2. Introduction to the Spring Framework

The Spring Framework is a Java platform that provides comprehensive infrastructure support for developing Java applications. Spring handles the infrastructure so you can focus on your application.

Spring enables you to build applications from "plain old Java objects" (POJOs) and to apply enterprise services non-invasively to POJOs. This capability applies to the Java SE programming model and to full and partial Java EE.

Examples of how you, as an application developer, can benefit from the Spring platform:

- Make a Java method execute in a database transaction without having to deal with transaction APIs.
- Make a local Java method a remote procedure without having to deal with remote APIs.
- Make a local Java method a management operation without having to deal with JMX APIs.
- Make a local Java method a message handler without having to deal with JMS APIs.

2.1 Dependency Injection and Inversion of Control

A Java application — a loose term that runs the gamut from constrained, embedded applications to n-tier, server-side enterprise applications — typically consists of objects that collaborate to form the application proper. Thus the objects in an application have *dependencies* on each other.

Although the Java platform provides a wealth of application development functionality, it lacks the means to organize the basic building blocks into a coherent whole, leaving that task to architects and developers. Although you can use design patterns such as *Factory*, *Abstract Factory*, *Builder*, *Decorator*, and *Service Locator* to compose the various classes and object instances that make up an application, these patterns are simply that: best practices given a name, with a description of what the pattern does, where to apply it, the problems it addresses, and so forth. Patterns are formalized best practices that *you must implement yourself* in your application.

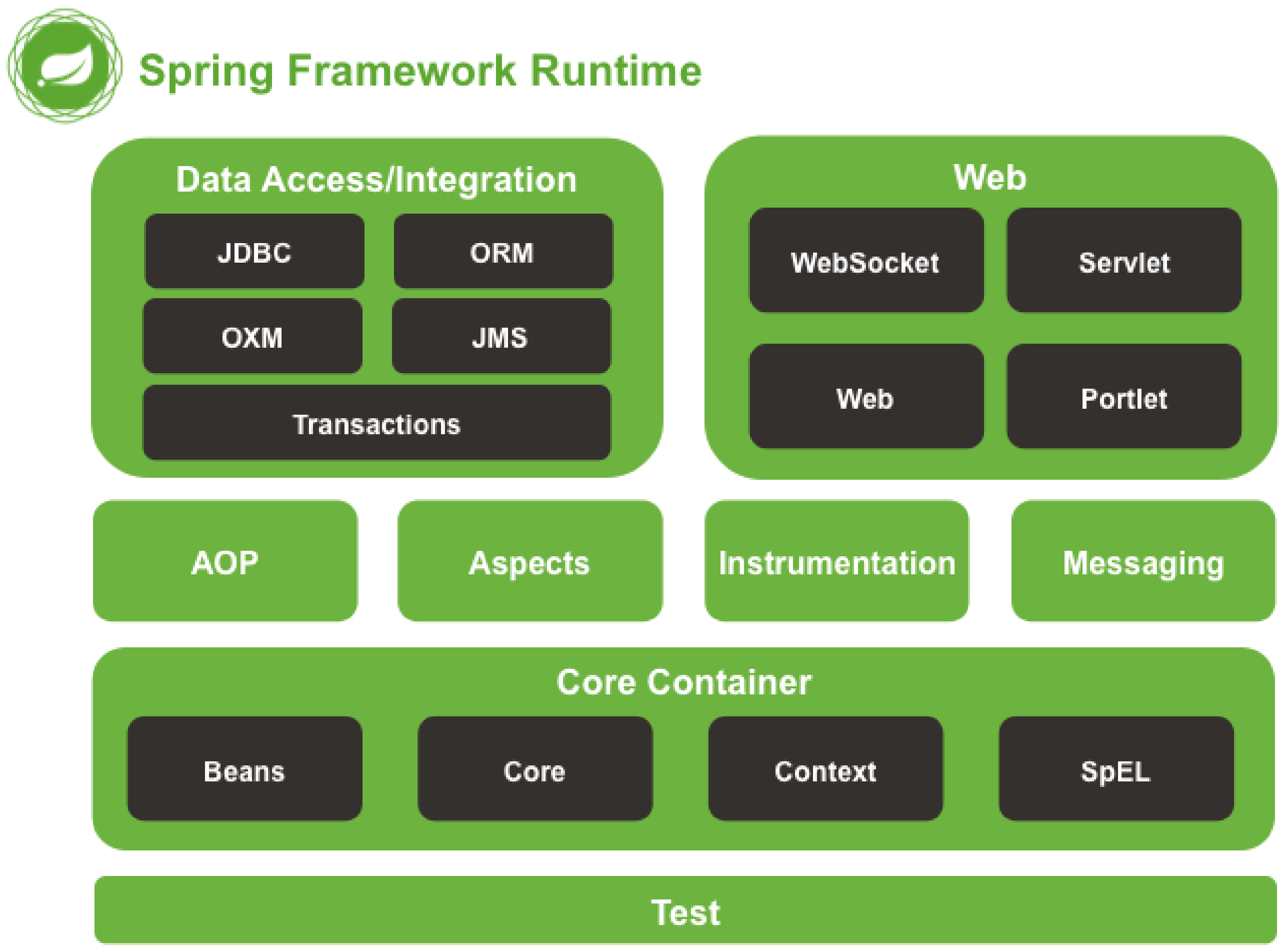
The Spring Framework *Inversion of Control* (IoC) component addresses this concern by providing a formalized means of composing disparate components into a fully working application ready for use. The Spring Framework codifies formalized design patterns as first-class objects that you can integrate into your own application(s). Numerous organizations and institutions use the Spring Framework in this manner to engineer robust, *maintainable* applications.

