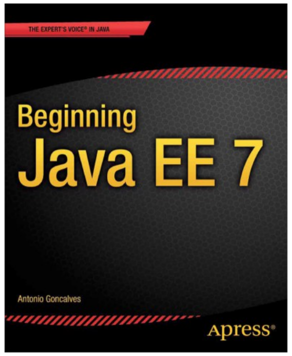
CDI : How do I ?

by antonio goncalves
@agoncal

Antonio Goncalves

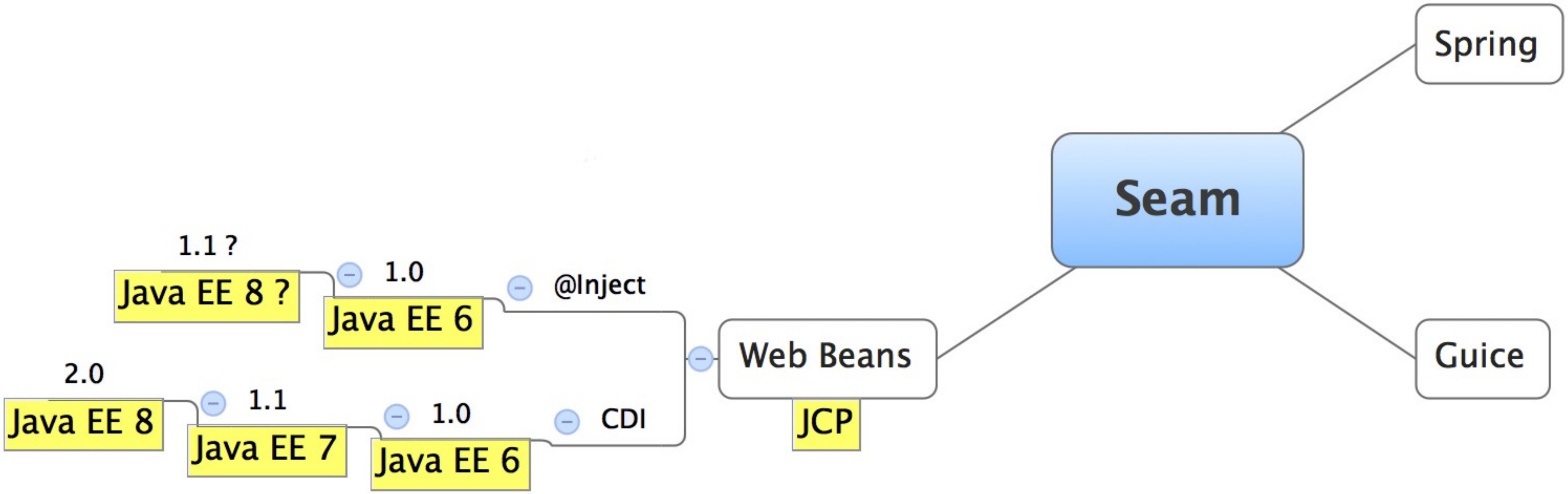


What is CDI ?

What is CDI ?

- Dependency injection
- Lose coupling, strong typing
- Context management
- Interceptors and decorators
- Event bus
- Extensions

History of CDI



Implementations

Weld

OpenWebBeans

WildFly

as 7

Apache TomEE™

ORACLE®
WEBLOGIC

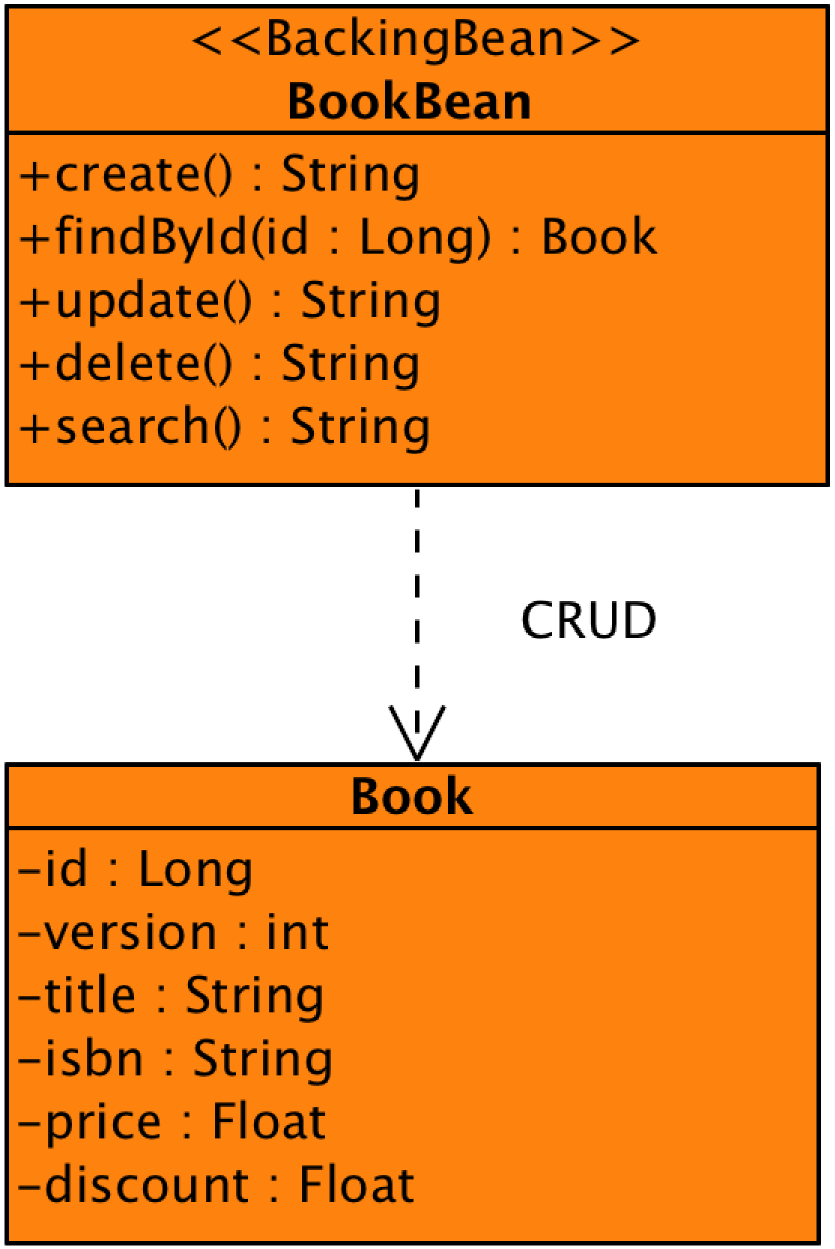
IBM®
WebSphere.

Demo
-
Creating a Web App

Demos with JBoss Forge

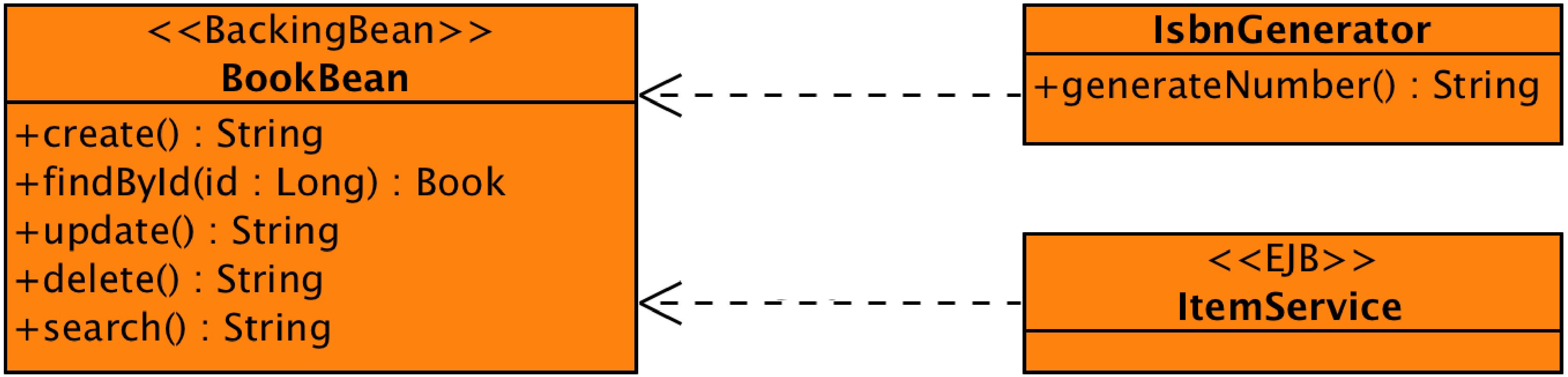
- Java EE scaffolding tool
- Shell commands
- CRUD application
- Gets you start quickly
- Takes care of integration
- Plugin based

Demo: Creating a Web App

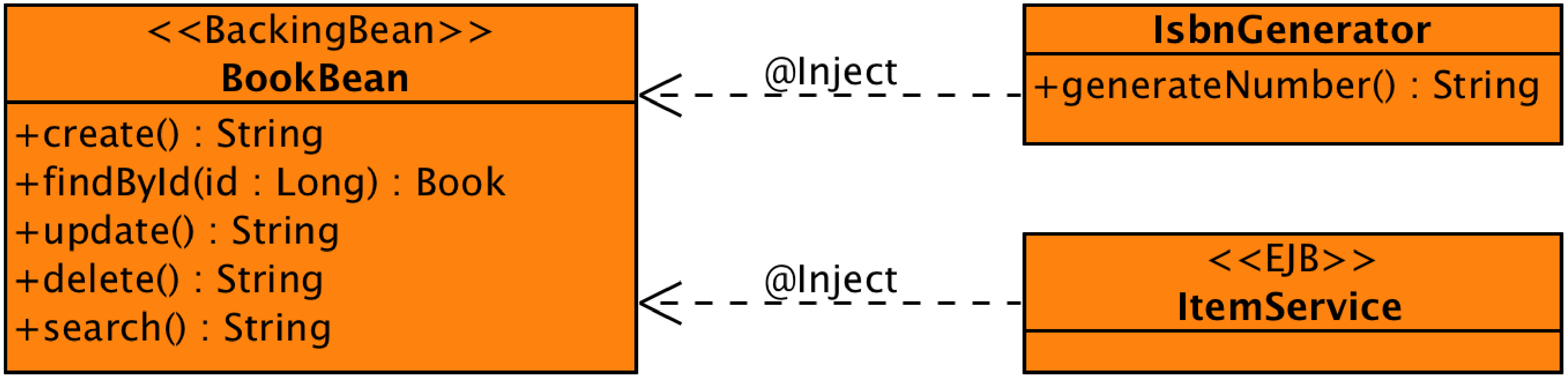


Dependency Injection

How Do I ?


<<BackingBean>>
BookBean
+create() : String
+findById(id : Long) : Book
+update() : String
+delete() : String
+search() : String
IsbnGenerator
+generateNumber() : String
<<EJB>>
ItemService

Use @Inject !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@Inject
IsbnGenerator
+generateNumber() : String
@Inject
<<EJB>>
ItemService

@Inject on Attributes

```java
public class BookBean implements Serializable {

   @Inject
   private NumberGenerator numberGenerator;

   @Inject
   private ItemService itemService;


   // ...
}
```

@Inject on Constructor

```java
public class BookBean implements Serializable {

   private NumberGenerator numberGenerator;
   private ItemService itemService;

   @Inject
   public BookBean(NumberGenerator numberGenerator,
                                       ItemService srv){
      this.numberGenerator = numberGenerator;
      this.itemService = srv;
   }

   // ...
}
```

@Inject on Setters

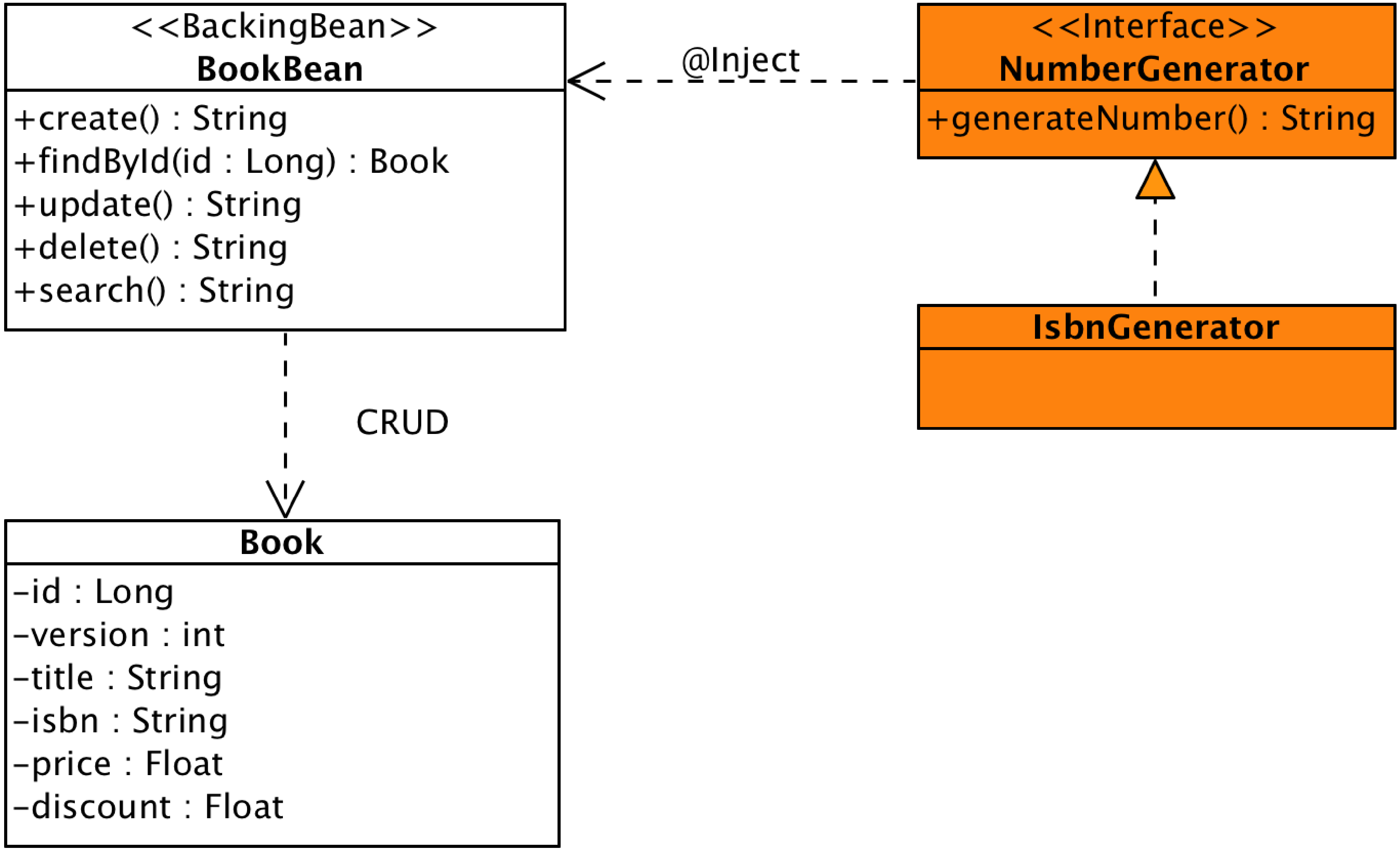
```
public class BookBean implements Serializable {

   private NumberGenerator numberGenerator;
   private ItemService itemService;

   @Inject
   public void setNumberGenerator(NumberGenerator numGen){
      this.numberGenerator = numGen;
   }

   @Inject
   public void setItemService(ItemService itemService) {
      this.itemService = itemService;
   }
   // ...
}
```

