

Hibernate Validator

JSR 303 Reference Implementation

Reference Guide

4.1.0.Final

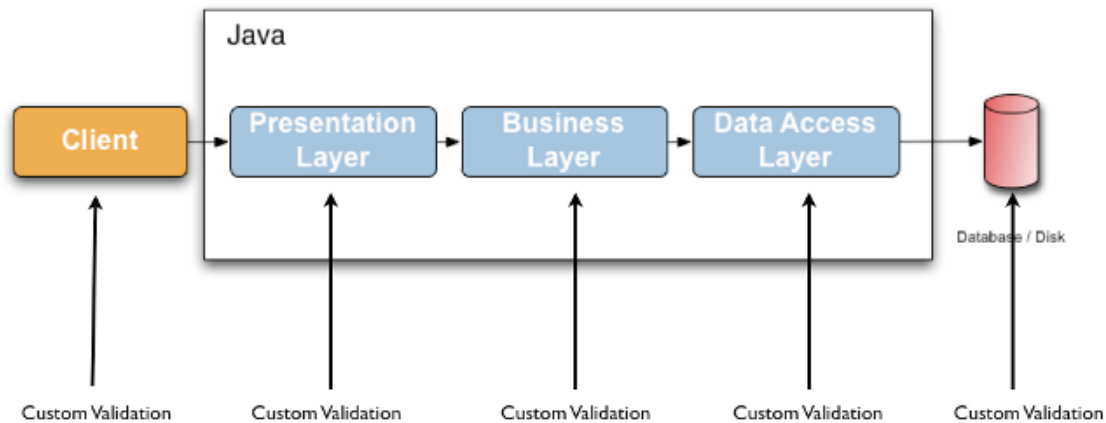
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Preface	v
1. Getting started	1
1.1. Setting up a new Maven project	2
1.2. Applying constraints	2
1.3. Validating constraints	3
1.4. Where to go next?	5
2. Validation step by step	7
2.1. Defining constraints	7
2.1.1. Field-level constraints	7
2.1.2. Property-level constraints	8
2.1.3. Class-level constraints	9
2.1.4. Constraint inheritance	10
2.1.5. Object graphs	11
2.2. Validating constraints	13
2.2.1. Obtaining a Validator instance	13
2.2.2. Validator methods	13
2.2.3. ConstraintViolation methods	15
2.2.4. Message interpolation	15
2.3. Validating groups	16
2.3.1. Group sequences	19
2.3.2. Redefining the default group sequence of a class	20
2.4. Built-in constraints	21
3. Creating custom constraints	29
3.1. Creating a simple constraint	29
3.1.1. The constraint annotation	29
3.1.2. The constraint validator	31
3.1.3. The error message	34
3.1.4. Using the constraint	34
3.2. Constraint composition	36
4. XML configuration	39
4.1. validation.xml	39
4.2. Mapping constraints	40
5. Bootstrapping	45
5.1. Configuration and ValidatorFactory	45
5.2. ValidationProviderResolver	46
5.3. MessageInterpolator	47
5.3.1. ResourceBundleLocator	47
5.4. TraversableResolver	48
5.5. ConstraintValidatorFactory	50
6. Integration with other frameworks	51
6.1. OSGi	51
6.2. Database schema-level validation	51
6.3. ORM integration	51
6.3.1. Hibernate event-based validation	51

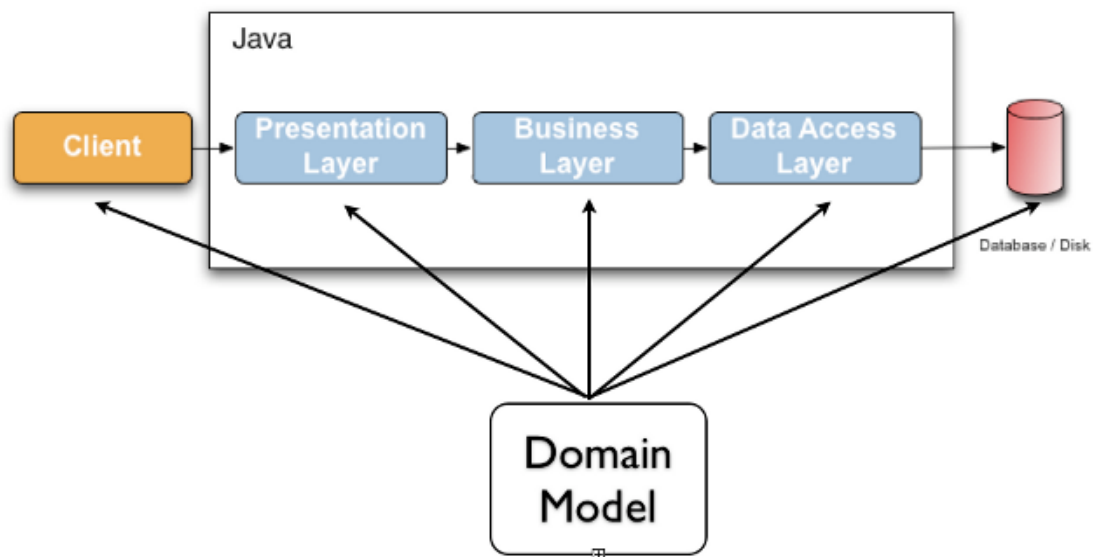
6.3.2. JPA	52
6.4. Presentation layer validation	53
7. Programmatic constraint definition	55
8. Annotation Processor (EXPERIMENTAL)	57
8.1. Prerequisites	57
8.2. Features	57
8.3. Options	58
8.4. Using the Annotation Processor	58
8.4.1. Command line builds	58
8.4.2. IDE builds	61
8.5. Known issues	63
9. Further reading	65

Preface

Validating data is a common task that occurs throughout any application, from the presentation layer to the persistence layer. Often the same validation logic is implemented in each layer, proving time consuming and error-prone. To avoid duplication of these validations in each layer, developers often bundle validation logic directly into the domain model, cluttering domain classes with validation code which is really metadata about the class itself.



JSR 303 - Bean Validation - defines a metadata model and API for entity validation. The default metadata source is annotations, with the ability to override and extend the meta-data through the use of XML. The API is not tied to a specific application tier or programming model. It is specifically not tied to either the web tier or the persistence tier, and is available for both server-side application programming, as well as rich client Swing application developers.



Hibernate Validator is the reference implementation of this JSR.

Getting started

This chapter will show you how to get started with Hibernate Validator, the reference implementation (RI) of Bean Validation. For the following quickstart you need:

- A JDK ≥ 5
- [Apache Maven](http://maven.apache.org/) [http://maven.apache.org/]
- An Internet connection (Maven has to download all required libraries)
- A properly configured remote repository. Add the following to your `settings.xml`:

Example 1.1. Configuring the JBoss Maven repository in `settings.xml`

```
<repositories>
  <repository>
    <id>jboss</id>
    <url>http://repository.jboss.com/maven2</url>
    <releases>
      <enabled>true</enabled>
    </releases>
    <snapshots>
      <enabled>false</enabled>
    </snapshots>
  </repository>
</repositories>
```

More information about `settings.xml` can be found in the [Maven Local Settings Model](http://maven.apache.org/ref/2.0.8/maven-settings/settings.html) [http://maven.apache.org/ref/2.0.8/maven-settings/settings.html].



Note

Hibernate Validator uses JAXB for XML parsing. JAXB is part of the Java Class Library since Java 6 which means that if you run Hibernate Validator with Java 5 you will have to add additional JAXB dependencies. Using maven you have to add the following dependencies:

```
<dependency>
  <groupId>javax.xml.bind</groupId>
  <artifactId>jaxb-api</artifactId>
  <version>2.2</version>
</dependency>
<dependency>
  <groupId>com.sun.xml.bind</groupId>
  <artifactId>jaxb-impl</artifactId>
  <version>2.1.12</version>
```

```
</dependency>
```

if you are using the SourceForge package you find the necessary libraries in the `lib/jdk5` directory. In case you are not using the XML configuration you can also disable it explicitly by calling `Configuration.ignoreXmlConfiguration()` during `ValidationFactory` creation. In this case the JAXB dependencies are not needed.

1.1. Setting up a new Maven project

Start by creating new Maven project using the Maven archetype plugin as follows:

Example 1.2. Using Maven's archetype plugin to create a sample project using Hibernate Validator

```
mvn archetype:create -DarchetypeGroupId=org.hibernate \
-DarchetypeArtifactId=hibernate-validator-quickstart-archetype \
-DarchetypeVersion=4.1.0.Final \
-DgroupId=com.mycompany \
-DartifactId=hv-quickstart
```

Maven will create your project in the directory `hv-quickstart`. Change into this directory and run:

```
mvn test
```

Maven will compile the example code and run the implemented unit tests. Let's have a look at the actual code.

1.2. Applying constraints

Open the project in the IDE of your choice and have a look at the class `Car`:

Example 1.3. Class `Car` annotated with constraints

```
package com.mycompany;

import javax.validation.constraints.Min;
import javax.validation.constraints.NotNull;
import javax.validation.constraints.Size;

public class Car {

    @NotNull
    private String manufacturer;
```



```

@NotNull
@Size(min = 2, max = 14)
private String licensePlate;

@Min(2)
private int seatCount;

public Car(String manufacturer, String licencePlate, int seatCount) {
    this.manufacturer = manufacturer;
    this.licensePlate = licencePlate;
    this.seatCount = seatCount;
}

//getters and setters ...
}

```

`@NotNull`, `@Size` and `@Min` are so-called constraint annotations, that we use to declare constraints, which shall be applied to the fields of a `Car` instance:

- manufacturer shall never be null
- licensePlate shall never be null and must be between 2 and 14 characters long
- seatCount shall be at least 2.