Background
"*The question is, what aspect of control are [they] inverting?*" Martin Fowler posed this question about Inversion of Control (IoC) on his site in 2004. Fowler suggested renaming the principle to make it more self-explanatory and came up with *Dependency Injection*.

2.2 Modules

The Spring Framework consists of features organized into about 20 modules. These modules are grouped into Core Container, Data Access/Integration, Web, AOP (Aspect Oriented Programming), Instrumentation, Messaging, and Test, as shown in the following diagram.

Figure 2.1. Overview of the Spring Framework



The following sections list the available modules for each feature along with their artifact names and the topics they cover. Artifact names correlate to *artifact IDs* used in Dependency Management tools.

2.2.1 Core Container

The *Core Container* consists of the `spring-core`, `spring-beans`, `spring-context`, `spring-context-support`, and `spring-expression` (Spring Expression Language) modules.

The `spring-core` and `spring-beans` modules provide the fundamental parts of the framework, including the IoC and Dependency Injection features. The `BeanFactory` is a sophisticated implementation of the factory pattern. It removes the need for programmatic singletons and allows you to decouple the configuration and specification of dependencies from your actual program logic.

The *Context* (`spring-context`) module builds on the solid base provided by the *Core and Beans* modules: it is a means to access objects in a framework-style manner that is similar to a JNDI registry. The Context module inherits its features from the Beans module and adds support for internationalization (using, for example, resource bundles), event propagation, resource loading, and the transparent creation of contexts by, for example, a Servlet container. The Context module also supports Java EE features such as EJB, JMX, and basic remoting. The `ApplicationContext` interface is the focal point of the Context module. `spring-context-support` provides support for integrating common third-party libraries into a Spring application context for caching (EhCache, Guava, JCache), mailing (JavaMail), scheduling (CommonJ, Quartz) and template engines (FreeMarker, JasperReports, Velocity).

The `spring-expression` module provides a powerful *Expression Language* for querying and manipulating an object graph at runtime. It is an extension of the unified expression language (unified EL) as specified in the JSP 2.1 specification. The language supports setting and getting property values, property assignment, method invocation, accessing the content of arrays, collections and indexers, logical and arithmetic operators, named variables, and retrieval of objects by name from Spring's IoC container. It also supports list projection and selection as well as common list aggregations.

2.2.2 AOP and Instrumentation

The `spring-aop` module provides an *AOP* Alliance-compliant aspect-oriented programming implementation allowing you to define, for example, method interceptors and pointcuts to cleanly decouple code that implements functionality that should be separated. Using source-level metadata functionality, you can also incorporate behavioral information into your code, in a manner similar to that of .NET attributes.

The separate `spring-aspects` module provides integration with AspectJ.

The `spring-instrument` module provides class instrumentation support and classloader implementations to be used in certain application servers. The `spring-instrument-tomcat` module contains Spring's instrumentation agent for Tomcat.

2.2.3 Messaging

Spring Framework 4 includes a `spring-messaging` module with key abstractions from the *Spring Integration* project such as `Message`, `MessageChannel`, `MessageHandler`, and others to serve as a foundation for messaging-based applications. The module also includes a set of annotations for mapping messages to methods, similar to the Spring MVC annotation based programming model.

2.2.4 Data Access/Integration

The *Data Access/Integration* layer consists of the JDBC, ORM, OXM, JMS, and Transaction modules.

The `spring-jdbc` module provides a JDBC-abstraction layer that removes the need to do tedious JDBC coding and parsing of database-vendor specific error codes.

The `spring-tx` module supports programmatic and declarative transaction management for classes that implement special interfaces and for *all your POJOs (Plain Old Java Objects)*.

The `spring-orm` module provides integration layers for popular object-relational mapping APIs, including JPA, JDO, and Hibernate. Using the `spring-orm` module you can use all of these O/R-mapping frameworks in combination with all of the other features Spring offers, such as the simple declarative transaction management feature mentioned previously.

The `spring-oxm` module provides an abstraction layer that supports Object/XML mapping implementations such as JAXB, Castor, XMLBeans, JiBX and XStream.

The `spring-jms` module (Java Messaging Service) contains features for producing and consuming messages. Since Spring Framework 4.1, it provides integration with the `spring-messaging` module.

2.2.5 Web

The *Web* layer consists of the `spring-web`, `spring-webmvc`, `spring-websocket`, and `spring-webmvc-portlet` modules.

The `spring-web` module provides basic web-oriented integration features such as multipart file upload functionality and the initialization of the IoC container using Servlet listeners and a web-oriented application context. It also contains an HTTP client and the web-related parts of Spring's remoting support.

The `spring-webmvc` module (also known as the *Web-Servlet* module) contains Spring's model-view-controller (*MVC*) and REST Web Services implementation for web applications. Spring's MVC framework provides a clean separation between domain model code and web forms and integrates with all of the other features of the Spring Framework.

The `spring-webmvc-portlet` module (also known as the *Web-Portlet* module) provides the MVC implementation to be used in a Portlet environment and mirrors the functionality of the `spring-webmvc` module.

