Introduction to Scala

Learning Objectives:

Get introduced to Scala and learn about the new features of Scala; understand the types

- What is Scala?
- Origin of Scala
- Features of Scala
- Scala Collection Library
- Understanding types in Scala
- Ways to parameterize a type
- Kinds of types
- Using types to express domain constraints

Deep Dive into Functions

Learning Objectives:

Look in detail at different flavors of defining a function. Apply the knowledge about types to make our functions polymorphic and of a higher order. Learn about recursion, tail recursion, and trampolining as important aspects of functional programming for the JVM.

- Ways to define a function
- Polymorphic functions
- Higher order functions
- Recursion
- Trampolining
- Object-oriented aspects of functions

Hands-on:
Implement a head-recursive function. Implement a tail-recursive function for factorial calculation. Implement a recursive function for factorial calculation using trampolining.

Implicits and Type Classes

Learning Objectives:

Learn about different types of implicits and recap the implicit scope resolution rules. Learn about type classes, the central implementation mechanism that's utilized in modern functional programming libraries.

- Types of implicits
- Context bounds
- Type classes
- Type classes and recursive resolution
- Type class variance
- Implicit scope resolution rules

Hands-on:

Implement implicit conversions, implicit classes, and implicit parameters.

Testing in Scala

Learning Objectives:

Understand the situations in which property-based testing can be especially useful, and look at how the expected properties can be formulated and the test data can be produced.

- Scala testing ecosystem
- Introduction to Behavior Driven Development
- ScalaTest
- Concept of property-based testing
- Properties
- Generators
- Shrinkers
- Properties as laws

Hands-on:

- Define an invariant property for sorting a list.
- Define an idempotent property for sorting a list.
- Define an inductive property for sorting a list.

Collections and Functional Programming

Learning Objectives:

Learn about functions and high order functions. Also, learn about the usage of collection library.

- Overview and usage collection library
- Immutability, persistent data structures and structural sharing

- Functions and high-order functions

Hands-on:

Use Immutability, persistent data structures and structural sharing.

For Loops and For Expressions

Learning Objectives:

Revisit for loops and for expressions, learn about the differences and compose high order functions.

- For Loops
- For Expressions
- Difference between for loops and for expressions
- Composing high-order functions

Hands-on:

Implement for loops and for expressions.

Inheritance and traits

Learning Objectives:

Learn about linearization, scala type system and traits.

- Scala type system
- Mix-in traits
- Linearization

Hands-on:

Mix-in traits in a class to use Linearization process.

Pattern Matching

Learning Objectives:

Learn about Pattern matching; exceptions, tuples.

- Usage and benefits
- Catch exceptions

- Deconstruct tuples

Hands-on:

Implement pattern matching by using exceptions and tuples.

Exploring Built-In effects

Learning Objectives:

Learn how the mentioned aspects are covered by Scala's standard library.

- Foundations of encoding runtime aspects with types
- Option
- Either
- Try
- Future

Hands-on:

Explore built-in effects and the effects defined in the standard library, apply option, try, either and then future.