Instructor Notes:

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Instructor Notes:

Explain the lesson coverage

Lesson Objectives

In this lesson , you will learn about

- Introduction to Spring
- Spring 5 New Features
- Spring Projects at a glance
- Spring IO Platform
  - Spring Framework
  - Spring Boot

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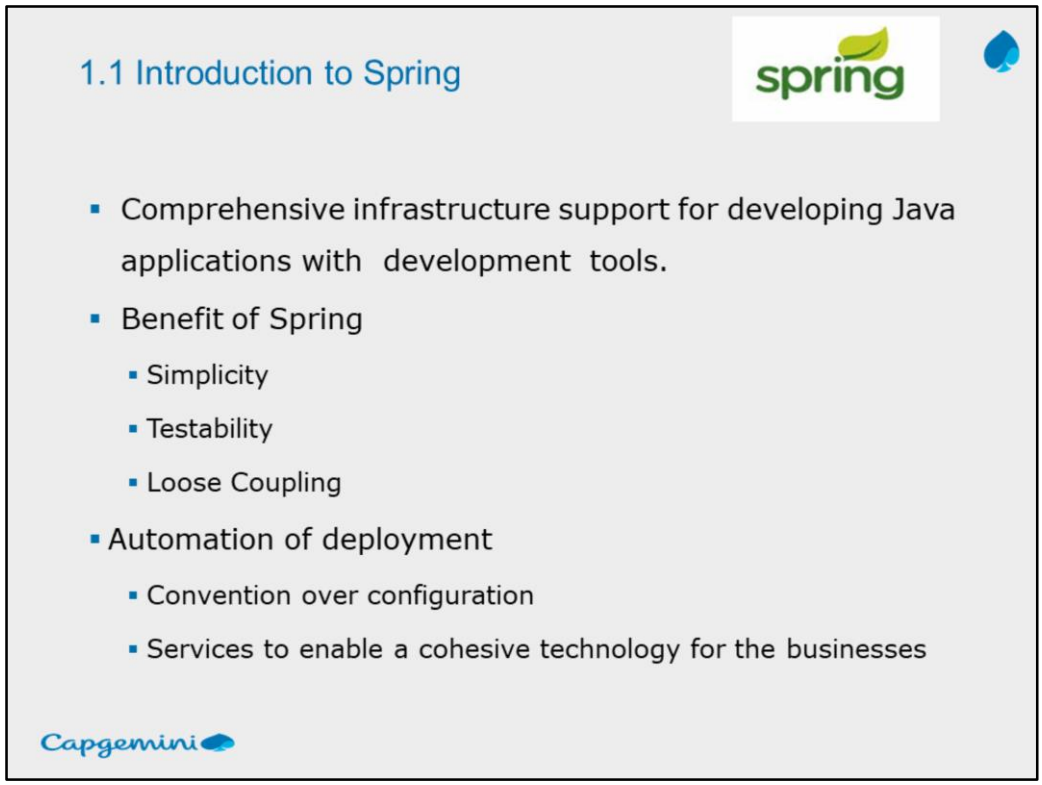

What is spring?

- Spring is a Java platform that provides comprehensive infrastructure support for developing Java applications with development tools.
- Any java application can benefit from Spring in terms of
    - Automation of deployment
    - Convention over configuration
    - Testing is simpler
    - Services to enable a cohesive technology experience not only for the developers, but also for the businesses
- Addresses the complexity of enterprise application development