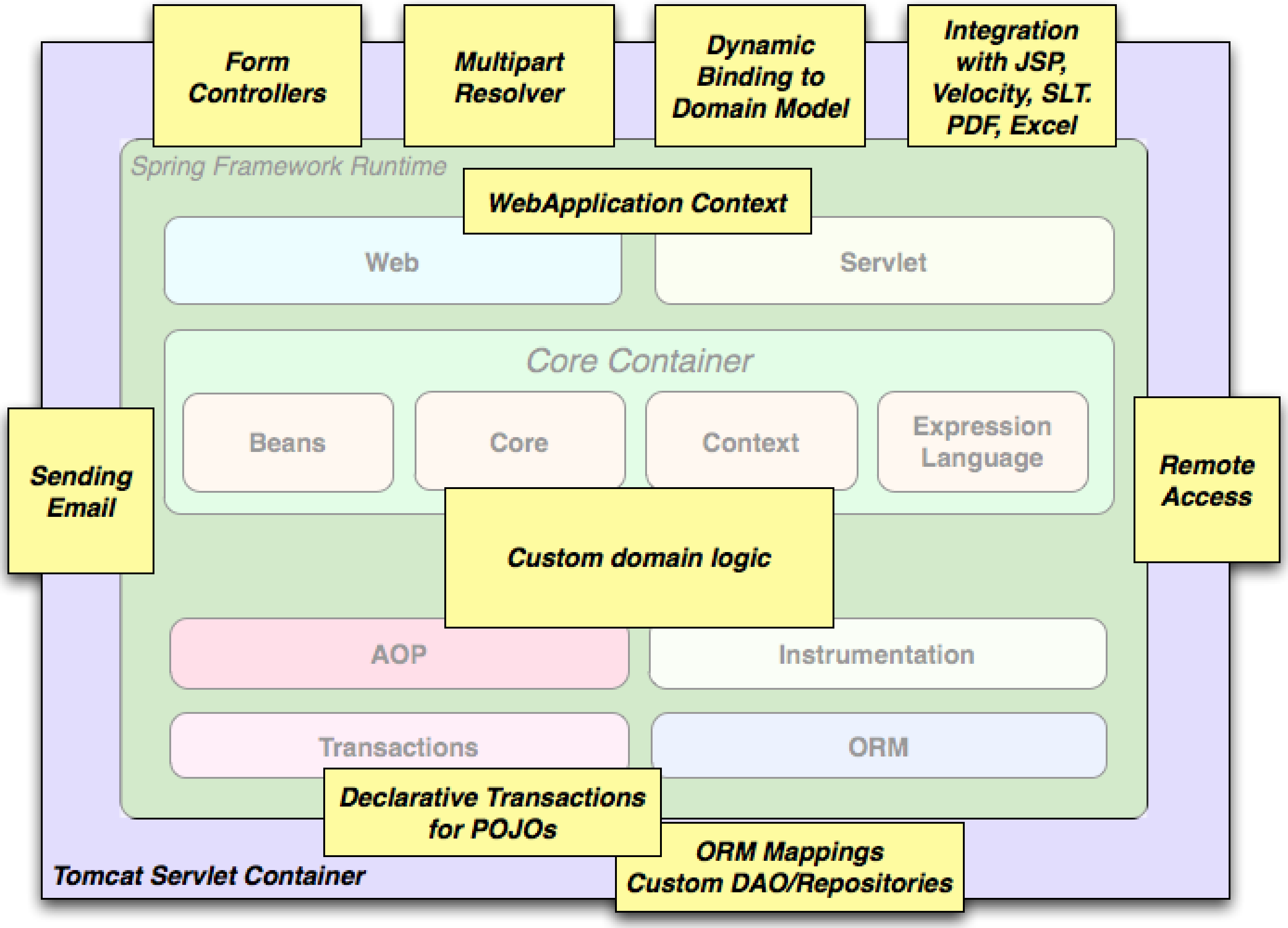
2.2.6 Test

The `spring-test` module supports the unit testing and integration testing of Spring components with JUnit or TestNG. It provides consistent loading of Spring ApplicationContexts and caching of those contexts. It also provides mock objects that you can use to test your code in isolation.