Activate CDI

- In CDI 1.0 `beans.xml` in archive
- Since CDI 1.1 it's activated by default
  - All classes having a bean definition annotation
  - `beans.xml` to deactivate or activate all
- Archive vs Bean archive

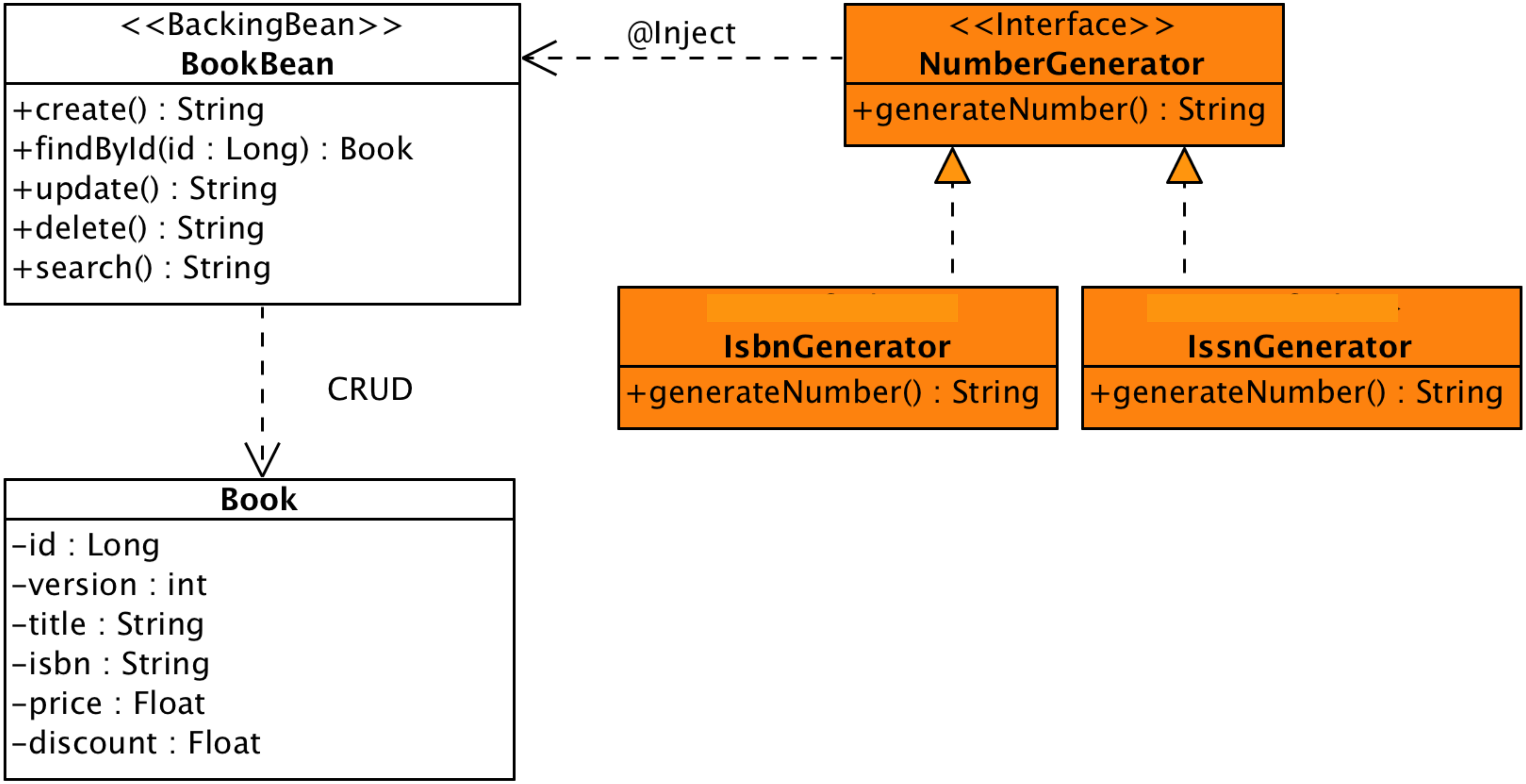
Demo
-
@Inject

Demo: @Inject One Implementation



Qualifiers

How Do I ?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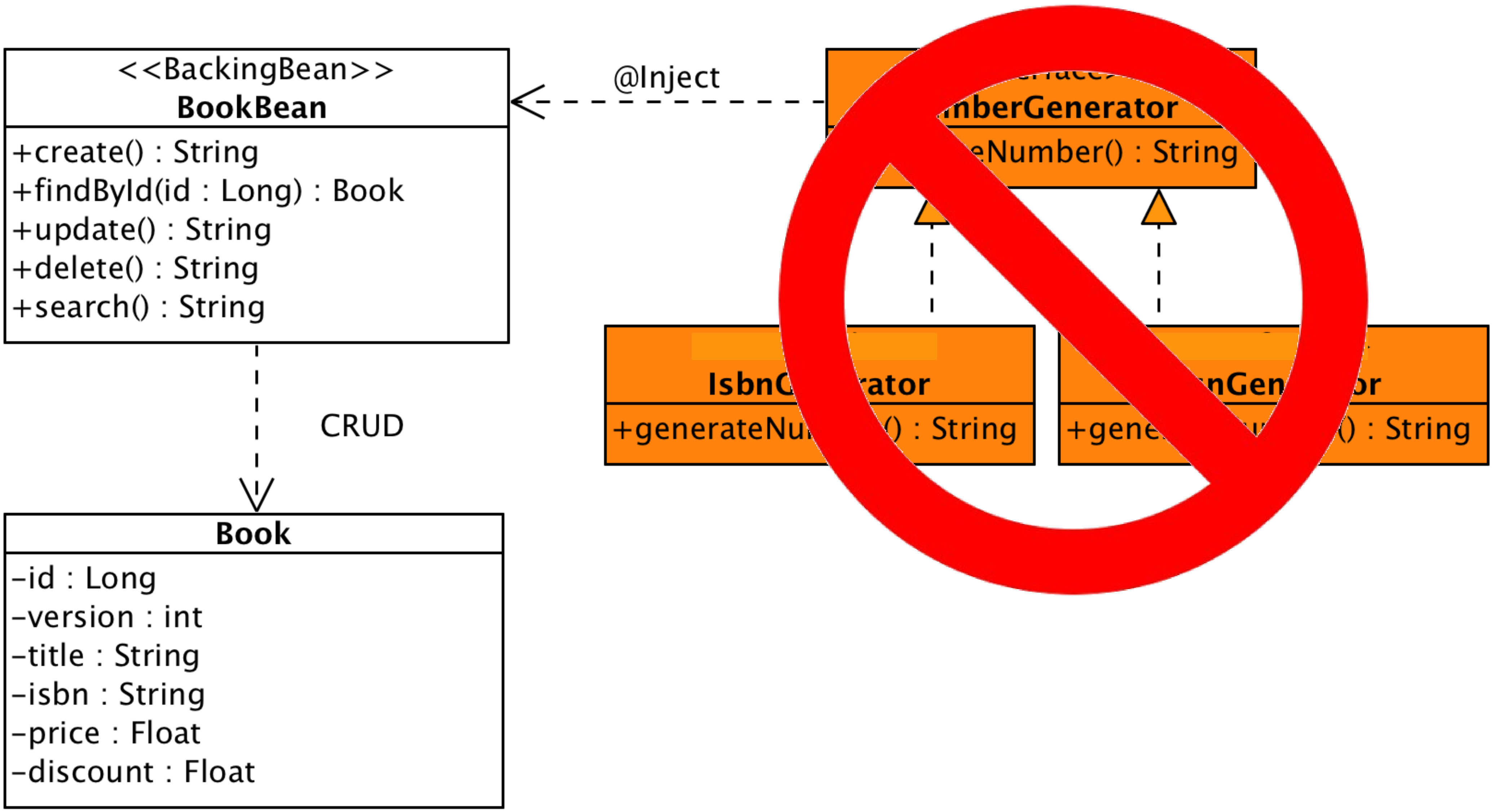
IsbnGenerator
+generateNumber() : String
IssnGenerator
+generateNumber() : String
CRUD
Book
-id : Long
-version : int
-title : String
-isbn : String
-price : Float
-discount : Float

How Do I ?



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IsbnG rator
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nGen or
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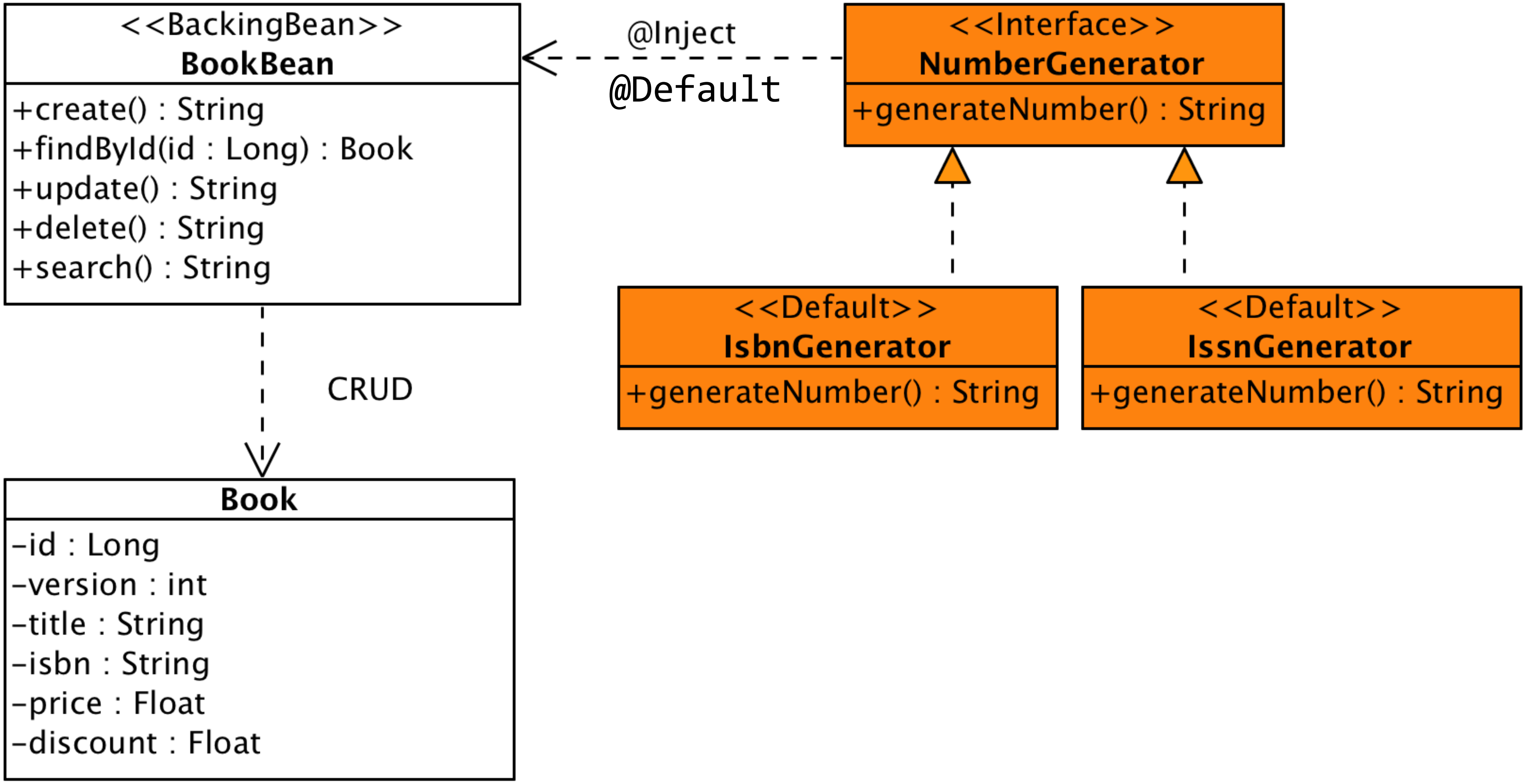