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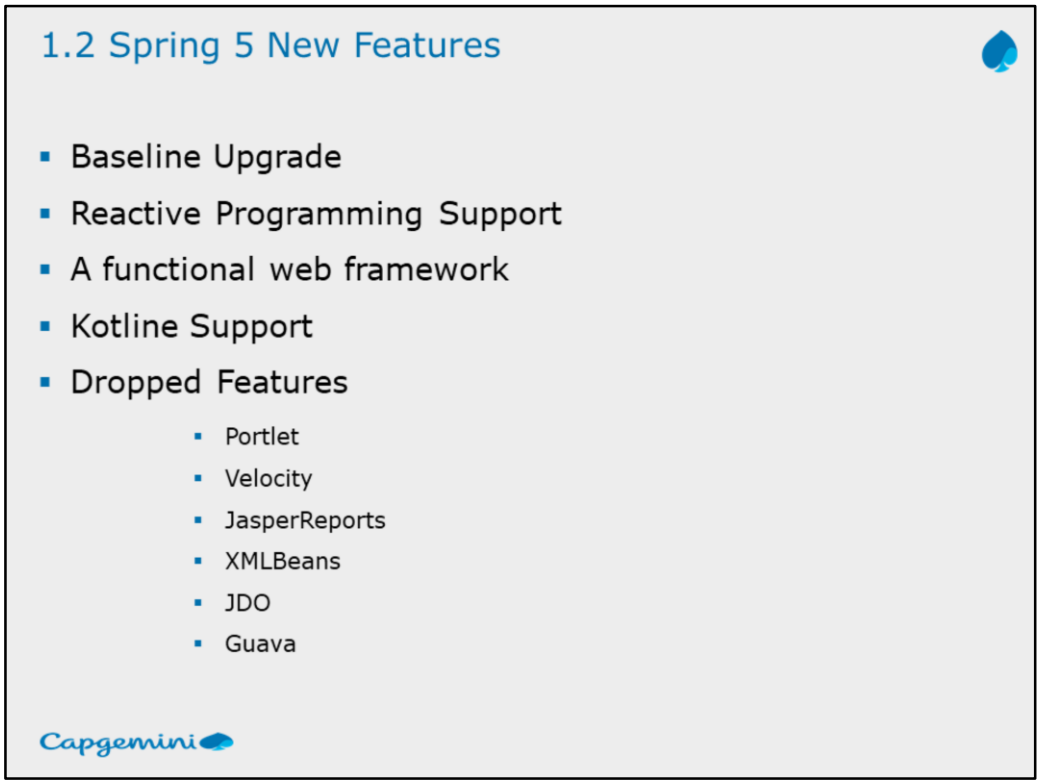

Baseline Upgrade
To build and run Spring 5 application, you will need minimum JDK 8 and Java EE 7. Previous JDK and Java EE versions are not supported anymore. To elaborate, Java EE 7 includes –

Servlet 3.1
JMS 2.0
JPA 2.1
JAX-RS 2.0
Bean Validation 1.1

Similar to Java baseline, there are changes in baselines of many other frameworks as well. e.g.
Hibernate 5
Jackson 2.6
JUnit 5
Tiles 3

Also, note down the minimum supported versions of various servers.

Tomcat 8.5+
Jetty 9.4+
WildFly 10+
Netty 4.1+
Undertow 1.4+

Spring 5 release has been very well aligned with JDK 9 release dates. The goal is for Spring Framework 5.0 to go GA right after JDK 9's GA. Spring 5.0 release candidates are already supporting Java 9 on classpath as well as modulepath.

Spring 5 has baseline version 8, so it uses many new features of Java 8 and 9 as well. e.g.
Java 8 default methods in core Spring interfaces
Internal code improvements based on Java 8 reflection enhancements
Use of functional programming in the framework code – lambdas and streams

Along with the increase in baseline versions for Java, Java EE and a few other frameworks, Spring Framework 5 removed support for a few frameworks. e.g.
Portlet
Velocity
JasperReports
XMLBeans
JDO
Guava