2.3 Usage scenarios

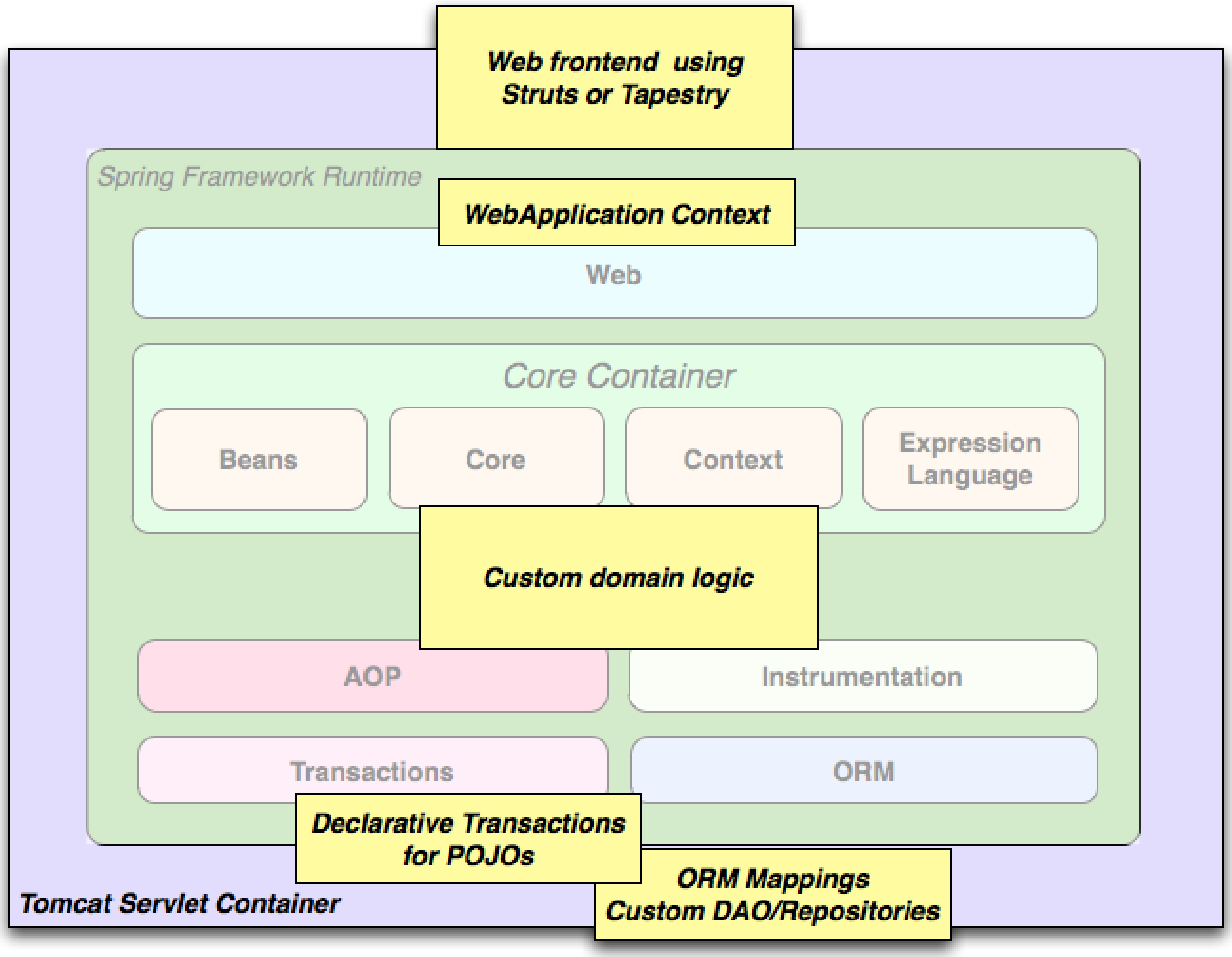
The building blocks described previously make Spring a logical choice in many scenarios, from embedded applications that run on resource-constrained devices to full-fledged enterprise applications that use Spring's transaction management functionality and web framework integration.

Figure 2.2. Typical full-fledged Spring web application



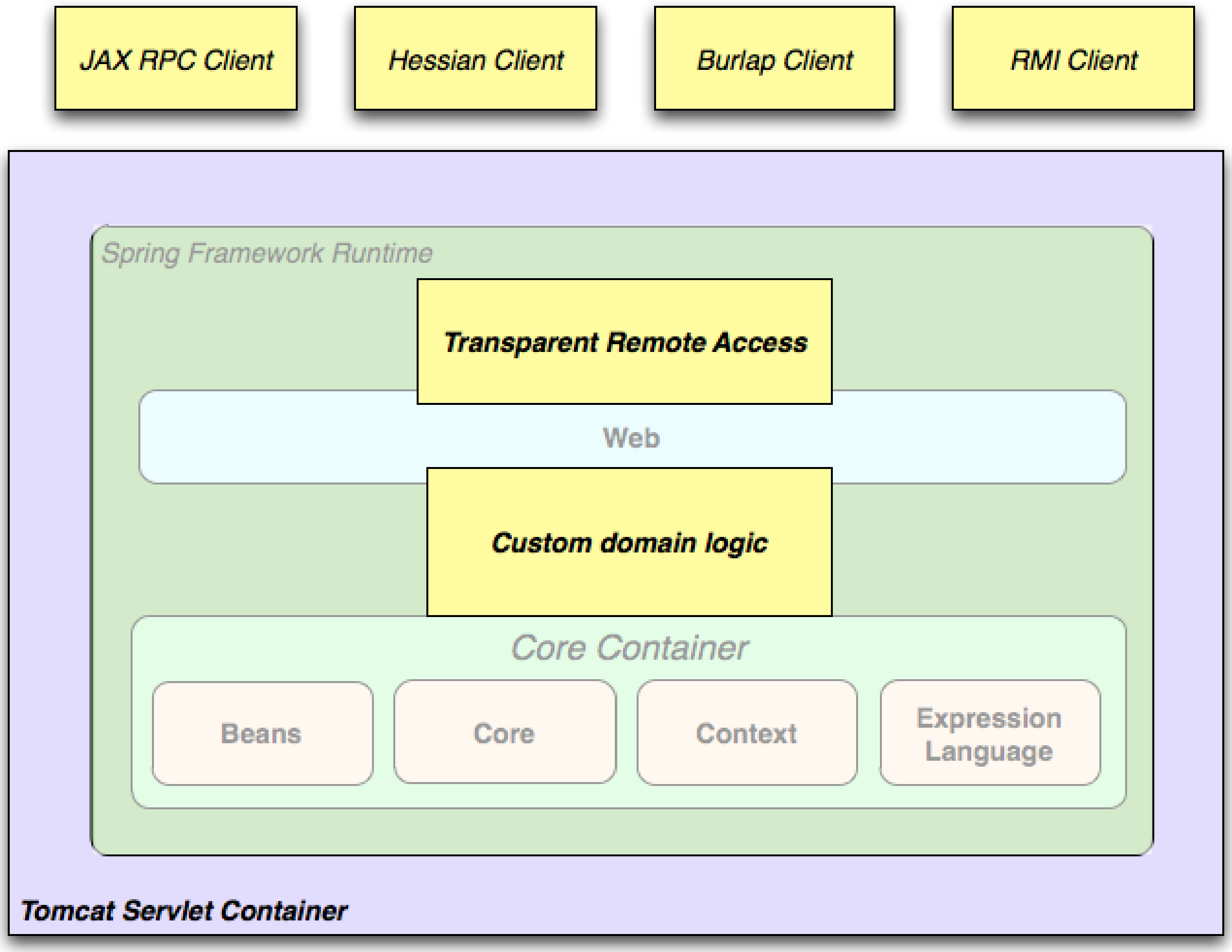
Spring’s declarative transaction management features make the web application fully transactional, just as it would be if you used EJB container-managed transactions. All your custom business logic can be implemented with simple POJOs and managed by Spring’s IoC container. Additional services include support for sending email and validation that is independent of the web layer, which lets you choose where to execute validation rules. Spring’s ORM support is integrated with JPA, Hibernate and JDO; for example, when using Hibernate, you can continue to use your existing mapping files and standard Hibernate `SessionFactory` configuration. Form controllers seamlessly integrate the web-layer with the domain model, removing the need for `ActionForms` or other classes that transform HTTP parameters to values for your domain model.

