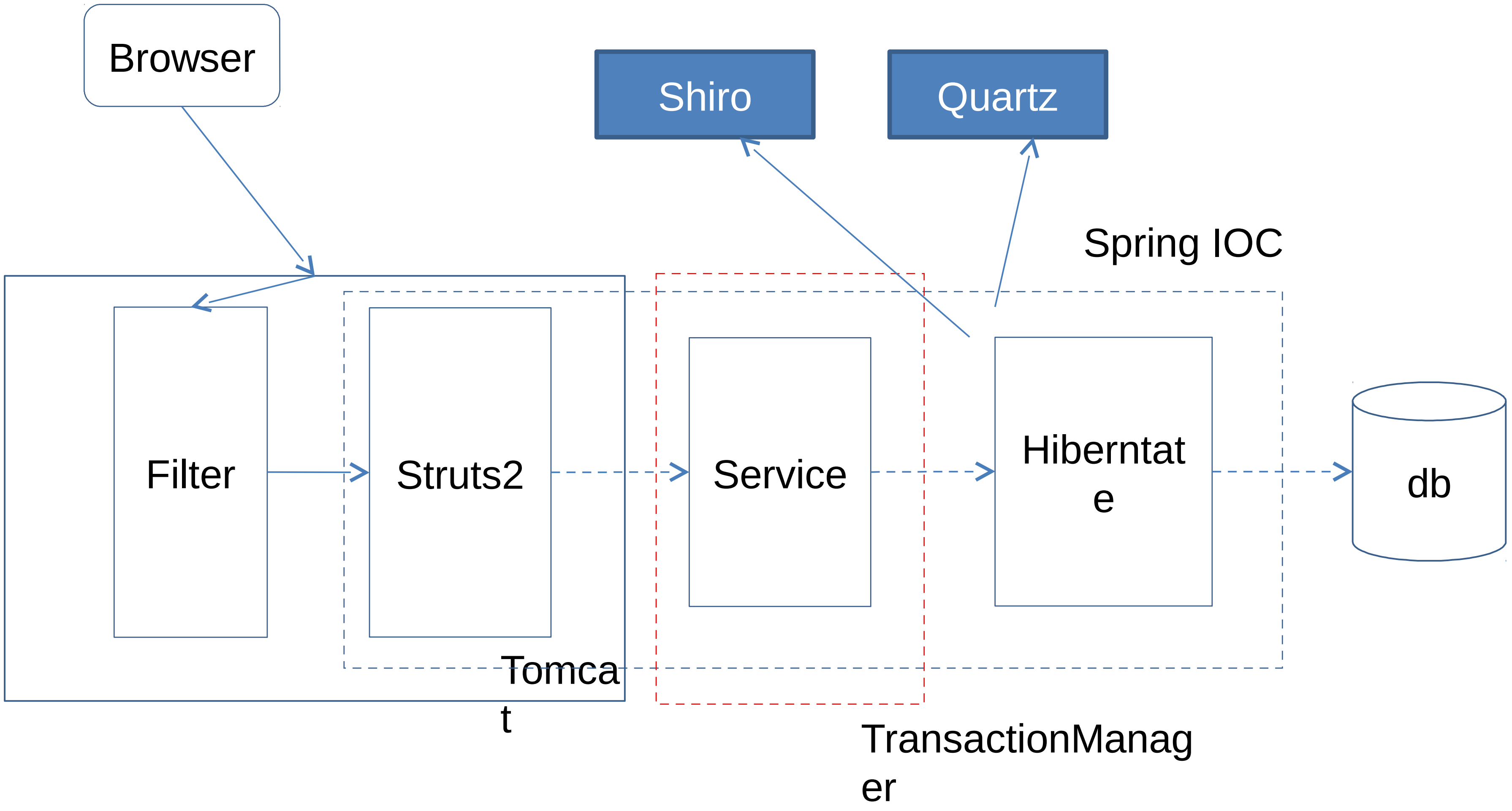
讲师：佟刚

新浪微博：尚硅谷－佟刚

B\S


Browser
Shiro
Quartz
Spring IOC
Filter
Struts2
Service
Hiberntat
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TransactionManag
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Hello World

讲讲：讲讲

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Spring □□□(1)

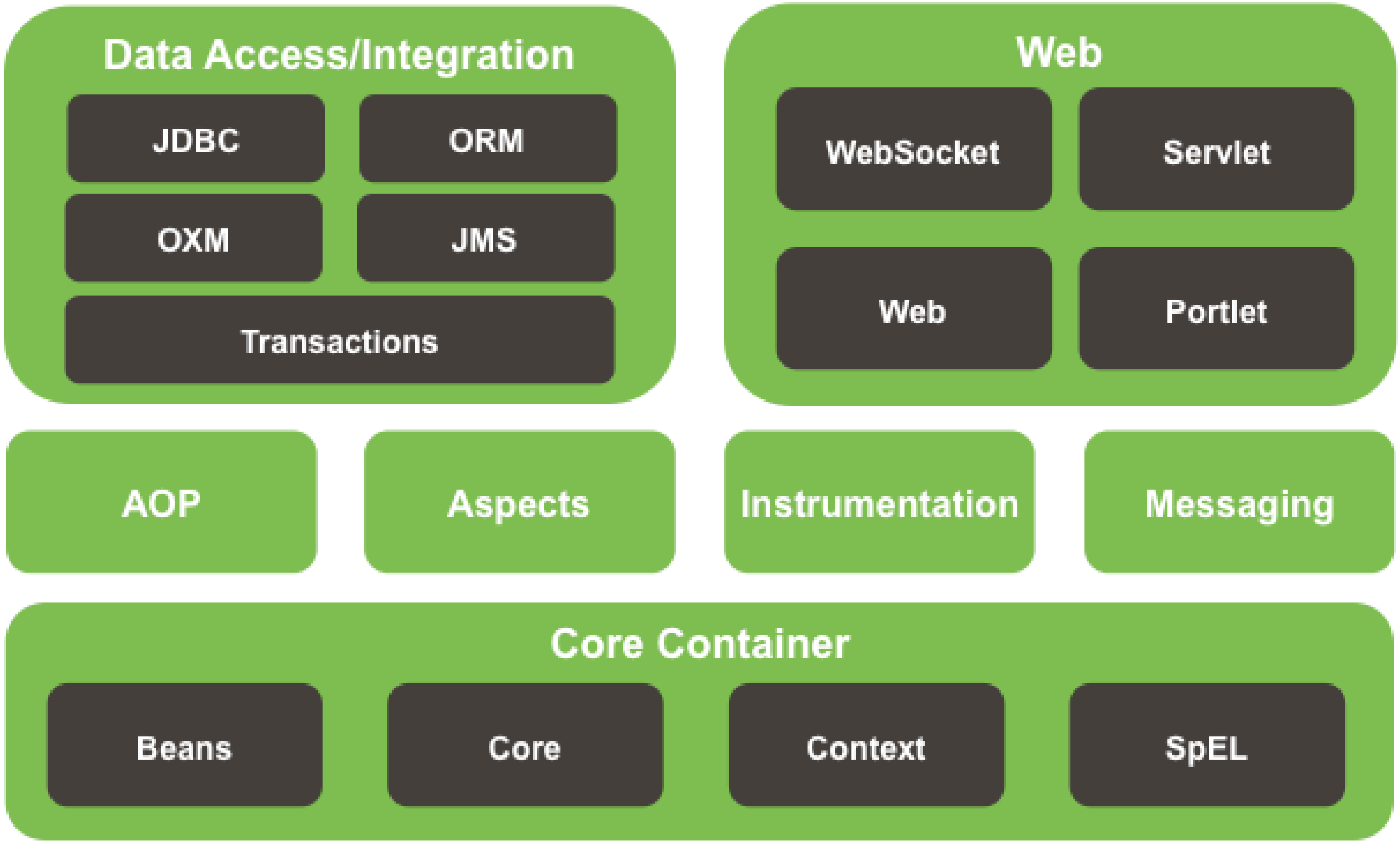
- Spring □□□□□□□.
- Spring □□□□□□□□□□□□. □□ Spring □□□□□□ JavaBean □□□□□□ EJB □□□□□□□.
- Spring □□□ IOC(DI) □ AOP □□□□.

J2ee without ejb

Spring □□□ (2)

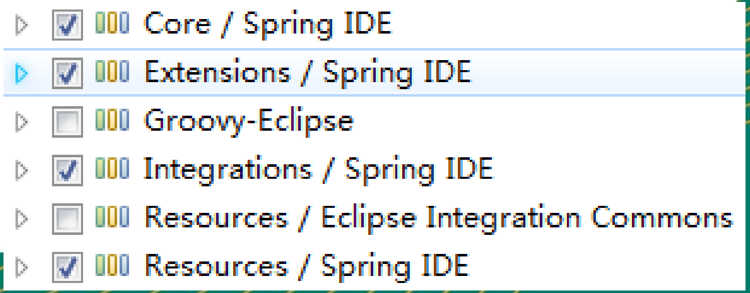
- □□□□ Spring:
  - □□□□□ **Spring □□□□□□** - □□ Spring □□□□□□□□□□□□□□□□ Spring □ API
  - □□□□ (DI --- dependency injection □ IOC)
  - □□□□□□ (AOP --- aspect oriented programming)
  - □□ : Spring □□□□□ , □□□□□□□□□□□□□□□□□□
  - □□ : Spring □□□□□□□□□□□□□□□□□□□□□□ . □ Spring □□□□□ XML □ Java □□□ □□□□□
  - □□□□□ IOC □ AOP □□□□□□□□□□□□□□□□□□□□□□□□□□□□ □□□□ Spring □□□□□□□□□□ SpringMVC □ □□□□ Spring JDBC □

Spring □□


Data Access/Integration
JDBC
ORM
OXM
JMS
Transactions
Web
WebSocket
Servlet
Web
Portlet
AOP
Aspects
Instrumentation
Messaging
Core Container
Beans
Core
Context
SpEL

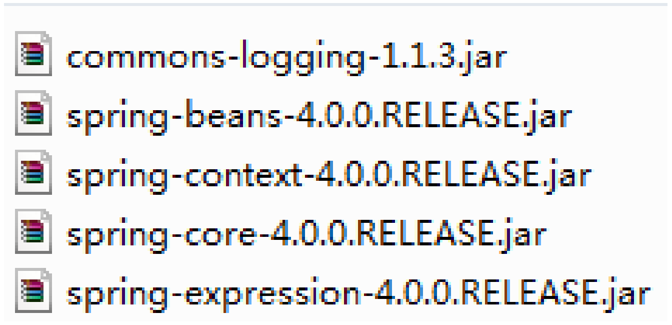
□□ SPRING TOOL SUITE

- SPRING TOOL SUITE □□□ Eclipse □□□□□□□□□□□□□□□□ Eclipse □□□□□□□ Spring □□□□
- □□□□□□□ springsource-tool-suite-3.4.0.RELEASE-e4.3.1-updatesite.zip □□
  - **Help** --> **Install New Software...**
  - Click Add...
  - In dialog Add Site dialog, click **Archive...**
  - Navigate to **springsource-tool-suite-3.4.0.RELEASE-e4.3.1-updatesite.zip** and click **Open**
  - Clicking **OK** in the Add Site dialog will bring you back to the dialog 'Install'
  - Select the **xxx/Spring IDE** that has appeared
  - Click **Next** and then **Finish**
  - **Approve the license**
  - Restart eclipse when that is asked


☑ □□□ Core / Spring IDE
☑ □□□ Extensions / Spring IDE
☐ □□□ Groovy-Eclipse
☑ □□□ Integrations / Spring IDE
☐ □□□ Resources / Eclipse Integration Commons
☑ □□□ Resources / Spring IDE

□□ Spring □□□□

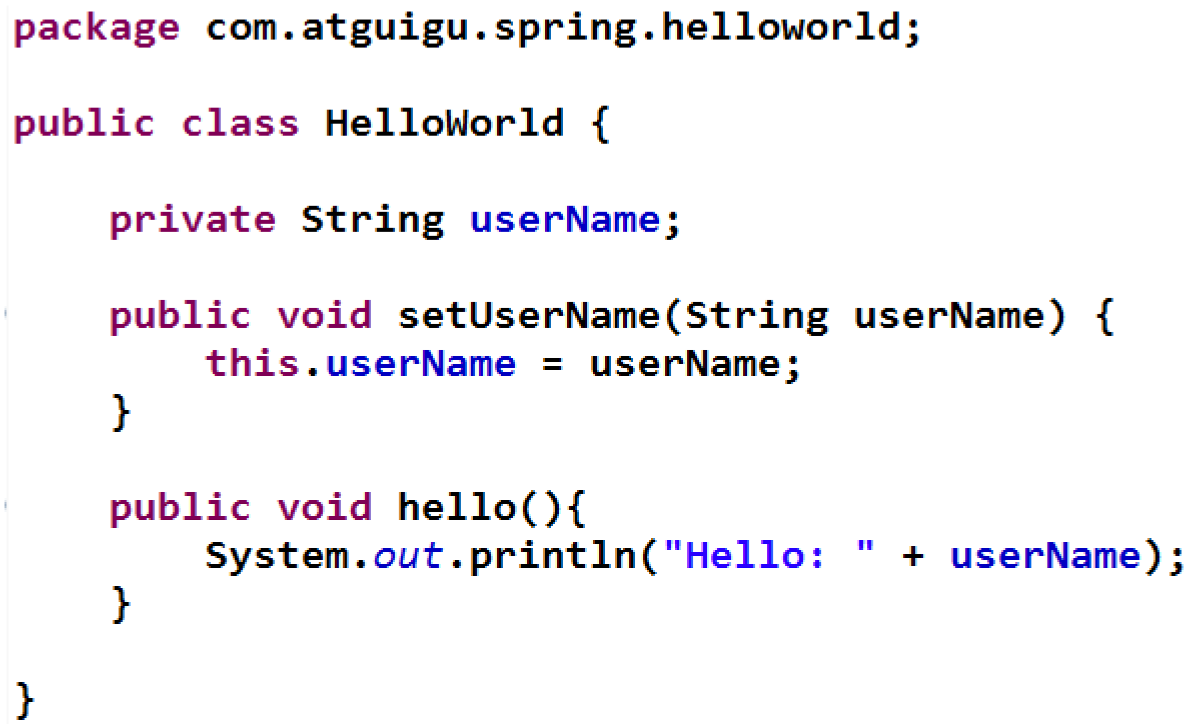
- □□□ jar □□□□□□□ classpath □:



commons-logging-1.1.3.jar
spring-beans-4.0.0.RELEASE.jar
spring-context-4.0.0.RELEASE.jar
spring-core-4.0.0.RELEASE.jar
spring-expression-4.0.0.RELEASE.jar

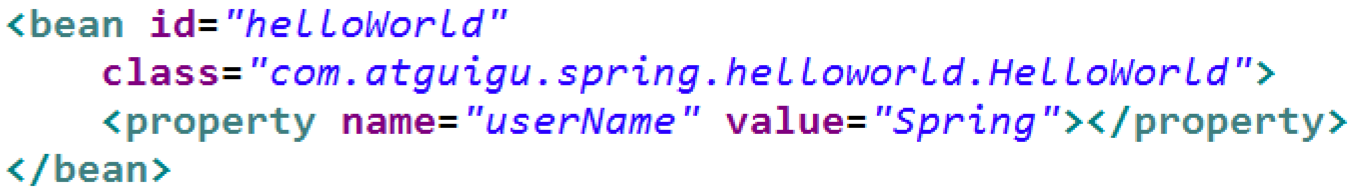
- Spring □□□□□: □□□□□ Spring □□□□□□□□□□□ Bean □□□□, □□□□□□□□□ Spring IOC □□□□□ Bean. Bean □□□□□□□**□□ classpath □**, □□□□□□□□□□.

□□ Spring □□



```
package com.atguigu.spring.helloworld;

public class HelloWorld {

    private String userName;

    public void setUserName(String userName) {
        this.userName = userName;
    }

    public void hello(){
        System.out.println("Hello: " + userName);
    }

}
```

HelloWorld.java



```
<bean id="helloWorld"
    class="com.atguigu.spring.helloworld.HelloWorld">
    <property name="userName" value="Spring"></property>
</bean>
```

applicationContext.xm
l

□□ Spring □□

```
public static void main(String[] args) {

    //1. 创建 Spring 的 IOC 容器
    ApplicationContext ctx =
            new ClassPathXmlApplicationContext("applicationContext.xml");

    //2. 从容器中获取 Bean
    HelloWorld helloWorld = (HelloWorld) ctx.getBean("helloWorld");
    System.out.println(helloWorld);

    //3. 调用方法
    helloWorld.hello();
}
```

Spring 是是 Bean 是是

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[illegible]

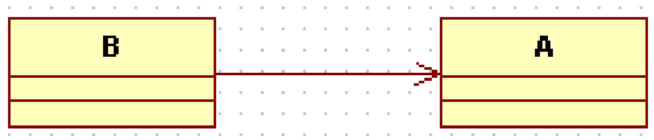
- **IOC & DI [illegible]**
- [illegible] bean
  - [illegible] XML [illegible]
  - Bean [illegible] & [illegible] FactoryBean
  - IOC [illegible] BeanFactory & ApplicationContext [illegible]
  - [illegible]
  - [illegible]
  - [illegible]
  - bean [illegible]
  - bean [illegible] singleton [illegible] prototype [illegible] WEB [illegible]
  - [illegible]
  - spEL
  - IOC [illegible] Bean [illegible]
  - Spring 4.x [illegible]

IOC □ DI

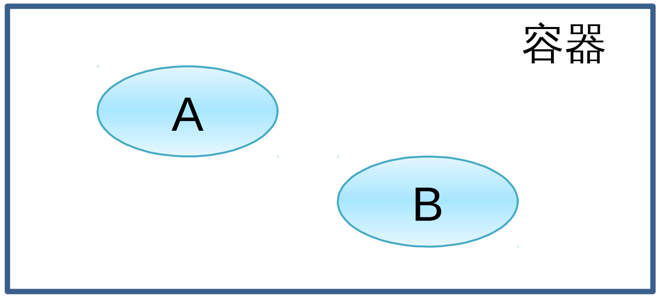
- IOC(Inversion of Control) □□□□□□□□□□□□□□. □□□□□□□□□□□□□□□□□□□□□□□ □□□. □□□□, □□□□□□□□□. □□□□ IOC □□, □□□□□□□□□□□□□□□□□□□□, □□□□□ □□□□□□□□□□□□□□□□□. □□□□□□□□□□□□□□□

- DI(Dependency Injection) — IOC □□□□□□□□□□□□□□□□□□□□□□□ (□□ **: setter** □□) □□□□□□□□□□□□. □□□ IOC □□□□□□□□□□

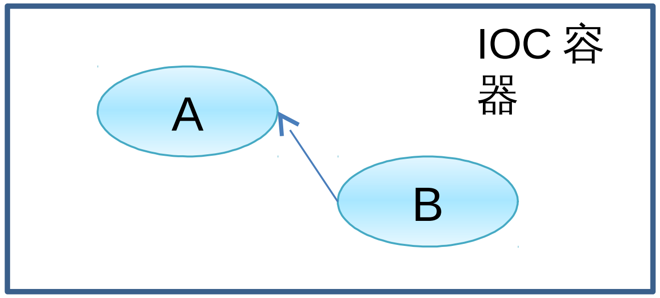
```
class A{}

class B{
	private A a;
	public void setA(A a){
		this.a = a;
	}
}
```



需求：从容器中获取 B 对象，并使 B 对象的 a 属性被赋值为容器中 A 对象的引用



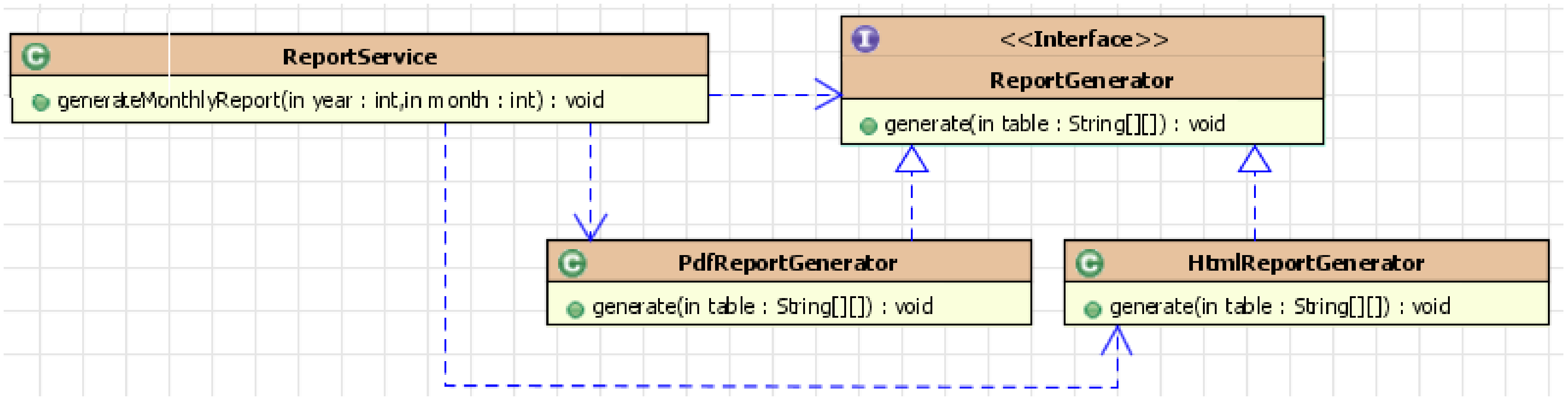
```
A a = getA();
B b = getB();
b.setA(a);
```



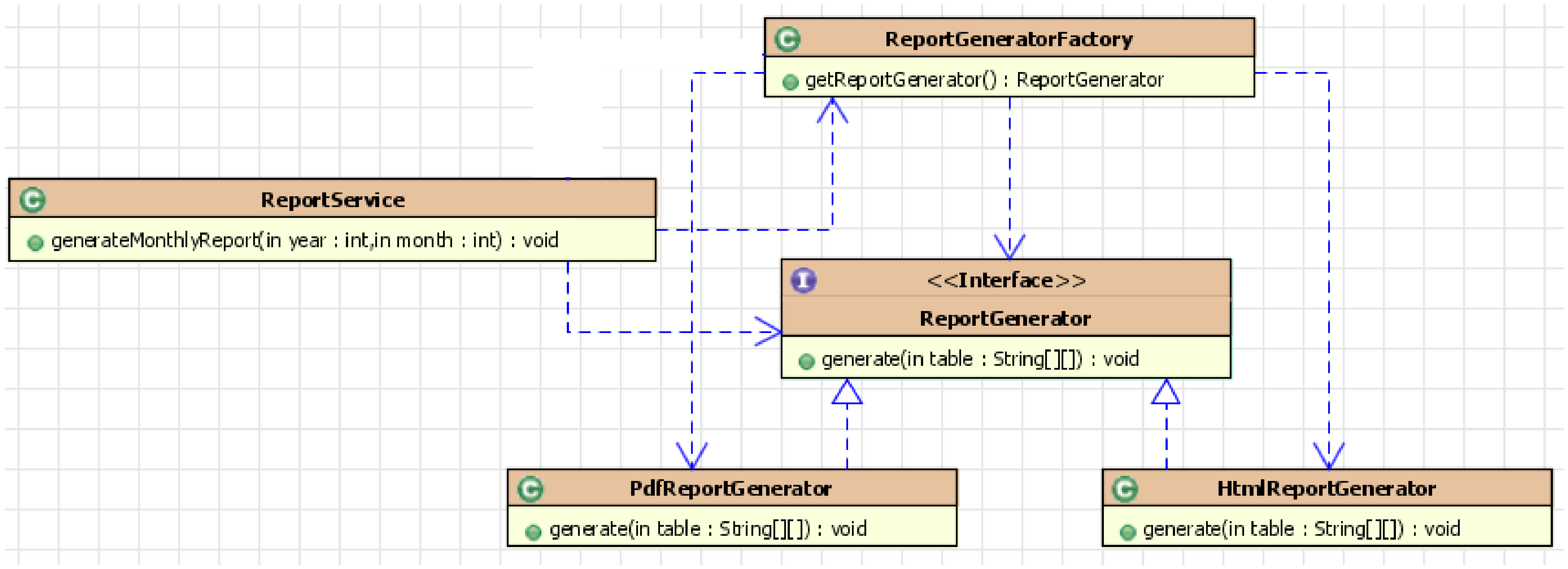
```
B b = getB();
```

IOC [illegible] --- [illegible]

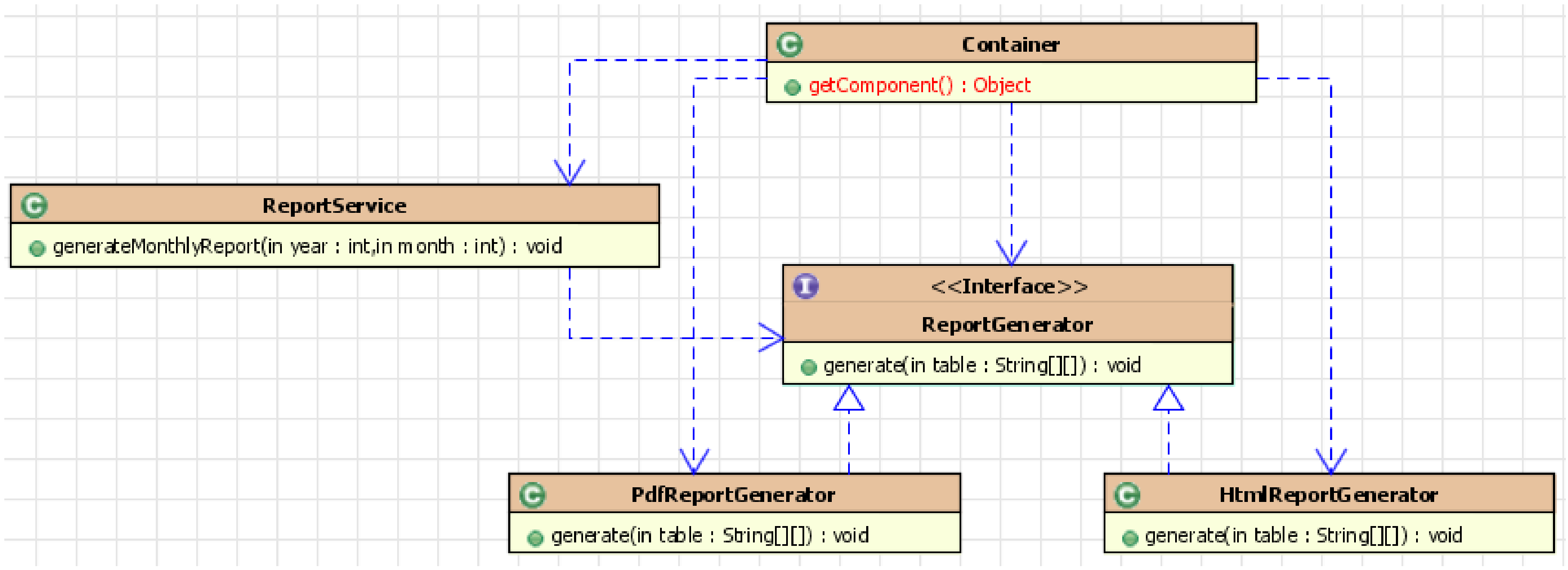
- [illegible] : [illegible] HTML [illegible] PDF [illegible] .


ReportService
generateMonthlyReport(in year : int,in month : int) : void
<<Interface>>
ReportGenerator
generate(in table : String[][]) : void
PdfReportGenerator
generate(in table : String[][]) : void
HtmlReportGenerator
generate(in table : String[][]) : void

IOC □□ --- □□□□□□□


ReportGeneratorFactory
getReportGenerator() : ReportGenerator
ReportService
generateMonthlyReport(in year : int,in month : int) : void
<<Interface>>
ReportGenerator
generate(in table : String[][]) : void
PdfReportGenerator
generate(in table : String[][]) : void
HtmlReportGenerator
generate(in table : String[][]) : void

IOC --- □□□□□□

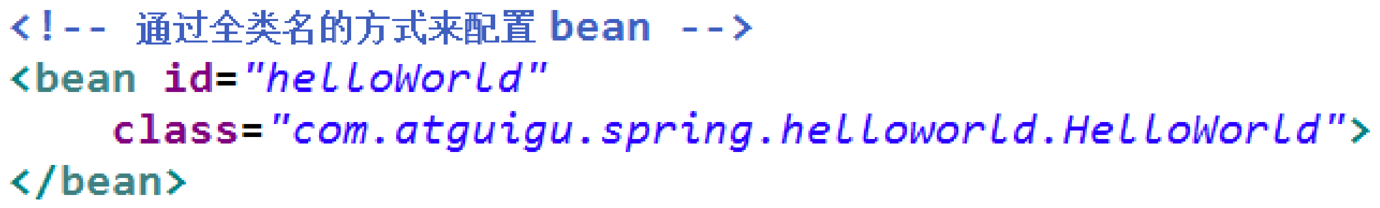

Container
getComponent() : Object
ReportService
generateMonthlyReport(in year : int,in month : int) : void
<<Interface>>
ReportGenerator
generate(in table : String[][]) : void
PdfReportGenerator
generate(in table : String[][]) : void
HtmlReportGenerator
generate(in table : String[][]) : void

[illegible]

- IOC & DI [illegible]
- **[illegible] bean**
  - [illegible] **XML** [illegible]
  - **Bean** [illegible] & [illegible] FactoryBean
  - **IOC [illegible] BeanFactory & ApplicationContext [illegible]**
  - [illegible]
  - [illegible]
  - [illegible]
  - bean [illegible]
  - bean [illegible] singleton [illegible] prototype [illegible] WEB [illegible]
  - [illegible]
  - spEL
  - IOC [illegible] Bean [illegible]
  - Spring 4.x [illegible]

□ Spring □ IOC □□□□□ Bean

- □ xml □□□□□ bean □□□□□ bean



```
<!-- 通过全类名的方式来配置 bean -->
<bean id="helloWorld"
    class="com.atguigu.spring.helloworld.HelloWorld">
</bean>
```

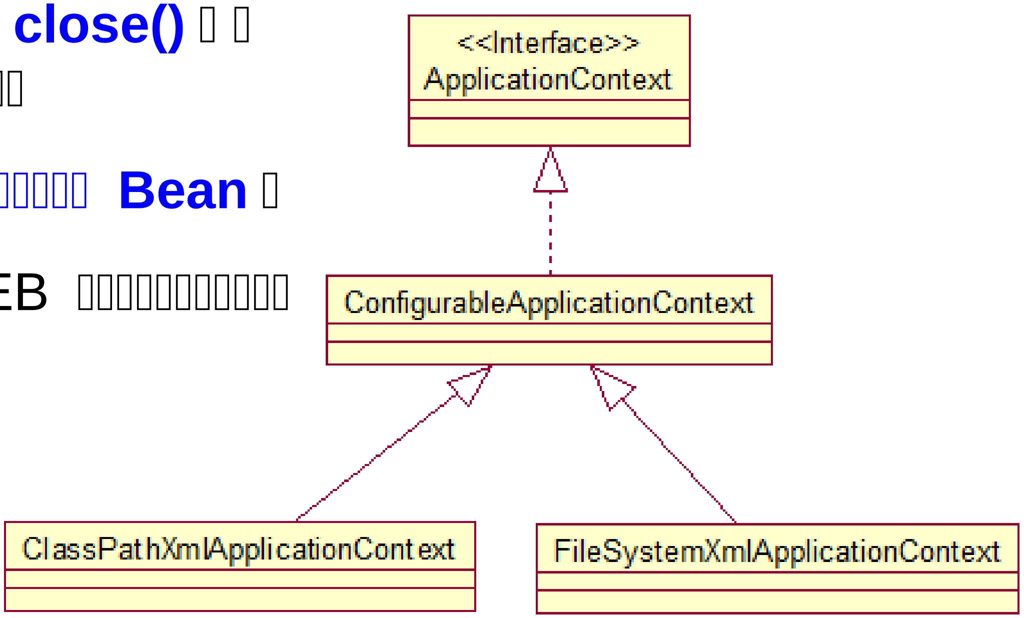
- id□Bean □□□□
  - □ **IOC □□□□□□□□□**
  - □ **id □□□□□Spring □□□□□□□□□□□ Bean □□□**
  - id □□□□□□□□□□□□□□□□□□□□□□□□□□

Spring □□

- □ **Spring IOC** □□□□ Bean □□□□ Bean □□□□ , □□□□□□□□□ . □□□□□□□□□ , □□□□ IOC □□□□□ Bean □□□□□ .
- Spring □□□□□□□□ IOC □□□□ .
  - **BeanFactory**: IOC □□□□□□□ .
  - **ApplicationContext**: □□□□□□□□□□ . □ BeanFactory □□□□ .
  - BeanFactory □ Spring □□□□□□□□□□ Spring □□□ ApplicationContext □□□□ Spring □□□□□□□□□□□□□□□□□□□□□ **ApplicationContext** □□□□□ **BeanFactory**
  - □□□□□□□□ , □□□□□□□□ .

