Spring & Hibernate

Overview:

The spring framework is an application framework that provides a lightweight container that supports the creation of simple-to-complex components in a non-invasive fashion. Spring's flexibility and transparency is congruent and supportive of incremental development and testing. The framework's structure supports the layering of functionality such as persistence, transactions, view-oriented frameworks, and enterprise systems and capabilities.

Objective:

- ❖ Explain how the issues associated with object persistence in a relational model are addressed by Hibernate
- ❖ Understand the relationships between SQL, Java, Spring, and Hibernate
- ❖ Discuss the challenges to adopting Hibernate in the enterprise
- ❖ Write applications that take advantage of the Hibernate Persistence Manager.
- ❖ Map Java classes to relational tables.
- ❖ Capture both relational and inheritance associations in metadata using either XML or the Java 5 Annotations mechanism.
- ❖ Create and use mappings between Java classes and relational databases.
- ❖ Understand how identity and keys are handled in Hibernate.
- ❖ Understand the persistent object lifecycle and how that relates to transactions and concurrency.
- ❖ Take advantage of Hibernate's data filtering and interception.
- ❖ Explain the issues associated with complex frameworks such as Java EE and how Spring addresses those issues
- ❖ Write applications that take advantage of the Spring container and the declarative nature of assembling simple components into applications.
- ❖ Work with Spring's support for transactions
- ❖ Understand how to use Hibernate within the Spring framework

Pre-requisite / Target Audience:

Prerequisites for learning Spring Framework include basic knowledge of Java and databases.

- ❖ Knowledge of core java.
- ❖ Knowledge of database.
- ❖ And basic Knowledge of web application development.

Module 1: Spring Basics

This module is the core of the Spring Framework. It provides implementation for features like ,IoC (Inversion of Control) and Dependency Injection with singleton design pattern.

- ❖ What is Spring Framework
- ❖ Inversion of Control
- ❖ Dependency Injection
- ❖ Bean Factory
- ❖ Developing First Spring Application

Module 2: Built-in Bean Factories

This module provides implementation for the factory design pattern through BeanFactory, and we will learn implementation of ApplicationConext.

- ❖ Application Context
- ❖ Wiring Beans
- ❖ Bean Lifecycle in Container
- ❖ Spring Events

Module 3: Spring AOP

In this module we will learn by separating application business logic from system services, Spring Framework supports Aspect Oriented Programming and enables cohesive development.

- ❖ Introduction to AOP
- ❖ Role of AOP in Spring
- ❖ AOP Advice
- ❖ AOP Pointcuts
- ❖ Spring AOP Introductions
- ❖ ProxyFactoryBean

Module 4: Spring Data Access

This module provides JDBC abstraction layer which eliminates the need of repetitive and unnecessary exception handling code.

- ❖ JDBC Abstraction Layer
- ❖ Data Access Exceptions
- ❖ DAO Support

Module 5: Spring O-R Mapping

ORM stands for Object Relational Mapping. This module provides consistency/ portability to our code regardless of data access technologies based on object oriented mapping concept.

- ❖ What is O-R Mapping
- ❖ O-R Mapping support in Spring
- ❖ Hibernate Support / Mapping

Module 6: Spring Transaction Management

This module supports programmatic and declarative transaction management for classes that implement special interfaces and for all your POJOs. All the enterprise level transaction implementation concepts can be implemented in Spring by using this module.

- ❖ Transaction Abstraction in Spring
- ❖ Transaction Strategies
- ❖ Programmatic Transaction
- ❖ Declarative Transaction

Module 7: Spring Remoting and Enterprise Services

In this module we will learn how spring Remoting will be implemented by following RMI and various remoting technique.

- ❖ Introduction to Spring Remoting
- ❖ Java RMI in Spring
- ❖ Accessing JNDI
- ❖ Invoking EJB from Spring
- ❖ Web Service in Spring using JAX-RPC Support
- ❖ Messaging Support in Spring using JMS
- ❖ Sending Mail with Spring Mail
- ❖ Scheduling using Timer Support

Module 8: Spring Web MVC Framework

This module contains Model-View-Controller (MVC) based implementation for web applications. It provides all other features of MVC, including UI tags and data validations. Web MVC Architecture

- ❖ Role of DispatcherServlet
- ❖ Controller
- ❖ Handler
- ❖ View Resolving
- ❖ Data Binding
- ❖ File Upload Support

Module 9: Securing Spring Applications

In this module we will learn how spring security will be implemented by HTTP basic authentication and following concept.

