Spring Highlights

EJBs are heavyweight and tightly coupled and Springs are lightweight and loosely coupled.

Heavyweight uses OS libraries and lightweight doesn’t use.

Tightly coupled dependent on other layers.

Loosely coupled doesn’t dependent on other layers.

ORM tools: - JDBC, Hibernate, JPA, ibatis

Spring developed using Runtime Polymorphism and association (has-A relation).

IOC container reads XML documents and pass the reference to pojo.

**IOC containers: Core and J2EE Container.**

**Spring MVC Container: Web Container.**

Core Container = Bean Factory(Interface) 🡪 XMLBeanFactory

J2EE Container = ApplicationContext(Interface) 🡪 ConfigurableApplicationContext(Interface) 🡪 ClassPathXmlApplicationContext(Class)

MVC Conatiner = WebApplicationContext(Interface)🡪 WebApplicationContextUtil (Factory Class)

XMLBeanFactory Container creates instance of pojo in user request (Lazy container).

ApplicationContext Container creates instance of pojo on loading xml file in case of singleton scope (Eager container).

What containers do:-

1. Create instance of pojo classes.
2. Mange life cycle of pojo.
3. Do dependency injection in pojo.

In xml file configure dtd or xsd in main beans tag.

Scope of beans: - Singleton, Prototype

MVC Scope of beans: - Request, Session, Global Session (Context)

Spring can access private constructors.

Two types of Dependency Injection:- Constructor Parameters and Setter Method

Bean references.

Required annotation. To activate annotation use “RequiredAnnotationBeanPostProcessor” class as bean.

P- Namespace and C- Namespaces.

Auto wiring: Auto dependency injection. Can inject secondary types only.

Auto wiring using Annotations. Activate it using bean class.

Stereo Type : Component, Controller, Repository, Services.

To create object by using auto scanning.

Use context-annotation to activate all annotations.

Inject static variables. “MethodInvokingFactoryBean”

How to create/get instance of java Singleton class, use factory-method tag in bean if static method.

If instance method use factory-bean tag also.

Create factory class by implementing factorybean interface.

Maintain pojo lifecycle 🡪 pojo implementing interfaces, configure in beans.xml, use annotations.

Classes to activate annotations.

DI by lookup method.3rd type.

What are lookup method? Interface methods, abstract method, and concreate method which we are overriding.

Method replacer.

DI using @Resource and @Inject. These are given by j2ee.

J2EE Stereo Types: @Named

Load properties from property file.

I18N – Language support

L10N – Business and Validation support.

IOC ApplicationContextListners.

Spring MVC using JSP model architecture

DispatcherServlet talk with hanlderMapping, Controller and View resolver.

Dispatcher Servlet Maping:-

1. Same name of spring xml file (dispatcher-servlet.xml) as dispatcher servlet name.
2. Read any xml file using init-param tag in servlet tag.
3. Read xml file using context-param and listener tags.

Handler Mapping types:

1. Bean Name handler mapping (Using name of pattern and controller mapping) (default).
2. Controller Class Name Handler Mapping (Same name controller automatic will find it)
3. Simple Url Handler Mapping (Map pattern to Id)

Controllers:-

1. Implementing Controller interface.
2. Extending AbstractController Class.
3. Extending ParameterizableViewController Class. (can set viewName DI).
4. UrlFileNameController (Just to forward to other page).
5. Throwaway Controller (like Struts 2 Action Class ,populate form data) (removed in 3.0)
6. MultiActionController (No override method, method name should be same as action name, if want to change method name as action name use method name resolver)
7. Basecommand controller
8. Abstract command controller.
9. AbstractForm controller.
10. Simpleform controller.
11. AbstractWizardFormController.

DAOs.

Spring DAO -> Use Interface –Implementation model.

1. Before implementing DAO classes must need to provide DAO interface.
2. In DAO interface, create signature with model objects.
3. In DAO implementations, get connection from connection pool.

Sun Datasources DS Implementations for connection pool:-

Apache 🡪 BasicDataSource

Mchange (c3p0) 🡪 CombopoolDataSource (Small Enterprise apps use this).