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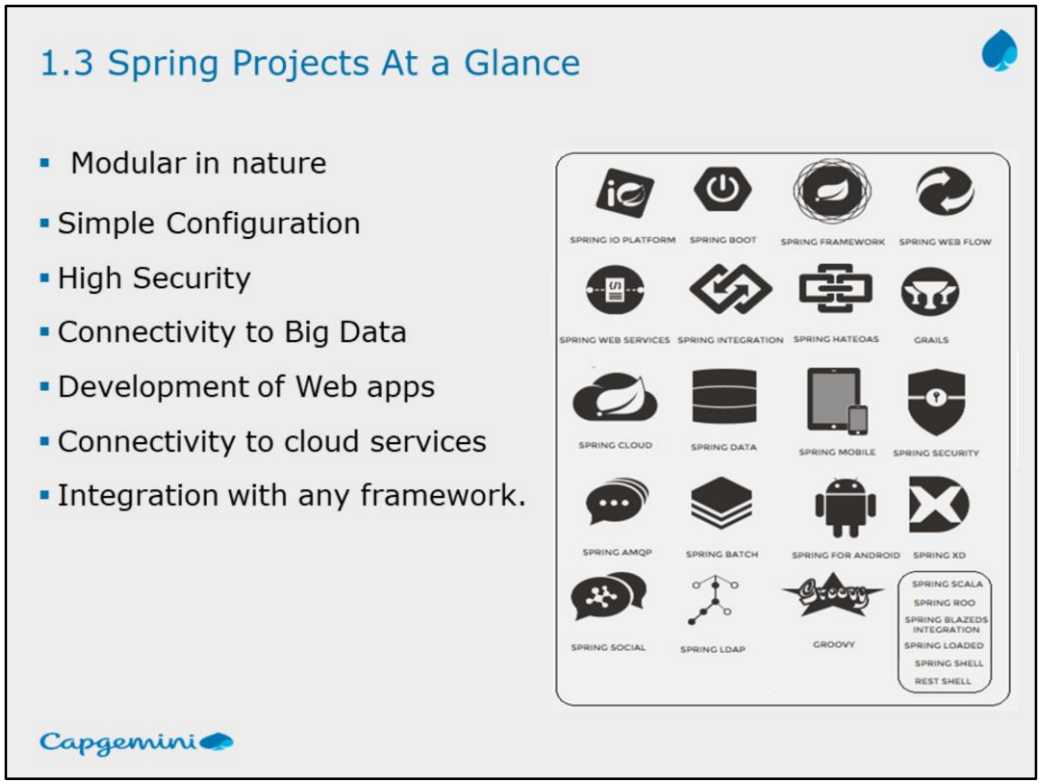

- Spring IO platform includes Foundation Layer modules and Execution Layer domain-specific runtimes (DSRs)
- Spring Boot favors convention over configuration and is designed to get you up and running as quickly
- Spring Framework provides a comprehensive programming and configuration model for modern Java-based enterprise applications on any kind of deployment platform
- Spring Web Flow builds on Spring MVC and allows implementing the "flows" of a web application
- Spring Web Services (Spring-WS) is a product of the Spring community focused on creating document-driven Web services
- Spring Integration extends the Spring programming model to support the well-known Enterprise Integration Patterns
- Spring eXtreem Data : The project‘s goal is to simplify the development of big data applications. the core Spring APIs into a cohesive and versioned foundational platform for modern applications.

- Spring Reactive : Reactive Streams, for handling live data (provide a standard for asynchronous stream processing with non-blocking back pressure on the JVM)
- **H**ypermedia **A**s **T**he **E**ngine **O**f application **S**tate : REST client interacts with a network application entirely through hypermedia provided dynamically by application servers. A REST client needs no prior knowledge about how to interact with any particular application or server beyond a generic understanding of hypermedia, in contrast with SOA.
- Spring HATEOS :link creation and representation assembly
- Microservices (wiki) : Software architecture design pattern, in which complex applications are composed of small, independent processes communicating with each other using language-agnostic APIs. These services are small, highly decoupled and focus on doing a small task.
- Spring Boot : It’s a new framework designed to simplify the bootstrapping and development of a new Spring application with opinionated approach to configuration, freeing developers from the need to define boilerplate configuration.
- Spring Cloud : Provides tools for developers to quickly build some of the common patterns in distributed systems (e.g. configuration management, service discovery, circuit breakers, intelligent routing, micro-proxy, control bus, one-time tokens, global locks, leadership election, distributed sessions, cluster state).