- ❖ Acegi Security System for Spring
- ❖ Authentication
- ❖ Access Control
- ❖ Web Application Security
- ❖ Method Invocation Security

Module 10: Spring Boot

In this module we will learn how Spring Boot makes it easy to create stand-alone, and pre compiled spring based Applications that we can "just run".

- ❖ Introduction Spring boot
- ❖ Installation of STS in eclipse
- ❖ Using Spring STS IDE
- ❖ Using Spring Initializer Website
- ❖ Hello World example using spring boot
- ❖ Java-Based Applications

Relational Persistence Using Hibernate

Module 1: Introduction to Hibernate

In this module we will learn how Hibernate framework simplifies the development of java application to interact with the database. Hibernate is an open source, lightweight, ORM (Object Relational Mapping) tool.

- ❖ Drawbacks of direct JDBC
- ❖ Plain Old Java Object (POJO)
- ❖ What is O-R Mapping
- ❖ Simple Database Application

Module 2: Hibernate Configuration

In this module we will learn configuration of hibernate and more about how to add various jar file by creating user defined lib.

Module 3: Hibernate Concepts

In this module we will learn how primary key will be configured and how we can make auto increment and crud example by using hibernate.

- ❖ Id and Primary Key

- ❖ Id Generation Methods
- ❖ SessionFactory
- ❖ Session
- ❖ Transaction
- ❖ Developing CRUD Application

Module 4: Hibernate O-R Mapping

In this module we will learn how different types of operation with respect to database and how the relationship of database can be maintained by following OR-Mapping.

- ❖ Mapping Declarations
- ❖ Modeling Composition with Relationship
- ❖ Modeling Composition with Components
- ❖ One-to-One Association
- ❖ One-to-Many Association
- ❖ Many-to-Many Association
- ❖ Uni and Bidirectional Associations
- ❖ Hibernate Value Types
- ❖ Custom Types

Module 5: Manipulating and Querying

In this module we will come to know how hibernate hibernate detects any changes made to that object and synchronizes it with database when we close or flush the session.

- ❖ Persistent Objects
- ❖ Object Loading
- ❖ Executing Queries
- ❖ Iterating Results
- ❖ Scalar Results
- ❖ Bind Parameters
- ❖ Pagination

Module 6: Hibernate Query Language

This module will learn about Hibernate Query Language (HQL) is an object-oriented query language, similar to SQL, but instead of operating on tables and columns, HQL works with persistent objects and their properties

- ❖ Select clause
- ❖ From clause
- ❖ Where clause

- ❖ Aggregate functions
- ❖ Expressions
- ❖ Sorting
- ❖ Grouping
- ❖ Sub queries

Module 7: Criteria Queries

In this module we will learn how to perform restriction between different classes and range of built-in criterion types (Restrictions subclasses).

- ❖ Creating Criteria
- ❖ Narrowing the Result
- ❖ Ordering the Result

Module 8: Native SQL

In this module we will learn use of Session.createSQLQuery(String query) to create the SQLQuery object and execute it.

- ❖ Using SQL Query
- ❖ Named SQL Query
- ❖ Using Stored Procedure for Querying
- ❖ Creating Custom SQL for CRUD

Module 9: Transactions and Concurrency

In this module we will come to know how a transaction is a unit of work in which either all operations must execute or none of them. To understand the importance of transaction,

- ❖ Session and Transaction Scopes
- ❖ Database Transaction Demarcation
- ❖ Optimistic Concurrency Control
- ❖ Pessimistic Concurrency Control

At the end of the course participants will be able

- ❖ Work in any spring and hibernate based project.
- ❖ Understand complete ORM feature by using hibernate.
- ❖ Messaging service
- ❖ Simple storage service.

Real-time Project involving most of the above concepts with following will be provided

- Product Abstract Document

- Requirement Specification Document

- **Step-by-Step procedure for building the project from ground up**

- Complete Source Code

- Database Script with Sample data

- Instructions to Setup the Project on a Development box

- Instruction to Deploy the project on Production Box / Tomcat server

At the end of the course participants will be able to

1. Work in spring and hibernate application.

2. Will be able to perform all operation including transaction management etc.