Figure 2.3. Spring middle-tier using a third-party web framework



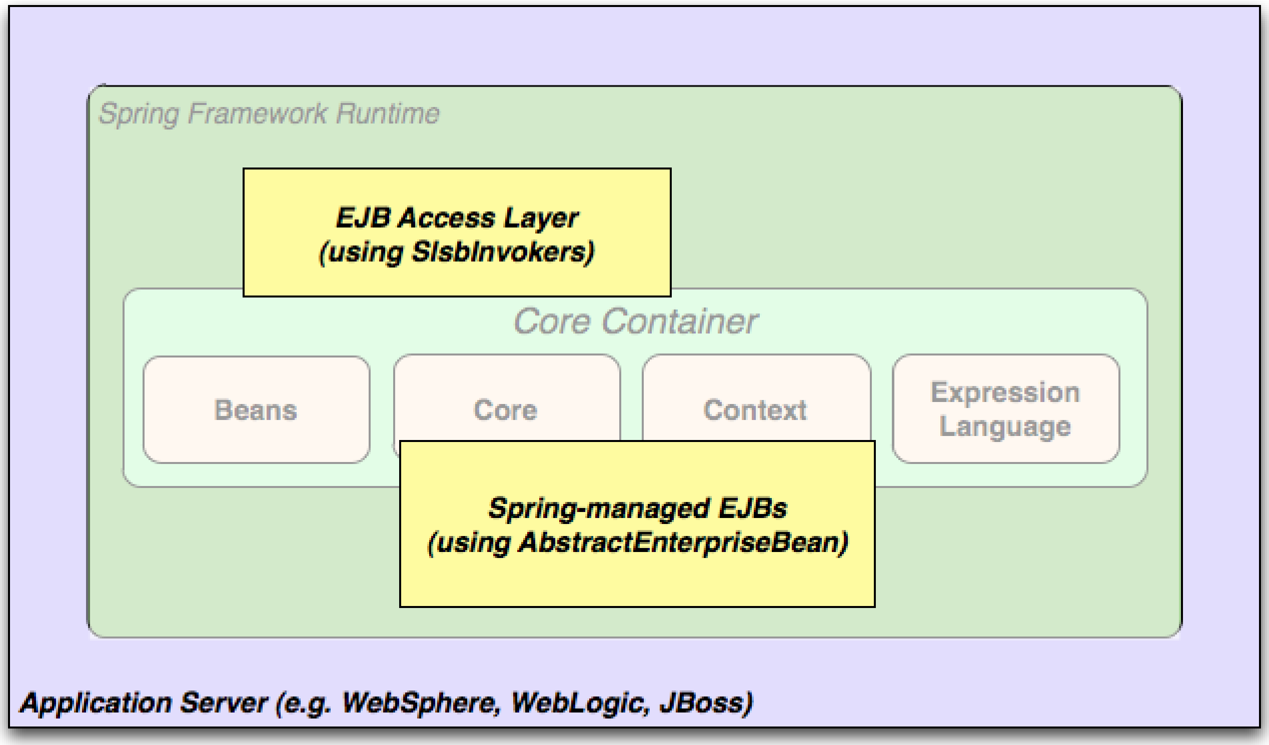
Sometimes circumstances do not allow you to completely switch to a different framework. The Spring Framework does *not* force you to use everything within it; it is not an *all-or-nothing* solution. Existing front-ends built with Struts, Tapestry, JSF or other UI frameworks can be integrated with a Spring-based middle-tier, which allows you to use Spring transaction features. You simply need to wire up your business logic using an `ApplicationContext` and use a `WebApplicationContext` to integrate your web layer.

Figure 2.4. Remoting usage scenario



When you need to access existing code through web services, you can use Spring's `Hessian-`, `Burlap-`, `Rmi-` or `JaxRpcProxyFactory` classes. Enabling remote access to existing applications is not difficult.

Figure 2.5. EJBs - Wrapping existing POJOs


Spring Framework Runtime
EJB Access Layer (using SlsbInvokers)
Core Container
Beans
Core
Context
Expression Language
Spring-managed EJBs (using AbstractEnterpriseBean)
Application Server (e.g. WebSphere, WebLogic, JBoss)

The Spring Framework also provides an access and abstraction layer for Enterprise JavaBeans, enabling you to reuse your existing POJOs and wrap them in stateless session beans for use in scalable, fail-safe web applications that might need declarative security.