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+delete() : String
+search() : String
@Inject
@Default
<<Interface>>
NumberGenerator
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<<Default>>
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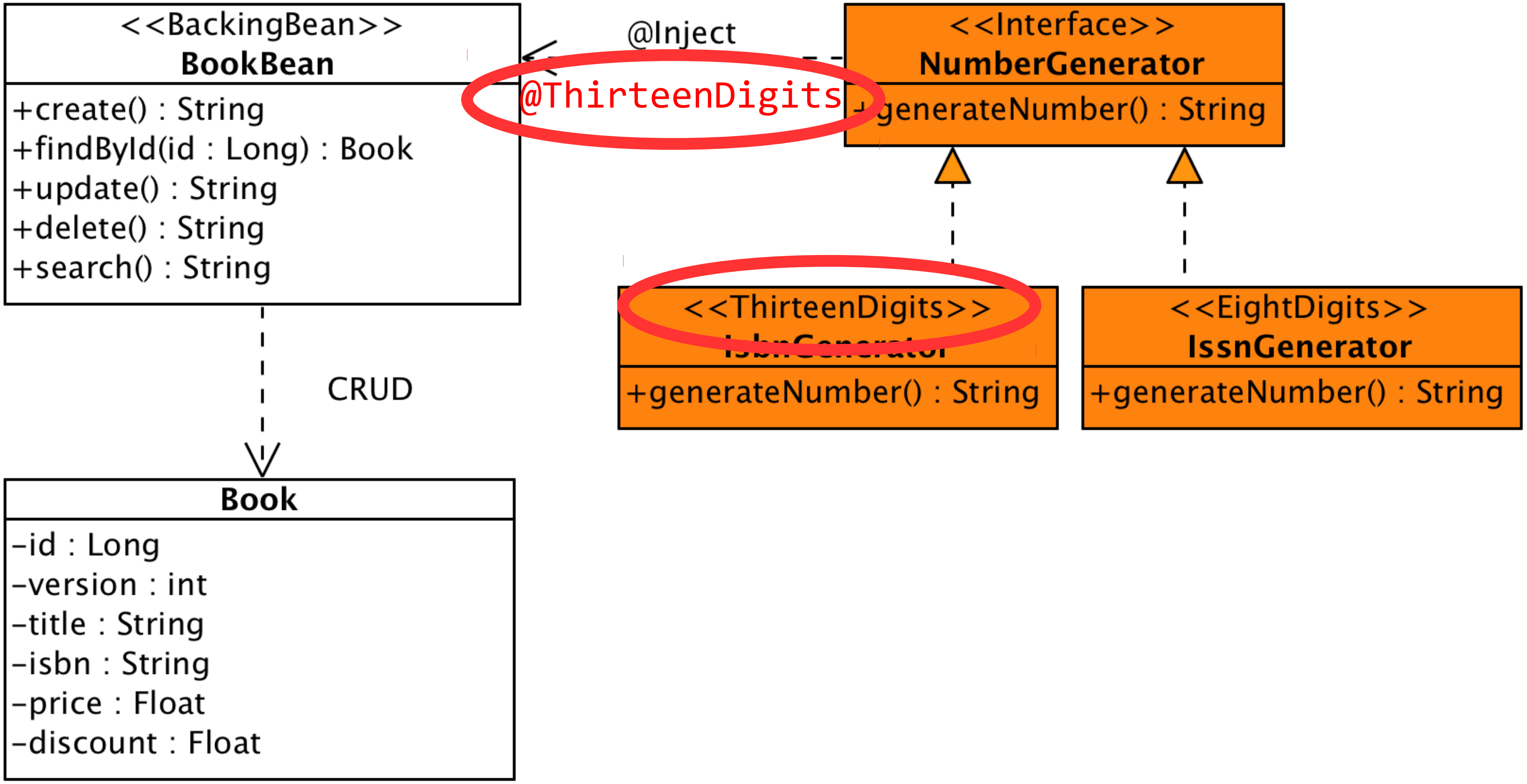
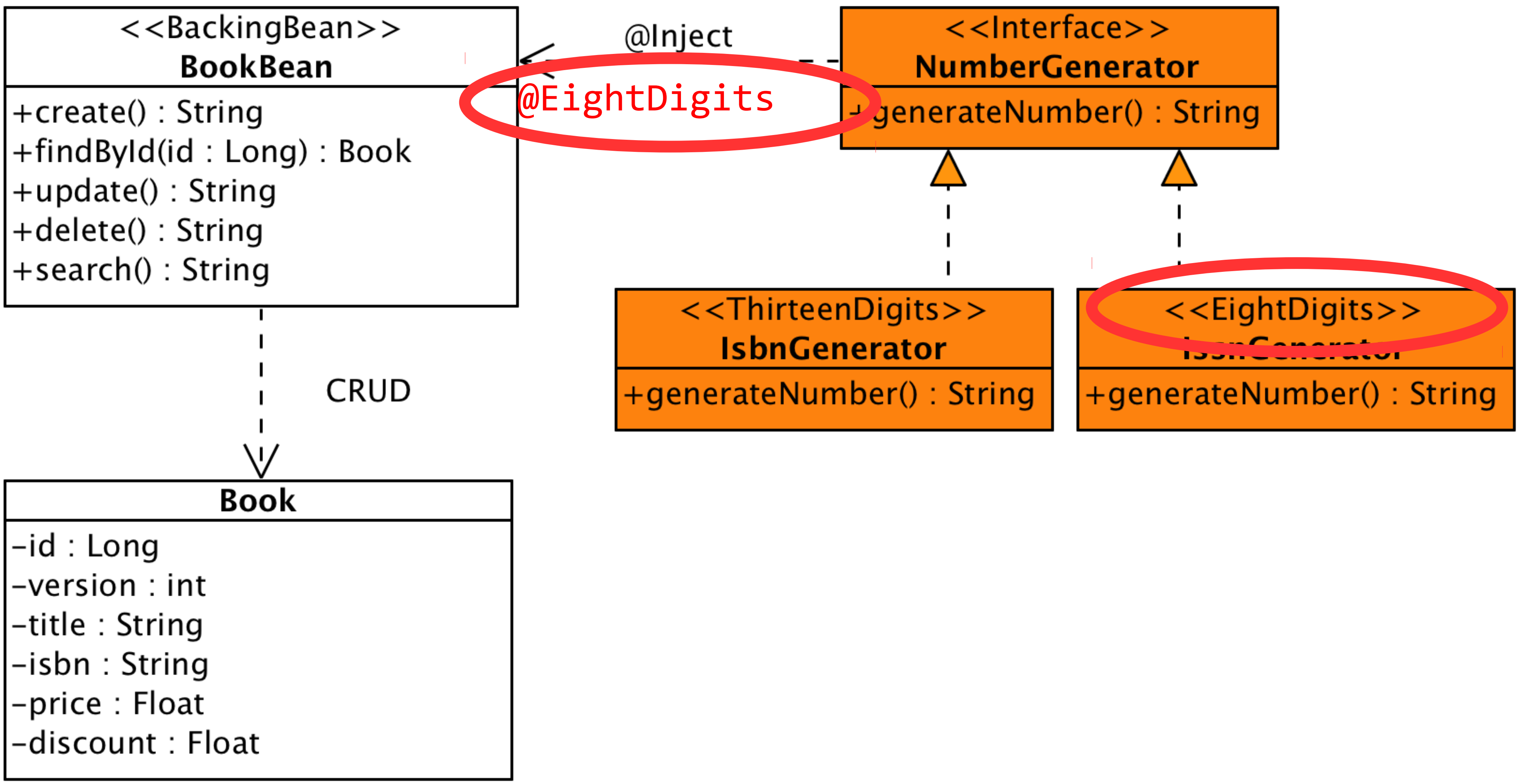
Use Qualifiers !



Use Qualifiers !



A Qualifier

```java
@Qualifier
@Retention(RUNTIME)
@Target({ METHOD, FIELD, PARAMETER, TYPE })
@Documented
public @interface ThirteenDigits {
}
```

Qualifying an Injection Point

```java
public class BookBean implements Serializable {

    @Inject @ThirteenDigits
    private NumberGenerator numberGenerator;

    @Inject
    private ItemService itemService;


    // ...
}
```

Qualifying an Injection Point

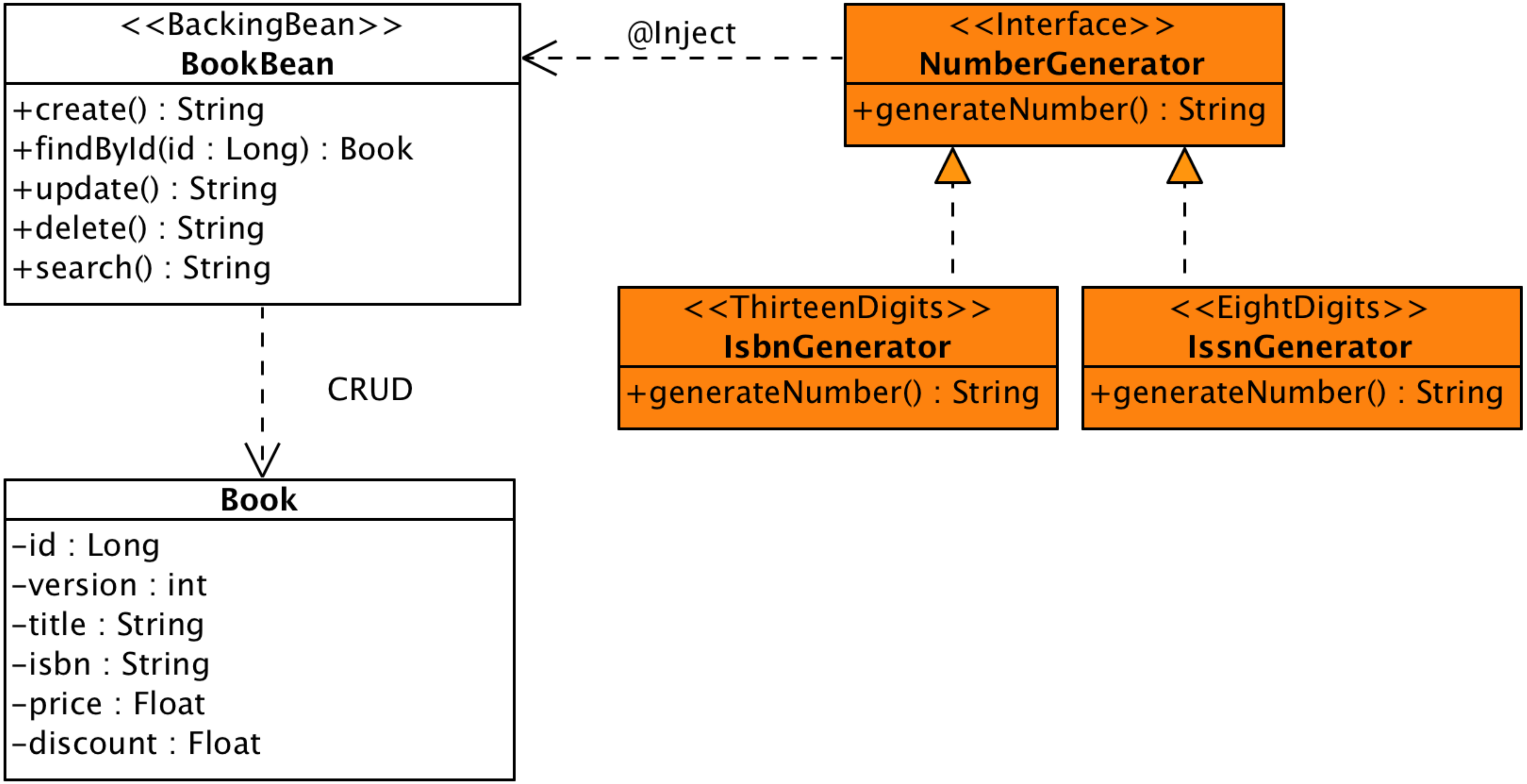
```
public class BookBean implements Serializable {

   @Inject @ThirteenDigits
   private NumberGenerator numberGenerator;

   @Inject @Default
   private ItemService itemService;


   // ...
}
```

Qualifying a Bean

```java
@ThirteenDigits
public class IsbnGenerator implements NumberGenerator {

  @Override
  public String generateNumber() {
    return "13-" + Math.abs(new Random().nextInt());
  }
}
```

Demo
-
Qualifiers

Demo: @Inject One Implementation

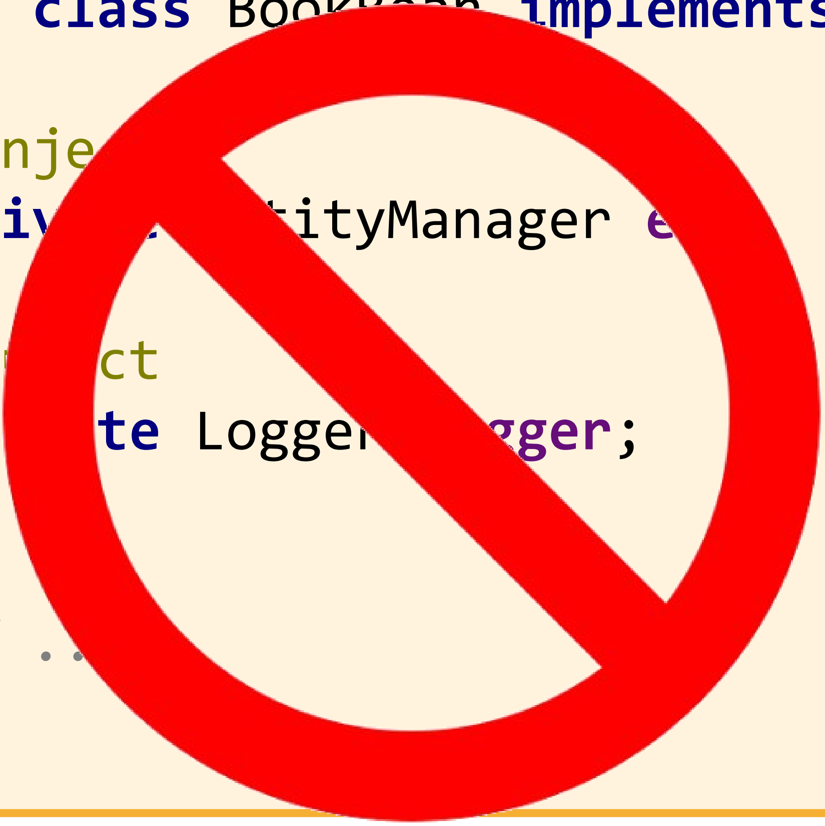


Producers

How Do I ?

```
public class BookBean implements Serializable {

    @Inject
    private EntityManager em;

    @Inject
    private Logger logger;


    // ...
}
```

How Do I ?



```
public class BookBean implements Serializable {

    @Inje
    priv      tityManager e

    @I     ct
    pr    te Logge     gger;


    // ..
}
```

How Do I ?

```
public class BookBean implements Serializable {

    @Inject
    private EntityManager em;

    @Inject
    private Logger logger;


    // ...
}
```

Several persistence units

```
@PersistenceContext(unitName = "myPU1")
@PersistenceContext(unitName = "myPU2")
```

How Do I ?

```
public class BookBean implements Serializable {

    @Inject
    private EntityManager em;

    @Inject
    private Logger logger;


    // ...
}
```

Third party framewok

Use Producers !

```
public class BookBean implements Serializable {

    @Inject
    private EntityManager em;

    // ...
}
```

```
public class ResourceProducer {

    @Produces
    @PersistenceContext(unitName = "myPU")
    private EntityManager entityManager;

}
```

Use Producers !

```java
public class BookBean implements Serializable {

    @Inject
    private Logger logger;

    // ...
}
```

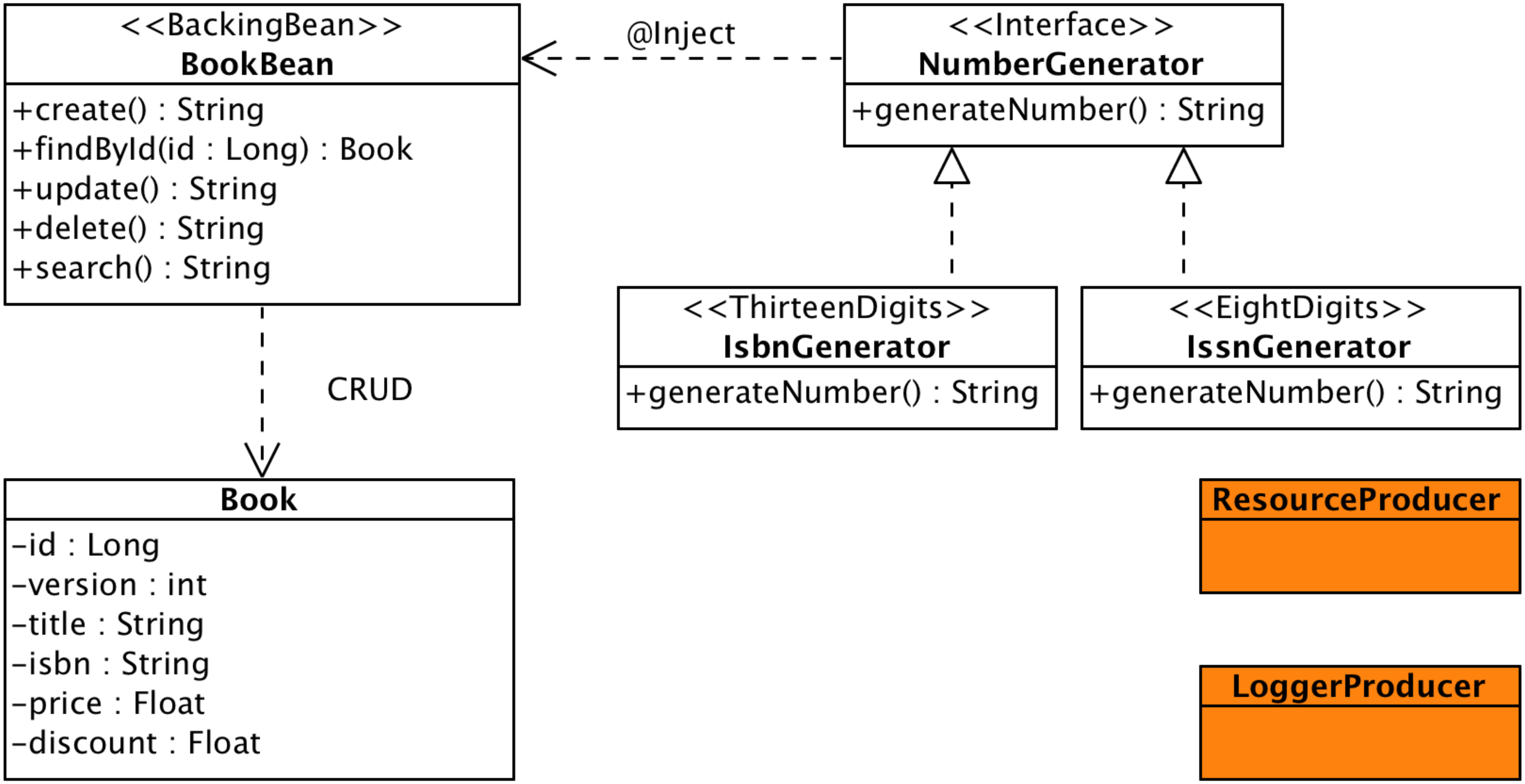
```java
public class ResourceProducer {

    @Produces
    private Logger produceLogger(InjectionPoint ip) {
     return
     Logger.getLogger(ip.getMember().getDeclaringClass().getName());
    }
}
```

