CSE 121 – Lesson 2
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Music: I Don’t Live Here Anymore – The War on Drugs
Announcements, Reminders

• **Creative Project 0** due TONIGHT by 11:59 PM
• Programming Assignment 0 releasing later today—due January 16th
• IPL is open! - [Schedule and instructions](#) can be found on course website.
• **Just joined CSE 121?** Resubmission policy is your friend! See more in [syllabus](#).
• Reminder: Pre-Class Work and Section work are not graded! (but you should do them anyway 😁)
Recap: Data Types & Expressions

- Types: `int`, `double`, `String`, `Boolean`
- Expressions: Operators
- Beware of precedence! (order of operations)
Data Types in Java

In programming, you’re dealing with data...

• ints (whole numbers)
• doubles (real numbers)
• Strings
• booleans (true or false)
(PCM) Operators (for numerical & String values)

Numerical:
• + Addition
• - Subtraction
• * Multiplication
• / Division
• % Modulo or “Mod”
• <, >, <=, >=, ==, !=

Strings:
• + Concatenation

Booleans:
• ! Logical Not
• && Logical And
• || Logical Or
**Precedence**

**Parentheses**

**Multiplication, Modulo, Division**

**Addition (and Concatenation), Subtraction**

If multiple operators at the same level?

**Evaluate subexpressions from left to right!**
Example

1 + 2 * 3

6

7

(1 + 2) * 3

3

9
Work on Expressions/Types Practice Problems

Part 1

• Ed lesson linked from the course calendar

• Work with the folks around you!

• TAs and I will be walking around to help

5 + 2 * 4
1 + 2 / 3
6 * 5 % 7
Part 1 Walkthrough

5 + 2 * 4 = 13

1 + 2 / 3 = 1

6 * 5 % 7 = 2
(PCM) Mixing Types 1

- When mixing types in an expression, Java will convert one type to the other and then perform the operation "normally"

- ints can be converted to doubles
- Both ints and doubles can be converted to Strings
- How about the other way?...
When mixing types in an expression, Java will convert one type to the other and then perform the operation “normally”

Can we convert doubles to ints? Strings to doubles? Strings to ints?

🚨 Danger: Data loss or incompatibility! 🚨
Example 2

```
2 + 2 + "hello" + 3 * 5 + "10"
```

```
"4hello1510"
```
Work on Expressions/Types Practice Problems

Part 2

• Ed lesson linked from the course calendar
• Work with the folks around you!
• TAs and I will be walking around to help

5 * 3 + 1.0
8 / 3 * 2.0
8.0 / 3 * 2
"Hello" + "world"
1 + "2" + 3
1 + 2 + "3"
1 + "2" + (3 + 4)
Part 2 Walkthrough

- $5 \times 3 + 1.0 = 15.0 + 1.0 = 16.0$
- $8 \div 3 \times 2.0 = 2.0 \times 2.0 = 4.0$
- $8.0 \div 3 \times 2.0 = 2.666... \times 2.0 = 5.333...$
- "Hello" + "world" = "Helloworld"
- "1" + "2" + "3" = "12" + "3" = "123"
- "1" + 2 + "3" = 1 + 2 + "3" = "33"
- "1" + "2" + (3 + 4) = "12" + "7" = "127"
(PCM) Boolean Operators

- ! Logical Not
- <> <= >= Relational Operators
- == != Relational Operators (equality)
- && Logical And
- || Logical Or
(PCM) Precedence (updated)

Logical not

Parentheses

Multiplication, Modulo, Division

Addition (and Concatenation), Subtraction

Relational operators

Equality operators

Logical and

Logical or
Example 3

\[ 1 + 2 \times 3 \neq (1 + 2) \times 3 \]

\[ 1 + 6 \neq 3 \times 3 \]

\[ 7 \neq 9 \]

true
Work on Expressions/Types Practice Problems

Part 3

• Ed lesson linked from the course calendar
• Work with the folks around you!
• TAs and I will be walking around to help

\[ 5 \times 3 < 12 \]
\[ 10 \% 3 == 10 / 3 \]
\[ 5 < 9 || (7 != 7) \]
\[ !(1 + 2 == 3 && 10 \% 4 > 2) \]
Part 3 Walkthrough 1

\[
\begin{align*}
5 \times 3 &< 12 \\
15 &< 12 \\
\text{false}
\end{align*}
\]

\[
\begin{align*}
10 \% 3 &= 10 / 3 \\
1 &= 10 / 3 \\
1 &= 3 \\
\text{false}
\end{align*}
\]

\[
\begin{align*}
5 < 9 || (7 != 7) &= \text{false} \\
5 < 9 || \text{false} &= \text{true} \\
\text{true} || \text{false} &= \text{true}
\end{align*}
\]
Part 3 Walkthrough 2

\[ !\left(1 + 2 == 3 \land\lor 10 \% 4 > 2\right) \]
\[ !\left(1 + 2 == 3 \land\lor 2 > 2\right) \]
\[ !\left(3 == 3 \land\lor 2 > 2\right) \]
\[ !\left(true \land\lor 2 > 2\right) \]
\[ !\left(true \land\lor false\right) \]
\[ !\left(false\right) \]
true
Variables

• Now that we know about different types and data, we can learn about how to store it!

• Java allows you to create variables within a program. A variable has:
  • a type,
  • a name, and
  • (potentially) a value it is storing

Declaration:  \(\text{int } x;\)
Initialization:  \(x = 30;\)

Or all in one line:  \(\text{int } x = 30;\)