2.3.1 Dependency Management and Naming Conventions

Dependency management and dependency injection are different things. To get those nice features of Spring into your application (like dependency injection) you need to assemble all the libraries needed (jar files) and get them onto your classpath at runtime, and possibly at compile time. These dependencies are not virtual components that are injected, but physical resources in a file system (typically). The process of dependency management involves locating those resources, storing them and adding them to classpaths. Dependencies can be direct (e.g. my application depends on Spring at runtime), or indirect (e.g. my application depends on `commons-dbcp` which depends on `commons-pool`). The indirect dependencies are also known as "transitive" and it is those dependencies that are hardest to identify and manage.

If you are going to use Spring you need to get a copy of the jar libraries that comprise the pieces of Spring that you need. To make this easier Spring is packaged as a set of modules that separate the dependencies as much as possible, so for example if you don’t want to write a web application you don’t need the spring-web modules. To refer to Spring library modules in this guide we use a shorthand naming convention `spring-*` or `spring-*.jar,` where `*` represents the short name for the module (e.g. `spring-core`, `spring-webmvc`, `spring-jms`, etc.). The actual jar file name that you use is normally the module name concatenated with the version number (e.g. *spring-core-4.3.0.RELEASE.jar*).

Each release of the Spring Framework will publish artifacts to the following places:

- Maven Central, which is the default repository that Maven queries, and does not require any special configuration to use. Many of the common libraries that Spring depends on also are available from Maven

Central and a large section of the Spring community uses Maven for dependency management, so this is convenient for them. The names of the jars here are in the form `spring-*-<version>.jar` and the Maven groupId is `org.springframework`.
- In a public Maven repository hosted specifically for Spring. In addition to the final GA releases, this repository also hosts development snapshots and milestones. The jar file names are in the same form as Maven Central, so this is a useful place to get development versions of Spring to use with other libraries deployed in Maven Central. This repository also contains a bundle distribution zip file that contains all Spring jars bundled together for easy download.

So the first thing you need to decide is how to manage your dependencies: we generally recommend the use of an automated system like Maven, Gradle or Ivy, but you can also do it manually by downloading all the jars yourself.

You will find bellow the list of Spring artifacts. For a more complete description of each modules, see Section 2.2, “Modules”.

Table 2.1. Spring Framework Artifacts

GroupId	ArtifactId	Description
org.springframework	spring-aop	Proxy-based AOP support
org.springframework	spring-aspects	AspectJ based aspects
org.springframework	spring-beans	Beans support, including Groovy
org.springframework	spring-context	Application context runtime, including scheduling and remoting abstractions
org.springframework	spring-context-support	Support classes for integrating common third-party libraries into a Spring application context
org.springframework	spring-core	Core utilities, used by many other Spring modules
org.springframework	spring-expression	Spring Expression Language (SpEL)
org.springframework	spring-instrument	Instrumentation agent for JVM bootstrapping
org.springframework	spring-instrument-tomcat	Instrumentation agent for Tomcat

org.springframework	spring-jdbc	JDBC support package, including DataSource setup and JDBC access support
org.springframework	spring-jms	JMS support package, including helper classes to send and receive JMS messages
org.springframework	spring-messaging	Support for messaging architectures and protocols
org.springframework	spring-orm	Object/Relational Mapping, including JPA and Hibernate support
org.springframework	spring-oxm	Object/XML Mapping
org.springframework	spring-test	Support for unit testing and integration testing Spring components
org.springframework	spring-tx	Transaction infrastructure, including DAO support and JCA integration
org.springframework	spring-web	Web support packages, including client and web remoting
org.springframework	spring-webmvc	REST Web Services and model-view-controller implementation for web applications
org.springframework	spring-webmvc-portlet	MVC implementation to be used in a Portlet environment
org.springframework	spring-websocket	WebSocket and SockJS implementations, including STOMP support

Spring Dependencies and Depending on Spring

Although Spring provides integration and support for a huge range of enterprise and other external tools, it intentionally keeps its mandatory dependencies to an absolute minimum: you shouldn't have to locate and download (even automatically) a large number of jar libraries in order to use Spring for simple use cases. For basic dependency injection there is only one mandatory external dependency, and that is for logging (see below for a more detailed description of logging options).

Next we outline the basic steps needed to configure an application that depends on Spring, first with Maven and then with Gradle and finally using Ivy. In all cases, if anything is unclear, refer to the documentation of your dependency management system, or look at some sample code - Spring itself uses Gradle to manage dependencies when it is building, and our samples mostly use Gradle or Maven.

Maven Dependency Management

If you are using Maven for dependency management you don’t even need to supply the logging dependency explicitly. For example, to create an application context and use dependency injection to configure an application, your Maven dependencies will look like this:

```
<dependencies>
    <dependency>
        <groupId>org.springframework</groupId>
        <artifactId>spring-context</artifactId>
        <version>4.3.0.RELEASE</version>
        <scope>runtime</scope>
    </dependency>
</dependencies>
```

That’s it. Note the scope can be declared as runtime if you don’t need to compile against Spring APIs, which is typically the case for basic dependency injection use cases.

