UNIVERSITY *of* WASHINGTON

LEC 02

CSE 121

Datatypes and Expressions

Questions during Class?

Raise hand or send here

sli.do   #cse121

BEFORE WE START

Talk to your neighbors:

What's your favorite song right now?

Respond on sli.do!

Music: ❄ CSE 121 26wi Lecture Tunes ❄

Instructor:	Miya Natsuhara			
TAs:	Amogh	Hayden	Anum	Sam	Shayna
	William	Aki	Abdul	Ethan	Jesse
	Johnathan	Spencer	Janvi	Jessica	Minh
	Anant	Savannah	Navya	Paul	Cayden
	Reese	Tamsyn	Ruslana	Carson	

Agenda

- **Announcements, Reminders** ⬅
- Intro Survey Recap
- Datatypes and Expressions Review
- Expressions Practice
- Combining Variables and Expressions

Announcements, Reminders

- Creative Project 0 due <u>tonight</u> by 11:59 PM

- Programming Assignment 0 releases later today

  - due Tuesday, January 20th at 11:59 PM

  - now on regular "cadence" (Wed release, due following Tue)

- IPL is open! <u>Schedule & instructions on website.</u>

- If you joined late, welcome!

  - Check out the <u>course website</u> and lecture recordings

  - Resubmissions are your friend!

- <u>Section credit and Pre-Section Work details</u>

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Intro Survey – things we're excited for!

- "Learning programming" / "Learning how to code"

- "Meeting more people!" / "working with my peers"

- "Learning something challenging"

- "making interactive programs like little games"

- "Learning the basics so computer science is less intimidating"

Intro Survey – things we're nervous about

- "failing" / "not knowing what to do and not feeling confident" / "coding isn't my strength"
  - *Everyone* struggles ("coming naturally" is a myth)
  - Remember, we don't expect you to get it perfect the first time! (Resubmissions)
- "that I am less experienced than everyone else"
  - This class is made for students with *no prior experience at all!* You're in the right place!
- "keeping pace while balancing [a busy schedule]" / "falling behind"
  - Utilize support systems (section, IPL, Ed, resubs, etc.)
- "final exam" / "quizzes"
  - We'll have more information and practice materials!
- "making friends to study with"
  - Remember last week there were lots of folks who wanted to meet other people and learn together! Let's create that welcoming environment ☺

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PCM: Datatypes & Expressions

- Programming is about data; we tell Java what **type** of data we have!

- Datatypes (so far): `int`, `double`, `String`, `boolean`

  - note: only `String` is capitalized!

- <u>All</u> values in a (Java) program have a type!

  - some are "obvious", e.g. 42 or `"hello world"`

    - aside: these are called **"literals"**

  - some are more complicated **expressions**!

PCM: Operators

We learned a *ton* of operators!

Numerical:

- \+ Addition
- \- Subtraction
- * Multiplication
- / Division (tricky!)
- % Modulo (or "mod")
- <, >, <=, >=, ==, != Relational

Strings:

- \+ Concatenation (not addition!)

Booleans:

- ! Logical Not
- && Logical And
- || Logical Or
- == and != Relational

PCM: **Precedence**

Operators have precedence (an order of operations).

In Math:

1. **P**arentheses

2. **E**xponent

3. **M**ultiplication

4. **D**ivision

5. **A**ddition

6. **S**ubtraction

In Java:

1. Parentheses

2. Logical not

3. Multiplication, Modulo, Division

4. Addition (and concatenation), Subtraction

5. Relational operators

6. Equality operators

7. Logical AND

8. Logical OR

Expressions in "little steps"

PCM: Conversions

When mixing types in an expression, Java will <u>convert</u> one type to the other and then perform the operation "normally".

Some conversions are straightforward:

- `ints` can be converted to `doubles` (add `.0`)

- `ints` and `doubles` can be converted to `Strings` (add `""`)

So, Java does these for you! (is this good? controversial!)

New: Conversions (Gone Wrong!!)

Other conversions are "lossy", because you <u>lose</u> data.

- e.g. to make `3.14` an `int`, you'd probably pick either 3 or 4 – but either one loses data

- Java won't do this automatically for you – you need to "ask".
  - called a **type cast**: you'll see this in Friday's PCM + in P0

Some conversions don't make sense.

- how would you convert "Beyoncé" to an `int`? `double`?

- Java really doesn't let you do these…

Practice: Think

What does this expression evaluate to?

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

a. "22hello3510"
b. "22hello1510"
c. "4hello1510"
d. "4hello25"
e. This will cause an error

Practice: Pair

What does this expression evaluate to?

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

a. "22hello3510"
b. "22hello1510"
c. "4hello1510"
d. "4hello25"
e. This will cause an error

Expression example with mixing types

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

"4"

"15"

"4hello"

"4hello15"

"4hello1510"

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Work on Expressions and Types Practice (1)

- On the Ed lesson for today, and on your handout
- Work with folks around you!
- TAs & I will walk around and 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 1 Walkthrough

Work on Expressions and Types Practice (2)

- On the Ed lesson for today, and on your handout

- Work with folks around you!

- TAs & I will walk around and help!

```
5 * 3 < 12
10 % 3 == 10 / 3
5 < 9 || (7 != 7)
!(1 + 2 == 3 && 10 % 4 > 2)
```

Part 2 Walkthrough

Part 2 Walkthrough (2)

```
!(1 + 2 == 3 && 10 % 4 > 2)

!(1 + 2 == 3 &&    2   > 2)

!(   3    == 3 &&    2   > 2)

!(   3    == 3 &&       false )

!(      true    &&     false )

!(             false           )
               true
```

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- **Combining Variables and Expressions** ⬅

Ed time :)

Applying what we learned to variables!

What's in a (variable) name or String?

Switch over to Ed and do some experiments (with a partner), then report back on sli.do.

1. What types of characters are "allowed" in Strings?

2. What types of characters are "allowed" in variable names?

sli.do #cse121

Food for Thought!

This is the beginning of a very interesting rabbit hole!

(but also, a decision made by the Java designers)

Whether or not you program for a career,
<u>you will also make decisions like these</u>!

- for example, what's a "<u>valid name</u>"?

- a theme we'll revisit (and something to continuously reflect on!)