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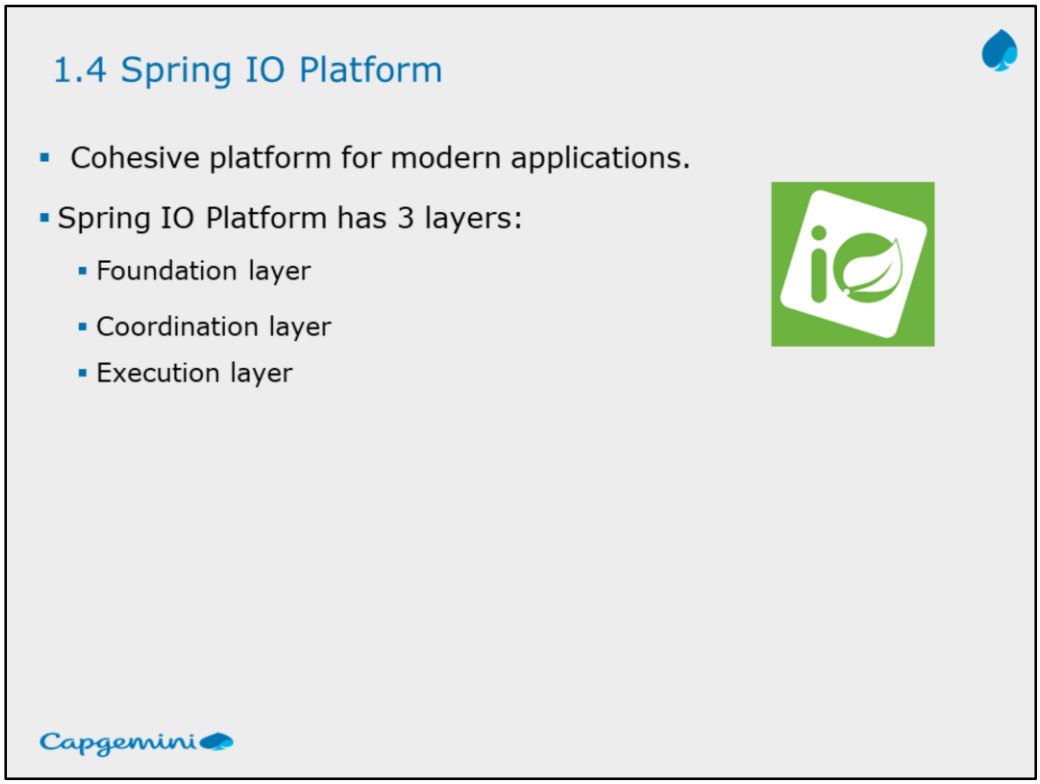


Spring IO Platform brings together the core Spring APIs into a cohesive platform for modern applications.
For example, there are many existing applications designed based on the core Spring Framework, and customers may want these applications to be upgraded with features like adding an OAuth secured REST service, connect to cloud services, Moving data into Hadoop, bridging multiple data stores, etc.. In order to upgrade applications including all the services use Spring IO Platform modules.

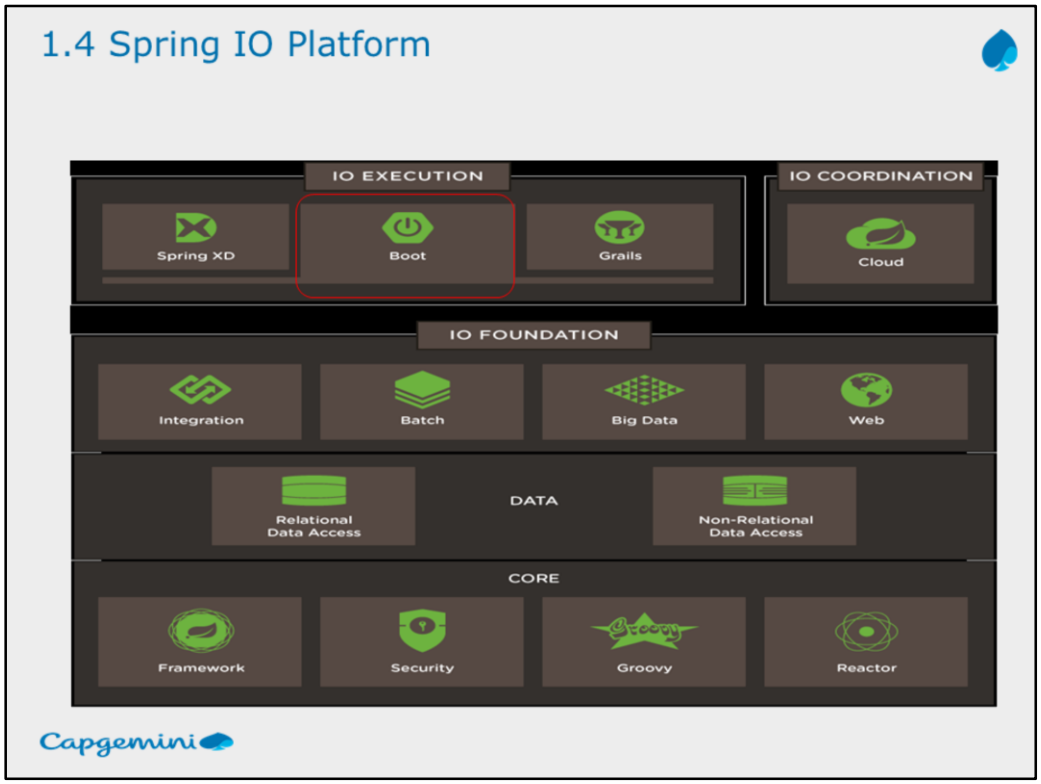
Spring IO Platform is comprised of 3 layers:

- Spring IO Foundation layer
  - A cohesive set of APIs and embeddable runtime components that enable to build applications
- IO Coordination
  - Provides API's to connect to cloud services with Spring Cloud.
- IO Execution
  - Provides DSR(Domain-Specific Runtime) for applications built using IO Foundation modules.
  - Helps to avoid deployment to an external container like Tomcat
  - Spring IO execution includes three DSRs: Spring XD, Spring Boot, and Grails.

Instructor Notes:

Give an overview of different modules available in 3 layers of IO platform.

Spring Boot will be explained with example. Spring Framework will be explained in detail further to this.



Spring IO Execution Layer:

- **Spring XD** provides a powerful runtime and DSL for describing big data ingestion and analytics, export, and Hadoop workflow management.
- **Spring Boot** reduces the effort needed to create production-ready, DevOps-friendly, XML-free Spring applications. Spring Boot dynamically wires up beans and settings and applies them to your application context
- **Grails** provides a productive and stream-lined full-stack web framework by combining the power of the Spring IO Foundation components with a set of comprehensive Groovy-based DSLs.

Spring IO Coordination Layer:

- **Spring Cloud** is an open-source library with which an application can be connected with cloud environment. For example, Instead of creating data source object to connect with relational databases use Spring cloud which does all these work(like access and configure service connectors) by using cloud connector.

Spring IO Foundation Layer

- **Spring Integration** extends the Spring programming model to support the well-known Enterprise Integration Patterns.
- **Spring Batch** is a lightweight, comprehensive batch framework designed to enable the development of robust batch applications vital for the daily operations of enterprise systems.
- **Spring Big Data** is used to simplify the development of big data applications.
- **Spring Web** builds on Spring MVC and allows implementing the "flows" of a web application.
- **Spring data** makes it easy to use new data access technologies, such as non-relational databases, map-reduce frameworks, and cloud based data services.
- **Spring Framework** provides a comprehensive programming and configuration model for modern Java-based enterprise applications on any kind of deployment platform.
- **Spring security** helps us to secure spring based applications since it is a powerful and highly customizable authentication and access-control framework.
- **Spring groovy** can be used to integrate with groovy for building high-productivity dynamic application.
- **Spring Reactor** is a Reactive Streams, for handling live data (provide a standard for asynchronous stream processing with non-blocking back pressure on the JVM)