The example above works with the Maven Central repository. To use the Spring Maven repository (e.g. for milestones or developer snapshots), you need to specify the repository location in your Maven configuration. For full releases:

```
<repositories>
    <repository>
        <id>io.spring.repo.maven.release</id>
        <url>http://repo.spring.io/release/</url>
        <snapshots><enabled>false</enabled></snapshots>
    </repository>
</repositories>
```

For milestones:

```
<repositories>
    <repository>
        <id>io.spring.repo.maven.milestone</id>
        <url>http://repo.spring.io/milestone/</url>
        <snapshots><enabled>false</enabled></snapshots>
    </repository>
</repositories>
```

And for snapshots:

```
<repositories>
    <repository>
        <id>io.spring.repo.maven.snapshot</id>
        <url>http://repo.spring.io/snapshot/</url>
        <snapshots><enabled>true</enabled></snapshots>
    </repository>
</repositories>
```

Maven "Bill Of Materials" Dependency

It is possible to accidentally mix different versions of Spring JARs when using Maven. For example, you may find that a third-party library, or another Spring project, pulls in a transitive dependency to an older release. If you forget to explicitly declare a direct dependency yourself, all sorts of unexpected issues can arise.

To overcome such problems Maven supports the concept of a "bill of materials" (BOM) dependency. You can import the `spring-framework-bom` in your `dependencyManagement` section to ensure that all spring dependencies (both direct and transitive) are at the same version.

```
<dependencyManagement>
    <dependencies>
        <dependency>
            <groupId>org.springframework</groupId>
            <artifactId>spring-framework-bom</artifactId>
            <version>4.3.0.RELEASE</version>
            <type>pom</type>
            <scope>import</scope>
        </dependency>
    </dependencies>
</dependencyManagement>
```

An added benefit of using the BOM is that you no longer need to specify the `<version>` attribute when depending on Spring Framework artifacts:

```
<dependencies>
    <dependency>
        <groupId>org.springframework</groupId>
        <artifactId>spring-context</artifactId>
    </dependency>
    <dependency>
        <groupId>org.springframework</groupId>
        <artifactId>spring-web</artifactId>
    </dependency>
```

```
<dependencies>
```

Gradle Dependency Management

To use the Spring repository with the Gradle build system, include the appropriate URL in the `repositories` section:

```
repositories {
    mavenCentral()
    // and optionally...
    maven { url "http://repo.spring.io/release" }
}
```

You can change the `repositories` URL from `/release` to `/milestone` or `/snapshot` as appropriate. Once a repository has been configured, you can declare dependencies in the usual Gradle way:

```
dependencies {
    compile("org.springframework:spring-context:4.3.0.RELEASE")
    testCompile("org.springframework:spring-test:4.3.0.RELEASE")
}
```

Ivy Dependency Management

If you prefer to use Ivy to manage dependencies then there are similar configuration options.

To configure Ivy to point to the Spring repository add the following resolver to your `ivysettings.xml`:

```
<resolvers>
    <ibiblio name="io.spring.repo.maven.release"
            m2compatible="true"
            root="http://repo.spring.io/release/"/>
</resolvers>
```

You can change the `root` URL from `/release/` to `/milestone/` or `/snapshot/` as appropriate.

Once configured, you can add dependencies in the usual way. For example (in `ivy.xml`):

```
<dependency org="org.springframework"
    name="spring-core" rev="4.3.0.RELEASE" conf="compile->runtime"/>
```

Distribution Zip Files

Although using a build system that supports dependency management is the recommended way to obtain the Spring Framework, it is still possible to download a distribution zip file.

Distribution zips are published to the Spring Maven Repository (this is just for our convenience, you don't need Maven or any other build system in order to download them).

To download a distribution zip open a web browser to http://repo.spring.io/release/org/springframework/spring and select the appropriate subfolder for the version that you want. Distribution files end `-dist.zip`, for example spring-framework-{spring-version}-RELEASE-dist.zip. Distributions are also published for milestones and snapshots.

2.3.2 Logging

Logging is a very important dependency for Spring because *a)* it is the only mandatory external dependency, *b)* everyone likes to see some output from the tools they are using, and *c)* Spring integrates with lots of other tools all of which have also made a choice of logging dependency. One of the goals of an application developer is often to have unified logging configured in a central place for the whole application, including all external components. This is more difficult than it might have been since there are so many choices of logging framework.

The mandatory logging dependency in Spring is the Jakarta Commons Logging API (JCL). We compile against JCL and we also make JCL `Log` objects visible for classes that extend the Spring Framework. It's important to users that all versions of Spring use the same logging library: migration is easy because backwards compatibility is preserved even with applications that extend Spring. The way we do this is to make one of the modules in Spring depend explicitly on `commons-logging` (the canonical implementation of JCL), and then make all the other modules depend on that at compile time. If you are using Maven for example, and wondering where you picked up the dependency on `commons-logging`, then it is from Spring and specifically from the central module called `spring-core`.

The nice thing about `commons-logging` is that you don't need anything else to make your application work. It has a runtime discovery algorithm that looks for other logging frameworks in well known places on the classpath and uses one that it thinks is appropriate (or you can tell it which one if you need to). If nothing else is available you get pretty nice looking logs just from the JDK (java.util.logging or JUL for short). You should find that your Spring application works and logs happily to the console out of the box in most situations, and that's important.

Not Using Commons Logging

Unfortunately, the runtime discovery algorithm in `commons-logging`, while convenient for the end-user, is problematic. If we could turn back the clock and start Spring now as a new project it would use a different logging dependency. The first choice would probably be the Simple Logging Facade for Java (SLF4J), which is also used by a lot of other tools that people use with Spring inside their applications.

There are basically two ways to switch off `commons-logging`:

1. Exclude the dependency from the `spring-core` module (as it is the only module that explicitly depends on `commons-logging`)
2. Depend on a special `commons-logging` dependency that replaces the library with an empty jar (more details can be found in the SLF4J FAQ)

To exclude commons-logging, add the following to your `dependencyManagement` section:

```
<dependencies>
    <dependency>
        <groupId>org.springframework</groupId>
        <artifactId>spring-core</artifactId>
        <version>4.3.0.RELEASE</version>
        <exclusions>
            <exclusion>
                <groupId>commons-logging</groupId>
                <artifactId>commons-logging</artifactId>
            </exclusion>
        </exclusions>
    </dependency>
</dependencies>
```

Now this application is probably broken because there is no implementation of the JCL API on the classpath, so to fix it a new one has to be provided. In the next section we show you how to provide an alternative implementation of JCL using SLF4J as an example.