1.3. Validating constraints

To perform a validation of these constraints, we use a `Validator` instance. Let's have a look at the `CarTest` class:

Example 1.4. Class `CarTest` showing validation examples

```

package com.mycompany;

import static org.junit.Assert.*;

import java.util.Set;

import javax.validation.ConstraintViolation;
import javax.validation.Validation;
import javax.validation.Validator;
import javax.validation.ValidatorFactory;

import org.junit.BeforeClass;
import org.junit.Test;

public class CarTest {

    private static Validator validator;

    @BeforeClass
    public static void setUp() {
        ValidatorFactory factory = Validation.buildDefaultValidatorFactory();
        validator = factory.getValidator();
    }
}

```

```
}

@Test
public void manufacturerIsNull() {
    Car car = new Car(null, "DD-AB-123", 4);

    Set<ConstraintViolation<Car>> constraintViolations =
        validator.validate(car);

    assertEquals(1, constraintViolations.size());
    assertEquals("may not be null", constraintViolations.iterator().next().getMessage());
}

@Test
public void licensePlateTooShort() {
    Car car = new Car("Morris", "D", 4);

    Set<ConstraintViolation<Car>> constraintViolations =
        validator.validate(car);

    assertEquals(1, constraintViolations.size());
    assertEquals("size must be between 2 and 14", constraintViolations.iterator().next().getMessage());
}

@Test
public void seatCountTooLow() {
    Car car = new Car("Morris", "DD-AB-123", 1);

    Set<ConstraintViolation<Car>> constraintViolations =
        validator.validate(car);

    assertEquals(1, constraintViolations.size());
    assertEquals("must be greater than or equal to 2", constraintViolations.iterator().next().getMessage());
}

@Test
public void carIsValid() {
    Car car = new Car("Morris", "DD-AB-123", 2);

    Set<ConstraintViolation<Car>> constraintViolations =
        validator.validate(car);

    assertEquals(0, constraintViolations.size());
}
}
```

In the `setUp()` method we get a `Validator` instance from the `ValidatorFactory`. A `Validator` instance is thread-safe and may be reused multiple times. For this reason we store it as field of our test class. We can use the `Validator` now to validate the different car instances in the test methods.

The `validate()` method returns a set of `ConstraintViolation` instances, which we can iterate in order to see which validation errors occurred. The first three test methods show some expected constraint violations:

- The `@NotNull` constraint on `manufacturer` is violated in `manufacturerIsNull()`
- The `@Size` constraint on `licensePlate` is violated in `licensePlateTooShort()`
- The `@Min` constraint on `seatCount` is violated in `seatCountTooLow()`

If the object validates successfully, `validate()` returns an empty set.

Note that we only use classes from the package `javax.validation` from the Bean Validation API. As we don't reference any classes of the RI directly, it would be no problem to switch to another implementation of the API, should that need arise.

1.4. Where to go next?

That concludes our 5 minute tour through the world of Hibernate Validator. Continue exploring the code examples or look at further examples referenced in [Chapter 9, Further reading](#). To deepen your understanding of Hibernate Validator just continue reading [Chapter 2, Validation step by step](#). In case your application has specific validation requirements have a look at [Chapter 3, Creating custom constraints](#).

Validation step by step

In this chapter we will see in more detail how to use Hibernate Validator to validate constraints for a given entity model. We will also learn which default constraints the Bean Validation specification provides and which additional constraints are only provided by Hibernate Validator. Let's start with how to add constraints to an entity.

2.1. Defining constraints

Constraints in Bean Validation are expressed via Java annotations. In this section we show how to annotate an object model with these annotations. We have to differentiate between three different type of constraint annotations - field-, property-, and class-level annotations.



Note

Not all constraints can be placed on all of these levels. In fact, none of the default constraints defined by Bean Validation can be placed at class level. The `java.lang.annotation.Target` annotation in the constraint annotation itself determines on which elements a constraint can be placed. See [Chapter 3, Creating custom constraints](#) for more information.

2.1.1. Field-level constraints

Constraints can be expressed by annotating a field of a class. [Example 2.1, “Field level constraint”](#) shows a field level configuration example:

Example 2.1. Field level constraint

```
package com.mycompany;

import javax.validation.constraints.NotNull;

public class Car {

    @NotNull
    private String manufacturer;

    @AssertTrue
    private boolean isRegistered;

    public Car(String manufacturer, boolean isRegistered) {
        super();
        this.manufacturer = manufacturer;
        this.isRegistered = isRegistered;
    }
}
```

When using field level constraints field access strategy is used to access the value to be validated. This means the bean validation provider directly accesses the instance variable and does not invoke the property accessor method also if such a method exists.



Note

The access type (private, protected or public) does not matter.



Note

Static fields and properties cannot be validated.

2.1.2. Property-level constraints

If your model class adheres to the [JavaBeans](http://java.sun.com/javase/technologies/desktop/javabeans/index.jsp) [http://java.sun.com/javase/technologies/desktop/javabeans/index.jsp] standard, it is also possible to annotate the properties of a bean class instead of its fields. [Example 2.2, “Property level constraint”](#) uses the same entity as in [Example 2.1, “Field level constraint”](#), however, property level constraints are used.



Note

The property's getter method has to be annotated, not its setter.

Example 2.2. Property level constraint

```
package com.mycompany;

import javax.validation.constraints.AssertTrue;
import javax.validation.constraints.NotNull;

public class Car {

    private String manufacturer;

    private boolean isRegistered;

    public Car(String manufacturer, boolean isRegistered) {
        super();
        this.manufacturer = manufacturer;
        this.isRegistered = isRegistered;
    }

    @NotNull
    public String getManufacturer() {
        return manufacturer;
    }
}
```

```

public void setManufacturer(String manufacturer) {
    this.manufacturer = manufacturer;
}

@AssertTrue
public boolean isRegistered() {
    return isRegistered;
}

public void setRegistered(boolean isRegistered) {
    this.isRegistered = isRegistered;
}
}

```

When using property level constraints property access strategy is used to access the value to be validated. This means the bean validation provider accesses the state via the property accessor method.



Tip

It is recommended to stick either to field *or* property annotation within one class. It is not recommended to annotate a field *and* the accompanying getter method as this would cause the field to be validated twice.

2.1.3. Class-level constraints

Last but not least, a constraint can also be placed on class level. When a constraint annotation is placed on this level the class instance itself is passed to the `ConstraintValidator`. Class level constraints are useful if it is necessary to inspect more than a single property of the class to validate it or if a correlation between different state variables has to be evaluated. In [Example 2.3, “Class level constraint”](#) we add the property passengers to the class `Car`. We also add the constraint `PassengerCount` on the class level. We will later see how we can actually create this custom constraint (see [Chapter 3, Creating custom constraints](#)). For now it is enough to know that `PassengerCount` will ensure that there cannot be more passengers in a car than there are seats.

Example 2.3. Class level constraint

```

package com.mycompany;

import javax.validation.constraints.Min;
import javax.validation.constraints.NotNull;
import javax.validation.constraints.Size;

@PassengerCount
public class Car {

    @NotNull
    private String manufacturer;
}

```

```
@NotNull
@Size(min = 2, max = 14)
private String licensePlate;

@Min(2)
private int seatCount;

private List<Person> passengers;

public Car(String manufacturer, String licencePlate, int seatCount) {
    this.manufacturer = manufacturer;
    this.licensePlate = licencePlate;
    this.seatCount = seatCount;
}

//getters and setters ...
}
```

2.1.4. Constraint inheritance

When validating an object that implements an interface or extends another class, all constraint annotations on the implemented interface and parent class apply in the same manner as the constraints specified on the validated object itself. To make things clearer let's have a look at the following example:

Example 2.4. Constraint inheritance using RentalCar

```
package com.mycompany;

import javax.validation.constraints.NotNull;

public class RentalCar extends Car {

    private String rentalStation;

    public RentalCar(String manufacturer, String rentalStation) {
        super(manufacturer);
        this.rentalStation = rentalStation;
    }

    @NotNull
    public String getRentalStation() {
        return rentalStation;
    }

    public void setRentalStation(String rentalStation) {
        this.rentalStation = rentalStation;
    }
}
```


Our well-known class `Car` is now extended by `RentalCar` with the additional property `rentalStation`. If an instance of `RentalCar` is validated, not only the `@NotNull` constraint on `rentalStation` is validated, but also the constraint on `manufacturer` from the parent class.

The same would hold true, if `Car` were an interface implemented by `RentalCar`.

Constraint annotations are aggregated if methods are overridden. If `RentalCar` would override the `getManufacturer()` method from `Car` any constraints annotated at the overriding method would be evaluated in addition to the `@NotNull` constraint from the super-class.

2.1.5. Object graphs

The Bean Validation API does not only allow to validate single class instances but also complete object graphs. To do so, just annotate a field or property representing a reference to another object with `@Valid`. If the parent object is validated, all referenced objects annotated with `@Valid` will be validated as well (as will be their children etc.). See [Example 2.6, “Adding a driver to the car”](#).

Example 2.5. Class Person

```
package com.mycompany;

import javax.validation.constraints.NotNull;

public class Person {

    @NotNull
    private String name;

    public Person(String name) {
        super();
        this.name = name;
    }

    public String getName() {
        return name;
    }

    public void setName(String name) {
        this.name = name;
    }
}
```

Example 2.6. Adding a driver to the car

```
package com.mycompany;

import javax.validation.Valid;
import javax.validation.constraints.NotNull;

public class Car {
```

```
@NotNull
@Valid
private Person driver;

public Car(Person driver) {
    this.driver = driver;
}

//getters and setters ...
}
```

If an instance of `Car` is validated, the referenced `Person` object will be validated as well, as the `driver` field is annotated with `@Valid`. Therefore the validation of a `Car` will fail if the `name` field of the referenced `Person` instance is `null`.

Object graph validation also works for collection-typed fields. That means any attributes that

- are arrays
- implement `java.lang.Iterable` (especially `Collection`, `List` and `Set`)
- implement `java.util.Map`

can be annotated with `@Valid`, which will cause each contained element to be validated, when the parent object is validated.

Example 2.7. Car with a list of passengers

```
package com.mycompany;

import java.util.ArrayList;
import java.util.List;

import javax.validation.Valid;
import javax.validation.constraints.NotNull;

public class Car {

    @NotNull
    @Valid
    private List<Person> passengers = new ArrayList<Person>();

    public Car(List<Person> passengers) {
        this.passengers = passengers;
    }

    //getters and setters ...
}
```

If a `Car` instance is validated, a `ConstraintValidation` will be created, if any of the `Person` objects contained in the `passengers` list has a `null` name.

**Note**

null values are getting ignored when validating object graphs.

2.2. Validating constraints

The `Validator` interface is the main entry point to Bean Validation. In [Section 5.1, “Configuration and ValidatorFactory”](#) we will first show how to obtain an `Validator` instance. Afterwards we will learn how to use the different methods of the `Validator` interface.

2.2.1. Obtaining a `Validator` instance

The first step towards validating an entity instance is to get hold of a `Validator` instance. The road to this instance leads via the `Validation` class and a `ValidatorFactory`. The easiest way is to use the static `Validation.buildDefaultValidatorFactory()` method:

Example 2.8. `Validation.buildDefaultValidatorFactory()`

```
ValidatorFactory factory = Validation.buildDefaultValidatorFactory();
Validator validator = factory.getValidator();
```

For other ways of obtaining a `Validator` instance see [Chapter 5, Bootstrapping](#). For now we just want to see how we can use the `Validator` instance to validate entity instances.

