Suggested Teaching Guidelines for

Java Programming PG-DBDA August 2024

Duration: 34 class room hours + 36 Lab hours

Objective: To reinforce knowledge of Java Programming

Prerequisites: Knowledge of Linux command, Oops concepts and any programming language

Evaluation method:
Theory exam– 40% weightage
Lab exam – 40% weightage
Internal exam– 20% weightage

List of Books / Other training material

Text Book :

Java for Dummies, Barry Burd ,Wiley India, Seventh Edition.

Reference:

1. Java Server Programming (J2EE 1.7 Edition) Black Book by Dreamtech Software Team
2. Core Java : Fundamentals - Volume 1 Gary Cornell, Cay S. Horstmann/ Pearson
3. Advanced Java programming by Uttam K Roy / Oxford University press

Note: Each session having 2 Hours

Session 1 & 2:
Lecture

- Java 8 Basics :Overview of Java, Features of Java, Scope of variables
- Object Oriented Concepts
- Java Virtual Machine –Overview
- JDK and its usage (Java Compiler, Java Runtime, Java Debugger, Java doc)
- Working with Data Types: Structure of a Java Class, Importing Packages, Difference between object reference variables and primitive variables, how to read or write to object fields)

Session 3:
Lecture

- Object's lifecycle(creation, reassignment, garbage collection: new, finalize)
- Wrapper classes (Boolean, Double and Integer)
- Operators (Unary, Binary, Arithmetic, Assignment, Compound, Relational, Logical, Equality) and Control Statements (if, if-else, for, while, switch, do-while, break and continue, ternary constructs)

Assignment – Lab:

1. Create Java Program for simple calculator, compile & test it.

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Session 4:
Lecture

- Packages and classpath
- Arrays
- Understanding of String Class, StringBuilder Class, StringBuffer class
- Methods and Encapsulation: Methods, Access Modifiers, Method Overloading, Passing Data, Creating Constructors, Immutable Classes

Assignment – Lab:
Get yourself acquainted with java environment. Build a class Emp, which contains details about the employee and compile and run its instance

Session 5:
Lecture

- Class Inheritance, Abstract Classes, Inner Classes, Interface and Implementation classes.
- Understanding Polymorphism: Object vs Reference, Object Casting, Virtual Methods, Method Overriding

Assignment – Lab:
Create an inner class for a manager, which contains information about the manager. Use the appropriate interfaces. Create an anonymous inner class for Tech. Members using the Session one assignment

Session 6:
Lecture

- Exception-Handling: Basics, Role of Exceptions, Types
- Using try and catch, Multiple Catch, Nested try (throw, throws, finally)
- Built-in Exceptions, Runtime Exceptions Checked Exceptions, Errors
- Creating own Exception Subclasses

Assignment – Lab:
Create a user defined exception to check whether your employee exist in your data structure and using the catch and finally block. Redeem an appropriate solution

Session 7:
Lecture

- Enumerations, Auto boxing, and Annotations

Assignment – Lab:
Create sample classes to understand boxing & unboxing. Use different methods of java defined wrapper classes

Session 8:
Lecture

- java.util, java.lang

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Assignment – Lab:
Create an appropriate data structures to store your employee object and use the java.util.package properties.

Session 9 & 10:
Lecture

- Generics and Collections

Assignment – Lab:

1. Implement String class and util package
2. Using the collection framework define an appropriate interface to your above application

Session 11:
Lecture

- Functional Programming Overview
- Functional Interfaces
- Explore java.util.function package : Predicate, Map, Consumer, Supplier
- Lambda Expressions
- Impact of Functional programming upon Collection Framework

Session 12:
Lecture

- Introduction to Streams
- Streams vs. Collections
- java.util.stream.Stream API
- Types of Primitive Streams : IntStream,LongStream,DoubleStream & its API
- Different operations on streams : filter, map, reduce, sort, flatMap, anyMatch, count, boxing.
- Overview of Java 8/17 Date Time API

Assignment – Lab:

1. Process bank accounts collection using stream functions.

Session 13 & 14:
Lecture

- Java Concurrency: Using threads in Java, Life cycle of thread
- Advantages and issues
- Thread class, thread groups
- The Runnable interface
- Synchronization

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Session: 15:
Lecture

- The java.io Package
- Files
- Byte Streams and Unicode Character Streams
- Persistence of objects
- Object Serialization Methods

Assignment – Lab:

- Make your above Employee, manger classes object persistent.

Session: 16:
Lecture: Reflection in Java & JVM Architecture

- Why Java Reflection
- Basic Reflection API for finding out details of the class name, super classes & interfaces.

Assignment – Lab:

- Use the Java Reflection API to print the name of a given class, its superclass, and all implemented interfaces.
- Create a Java program that lists all the methods declared in an interface implemented by a class using reflection.

Session 17:
Lecture

- Introduction of JDBC API
- JDBC Architecture
- JDBC Drivers
- Drivers, Connection, Statement, Prepared Statement and Result Set interfaces and their relationship to provider implementations

Assignment – Lab:

- Build an application to get student's details using database.