Demo

-

Producers

Demo: Producers

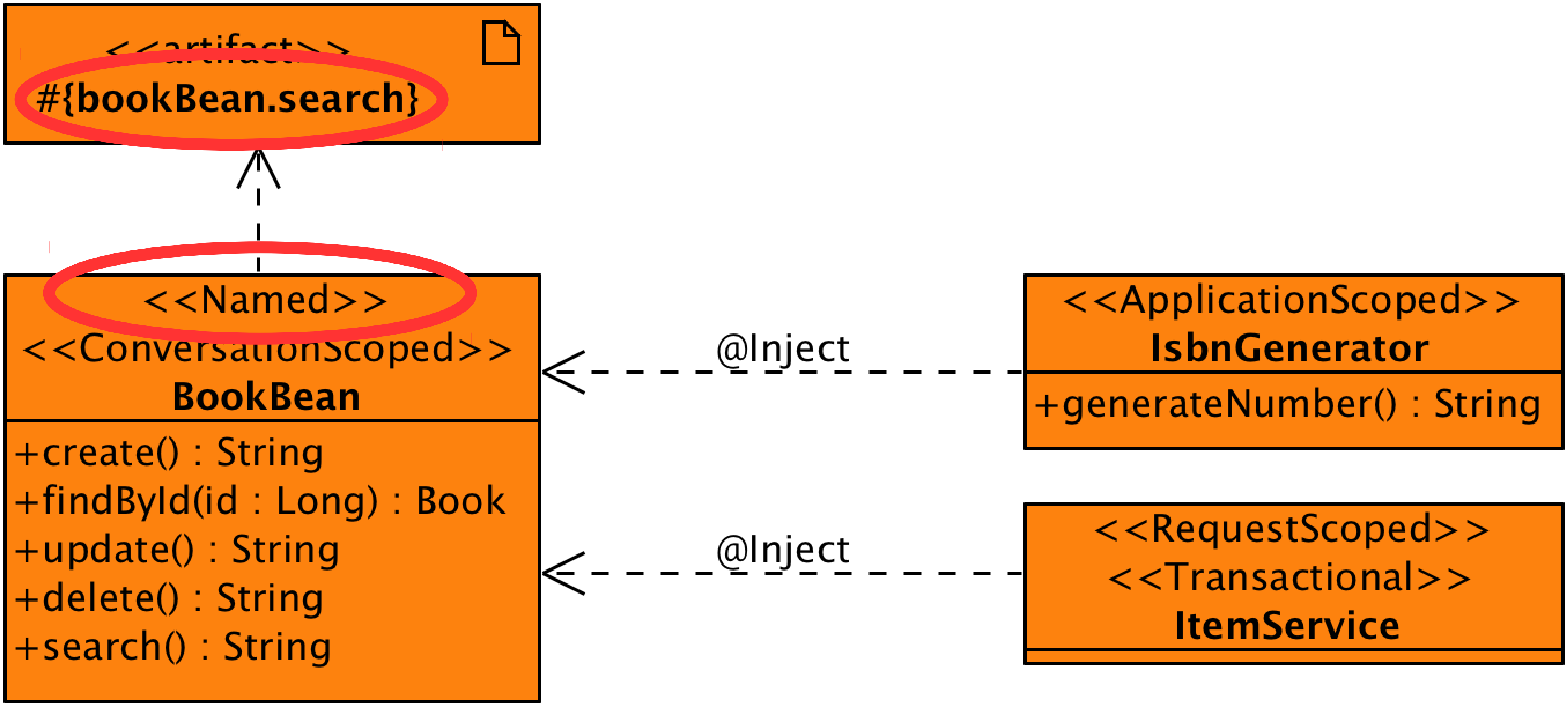


Web tier
&
Service tier

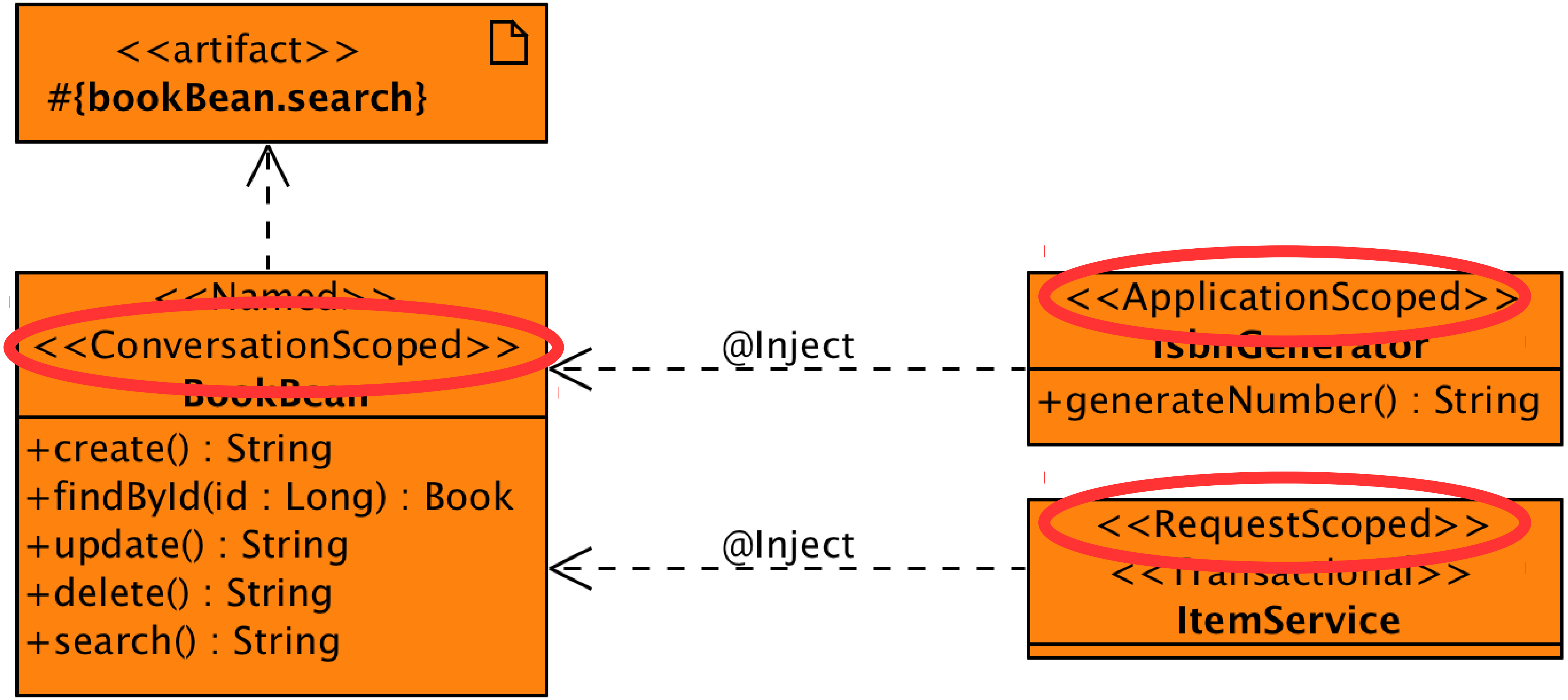
How Do I ?

How Do I ?

Use Expression Language...



Use Expression Language and Scopes !



Service Tier

```
@Transactional
public class BookBean implements Serializable {

   @Inject
   private EntityManager em;

   public void update() {
      em.persist(book);
   }
}
```

Service Tier + Web Tier

```java
@Named

@Transactional
public class BookBean implements Serializable {

   @Inject
   private EntityManager em;

   public void update() {
      em.persist(book);
   }
}
```

```xml
<h:commandLink value="Create"
               action='#{bookBean.update}'/>
```

Service Tier + Web Tier

```
@Named("service")

@Transactional
public class BookBean implements Serializable {

    @Inject
    private EntityManager em;

    public void update() {
        em.persist(book);
    }
}
```

```
<h:commandLink value="Create"
               action='#{service.update}'/>
```

Several scopes

- `@Dependent` (default)
- `@ApplicationScoped`, `@SessionScoped`, `@RequestScoped`
- `@ConversationScoped`
- Create your own
  - `@TransactionalScoped`
  - `@ViewScoped`
  - `@ThreadScoped`
  - `@ClusterScoped`

Just choose the right scope

```java
@Named
@RequestScoped
@Transactional
public class BookBean implements Serializable {




    public void update() {

    }

    public void delete() {

    }
}
```

Just choose the right scope

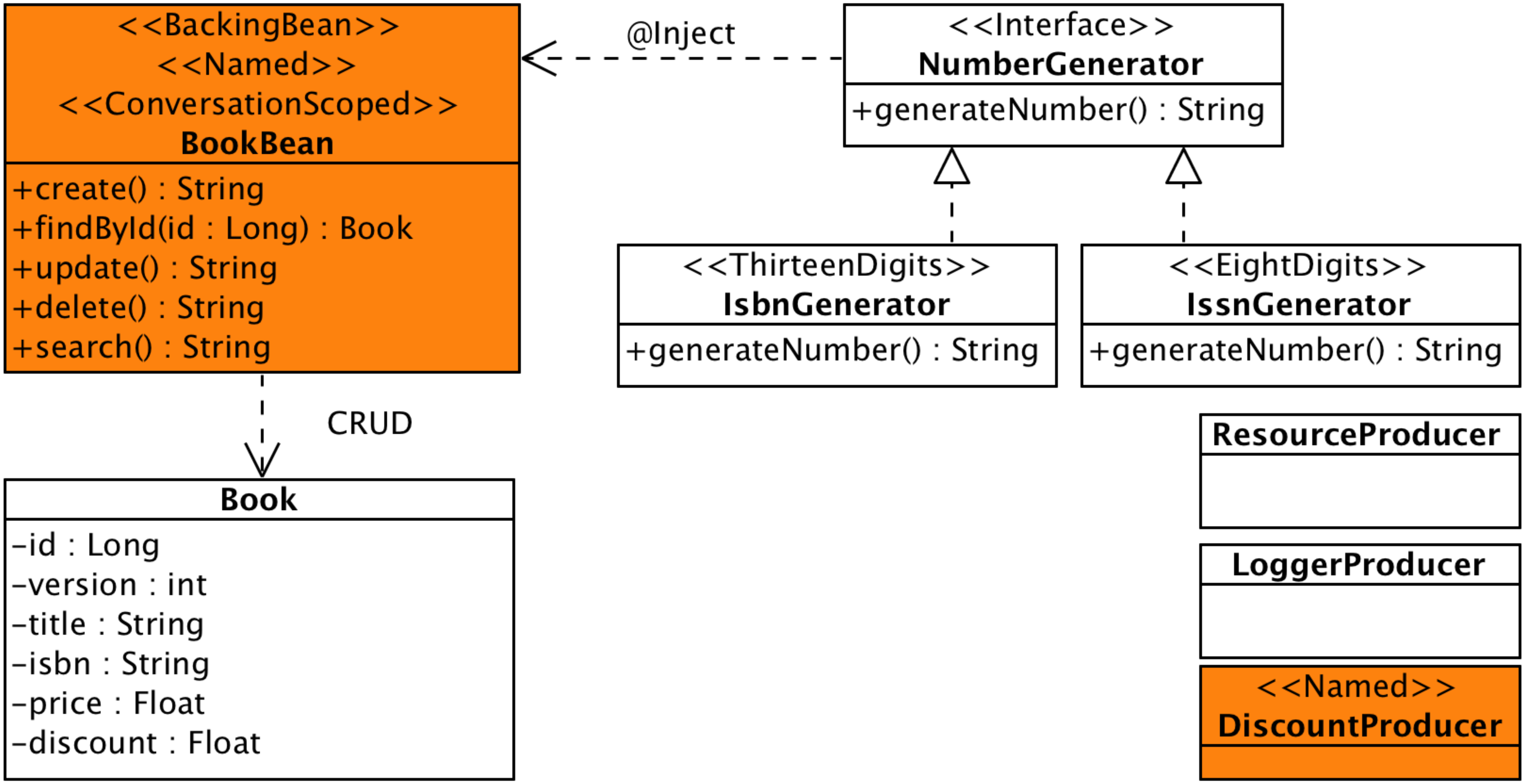
```
@Named
@SessionScoped
@Transactional
public class BookBean implements Serializable {





   public void update() {

   }

   public void delete() {

   }
}
```

Just choose the right scope

```java
@Named
@ConversationScoped
@Transactional
public class BookBean implements Serializable {

    @Inject
    private Conversation conversation;

    public void update() {
        conversation.begin();
    }

    public void delete() {
        conversation.end();
    }
}
```

Demo
-
@Named & scope

Demo: @Named & Scope



</>

Alternatives

How Do I ?

```java
public class MockGenerator implements NumberGenerator  {

   public String generateNumber() {
      return "mock-" + Math.abs(new Random().nextInt());
   }
}
```

How Do I ?

```java
@Mock
public class MockGenerator implements NumberGenerator  {

    public String generateNumber() {
        return "mock-" + Math.abs(new Random().nextInt());
    }
}
```

```java
public class BookBean implements Serializable {

    @Inject @Mock
    private NumberGenerator numberGenerator;
    // ...
}
```

How Do I ?

```
@Mock
public class Mock                 ts NumberGenerator  {

    public Str      erateNumber() {
        retur   oc      Math.abs(new r    om().nextInt());
    }
}
```

```
pu   c class BookBe     mpleme    Serializable {

    @    ct @Mock
    pr       NumberGenerat      mberGenerator;
    // ..
}
```

Use an Alternative !

```java
@Alternative
@EightDigits
public class MockGenerator implements NumberGenerator  {

   public String generateNumber() {
      return "mock-" + Math.abs(new Random().nextInt());
   }
}
```