2.2.2. Validator methods

The `Validator` interface contains three methods that can be used to either validate entire entities or just a single properties of the entity.

All three methods return a `Set<ConstraintViolation>`. The set is empty, if the validation succeeds. Otherwise a `ConstraintViolation` instance is added for each violated constraint.

All the validation methods have a var-args parameter which can be used to specify, which validation groups shall be considered when performing the validation. If the parameter is not specified the default validation group (`javax.validation.groups.Default`) will be used. We will go into more detail on the topic of validation groups in [Section 2.3, “Validating groups”](#)

2.2.2.1. `validate`

Use the `validate()` method to perform validation of all constraints of a given entity instance (see [Example 2.9, “Usage of `Validator.validate\(\)`”](#)).

Example 2.9. Usage of `validator.validate()`

```
ValidatorFactory factory = Validation.buildDefaultValidatorFactory();
```

```
Validator validator = factory.getValidator();

Car car = new Car(null);

Set<ConstraintViolation<Car>> constraintViolations = validator.validate(car);

assertEquals(1, constraintViolations.size());
assertEquals("may not be null", constraintViolations.iterator().next().getMessage());
```

2.2.2.2. validateProperty

With help of the `validateProperty()` a single named property of a given object can be validated. The property name is the JavaBeans property name.

Example 2.10. Usage of `validator.validateProperty()`

```
Validator validator = Validation.buildDefaultValidatorFactory().getValidator();

Car car = new Car(null);

Set<ConstraintViolation<Car>> constraintViolations = validator.validateProperty(car, "manufacturer");

assertEquals(1, constraintViolations.size());
assertEquals("may not be null", constraintViolations.iterator().next().getMessage());
```

`Validator.validateProperty` is for example used in the integration of Bean Validation into JSF 2 (see [Section 6.4, "Presentation layer validation"](#)).

2.2.2.3. validateValue

Using the `validateValue()` method you can check, whether a single property of a given class can be validated successfully, if the property had the specified value:

Example 2.11. Usage of `validator.validateValue()`

```
Validator validator = Validation.buildDefaultValidatorFactory().getValidator();

Set<ConstraintViolation<Car>> constraintViolations = validator.validateValue(Car.class, "manufacturer", null);

assertEquals(1, constraintViolations.size());
assertEquals("may not be null", constraintViolations.iterator().next().getMessage());
```



Note

`@Valid` is not honored by `validateProperty()` or `validateValue()`.

2.2.3. ConstraintViolation methods

Now it is time to have a closer look at what a `ConstraintViolation`. Using the different methods of `ConstraintViolation` a lot of useful information about the cause of the validation failure can be determined. [Table 2.1, “The various `ConstraintViolation` methods”](#) gives an overview of these methods:

Table 2.1. The various `ConstraintViolation` methods

Method	Usage	Example (referring to Example 2.9, “Usage of <code>Validator.validate()</code>”)
<code>getMessage()</code>	The interpolated error message.	may not be null
<code>getMessageTemplate()</code>	The non-interpolated error message.	<code>{javax.validation.constraints.NotNull.message}</code>
<code>getRootBean()</code>	The root bean being validated.	car
<code>getRootBeanClass()</code>	The class of the root bean being validated.	<code>Car.class</code>
<code>getLeafBean()</code>	If a bean constraint, the bean instance the constraint is applied on. If a property constraint, the bean instance hosting the property the constraint is applied on.	car
<code>getPropertyPath()</code>	The property path to the value from root bean.	
<code>getInvalidValue()</code>	The value failing to pass the constraint.	passengers
<code>getConstraintDescriptor()</code>	Constraint metadata reported to fail.	

2.2.4. Message interpolation

As we will see in [Chapter 3, *Creating custom constraints*](#) each constraint definition must define a default message descriptor. This message can be overridden at declaration time using the `message` attribute of the constraint. You can see this in [Example 2.13, “Driver”](#). This message descriptors get interpolated when a constraint validation fails using the configured `MessageInterpolator`. The interpolator will try to resolve any message parameters, meaning string literals enclosed in braces. In order to resolve these parameters Hibernate Validator's default `MessageInterpolator` first recursively resolves parameters against a custom `ResourceBundle` called `ValidationMessages.properties` at the root of the classpath (It is up to you to create this file). If no further replacements are possible against the custom bundle the default

`ResourceBundle` under `/org/hibernate/validator/ValidationMessages.properties` gets evaluated. If a replacement occurs against the default bundle the algorithm looks again at the custom bundle (and so on). Once no further replacements against these two resource bundles are possible remaining parameters are getting resolved against the attributes of the constraint to be validated.

Since the braces `{` and `}` have special meaning in the messages they need to be escaped if they are used literally. The following rules apply:

- `\{` is considered as the literal `{`
- `\}` is considered as the literal `}`
- `\\` is considered as the literal `\`

If the default message interpolator does not fit your requirements it is possible to plug a custom `MessageInterpolator` when the `ValidatorFactory` gets created. This can be seen in [Chapter 5, Bootstrapping](#).

2.3. Validating groups

Groups allow you to restrict the set of constraints applied during validation. This makes for example wizard like validation possible where in each step only a specified subset of constraints get validated. The groups targeted are passed as var-args parameters to `validate`, `validateProperty` and `validateValue`. Let's have a look at an extended `Car` with `Driver` example. First we have the class `Person` ([Example 2.12, "Person"](#)) which has a `@NotNull` constraint on `name`. Since no group is specified for this annotation its default group is `javax.validation.groups.Default`.



Note

When more than one group is requested, the order in which the groups are evaluated is not deterministic. If no group is specified the default group `javax.validation.groups.Default` is assumed.

Example 2.12. Person

```
public class Person {
    @NotNull
    private String name;

    public Person(String name) {
        this.name = name;
    }
}
```

```
// getters and setters ...
}
```

Next we have the class `Driver` ([Example 2.13, “Driver”](#)) extending `Person`. Here we are adding the properties `age` and `hasDrivingLicense`. In order to drive you must be at least 18 (`@Min(18)`) and you must have a driving license (`@AssertTrue`). Both constraints defined on these properties belong to the group `DriverChecks`. As you can see in [Example 2.14, “Group interfaces”](#) the group `DriverChecks` is just a simple tagging interface. Using interfaces makes the usage of groups type safe and allows for easy refactoring. It also means that groups can inherit from each other via class inheritance.



Note

The Bean Validation specification does not enforce that groups have to be interfaces. Non interface classes could be used as well, but we recommend to stick to interfaces.

Example 2.13. Driver

```
public class Driver extends Person {
    @Min(value = 18, message = "You have to be 18 to drive a car", groups = DriverChecks.class)
    public int age;

    @AssertTrue(message = "You first have to pass the driving test", groups = DriverChecks.class)
    public boolean hasDrivingLicense;

    public Driver(String name) {
        super( name );
    }

    public void passedDrivingTest(boolean b) {
        hasDrivingLicense = b;
    }

    public int getAge() {
        return age;
    }

    public void setAge(int age) {
        this.age = age;
    }
}
```

Example 2.14. Group interfaces

```
public interface DriverChecks {
}
```

```
public interface CarChecks {  
}
```

Last but not least we add the property `passedVehicleInspection` to the `Car` class ([Example 2.15, “Car”](#)) indicating whether a car passed the road worthy tests.

Example 2.15. Car

```
public class Car {  
    @NotNull  
    private String manufacturer;  
  
    @NotNull  
    @Size(min = 2, max = 14)  
    private String licensePlate;  
  
    @Min(2)  
    private int seatCount;  
  
    @AssertTrue(message = "The car has to pass the vehicle inspection  
first", groups = CarChecks.class)  
    private boolean passedVehicleInspection;  
  
    @Valid  
    private Driver driver;  
  
    public Car(String manufacturer, String licencePlate, int seatCount) {  
        this.manufacturer = manufacturer;  
        this.licensePlate = licencePlate;  
        this.seatCount = seatCount;  
    }  
}
```

Overall three different groups are used in our example. `Person.name`, `Car.manufacturer`, `Car.licensePlate` and `Car.seatCount` all belong to the `Default` group. `Driver.age` and `Driver.hasDrivingLicense` belong to `DriverChecks` and last but not least `Car.passedVehicleInspection` belongs to the group `CarChecks`. [Example 2.16, “Drive away”](#) shows how passing different group combinations to the `Validator.validate` method result in different validation results.

Example 2.16. Drive away

```
public class GroupTest {  
  
    private static Validator validator;  
  
    @BeforeClass  
    public static void setUp() {  
        ValidatorFactory factory = Validation.buildDefaultValidatorFactory();  
        validator = factory.getValidator();  
    }  
}
```



```

@Test
public void driveAway() {
    // create a car and check that everything is ok with it.
    Car car = new Car( "Morris", "DD-AB-123", 2 );
    Set<ConstraintViolation<Car>> constraintViolations = validator.validate( car );
    assertEquals( 0, constraintViolations.size() );

    // but has it passed the vehicle inspection?
    constraintViolations = validator.validate( car, CarChecks.class );
    assertEquals( 1, constraintViolations.size() );
    assertEquals( "The car has to pass the vehicle inspection first", constraintViolations.iterator().next().getMessage() );

    // let's go to the vehicle inspection
    car.setPassedVehicleInspection( true );
    assertEquals( 0, validator.validate( car ).size() );

    // now let's add a driver. He is 18, but has not passed the driving test yet
    Driver john = new Driver( "John Doe" );
    john.setAge( 18 );
    car.setDriver( john );
    constraintViolations = validator.validate( car, DriverChecks.class );
    assertEquals( 1, constraintViolations.size() );
    assertEquals( "You first have to pass the driving test", constraintViolations.iterator().next().getMessage() );

    // ok, John passes the test
    john.passedDrivingTest( true );
    assertEquals( 0, validator.validate( car, DriverChecks.class ).size() );

    // just checking that everything is in order now
    assertEquals( 0, validator.validate( car, Default.class, CarChecks.class, DriverChecks.class ).size() );
}
}

```

First we create a car and validate it using no explicit group. There are no validation errors, even though the property `passedVehicleInspection` is per default `false`. However, the constraint defined on this property does not belong to the default group. Next we just validate the `CarChecks` group which will fail until we make sure that the car passes the vehicle inspection. When we then add a driver to the car and validate against `DriverChecks` we get again a constraint violation due to the fact that the driver has not yet passed the driving test. Only after setting `passedDrivingTest` to true the validation against `DriverChecks` will pass.