ApplicationContext

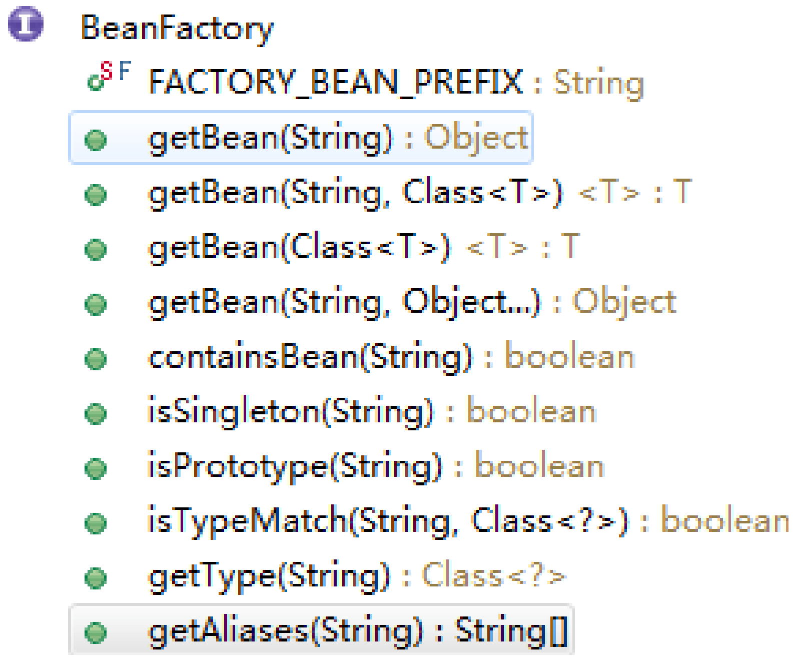
- ApplicationContext □□□□□□□
  - **ClassPathXmlApplicationContext**□□ □□□□□□□□
    □□
  - FileSystemXmlApplicationContext: □□□□□□□□□□□□
- ConfigurableApplicationContext □□□ ApplicationContext □□□□□□□□□□□□ refresh() □ **close()** □ □ ApplicationContext □□□□□□□□□□□□□□□□□□
- **ApplicationContext □□□□□□□□□□□□□□□□□□□ Bean** □
- WebApplicationContext □□□□ WEB □□□□□□□□□□□□□□□ WEB □□□□□□□□□□□□□□□



<<Interface>>
ApplicationContext
ConfigurableApplicationContext
ClassPathXmlApplicationContext
FileSystemXmlApplicationContext

□ IOC □□□□□ Bean

- □□ ApplicationContext □ getBean() □□



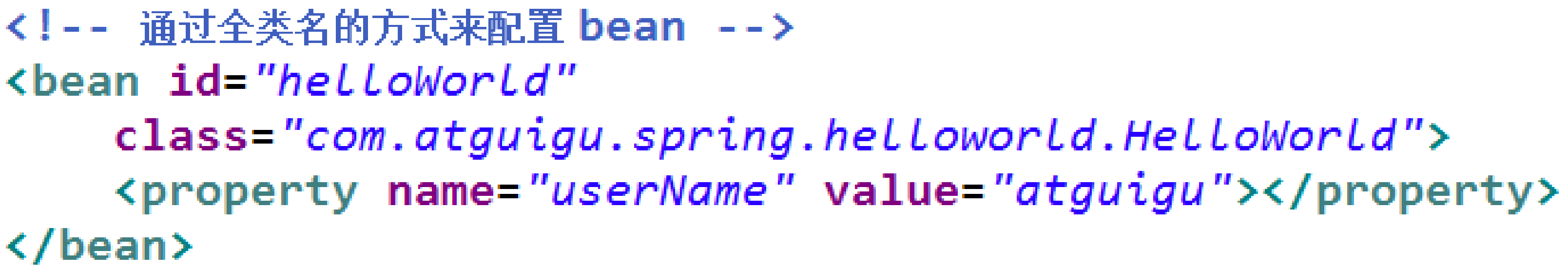
```
BeanFactory
  FACTORY_BEAN_PREFIX : String
  getBean(String) : Object
  getBean(String, Class<T>) <T> : T
  getBean(Class<T>) <T> : T
  getBean(String, Object...) : Object
  containsBean(String) : boolean
  isSingleton(String) : boolean
  isPrototype(String) : boolean
  isTypeMatch(String, Class<?>) : boolean
  getType(String) : Class<?>
  getAliases(String) : String[]
```

[illegible]

- Spring [illegible] 3 [illegible]
  - [illegible]
  - [illegible]
  - [illegible]

□□□□

- □□□□□□□ **setter** □□□□ Bean □□□□□□□□□□
- □□□□□□ <property> □□ , □□ name □□□□ Bean □□□□□ value □□□ <value> □□□□□□□□
- □□□□□□□□□□□□□□□□□□



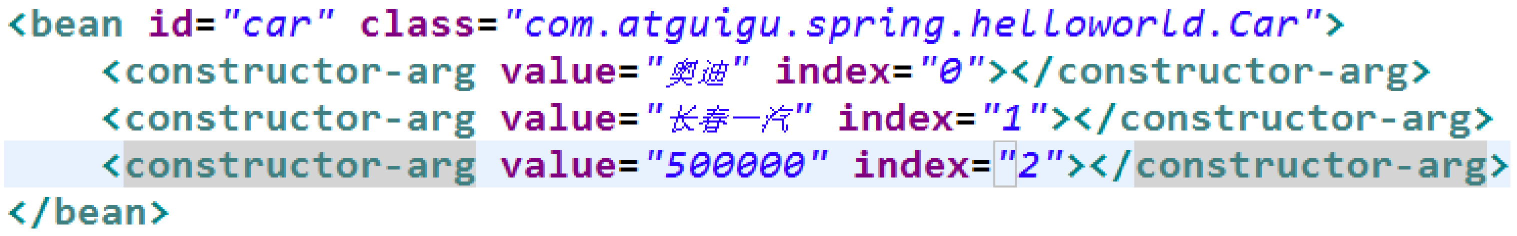
```
<!-- 通过全类名的方式来配置 bean -->
<bean id="helloWorld"
    class="com.atguigu.spring.helloworld.HelloWorld">
    <property name="userName" value="atguigu"></property>
</bean>
```

[illegible]

- [illegible] Bean [illegible] Bean [illegible]
- [illegible] <constructor-arg> [illegible] , **<constructor-arg> [illegible] name [illegible]**

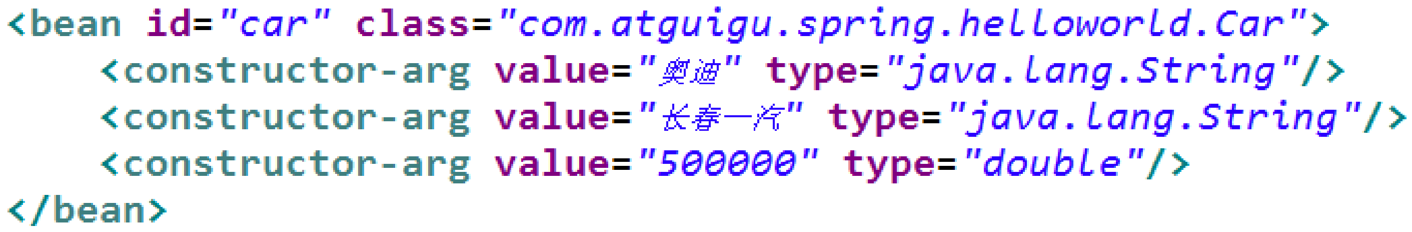
[illegible]

- [illegible]



```xml
<bean id="car" class="com.atguigu.spring.helloworld.Car">
    <constructor-arg value="奥迪" index="0"></constructor-arg>
    <constructor-arg value="长春一汽" index="1"></constructor-arg>
    <constructor-arg value="500000" index="2"></constructor-arg>
</bean>
```

- [illegible]



```xml
<bean id="car" class="com.atguigu.spring.helloworld.Car">
    <constructor-arg value="奥迪" type="java.lang.String"/>
    <constructor-arg value="长春一汽" type="java.lang.String"/>
    <constructor-arg value="500000" type="double"/>
</bean>
```

[illegible]

- IOC & DI [illegible]
- [illegible] **bean**
  - [illegible] **XML** [illegible]
  - Bean [illegible] & [illegible] FactoryBean
  - IOC [illegible] BeanFactory & ApplicationContext [illegible]
  - [illegible]
  - [illegible]
  - [illegible]
  - bean [illegible]
  - bean [illegible] singleton [illegible] prototype [illegible] WEB [illegible]
  - [illegible]
  - spEL
  - IOC [illegible] Bean [illegible]
  - Spring 4.x [illegible]

□□□

- □□□□□□□□□□□□□□□□□□ <value> □□□□□ value □□□□□□□
- □□□□□□□□□□□□ String □□□□□□□□□□□□□□□□
- □□□□□□□□□□□□□□□□ <![CDATA[]]> □□□□□□□□□

引用其它 Bean

- 组成应用程序的 Bean 经常需要相互协作以完成应用程序的功能. 要**使 Bean 能够相互访问**, 就必须在 Bean 配置文件中指定对 Bean 的引用
- 在 Bean 的配置文件中, 可以**通过 <ref> 元素或 ref 属性**为 Bean 的属性或构造器参数指定对 Bean 的引用.
- 也可以**在属性或构造器里包含 Bean 的声明**, 这样的 Bean 称为**内部 Bean**

```
<bean id="service" class="com.atguigu.spring.ioc.ref.Service"></bean>

<bean id="action" class="com.atguigu.spring.ioc.ref.Action">
    <!--
        为 service 属性赋值
        因为 service 属性是一个 bean 类型, 可以使用 ref 指向 ioc 容器中的其他的 bean
    -->
    <property name="service" ref="service"></property>
</bean>
```

□□ Bean

- □ Bean □□□□□□□□□□□□□□□, □□□□□□□□□ Bean. □□ Bean □□□□□□□ < property> □ <constructor-arg> □□□, □□□□□□□ id □ name □□
- □□ Bean □□□□□□□□□□□

□□□□□□□ null □□□□□□

- □□□□□□□ **<null/>** □□□□□ Bean □□□□□□□□□□□□□□□□ null □
- □ Struts □ Hiberante □□□□□□ **Spring** □□□□□□□□□□

□□□□

- □ Spring□□□□□□□□□□ xml □□(□□: <list>, <set> □ <map>) □□□□□□□.
- □□ java.util.List □□□□□, □□□□ **<list>** □□, □□□□□□□□□□. □□□□□□□□ **<value>** □□□□□□□□, □□ **<ref>** □□□□□ Bean □□□. □□**<bean>** □□□□ Bean □□. □□ <null/> □□□□□. □□□□□□□□□□.
- □□□□□□ List □□, □□□ <list>
- □□ java.util.Set □□□□ <set> □□, □□□□□□□□ List □□.

□□□□

- Java.util.Map □□ **<map>** □□□□, <map> □□□□□□□□□ **<entry>** □□□□□. □□□□□□□□□□□□□.
- □□□ **<key>** □□□□□□
- □□□□□□□□□□□□, □□□□□□□□□□□□ **<value>, <ref>, <bean>** □ **<null>** □□.
- □□□ Map □□□□□□ <entry> □□□□□: □□□□□□ key □ value □□□; Bean □□□□ key-ref □ value-ref □□□□
- □□ **<props>** □□ java.util.Properties, □□□□□□□ **<prop>** □□□□□. □□ **<prop>** □□□□□□ **key** □□.

[illegible] utility scheme [illegible]

- [illegible], **[illegible] Bean [illegible], [illegible] Bean [illegible], [illegible] Bean [illegible]**.
- [illegible] util schema [illegible] Bean. [illegible], [illegible] <beans> [illegible] util schema [illegible]

□□ p □□□□

- □□□□ XML □□□□□□□□□□□ XML □□□□□□□□□□□□□□□□
- Spring □ 2.5 □□□□□□□□□□□ p □□□□□□□□□ <bean> □□□□□□□□□ Bean □□□□
- □□ p □□□□□□□□ XML □□□□□□□□□□□

[illegible]

- IOC & DI [illegible]
- [illegible] **bean**
  - [illegible] **XML** [illegible]
  - Bean [illegible] & [illegible] FactoryBean
  - IOC [illegible] BeanFactory & ApplicationContext [illegible]
  - [illegible]
  - [illegible]
  - [illegible]
  - bean [illegible]
  - bean [illegible] singleton [illegible] prototype [illegible] WEB [illegible]
  - [illegible]
  - spEL
  - IOC [illegible] Bean [illegible]
  - Spring 4.x [illegible]

XML [illegible] Bean [illegible]

- Spring IOC [illegible] Bean. [illegible] **<bean> [illegible] autowire [illegible]**
- **byType**([illegible]): [illegible] IOC [illegible] Bean [illegible] Bean. [illegible], Spring [illegible] Bean [illegible], [illegible].
- **byName**([illegible]): [illegible] Bean [illegible].
- constructor([illegible]): [illegible] Bean [illegible], [illegible]. [illegible]

XML □□□□ Bean □□□□□□□

- □ Bean □□□□□□□ autowire □□□□□□□□□□□□ Bean □□□□□. □□, □□□□□□□□□□□, autowire □□□□□□□□.
- autowire □□□□□□□□□□□□, □□□□□□□□□□, □□□□□□□□.
- □□

[illegible]

- IOC & DI [illegible]
- [illegible] **bean**
  - [illegible] **XML** [illegible]
  - Bean [illegible] & [illegible] FactoryBean
  - IOC [illegible] BeanFactory & ApplicationContext [illegible]
  - [illegible]
  - [illegible]
  - [illegible]
  - **bean** [illegible]
  - bean [illegible] singleton [illegible] prototype [illegible] WEB [illegible]
  - [illegible]
  - spEL
  - IOC [illegible] Bean [illegible]
  - Spring 4.x [illegible]

继承 Bean 配置

- **Spring 允许继承 bean 的配置**, 被继承的 bean 称为父 bean. 继承这个父 Bean 的 Bean 称为子 Bean
- **子 Bean 从父 Bean 中继承配置, 包括 Bean 的属性配置**
- 子 Bean 也可以覆盖从父 Bean 继承过来的配置
- 父 Bean 可以作为配置模板, 也可以作为 Bean 实例. **若只想把父 Bean 作为模板, 可以设置 <bean> 的abstract 属性为 true**, 这样 Spring 将不会实例化这个 Bean
- **并不是 <bean> 元素里的所有属性都会被继承**. 比如: autowire, abstract 等.
- 也**可以忽略父 Bean 的 class 属性**, 让子 Bean 指定自己的类, 而共享相同的属性配置. 但此时 **abstract 必须设为 true**

[illegible] Bean [illegible]

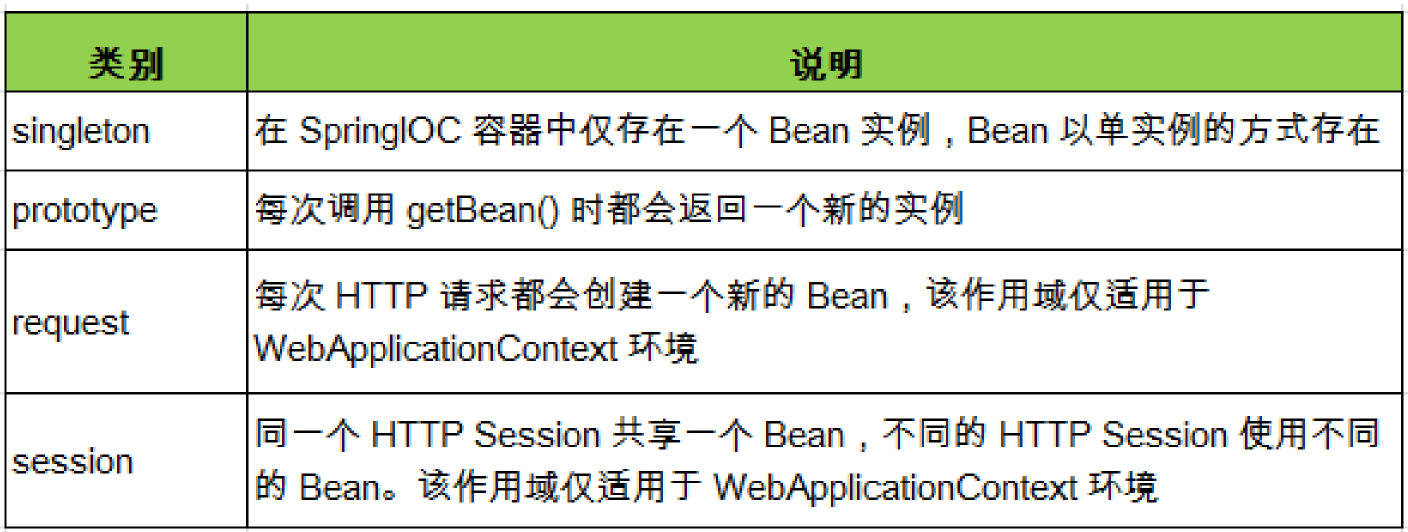
- **Spring** [illegible] **depends-on** [illegible] **Bean** [illegible] **Bean** [illegible] Bean [illegible] Bean [illegible]
- [illegible] **Bean** [illegible] **Bean** [illegible]

[illegible]

- IOC & DI [illegible]
- [illegible] **bean**
  - [illegible] **XML** [illegible]
  - Bean [illegible] & [illegible] FactoryBean
  - IOC [illegible] BeanFactory & ApplicationContext [illegible]
  - [illegible]
  - [illegible]
  - [illegible]
  - bean [illegible]
  - **bean [illegible] singleton [illegible] prototype [illegible] WEB [illegible]**
  - [illegible]
  - spEL
  - IOC [illegible] Bean [illegible]
  - Spring 4.x [illegible]

Bean [illegible]

- [illegible] Spring [illegible] , [illegible] <bean> [illegible] **scope** [illegible] Bean [illegible] .
- **[illegible] , Spring [illegible] IOC [illegible] Bean [illegible] , [illegible] IOC [illegible]** [illegible] getBean() [illegible] Bean [illegible] Bean [illegible] . [illegible] **singleton**, [illegible] Bean [illegible] .



类别	说明
singleton	在 SpringIOC 容器中仅存在一个 Bean 实例，Bean 以单实例的方式存在
prototype	每次调用 getBean() 时都会返回一个新的实例
request	每次 HTTP 请求都会创建一个新的 Bean，该作用域仅适用于 WebApplicationContext 环境
session	同一个 HTTP Session 共享一个 Bean，不同的 HTTP Session 使用不同的 Bean。该作用域仅适用于 WebApplicationContext 环境

□□□□

- IOC & DI □□
- □□ bean
  - □□□□□□□ XML □□□□□□□□□□□□□
  - Bean □□□□□□□□□□□□□□□□□□□□□□□□□□□□□ & □□□□□□□□FactoryBean
  - IOC □□ BeanFactory & ApplicationContext □□
  - □□□□□□□□□□□□□□□□□□
  - □□□□□□□
  - □□□□
  - bean □□□□□□□□□□□
  - bean □□□□□singleton□prototype□WEB □□□□□
  - □□□□□□□□
  - spEL
  - IOC □□□ Bean □□□□□
  - Spring 4.x □□□□□□□□□□

[illegible]

- [illegible] Bean [illegible], [illegible] Bean [illegible] ([illegible]: [illegible], [illegible]). [illegible] Bean [illegible]
- Spring [illegible] PropertyPlaceholderConfigurer [illegible] **BeanFactory** [illegible], [illegible] Bean [illegible]. [illegible] Bean [illegible] **${var}** [illegible], PropertyPlaceholderConfigurer [illegible], [illegible].
- Spring [illegible] ${propName} [illegible]

是是 PropertyPlaceholderConfigurer

- Spring 2.0:

```
<bean
    class="org.springframework.beans.factory.config.PropertyPlaceholderConfigurer">
    <property name="location" value="classpath:jdbc.propertiess"></property>
</bean>
```

- **Spring 2.5 轻轻：轻轻轻 <context:property-placeholder> 轻轻轻：**
  - <beans> 是是是 context Schema 是是

```
<context:property-placeholder
    location="classpath:db.properties"/>
```

[illegible]

- IOC & DI [illegible]
- **[illegible] bean**
  - [illegible] **XML** [illegible]
  - Bean [illegible] & [illegible] FactoryBean
  - IOC [illegible] BeanFactory & ApplicationContext [illegible]
  - [illegible]
  - [illegible]
  - [illegible]
  - bean [illegible]
  - bean [illegible] singleton [illegible] prototype [illegible] WEB [illegible]
  - [illegible]
  - **SpEL**
  - IOC [illegible] Bean [illegible]
  - Spring 4.x [illegible]

Spring □□□□□□ SpEL

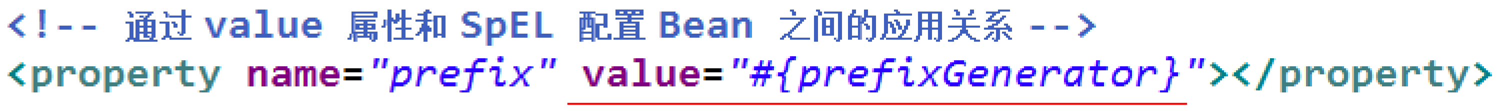
- **Spring** □□□□□□□□ **SpEL** □□□□□□□□□□□□□□□□□□□□□□□□□□□□
- □□□□□ **EL** □ **SpEL** □□ **#{…}** □□□□□□□□□□□□□□□□□□□□□□ **SpEL**
- **SpEL** □ **bean** □□□□□□□□□□□□□□
- □□ SpEL □□□□□
  - □□ bean □ id □ bean □□□□
  - □□□□□□□□□□□□□□
  - □□□□□□□
  - □□□□□□□□

SpEL □□□□

- □□□□□□
  - □□□ <property name="count" value="**#{5}**"/>
  - □□□ <property name="frequency" value="**#{89.7}**"/>
  - □□□□□□ <property name="capacity" value="**#{1e4}**"/>
  - **String** □□□□□□□□□□□□□□□□□□□□□□□ <property name=“name” value="**#{'Chuck'}**"/> □ <property name='name' value='**#{"Chuck"}**'/>
  - Boolean □ <property name="enabled" value="**#{false}**"/>

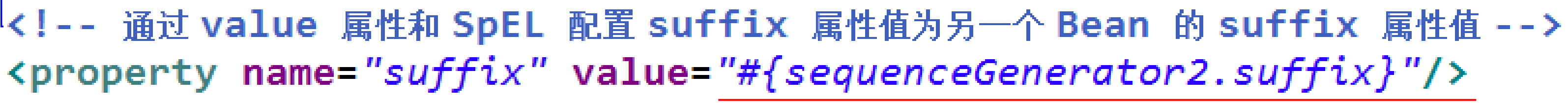
SpEL：引用 Bean、属性和方法（1）

- 引用其他对象：



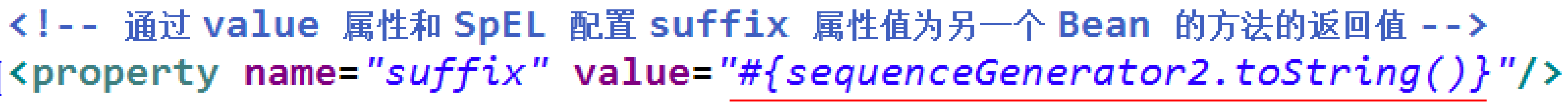
```
<!-- 通过 value 属性和 SpEL 配置 Bean 之间的应用关系 -->
<property name="prefix" value="#{prefixGenerator}"></property>
```

- 引用其他对象的属性：

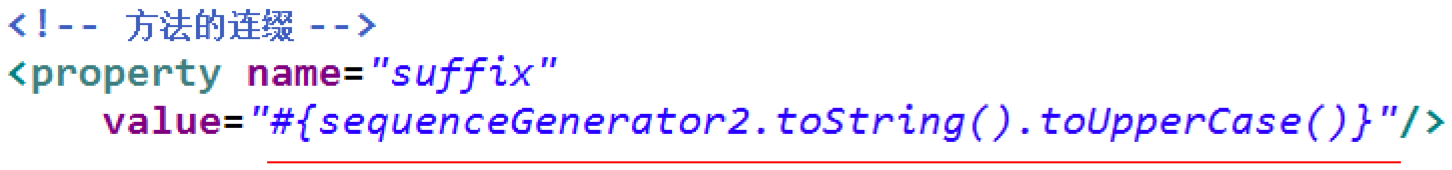


```
<!-- 通过 value 属性和 SpEL 配置 suffix 属性值为另一个 Bean 的 suffix 属性值 -->
<property name="suffix" value="#{sequenceGenerator2.suffix}"/>
```

-



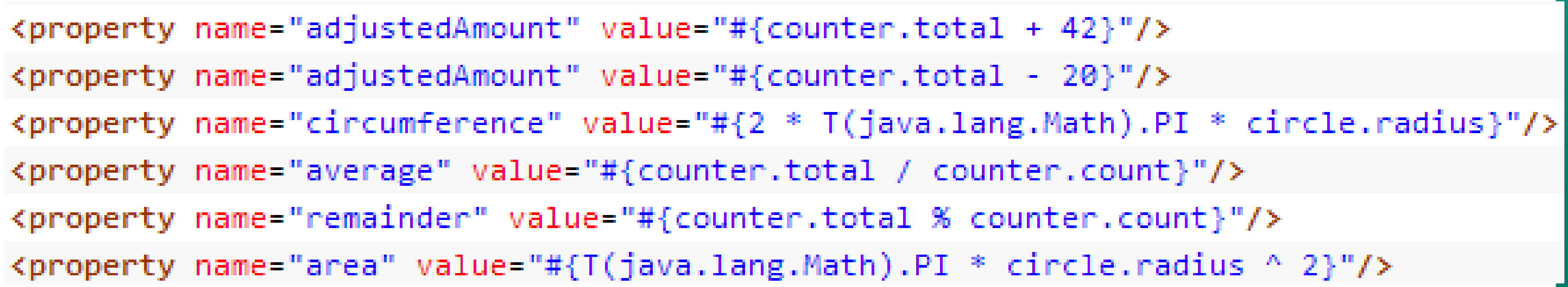
```
<!-- 通过 value 属性和 SpEL 配置 suffix 属性值为另一个 Bean 的方法的返回值 -->
<property name="suffix" value="#{sequenceGenerator2.toString()}"/>
```



```
<!-- 方法的连缀 -->
<property name="suffix"
    value="#{sequenceGenerator2.toString().toUpperCase()}"/>
```

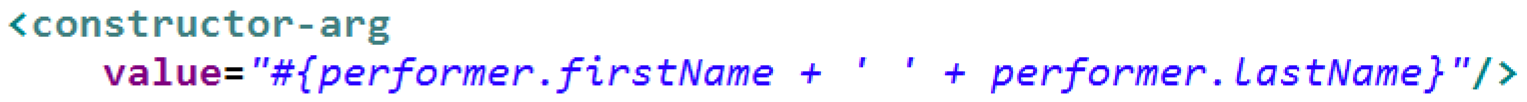
SpEL □□□□□□□□ 1 □

- □□□□□ +, -, *, /, %, ^ □



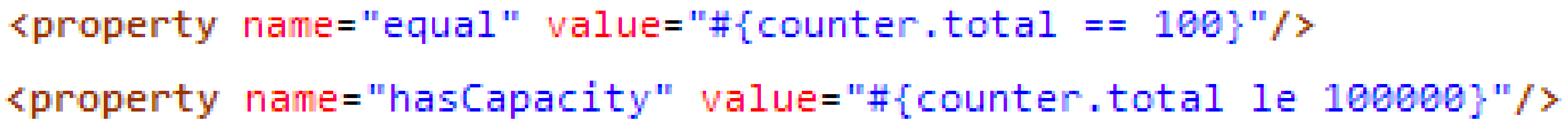
```
<property name="adjustedAmount" value="#{counter.total + 42}"/>
<property name="adjustedAmount" value="#{counter.total - 20}"/>
<property name="circumference" value="#{2 * T(java.lang.Math).PI * circle.radius}"/>
<property name="average" value="#{counter.total / counter.count}"/>
<property name="remainder" value="#{counter.total % counter.count}"/>
<property name="area" value="#{T(java.lang.Math).PI * circle.radius ^ 2}"/>
```

- □□□□□□□□□□□

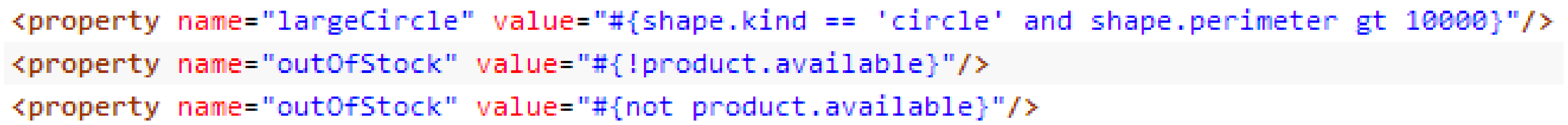


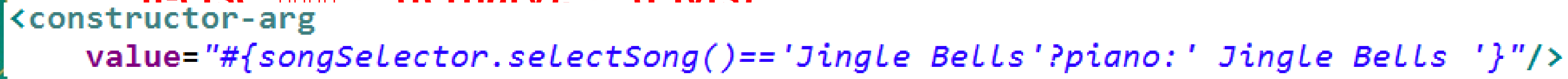
```
<constructor-arg
    value="#{performer.firstName + ' ' + performer.lastName}"/>
```

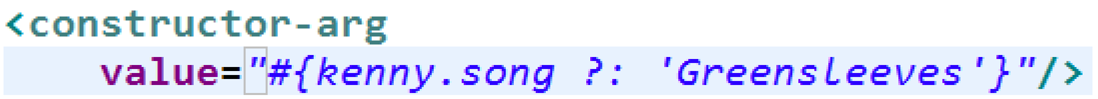
- □□□□□ <, >, ==, <=, >=, lt, gt, eq, le, ge

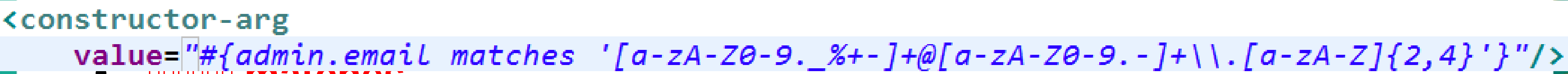


```
<property name="equal" value="#{counter.total == 100}"/>

<property name="hasCapacity" value="#{counter.total le 100000}"/>
```









SpEL 是是是是是是是是 2 是

- 轻轻轻轻轻轻轻 **and, or, not, |**

```
<property name="largeCircle" value="#{shape.kind == 'circle' and shape.perimeter gt 10000}"/>
<property name="outOfStock" value="#{!product.available}"/>
<property name="outOfStock" value="#{not product.available}"/>
```

- **if-else □□□□ ?: (ternary), ?: (Elvis)**

```
<constructor-arg
    value="#{songSelector.selectSong()=='Jingle Bells'?piano:' Jingle Bells '}"/>
```

-
```
<constructor-arg
    value="#{kenny.song ?: 'Greensleeves'}"/>
```

```
<constructor-arg
    value="#{admin.email matches '[a-zA-Z0-9._%+-]+@[a-zA-Z0-9.-]+\\.[a-zA-Z]{2,4}'}"/>
```

- □□□□□□ **matches**

SpEL：□□ Bean□□□□□□ 2 □

- □□□□□□□□□□□□□□□ **T()** □□□□□□□□□□□□□□□□□□ Class Object □□□□□□□□□□□□□□□
  □

```
<property name="initValue"
    value="#{T(java.lang.Math).PI}"></property>
```

[illegible]

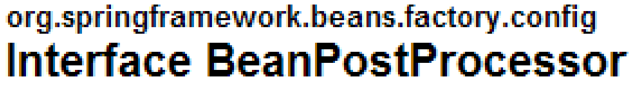
- IOC & DI [illegible]
- [illegible] **bean**
  - [illegible] **XML** [illegible]
  - Bean [illegible] & [illegible] FactoryBean
  - IOC [illegible] BeanFactory & ApplicationContext [illegible]
  - [illegible]
  - [illegible]
  - [illegible]
  - bean [illegible]
  - bean [illegible] singleton [illegible] prototype [illegible] WEB [illegible]
  - [illegible]
  - spEL
  - **IOC** [illegible] **Bean** [illegible]
  - Spring 4.x [illegible]

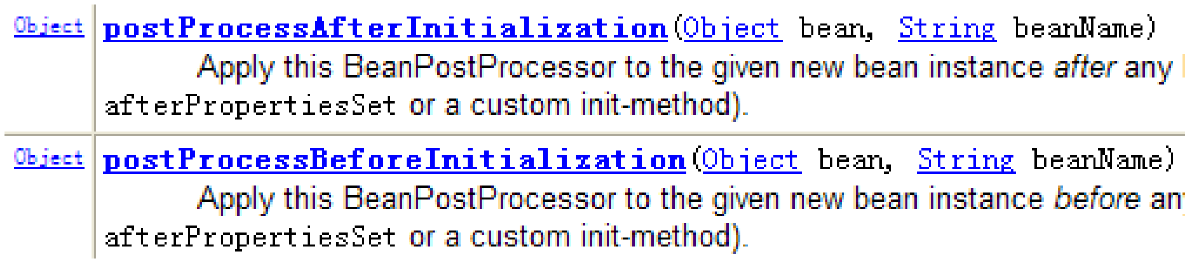
IOC □□□ Bean □□□□□□□

- **Spring IOC □□□□□□ Bean □□□□□**, Spring □□□ Bean □□□□□□□□□□□□□□□.
- Spring IOC □□□ Bean □□□□□□□□□□□□:
  - □□□□□□□□□□□□ Bean □□
  - □ Bean □□□□□□□□□□ Bean □□□
  - **□□ Bean □□□□□□**
  - Bean □□□□□
  - **□□□□□□, □□ Bean □□□□□**
- □ Bean □□□□□ init-method □ destroy-method □□, □ Bean □□□□□□□□□.