Using SLF4J

SLF4J is a cleaner dependency and more efficient at runtime than `commons-logging` because it uses compile-time bindings instead of runtime discovery of the other logging frameworks it integrates. This also means that you have to be more explicit about what you want to happen at runtime, and declare it or configure it accordingly. SLF4J provides bindings to many common logging frameworks, so you can usually choose one that you already use, and bind to that for configuration and management.

SLF4J provides bindings to many common logging frameworks, including JCL, and it also does the reverse: bridges between other logging frameworks and itself. So to use SLF4J with Spring you need to replace the `commons-logging` dependency with the SLF4J-JCL bridge. Once you have done that then logging calls from within Spring will be translated into logging calls to the SLF4J API, so if other libraries in your application use that API, then you have a single place to configure and manage logging.

A common choice might be to bridge Spring to SLF4J, and then provide explicit binding from SLF4J to Log4J. You need to supply 4 dependencies (and exclude the existing `commons-logging`): the bridge, the SLF4J API, the binding to Log4J, and the Log4J implementation itself. In Maven you would do that like this

```
<dependencies>
    <dependency>
        <groupId>org.springframework</groupId>
        <artifactId>spring-core</artifactId>
        <version>4.3.0.RELEASE</version>
        <exclusions>
```

```
            <exclusion>
                <groupId>commons-logging</groupId>
                <artifactId>commons-logging</artifactId>
            </exclusion>
        </exclusions>
    </dependency>
    <dependency>
        <groupId>org.slf4j</groupId>
        <artifactId>jcl-over-slf4j</artifactId>
        <version>1.5.8</version>
    </dependency>
    <dependency>
        <groupId>org.slf4j</groupId>
        <artifactId>slf4j-api</artifactId>
        <version>1.5.8</version>
    </dependency>
    <dependency>
        <groupId>org.slf4j</groupId>
        <artifactId>slf4j-log4j12</artifactId>
        <version>1.5.8</version>
    </dependency>
    <dependency>
        <groupId>log4j</groupId>
        <artifactId>log4j</artifactId>
        <version>1.2.14</version>
    </dependency>
</dependencies>
```

That might seem like a lot of dependencies just to get some logging. Well it is, but it *is* optional, and it should behave better than the vanilla `commons-logging` with respect to classloader issues, notably if you are in a strict container like an OSGi platform. Allegedly there is also a performance benefit because the bindings are at compile-time not runtime.

A more common choice amongst SLF4J users, which uses fewer steps and generates fewer dependencies, is to bind directly to Logback. This removes the extra binding step because Logback implements SLF4J directly, so you only need to depend on two libraries not four (`jcl-over-slf4j` and `logback`). If you do that you might also need to exclude the slf4j-api dependency from other external dependencies (not Spring), because you only want one version of that API on the classpath.

Using Log4J

Many people use Log4j as a logging framework for configuration and management purposes. It's efficient and well-established, and in fact it's what we use at runtime when we build and test Spring. Spring also provides some utilities for configuring and initializing Log4j, so it has an optional compile-time dependency on Log4j in some modules.

To make Log4j work with the default JCL dependency (`commons-logging`) all you need to do is put Log4j on the classpath, and provide it with a configuration file (`log4j.properties` or `log4j.xml` in the root of the classpath). So for Maven users this is your dependency declaration:

```
<dependencies>
    <dependency>
        <groupId>org.springframework</groupId>
        <artifactId>spring-core</artifactId>
        <version>4.3.0.RELEASE</version>
    </dependency>
    <dependency>
        <groupId>log4j</groupId>
        <artifactId>log4j</artifactId>
        <version>1.2.14</version>
    </dependency>
</dependencies>
```

And here's a sample log4j.properties for logging to the console:

```
log4j.rootCategory=INFO, stdout

log4j.appender.stdout=org.apache.log4j.ConsoleAppender
log4j.appender.stdout.layout=org.apache.log4j.PatternLayout
log4j.appender.stdout.layout.ConversionPattern=%d{ABSOLUTE} %5p %t %c{2}:%L - %m%n

log4j.category.org.springframework.beans.factory=DEBUG
```

Runtime Containers with Native JCL

Many people run their Spring applications in a container that itself provides an implementation of JCL. IBM Websphere Application Server (WAS) is the archetype. This often causes problems, and unfortunately there is no silver bullet solution; simply excluding `commons-logging` from your application is not enough in most situations.

To be clear about this: the problems reported are usually not with JCL per se, or even with `commons-logging`: rather they are to do with binding `commons-logging` to another framework (often Log4J). This can fail because `commons-logging` changed the way they do the runtime discovery in between the older versions (1.0) found in some containers and the modern versions that most people use now (1.1). Spring does not use any unusual parts of the JCL API, so nothing breaks there, but as soon as Spring or your application tries to do any logging you can find that the bindings to Log4J are not working.

In such cases with WAS the easiest thing to do is to invert the class loader hierarchy (IBM calls it "parent last") so that the application controls the JCL dependency, not the container. That option isn’t always open, but there are plenty of other suggestions in the public domain for alternative approaches, and your mileage may vary depending on the exact version and feature set of the container.