Last but not least, we show that all constraints are passing by validating against all defined groups.

2.3.1. Group sequences

By default, constraints are evaluated in no particular order and this regardless of which groups they belong to. In some situations, however, it is useful to control the order of the constraints evaluation. In our example from [Section 2.3, “Validating groups”](#) we could for example require that first all default car constraints are passing before we check the road worthiness of the car. Finally before we drive away we check the actual driver constraints. In order to implement such an

order one would define a new interface and annotate it with `@GroupSequence` defining the order in which the groups have to be validated.



Note

If at least one constraints fails in a sequenced group none of the constraints of the following groups in the sequence get validated.

Example 2.17. Interface with `@GroupSequence`

```
@GroupSequence({Default.class, CarChecks.class, DriverChecks.class})
public interface OrderedChecks {
}
```



Warning

Groups defining a sequence and groups composing a sequence must not be involved in a cyclic dependency either directly or indirectly, either through cascaded sequence definition or group inheritance. If a group containing such a circularity is evaluated, a `GroupDefinitionException` is raised.

The usage of the new sequence could then look like in [Example 2.18, “Usage of a group sequence”](#).

Example 2.18. Usage of a group sequence

```
@Test
public void testOrderedChecks() {
    Car car = new Car( "Morris", "DD-AB-123", 2 );
    car.setPassedVehicleInspection( true );

    Driver john = new Driver( "John Doe" );
    john.setAge( 18 );
    john.passedDrivingTest( true );
    car.setDriver( john );

    assertEquals( 0, validator.validate( car, OrderedChecks.class ).size() );
}
```

2.3.2. Redefining the default group sequence of a class

The `@GroupSequence` annotation also fulfills a second purpose. It allows you to redefine what the Default group means for a given class. To redefine `Default` for a class, place a `@GroupSequence`

annotation on the class. The defined groups in the annotation express the sequence of groups that substitute `Default` for this class. [Example 2.19, “RentalCar”](#) introduces a new class `RentalCar` with a redefined default group. With this definition the check for all three groups can be rewritten as seen in [Example 2.20, “testOrderedChecksWithRedefinedDefault”](#).

Example 2.19. RentalCar

```
@GroupSequence({ RentalCar.class, CarChecks.class })
public class RentalCar extends Car {
    public RentalCar(String manufacturer, String licencePlate, int seatCount) {
        super( manufacturer, licencePlate, seatCount );
    }
}
```

Example 2.20. testOrderedChecksWithRedefinedDefault

```
@Test
public void testOrderedChecksWithRedefinedDefault() {
    RentalCar rentalCar = new RentalCar( "Morris", "DD-AB-123", 2 );
    rentalCar.setPassedVehicleInspection( true );

    Driver john = new Driver( "John Doe" );
    john.setAge( 18 );
    john.passedDrivingTest( true );
    rentalCar.setDriver( john );

    assertEquals( 0, validator.validate( rentalCar, Default.class, DriverChecks.class ).size() );
}
```



Note

Due to the fact that there cannot be a cyclic dependency in the group and group sequence definitions one cannot just add `Default` to the sequence redefining `Default` for a class. Instead the class itself should be added!

2.4. Built-in constraints

Hibernate Validator implements all of the default constraints specified in Bean Validation as well as some custom ones. [Table 2.2, “Built-in constraints”](#) list all constraints available in Hibernate Validator.

Table 2.2. Built-in constraints

Annotation	Part of Bean Validation Specification	Apply on	Use	Hibernate Metadata impact
@AssertFalse	yes	field/property	Check that the annotated element is <i>false</i> .	none
@AssertTrue	yes	field/property	Check that the annotated element is <i>true</i> .	none
@CreditCardNumber	no	field/property. The supported type is <i>String</i> .	Check that the annotated string passes the Luhn checksum test. Note, this validation aims to check for user mistake, not credit card validity! See also Anatomy of Credit Card Numbers [http://www.merriampark.com/anatomycc.htm].	none
@DecimalMax	yes	field/property. Supported types are <i>BigDecimal</i> , <i>BigInteger</i> , <i>String</i> , <i>byte</i> , <i>short</i> , <i>int</i> , <i>long</i> and the respective wrappers of the primitive types.	The annotated element must be a number whose value must be lower or equal to the specified maximum. The parameter value is the string representation of the max value according to the <i>BigDecimal</i> string representation.	none
@DecimalMin	yes	field/property. Supported types	The annotated element must be	none

Annotation	Part of Bean Validation Specification	Apply on	Use	Hibernate Metadata impact
		are <code>BigDecimal</code> , <code>BigInteger</code> , <code>String</code> , <code>byte</code> , <code>short</code> , <code>int</code> , <code>long</code> and the respective wrappers of the primitive types.	a number whose value must be higher or equal to the specified minimum. The parameter value is the string representation of the min value according to the <code>BigDecimal</code> string representation.	
<code>@Digits(integer=, fraction=)</code>	yes	field/property. Supported types are <code>BigDecimal</code> , <code>BigInteger</code> , <code>String</code> , <code>byte</code> , <code>short</code> , <code>int</code> , <code>long</code> and the respective wrappers of the primitive types.	Check whether the property is a number having up to integer digits and fractional digits.	Define column precision and scale.
<code>@Email</code>	no	field/property. Needs to be a string.	Check whether the specified string is a valid email address.	none
<code>@Future</code>	yes	field/property. Supported types are <code>java.util.Date</code> and <code>java.util.Calendar</code> .	Checks whether the annotated date is in the future.	none
<code>@Length(min=, max=)</code>	no	field/property. Needs to be a string.	Validate that the annotated string is between <i>min</i> and <i>max</i> included.	Column length will be set to max.
<code>@Max</code>	yes	field/property. Supported types are <code>BigDecimal</code> ,	Checks whether the annotated value is less	Add a check constraint on the column.

Annotation	Part of Bean Validation Specification	Apply on	Use	Hibernate Metadata impact
		BigInteger, String, byte, short, int, long and the respective wrappers of the primitive types.	than or equal to the specified maximum.	
@Min	yes	field/property. Supported types are BigDecimal, BigInteger, String, byte, short, int, long and the respective wrappers of the primitive types.	Checks whether the annotated value is higher than or equal to the specified minimum.	Add a check constraint on the column.
@NotNull	yes	field/property	Check that the annotated value is not <code>null</code> .	Column(s) are not null.
@NotBlank	no	field/property	Check that the annotated string is not null and the trimmed length is greater than 0. The difference to @NotEmpty is that this constraint can only be applied on strings and that trailing whitespaces are ignored.	none
@NotEmpty	no	field/property. Supported types are String, Collection, Map and arrays.	Check whether the annotated element is not <code>null</code> nor empty.	none

Annotation	Part of Bean Validation Specification	Apply on	Use	Hibernate Metadata impact
@Null	yes	field/property	Check that the annotated value is <code>null</code> .	none
@Past	yes	field/property. Supported types are <code>java.util.Date</code> and <code>java.util.Calendar</code> .	Checks whether the annotated date is in the past.	none
@Pattern(regex=, flag=)	yes	field/property. Needs to be a string.	Checks if the annotated string matches the regular expression <i>regex</i> considering the given flag <i>match</i> .	none
@Range(min=, max=)	no	field/property. Supported types are <code>BigDecimal</code> , <code>BigInteger</code> , <code>String</code> , <code>byte</code> , <code>short</code> , <code>int</code> , <code>long</code> and the respective wrappers of the primitive types.	Check whether the annotated value lies between (inclusive) the specified minimum and maximum.	none
@Size(min=, max=)	yes	field/property. Supported types are <code>String</code> , <code>Collection</code> , <code>Map</code> and arrays.	Check if the annotated element size is between min and max (inclusive).	Column length will be set to max.
@ScriptAssert(language=, script=, alias=)	no	type	Checks whether the given script can successfully be evaluated against the annotated element. In order	none

Annotation	Part of Bean Validation Specification	Apply on	Use	Hibernate Metadata impact
			to use this constraint, an implementation of the Java Scripting API as defined by JSR 223 ("Scripting for the Java™ Platform") must part of the class path. This is automatically the case when running on Java 6. For older Java versions, the JSR 223 RI can be added manually to the class path. The expressions to be evaluated can be written in any scripting or expression language, for which a JSR 223 compatible engine can be found in the class path.	
@URL(protocol=, host=, port=)	no	field/property. The supported type is <code>String</code> .	Check if the annotated string is a valid URL. If any of parameters <i>protocol</i> , <i>host</i> or <i>port</i> is specified the URL must match the specified	none

Annotation	Part of Bean Validation Specification	Apply on	Use	Hibernate Metadata impact
			values in the according part.	
@Valid	yes	field/property. Any non-primitive types are supported.	Performs validation recursively on the associated object. If the object is a collection or an array, the elements are validated recursively. If the object is a map, the value elements are validated recursively.	none



Note

On top of the parameters indicated in [Table 2.2, “Built-in constraints”](#) each constraint supports the parameters *message*, *groups* and *payload*. This is a requirement of the Bean Validation specification.

In some cases these built-in constraints will not fulfill your requirements. In this case you can literally in a minute write your own constraints. We will discuss this in [Chapter 3, Creating custom constraints](#)

Creating custom constraints

Though the Bean Validation API defines a whole set of standard constraint annotations one can easily think of situations in which these standard annotations won't suffice. For these cases you are able to create custom constraints tailored to your specific validation requirements in a simple manner.

3.1. Creating a simple constraint

To create a custom constraint, the following three steps are required:

- Create a constraint annotation
- Implement a validator
- Define a default error message

3.1.1. The constraint annotation

Let's write a constraint annotation, that can be used to express that a given string shall either be upper case or lower case. We'll apply it later on to the `licensePlate` field of the `Car` class from [Chapter 1, Getting started](#) to ensure, that the field is always an upper-case string.