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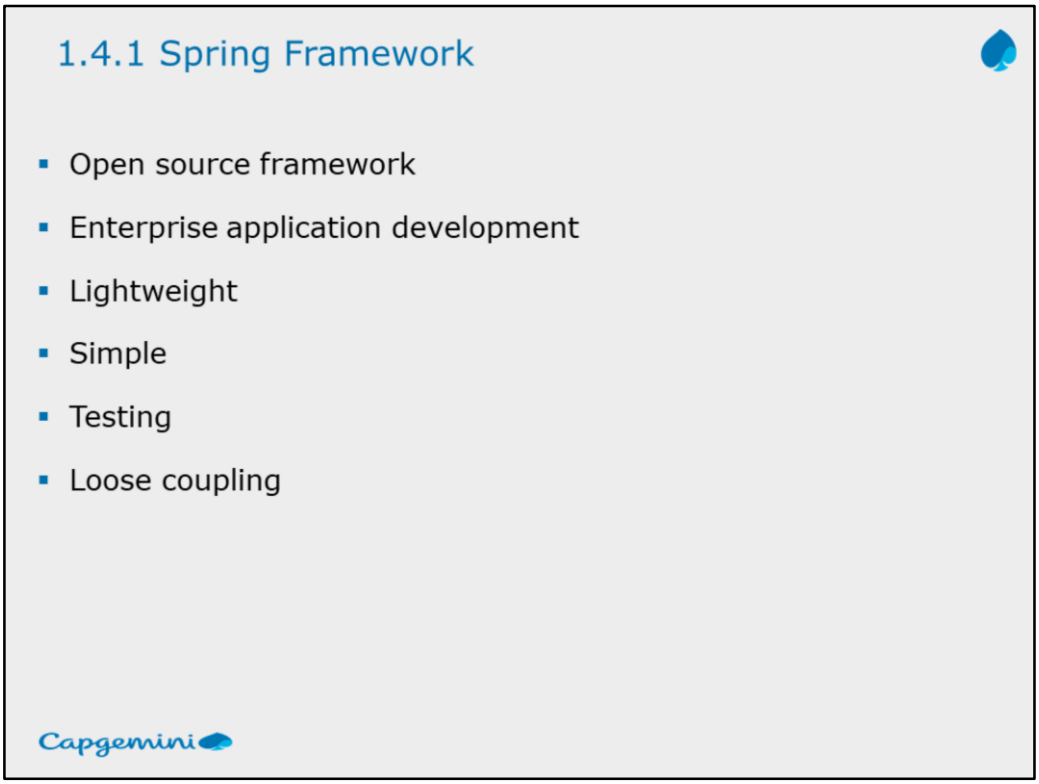

Spring makes it easy to use POJO (Plain Old Java Objects) to achieve things that were previously only possible with EJBs. However, Spring's usefulness isn't restricted to server-side development. Any java application can benefit from Spring in terms of simplicity, testability and loose coupling.

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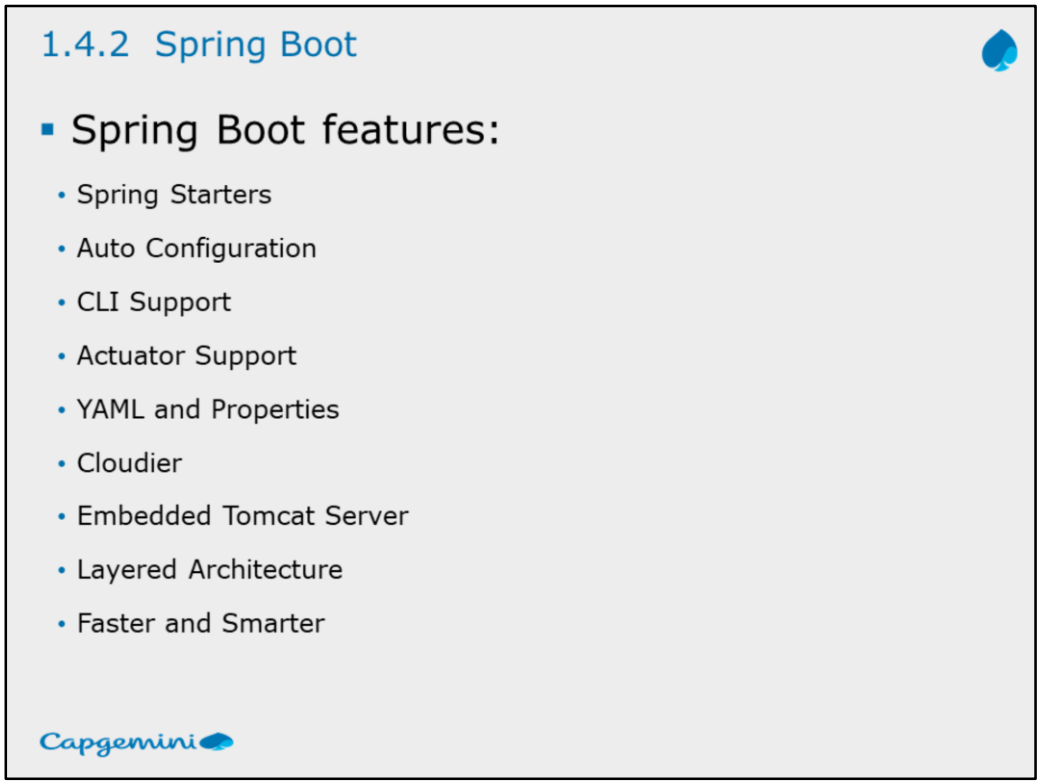