□□ Bean □□□□□

- **Bean □□□□□□□□□□□□□□□□□□ Bean □□□□□□□.**
- **Bean □□□□□□ IOC □□□□□□ Bean □□□□□□**, □□□□□□. □□□□□□: □□ Bean □□□□□□□□□□□□□□□□ Bean □□□.
- □Bean □□□□□□□, □□□□ □□. □□□□□□□□□□□, Spring □□□□ Bean □□□□□□□□□□□□□□□□□□:


org.springframework.beans.factory.config
Interface BeanPostProcessor



Object	**postProcessAfterInitialization**(Object bean, String beanName) Apply this BeanPostProcessor to the given new bean instance *after* any afterPropertiesSet or a custom init-method).
Object	**postProcessBeforeInitialization**(Object bean, String beanName) Apply this BeanPostProcessor to the given new bean instance *before* an afterPropertiesSet or a custom init-method).

□□ Bean □□□□□□ Bean □□□□□

- Spring IOC □□□ Bean □□□□□□□□□□□ :
  - □□□□□□□□□□□□ Bean □□
  - □ Bean □□□□□□□□□□ Bean □□□
  - **□ Bean □□□□□ Bean □□□□□□ postProcessBeforeInitialization □□**
  - □□ Bean □□□□□□
  - **□ Bean □□□□□ Bean □□□□□□ postProcessAfterInitialization □□**
  - Bean □□□□□
  - □□□□□□ , □□ Bean □□□□□

内容提要

- IOC & DI 概述
- 配置 bean
  - 配置形式：基于 XML 文件的方式；基于注解的方式
  - **Bean 的配置方式：通过全类名（反射）、通过工厂方法（静态工厂方法 & 实例工厂方法）**、FactoryBean
  - IOC 容器 BeanFactory & ApplicationContext 概述
  - 依赖注入的方式：属性注入；构造器注入
  - [illegible] bean [illegible]
  - 自动装配
  - bean 之间的关系：继承；依赖
  - bean 的作用域：singleton；prototype；WEB 环境作用域
  - 使用外部属性文件
  - spEL
  - IOC 容器中 Bean 的生命周期
  - Spring 4.x 新特性：泛型依赖注入

[illegible] Bean

- [illegible] Bean [illegible]. [illegible], [illegible], [illegible].
- [illegible] Bean, [illegible] Bean [illegible] **class** [illegible], [illegible] **factory-method** [illegible]. [illegible], [illegible] **<constrctor-arg>** [illegible].

[illegible] Bean

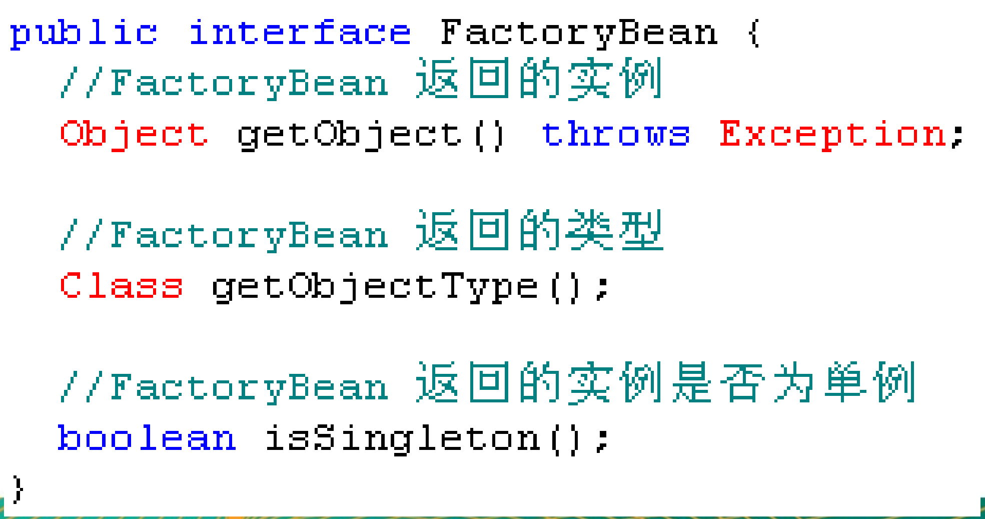
- [illegible]: [illegible]. [illegible], [illegible].
- [illegible] Bean
  - [illegible] bean [illegible] **factory-bean** [illegible] Bean
  - [illegible] **factory-method** [illegible]
  - [illegible] **construtor-arg** [illegible]

[illegible]

- IOC & DI [illegible]
- [illegible] bean
  - [illegible] XML [illegible]
  - **Bean [illegible] & [illegible] FactoryBean**
  - IOC [illegible] BeanFactory & ApplicationContext [illegible]
  - [illegible]
  - [illegible]
  - [illegible]
  - bean [illegible]
  - bean [illegible] singleton [illegible] prototype [illegible] WEB [illegible]
  - [illegible]
  - spEL
  - IOC [illegible] Bean [illegible]
  - Spring 4.x [illegible]

□□ FactoryBean □□□ Spring IOC □□□□□ Bean

- Spring □□□□□□□ Bean, □□□□□ Bean, □□□□□□ Bean, □ FactoryBean.
- □□ Bean □□□ Bean □□ , □□□□□□□□□□□□□□□□ , □□□□□□□□ Bean □ getObject □□□□□□□□



```
public interface FactoryBean {
  //FactoryBean 返回的实例
  Object getObject() throws Exception;

  //FactoryBean 返回的类型
  Class getObjectType();

  //FactoryBean 返回的实例是否为单例
  boolean isSingleton();
}
```

[illegible]

- IOC & DI [illegible]
- [illegible] bean
  - [illegible] XML [illegible] Bean [illegible] Bean [illegible]
  - Bean [illegible] & [illegible] FactoryBean
  - IOC [illegible] BeanFactory & ApplicationContext [illegible]
  - [illegible]
  - [illegible]
  - [illegible]
  - bean [illegible]
  - bean [illegible] singleton [illegible] prototype [illegible] WEB [illegible]
  - [illegible]
  - spEL
  - IOC [illegible] Bean [illegible]
  - Spring 4.x [illegible]

在 classpath 中扫描组件

- 组件扫描(component scanning): Spring 能够从 classpath 下自动扫描, 侦测和实例化具有特定注解的组件.
- 特定组件包括:
  - @Component: 基本注解, 标识了一个受 Spring 管理的组件
  - @Respository: 标识持久层组件
  - @Service: 标识服务层(业务层)组件
  - @Controller: 标识表现层组件
- 对于扫描到的组件, **Spring 有默认的命名策略**: 使用非限定类名, 第一个字母小写**. 也可以在注解中通过 value 属性值标识组件的名称**

□ classpath □□□□□

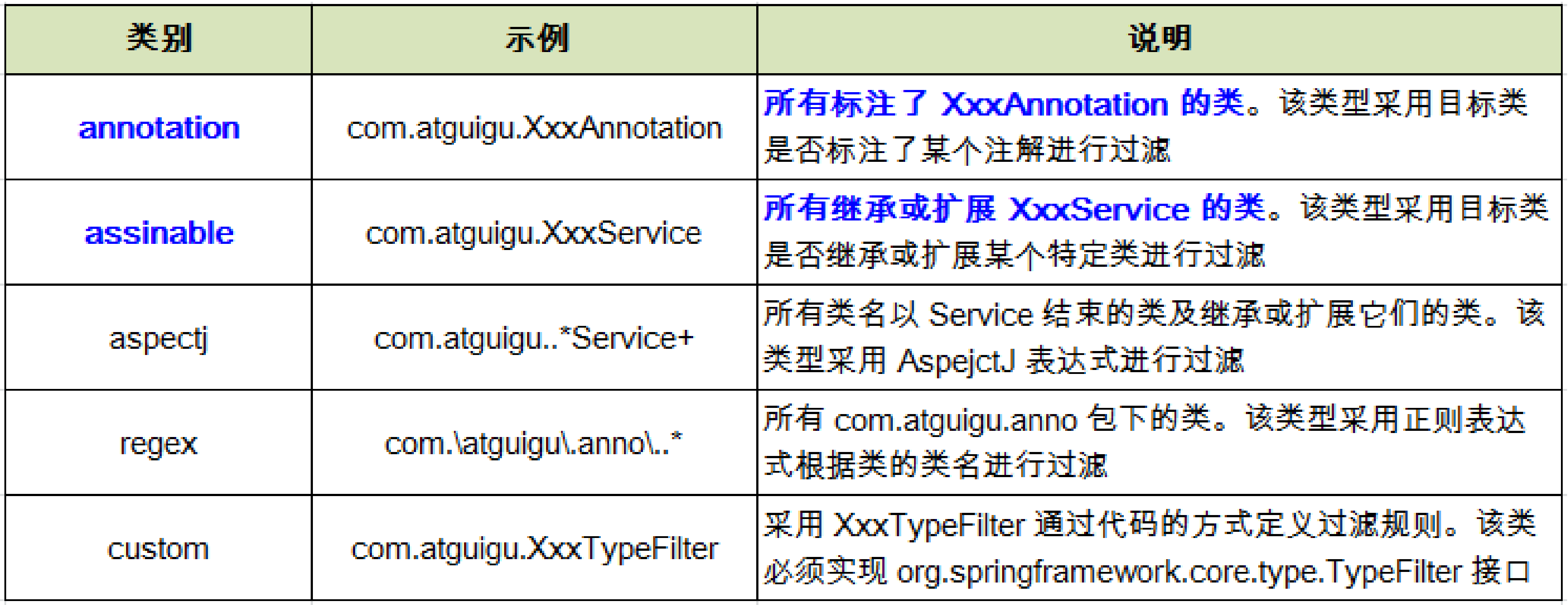
- □□□□□□□□□□□□□□□□, □□□□ Spring □□□□□□□□ **<context:component-scan>** □
  - **base-package** □□□□□□□□□□□□□□□Spring □□□□□□□□□□□□□□□□□□□□□.
  - □□□□□□□□□, □□□□□□□□.
  - □□□□□□□□□□□□□□□□□□□□□□□□ resource-pattern □□□□□□□□□□□□

```
<context:component-scan
      base-package="com.atguigu.spring.beans"
      resource-pattern="autowire/*.class"/>
```

  - **<context:include-filter>** □□□□□□□□□□□□
  - **<context:exclude-filter>** □□□□□□□□□□□□□□
  - <context:component-scan> □□□□□□□□ <context:include-filter> □ <context:exclude-filter> □□□

□ classpath □□□□□

- <context:include-filter> □ <context:exclude-filter> □□□□□□□□□□
  □□□□□□□□□□



类别	示例	说明
annotation	com.atguigu.XxxAnnotation	所有标注了 XxxAnnotation 的类。该类型采用目标类是否标注了某个注解进行过滤
assinable	com.atguigu.XxxService	所有继承或扩展 XxxService 的类。该类型采用目标类是否继承或扩展某个特定类进行过滤
aspectj	com.atguigu..*Service+	所有类名以 Service 结束的类及继承或扩展它们的类。该类型采用 AspejctJ 表达式进行过滤
regex	com.\atguigu\.anno\..*	所有 com.atguigu.anno 包下的类。该类型采用正则表达式根据类的类名进行过滤
custom	com.atguigu.XxxTypeFilter	采用 XxxTypeFilter 通过代码的方式定义过滤规则。该类必须实现 org.springframework.core.type.TypeFilter 接口

□□□□

- <context:component-scan> □□□□□□□□ AutowiredAnnotation BeanPostProcessor □□, □□□□□□□□□□□ **@Autowired** □ **@Resource** □ **@Inject** □□□□□.

□□ @Autowired □□□□ Bean

- @Autowired □□□□□□□□□□□□□□□ Bean □□
  - **□□□, □□□□(□□□□ public), □□□□□□□□□□□□□□□□□ @Authwired □□**
  - **□□□□□, □□□□ @Authwired □□□□□□□□□□. □ Spring □□□□□ Bean □□□□□, □□□□□, □□□□□□□□□□□, □□□□ @Authwired □□□ required □□□ false**
  - □□□□□, □ IOC □□□□□□□□□□□ Bean □, □□□□□□□□□□□□□. □□□□□ **@Qualifier** □□□□□ Bean □□□. **Spring □□□□□□□□□ @Qualifiter □□□□□ Bean □□□**
  - @Authwired □□□□□□□□□□□□□□□, □□ Spring □□□□□□□ Bean □□□□□□.
  - @Authwired □□□□□□□□□□□□, □□ Spring □□□□□□□□□, □□□□□□□□□□□□ Bean.
  - @Authwired □□□□ **java.util.Map** □□, □□ Map □□□□ String, □□ Spring □□□□□□ Map □□□□□ Bean, □□ Bean □□□□□□

□□ @Resource □ @Inject □□□□ Bean

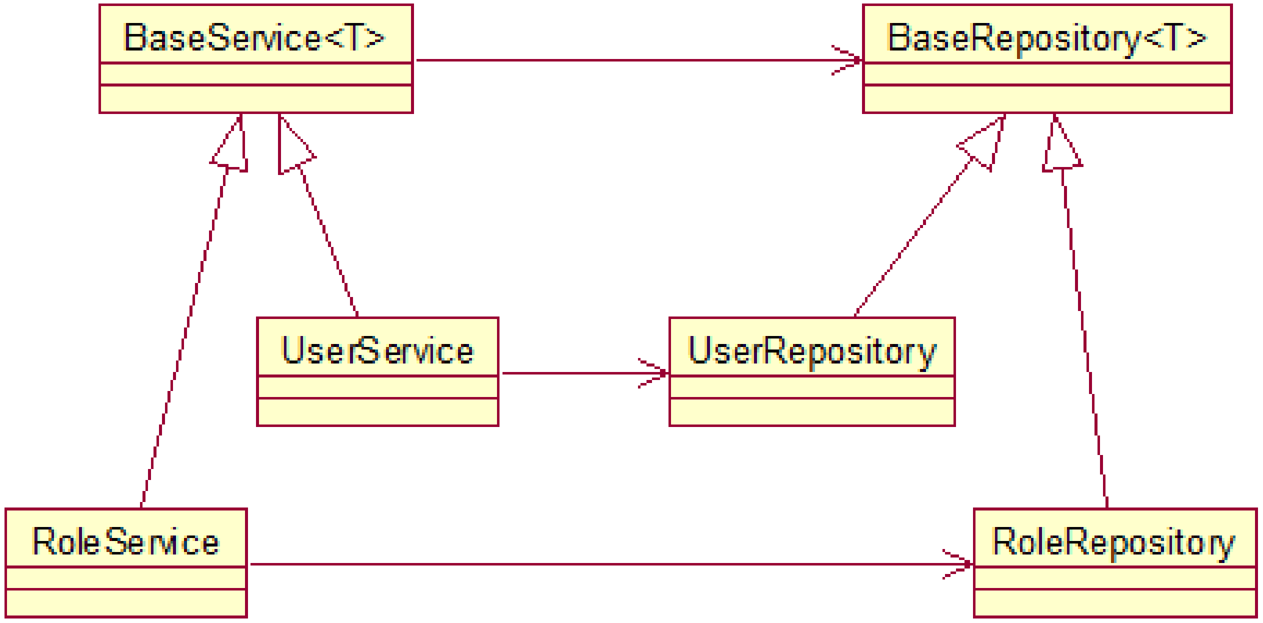
- Spring □□□ @Resource □ @Inject □□□□□□□□ @Autowired □ □□□□□
- @Resource □□□□□□□ Bean □□□□□□□□□□□□□□□□□□□□□□□□□□□ Bean □□□
- @Inject □ @Autowired □□□□□□□□□□□□ Bean□ □□□ reqired □□
- □□□□ **@Autowired** □□

[illegible]

- IOC & DI [illegible]
- [illegible] bean
  - [illegible] XML [illegible]
  - Bean [illegible] & [illegible] FactoryBean
  - IOC [illegible] BeanFactory & ApplicationContext [illegible]
  - [illegible]
  - [illegible]
  - [illegible]
  - bean [illegible]
  - bean [illegible] singleton [illegible] prototype [illegible] WEB [illegible]
  - [illegible]
  - spEL
  - IOC [illegible] Bean [illegible]
  - **Spring 4.x** [illegible]

[illegible]

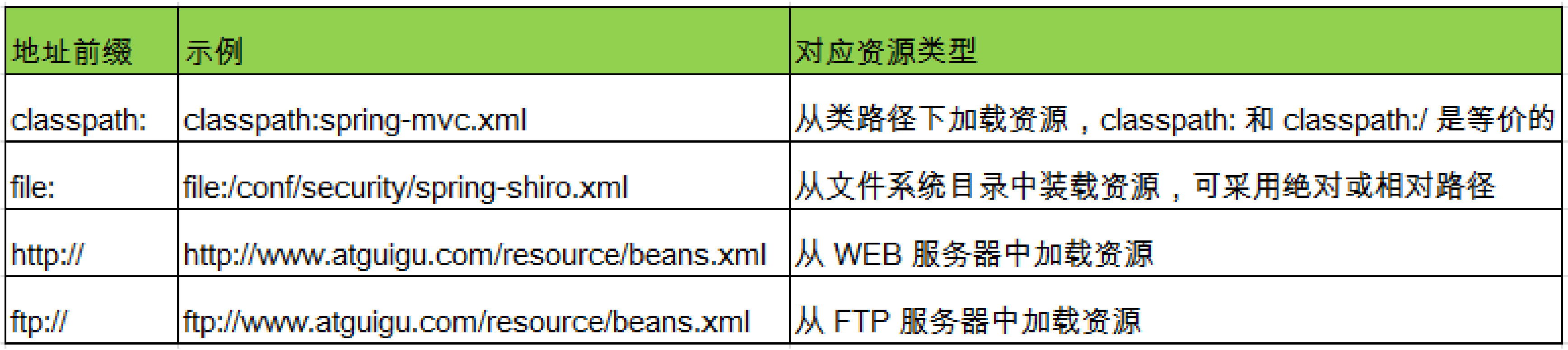
- Spring 4.x [illegible]



BaseService<T>
BaseRepository<T>
UserService
UserRepository
RoleService
RoleRepository

[illegible]

- Spring [illegible] <import> [illegible] Spring [illegible]
- import [illegible] resource [illegible] Spring [illegible]



地址前缀	示例	对应资源类型
classpath:	classpath:spring-mvc.xml	从类路径下加载资源，classpath: 和 classpath:/ 是等价的
file:	file:/conf/security/spring-shiro.xml	从文件系统目录中装载资源，可采用绝对或相对路径
http://	http://www.atguigu.com/resource/beans.xml	从 WEB 服务器中加载资源
ftp://	ftp://www.atguigu.com/resource/beans.xml	从 FTP 服务器中加载资源

尚硅谷
www.atguigu.com

Spring AOP

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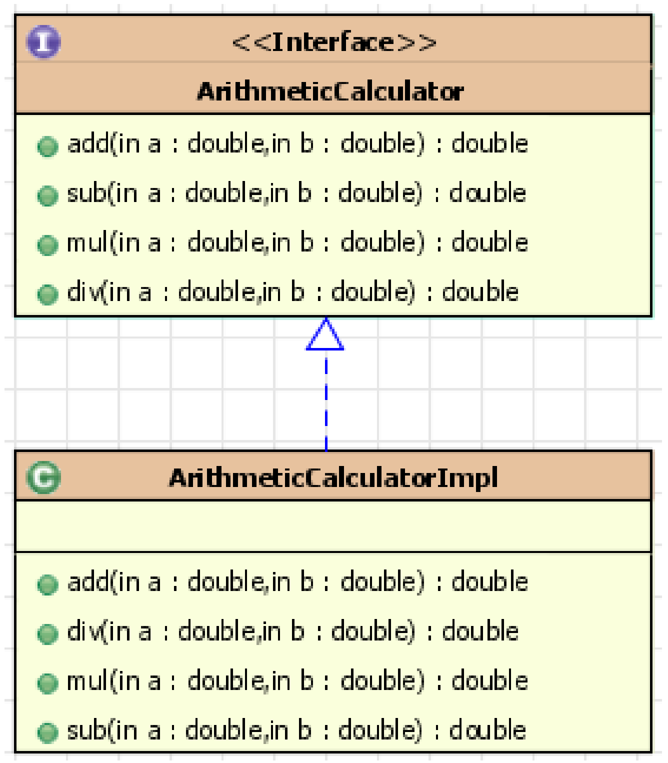
AOP □□

- WHY AOP □



<<Interface>>
ArithmeticCalculator
add(in a : double,in b : double) : double
sub(in a : double,in b : double) : double
mul(in a : double,in b : double) : double
div(in a : double,in b : double) : double
ArithmeticCalculatorImpl
add(in a : double,in b : double) : double
div(in a : double,in b : double) : double
mul(in a : double,in b : double) : double
sub(in a : double,in b : double) : double

□□ 1- □□□□□□□□□□□□□□□□□□□

□□ 2- □□□□□□□□□□□□□□□□□

□□□□□

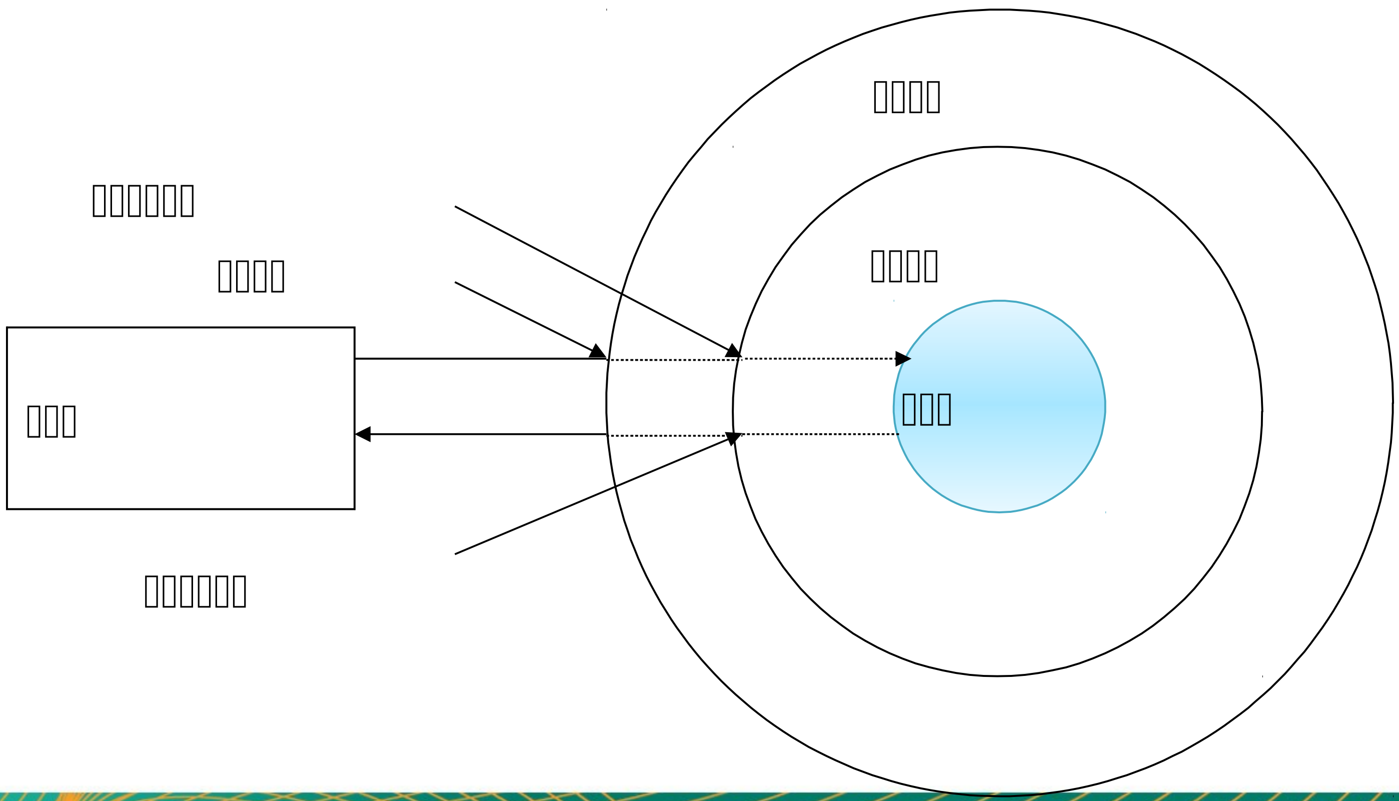
```java
public class ArithmeticCalculatorImpl implements ArithmeticCalculator {

    @Override
    public void add(int i, int j) {

        System.out.println("日志:The method add begins with [" +
                i + ", " +  j + "]" );

        int result = i + j;
        System.out.println("result: " + result);

        System.out.println("日志:The method add ends with " + result);
    }

    @Override
    public void sub(int i, int j) {

        System.out.println("日志:The method sub begins with [" +
                i + ", " +  j + "]" );

        int result = i - j;
        System.out.println("result: " + result);

        System.out.println("日志:The method sub ends with " + result);
    }
```

[illegible]

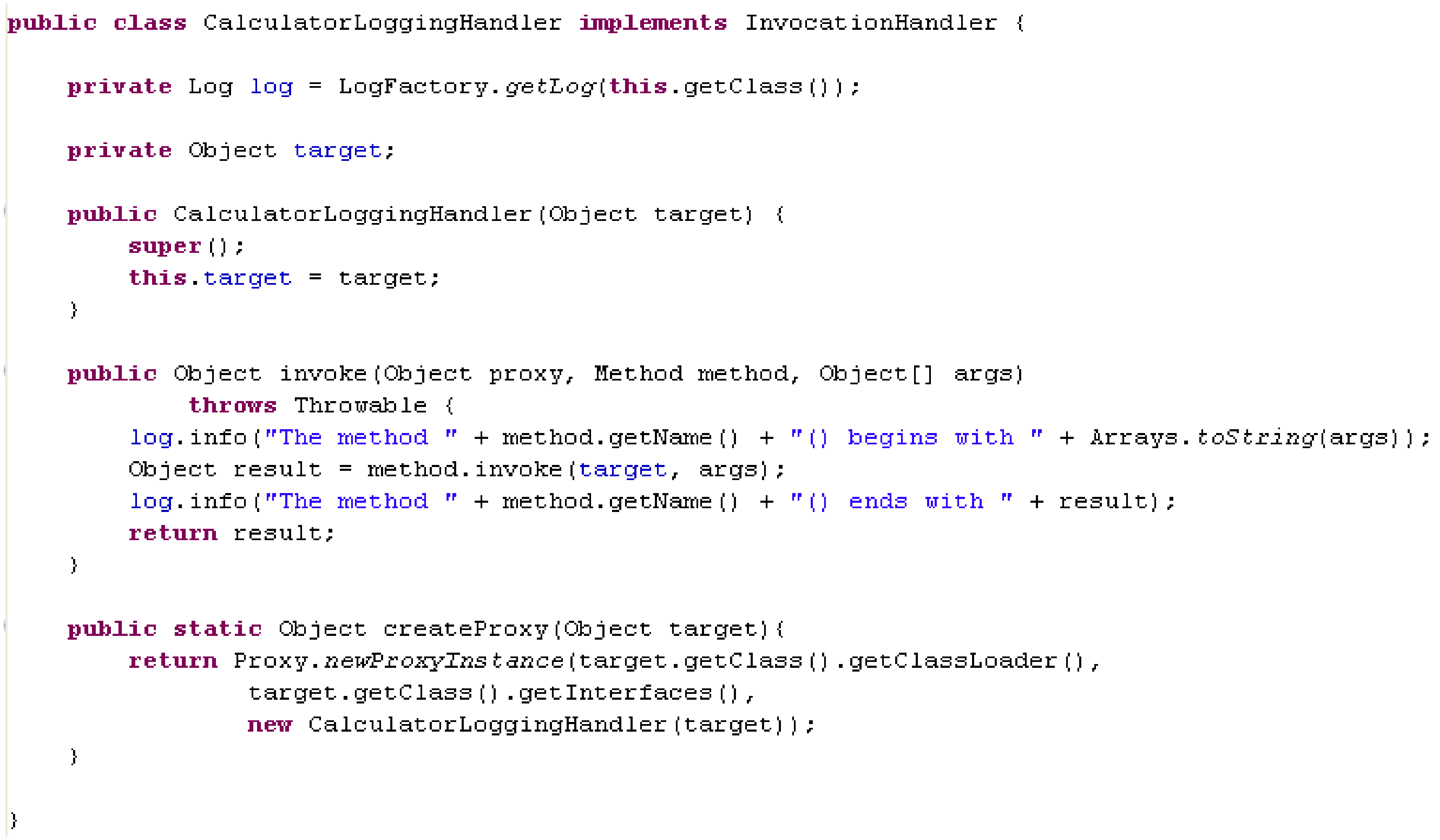
- [illegible] ([illegible]) [illegible] , [illegible] . [illegible] .
- [illegible] : [illegible] , [illegible] , [illegible] . [illegible] , [illegible] .