First we need a way to express the two case modes. We might use `String` constants, but a better way to go is to use a Java 5 enum for that purpose:

Example 3.1. Enum `CaseMode` to express upper vs. lower case

```
package com.mycompany;

public enum CaseMode {
    UPPER,
    LOWER;
}
```

Now we can define the actual constraint annotation. If you've never designed an annotation before, this may look a bit scary, but actually it's not that hard:

Example 3.2. Defining `CheckCase` constraint annotation

```
package com.mycompany;

import static java.lang.annotation.ElementType.*;
import static java.lang.annotation.RetentionPolicy.*;

import java.lang.annotation.Documented;
```

```
import java.lang.annotation.Retention;
import java.lang.annotation.Target;

import javax.validation.Constraint;
import javax.validation.Payload;

@Target( { METHOD, FIELD, ANNOTATION_TYPE })
@Retention(RUNTIME)
@Constraint(validatedBy = CheckCaseValidator.class)
@Documented
public @interface CheckCase {

    String message() default "{com.mycompany.constraints.checkcase}";

    Class<?>[] groups() default {};

    Class<? extends Payload>[] payload() default {};

    CaseMode value();

}
```

An annotation type is defined using the `@interface` keyword. All attributes of an annotation type are declared in a method-like manner. The specification of the Bean Validation API demands, that any constraint annotation defines

- an attribute `message` that returns the default key for creating error messages in case the constraint is violated
- an attribute `groups` that allows the specification of validation groups, to which this constraint belongs (see [Section 2.3, “Validating groups”](#)). This must default to an empty array of type `Class<?>`.
- an attribute `payload` that can be used by clients of the Bean Validation API to assign custom payload objects to a constraint. This attribute is not used by the API itself.



Tip

An example for a custom payload could be the definition of a severity.

```
public class Severity {
    public static class Info extends Payload {}
    public static class Error extends Payload {}
}

public class ContactDetails {
    @NotNull(message="Name is mandatory", payload=Severity.Error.class)
    private String name;

    @NotNull(message="Phone number not specified, but not mandatory",
        payload=Severity.Info.class)
```

```
private String phoneNumber;
```

```
    @CheckCase  
    }
```

Now a client can after the validation of a `ContactDetails` instance access the severity of a constraint using `ConstraintViolation.getConstraintDescriptor().getPayload()` and adjust its behaviour depending on the severity.

Besides those three mandatory attributes (message, groups and payload) we add another one allowing for the required case mode to be specified. The name value is a special one, which can be omitted upon using the annotation, if it is the only attribute specified, as e.g. in `@CheckCase(CaseMode.UPPER)`.

In addition we annotate the annotation type with a couple of so-called meta annotations:

- `@Target({ METHOD, FIELD, ANNOTATION_TYPE })`: Says, that methods, fields and annotation declarations may be annotated with `@CheckCase` (but not type declarations e.g.)
- `@Retention(RUNTIME)`: Specifies, that annotations of this type will be available at runtime by the means of reflection
- `@Constraint(validatedBy = CheckCaseValidator.class)`: Specifies the validator to be used to validate elements annotated with `@CheckCase`
- `@Documented`: Says, that the use of `@CheckCase` will be contained in the JavaDoc of elements annotated with it

3.1.2. The constraint validator

Next, we need to implement a constraint validator, that's able to validate elements with a `@CheckCase` annotation. To do so, we implement the interface `ConstraintValidator` as shown below:

Example 3.3. Implementing a constraint validator for the constraint `CheckCase`

```
package com.mycompany;

import javax.validation.ConstraintValidator;
import javax.validation.ConstraintValidatorContext;

public class CheckCaseValidator implements ConstraintValidator<CheckCase, String> {

    private CaseMode caseMode;

    public void initialize(CheckCase constraintAnnotation) {
        this.caseMode = constraintAnnotation.value();
    }
}
```

```
}

    public boolean isValid(String object, ConstraintValidatorContext constraintContext) {

        if (object == null)
            return true;

        if (caseMode == CaseMode.UPPER)
            return object.equals(object.toUpperCase());
        else
            return object.equals(object.toLowerCase());
    }
}
```

The `ConstraintValidator` interface defines two type parameters, which we set in our implementation. The first one specifies the annotation type to be validated (in our example `CheckCase`), the second one the type of elements, which the validator can handle (here `String`).

In case a constraint annotation is allowed at elements of different types, a `ConstraintValidator` for each allowed type has to be implemented and registered at the constraint annotation as shown above.

The implementation of the validator is straightforward. The `initialize()` method gives us access to the attribute values of the annotation to be validated. In the example we store the `CaseMode` in a field of the validator for further usage.

In the `isValid()` method we implement the logic, that determines, whether a `String` is valid according to a given `@CheckCase` annotation or not. This decision depends on the case mode retrieved in `initialize()`. As the Bean Validation specification recommends, we consider `null` values as being valid. If `null` is not a valid value for an element, it should be annotated with `@NotNull` explicitly.

3.1.2.1. The `ConstraintValidatorContext`

Example 3.3, “Implementing a constraint validator for the constraint `CheckCase`” relies on the default error message generation by just returning `true` or `false` from the `isValid` call. Using the passed `ConstraintValidatorContext` object it is possible to either add additional error messages or completely disable the default error message generation and solely define custom error messages. The `ConstraintValidatorContext` API is modeled as fluent interface and is best demonstrated with an example:

Example 3.4. Use of `ConstraintValidatorContext` to define custom error messages

```
package com.mycompany;

import javax.validation.ConstraintValidator;
import javax.validation.ConstraintValidatorContext;
```

```

public class CheckCaseValidator implements ConstraintValidator<CheckCase, String> {

    private CaseMode caseMode;

    public void initialize(CheckCase constraintAnnotation) {
        this.caseMode = constraintAnnotation.value();
    }

    public boolean isValid(String object, ConstraintValidatorContext constraintContext) {

        if (object == null)
            return true;

        boolean isValid;
        if (caseMode == CaseMode.UPPER) {
            isValid = object.equals(object.toUpperCase());
        }
        else {
            isValid = object.equals(object.toLowerCase());
        }

        if(!isValid) {
            constraintContext.disableDefaultConstraintViolation();
            constraintContext.buildConstraintViolationWithTemplate( "{com.mycompany.constraints.CheckCase.message"
        }
        return result;
    }
}

```

Example 3.4, “Use of ConstraintValidatorContext to define custom error messages” shows how you can disable the default error message generation and add a custom error message using a specified message template. In this example the use of the `ConstraintValidatorContext` results in the same error message as the default error message generation.



Tip

It is important to end each new constraint violation with `addConstraintViolation`. Only after that the new constraint violation will be created.

In case you are implementing a `ConstraintValidator` a class level constraint it is also possible to adjust set the property path for the created constraint violations. This is important for the case where you validate multiple properties of the class or even traverse the object graph. A custom property path creation could look like *Example 3.5, “Adding new ConstraintViolation with custom property path”*.

Example 3.5. Adding new `ConstraintViolation` with custom property path

```

public boolean isValid(Group group, ConstraintValidatorContext constraintValidatorContext) {
    boolean isValid = false;

```

```
...

    if(!isValid) {
        constraintValidatorContext
            .buildConstraintViolationWithTemplate( "{my.custom.template}" )
            .addNode( "myProperty" ).addConstraintViolation();
    }
    return isValid;
}
```

3.1.3. The error message

Finally we need to specify the error message, that shall be used, in case a `@CheckCase` constraint is violated. To do so, we add the following to our custom `ValidationMessages.properties` (see also [Section 2.2.4, “Message interpolation”](#))

Example 3.6. Defining a custom error message for the `CheckCase` constraint

```
com.mycompany.constraints.CheckCase.message=Case mode must be {value}.
```

If a validation error occurs, the validation runtime will use the default value, that we specified for the message attribute of the `@CheckCase` annotation to look up the error message in this file.

3.1.4. Using the constraint

Now that our first custom constraint is completed, we can use it in the `Car` class from the [Chapter 1, Getting started](#) chapter to specify that the `licensePlate` field shall only contain upper-case strings:

Example 3.7. Applying the `CheckCase` constraint

```
package com.mycompany;

import javax.validation.constraints.Min;
import javax.validation.constraints.NotNull;
import javax.validation.constraints.Size;

public class Car {

    @NotNull
    private String manufacturer;

    @NotNull
    @Size(min = 2, max = 14)
    @CheckCase(CaseMode.UPPER)
    private String licensePlate;

    @Min(2)
    private int seatCount;

    public Car(String manufacturer, String licencePlate, int seatCount) {
```



```

        this.manufacturer = manufacturer;
        this.licensePlate = licencePlate;
        this.seatCount = seatCount;
    }

    //getters and setters ...
}

```

Finally let's demonstrate in a little test that the `@CheckCase` constraint is properly validated:

Example 3.8. Testcase demonstrating the `CheckCase` validation

```

package com.mycompany;

import static org.junit.Assert.*;

import java.util.Set;

import javax.validation.ConstraintViolation;
import javax.validation.Validation;
import javax.validation.Validator;
import javax.validation.ValidatorFactory;

import org.junit.BeforeClass;
import org.junit.Test;

public class CarTest {

    private static Validator validator;

    @BeforeClass
    public static void setUp() {
        ValidatorFactory factory = Validation.buildDefaultValidatorFactory();
        validator = factory.getValidator();
    }

    @Test
    public void testLicensePlateNotUpperCase() {

        Car car = new Car("Morris", "dd-ab-123", 4);

        Set<ConstraintViolation<Car>> constraintViolations =
            validator.validate(car);
        assertEquals(1, constraintViolations.size());
        assertEquals(
            "Case mode must be UPPER.",
            constraintViolations.iterator().next().getMessage());
    }

    @Test
    public void carIsValid() {

        Car car = new Car("Morris", "DD-AB-123", 4);
    }
}

```

```
        Set<ConstraintViolation<Car>> constraintViolations =  
            validator.validate(car);  
  
        assertEquals(0, constraintViolations.size());  
    }  
}
```

3.2. Constraint composition

Looking at the `licensePlate` field of the `Car` class in [Example 3.7, “Applying the CheckCase constraint”](#), we see three constraint annotations already. In complexer scenarios, where even more constraints could be applied to one element, this might become a bit confusing easily. Furthermore, if we had a `licensePlate` field in another class, we would have to copy all constraint declarations to the other class as well, violating the DRY principle.