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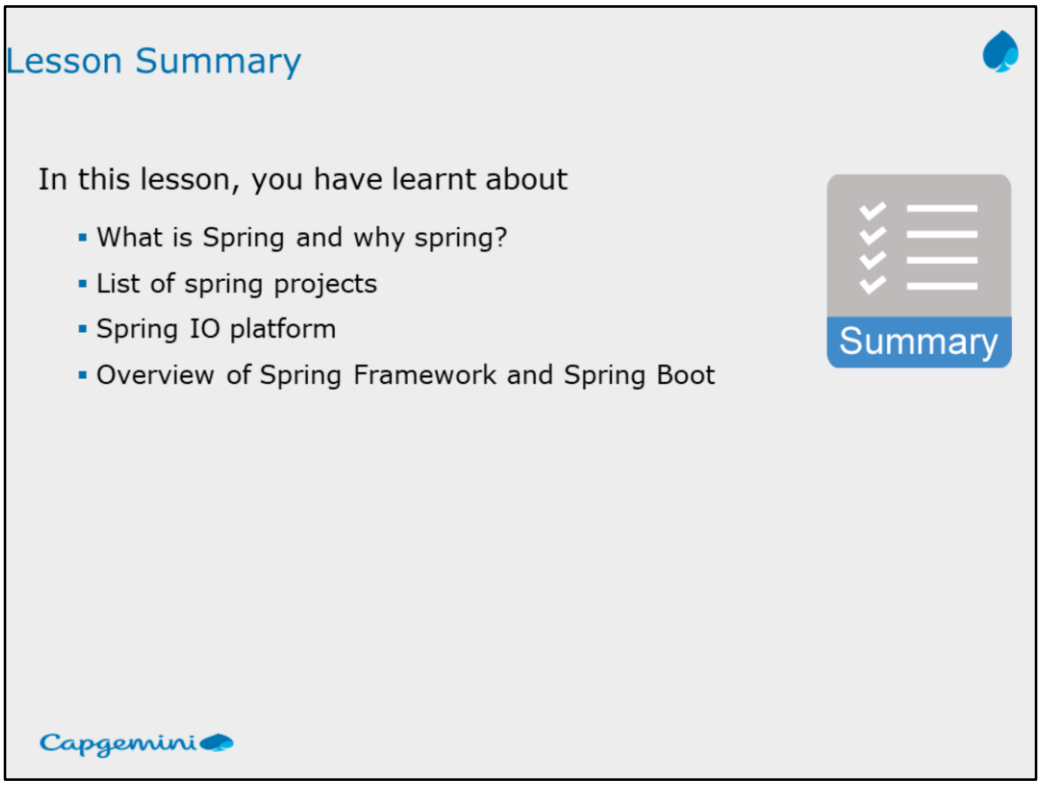

Thus we have seen that Spring is the most popular and comprehensive of the lightweight J2EE frameworks that have gained popularity since 2003.
We saw how Spring is designed to promote architectural good practice. A typical spring architecture will be based on programming to interfaces rather than classes.
We have seen what is Inversion of control and dependency injection.
We also saw Bean containers and lifecycle of beans in containers. We saw how to hook into the lifecycle of a bean and make it aware of the Spring environment.

Instructor Notes:

Question 1: Option 2
Question 2: True

Review Questions

- Question 1: Spring IO _____ layer provides API to connect to cloud services
  - Option 1: Foundation
  - Option 2: Coordination
  - Option 3: Execution

- Question 2: Spring Boot reduces the effort needed to create production-ready, DevOps-friendly, XML-free Spring applications.
  - Option 1: True
  - Option 2: false

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