Overview

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Functional Techniques

Introduction

In this lesson on functional programming, we will follow a string of related techniques. First, we will look at closures and compare them to classes and objects and thereby bridge the gap between functional programming and object oriented programming. We will then see how closures form the basis of function currying, and in turn how function currying facilitates functional composition.

We wrap up our series of functional programming lessons with an overview of the Itertools and Functools libraries which facilitate the techniques covered across all three lessons.

Learning Objectives

Upon successful completion of this lesson, you will be able to:

* define a closure as a factory for creating stand-alone methods.
* describe the arity of a function.
* curry a function to reduce its arity, its number of arguments in particular, and thereby make it suitable for functional composition.
* use the Itertools library.
* use the Functools library.

New Words or Concepts

* Closure
* Scope
* Curry
* Arity
* Functional Composition
* Itertools
* Functools

Prerequisites

Beyond the content covered on this and the prior class, there are no specific prerequisites for this lesson.

Before you Start

Required Reading

Functional Programming Modules

https://docs.python.org/3/library/functional.html

Closures

https://en.wikipedia.org/wiki/Closure_(computer_programming)
http://wiki.c2.com/?ClosuresAndObjectsAreEquivalent

Scope or *Lexical Scope* in Python

https://en.wikipedia.org/wiki/Scope_(computer_science)#Python

Currying

https://en.wikipedia.org/wiki/Currying
https://en.wikipedia.org/wiki/Arity
https://en.wikipedia.org/wiki/Function_composition_(computer_science)

Optional Reading

Lott, S. (2015) Chapter 14. The PyMonad Library. Functional composition and currying. In Functional Python Programming.

Lott, S. (2015) Chapter 8. The Itertools Module. In Functional Python Programming.

Lott, S. (2015) Chapter 10. The Functools Module. In Functional Python Programming.

What is the advantage of currying?

https://softwareengineering.stackexchange.com/questions/185585/what-is-the-advantage-of-currying

FP is Dead, Long live FP

https://youtu.be/ROL58LJGNfA

Suggested Workflow

- Explore the "Before you Start" readings and video
- Work through the lesson content pages
- Watch the required videos
- Submit your assignment

At the End of the Lesson

What material in this lesson do you still feel unclear about? Please use the discussion forum for this lesson to describe any concepts or ideas you've struggled with this week. Your instructor will address concepts that seem problematic for several students. You may also want to address issues raised by other students or ask for their help.