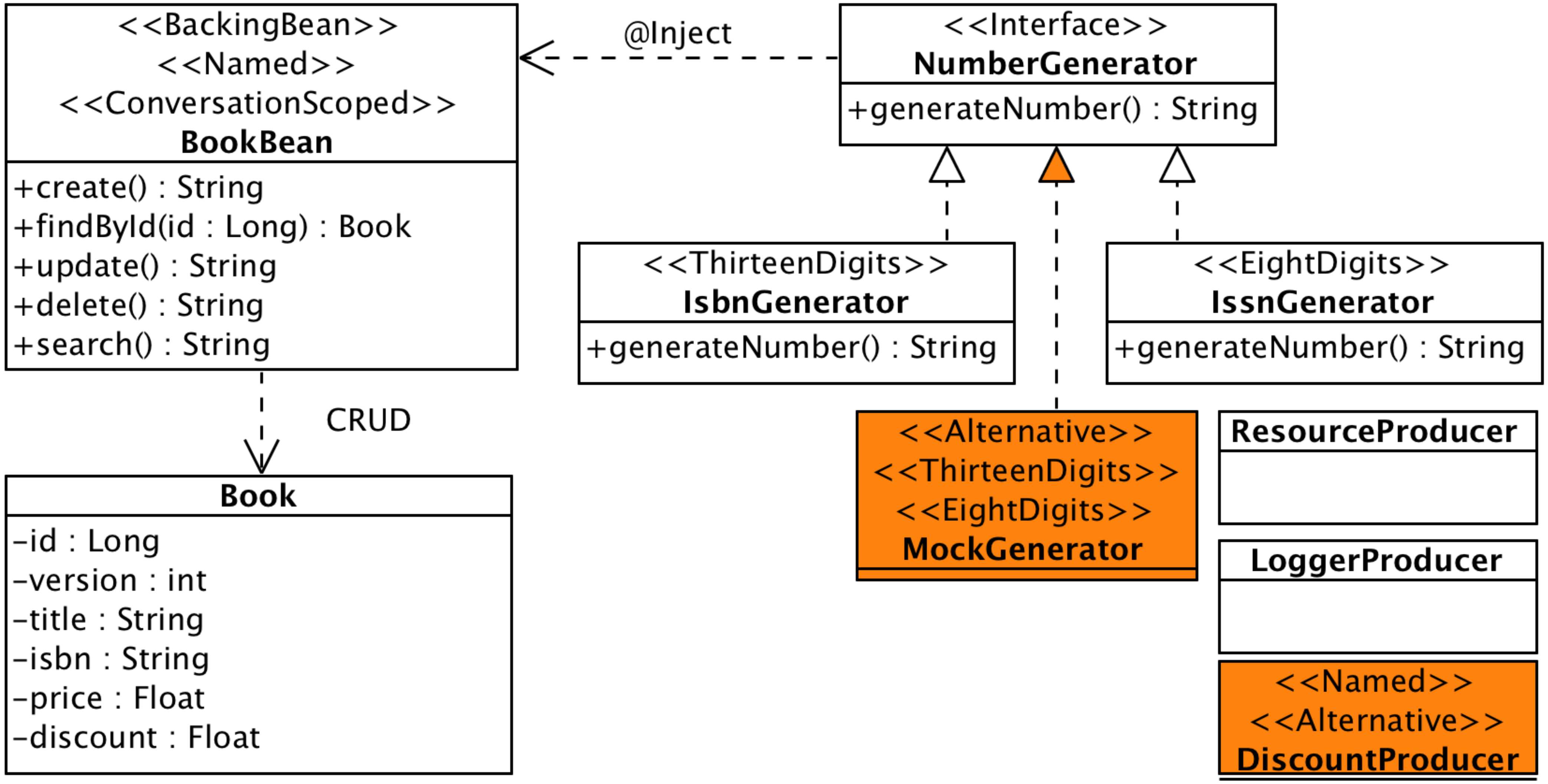
```java
public class BookBean implements Serializable {

   @Inject @EightDigits
   private NumberGenerator numberGenerator;
   // ...
}
```

Activate the Alternative

```
<beans xmlns="http://xmlns.jcp.org/xml/ns/javaee"
       ...
       version="1.1" bean-discovery-mode="all">

  <alternatives>
    <class>com.foo.MockGenerator</class>
  </alternatives>
</beans>
```

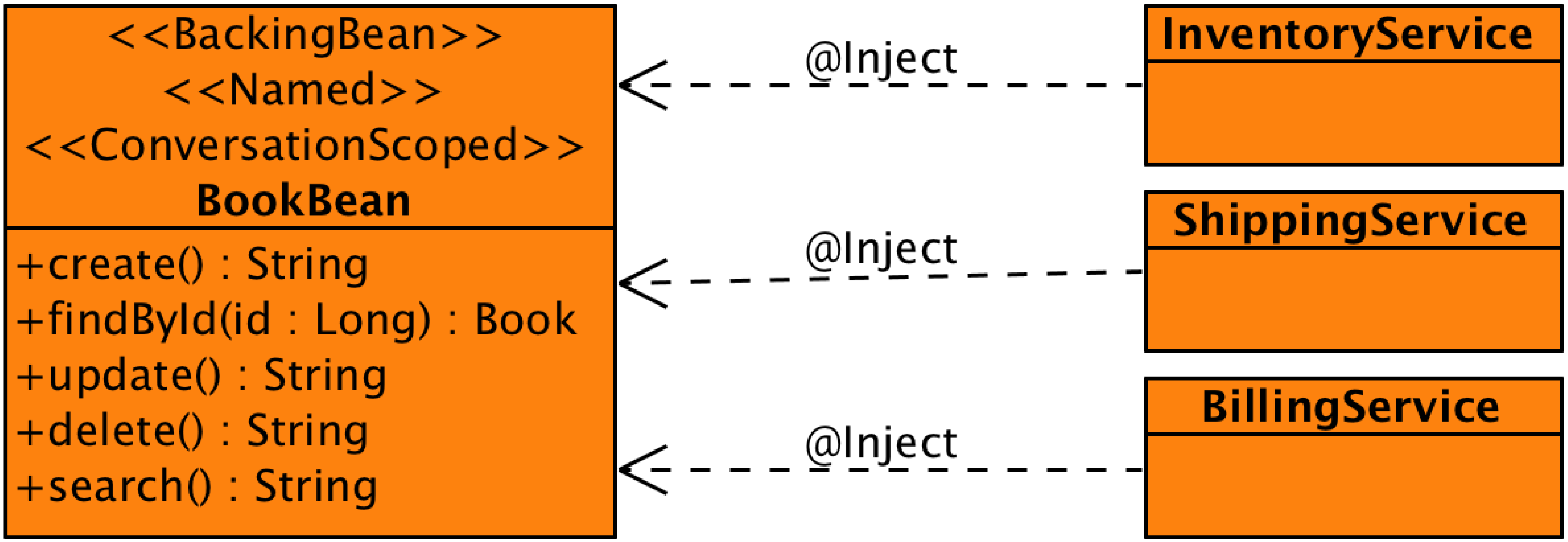
Demo
-
Alternatives

Demo: Alternatives



Events

How Do I ?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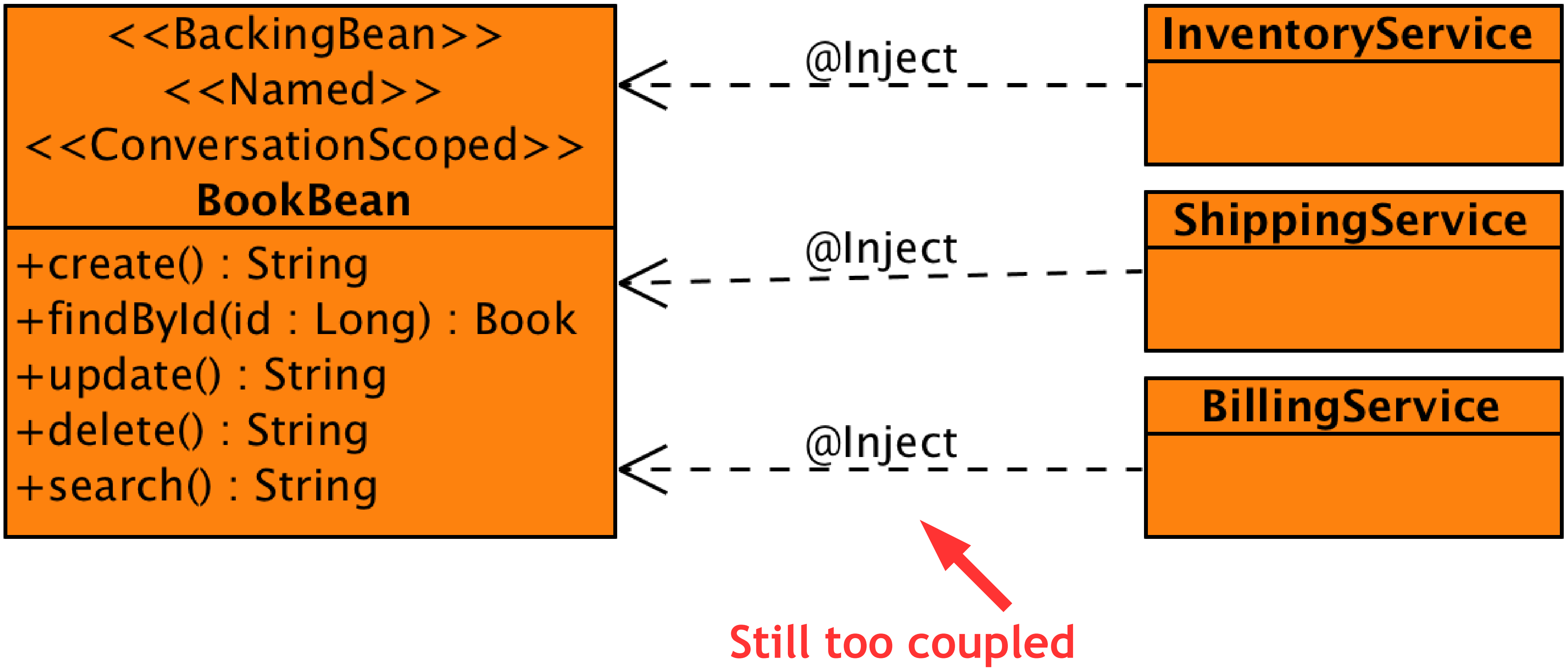
@Inject
@Inject
@Inject
InventoryService
ShippingService
BillingService

How Do I ?



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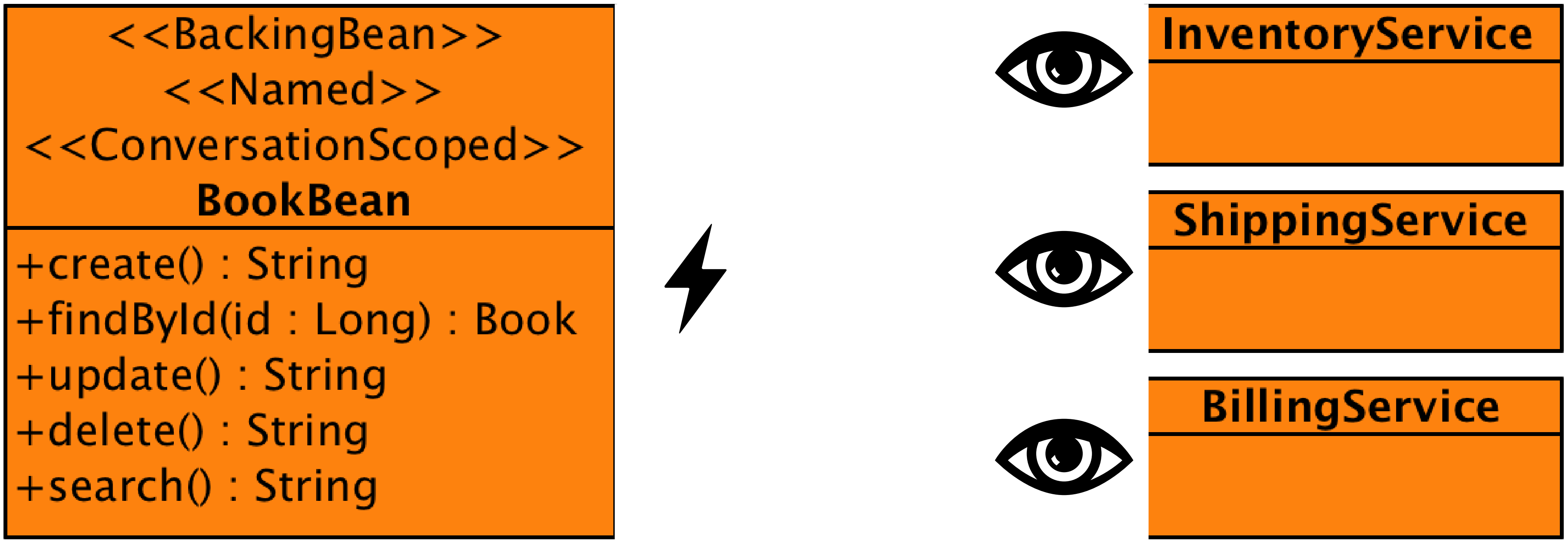
+search() : String
@Inject
@Inject
@Inject
InventoryService
ShippingService
BillingService
Still too coupled

Use Events !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InventoryService
ShippingService
BillingService

Fire and Observe

```java
public class BookBean implements Serializable {

   @Inject
   private Event<Book> boughtEvent;

   public void update() {
      boughtEvent.fire(book);
   }
}
```

```java
public class InventoryService {

    private void observeBooks (@Observes       Book book) {
        logger.info("Book recevied " + book.getTitle());
    }
}
```

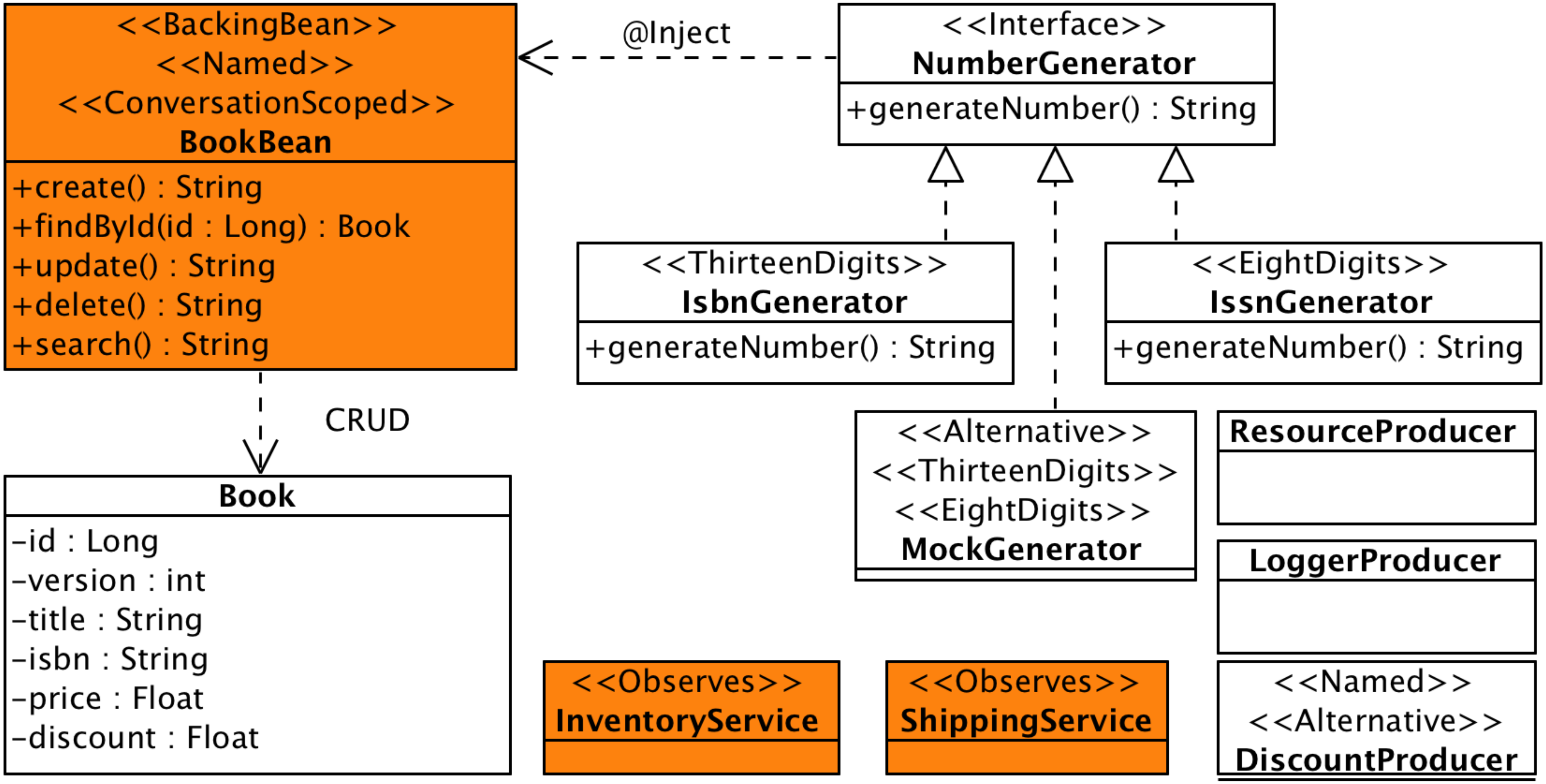
Fire and Observe with Qualifier

```
public class BookBean implements Serializable {

   @Inject @Paper
   private Event<Book> boughtEvent;

   public void update() {
      boughtEvent.fire(book);
   }
}
```

```
public class InventoryService {

    private void observeBooks (@Observes @Paper Book book) {
        logger.info("Book recevied " + book.getTitle());
    }
}
```