[illegible]

- [illegible]: [illegible], [illegible]. [illegible]. [illegible].

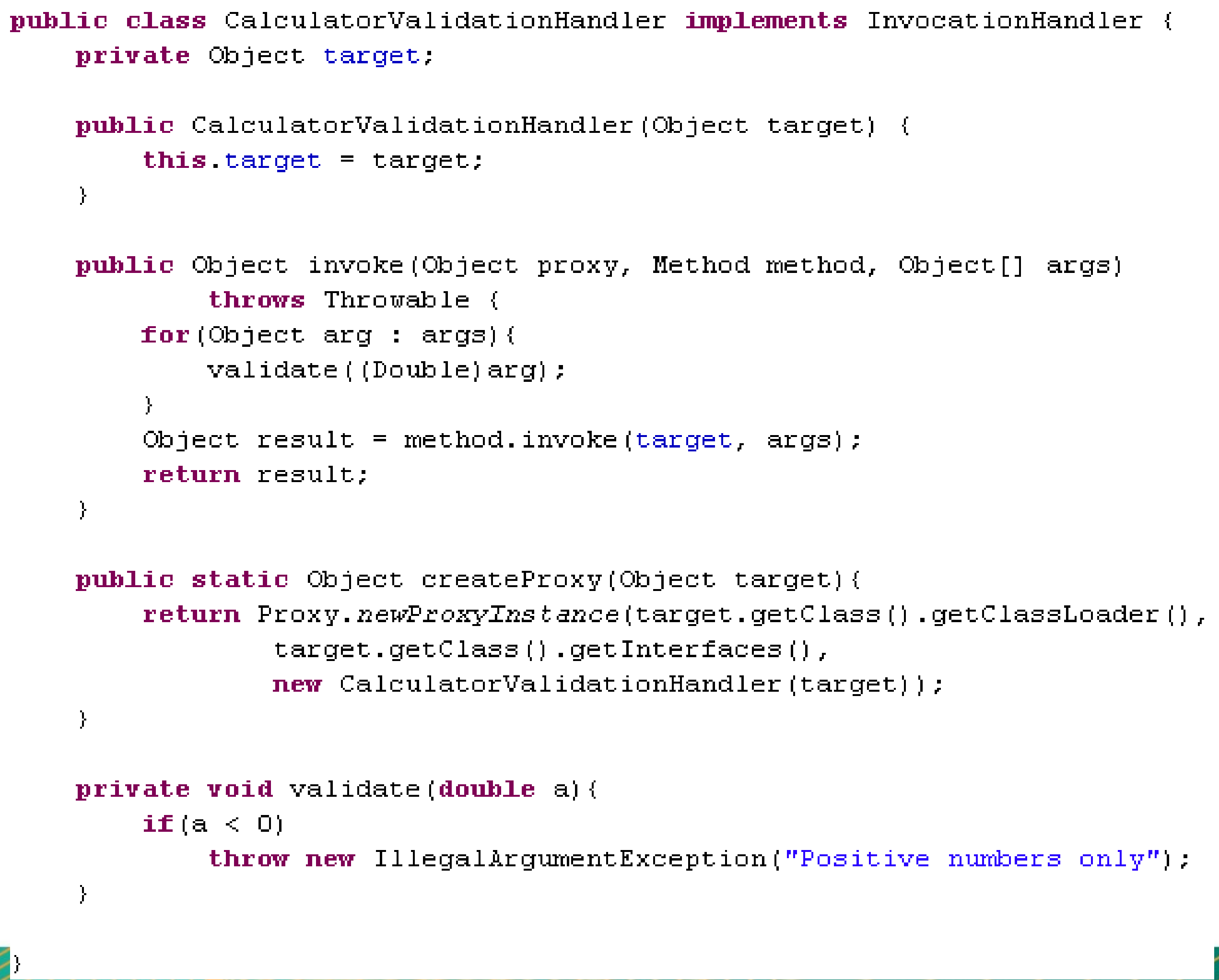


CalculatorLoggingHandler



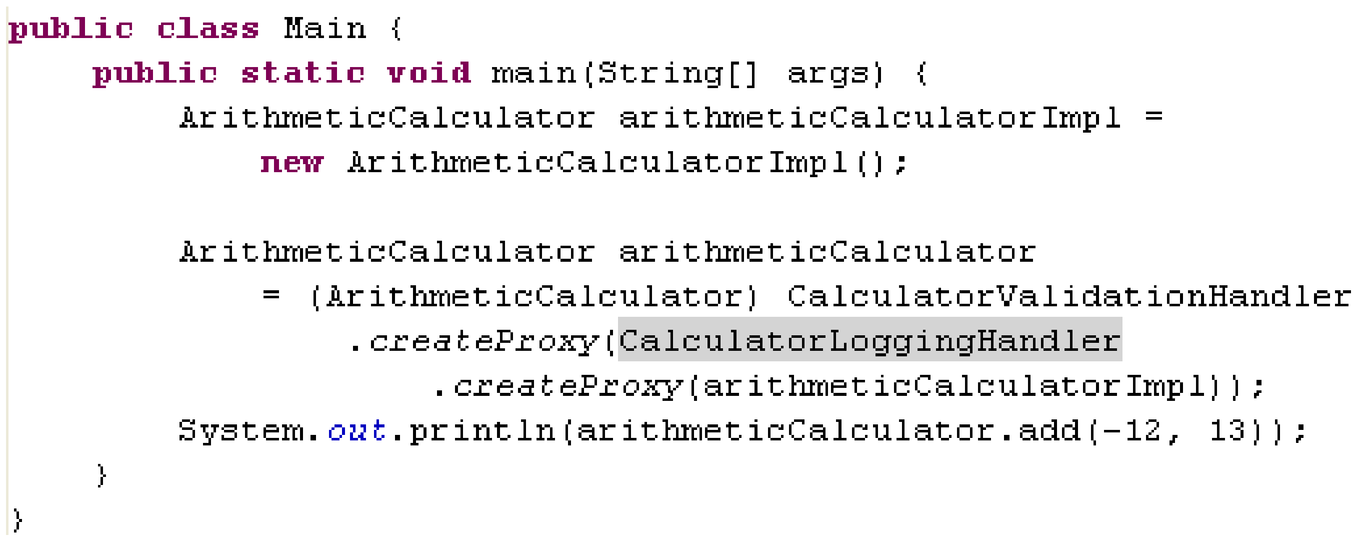
```java
public class CalculatorLoggingHandler implements InvocationHandler {

    private Log log = LogFactory.getLog(this.getClass());

    private Object target;

    public CalculatorLoggingHandler(Object target) {
        super();
        this.target = target;
    }

    public Object invoke(Object proxy, Method method, Object[] args)
            throws Throwable {
        log.info("The method " + method.getName() + "() begins with " + Arrays.toString(args));
        Object result = method.invoke(target, args);
        log.info("The method " + method.getName() + "() ends with " + result);
        return result;
    }

    public static Object createProxy(Object target){
        return Proxy.newProxyInstance(target.getClass().getClassLoader(),
                target.getClass().getInterfaces(),
                new CalculatorLoggingHandler(target));
    }

}
```

CalculatorValidationHandler



```java
public class CalculatorValidationHandler implements InvocationHandler {
    private Object target;

    public CalculatorValidationHandler(Object target) {
        this.target = target;
    }

    public Object invoke(Object proxy, Method method, Object[] args)
            throws Throwable {
        for(Object arg : args){
            validate((Double)arg);
        }
        Object result = method.invoke(target, args);
        return result;
    }

    public static Object createProxy(Object target){
        return Proxy.newProxyInstance(target.getClass().getClassLoader(),
                target.getClass().getInterfaces(),
                new CalculatorValidationHandler(target));
    }

    private void validate(double a){
        if(a < 0)
            throw new IllegalArgumentException("Positive numbers only");
    }

}
```

□□□□

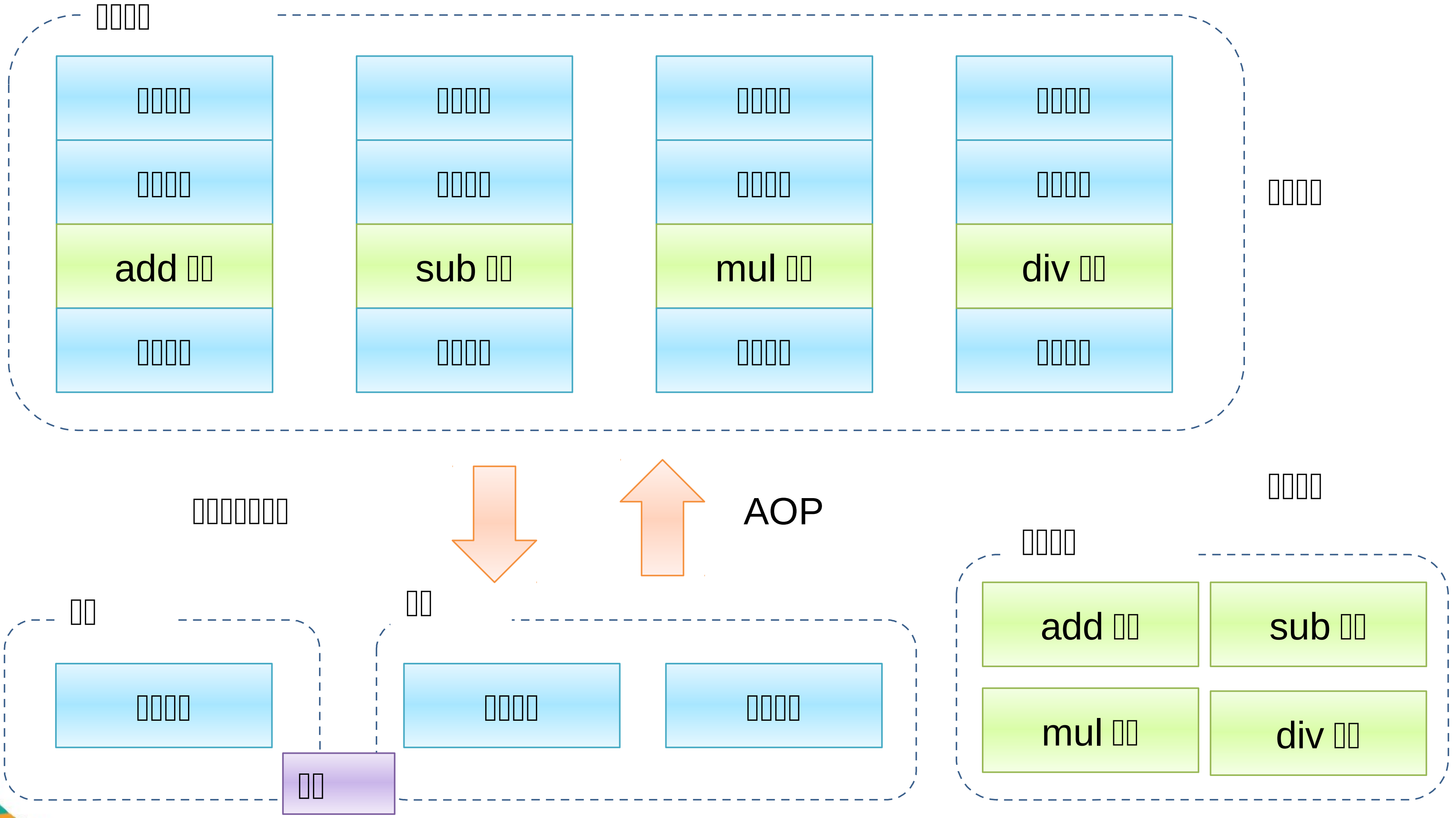


```java
public class Main {
    public static void main(String[] args) {
        ArithmeticCalculator arithmeticCalculatorImpl =
            new ArithmeticCalculatorImpl();

        ArithmeticCalculator arithmeticCalculator
            = (ArithmeticCalculator) CalculatorValidationHandler
                .createProxy(CalculatorLoggingHandler
                    .createProxy(arithmeticCalculatorImpl));
        System.out.println(arithmeticCalculator.add(-12, 13));
    }
}
```

AOP □□

- AOP(Aspect-Oriented Programming, □□□□□□): □□□□□□□□, □□□□ OOP(Object-Oriented Programming, □□□□□□) □□□.
- AOP □□□□□□□□□□(aspect), □□□□□□□□□□□.
- □□□ AOP □□□, □□□□□□□□□□, □□□□□□□□□□□□□□□, □□□□□□□, □□□□□□□□□□□. □□□□□□□□□□□□□□□□□□□□□(□□)□.
- AOP □□□:
  - □□□□□□□□□□□□, □□□□□, □□□□□□□
  - □□□□□□□, □□□□□□□□□.

AOP



AOP [illegible]

- [illegible] (Aspect): [illegible] ([illegible]) [illegible]
- [illegible] (Advice): [illegible]
- [illegible] (Target): [illegible]
- [illegible] (Proxy): [illegible]
- [illegible] Joinpoint [illegible] ArithmethicCalculator#add() [illegible] ArithmethicCalculator#add() [illegible]
- [illegible] pointcut [illegible] ArithmethicCalculator [illegible] **AOP** [illegible] org.springframework.aop.Pointcut [illegible]

Spring AOP

- **AspectJ**□Java □□□□□□□□□□ AOP □□.
- □ Spring2.0 □□□□□, □□□□□□ AspectJ □□□□□ XML □□□ AOP

□ Spring □□□ AspectJ □□□□

- □□ Spring □□□□□ AspectJ □□, **□□□ classpath □□□ AspectJ □□**: aopalliance.jar□aspectj.weaver.jar □ spring-aspects.jar
- **□ aop Schema □□□ <beans> □□□□**.
- □□ Spring IOC □□□□□ AspectJ □□□□, □□□ **Bean □□□□□□□□□□□ XML □□ <aop:aspectj-autoproxy>**
- □ Spring IOC □□□□□ Bean □□□□□□ <aop:aspectj-autoproxy> □□□, □□□□□ AspectJ □□□□□ Bean □□□□.

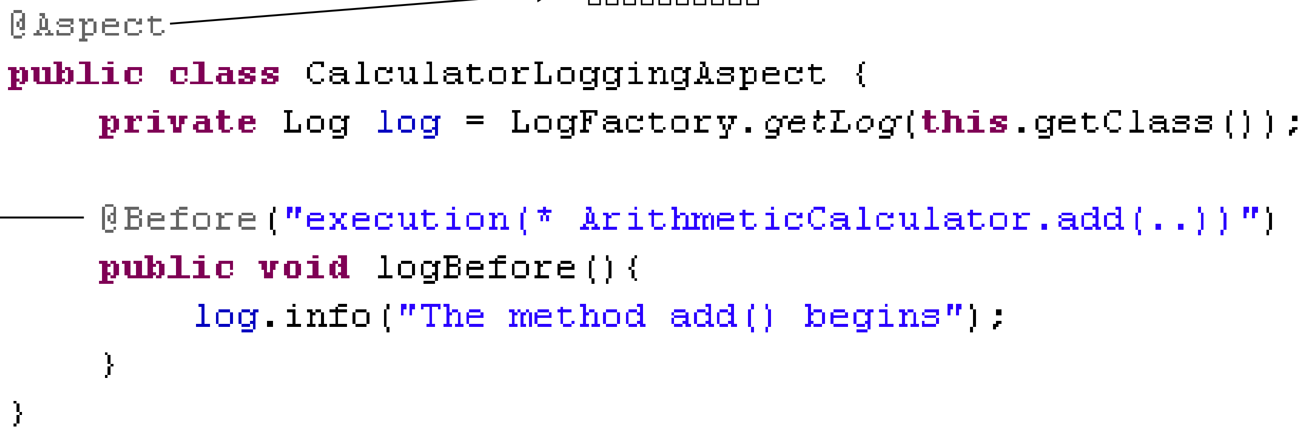
[illegible] AspectJ [illegible]

- **[illegible] Spring [illegible] AspectJ [illegible], [illegible] IOC [illegible] Bean [illegible]**. [illegible] Spring IOC [illegible] AspectJ [illegible], Spring IOC [illegible] AspectJ [illegible] Bean [illegible].
- **[illegible] AspectJ [illegible], [illegible] @Aspect [illegible] Java [illegible]**.
- **[illegible] Java [illegible]**.
- AspectJ [illegible] 5 [illegible]:
  - **@Before:** [illegible], [illegible]
  - **@After:** [illegible], [illegible]
  - **@AfterRunning:** [illegible], [illegible]
  - **@AfterThrowing:** [illegible], [illegible]
  - **@Around:** [illegible], [illegible]

[illegible]

- [illegible] : [illegible]
- [illegible] @Before [illegible] , [illegible] .

[illegible]



```
@Aspect
public class CalculatorLoggingAspect {
    private Log log = LogFactory.getLog(this.getClass());

    @Before("execution(* ArithmeticCalculator.add(..))")
    public void logBefore(){
        log.info("The method add() begins");
    }
}
```

[illegible] , [illegible] ArithmeticCalculator

[illegible] add() [illegible] . * [illegible] , [illegible] ..

[illegible]

□□□□□□□□ AspectJ □□□□□□

- □□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□ :
  - execution ***** com.atguigu.spring.ArithmeticCalculator.*****(..): □□ ArithmeticCalculator □□□□□□□□□□ , □□□ ***** □□□□□□□□□□□□□□□ . □□□ ***** □□□□□□□ . **..** □□□□□□□□□□ . □□□□□□□□□□□□□□□□□□ , □□□□□□□ .
  - execution **public** * ArithmeticCalculator.*(..): □□ ArithmeticCalculator □□□□□□□□□□ .
  - execution **public** double ArithmeticCalculator.*(..): □□ ArithmeticCalculator □□□ **double** □□□□□□□□
  - execution **public** double ArithmeticCalculator.*(**double**, ..): □□□□□□□□□ double □□□□□□ , .. □□□□□□□□□□□□□□□
  - execution **public** double ArithmeticCalculator.*(**double**, **double**): □□□□□□□□ double, double □□□□□□ .

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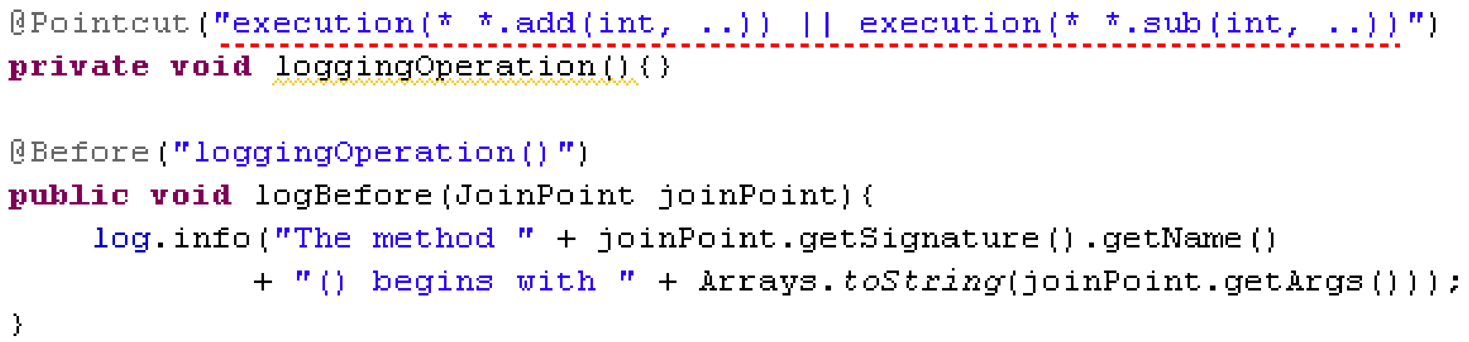
- [illegible] AspectJ [illegible], [illegible] &&, ||, ! [illegible].

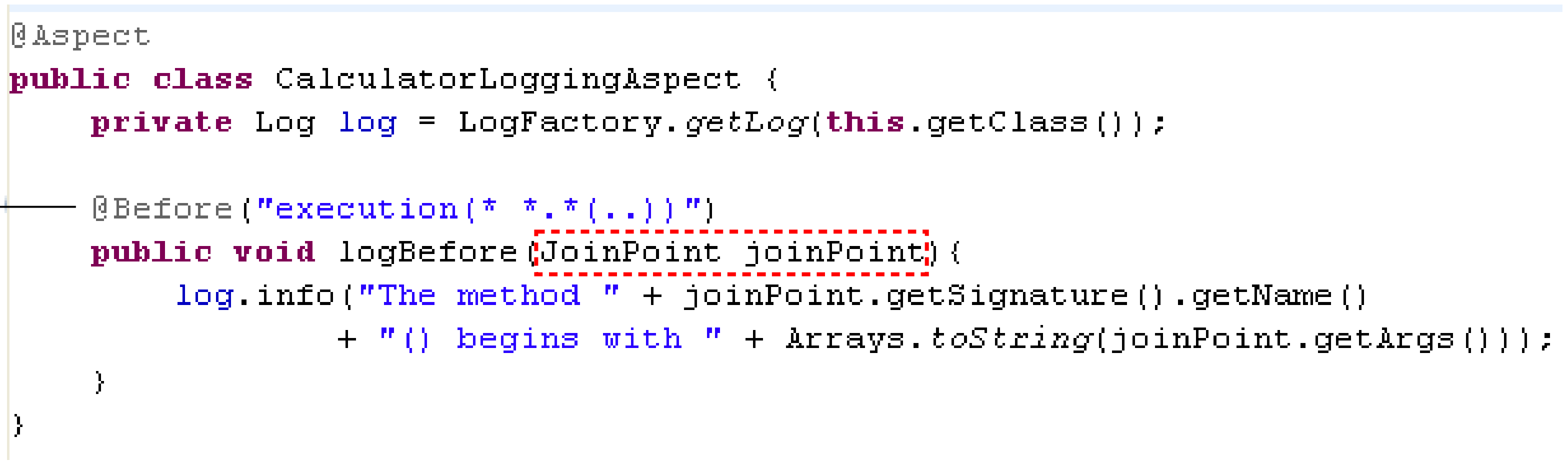


```
@Pointcut("execution(* *.add(int, ..)) || execution(* *.sub(int, ..))")
private void loggingOperation(){}

@Before("loggingOperation()")
public void logBefore(JoinPoint joinPoint){
    log.info("The method " + joinPoint.getSignature().getName()
            + "() begins with " + Arrays.toString(joinPoint.getArgs()));
}
```

让通知访问当前连接点的细节

- 可以在通知方法中声明一个类型为 JoinPoint 的参数. 然后就能访问链接细节. 如方法名称和参数值.



```
@Aspect
public class CalculatorLoggingAspect {
    private Log log = LogFactory.getLog(this.getClass());

    @Before("execution(* *.*(..))")
    public void logBefore(JoinPoint joinPoint){
        log.info("The method " + joinPoint.getSignature().getName()
                + "() begins with " + Arrays.toString(joinPoint.getArgs()));
    }
}
```

[illegible], [illegible]. [illegible]

[illegible] * [illegible], [illegible] * [illegible],

[illegible] * [illegible], [illegible] .. [illegible]

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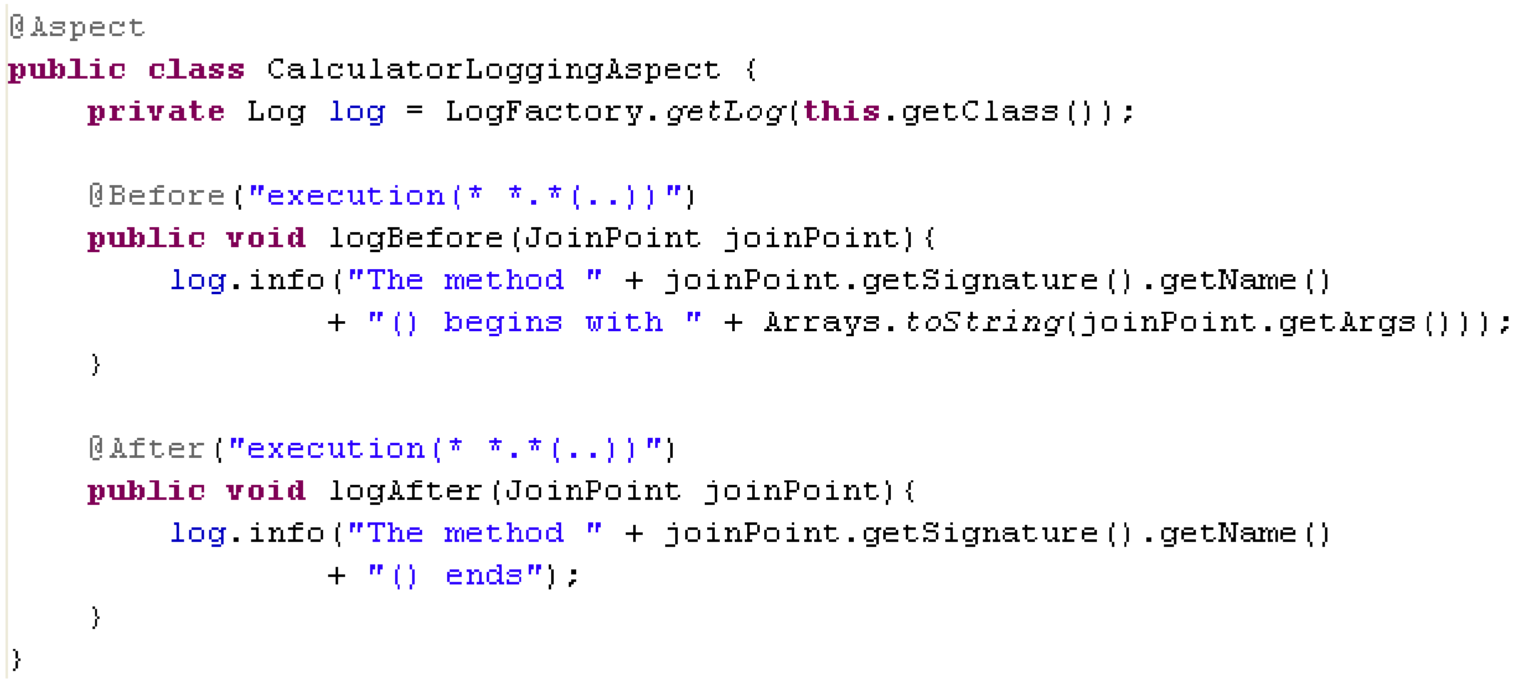


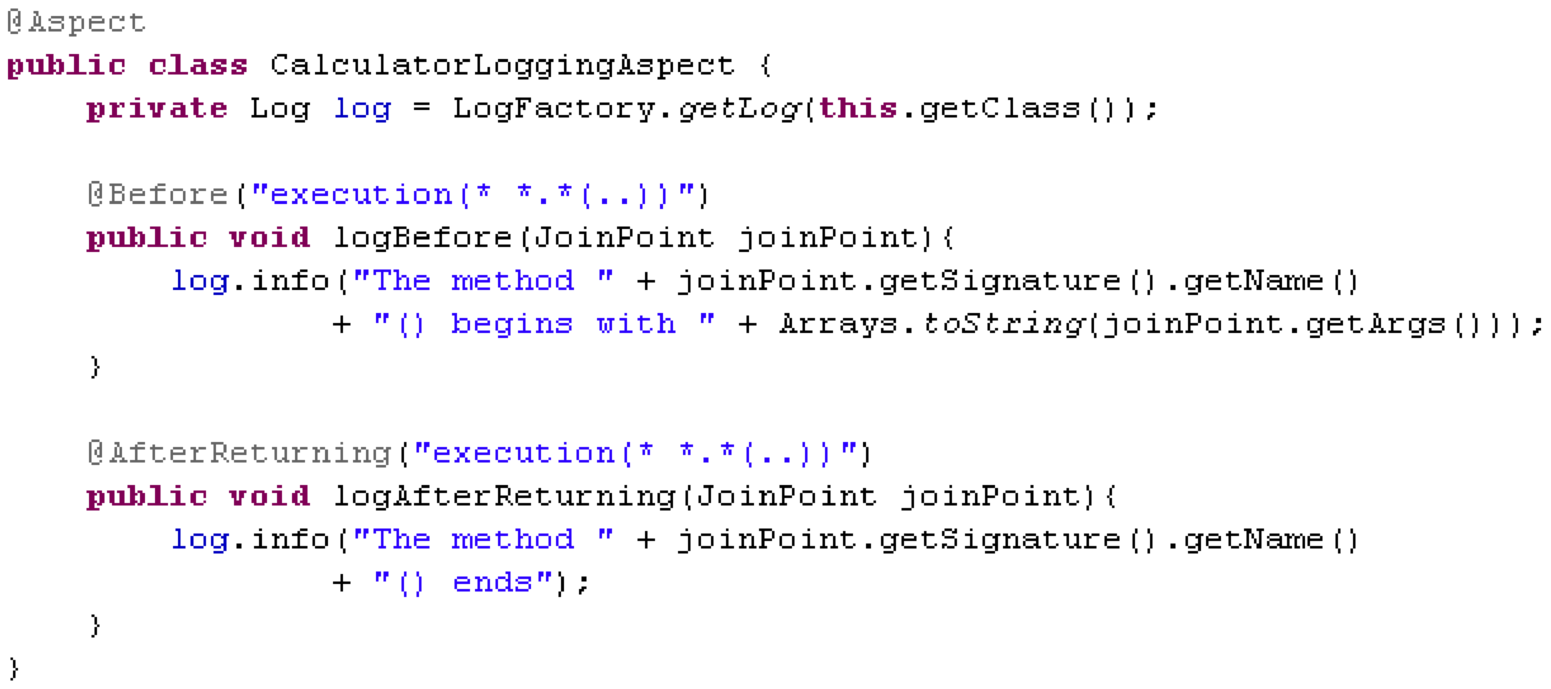
```java
@Aspect
public class CalculatorLoggingAspect {
    private Log log = LogFactory.getLog(this.getClass());

    @Before("execution(* *.*(..))")
    public void logBefore(JoinPoint joinPoint){
        log.info("The method " + joinPoint.getSignature().getName()
                + "() begins with " + Arrays.toString(joinPoint.getArgs()));
    }

    @After("execution(* *.*(..))")
    public void logAfter(JoinPoint joinPoint){
        log.info("The method " + joinPoint.getSignature().getName()
                + "() ends");
    }
}
```