This problem can be tackled using compound constraints. In the following we create a new constraint annotation `@ValidLicensePlate`, that comprises the constraints `@NotNull`, `@Size` and `@CheckCase`:

Example 3.9. Creating a composing constraint `ValidLicensePlate`

```
package com.mycompany;  
  
import static java.lang.annotation.ElementType.*;  
import static java.lang.annotation.RetentionPolicy.*;  
  
import java.lang.annotation.Documented;  
import java.lang.annotation.Retention;  
import java.lang.annotation.Target;  
  
import javax.validation.Constraint;  
import javax.validation.Payload;  
import javax.validation.constraints.NotNull;  
import javax.validation.constraints.Size;  
  
@NotNull  
@Size(min = 2, max = 14)  
@CheckCase(CaseMode.UPPER)  
@Target( { METHOD, FIELD, ANNOTATION_TYPE } )  
@Retention(RUNTIME)  
@Constraint(validatedBy = {})  
@Documented  
public @interface ValidLicensePlate {  
  
    String message() default "{com.mycompany.constraints.validlicenseplate}";  
  
    Class<?>[] groups() default {};  
  
    Class<? extends Payload>[] payload() default {};  
  
}
```

To do so, we just have to annotate the constraint declaration with its comprising constraints (btw. that's exactly why we allowed annotation types as target for the `@CheckCase` annotation). As no additional validation is required for the `@ValidLicensePlate` annotation itself, we don't declare a validator within the `@Constraint` meta annotation.

Using the new compound constraint at the `licensePlate` field now is fully equivalent to the previous version, where we declared the three constraints directly at the field itself:

Example 3.10. Application of composing constraint `ValidLicensePlate`

```
package com.mycompany;

public class Car {

    @ValidLicensePlate
    private String licensePlate;

    //...

}
```

The set of `ConstraintViolations` retrieved when validating a `Car` instance will contain an entry for each violated composing constraint of the `@ValidLicensePlate` constraint. If you rather prefer a single `ConstraintViolation` in case any of the composing constraints is violated, the `@ReportAsSingleViolation` meta constraint can be used as follows:

Example 3.11. Usage of `@ReportAsSingleViolation`

```
//...
@ReportAsSingleViolation
public @interface ValidLicensePlate {

    String message() default "{com.mycompany.constraints.validlicenseplate}";

    Class<?>[] groups() default {};

    Class<? extends Payload>[] payload() default {};

}
```

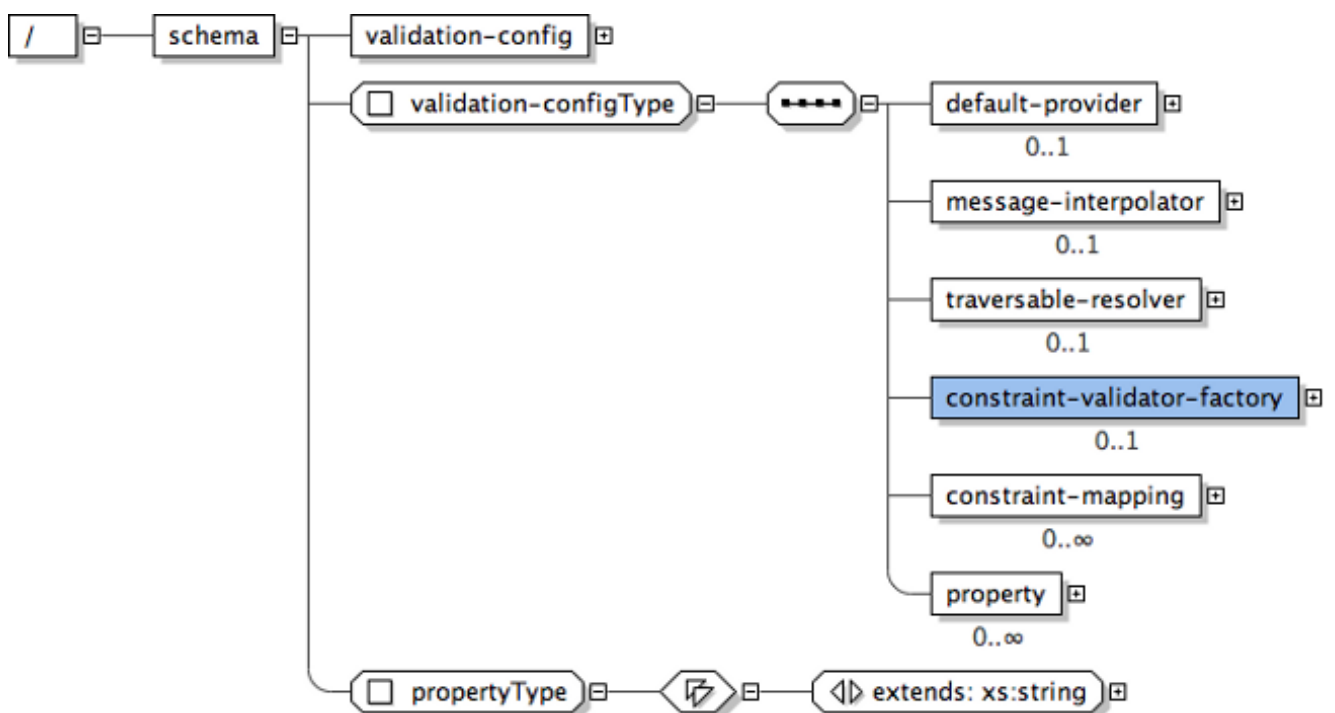

XML configuration

4.1. validation.xml

The key to enable XML configuration for Hibernate Validator is the file `validation.xml`. If this file exists in the classpath its configuration will be applied when the `ValidationFactory` gets created.

Example 4.1, “*validation-configuration-1.0.xsd*” shows a model view of the xsd `validation.xml` has to adhere to.

Example 4.1. validation-configuration-1.0.xsd



Example 4.2, “*validation.xml*” shows the several configuration options of `validation.xml`.

Example 4.2. validation.xml

```

<validation-config xmlns="http://jboss.org/xml/ns/javax/validation/configuration"
  xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
  xsi:schemaLocation="http://jboss.org/xml/ns/javax/validation/configuration">
  <default-provider>org.hibernate.validator.HibernateValidator</default-provider>
  <message-interpolator>org.hibernate.validator.engine.ResourceBundleMessageInterpolator</
message-interpolator>
  <traversable-resolver>org.hibernate.validator.engine.resolver.DefaultTraversableResolver</
traversable-resolver>
  <constraint-validator-factory>org.hibernate.validator.engine.ConstraintValidatorFactoryImpl</constraint-validator-
factory>
  <constraint-mapping>/constraints-car.xml</constraint-mapping>
</validation-config>
  
```

```
<property name="prop1">value1</property>
<property name="prop2">value2</property>
</validation-config>
```



Warning

There can only be one `validation.xml` in the classpath. If more than one is found an exception is thrown.

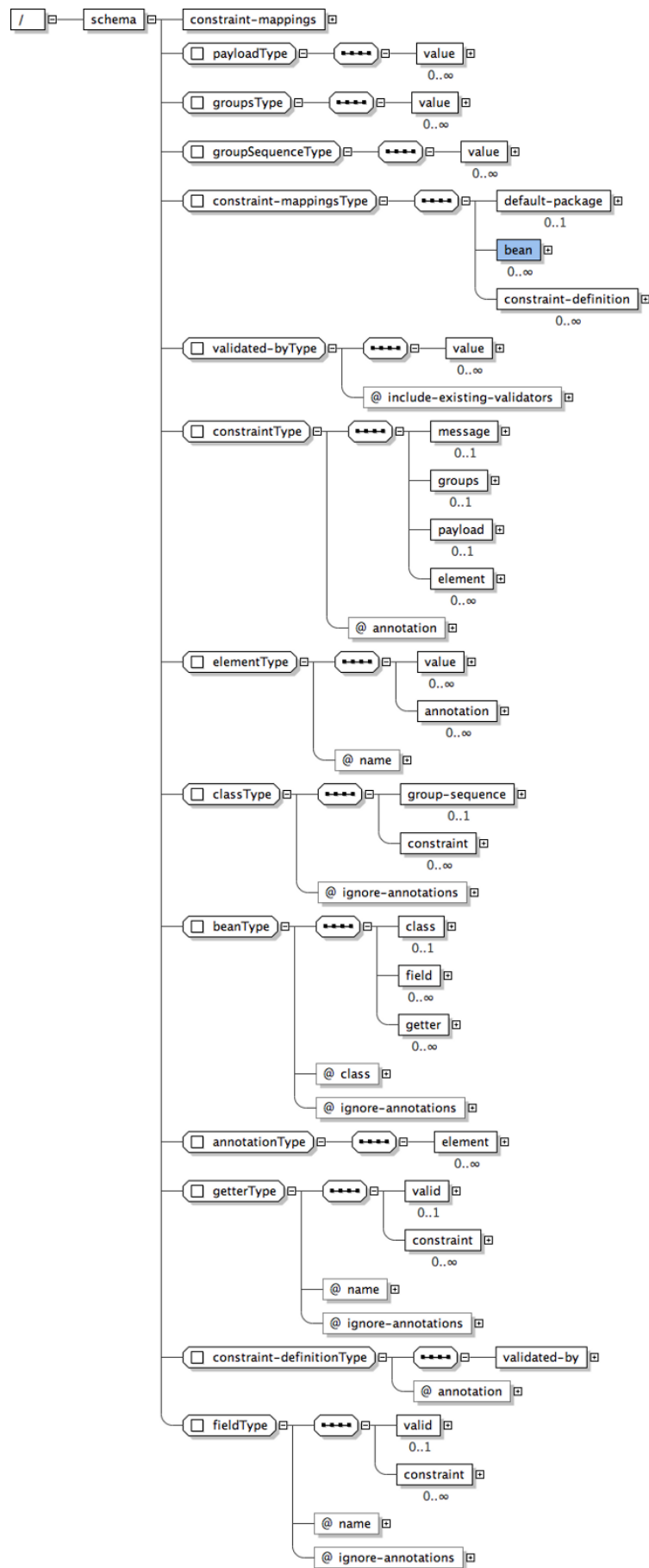
All settings shown in the `validation.xml` are optional and in the case of [Example 4.2](#), “*validation.xml*” show the defaults used within Hibernate Validator. The node `default-provider` allows to choose the Bean Validation provider. This is useful if there is more than one provider in the classpath. `message-interpolator`, `traversable-resolver` and `constraint-validator-factory` allow to customize the `javax.validation.MessageInterpolator`, `javax.validation.TraversableResolver` resp. `javax.validation.ConstraintValidatorFactory`. The same configuration options are also available programmatically through the `javax.validation.Configuration`. In fact XML configuration will be overridden by values explicitly specified via the API. It is even possible to ignore the XML configuration completely via `Configuration.ignoreXmlConfiguration()`. See also [Chapter 5, Bootstrapping](#).

Via the `constraint-mapping` you can list an arbitrary number of additional XML files containing the actual constraint configuration. See [Section 4.2](#), “*Mapping constraints*”.

