



Pivotal®

# Factory Beans

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Spring Essentials



# Module Objectives

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After completing this lesson, you should be able to do the following

- Describe the Factory Pattern
- Explain the purpose of Factory Beans and be able to use them

# Agenda

- Defining Bean using the Factory Pattern
- Spring's FactoryBean Interface



# Factory Pattern

- Object creation more complicated than a simple use of operator **new**
  - Different implementations
    - Depending on platform, configuration, user, ...
- Wrap all creation code in a dedicated method or class
  - A “factory” for creating objects

```
public class AccountServiceFactory {  
    public AccountService getInstance() {  
        // Conditional logic – for example: selecting the right  
        // implementation or sub-class of AccountService to create  
        return accountService;  
    }  
}
```

# @Configuration Classes *are* Factories

- Spring's @Bean methods are factory methods
  - They create Spring Beans

```
@Configuration
public class AccountServiceFactory {
    @Bean
    public AccountService accountService() {
        // Conditional logic – for example: selecting the right
        // implementation or sub-class of AccountService to create
        return accountService;
    }
}
```

# Spring *is* a Factory

- Spring creates Spring Beans
  - No matter how you define the beans
- Bean definition options
  - **Java Configuration:** `@Configuration` classes
  - **Annotation-Based:** `@Component`, `@Autowired` and component-scanning
  - **XML Configuration:** `<bean>` elements
    - Common in existing applications
    - Not covered in this course
    - See optional sections at end of notes



# Agenda

- Defining Bean using the Factory Pattern
- **Spring's FactoryBean Interface**



# Complex Bean Instantiation

**Note:** XML *is not* in the certification exam  
– Factory Beans *are*

- Originally Spring only supported XML configuration
  - No easy way to do complex instantiation logic
  - `@Bean` methods can use *any* Java you need
- Instead Spring XML relied on the *Factory Pattern*
  - Use a factory to create the bean(s) we want
    - Implement Spring's **FactoryBean** interface
  - Put *any* complex Java code needed in factory's internal logic
  - *Spring FactoryBeans may be used in Java Config also*



# The Spring *FactoryBean* interface



- Originally invented as a fall-back for complex configuration in XML
  - Used long before `@Bean` methods introduced

```
interface FactoryBean<T> {  
    // The factory method  
    public T getObject() throws Exception;  
  
    // Is this a singleton instance or not?  
    public default boolean isSingleton() { return true; }  
  
    // What type of object is this – easier than introspecting T  
    public Class<?> getObjectType();  
}
```

**Note:** Sometimes convenient to use factory beans in `@Bean` methods

# FactoryBean Example



```
public class AccountServiceFactoryBean
    implements FactoryBean <AccountService>{

    public AccountService getObject() throws Exception {
        // Conditional logic – for example: selecting the right
        // implementation or sub-class of AccountService to create
        return accountService;
    }

    public Class<?> getObjectType() { return AccountService.class; }

    // isSingleton defaults to returning true since Spring V5
}
```

# FactoryBeans with Java Configuration

- Spring calls `getObject()` *automatically*

```
@Configuration
```

```
public class ServiceConfig {
```

```
    @Bean
```

```
    public AccountServiceFactoryBean accountService() {
```

```
        return new AccountServiceFactoryBean();
```

```
    }
```

```
    @Bean
```

```
    public CustomerService customerService(AccountService accountService) {
```

```
        return new CustomerService(accountService);
```

```
    }
```

***getObject() called by  
Spring internally***

***creates***

***Do not call getObject() yourself***

Spring often does *additional* setup *internally* first  
- such as invoking post-construct methods

# Factory Beans in Spring

- FactoryBeans are widely used within Spring
  - `EmbeddedDatabaseFactoryBean`
    - Replaced by `EmbeddedDatabaseBuilder`
  - `JndiObjectFactoryBean`
    - One option for looking up JNDI objects
  - Creating Remoting proxies
  - Creating Caching proxies
  - For configuring data access technologies
    - JPA, Hibernate or MyBatis

# Summary

- Factory Beans
  - Important configuration device
  - Understand how *getObject()* works

- XML configuration has existed in Spring since first release
  - Many existing applications use it
  - Optional sections at end of course
    - *XML Configuration*
    - *XML Best Practices*
    - *XML for Spring Security*