□□□□

- □□□□□□□□□□□□□□□□□□， □□□□□□□□□． □□□□□□□□□□□□□□□□□□□， □□□□□□□□□□□□□□□．



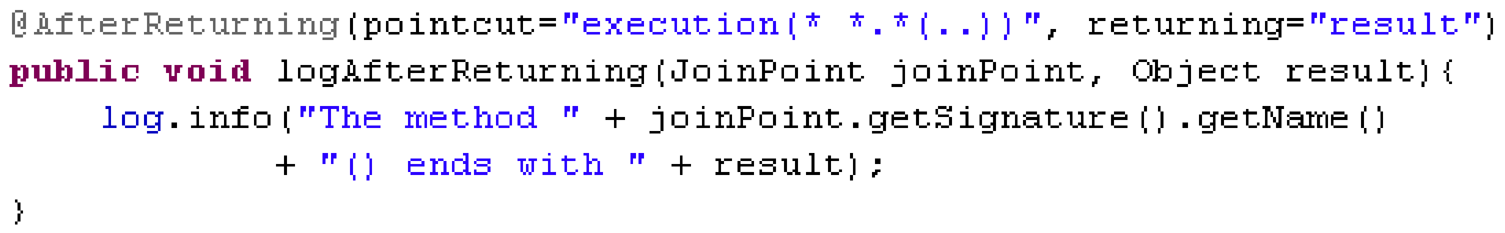
```java
@Aspect
public class CalculatorLoggingAspect {
    private Log log = LogFactory.getLog(this.getClass());

    @Before("execution(* *.*(..))")
    public void logBefore(JoinPoint joinPoint){
        log.info("The method " + joinPoint.getSignature().getName()
                + "() begins with " + Arrays.toString(joinPoint.getArgs()));
    }

    @AfterReturning("execution(* *.*(..))")
    public void logAfterReturning(JoinPoint joinPoint){
        log.info("The method " + joinPoint.getSignature().getName()
                + "() ends");
    }
}
```

[illegible]

- [illegible], [illegible] **returning** [illegible] @AfterReturning [illegible], [illegible] [illegible]. [illegible].
- [illegible]. [illegible], Spring AOP [illegible].
- [illegible] **pointcut** [illegible]



```
@AfterReturning(pointcut="execution(* *.*(..))", returning="result")
public void logAfterReturning(JoinPoint joinPoint, Object result){
    log.info("The method " + joinPoint.getSignature().getName()
            + "() ends with " + result);
}
```

□□□□

- □□□□□□□□□□□□□□□□□
- □ **throwing** □□□□□ **@AfterThrowing** □□□, □□□□□□□□□□□□□. Throwable □□□□□□□□□□□□. □□□□□□□□□□□□□□□□□□□□□.
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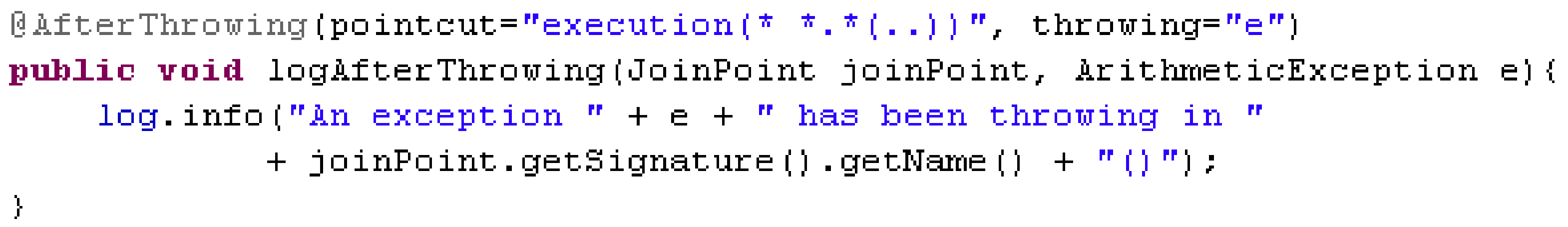
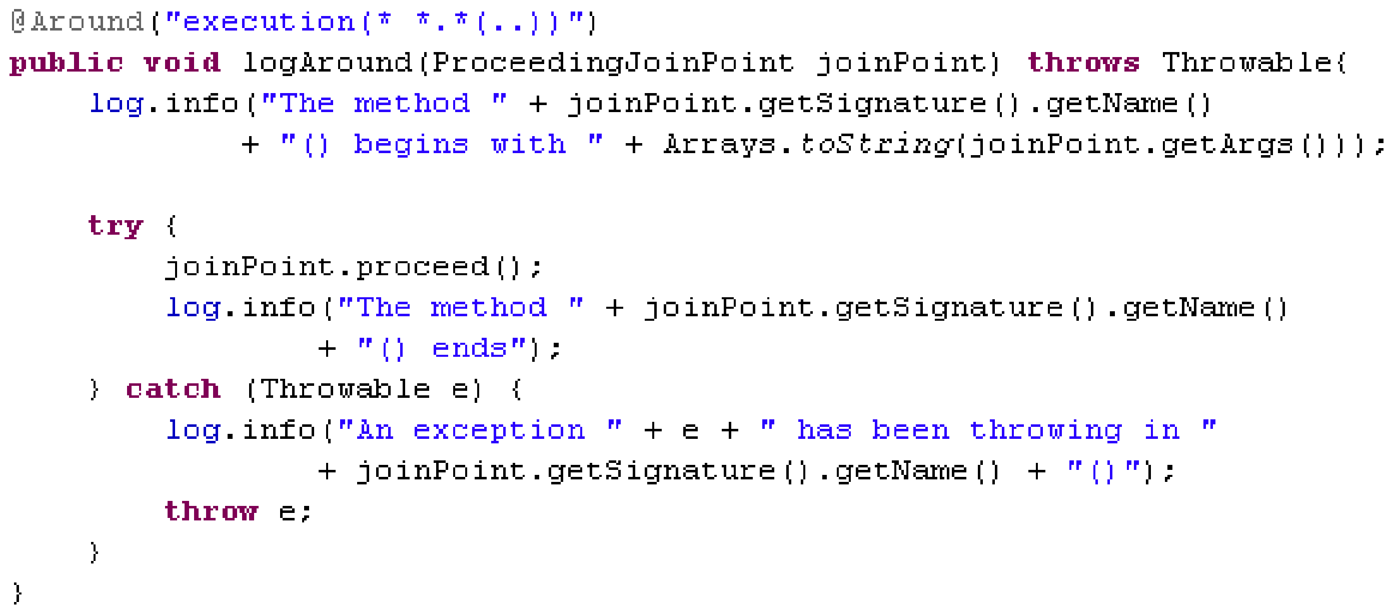


```
@AfterThrowing(pointcut="execution(* *.*(..))", throwing="e")
public void logAfterThrowing(JoinPoint joinPoint, ArithmeticException e){
    log.info("An exception " + e + " has been throwing in "
            + joinPoint.getSignature().getName() + "()");
}
```

[illegible]

- [illegible], [illegible]. [illegible].
- **[illegible], [illegible] ProceedingJoinPoint**. [illegible] JoinPoint [illegible], **[illegible], [illegible]**.
- **[illegible] ProceedingJoinPoint [illegible] proceed() [illegible]. [illegible], [illegible].**
- **[illegible]: [illegible], [illegible] joinPoint.proceed(); [illegible], [illegible]**

[illegible]



```
@Around("execution(* *.*(..))")
public void logAround(ProceedingJoinPoint joinPoint) throws Throwable{
    log.info("The method " + joinPoint.getSignature().getName()
            + "() begins with " + Arrays.toString(joinPoint.getArgs()));

    try {
        joinPoint.proceed();
        log.info("The method " + joinPoint.getSignature().getName()
                + "() ends");
    } catch (Throwable e) {
        log.info("An exception " + e + " has been throwing in "
                + joinPoint.getSignature().getName() + "()");
        throw e;
    }
}
```

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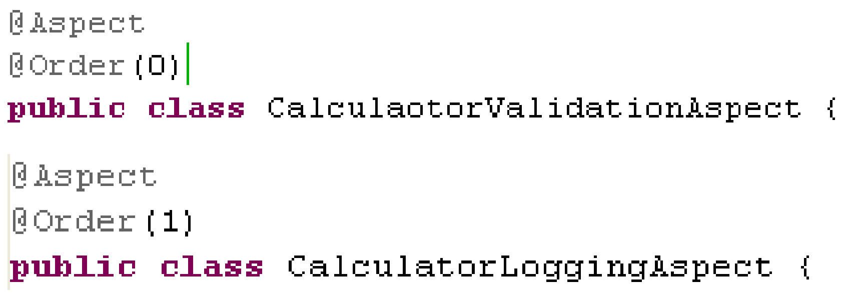
- □□□□□□□□□□□□ Ordered □□□□□ @Order □□□□.
- □□ Ordered □□, getOrder() □□□□□□□□, □□□□□.
- □□□ @Order □□, □□□□□□□□

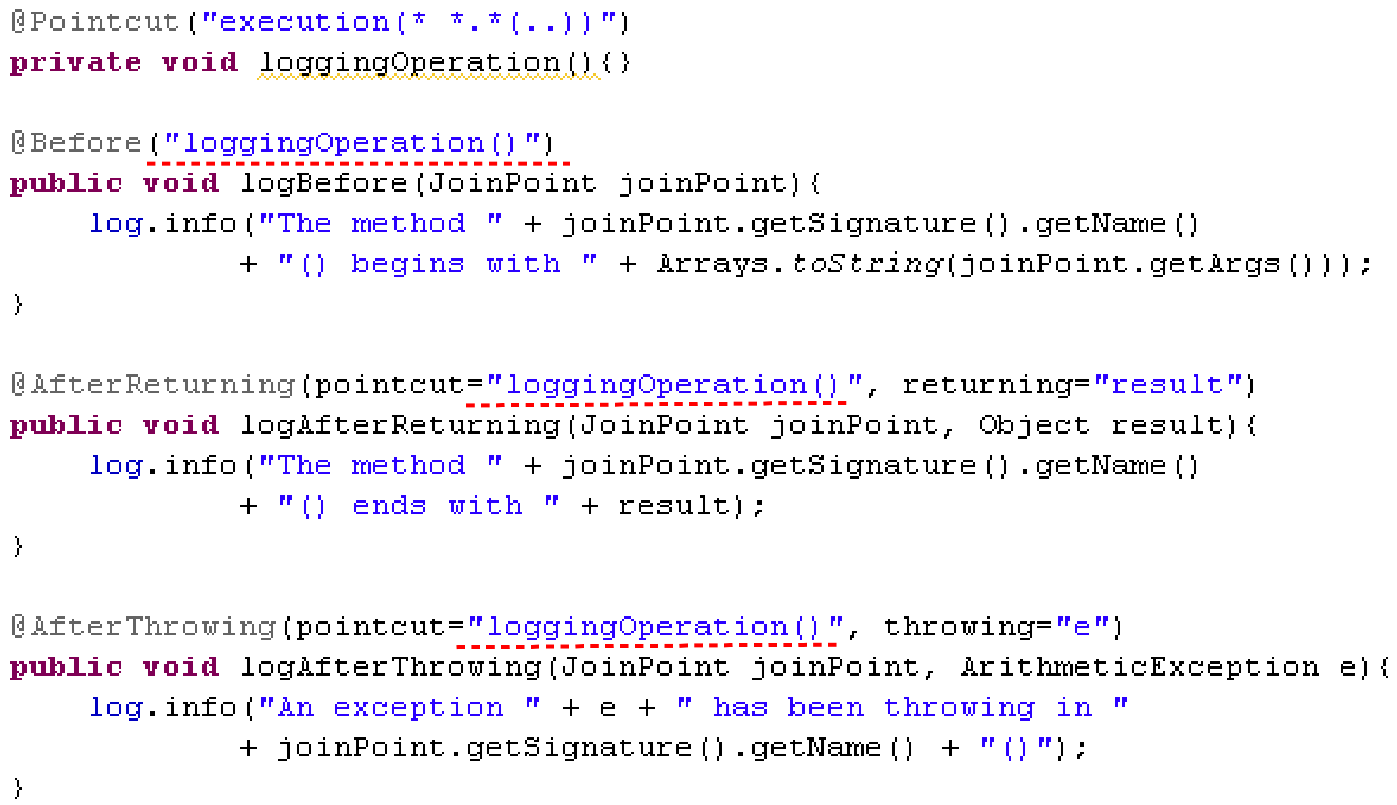


```
@Aspect
@Order(0)
public class CalculaotorValidationAspect {

@Aspect
@Order(1)
public class CalculatorLoggingAspect {
```

[illegible]

- [illegible] AspectJ [illegible], [illegible]. [illegible].
- [illegible] AspectJ [illegible], [illegible] **@Pointcut** [illegible]. [illegible], [illegible].
- [illegible]. [illegible], [illegible]. [illegible], [illegible] public. [illegible], [illegible]. [illegible], [illegible].
- [illegible].

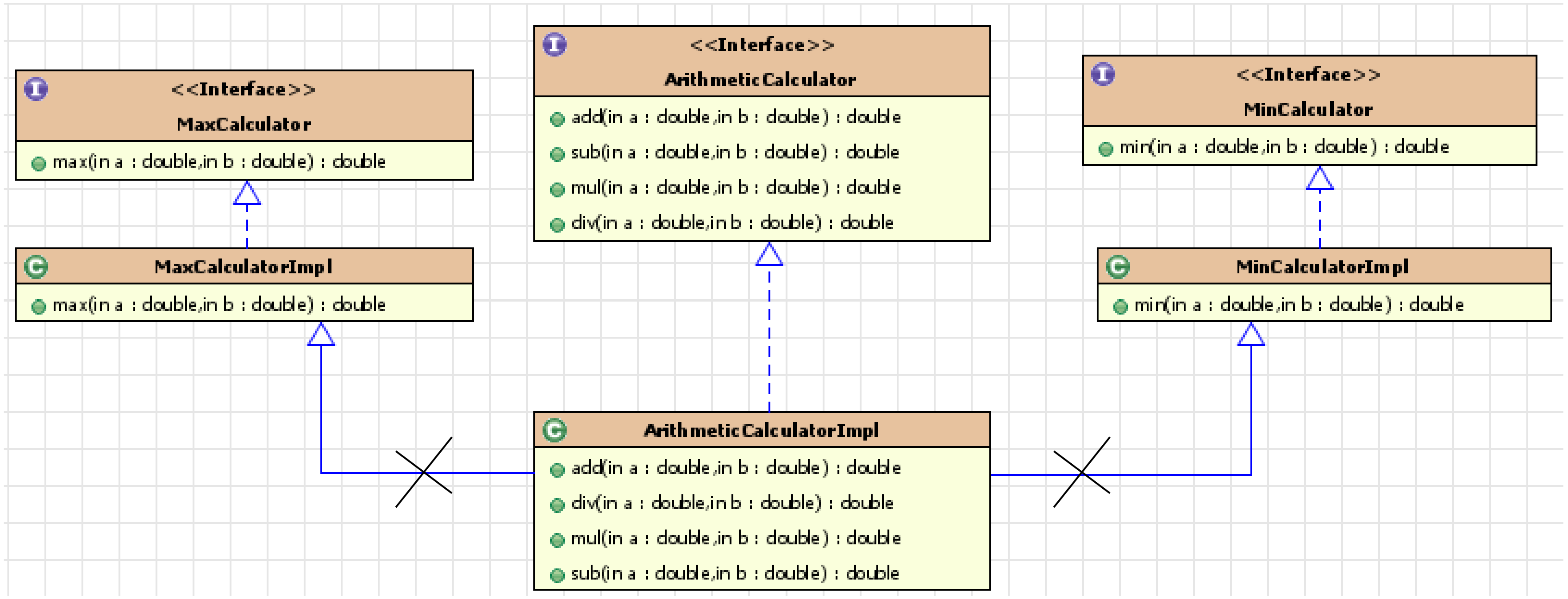
[illegible]



```
@Pointcut("execution(* *.*(..))")
private void loggingOperation(){}

@Before("loggingOperation()")
public void logBefore(JoinPoint joinPoint){
    log.info("The method " + joinPoint.getSignature().getName()
            + "() begins with " + Arrays.toString(joinPoint.getArgs()));
}

@AfterReturning(pointcut="loggingOperation()", returning="result")
public void logAfterReturning(JoinPoint joinPoint, Object result){
    log.info("The method " + joinPoint.getSignature().getName()
            + "() ends with " + result);
}

@AfterThrowing(pointcut="loggingOperation()", throwing="e")
public void logAfterThrowing(JoinPoint joinPoint, ArithmeticException e){
    log.info("An exception " + e + " has been throwing in "
            + joinPoint.getSignature().getName() + "()");
}
```

[illegible]

- [illegible]. [illegible], [illegible], [illegible].



<<Interface>>
MaxCalculator
max(in a : double,in b : double) : double
<<Interface>>
ArithmeticCalculator
add(in a : double,in b : double) : double
sub(in a : double,in b : double) : double
mul(in a : double,in b : double) : double
div(in a : double,in b : double) : double
<<Interface>>
MinCalculator
min(in a : double,in b : double) : double
MaxCalculatorImpl
max(in a : double,in b : double) : double
MinCalculatorImpl
min(in a : double,in b : double) : double
ArithmeticCalculatorImpl
add(in a : double,in b : double) : double
div(in a : double,in b : double) : double
mul(in a : double,in b : double) : double
sub(in a : double,in b : double) : double

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- □□□□□□□□□□□□□ MaxCalculatorImpl □ MinCalculatorImpl, □ ArithmeticCalculatorImpl □□□□□ MaxCalculator □ MinCalculator □□. □□□□ MaxCalculatorImpl □ MinCalculatorImpl □□□□□□□□□□□. □□□□□□□ ArithmeticCalculatorImpl □□□□
- □□□□□□□□□□□□□
- □□□□, □□□□□□□□□ **@DeclareParents** □□□□□□□.
- □□□□□ **value** □□□□□□□□□□□□□□□□□. value □□□□□□□□□ AspectJ □□□□□□, □□□□□□□□□□□□□. **defaultImpl** □□□□□□□□□□□□□□□

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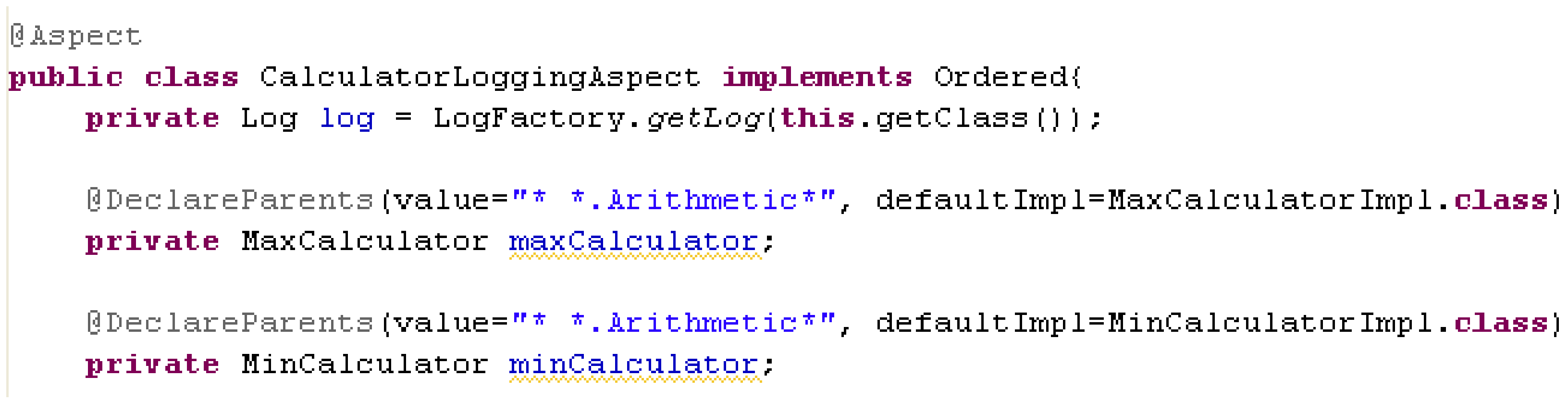
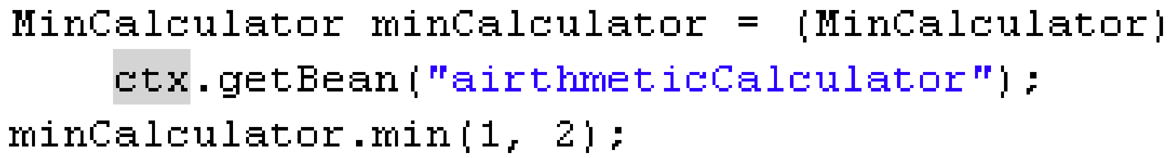


```
@Aspect
public class CalculatorLoggingAspect implements Ordered{
    private Log log = LogFactory.getLog(this.getClass());

    @DeclareParents(value="* *.Arithmetic*", defaultImpl=MaxCalculatorImpl.class)
    private MaxCalculator maxCalculator;

    @DeclareParents(value="* *.Arithmetic*", defaultImpl=MinCalculatorImpl.class)
    private MinCalculator minCalculator;
```



```
MinCalculator minCalculator = (MinCalculator)
    ctx.getBean("airthmeticCalculator");
minCalculator.min(1, 2);
```

□□□ XML □□□□□□□

- □□□□ AspectJ □□□□□□, Spring □□□□ Bean □□□□□□□□□. □□□□□□□ aop schema □□ XML □□□□□.
- □□□□□, <span style="color:blue">**□□□□□□□□□□□□□ XML □□□.**</span> □□ AspectJ □□, □□□□□ AspectJ □□, □□□ XML □□□□□ Spring □□□. □□ AspectJ □□□□□□□ AOP □□□□, □□□□□□□□□□□□□□□□□□□□□□.

□□ XML ---- □□□□

- □□□ XML □□□□□ , □□□ <beans> □□□□□□ aop Schema
- □ Bean □□□□□ , □□□ Spring AOP □□□□□□□□ **<aop:config>** □□□□ . □□□□□□□□ , □□□□□□ **<aop:aspect>** □□□□□□□□□□□□□□□ Bean □□ .
- □□ Bean □□□□□□□□ , □ <aop:aspect> □□□□

[illegible]

```
<bean id="calculatorLoggingAspect"
    class="org.simpleit.CalculatorLoggingAspect"></bean>

<bean id="calculatorValidationAspect"
    class="org.simpleit.CalculaotorValidationAspect"></bean>

<aop:config>
    <aop:aspect id="loggingAspect"
        ref="calculatorLoggingAspect"></aop:aspect>

    <aop:aspect id="validationAspect"
        ref="calculatorValidationAspect"></aop:aspect>
</aop:config>
```

□□ XML ---- □□□□□

- □□□□□ **<aop:pointcut>** □□□□
- □□□□□□□□ <aop:aspect> □□□ , □□□□□□□ <aop:config> □□□ .
  - □□□ <aop:aspect> □□□ : □□□□□□□□
  - □□□ <aop:config> □□□ : □□□□□□□□
- □□ XML □ AOP □□□□□□□□□□□□□□□□□□□□□□ .

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```
<aop:config>
    <aop:pointcut id="testOperation"
        expression="execution(* org.simpleit.bean.Arithmetic*.*(..))"/>

    <aop:aspect id="loggingAspect"
        ref="calculatorLoggingAspect">
    </aop:aspect>

    <aop:aspect id="validationAspect"
        ref="calculatorValidationAspect">
    </aop:aspect>
</aop:config>
```

□□ XML ---- □□□□

- □ aop Schema □, □□□□□□□□□□□□□□ XML □□.
- □□□□□□□□ <pointcut-ref> □□□□□□, □□ <pointcut> □□□□□□□□□□. method □□□□□□□□□□□□□□□.

□□□□□□□

```
<aop:config>
    <aop:pointcut id="testOperation"
        expression="execution(* org.simpleit.bean.Arithmetic*.*(..))"/>

    <aop:aspect id="loggingAspect"
        ref="calculatorLoggingAspect">
        <aop:after method="logBefore"
            pointcut-ref="testOperation"/>
    </aop:aspect>

    <aop:aspect id="validationAspect"
        ref="calculatorValidationAspect">
        <aop:before method="validateBefore"
            pointcut-ref="testOperation"/>
    </aop:aspect>
</aop:config>
```

是是是是

- 是是是是 <aop:declare-parents> 是是是是是是是是是是是是是是

```
<aop:aspect id="loggingAspect"
    ref="calculatorLoggingAspect">
    <aop:after method="logBefore"
        pointcut-ref="testOperation"/>

    <aop:declare-parents
        types-matching="org.simpleit.bean.Arithmetic*"
        implement-interface="org.simpleit.bean.MinCalculator"
        default-impl="org.simpleit.bean.MinCalculatorImpl"/>

</aop:aspect>
```

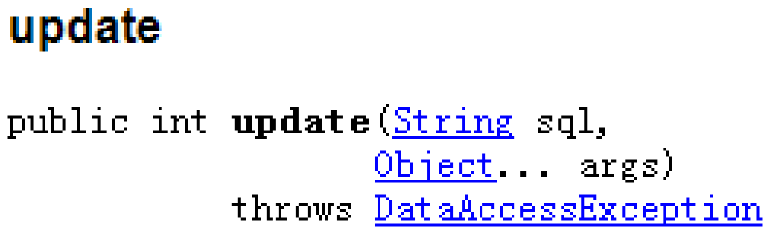
Spring [illegible] JDBC [illegible]

JdbcTemplate □□

- □□□ JDBC □□□□□□, Spring □ JDBC API □□□□□□□□□, □□□□□□ JDBC □□□□.
- □□ Spring JDBC □□□□□, **JDBC** □□□□□□□□□□□□□□ JDBC □□□□□□□□. □□□□□□□□□□□□□, □□□□□□□□□□□□. □□□□□□, □□□□□□□□□□□□□□□, □□□□□□□□□□□□□.

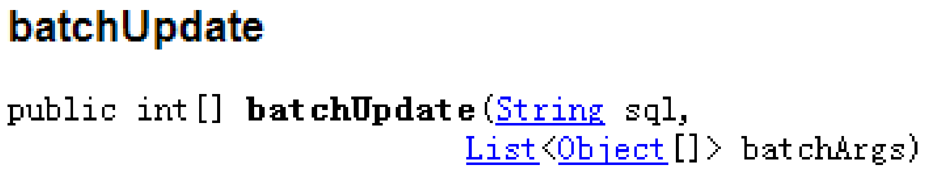
□□ JdbcTemplate □□□□□

- □ sql □□□□□□□□□□ :



update

```
public int update(String sql,
                  Object... args)
           throws DataAccessException
```

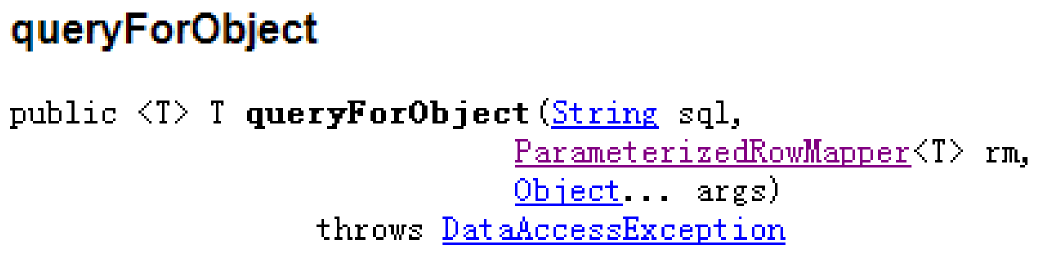
- 

batchUpdate

```
public int[] batchUpdate(String sql,
                         List<Object[]> batchArgs)
```

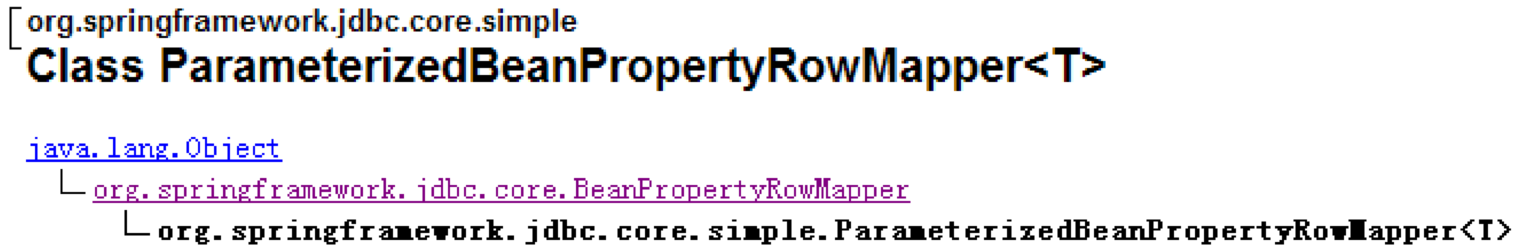
□□ JdbcTemplate □□□□□

- □□□□ :



queryForObject

```
public <T> T queryForObject(String sql,
                            ParameterizedRowMapper<T> rm,
                            Object... args)
                     throws DataAccessException
```

- 

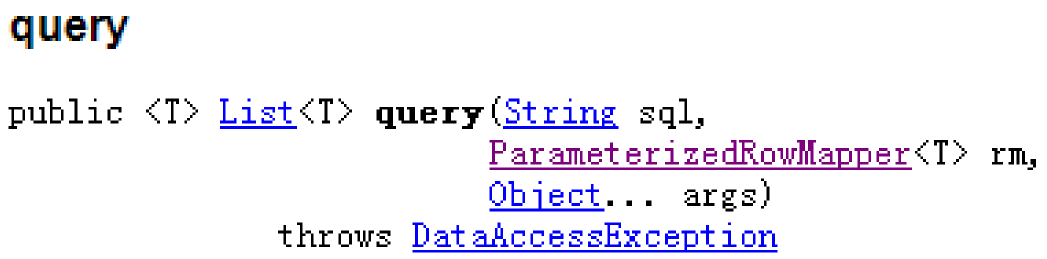
org.springframework.jdbc.core.simple

Class ParameterizedBeanPropertyRowMapper<T>

```
java.lang.Object
  └org.springframework.jdbc.core.BeanPropertyRowMapper
      └org.springframework.jdbc.core.simple.ParameterizedBeanPropertyRowMapper<T>
```

□□ JdbcTemplate □□□□□

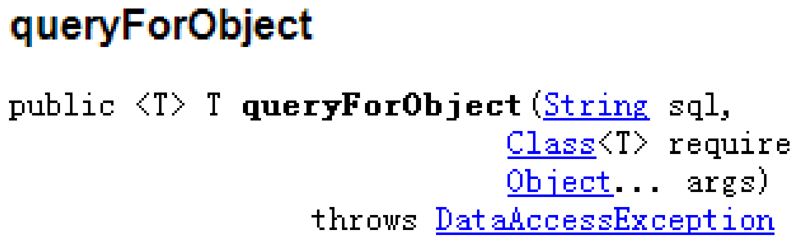
- □□□□ :



query