Demo
-
Events

Demo: Events



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<<ThirteenDigits>>
IsbnGenerator
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IssnGenerator
+generateNumber() : String
CRUD
<<Alternative>>
<<ThirteenDigits>>
<<EightDigits>>
MockGenerator
ResourceProducer
LoggerProducer
Book
-id : Long
-version : int
-title : String
-isbn : String
-price : Float
-discount : Float
<<Observes>>
InventoryService
<<Observes>>
ShippingService
<<Named>>
<<Alternative>>
DiscountProducer

CDI : So Much More

CDI : So Much More

CDI Extension ecosystem

DELTASPIKE

CDI Course on PluralSight

pluralsight
hardcore developer training

http://www.pluralsight.com/courses/context-dependency-injection-1-1

Thanks

www.antoniogoncalves.org
antonio.goncalves@gmail.com
@agoncal
@devoxxfr
@lescastcodeurs

Q & A

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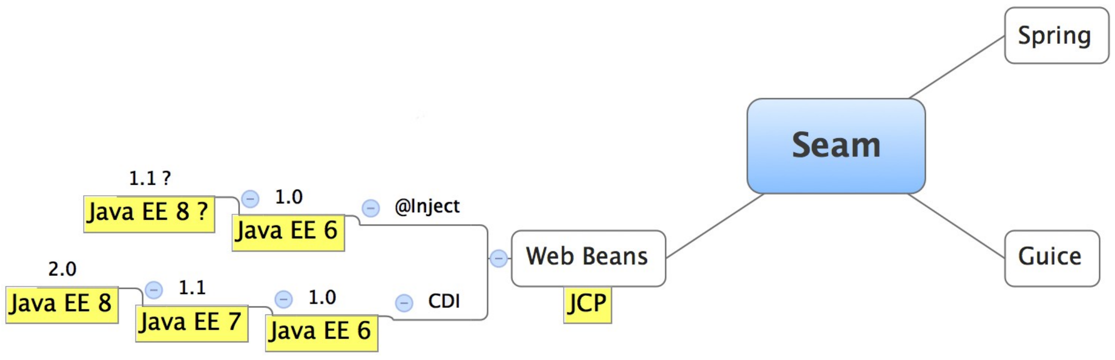

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as 7

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Creating a Web App

Demos with JBoss Forge

- Java EE scaffolding tool
- Shell commands
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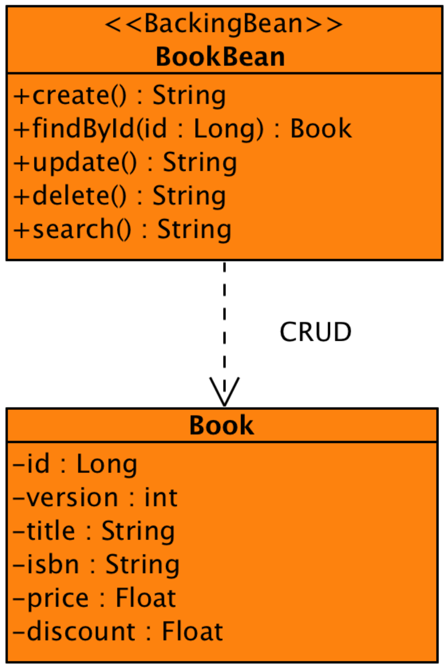
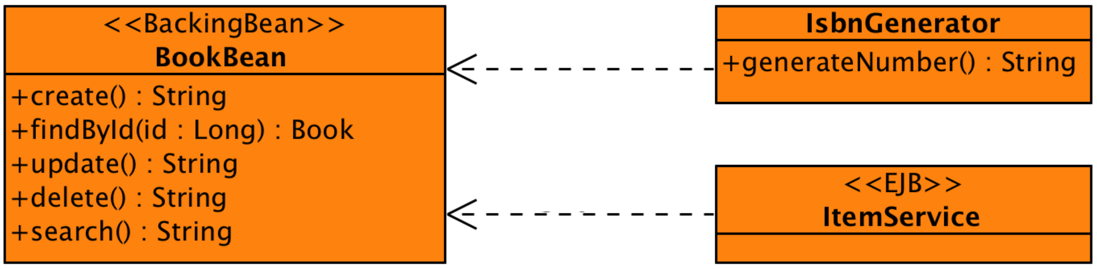
- Gets you start quickly
- Takes care of integration
- Plugin based

Demo: Creating a Web App



Dependency Injection

How Do I ?



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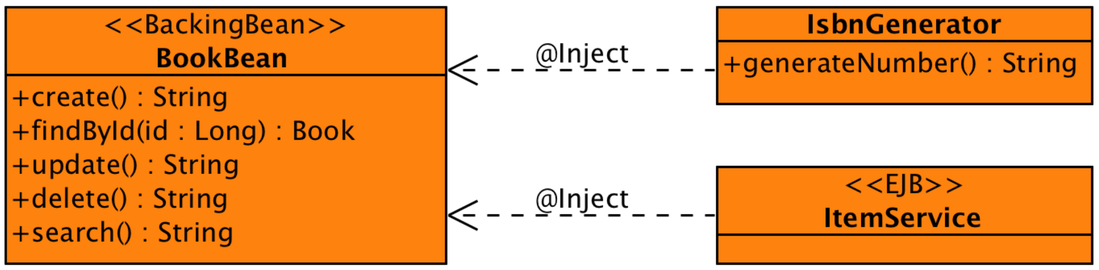

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@Inject on Attributes

```
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   private NumberGenerator numberGenerator;

   @Inject
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   // ...
}
```

@Inject on Constructor

```
public class BookBean implements Serializable {

   private NumberGenerator numberGenerator;
   private ItemService itemService;

   @Inject
   public BookBean(NumberGenerator numberGenerator,
                                   ItemService srv){
      this.numberGenerator = numberGenerator;
      this.itemService = srv;
   }

   // ...
}
```

@Inject on Setters

```
public class BookBean implements Serializable {

   private NumberGenerator numberGenerator;
   private ItemService itemService;

   @Inject
   public void setNumberGenerator(NumberGenerator numGen){
      this.numberGenerator = numGen;
   }

   @Inject
   public void setItemService(ItemService itemService) {
      this.itemService = itemService;
   }
   // ...
}
```

Activate CDI

- In CDI 1.0 `beans.xml` in archive
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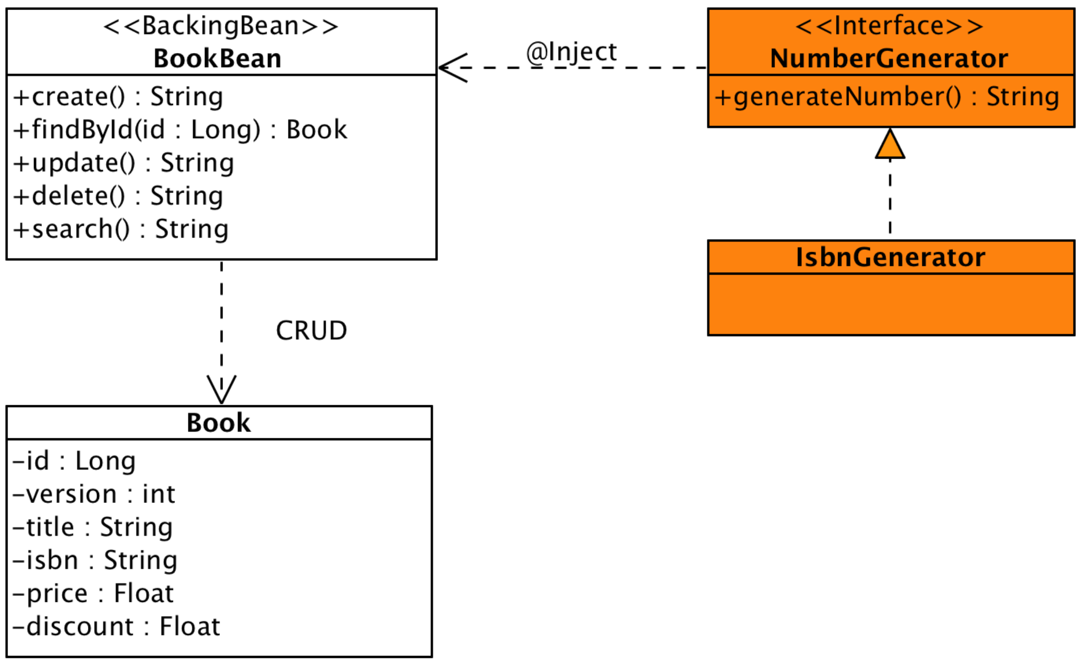
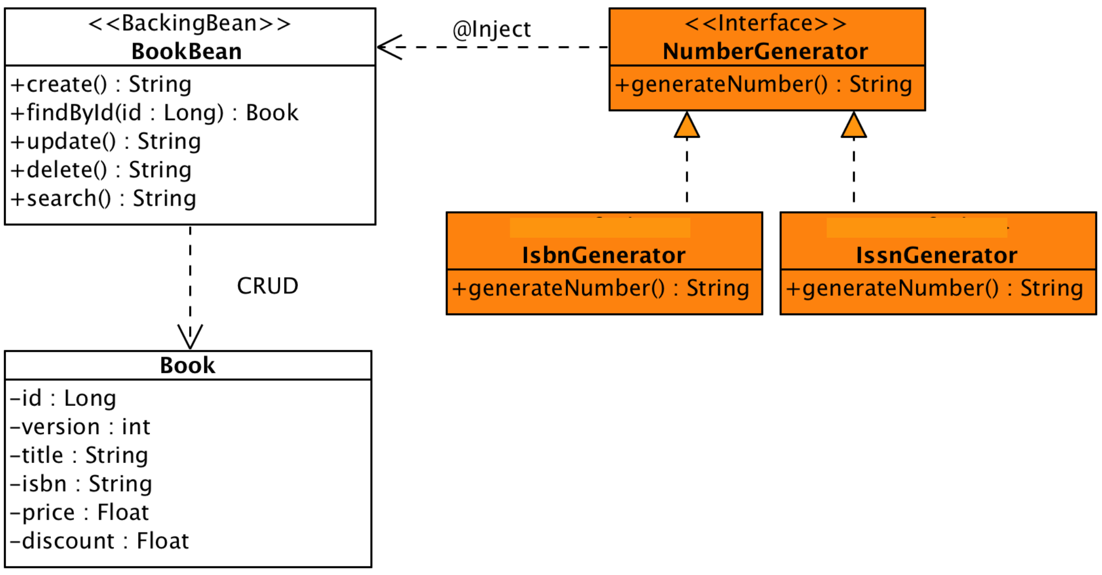
Demo
-
@Inject

Demo: @Inject One Implementation



Qualifiers

How Do I ?



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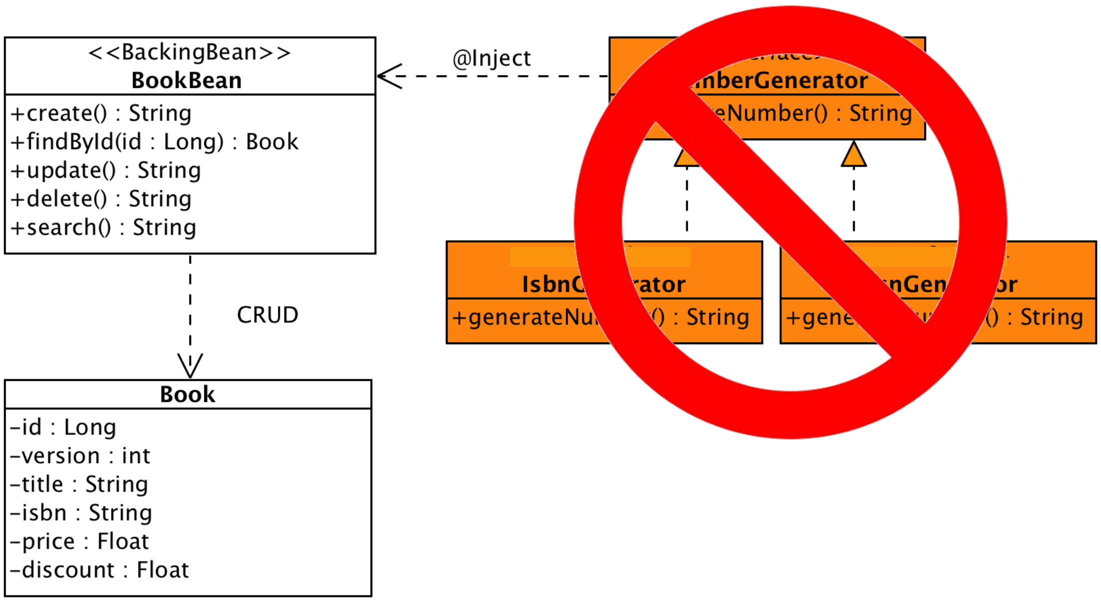
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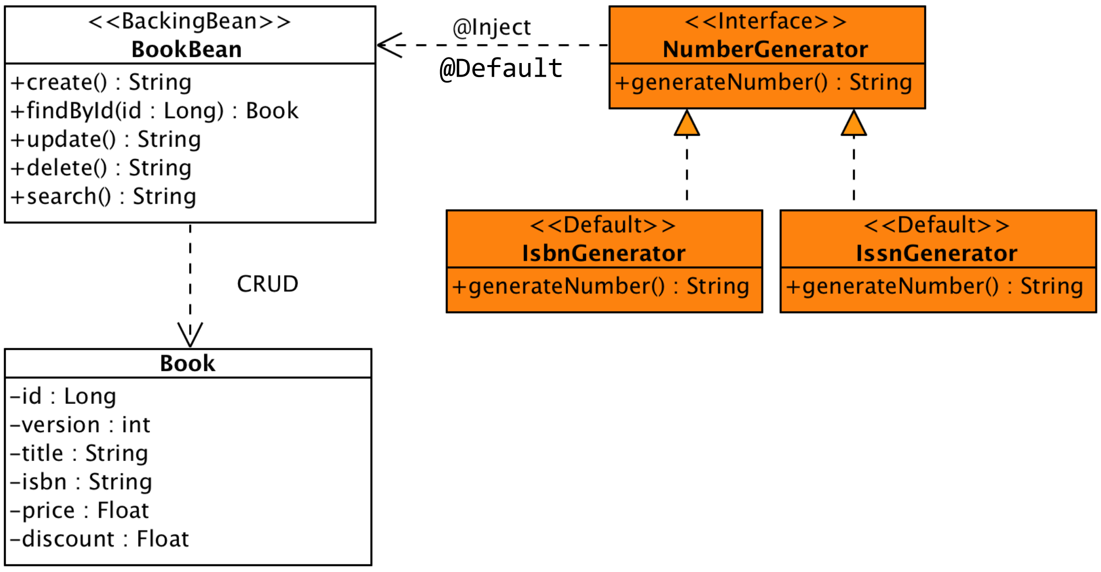
+update() : String
+delete() : String
+search() : String
CRUD
Book
-id : Long
-version : int
-title : String
-isbn : String
-price : Float
-discount : Float
nberGenerator
eNumber() : String
IsbnC rator
+generateNu () : String
nGen or
+gene () : String

How Do I ?



