - ◆ Include answers Participation Activity 2.4.1, 2.4.2, 2.4.3, 2.4.4, 2.4.5 & 2.4.6
 - ◆ Attach fixed up Errors4.java, Errors5.java and Errors6.java
 - ◆ Attach filled in BooleanOp.java
 - ◆ List of Collaborators
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