Last but not least, you can specify provider specific properties via the property nodes. Hibernate Validator does currently not make use of any custom properties.

4.2. Mapping constraints

Expressing constraints in XML is possible via files adhering to the xsd seen in [Example 4.3](#), “*validation-mapping-1.0.xsd*”. Note that these mapping files are only processed if listed via `constraint-mapping` in your `validation.xml`.



Example 4.4, “*constraints-car.xml*” shows how our classes *Car* and *RentalCar* from *Example 2.15*, “*Car*” resp. *Example 2.19*, “*RentalCar*” could be mapped in XML.

Example 4.4. constraints-car.xml

```
<constraint-mappings xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
                    xsi:schemaLocation="http://jboss.org/xml/ns/javax/validation/mapping
validation-mapping-1.0.xsd"
                    xmlns="http://jboss.org/xml/ns/javax/validation/mapping">
  <default-package>org.hibernate.validator.quickstart</default-package>
  <bean class="Car" ignore-annotations="true">
    <field name="manufacturer">
      <constraint annotation="javax.validation.constraints.NotNull"/>
    </field>
    <field name="licensePlate">
      <constraint annotation="javax.validation.constraints.NotNull"/>
    </field>
    <field name="seatCount">
      <constraint annotation="javax.validation.constraints.Min">
        <element name="value">2</element>
      </constraint>
    </field>
    <field name="driver">
      <valid/>
    </field>
    <getter name="passedVehicleInspection" ignore-annotations="true">
      <constraint annotation="javax.validation.constraints.AssertTrue">
        <message>The car has to pass the vehicle inspection first</message>
        <groups>
          <value>CarChecks</value>
        </groups>
        <element name="max">10</element>
      </constraint>
    </getter>
  </bean>
  <bean class="RentalCar" ignore-annotations="true">
    <class ignore-annotations="true">
      <group-sequence>
        <value>RentalCar</value>
        <value>CarChecks</value>
      </group-sequence>
    </class>
  </bean>
  <constraint-definition annotation="org.mycompany.CheckCase" include-existing-
validator="false">
    <validated-by include-existing-validators="false">
      <value>org.mycompany.CheckCaseValidator</value>
    </validated-by>
  </constraint-definition>
</constraint-mappings>
```

The XML configuration is closely mirroring the programmatic API. For this reason it should suffice to just add some comments. `default-package` is used for all fields where a classname is expected. If the specified class is not fully qualified the configured default package will be used. Every

mapping file can then have several bean nodes, each describing the constraints on the entity with the specified class name.



Warning

A given entity can only be configured once across all configuration files. If the same class is configured more than once an exception is thrown.

Settings `ignore-annotations` to `true` means that constraint annotations placed on the configured bean are ignored. The default for this value is `true`. `ignore-annotations` is also available for the nodes `class`, `fields` and `getter`. If not explicitly specified on these levels the configured bean value applies. Otherwise do the nodes `class`, `fields` and `getter` determine on which level the constraints are placed (see [Section 2.1, “Defining constraints”](#)). The constraint node is then used to add a constraint on the corresponding level. Each constraint definition must define the class via the annotation attribute. The constraint attributes required by the Bean Validation specification (message, groups and payload) have dedicated nodes. All other constraint specific attributes are configured using the `element` node.

The `class` node also allows to reconfigure the default group sequence (see [Section 2.3.2, “Redefining the default group sequence of a class”](#)) via the `group-sequence` node.

Last but not least, the list of `ConstraintValidator`s associated to a given constraint can be altered via the constraint-definition node. The annotation attribute represents the constraint annotation being altered. The `validated-by` elements represent the (ordered) list of `ConstraintValidator` implementations associated to the constraint. If `include-existing-validator` is set to `false`, validators defined on the constraint annotation are ignored. If set to `true`, the list of `ConstraintValidator`s described in XML are concatenated to the list of validators described on the annotation.

Bootstrapping

We already seen in [Section 5.1, “Configuration and ValidatorFactory”](#) the easiest way to create a `Validator` instance - `Validation.buildDefaultValidatorFactory()`. In this chapter we have a look at the other methods in `javax.validation.Validation` and how they allow to configure several aspects of Bean Validation at bootstrapping time.

The different bootstrapping options allow, amongst other things, to bootstrap any Bean Validation implementation on the classpath. Generally, an available provider is discovered by the [Java Service Provider](http://java.sun.com/j2se/1.3/docs/guide/jar/jar.html#Service%20Provider) [http://java.sun.com/j2se/1.3/docs/guide/jar/jar.html#Service%20Provider] mechanism. A Bean Validation implementation includes the file `javax.validation.spi.ValidationProvider` in `META-INF/services`. This file contains the fully qualified classname of the `ValidationProvider` of the implementation. In the case of Hibernate Validator this is `org.hibernate.validator.HibernateValidator`.



Note

If there are more than one Bean Validation implementation providers in the classpath and `Validation.buildDefaultValidatorFactory()` is used, there is no guarantee which provider will be chosen. To enforce the provider `Validation.byProvider()` should be used.

5.1. Configuration and ValidatorFactory

There are three different methods in the `Validation` class to create a `Validator` instance. The easiest is shown in [Example 5.1, “Validation.buildDefaultValidatorFactory\(\)”](#).

Example 5.1. Validation.buildDefaultValidatorFactory()

```
ValidatorFactory factory = Validation.buildDefaultValidatorFactory();
Validator validator = factory.getValidator();
```

You can also use the method `Validation.byDefaultProvider()` which will allow you to configure several aspects of the created `Validator` instance:

Example 5.2. Validation.byDefaultProvider()

```
Configuration<?> config = Validation.byDefaultProvider().configure();
config.messageInterpolator(new MyMessageInterpolator())
    .traversableResolver( new MyTraversableResolver())
    .constraintValidatorFactory(new MyConstraintValidatorFactory());
```

```
ValidatorFactory factory = config.buildValidatorFactory();
Validator validator = factory.getValidator();
```

We will learn more about `MessageInterpolator`, `TraversableResolver` and `ConstraintValidatorFactory` in the following sections.

Last but not least you can ask for a Configuration object of a specific Bean Validation provider. This is useful if you have more than one Bean Validation provider in your classpath. In this situation you can make an explicit choice about which implementation to use. In the case of Hibernate Validator the `Validator` creation looks like:

Example 5.3. `Validation.byProvider(HibernateValidator.class)`

```
HibernateValidatorConfiguration config = Validation.byProvider( HibernateValidator.class ).configure();
config.messageInterpolator( new MyMessageInterpolator() )
    .traversableResolver( new MyTraversableResolver() )
    .constraintValidatorFactory( new MyConstraintValidatorFactory() );

ValidatorFactory factory = config.buildValidatorFactory();
Validator validator = factory.getValidator();
```



Tip

The generated `Validator` instance is thread safe and can be cached.

5.2. `ValidationProviderResolver`

In the case that the Java Service Provider mechanism does not work in your environment or you have a special classloader setup, you are able to provide a custom `ValidationProviderResolver`. An example in an OSGi environment you could plug your custom provider resolver like seen in [Example 5.4, “Providing a custom `ValidationProviderResolver`”](#).

Example 5.4. Providing a custom `ValidationProviderResolver`

```
Configuration<?> config = Validation.byDefaultProvider()
    .providerResolver( new OSGiServiceDiscoverer() )
    .configure();

ValidatorFactory factory = config.buildValidatorFactory();
Validator validator = factory.getValidator();
```

Your `OSGiServiceDiscoverer` must in this case implement the interface `ValidationProviderResolver`:

Example 5.5. ValidationProviderResolver interface

```
public interface ValidationProviderResolver {
    /**
     * Returns a list of ValidationProviders available in the runtime environment.
     *
     * @return list of validation providers.
     */
    List<ValidationProvider<?>> getValidationProviders();
}
```

5.3. MessageInterpolator

[Section 2.2.4](#), “*Message interpolation*” already discussed the default message interpolation algorithm. If you have special requirements for your message interpolation you can provide a custom interpolator using `Configuration.messageInterpolator()`. This message interpolator will be shared by all validators generated by the `ValidatorFactory` created from this `Configuration` (see [Example 5.6](#), “*Providing a custom MessageInterpolator*”).

Example 5.6. Providing a custom MessageInterpolator

```
Configuration<?> configuration = Validation.byDefaultProvider().configure();
ValidatorFactory factory = configuration
    .messageInterpolator(new ContextualMessageInterpolator(configuration.getDefaultMessageInterpolator()))
    .buildValidatorFactory();

Validator validator = factory.getValidator();
```



Tip

It is recommended that `MessageInterpolator` implementations delegate final interpolation to the Bean Validation default `MessageInterpolator` to ensure standard Bean Validation interpolation rules are followed. The default implementation is accessible through `Configuration.getDefaultMessageInterpolator()`.

5.3.1. ResourceBundleLocator

A common use case is the ability to specify your own resource bundles for message interpolation. The default `MessageInterpolator` implementation in Hibernate Validator is called `ResourceBundleMessageInterpolator` and per default loads resource bundles via `ResourceBundle.getBundle`. However, `ResourceBundleMessageInterpolator` also allows you to specify a custom implementation of `ResourceBundleLocator` allowing you to provide your own resource bundles. [Example 5.7](#), “*Providing a custom ResourceBundleLocator*” shows an example.

In the example `HibernateValidatorConfiguration.getDefaultResourceBundleLocator` is used to retrieve the default `ResourceBundleLocator` which then can be passed to the custom implementation in order implement delegation.

Example 5.7. Providing a custom `ResourceBundleLocator`

```
HibernateValidatorConfiguration configure = Validation.byProvider(HibernateValidator.class).configure();

ResourceBundleLocator defaultResourceBundleLocator = configure.getDefaultResourceBundleLocator();
ResourceBundleLocator myResourceBundleLocator = new MyCustomResourceBundleLocator(defaultResourceBundleLocator);

configure.messageInterpolator(new ResourceBundleMessageInterpolator(myResourceBundleLocator));
```

Hibernate Validator provides the following implementation of `ResourceBundleLocator` - `PlatformResourceBundleLocator` (the default) and `AggregateResourceBundleLocator`. The latter can be used to specify a list of resource bundle names which will get loaded and merged into a single resource bundle. Refer to the JavaDoc documentation for more information.