```
public <T> List<T> query(String sql,
                         ParameterizedRowMapper<T> rm,
                         Object... args)
              throws DataAccessException
```

- □[



queryForObject

```
public <T> T queryForObject(String sql,
                            Class<T> requiredType,
                            Object... args)
                 throws DataAccessException
```

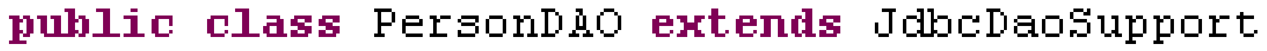
□□ JDBC □□□□

- □□□□□□□□□ JdbcTemplate □□□□, □□□□□□□□□.
- **JdbcTemplate □□□□□□□□□□□**, □□□□□ IOC □□□□□□□□□□□, □□□□□□□□□□□□ DAO □□□.
- JdbcTemplate □□□□ Java 1.5 □□□(□□□□, □□, □□□□□)□□□□□
- Spring JDBC □□□□□□□□ JdbcDaoSupport □□□□ DAO □□. □□□□□ jdbcTemplate □□, □□□□ IOC □□□□□, □□□□□□□□□□□.

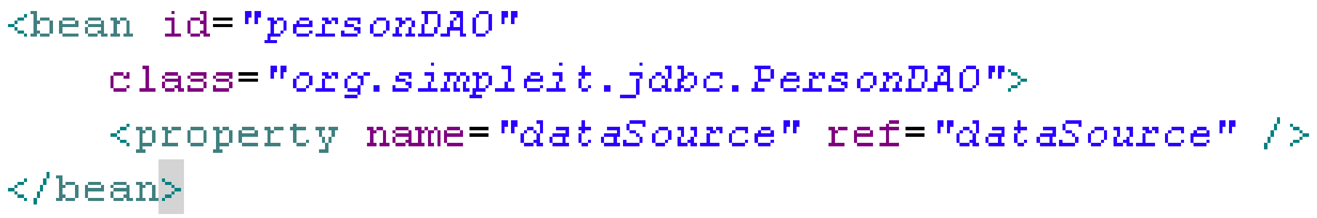
□□ JDBC □□□□□

```xml
<bean id="jdbcTemplate"
    class="org.springframework.jdbc.core.JdbcTemplate">
    <property name="dataSource" ref="dataSource"/>
</bean>

<bean id="personDAO"
    class="org.simpleit.jdbc.PersonDAO">
    <property name="jdbcTemplate" ref="jdbcTemplate"></property>
</bean>
```

[illegible] JdbcDaoSupport [illegible]



```java
public class PersonDAO extends JdbcDaoSupport
```



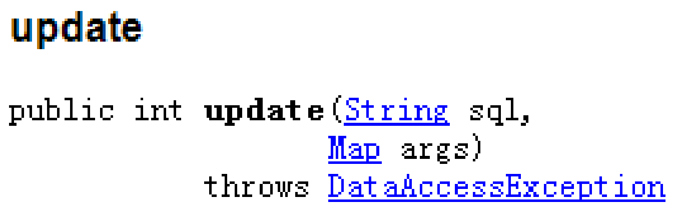
```xml
<bean id="personDAO"
    class="org.simpleit.jdbc.PersonDAO">
    <property name="dataSource" ref="dataSource" />
</bean>
```

[illegible] JDBC [illegible]

- [illegible] JDBC [illegible], SQL [illegible] ? [illegible],[illegible]. [illegible], [illegible], [illegible].
- [illegible] Spring JDBC [illegible], [illegible] SQL [illegible](named parameter).
- [illegible]: SQL [illegible]([illegible])[illegible]. [illegible], [illegible]. [illegible]
- [illegible] NamedParameterJdbcTemplate [illegible]

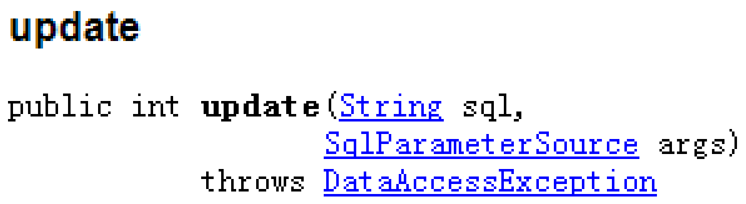
□ JDBC □□□□□□□□□

- □ SQL □□□□□□□□□□□ , □□□□□ Map □□□□□□ , □□□□□
- □□□□□ SqlParameterSource □□
- □□□□□□□□□ Map □ SqlParameterSource □□□



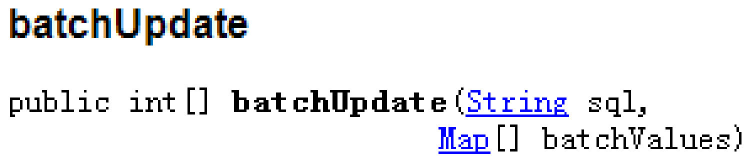
update

```
public int update(String sql,
                  Map args)
           throws DataAccessException
```



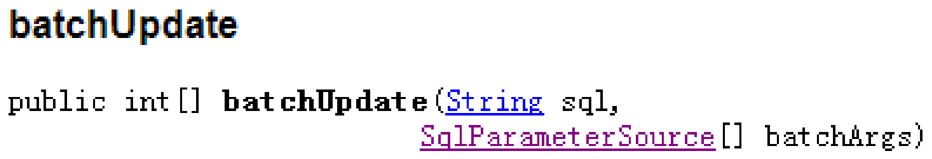
update

```
public int update(String sql,
                  SqlParameterSource args)
           throws DataAccessException
```



batchUpdate

```
public int[] batchUpdate(String sql,
                         Map[] batchValues)
```



batchUpdate

```
public int[] batchUpdate(String sql,
                         SqlParameterSource[] batchArgs)
```

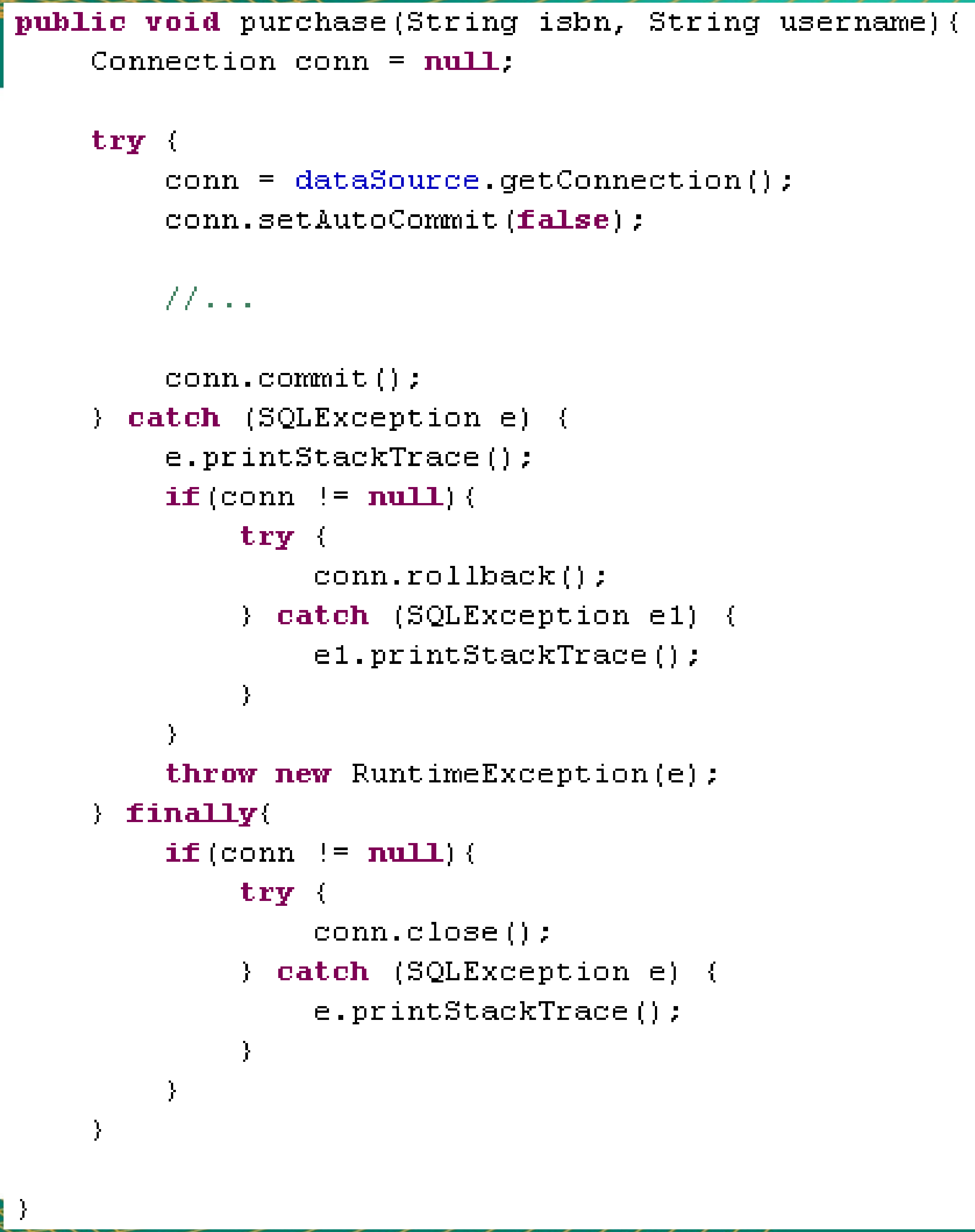
Spring ing □□□□□□

[illegible]

- [illegible], [illegible].
- [illegible], [illegible]. [illegible], [illegible]
- [illegible] (**ACID**)
  - [illegible] (atomicity): [illegible], [illegible]. [illegible].
  - [illegible] (consistency): [illegible], [illegible]. [illegible].
  - [illegible] (isolation): [illegible], [illegible], [illegible].
  - [illegible] (durability): [illegible], [illegible], [illegible]. [illegible], [illegible].

[illegible]

- [illegible] :
  - [illegible]
  - [illegible] JDBC [illegible] , [illegible] , [illegible]



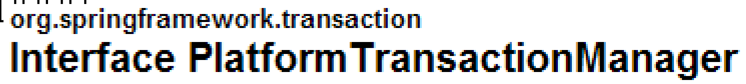
```
public void purchase(String isbn, String username){
    Connection conn = null;

    try {
        conn = dataSource.getConnection();
        conn.setAutoCommit(false);

        //...

        conn.commit();
    } catch (SQLException e) {
        e.printStackTrace();
        if(conn != null){
            try {
                conn.rollback();
            } catch (SQLException e1) {
                e1.printStackTrace();
            }
        }
        throw new RuntimeException(e);
    } finally{
        if(conn != null){
            try {
                conn.close();
            } catch (SQLException e) {
                e.printStackTrace();
            }
        }
    }

}
```

Spring [illegible]

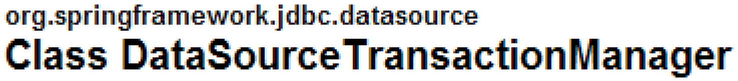
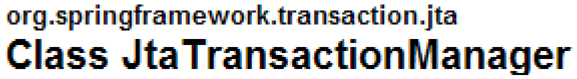
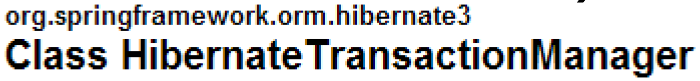
- [illegible], **Spring [illegible] API [illegible]**. [illegible] API, [illegible] Spring [illegible].
- Spring [illegible], [illegible].
- **[illegible]: [illegible]**. [illegible], [illegible].
- [illegible]: [illegible]. [illegible]**[illegible], [illegible]**. [illegible], [illegible] AOP [illegible]. **Spring [illegible] Spring AOP [illegible]**.

Spring □□□□□□□

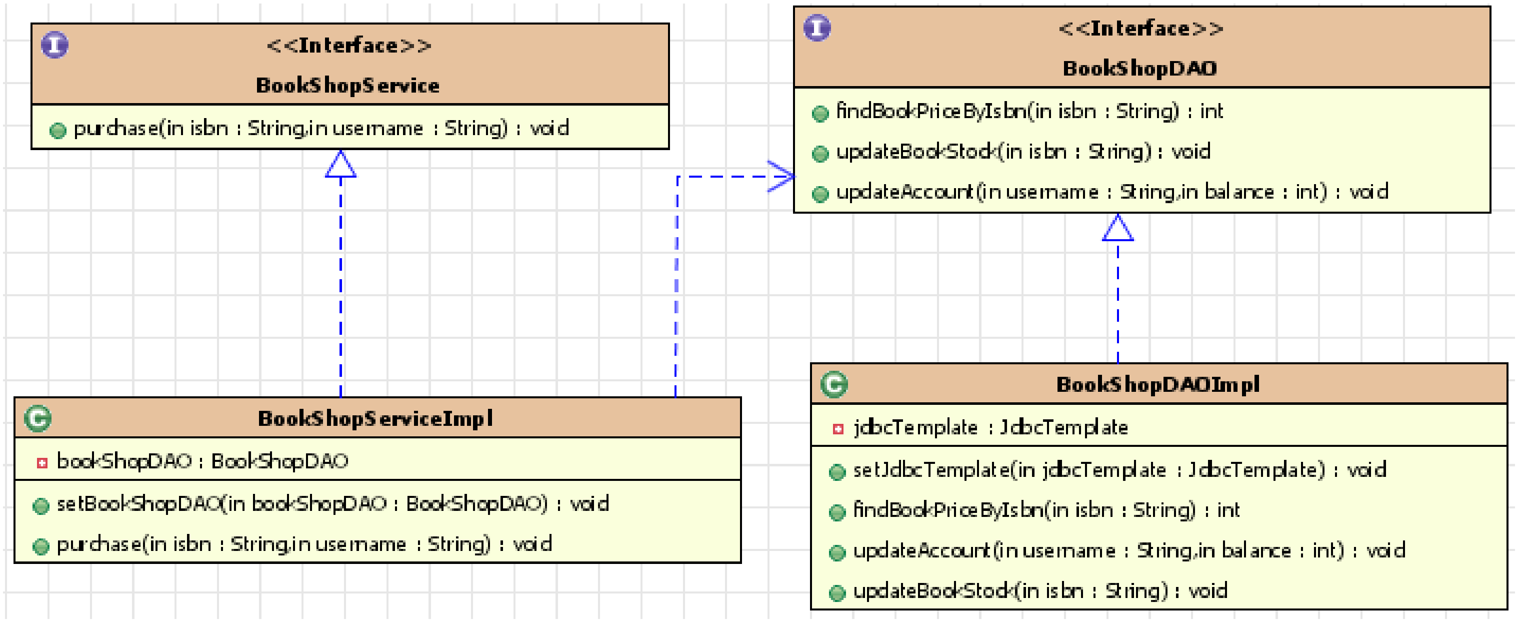
- Spring □□□□□□□□ API □□□□□□□□□□□□. □□□□□□□□□□□□□ API, □□□□□□□□□□□. □□□□□□□□, □□□□□□□□□□□□□□□□□□□.
- Spring □□□□□□□□□□ □□□□□□□□□□□□□□□□□□□. □□□□ Spring □□□□□□□□□(□□□□□□□), □□□□□□□□□□


org.springframework.transaction
Interface PlatformTransactionManager

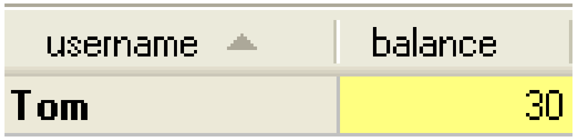
Spring [illegible]

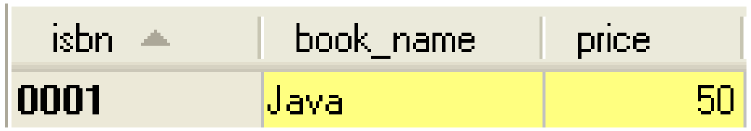
- 
  org.springframework.jdbc.datasource
  Class DataSourceTransactionManager
  ：[illegible]， [illegible] JDBC [illegible]
- 
  org.springframework.transaction.jta
  Class JtaTransactionManager
  ： [illegible] JavaEE [illegible] JTA(Java Transaction API) [illegible]
- 
  org.springframework.orm.hibernate3
  Class HibernateTransactionManager
  [illegible] Hibernate [illegible]
- ……
- [illegible] Bean [illegible] Spring IOC [illegible]

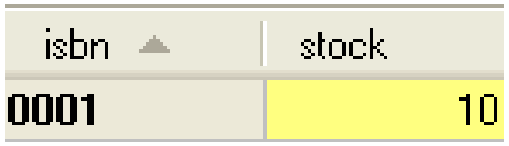
□□



<<Interface>>
BookShopService
purchase(in isbn : String,in username : String) : void
<<Interface>>
BookShopDAO
findBookPriceByIsbn(in isbn : String) : int
updateBookStock(in isbn : String) : void
updateAccount(in username : String,in balance : int) : void
BookShopServiceImpl
bookShopDAO : BookShopDAO
setBookShopDAO(in bookShopDAO : BookShopDAO) : void
purchase(in isbn : String,in username : String) : void
BookShopDAOImpl
jdbcTemplate : JdbcTemplate
setJdbcTemplate(in jdbcTemplate : JdbcTemplate) : void
findBookPriceByIsbn(in isbn : String) : int
updateAccount(in username : String,in balance : int) : void
updateBookStock(in isbn : String) : void







是是是是是是是

Account 是

username	balance
Tom	30

Book 是

isbn	book_name	price
0001	Java	50

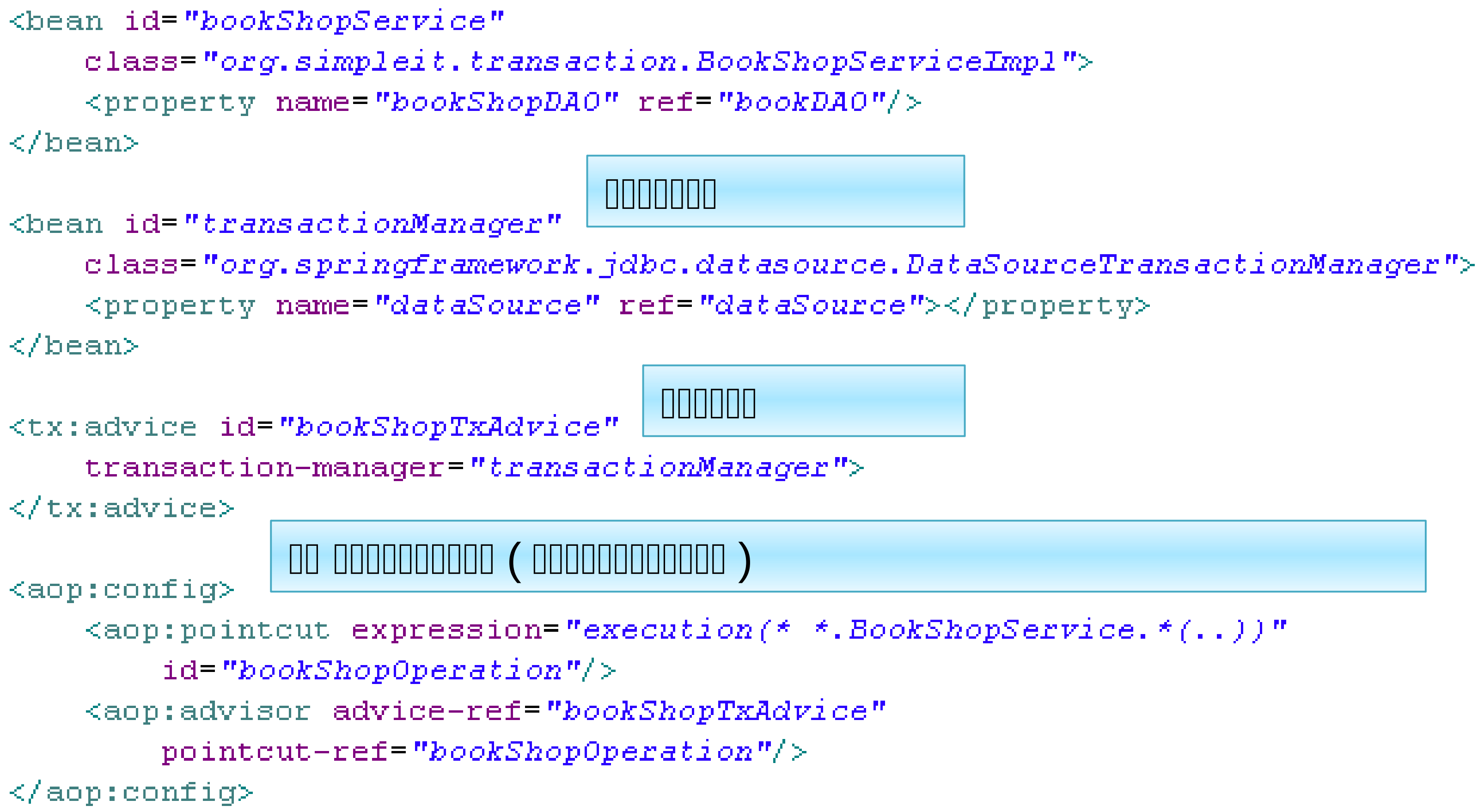
Book_STOCK 是

isbn	stock
0001	10

□□□□□□□□□□□□□

- □□□□□□□□□□□□
- □□□ Spring 2.x □□□□□□□□□□, □□□□ tx Schema □□□□ **<tx:advice>** □□□□□□□□, □□□□□□□□□ Schema □□□□□ <beans> □□□□□.
- □□□□□□□□, □□□□□□□□□□□□□□. □□□□□□□□ <aop:config> □□□□□□□, □□□□□□□□□□□□□□□. □□□□□ **<aop:config>** □□□□□□□□□□□□□□□□□□□□.
- □□ Spring AOP □□□□□□□□, □□□□□□□□□□. □□, □□□□□□□□□□ **Spring AOP** □□□□□□.

[illegible]



```
<bean id="bookShopService"
    class="org.simpleit.transaction.BookShopServiceImpl">
    <property name="bookShopDAO" ref="bookDAO"/>
</bean>

<bean id="transactionManager"
    class="org.springframework.jdbc.datasource.DataSourceTransactionManager">
    <property name="dataSource" ref="dataSource"></property>
</bean>

<tx:advice id="bookShopTxAdvice"
    transaction-manager="transactionManager">
</tx:advice>

<aop:config>
    <aop:pointcut expression="execution(* *.BookShopService.*(..))"
        id="bookShopOperation"/>
    <aop:advisor advice-ref="bookShopTxAdvice"
        pointcut-ref="bookShopOperation"/>
</aop:config>
```

[illegible]

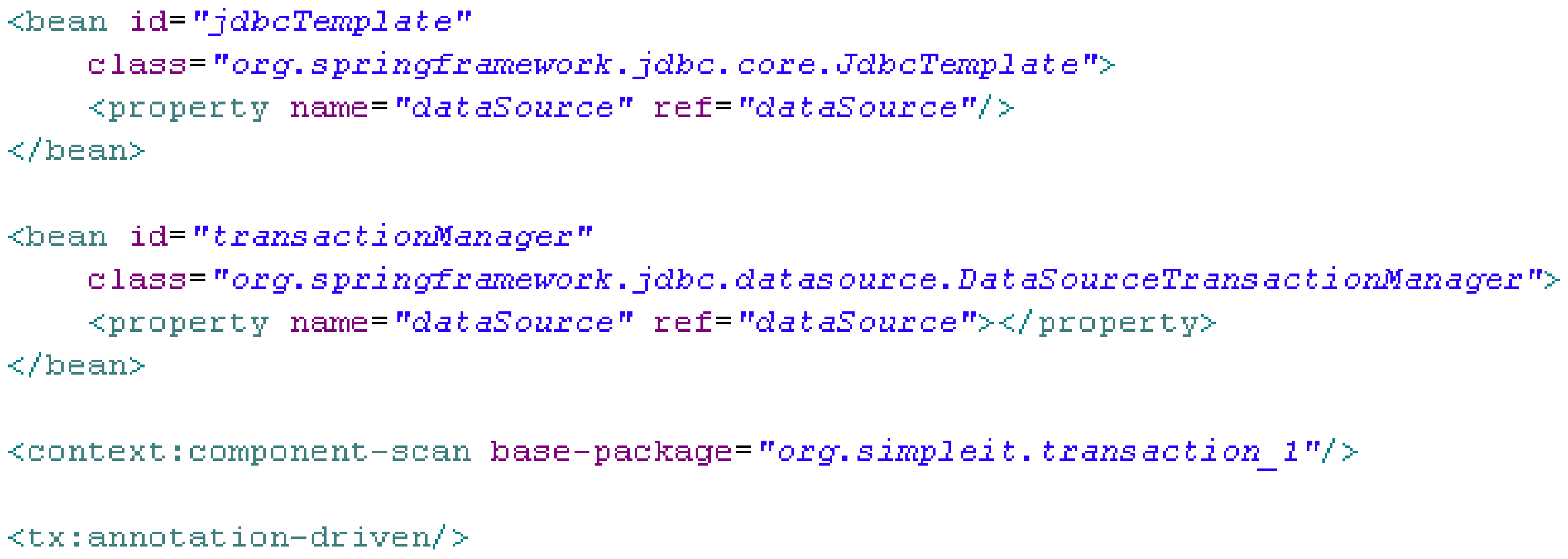
[illegible]

[illegible] [illegible] ([illegible])

□ @Transactional □□□□□□□□□□

- □□□□□□□□, □□□□□□□ Bean □□□□□□□□□□, Spring □□□□□□□ @Transactional □□□□□□□□□.
- **□□□□□□□□□□□□□□□, □□□□□□□ @Transactional □□**. □□ Spring AOP □□□□□□, □□□□□□□□.
- □□□□□□□□□□□□□ @Transactional □□. □□□□□□□□□□□□, □□□□□□□□□□□□□□□□□□□□□□□□.
- □ Bean □□□□□□□□□□ **<tx:annotation-driven>** □□, □□□□□□□□□□□□□.
- □□□□□□□□□□□ **transactionManager**, □□□□<tx:annotation-driven> □□□□□ transaction-manager □□. □□□□□□□□□□□□□□□□□□.

□ @Transactional □□□□□□□□□□□□□□□□□□



```
<bean id="jdbcTemplate"
    class="org.springframework.jdbc.core.JdbcTemplate">
    <property name="dataSource" ref="dataSource"/>
</bean>

<bean id="transactionManager"
    class="org.springframework.jdbc.datasource.DataSourceTransactionManager">
    <property name="dataSource" ref="dataSource"></property>
</bean>

