Week 9: Lab 6

CS2030S Lab 16B

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Overview

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3. Lab 6 Brief

1: Recap

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First Class Citizens

- First Class Citizen:
    - Can be assigned to a variable
    - Can be returned from a method
    - Can be passed into a method
- Anonymous classes
- Transformer<A, B> transformer = new Transformer< >() {...}

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Anon Classes and Lambda

- Interfaces that have only one method: @FunctionalInterface
- For anonymous classes implementing functional interface:
    - Can use lambda function instead

- Lambda functions:
    - Have no name
    - Use {} for multiple lines
    - Can also be replaced by method references
        - shape -> shape.toString()
        - Shape::toString

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Method References

Method References can be used for:

1. Static method in a class
2. Instance method of a class or interface
3. Constructor of a class

```
Box::of       // x -> Box.of(x)                           |
Box::new      // x -> new Box(x)                          |
x::compareTo  // y -> x.compareTo(y)                      |
A::foo        // (x, y) -> x.foo(y) or (x, y) -> A.foo(x,y)|
```

Pure Functions

- Deterministic: the same output is always returned for the same input.

No side effects:

- Cannot throw exceptions
- Cannot modify external variables
- Cannot modify parameters/arguments
- No I/O operations

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Method Currying

Essentially Higher Order Functions

In Java:

- b -> c -> d -> b+c+d;
- Type?
- Transformer<A, B> transforms type B to type A
- Transformer<Int, ?> lambda = … (POLLEV)

- Transformer<Int, Transformer<Int, Int>>
- To resolve, lambda.apply(1).apply(2).apply(3) where apply simply applies the transformer function

Purpose:

- To partially apply the function

Lazy Evaluation

To delay computation of e.g. 2 + 3,
Do this: Producer<Integer> producer = () -> 2 + 3;

The computation of `2 + 3` is not done until producer.produce() is called.

- Similarly, any kind of lambda function is not executed until it is called.
- Use memoization to only call functions once.

That’s all for today! Thanks for coming!

Feedback