Spring 🡪 DriverManagerDataSource

Oracle Weblogic 🡪 WeblogicDataSource

Use JDBC Template for Spring JDBC implementation

**AOP Aspect Orient Programing**

1. Before - Method before advice
2. After :- After returning advice
3. Around :- Method Interceptor
4. While exceptions :- Throws Advice

Proxy Class: - ProxyFactoryBean: - to combine business code with services in controller.

Aspect – A Service

Advice – Service Provider

Point Cut – A point/condition to execute aspect for business methods

Advisor – This is a point cut with advice combination

Proxy – weaver – It combine services code with business

Target – business object

Approaches to implement AOP

1. Programmatic
2. Declarative (Xmls)
3. Annotations

Conditions execute/not execute service for a method (Staticmethodpointcut and Namemethodpointcut classes)

Advisors:-

DefaultPointCutAdvisor

RegExMethodPointCutAdvisor

Aspect: a modularization of a concern that cuts across multiple classes. Transaction management is a good example of a crosscutting concern in enterprise Java applications. In Spring AOP, aspects are implemented using regular classes (the schema-based approach) or regular classes annotated with the @Aspect annotation (the @AspectJ style).

Join point: a point during the execution of a program, such as the execution of a method or the handling of an exception. In Spring AOP, a join point always represents a method execution.

Advice: action taken by an aspect at a particular join point. Different types of advice include "around," "before" and "after" advice. (Advice types are discussed below.) Many AOP frameworks, including Spring, model an advice as an interceptor, maintaining a chain of interceptors around the join point.

Pointcut: a predicate that matches join points. Advice is associated with a pointcut expression and runs at any join point matched by the pointcut (for example, the execution of a method with a certain name). The concept of join points as matched by pointcut expressions is central to AOP, and Spring uses the AspectJ pointcut expression language by default.

Introduction: declaring additional methods or fields on behalf of a type. Spring AOP allows you to introduce new interfaces (and a corresponding implementation) to any advised object. For example, you could use an introduction to make a bean implement an IsModified interface, to simplify caching. (An introduction is known as an inter-type declaration in the AspectJ community.)

Target object: object being advised by one or more aspects. Also referred to as the advised object. Since Spring AOP is implemented using runtime proxies, this object will always be a proxied object.

AOP proxy: an object created by the AOP framework in order to implement the aspect contracts (advise method executions and so on). In the Spring Framework, an AOP proxy will be a JDK dynamic proxy or a CGLIB proxy.

Weaving: linking aspects with other application types or objects to create an advised object. This can be done at compile time (using the AspectJ compiler, for example), load time, or at runtime. Spring AOP, like other pure Java AOP frameworks, performs weaving at runtime.

If you only need to advise the execution of operations on Spring beans, then Spring AOP is the right choice. If you need to advise objects not managed by the Spring container (such as domain objects typically), then you will need to use AspectJ.

final methods cannot be advised, as they cannot be overridden.

**Spring MVC**

WebApplicationInitializer implement to initialize the dispatcher Servlet in java config.

AbstractAnnotationConfigDispatcherServletInitializer - An abstract base class implementation of this interface named AbstractAnnotationConfigDispatcherServletInitializer makes it even easier to register the DispatcherServlet by simply specifying its servlet mapping and listing configuration classes - it’s even the recommended way to set up your Spring MVC application.

**DispatcherServlet initialization parameters**

1. contextClass - Class that implements WebApplicationContext, which instantiates the context used by this Servlet. By default, the XmlWebApplicationContext is used.
2. contextConfigLocation - String that is passed to the context instance (specified by contextClass) to indicate where context(s) can be found.
3. Namespace - Namespace of the WebApplicationContext. Defaults to [servlet-name]-servlet.

**Spring in Action Book**

AOP: - Cross Cutting Concerns: - any functionality that affects multiple points of an application. Security, for example, is a cross-cutting concern, in that many methods in an application can have security rules applied to them.

Crosscutting concerns can now be modularized into special classes called **aspects**.