<context:component-scan base-package="org.simpleit.transaction_1"/>

<tx:annotation-driven/>
```

[illegible]

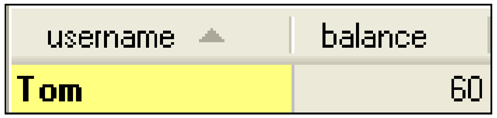
- [illegible], [illegible]. [illegible]: [illegible], [illegible], [illegible].
- [illegible]. Spring [illegible] 7 [illegible].

Spring [illegible]

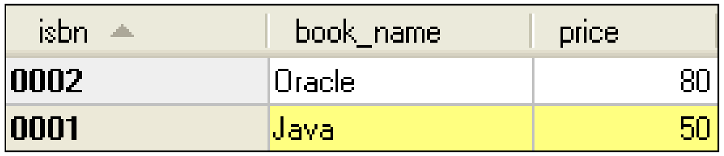
传播属性	描述
● REQUIRED	如果有事务在运行，当前的方法就在这个事务内运行，否则，就启动一个新的事务，并在自己的事务内运行
● REQUIRED_NEW	当前的方法必须启动新事务，并在它自己的事务内运行．如果有事务正在运行，应该将它挂起
SUPPORTS	如果有事务在运行，当前的方法就在这个事务内运行．否则它可以不运行在事务中．
NOT_SUPPORTE	当前的方法不应该运行在事务中．如果有运行的事务，将它挂起
MANDATORY	当前的方法必须运行在事务内部，如果没有正在运行的事务，就抛出异常
NEVER	当前的方法不应该运行在事务中．如果有运行的事务，就抛出异常
NESTED	如果有事务在运行，当前的方法就应该在这个事务的嵌套事务内运行．否则，就启动一个新的事务，并在它自己的事务内运行．

□□

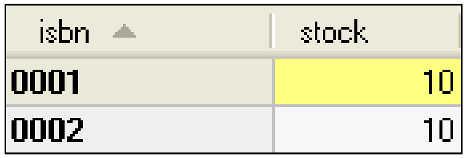
- □□□ Cashier □□: □□□□□□□□□
- □□□□□□□□□, □□□□□ Tom □□□□, □□□□□□□□□□, □□□□□□□□□



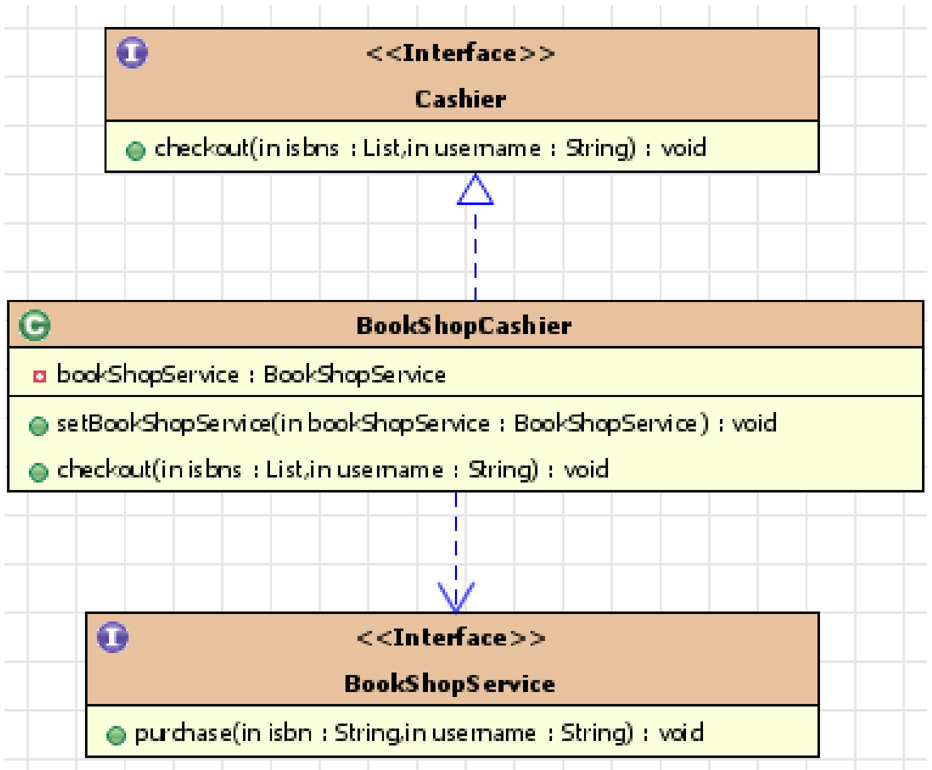
username	balance
Tom	60



isbn	book_name	price
0002	Oracle	80
0001	Java	50



isbn	stock
0001	10
0002	10

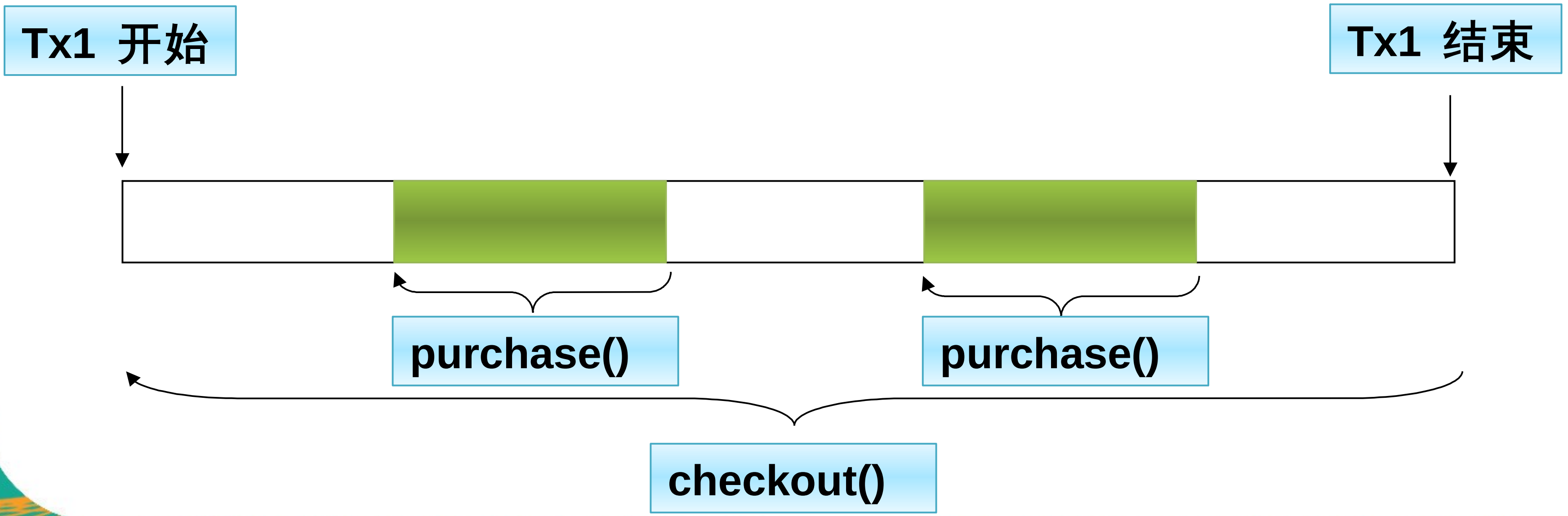


<<Interface>>
Cashier
checkout(in isbns : List,in username : String) : void
BookShopCashier
bookShopService : BookShopService
setBookShopService(in bookShopService : BookShopService) : void
checkout(in isbns : List,in username : String) : void
<<Interface>>
BookShopService
purchase(in isbn : String,in username : String) : void

REQUIRED [illegible]

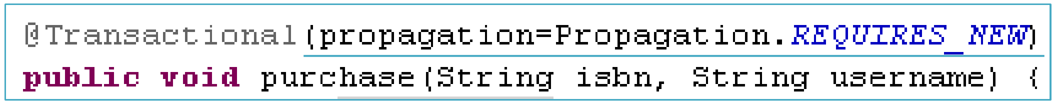
- [illegible] bookService [illegible] purchase() [illegible] checkout() [illegible], [illegible]. [illegible] REQUIRED. [illegible] checkout() [illegible]. [illegible] checkout() [illegible], [illegible]

- [illegible] @Transactional [illegible] propagation [illegible]

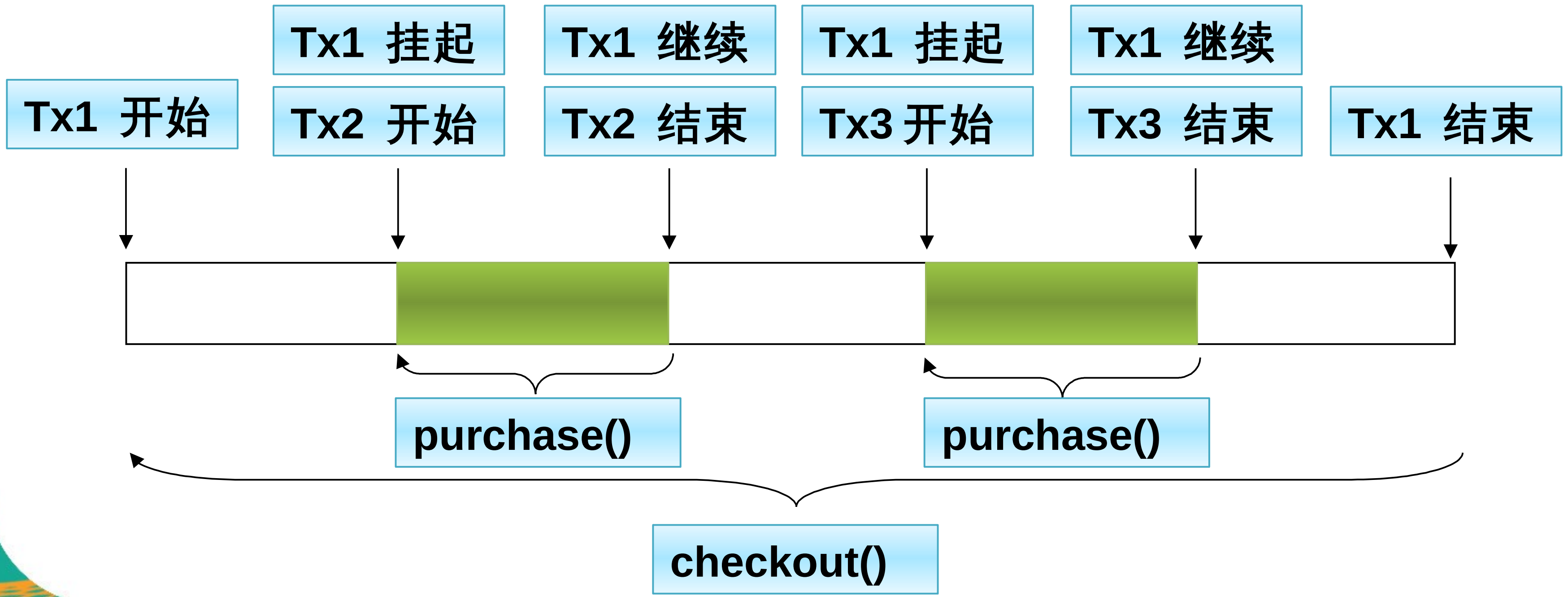


REQUIRES_NEW □□□□

- □□□□□□□□□□□ REQUIRES_NEW. □□□□□□□□□□□□□□□, □□□□□□□□□□. □ □□□□□□□, □□□□□□□.

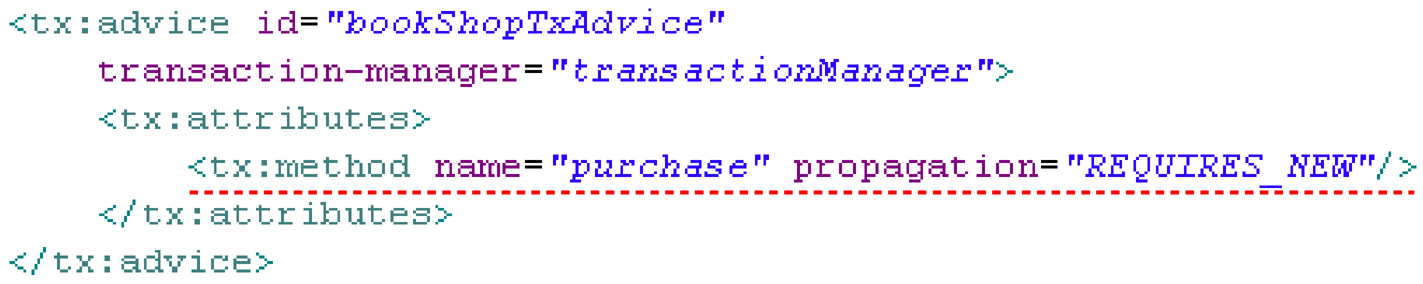


```
@Transactional(propagation=Propagation.REQUIRES_NEW)
public void purchase(String isbn, String username) {
```



□ Spring 2.x □□□□□□□□□□□

- □ Spring 2.x □□□□□ , □□□□□□□□ <tx:method> □□□□□□□□□□□



```
<tx:advice id="bookShopTxAdvice"
    transaction-manager="transactionManager">
    <tx:attributes>
        <tx:method name="purchase" propagation="REQUIRES_NEW"/>
    </tx:attributes>
</tx:advice>
```

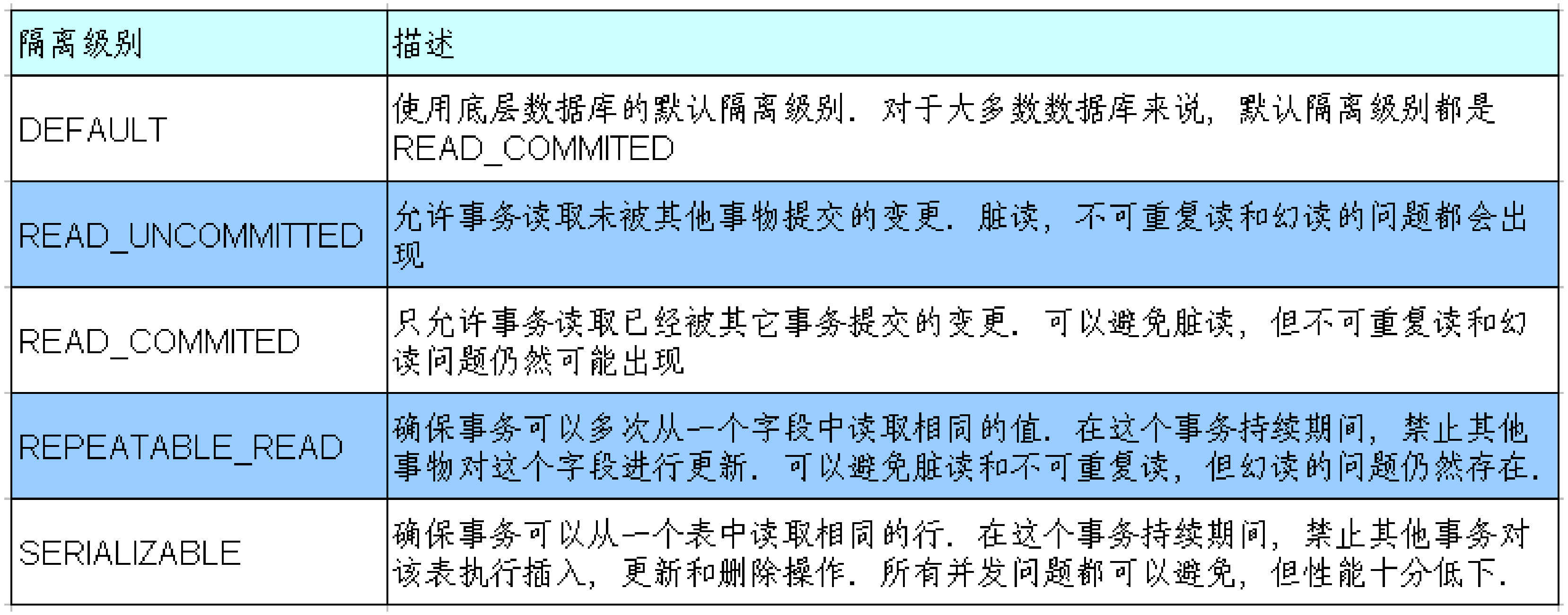
□□□□□□□□□□

- □□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□, □□□□□□□□□□□□
- □□□□□□□□□□□□□□□□□□□□:
  - □□: □□□□□□ T1, T2, T1 □□□□□□ T2 □□□ □□□□□□□□□. □□, □ T2 □□, T1□□□□□□ □□□□□□□.
  - □□□□□: □□□□□□ T1, T2, T1 □□□□□□□, □□ T2 □□□□□□. □□, T1□□□□□□□□□, □□□□□ .
  - □□: □□□□□□ T1, T2, T1 □□□□□□□□□□□□, □□ T2 □□□□□□□□□□□□. □□, □□ T1 □□□□ □□□□, □□□□□□.

[illegible]

- [illegible], [illegible], [illegible]. [illegible], [illegible], [illegible].
- [illegible], [illegible], [illegible].
- [illegible]

Spring [illegible]



隔离级别	描述
DEFAULT	使用底层数据库的默认隔离级别. 对于大多数数据库来说, 默认隔离级别都是READ_COMMITED
READ_UNCOMMITTED	允许事务读取未被其他事物提交的变更. 脏读, 不可重复读和幻读的问题都会出现
READ_COMMITED	只允许事务读取已经被其它事务提交的变更. 可以避免脏读, 但不可重复读和幻读问题仍然可能出现
REPEATABLE_READ	确保事务可以多次从一个字段中读取相同的值. 在这个事务持续期间, 禁止其他事物对这个字段进行更新. 可以避免脏读和不可重复读, 但幻读的问题仍然存在.
SERIALIZABLE	确保事务可以从一个表中读取相同的行. 在这个事务持续期间, 禁止其他事务对该表执行插入, 更新和删除操作. 所有并发问题都可以避免, 但性能十分低下.

- [illegible], [illegible].
- Oracle [illegible] 2 [illegible] READ_COMMITED , SERIALIZABLE
- Mysql [illegible] 4 [illegible].

□□□□□□□□

- □ @Transactional □□□□□□□□□□□□□□□ @Transactional □ isolation □□□□□□□□□□ .

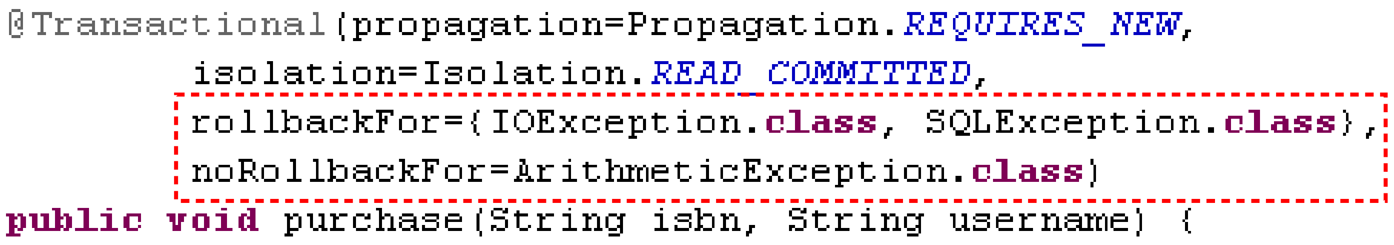
```
@Transactional(propagation=Propagation.REQUIRES_NEW,
        isolation=Isolation.READ_COMMITTED)
public void purchase(String isbn, String username) {
```

- □ Spring 2.x □□□□□ , □□□ <tx:method> □□□□□□□□□

```
<tx:advice id="bookShopTxAdvice"
    transaction-manager="transactionManager">
    <tx:attributes>
        <tx:method name="purchase"
            propagation="REQUIRES_NEW"
            isolation="READ_COMMITTED"/>
    </tx:attributes>
</tx:advice>
```

□□□□□□□□

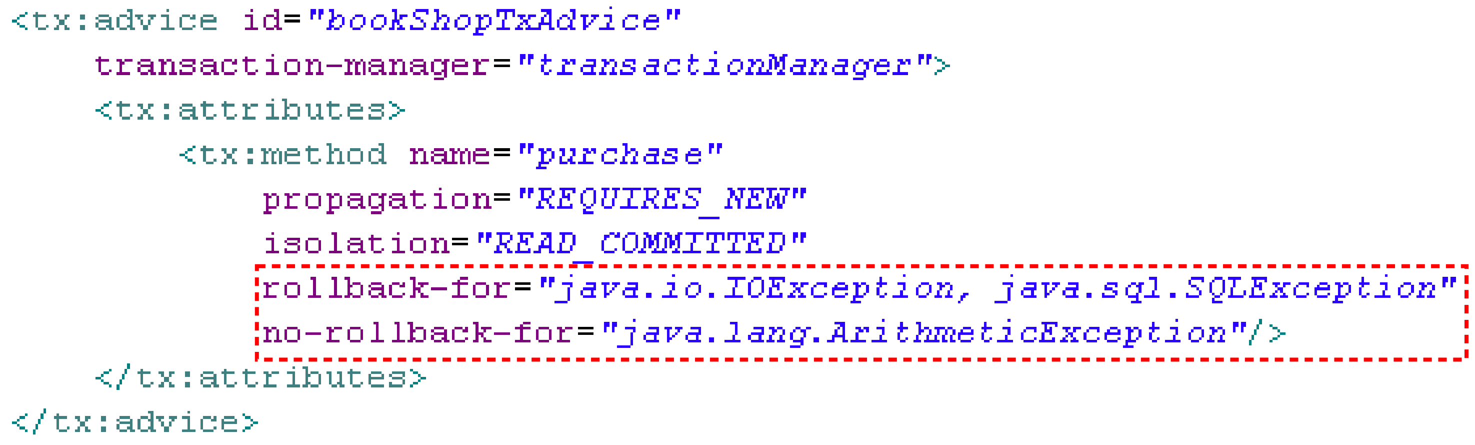
- □□□□□□□□□□□□ (RuntimeException □ Error □□□□□) □□□□□□□ . □□□□□□□□ .
- □□□□□□□□□□□ @Transactional □□□ rollbackFor □ noRollbackFor □□□□□ . □□□□□□□□□ Class[] □□□ , □□□□□□□□□□□□□□□□□ .
  - rollbackFor: □□□□□□□□□
  - noRollbackFor: □□□□□□□□□□□□□□



```
@Transactional(propagation=Propagation.REQUIRES_NEW,
        isolation=Isolation.READ_COMMITTED,
        rollbackFor={IOException.class, SQLException.class},
        noRollbackFor=ArithmeticException.class)
public void purchase(String isbn, String username) {
```

□□□□□□□□

- □ Spring 2.x □□□□□, □□□ <tx:method> □□□□□□□□□. □□□□□□□□□, □□□□□.



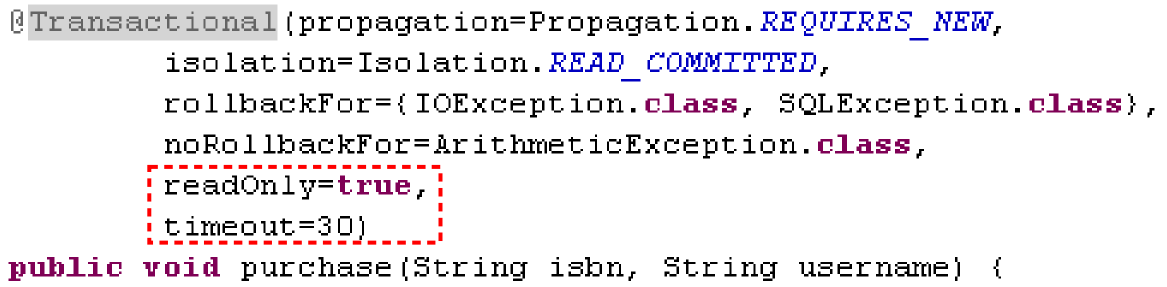
```
<tx:advice id="bookShopTxAdvice"
    transaction-manager="transactionManager">
    <tx:attributes>
        <tx:method name="purchase"
            propagation="REQUIRES_NEW"
            isolation="READ_COMMITTED"
            rollback-for="java.io.IOException, java.sql.SQLException"
            no-rollback-for="java.lang.ArithmeticException"/>
    </tx:attributes>
</tx:advice>
```

[illegible]

- [illegible], [illegible], [illegible].
- [illegible], [illegible].
- [illegible]: [illegible]. [illegible].
- [illegible]: [illegible], [illegible].

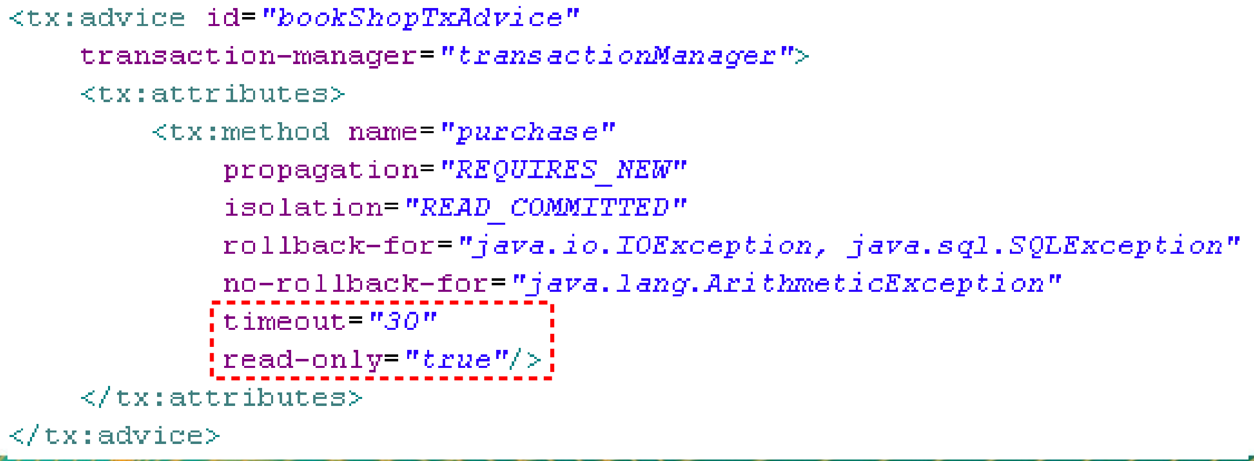
[illegible]

- [illegible] @Transactional [illegible] . [illegible] .



```
@Transactional(propagation=Propagation.REQUIRES_NEW,
        isolation=Isolation.READ_COMMITTED,
        rollbackFor={IOException.class, SQLException.class},
        noRollbackFor=ArithmeticException.class,
        readOnly=true,
        timeout=30)
public void purchase(String isbn, String username) {
```

- [illegible] Spring 2.x [illegible] , [illegible] <tx:method> [illegible] .



```
<tx:advice id="bookShopTxAdvice"
    transaction-manager="transactionManager">
    <tx:attributes>
        <tx:method name="purchase"
            propagation="REQUIRES_NEW"
            isolation="READ_COMMITTED"
            rollback-for="java.io.IOException, java.sql.SQLException"
            no-rollback-for="java.lang.ArithmeticException"
            timeout="30"
            read-only="true"/>
    </tx:attributes>
</tx:advice>
```

Spring □□ Hibernate

Spring □□ Hibernate

- Spring □□□□□□□□ ORM □□, □□ Hibernate JDO, TopLink, Ibatis □ JPA□
- **Spring □□□ ORM □□□□□□□□□**, □□□□□□ Hibernate □□□□□□□□□ ORM □□□.
- Spring 2.0 □□□□ Hibernate 2.x □ 3.x. □ Spring 2.5 □□□ Hibernate 3.1 □□□□□

□ Spring □□□ SessionFactory

- □□ Hibernate □□, □□□□□□ Hibernate API □□□ SessionFactory. □□, □□□□□□□□□□ Spring □□□□□□□□□□(□□: Spring □□□□□□□□)
- Spring □□□□□□□□□ Bean, □□□□□□□□□□□ IOC □□□□□□ SessionFactory □□.

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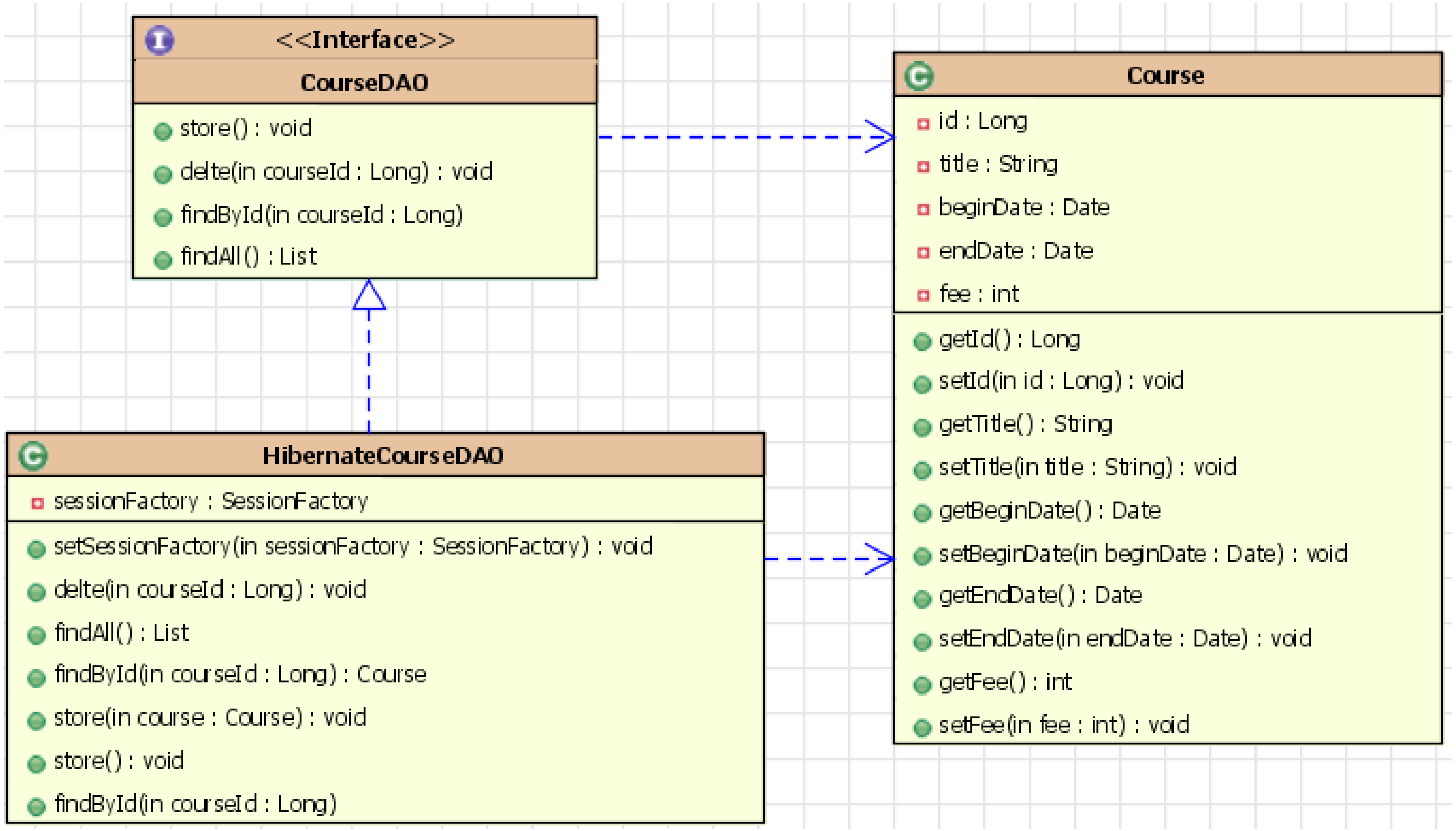
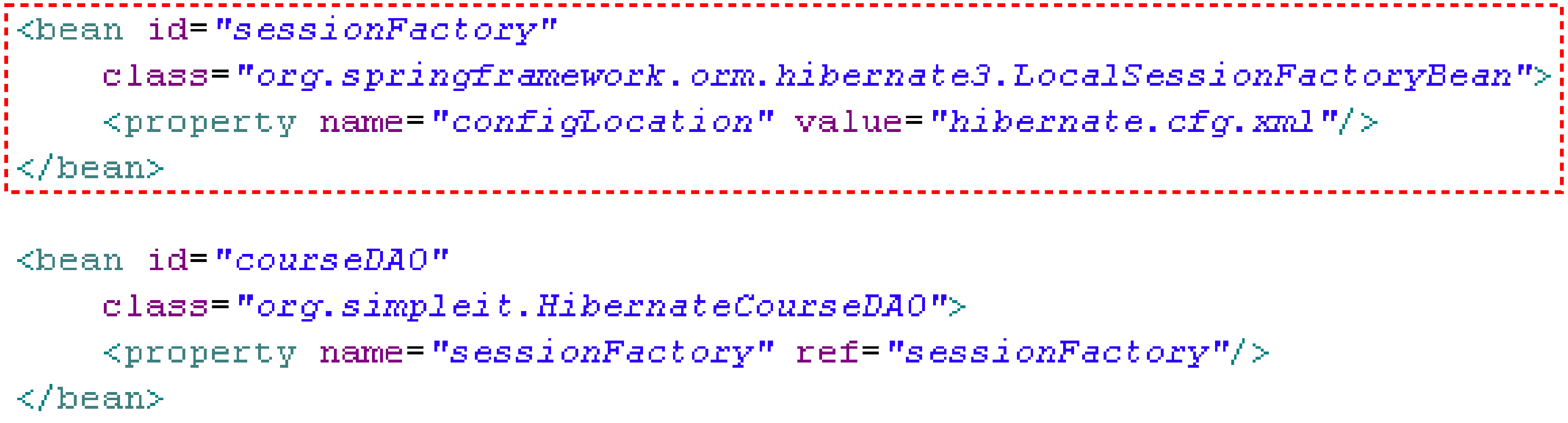
□□



<<Interface>>
CourseDAO
store() : void
delte(in courseId : Long) : void
findById(in courseId : Long)
findAll() : List
Course
id : Long
title : String
beginDate : Date
endDate : Date
fee : int
getId() : Long
setId(in id : Long) : void
getTitle() : String
setTitle(in title : String) : void
getBeginDate() : Date
setBeginDate(in beginDate : Date) : void
getEndDate() : Date
setEndDate(in endDate : Date) : void
getFee() : int
setFee(in fee : int) : void
HibernateCourseDAO
sessionFactory : SessionFactory
setSessionFactory(in sessionFactory : SessionFactory) : void
delte(in courseId : Long) : void
findAll() : List
findById(in courseId : Long) : Course
store(in course : Course) : void
store() : void
findById(in courseId : Long)

□ Spring □□□ SessionFactory(1)

- □□□□ **LocalSessionFactoryBean** □□ Bean, □□□□□□ XML □□□□□ SessionFactory □□ .
- □□□□□□ Bean □□ configLocation □□□□□ Hibernate □□□□ .