<<BackingBean>>
BookBean
+create() : String
+findById(id : Long) : Book
+update() : String
+delete() : String
+search() : String
@Inject
@Default
<<Interface>>
NumberGenerator
+generateNumber() : String
<<Default>>
IsbnGenerator
+generateNumber() : String
<<Default>>
IssnGenerator
+generateNumber() : String
CRUD
Book
-id : Long
-version : int
-title : String
-isbn : String
-price : Float
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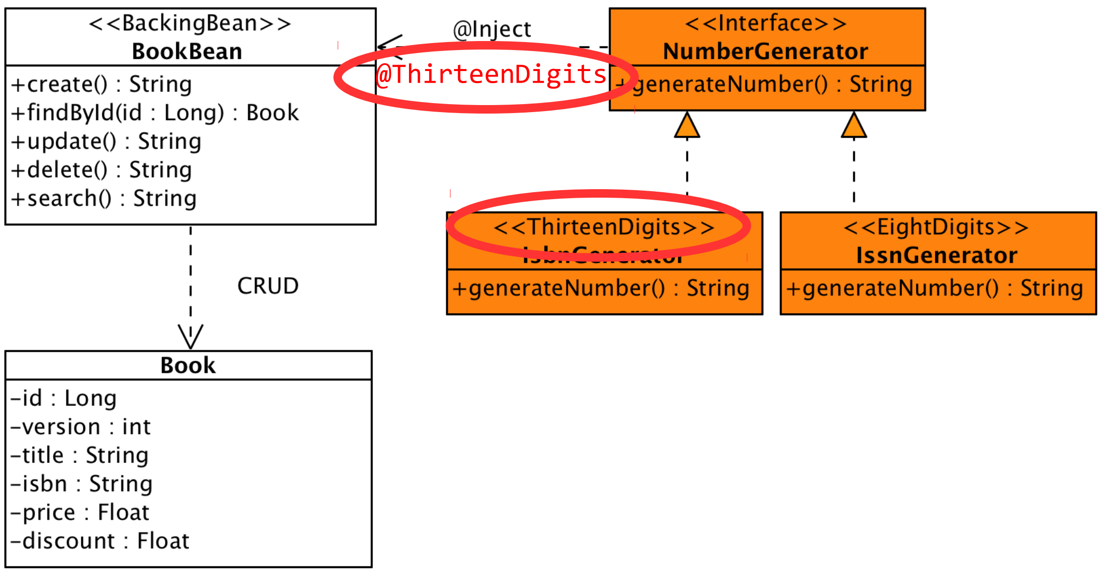
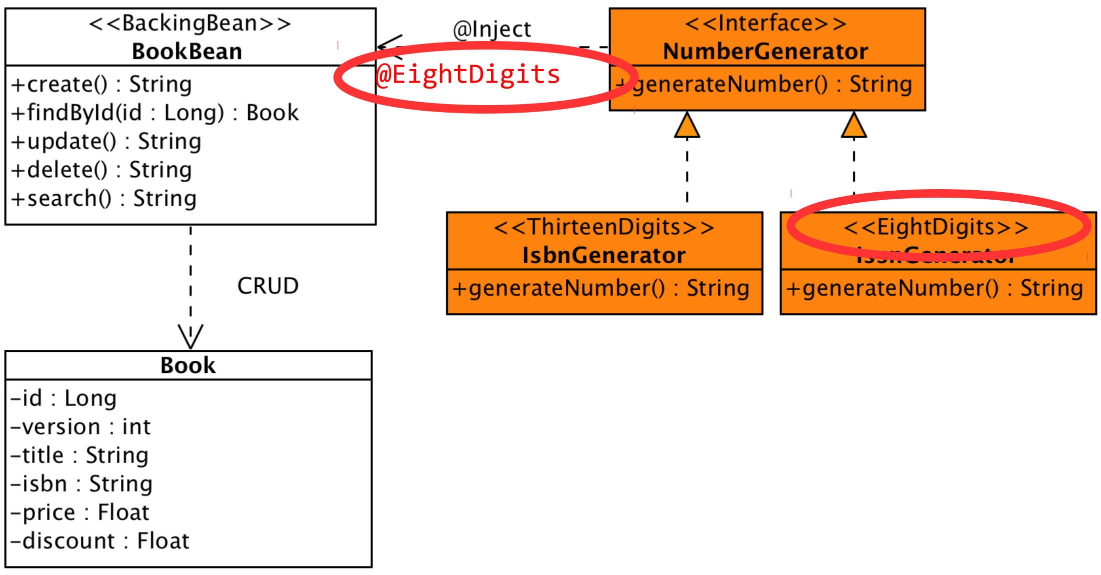
Use Qualifiers !



Use Qualifiers !



A Qualifier

```
@Qualifier
@Retention(RUNTIME)
@Target({ METHOD, FIELD, PARAMETER, TYPE })
@Documented
public @interface ThirteenDigits {
}
```

Qualifying an Injection Point

```
public class BookBean implements Serializable {

    @Inject @ThirteenDigits
    private NumberGenerator numberGenerator;

    @Inject
    private ItemService itemService;


    // ...
}
```

Qualifying an Injection Point

```
public class BookBean implements Serializable {

   @Inject @ThirteenDigits
   private NumberGenerator numberGenerator;

   @Inject @Default
   private ItemService itemService;


   // ...
}
```

Qualifying a Bean

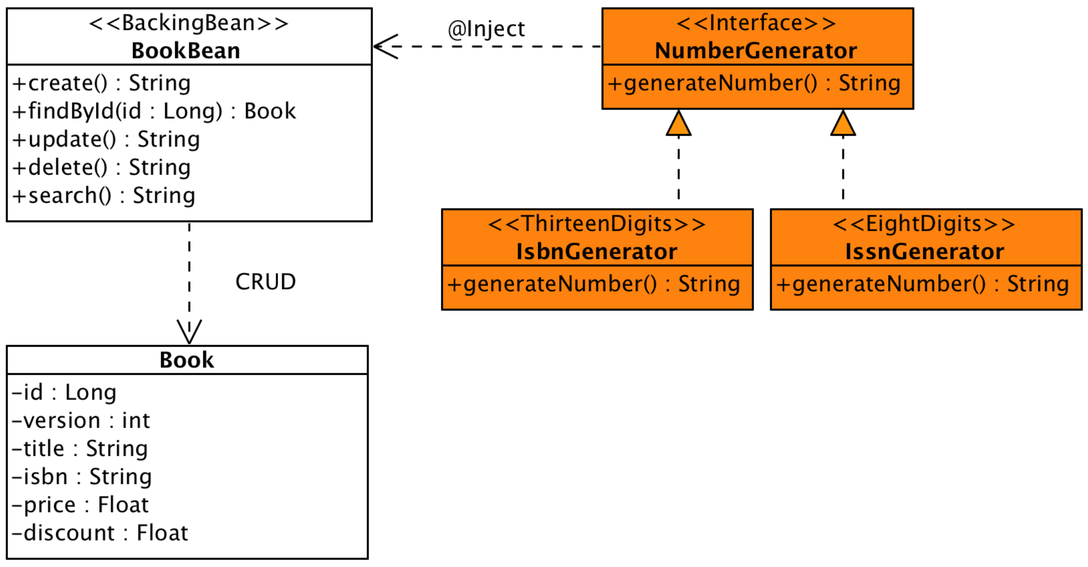
```
@ThirteenDigits
public class IsbnGenerator implements NumberGenerator {

  @Override
  public String generateNumber() {
    return "13-" + Math.abs(new Random().nextInt());
  }
}
```

Demo

-

Qualifiers

Demo: @Inject One Implementation



Producers

How Do I ?

```
public class BookBean implements Serializable {

    @Inject
    private EntityManager em;

    @Inject
    private Logger logger;


    // ...
}
```

How Do I ?

```
public class BookBean implements Serializable {

    @Inje
    priv        ityManager e

    @I    ct
    pr    te Logge    gger;


    // ..
}
```

How Do I ?

```
public class BookBean implements Serializable {

    @Inject
    private EntityManager em;

    @Inject
    private Logger logger;


    // ...
}
```

Several persistence units

```
@PersistenceContext(unitName = "myPU1")
@PersistenceContext(unitName = "myPU2")
```

How Do I ?

```
public class BookBean implements Serializable {

    @Inject
    private EntityManager em;

    @Inject
    private Logger logger;


    // ...
}
```

Third party framewok

Use Producers !

```
public class BookBean implements Serializable {

    @Inject
    private EntityManager em;

    // ...
}
```

```
public class ResourceProducer {

    @Produces
    @PersistenceContext(unitName = "myPU")
    private EntityManager entityManager;

}
```

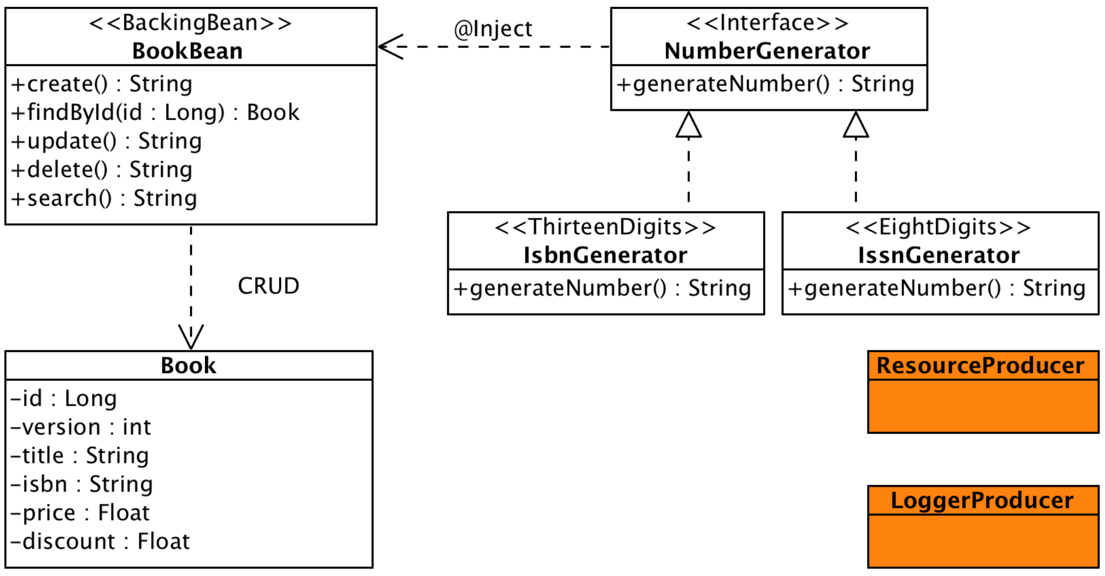
Use Producers !

```java
public class BookBean implements Serializable {

    @Inject
    private Logger logger;

    // ...
}
```

```java
public class ResourceProducer {

    @Produces
    private Logger produceLogger(InjectionPoint ip) {
     return
     Logger.getLogger(ip.getMember().getDeclaringClass().getName());
    }
}
```

Demo
-
Producers

Demo: Producers

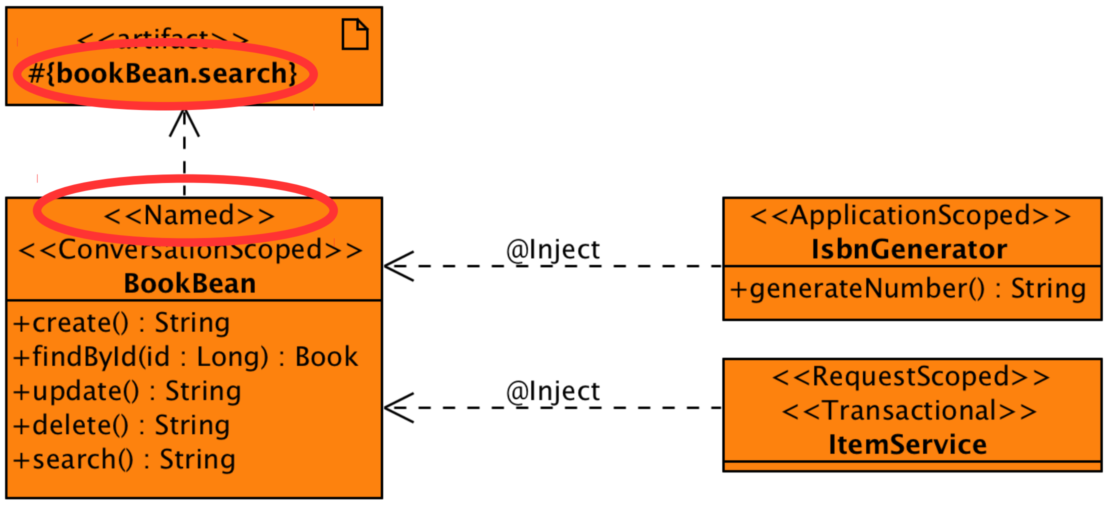


Web tier
&
Service tier

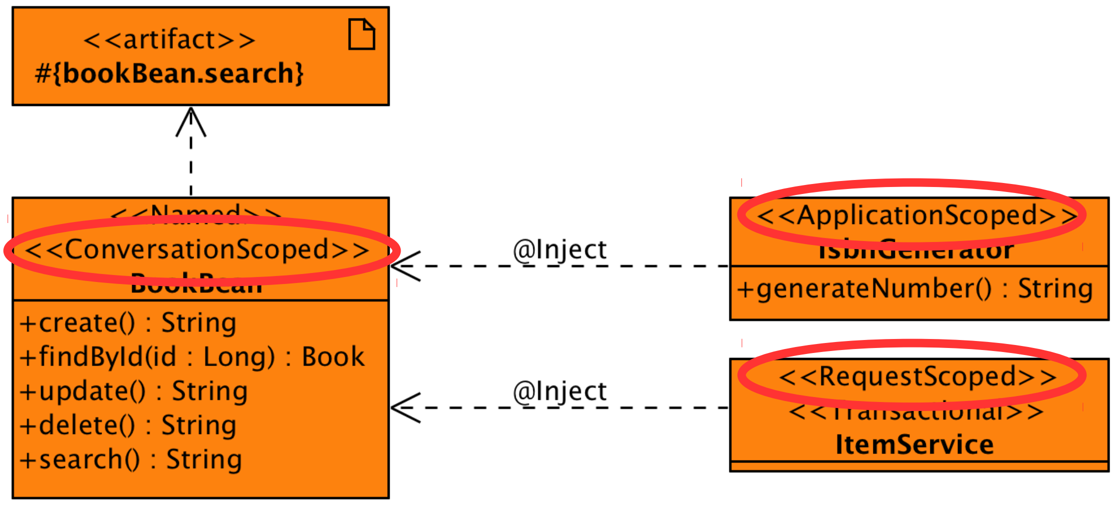
How Do I ?

How Do I ?

Use Expression Language...



Use Expression Language and Scopes !



