

- A *package-qualified class name*: typically the actual implementation class of the bean being defined.
- Bean behavioral configuration elements, which state how the bean should behave in the container (scope, lifecycle callbacks, and so forth).
- References to other beans that are needed for the bean to do its work; these references are also called *collaborators* or *dependencies*.
- Other configuration settings to set in the newly created object, for example, the number of connections to use in a bean that manages a connection pool, or the size limit of the pool.

This metadata translates to a set of properties that make up each bean definition.

Table 7.1. The bean definition

Property	Explained in...
class	the section called “Instantiating beans”
name	the section called “Naming beans”
scope	Section 7.5, “Bean scopes”
constructor arguments	the section called “Dependency Injection”
properties	the section called “Dependency Injection”
autowiring mode	the section called “Autowiring collaborators”
lazy-initialization mode	the section called “Lazy-initialized beans”
initialization method	the section called “Initialization callbacks”
destruction method	the section called “Destruction callbacks”

In addition to bean definitions that contain information on how to create a specific bean, the `ApplicationContext` implementations also permit the registration of existing objects that are created outside the container, by users. This is done by accessing the `ApplicationContext`’s `BeanFactory` via the method `getBeanFactory()` which returns the `BeanFactory` implementation `DefaultListableBeanFactory`. `DefaultListableBeanFactory` supports this registration through the methods `registerSingleton(...)` and `registerBeanDefinition(...)`. However, typical applications work solely with beans defined through metadata bean definitions.

Note

Bean metadata and manually supplied singleton instances need to be registered as early as possible, in order for the container to properly reason about them during autowiring and other introspection steps. While overriding of existing metadata and existing singleton instances is supported to some degree, the registration of new beans at runtime (concurrently with live access to factory) is not officially supported and may lead to concurrent access exceptions and/or inconsistent state in the bean container.

Naming beans

Every bean has one or more identifiers. These identifiers must be unique within the container that hosts the bean. A bean usually has only one identifier, but if it requires more than one, the extra ones can be considered aliases.

In XML-based configuration metadata, you use the `id` and/or `name` attributes to specify the bean identifier(s). The `id` attribute allows you to specify exactly one id. Conventionally these names are alphanumeric ('myBean', 'fooService', etc.), but may contain special characters as well. If you want to introduce other aliases to the bean, you can also specify them in the `name` attribute, separated by a comma (,), semicolon (;), or white space. As a historical note, in versions prior to Spring 3.1, the `id` attribute was defined as an `xsd:ID` type, which constrained possible characters. As of 3.1, it is defined as an `xsd:string` type. Note that bean `id` uniqueness is still enforced by the container, though no longer by XML parsers.

You are not required to supply a name or id for a bean. If no name or id is supplied explicitly, the container generates a unique name for that bean. However, if you want to refer to that bean by name, through the use of the `ref` element or [Service Locator](#) style lookup, you must provide a name. Motivations for not supplying a name are related to using [inner beans](#) and [autowiring collaborators](#).

Bean Naming Conventions

The convention is to use the standard Java convention for instance field names when naming beans. That is, bean names start with a lowercase letter, and are camel-cased from then on. Examples of such names would be (without quotes) 'accountManager', 'accountService', 'userDao', 'loginController', and so forth.

Naming beans consistently makes your configuration easier to read and understand, and if you are using Spring AOP it helps a lot when applying advice to a set of beans related by name.

Note

With component scanning in the classpath, Spring generates bean names for unnamed components, following the rules above: essentially, taking the simple class name and turning its initial character to lower-case. However, in the (unusual) special case when there is more than one character and both the first and second characters are upper case, the original casing gets preserved. These are the same rules as defined by `java.beans.Introspector.decapitalize` (which Spring is using here).

Aliasing a bean outside the bean definition

In a bean definition itself, you can supply more than one name for the bean, by using a combination of up to one name specified by the `id` attribute, and any number of other names in the `name` attribute. These names can be equivalent aliases to the same bean, and are useful for some situations, such as allowing each component in an application to refer to a common dependency by using a bean name that is specific to that component itself.

Specifying all aliases where the bean is actually defined is not always adequate, however. It is sometimes desirable to introduce an alias for a bean that is defined elsewhere. This is commonly the case in large systems where configuration is split amongst each subsystem, each subsystem having its own set of object definitions. In XML-based configuration metadata, you can use the `<alias/>` element to accomplish this.

```
<alias name="fromName" alias="toName"/>
```

In this case, a bean in the same container which is named `fromName`, may also, after the use of this alias definition, be referred to as `toName`.