**Inversion of Control (IoC)** refers to a programming style where a framework or runtime, controls the program flow. Inversion of control means we are changing the control from normal way. It works on Dependency Inversion Principle. Inversion of Control (IoC) means that objects do not construct other objects on which they rely on. Instead, the application will get these objects from an external framework (an IoC container). **IoC** is a generic term meaning rather than having the application call the methods in a framework, the framework calls implementations provided by the application.

**DI is a software design pattern** that allow us to develop loosely coupled code. DI is a great way to reduce tight coupling between software components. DI also enables us to better manage future changes and other complexity in our software. The purpose of DI is to make code maintainable.

**Web Services**

WS Components:-

1. WSDL
2. UDDI
3. SKELTON
4. STUB
5. SOAP Protocol
6. HTTP Protocol

Java WS APIs:-

1. JAX-RPC – Synch WS – develop Soap
2. JAX-M – to Develop Async WS
3. JAX-WS – Synch WS – Soap
4. JAX-RS – Synch WS – Restful

WS Providers:-

1. JAX-RPC
   1. Sun Implementation - Sun Microsystem
   2. Axis 1 - Apache
   3. Weblogic Impl – BEA
   4. Websphere – IBM
   5. JBoss – Redhot
2. JAX-WS
   1. JAX-WS RI (reference impl) – Sun Micro
   2. Metro – Sun
   3. Axis 2 – Apache foundation – Doesn’t support Spring Integration
   4. Apache CXF – Apache – Support Spring Integration
   5. Weblogic – BEA
   6. Webspeher – IBM
   7. JBoss – Redhot
   8. Glassfish – Sun Microsystem – Internal Metro Impl
3. JAX-RS
   1. Jersey Impl – Sun Microsystem
   2. Rest Easy – Redhot
   3. Rest Let – Jerome Lovel (Developer)
   4. Apache CXF – Apache – Support Spring
   5. Apache Wink – Apache – Doesn’t Support Spring
4. JAX-M
   1. Instead this use JMS, never use JAX-M

Spring Web Services

WS Security:-

**Authentication**

**Digital signatures**

**Encryption and Decryption**

All three implemented using “XwsSecurityInterceptor” or “Wss4jSecurityInterceptor”.

Keystores

Private Keys

Symmetric Keys

Trusted certificates

Using XwsSecurityInterceptor :-

The XwsSecurityInterceptor is an EndpointInterceptor (see Section 5.5.2, “Intercepting requests - the EndpointInterceptor interface”) that is based on SUN's XML and Web Services Security package (XWSS). This WS-Security implementation is part of the Java Web Services Developer Pack.

The XwsSecurityInterceptor requires a security policy file to operate. This XML file tells the interceptor what security aspects to require from incoming SOAP messages, and what aspects to add to outgoing messages.

Authentication

1. Plain Text Username Authentication
   1. SimplePasswordValidationCallbackHandler
   2. SpringPlainTextPasswordValidationCallbackHandler
   3. JaasPlainTextPasswordValidationCallbackHandler
2. Digest Username Authentication
   1. SimplePasswordValidationCallbackHandler
   2. SpringDigestPasswordValidationCallbackHandler
3. Certificate Authentication
4. KeyStoreCallbackHandler
5. SpringCertificateValidationCallbackHandler
6. JaasCertificateValidationCallbackHandler

Digital Signatures

1. Verifying Signatures
   1. KeyStoreCallbackHandler
2. Signing Messages
   1. KeyStoreCallbackHandler

Encryption and Decryption

1. Decryption
   1. KeyStoreCallbackHandler
2. Encryption
   1. KeyStoreCallbackHandler

Using Wss4jSecurityInterceptor:-

This interceptor supports messages created by the AxiomSoapMessageFactory and the SaajSoapMessageFactory.

Authentication

1. Validating Username Token
   1. SimplePasswordValidationCallbackHandler
   2. SpringSecurityPasswordValidationCallbackHandler
2. Certificate Authentication
3. Security Timestamps

Digital Signatures

1. Verifying Signatures
2. Signing Messages
3. Signature Confirmation

Encryption and Decryption

1. Decryption
2. Encryption