JAVA Programming Basics
Course Curriculum

Java Overview

- How the Java Environment Works

- HelloWorld Program

- Launch Single-File Source Code

- jShell REPL

- Comments and Terminators

- Identifiers

Syntax and Types

- Java Variables

- var declarations

- Java Types

- Basic Java Types

- Reference types

- Conditional Expressions

- Logical operators

- If statement

- While Statement

- Do Statement

- For statement

- Special flow of control operators

- Switch statement

- Numerical Operators

- Casting

- Strings

Classes and Objects

- What is an Object?

- Objects and Encapsulation

- What is a Class?

- Class Object Relationship

- The Person class

- Variable types

- Constructors

- Working with the class Person

Working with Methods

- Method Definitions

- Method Arguments & Return Types

- Overloading Methods

- Method Invocations

- Defining methods

- Constructors Versus Methods

- toString() method

- Adding behaviour to the class Person

- The PersonApp program

Class Inheritance

- Inheritance in Java

- Implementing Inheritance

- Rule for overriding methods

- Rules for Polymorphic variables

- Casting and Inheritance

- The super variable

- Constructors and Inheritance

Abstract Classes, Class Side Behaviour and Final

- Abstract Classes

- Abstract Classes in Java

- Defining an Abstract Class

- Extending an Abstract Class

- Using Concrete Subclasses

- Class Side Information

- Class Side Data

- Class Side Behaviour

- Final Keyword

Java Interfaces and Enumerations

- What is an Interface in Java?

- Basic Interface Definitions

- Implementing an Interface

- Interface

- Using an Interface in a Contract

- Inheritance by Interfaces and Types

- Classes and multiple Interfaces

- Default Interface Methods

- Static Interface Methods

- Enumeration Support

- Implementing Enumerated Types

Packages

- Packages

- Class-Package Relationship

- Declaring Packages

- Packaging the Person class

- Role of the Classpath

- JAR Files

- Encapsulation and Packages

- Class modifier

- Constructor Modifier

- Variable Modifier

- Method Modifiers

- Package Summary

Java 9+ Modules

- Introduction the JPMS

- Java Platform Module System

- Why we need modules

- Look at what modules are

- How to define a module

- How to create a single module application

- How to link modules

Arrays

- What is a Java Array?

- Creating arrays of Objects

- Accessing Array Elements

- Main method args array

- Short hand from

- Ragged Arrays in Java

- Working with Ragged Arrays

- Implications of Inheritance for Arrays

- Integer Array Example

Java Generics

- Generics and Basic Types

- Generics and Their Types

- Adding Generics to your classes

- A simple user defined Generic class (the Bag class)

- Type Equality

- Generic Collection Assignment

- Generics and Inheritance

Collections Classes

- Collections API

- ArrayList

- Interfaces v Concrete Classes

- HashMap

- Iteration and Enumeration

- Queues

- Generics and Collections

- For Loops

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- Boxing and Unboxing

- Raw Collections

Java 9+ Immutable Collections

- Why Immutability?

- Immutability

- List.of Factory method

- Set.of Factory method

- Map.of Factory method

- Immutable Collection Nodes

- Java 10 Enhancement

Error and Exception Handling

- Errors & Exceptions

- Exception types in Java

- Part of the Exception Hierarchy

- Exception Handling

- Local Handling

- Exception Handling Example

- Passing the Buck

- Try with Resources

- Defining new Exceptions

- Chained Exceptions

Nested / Inner Classes

- Four types of Nested / Inner Class

- Properties of Member level inner classes

- Properties of Method Inner classes

- Anonymous Method Inner classes

- Java 11 Nest-based Access

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Java Functions

- Functional Programming
- Functional Programming in Java
- Functional Interfaces
- Using Functional Interfaces
- Lambdas in Java
- Closing / Capturing Variables
- Returning Functions
- Combining Functions
- Higher Order Functions
- Defining Lambdas
- Method References

Java Optional Type

- Null considered Harmful
- Java Optional Type
- Optional Variables
- Creating Optional values
- Method Summary

Java 9 Streams

- Streams
- Streams from Collections
- Terminal / Non Terminal Operators
- Creating a Stream
- Map Operation
- Collectors
- Filter operation
- Sorted operation

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- ForEach

- Pipelining Operations

- Parallel Streams

- Not just collections

Files, Paths and IO Streams

- Introducing NIO.2

- Paths class and Path Interface

- The Files class

- File Attributes

- The File Watcher Service

- IO Streams

- Scanners

By the end of this course, you will have:

- Learnt about Java class and Objects

- Explored defining methods and properties

- Examined Class Inheritance

- Understood Java Interfaces and Enumerations

- Considered how to use Packages and Modules

- Learnt about Functional Programming in Java

- Understood how to handle Errors and Exceptions

- Worked with Files, paths and Stream IO

- Used the new Streams API for processing data

- Explored the Collection classes