```
<bean id="sessionFactory"
    class="org.springframework.orm.hibernate3.LocalSessionFactoryBean">
    <property name="configLocation" value="hibernate.cfg.xml"/>
</bean>

<bean id="courseDAO"
    class="org.simpleit.HibernateCourseDAO">
    <property name="sessionFactory" ref="sessionFactory"/>
</bean>
```

□ Spring □□□ SessionFactory(2)

- □□□ Spring IOC □□□□□□□□□. □□□□□□□□□□□ LocalSession FactoryBean □ dataSource □□□. □□□□□□□□□□□□□□□□ Hibernate □□□□□□□□□□□□.

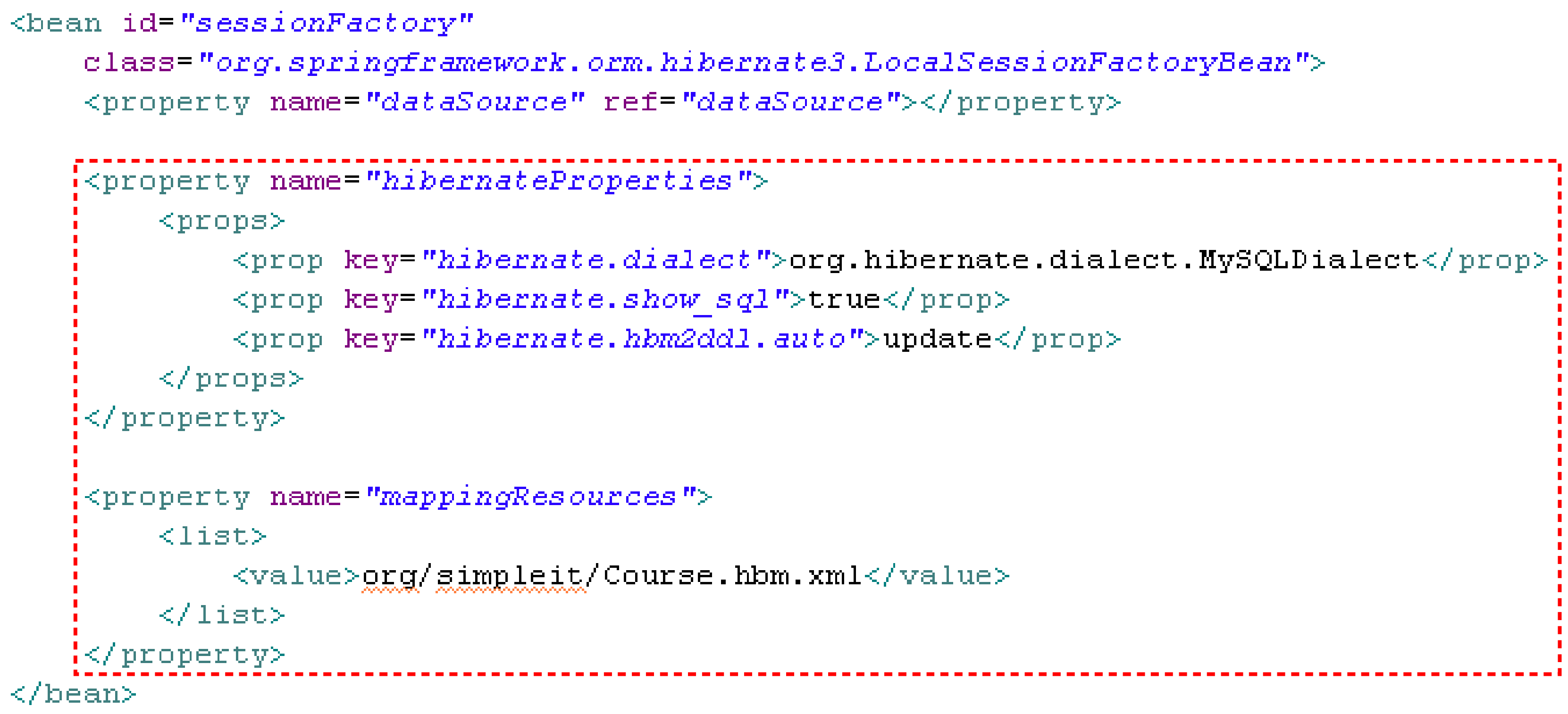
□ Spring □□□ SessionFactory(2)

```
<context:property-placeholder location="C3P0_config.properties"/>

<bean id="dataSource"
    class="com.mchange.v2.c3p0.ComboPooledDataSource">
    <property name="user" value="${user}"/>
    <property name="password" value="${password}"/>
    <property name="jdbcUrl" value="${jdbcUrl}"/>
    <property name="driverClass" value="${driverClass}"/>

    <property name="checkoutTimeout" value="${checkoutTimeout}"/>
    <property name="idleConnectionTestPeriod" value="${idleConnectionTestPeriod}"/>
    <property name="initialPoolSize" value="${initialPoolSize}"/>
    <property name="maxIdleTime" value="${maxIdleTime}"/>

    <property name="maxPoolSize" value="${checkoutTimeout}"></property>
    <property name="minPoolSize" value="${minPoolSize}"></property>
    <property name="maxStatements" value="${maxStatements}"></property>
</bean>

<bean id="sessionFactory"
    class="org.springframework.orm.hibernate3.LocalSessionFactoryBean">
    <property name="configLocation" value="hibernate.cfg.xml"/>
    <property name="dataSource" ref="dataSource"></property>
</bean>
```

[illegible] Spring [illegible] SessionFactory(3)

- [illegible] LocalSessionFactoryBean [illegible] , [illegible] Hibernate [illegible] .
- [illegible] LocalSessionFactoryBean [illegible] **mappingResources** [illegible] XML [illegible] . [illegible] String[] [illegible] . [illegible] .
- [illegible] hibernateProperties [illegible] .

□ Spring □□□ SessionFactory(3)

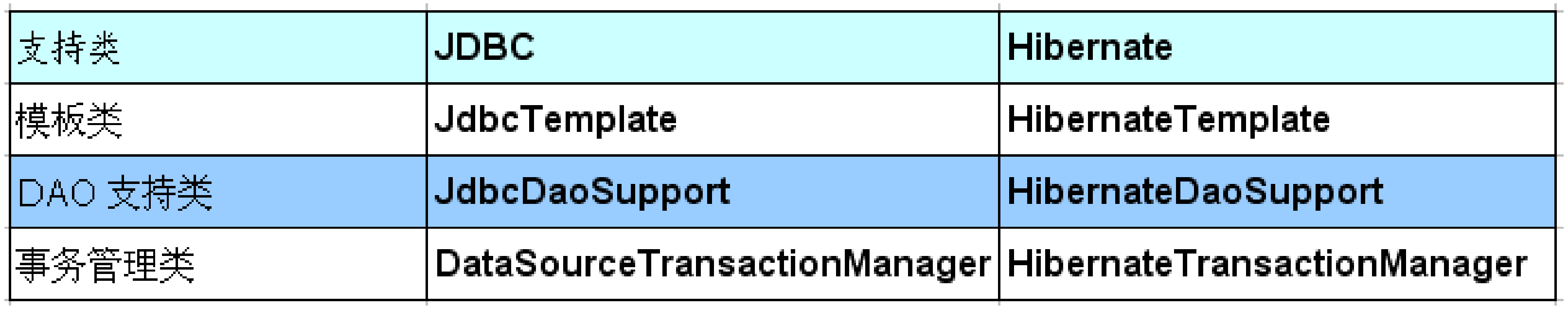


```
<bean id="sessionFactory"
    class="org.springframework.orm.hibernate3.LocalSessionFactoryBean">
    <property name="dataSource" ref="dataSource"></property>

    <property name="hibernateProperties">
        <props>
            <prop key="hibernate.dialect">org.hibernate.dialect.MySQLDialect</prop>
            <prop key="hibernate.show_sql">true</prop>
            <prop key="hibernate.hbm2ddl.auto">update</prop>
        </props>
    </property>

    <property name="mappingResources">
        <list>
            <value>org/simpleit/Course.hbm.xml</value>
        </list>
    </property>
</bean>
```

□ Spring □ ORM □□□□□□

- □□□□□ ORM □□□, □□□□□ DAO □□□□□□□□□□. □□: □□□□ Session □□; □□, □□, □□□□□.
- □ JDBC □□, Spring □□□□□□□□ ------ □□□□□□ **DAO** □□□□□□ OR M □□□□□. □□ Spring □□□□□□□□ API □□□□□□□□□□□□. □□□□□ ORM □□, □□□□□□□□□□□□□□□□.

Spring □□□□□□□□□□□□□



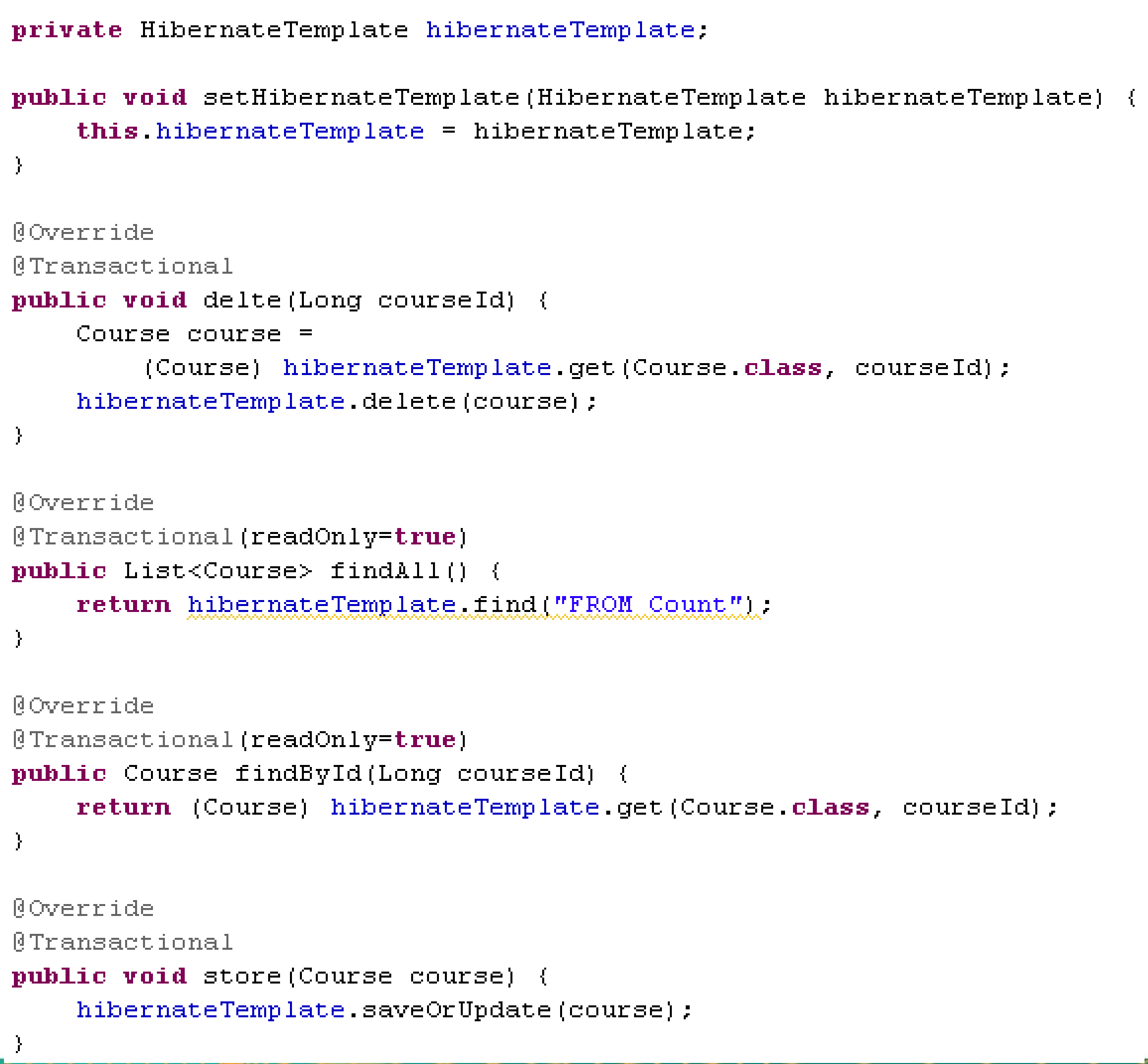
支持类	JDBC	Hibernate
模板类	JdbcTemplate	HibernateTemplate
DAO 支持类	JdbcDaoSupport	HibernateDaoSupport
事务管理类	DataSourceTransactionManager	HibernateTransactionManager

- HibernateTemplate □□□ Hibernate □□□□□□□□□□□□.
- HibernateTemplate □□□□□□ Hibernate □□□□□ Spring □□□□□□□□□. □□□□ Spring □□□□□□□□□□□.

□□ Hibernate □□

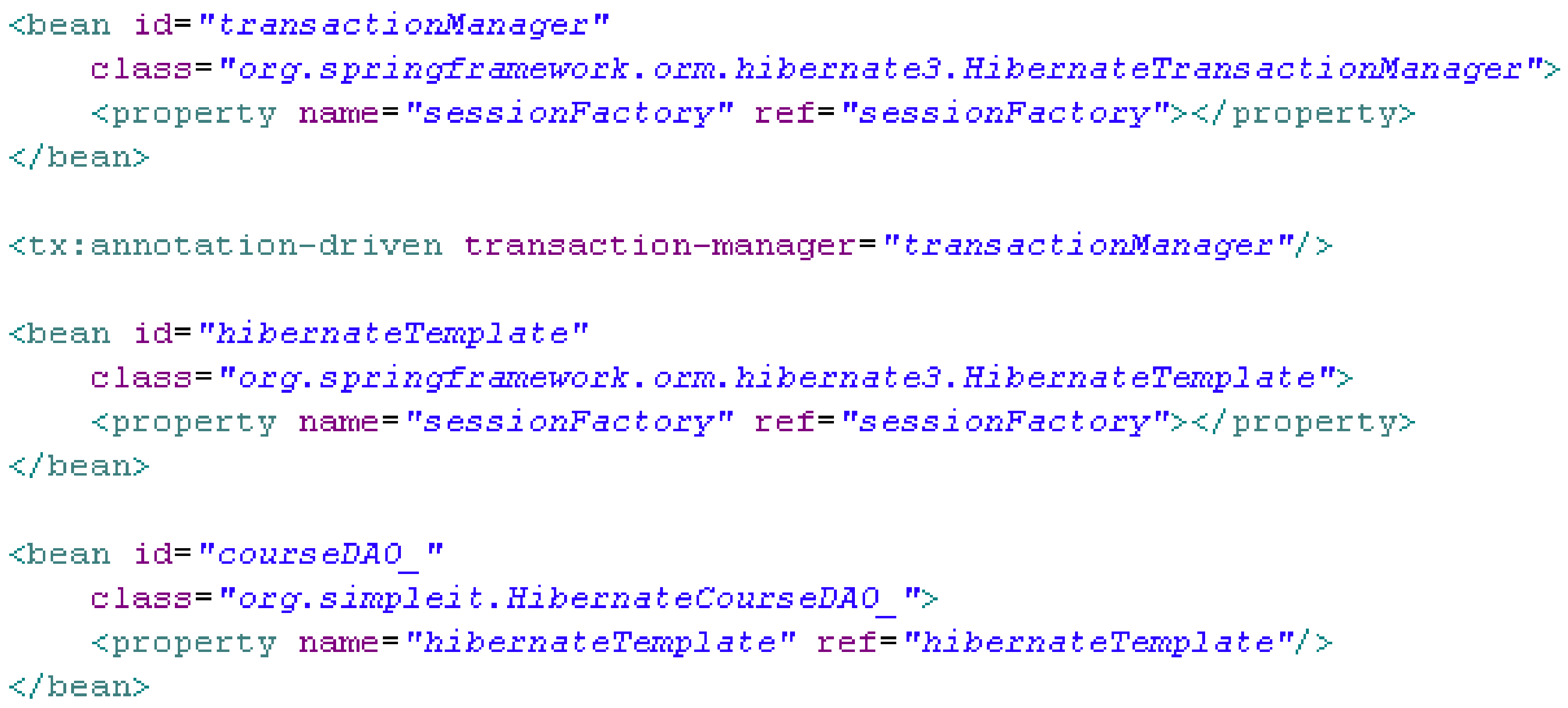
- HibernateTemplate □□□□□□□□□□□□□□. □□□□□□□□□□□ DAO □□□□□□ Hibernate □□, □□□□□□□□□□□□□□□□□□□□□□□□□□. □□□□□□□□□□□□□□□□□□ Hibernate API □□□.
- □□□ DAO □□□□ @Transactional □□□□□□□□□□□□□□.
- HibernateTemplate □□□□□□□, □□□□□ Bean □□□□□□□□□□□□□□, □□□□□□□□□□□□ Hibernate DAO □.

[illegible] Hibernate [illegible]



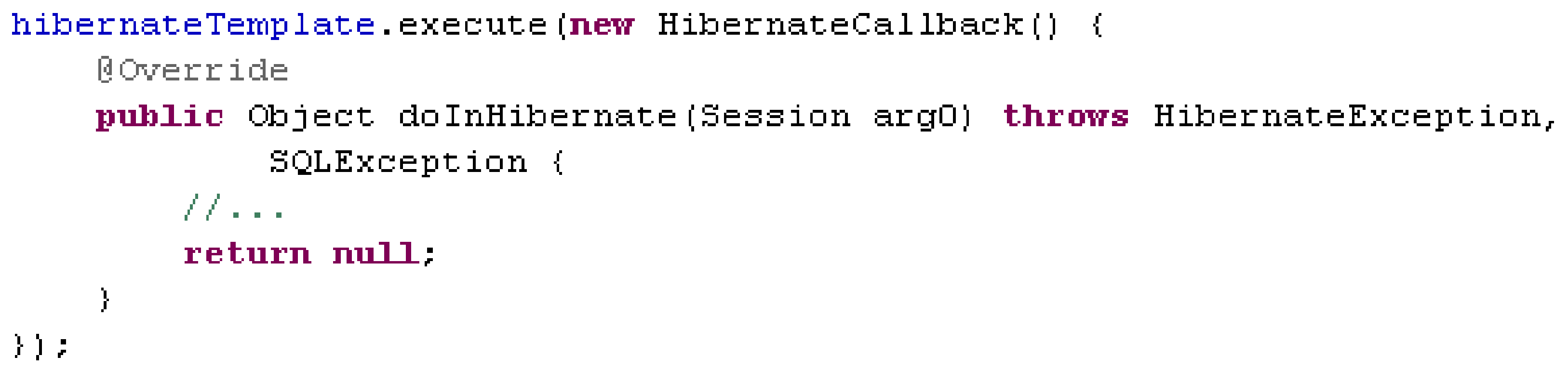
```java
private HibernateTemplate hibernateTemplate;

public void setHibernateTemplate(HibernateTemplate hibernateTemplate) {
    this.hibernateTemplate = hibernateTemplate;
}

@Override
@Transactional
public void delte(Long courseId) {
    Course course =
        (Course) hibernateTemplate.get(Course.class, courseId);
    hibernateTemplate.delete(course);
}

@Override
@Transactional(readOnly=true)
public List<Course> findAll() {
    return hibernateTemplate.find("FROM Count");
}

@Override
@Transactional(readOnly=true)
public Course findById(Long courseId) {
    return (Course) hibernateTemplate.get(Course.class, courseId);
}

@Override
@Transactional
public void store(Course course) {
    hibernateTemplate.saveOrUpdate(course);
}
```

□□ Hibernate □□□□□



```xml
<bean id="transactionManager"
    class="org.springframework.orm.hibernate3.HibernateTransactionManager">
    <property name="sessionFactory" ref="sessionFactory"></property>
</bean>

<tx:annotation-driven transaction-manager="transactionManager"/>

<bean id="hibernateTemplate"
    class="org.springframework.orm.hibernate3.HibernateTemplate">
    <property name="sessionFactory" ref="sessionFactory"></property>
</bean>

<bean id="courseDAO_"
    class="org.simpleit.HibernateCourseDAO_">
    <property name="hibernateTemplate" ref="hibernateTemplate"/>
</bean>
```

□ HibernateTemplate □□□ Hibernate □□ Session



```
hibernateTemplate.execute(new HibernateCallback() {
    @Override
    public Object doInHibernate(Session arg0) throws HibernateException,
            SQLException {
        //...
        return null;
    }
});
```

□□ Hibernate □ DAO □□□

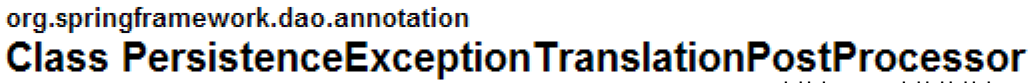
- Hibernate DAO □□□□□ HibernateDaoSupport □□□ setSessionFactory() □ setHibernateTemplate() □□. □□, □□□ DAO □□□□□ getHibernateTemplate() □□□□□□□□□□□□□.
- □□□ HibernateDaoSupport □□□□□□ SessionFactory □□, □□□□□ □□□□ HibernateTemplate □□□, □□ HibernateDaoSupport □□□ □□□ SessionFactory □□□□□□□□ HibernateTemplate □□□, □□□ hibernateTemplate □□

□ Hibernate □□□□ Session □□□□□

- Spring □ HibernateTemplate □□□□□□□□□ , □□ DAO □□ . □□□ HibernateTemplate □□□ DAO □□□□□ Spring □ API
- □□ HibernateTemplate □□□□□□□□□ Hibernate □□□□ Session □□ .
- **Hibernate □□□ Session □□□ Spring □□□□□□□□□□ , □□□□□□□□□ DAO □□□□□□□**
- □□□□□□□ beans.xml □□□□□ , □□ Spring □□□□□□□□ , □□□□□ Thread Local □□□□□□ Session □□

```
<prop key="hibernate.current_session_context_class">thread</prop>
```

□ Hibernate □□□□ Session □□□□□

- □ Hibernate □□□□□□□□□□□□, □□□□□□□□□□□□ HibernateException.
- □□□□□□□□□□□□□□, □□ Hibernate □□□□□ Spring □ DataAccessException □□, □□□□□□□□□□□□□ DAO □□□ @Respository □□.
- □□□□□□□ 
org.springframework.dao.annotation
Class PersistenceExceptionTranslationPostProcessor
□□, □□□□ Hibernate □□□□□ Spring □ DataAccessException □□□□ □□□□□□□□. □□ Bean □□□□□□□□□□ @Respository □□□ Bean □□□□.

Hibernate □□□□□□ Session(1)

- □ Hibernate 3 □□ , SessionFactory □□□□ getCurrentSession() □□ , □□□□□□□□□“□□□“□□□ Session.
- Hibernate □□ CurrentSessionContext □□□□□□□ □□□□ hibernate.current_session_context_class □□ “□□□”
  - JTASessionContext: □□ JTA □□□□□□ Session □□ .
  - ThreadLocalSessionContext: □□□□□□□□□□□□□□□□□ Session □□
  - ManagedSessionContext: □□□□□□□□□□□□□□□ Session □□ . □□□□□□□□□□□□□□ □□□□ Sessio □□ , □□□□ , flush □□□□ Session □□ .

Hibernate □□□□□ Session(2)

- □□□□ ThreadLocalSessionContext □□, Hibernate □ Session □□□ getCurrentSession() □□□□□□, □□□□□□□□□□.
- □□□□□□□□ JTA □□□□□□, □□□□□□□□□; □□□□□□ Hibernate □□□□□□□□□□.
- □□:
  - □□ JTA □□□□□ Session □□:

```
<property name="hibernate.current_session_context_class">thread</property>
```

  - □□□□□□□□□□□□□□ Session □□□

```
<property name="hibernate.current_session_context_class">jta</property>
```

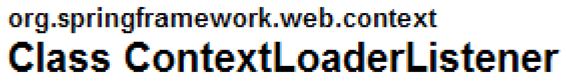
□□ Struts2

□□□□ web □□□□□ Spring

- □□□□ Servlet □□□ ContextLoaderListener, Web □□□□□□□□ Spring □ApplicationContext □□. □□□□□□□□□□□ApplicationContext □□□□□ Web □□□□□ ServletContext □. □□, Servlet □□□□□ ServletContext □□□□□□□□□□□□□□□□□□ Spring □□□□□□□□□.

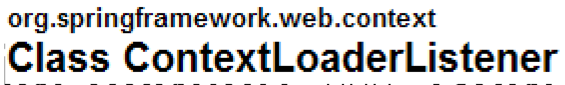
□□□□ web □□□□□ Spring □□□□

- □ web.xml □□□□□ Spring □□□ Servlet □□□

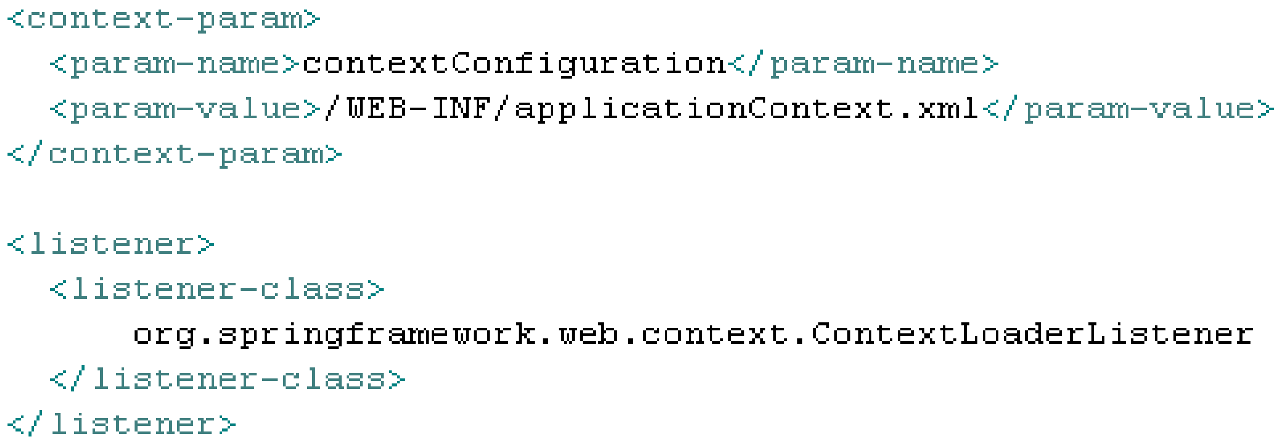

org.springframework.web.context
Class ContextLoaderListener

□□□□ Spring □ ApplicationContext □□□ ServletContext □□□ .

- □□□□□□□ web □□□□□□□ contextConfigLocation □□□ Bean □□□□□□□ . □□□□□ Bean □□□□ , □□□□□□□□□□□□□ . contextConfigLocation □□□□□ /WEB-INF/applicationContext.xml. □□□□□□□□□□□□□□□□□□□ web □□□□□□□□


org.springframework.web.context
Class ContextLoaderListener

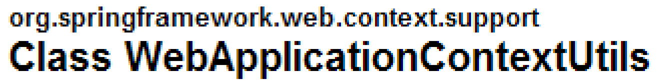
web.xml □□□□□



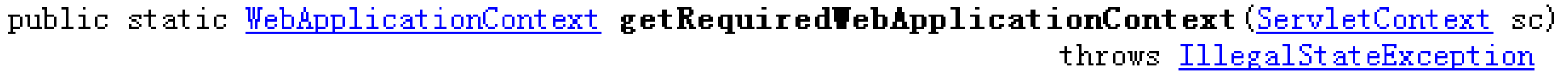
```
<context-param>
  <param-name>contextConfiguration</param-name>
  <param-value>/WEB-INF/applicationContext.xml</param-value>
</context-param>

<listener>
  <listener-class>
      org.springframework.web.context.ContextLoaderListener
  </listener-class>
</listener>
```

□ web □□□□□□ Spring □ ApplicationContext □ □

- □□□□

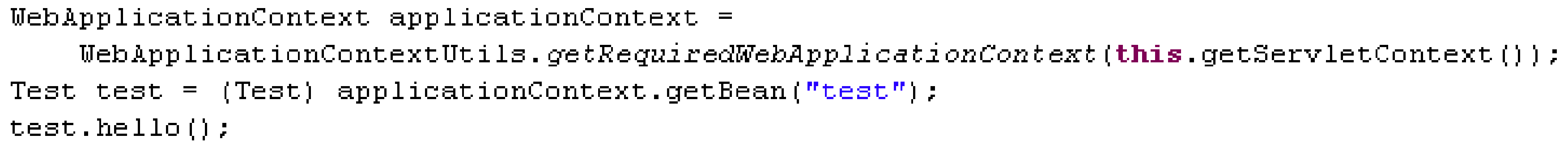


org.springframework.web.context.support
Class WebApplicationContextUtils

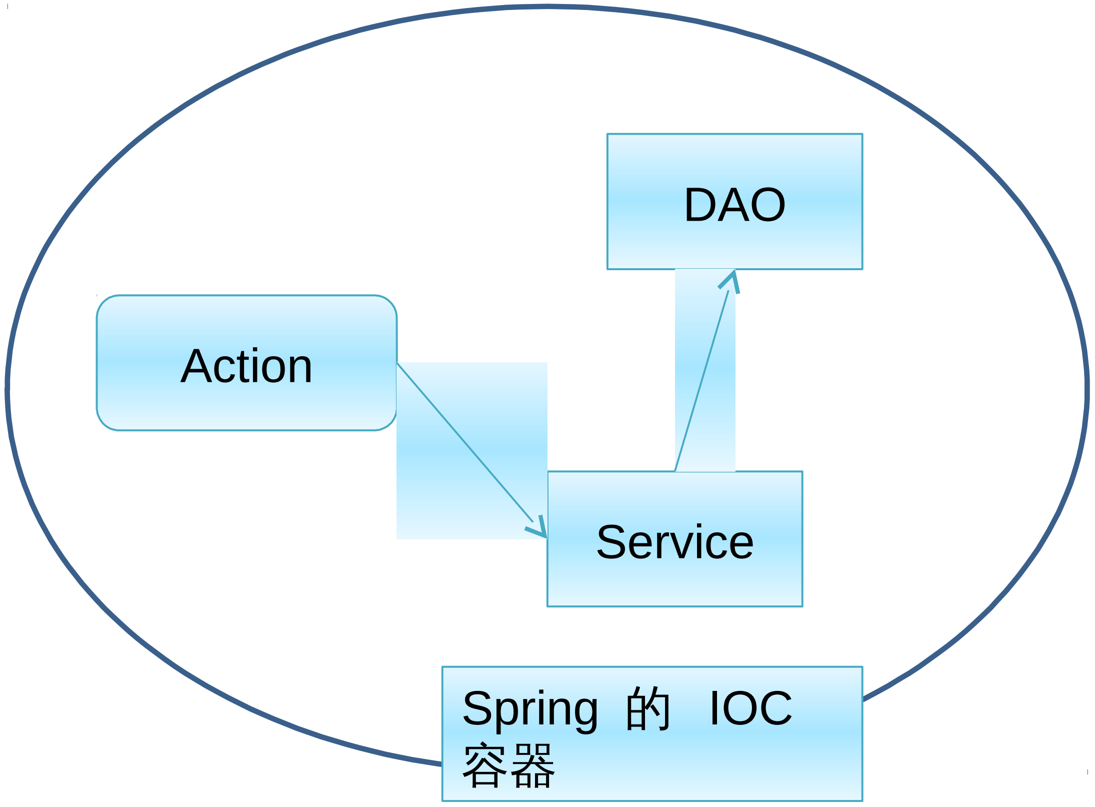


```
public static WebApplicationContext getRequiredWebApplicationContext(ServletContext sc)
                                                                  throws IllegalStateException
```

□□□ Spring □ ApplicationContext □□



```
WebApplicationContext applicationContext =
    WebApplicationContextUtils.getRequiredWebApplicationContext(this.getServletContext());
Test test = (Test) applicationContext.getBean("test");
test.hello();
```


DAO
Action
Service
Spring 的 IOC 容器

□□ Struts2

- Struts2 □□□□□□□ Spring □□□.
- Struts2 □□□□□□ Spring□□□□□□□:
  - □ Action □□□□ Spring □□□□□□□, □□, □□□□□□, □□□□□□ Spring □□□ IOC □□, □□□□□□□
  - □□ Spring □□□□□□□□□, □ Spring □□□□ Action □□□, □□□ Spring □□□□□□□□□□□□□□□ Action □□.

□ Spring □□□□□

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  - □□ Spring □□ : □ struts2-spring-plugin-2.2.1.jar □□□□□ WEB □□□ WEB-INF/lib □□□
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  - □ Struts □□□□□□□ action, □□ class □□□□□□□ Action □□□□ , □□□□ Spring □□□ Action □□□ ID

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  - name: □□□□□□□□.
  - type: □□□□□□□. □□□□ type □□□ Bean, □□□□□□□□; □□□□□ Bean, □□□□□□□, □□□□□□
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