Service Tier

```
@Transactional
public class BookBean implements Serializable {

   @Inject
   private EntityManager em;

   public void update() {
      em.persist(book);
   }
}
```

Service Tier + Web Tier

```
@Named

@Transactional
public class BookBean implements Serializable {

   @Inject
   private EntityManager em;

   public void update() {
      em.persist(book);
   }
}
```

```
<h:commandLink value="Create"
               action='#{bookBean.update}'/>
```

Service Tier + Web Tier

```
@Named("service")

@Transactional
public class BookBean implements Serializable {

    @Inject
    private EntityManager em;

    public void update() {
        em.persist(book);
    }
}
```

```
<h:commandLink value="Create"
               action='#{service.update}'/>
```

Several scopes

- `@Dependent` (default)
- `@ApplicationScoped, @SessionScoped, @RequestScoped`
- `@ConversationScoped`
- Create your own
  - `@TransactionalScoped`
  - `@ViewScoped`
  - `@ThreadScoped`
  - `@ClusterScoped`

Just choose the right scope

```
@Named
@RequestScoped
@Transactional
public class BookBean implements Serializable {




    public void update() {

    }

    public void delete() {

    }
}
```

Just choose the right scope

```
@Named
@SessionScoped
@Transactional
public class BookBean implements Serializable {




   public void update() {

   }

   public void delete() {

   }
}
```

Just choose the right scope

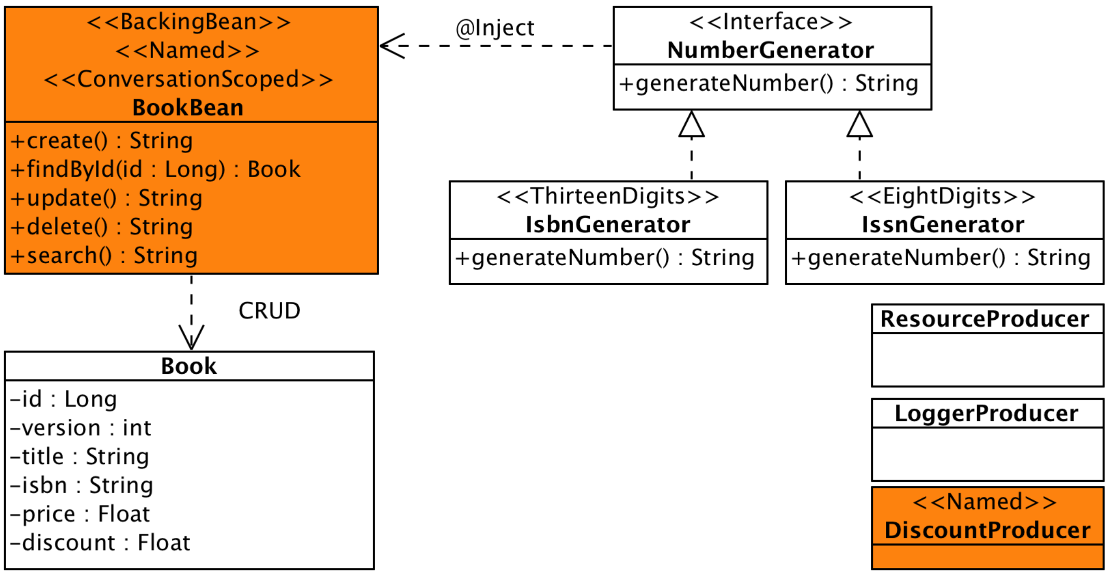
```
@Named
@ConversationScoped
@Transactional
public class BookBean implements Serializable {

   @Inject
   private Conversation conversation;

   public void update() {
      conversation.begin();
   }

   public void delete() {
      conversation.end();
   }
}
```

Demo

-

@Named & scope

Demo: @Named & Scope



Alternatives

How Do I ?

```
public class MockGenerator implements NumberGenerator  {

   public String generateNumber() {
      return "mock-" + Math.abs(new Random().nextInt());
   }
}
```

How Do I ?

```
@Mock
public class MockGenerator implements NumberGenerator  {

   public String generateNumber() {
      return "mock-" + Math.abs(new Random().nextInt());
   }
}
```

```
public class BookBean implements Serializable {

   @Inject @Mock
   private NumberGenerator numberGenerator;
   // ...
}
```

How Do I ?

```
@Mock
public class Mock                   ts NumberGenerator  {

   public Str       erateNumber() {
      retur   oc      Math.abs(new R    om().nextInt());
   }
}
```

```
pu    class BookBe     mpleme    Serializable {

   @     ct @Mock
   pri      NumberGenerat       mberGenerator;
   // ..
}
```

Use an Alternative !

```
@Alternative
@EightDigits
public class MockGenerator implements NumberGenerator  {

   public String generateNumber() {
      return "mock-" + Math.abs(new Random().nextInt());
   }
}
```

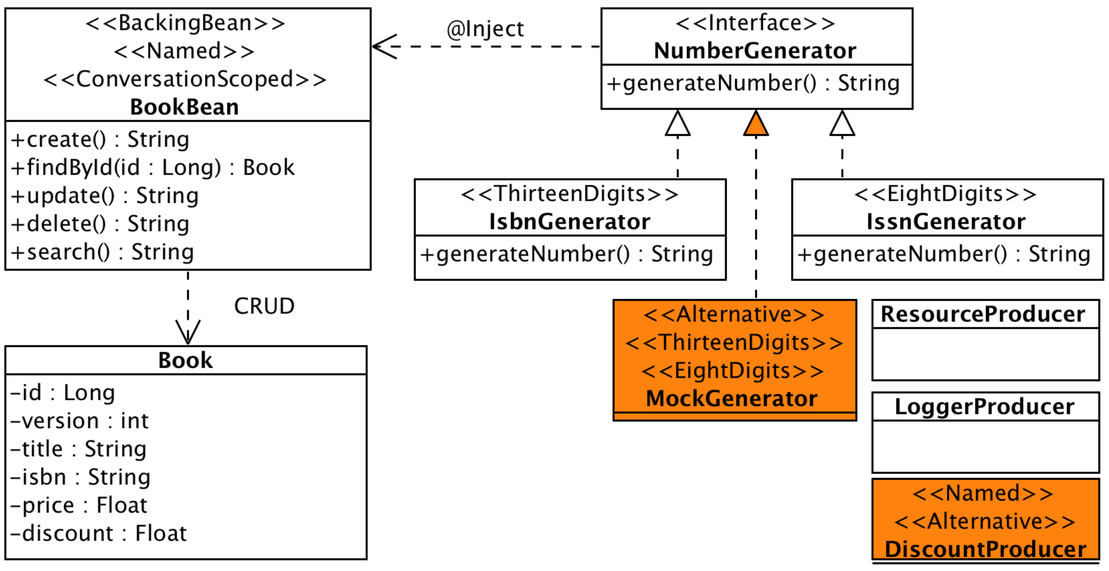
```
public class BookBean implements Serializable {

   @Inject @EightDigits
   private NumberGenerator numberGenerator;
   // ...
}
```

Activate the Alternative

```xml
<beans xmlns="http://xmlns.jcp.org/xml/ns/javaee"
       ...
       version="1.1" bean-discovery-mode="all">

  <alternatives>
    <class>com.foo.MockGenerator</class>
  </alternatives>
</beans>
```

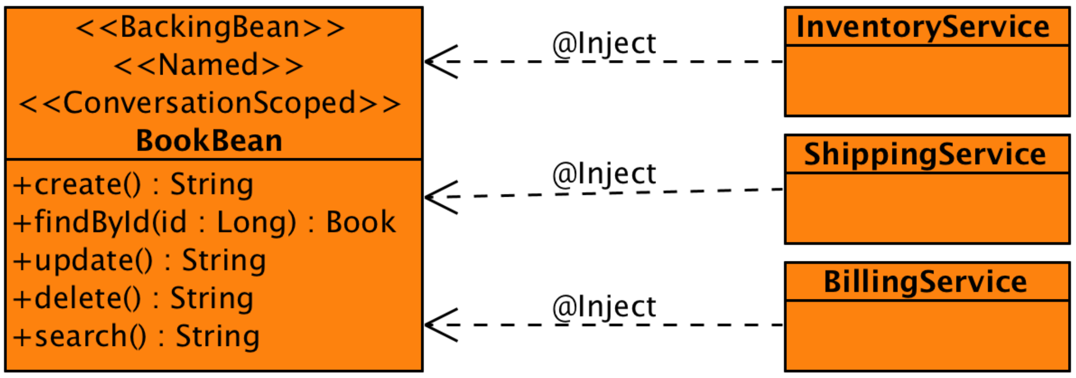
Demo
-
Alternatives

Demo: Alternatives



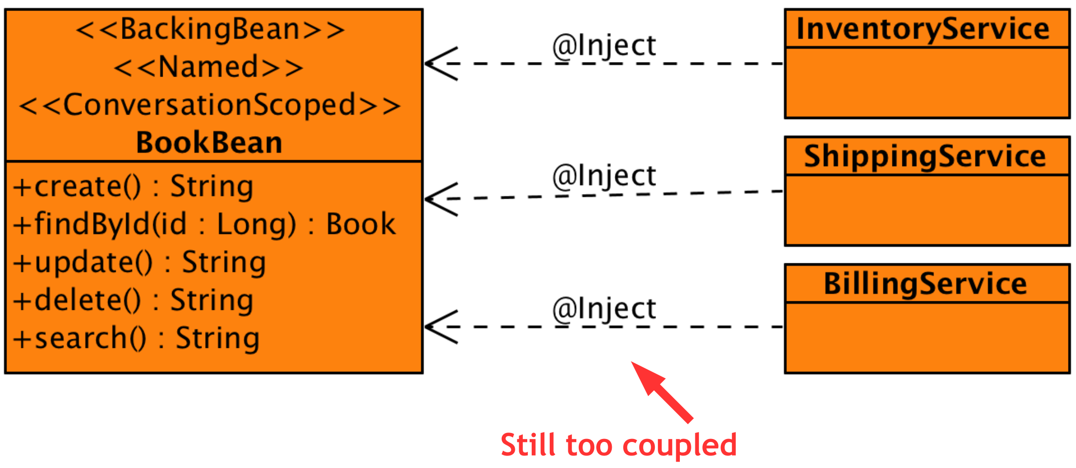
Events

How Do I ?



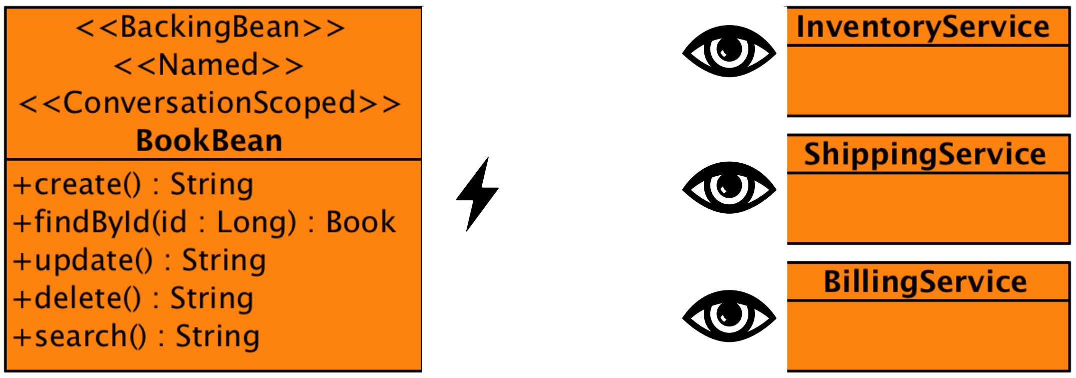
<<BackingBean>>
<<Named>>
<<ConversationScoped>>
BookBean
+create() : String
+findById(id : Long) : Book
+update() : String
+delete() : String
+search() : String
@Inject
@Inject
@Inject
InventoryService
ShippingService
BillingService

How Do I ?



<<BackingBean>>
<<Named>>
<<ConversationScoped>>
BookBean
+create() : String
+findById(id : Long) : Book
+update() : String
+delete() : String
+search() : String
@Inject
@Inject
@Inject
InventoryService
ShippingService
BillingService
Still too coupled

Use Events !



<<BackingBean>>
<<Named>>
<<ConversationScoped>>
BookBean
+create() : String
+findById(id : Long) : Book
+update() : String
+delete() : String
+search() : String
InventoryService
ShippingService
BillingService

Fire and Observe

```java
public class BookBean implements Serializable {

   @Inject
   private Event<Book> boughtEvent;

   public void update() {
      boughtEvent.fire(book);
   }
}
```

```java
public class InventoryService {

    private void observeBooks (@Observes        Book book) {
        logger.info("Book recevied " + book.getTitle());
    }
}
```

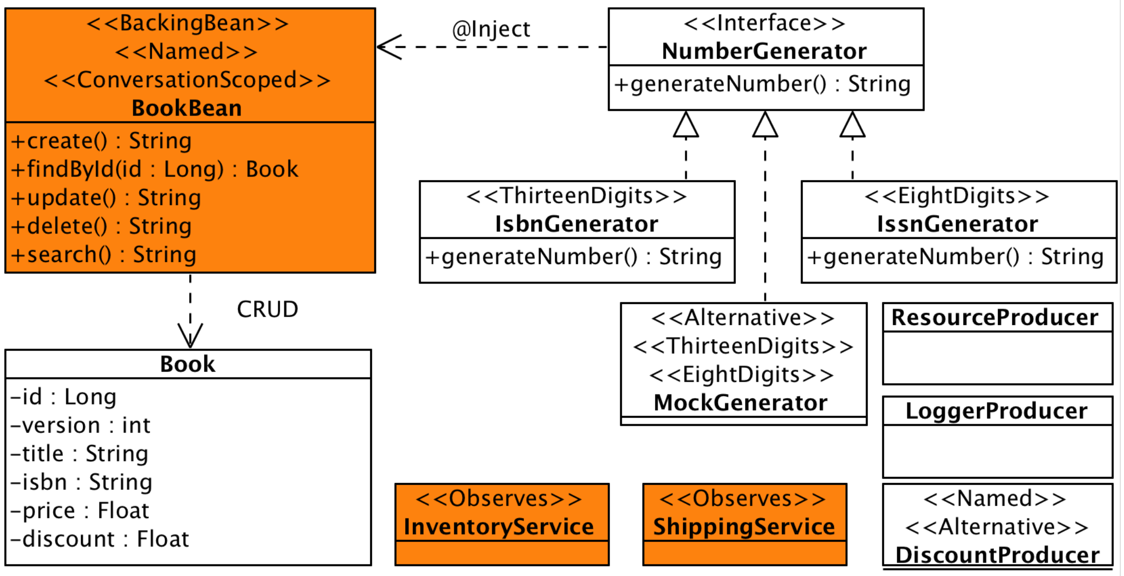
Fire and Observe with Qualifier

```java
public class BookBean implements Serializable {

   @Inject @Paper
   private Event<Book> boughtEvent;

   public void update() {
      boughtEvent.fire(book);
   }
}
```

```java
public class InventoryService {

    private void observeBooks (@Observes @Paper Book book) {
        logger.info("Book recevied " + book.getTitle());
    }
}
```

Demo
-
Events

Demo: Events



<<BackingBean>>
<<Named>>
<<ConversationScoped>>
BookBean
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+findById(id : Long) : Book
+update() : String
+delete() : String
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NumberGenerator
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<<ThirteenDigits>>
IsbnGenerator
+generateNumber() : String
<<EightDigits>>
IssnGenerator
+generateNumber() : String
CRUD
Book
-id : Long
-version : int
-title : String
-isbn : String
-price : Float
-discount : Float
<<Alternative>>
<<ThirteenDigits>>
<<EightDigits>>
MockGenerator
ResourceProducer
LoggerProducer
<<Observes>>
InventoryService
<<Observes>>
ShippingService
<<Named>>
<<Alternative>>
DiscountProducer

CDI : So Much More

CDI : So Much More

CDI Extension ecosystem

DELTASPIKE

CDI Course on PluralSight

pluralsight
hardcore developer training

http://www.pluralsight.com/courses/context-dependency-injection-1-1

Thanks

www.antoniogoncalves.org
antonio.goncalves@gmail.com
@agoncal
@devoxxfr
@lescastcodeurs

Q & A

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