5.4. `TraversableResolver`

The usage of the `TraversableResolver` has so far not been discussed. The idea is that in some cases, the state of a property should not be accessed. The most obvious example for that is a lazy loaded property or association of a Java Persistence provider. Validating this lazy property or association would mean that its state would have to be accessed triggering a load from the database. Bean Validation controls which property can and cannot be accessed via the `TraversableResolver` interface (see [Example 5.8, “TraversableResolver interface”](#)). In the example `HibernateValidatorConfiguration`.

Example 5.8. `TraversableResolver` interface

```
/**
 * Contract determining if a property can be accessed by the Bean Validation provider
 * This contract is called for each property that is being either validated or cascaded.
 *
 * A traversable resolver implementation must be thread-safe.
 */
public interface TraversableResolver {
    /**
     * Determine if the Bean Validation provider is allowed to reach the property state
     *
     * @param traversableObject object hosting traversableProperty or null
     *                        if validateValue is called
     * @param traversableProperty the traversable property.
     * @param rootBeanType type of the root object passed to the Validator.
     * @param pathToTraversableObject path from the root object to
     *    traversableObject
     *    (using the path specification defined by Bean Validator).
     * @param elementType either FIELD or METHOD.
     */
}
```

```

*
* @return <code>true</code> if the Bean Validation provider is allowed to
*         reach the property state, <code>false</code> otherwise.
*/
boolean isReachable(Object traversableObject,
                    Path.Node traversableProperty,
                    Class<?> rootBeanType,
                    Path pathToTraversableObject,
                    ElementType elementType);

/**
 * Determine if the Bean Validation provider is allowed to cascade validation on
 * the bean instance returned by the property value
 * marked as <code>@Valid</code>.
 * Note that this method is called only if isReachable returns true for the same set of
 * arguments and if the property is marked as <code>@Valid</code>
 *
 * @param traversableObject object hosting <code>traversableProperty</code> or null
 *                           if validateValue is called
 * @param traversableProperty the traversable property.
 * @param rootBeanType type of the root object passed to the Validator.
 * @param pathToTraversableObject path from the root object to
 *                                <code>traversableObject</code>
 *                                (using the path specification defined by Bean Validator).
 * @param elementType either <code>FIELD</code> or <code>METHOD</code>.
 *
 * @return <code>true</code> if the Bean Validation provider is allowed to
 *         cascade validation, <code>false</code> otherwise.
*/
boolean isCascadable(Object traversableObject,
                    Path.Node traversableProperty,
                    Class<?> rootBeanType,
                    Path pathToTraversableObject,
                    ElementType elementType);
}

```

Hibernate Validator provides two TraversableResolvers out of the box which will be enabled automatically depending on your environment. The first is the DefaultTraversableResolver which will always return true for isReachable() and isTraversable(). The second is the JPATraversableResolver which gets enabled when Hibernate Validator gets used in combination with JPA 2. In case you have to provide your own resolver you can do so again using the Configuration object as seen in [Example 5.9, “Providing a custom TraversableResolver”](#).

Example 5.9. Providing a custom TraversableResolver

```

Configuration<?> configuration = Validation.byDefaultProvider().configure();
ValidatorFactory factory = configuration
    .traversableResolver(new MyTraversableResolver())
    .buildValidatorFactory();

Validator validator = factory.getValidator();

```

5.5. ConstraintValidatorFactory

Last but not least, there is one more configuration option to discuss, the `ConstraintValidatorFactory`. The default `ConstraintValidatorFactory` provided by Hibernate Validator requires a public no-arg constructor to instantiate `ConstraintValidator` instances (see [Section 3.1.2, “The constraint validator”](#)). Using a custom `ConstraintValidatorFactory` offers for example the possibility to use dependency injection in constraint implementations. The configuration of the custom factory is once more via the Configuration ([Example 5.10, “Providing a custom `ConstraintValidatorFactory`”](#)).

Example 5.10. Providing a custom `ConstraintValidatorFactory`

```
Configuration<?> configuration = Validation.byDefaultProvider().configure();
ValidatorFactory factory = configuration
    .constraintValidatorFactory(new IOCCConstraintValidatorFactory())
    .buildValidatorFactory();

Validator validator = factory.getValidator();
```

The interface you have to implement is:

Example 5.11. `ConstraintValidatorFactory` interface

```
public interface ConstraintValidatorFactory {
    /**
     * @param key The class of the constraint validator to instantiate.
     *
     * @return A constraint validator instance of the specified class.
     */
    <T extends ConstraintValidator<?,?>> T getInstance(Class<T> key);
}
```



Warning

Any constraint implementation relying on `ConstraintValidatorFactory` behaviors specific to an implementation (dependency injection, no no-arg constructor and so on) are not considered portable.



Note

`ConstraintValidatorFactory` should not cache instances as the state of each instance can be altered in the initialize method.

Integration with other frameworks

Hibernate Validator is intended to be used to implement multi-layered data validation, where constraints are expressed in a single place (the annotated domain model) and checked in various different layers of the application.

6.1. OSGi

The Hibernate Validator jar file is conform to the OSGi specification and can be used within any OSGi container. The classes in the following packages are exported by Hibernate Validator and are considered part of the public API - `org.hibernate.validator`, `org.hibernate.validator.constraints`, `org.hibernate.validator.messageinterpolation` and `org.hibernate.validator.resourceloading`.

6.2. Database schema-level validation

Out of the box, Hibernate Annotations (as of Hibernate 3.5.x) will translate the constraints you have defined for your entities into mapping metadata. For example, if a property of your entity is annotated `@NotNull`, its columns will be declared as `not null` in the DDL schema generated by Hibernate.

If, for some reason, the feature needs to be disabled, set `hibernate.validator.apply_to_ddl` to `false`. See also [Table 2.2, “Built-in constraints”](#).

You can also limit the DDL constraint generation to a subset of the defined constraints by setting the property `org.hibernate.validator.group.ddl`. The property specifies the comma-separated, fully specified class names of the groups a constraint has to be part of in order to be considered for DDL schema generation.

6.3. ORM integration

Hibernate Validator integrates with both Hibernate and all pure Java Persistence providers.

6.3.1. Hibernate event-based validation

Hibernate Validator has a built-in Hibernate event listener - [org.hibernate.cfg.beanvalidation.BeanValidationEventListener](http://fisheye.jboss.org/browse/Hibernate/core/trunk/annotations/src/main/java/org/hibernate/cfg/beanvalidation/BeanValidationEventListener.java) [http://fisheye.jboss.org/browse/Hibernate/core/trunk/annotations/src/main/java/org/hibernate/cfg/beanvalidation/BeanValidationEventListener.java] - which is part of Hibernate Annotations (as of Hibernate 3.5.x). Whenever a `PreInsertEvent`, `PreUpdateEvent` or `PreDeleteEvent` occurs, the listener will verify all constraints of the entity instance and throw an exception if any constraint is violated. Per default objects will be checked before any inserts or updates are made by Hibernate. Pre deletion events will per default not trigger a validation. You can configure the groups to be validated per event type using the properties `javax.persistence.validation.group.pre-persist`, `javax.persistence.validation.group.pre-update` and `javax.persistence.validation.group.pre-remove`. The values of these properties are the

comma-separated, fully specified class names of the groups to validate. [Example 6.1, “Manual configuration of BeanValidationEventListener”](#) shows the default values for these properties. In this case they could also be omitted.

On constraint violation, the event will raise a runtime `ConstraintViolationException` which contains a set of `ConstraintViolations` describing each failure.

If Hibernate Validator is present in the classpath, Hibernate Annotations (or Hibernate EntityManager) will use it transparently. To avoid validation even though Hibernate Validator is in the classpath set `javax.persistence.validation.mode` to `none`.



Note

If the beans are not annotated with validation annotations, there is no runtime performance cost.

In case you need to manually set the event listeners for Hibernate Core, use the following configuration in `hibernate.cfg.xml`:

Example 6.1. Manual configuration of `BeanValidationEventListener`

```
<hibernate-configuration>
  <session-factory>
    ...
    <property name="javax.persistence.validation.group.pre-
persist">javax.validation.groups.Default</property>
    <property name="javax.persistence.validation.group.pre-
update">javax.validation.groups.Default</property>
    <property name="javax.persistence.validation.group.pre-remove"></property>
    ...
    <event type="pre-update">
      <listener class="org.hibernate.cfg.beanvalidation.BeanValidationEventListener"/>
    </event>
    <event type="pre-insert">
      <listener class="org.hibernate.cfg.beanvalidation.BeanValidationEventListener"/>
    </event>
    <event type="pre-delete">
      <listener class="org.hibernate.cfg.beanvalidation.BeanValidationEventListener"/>
    </event>
  </session-factory>
</hibernate-configuration>
```

6.3.2. JPA

If you are using JPA 2 and Hibernate Validator is in the classpath the JPA2 specification requires that Bean Validation gets enabled. The properties `javax.persistence.validation.group.pre-persist`, `javax.persistence.validation.group.pre-update` and `javax.persistence.validation.group.pre-remove` as described in [Section 6.3.1](#),

“Hibernate event-based validation” can in this case be configured in `persistence.xml`. `persistence.xml` also defines a node validation-mode while can be set to `AUTO`, `CALLBACK`, `NONE`. The default is `AUTO`.

In a JPA 1 you will have to create and register Hibernate Validator yourself. In case you are using Hibernate EntityManager you can add a customized version of the `BeanValidationEventListener` described in [Section 6.3.1, “Hibernate event-based validation”](#) to your project and register it manually.

6.4. Presentation layer validation

When working with JSF2 or JBoss Seam™ and Hibernate Validator (Bean Validation) is present in the runtime environment validation is triggered for every field in the application. [Example 6.2, “Usage of Bean Validation within JSF2”](#) shows an example of the `f:validateBean` tag in a JSF page. For more information refer to the Seam documentation or the JSF 2 specification.

Example 6.2. Usage of Bean Validation within JSF2

```
<h:form>
  <f:validateBean>
    <h:inputText value="#{model.property}" />
    <h:selectOneRadio value="#{model.radioProperty}" > ... </h:selectOneRadio>
    <!-- other input components here -->
  </f:validateBean>
</h:form>
```


Programmatic constraint definition



Note

Use of the features described in the following sections is not portable between Bean Validation providers/implementations.

Hibernate Validator allows to configure constraints not only via annotations and xml, but also via a programmatic API. This API can be used exclusively or in combination with annotations and xml. If used in combination programmatic constraints are additive to otherwise configured constraints.

The programmatic API is centered around the `ConstraintMapping` class which can be found together with its supporting classes in the `org.hibernate.validator.cfg` package. `ConstraintMapping` is the entry point to a fluent API allowing the definition of constraints. [Example 7.1, “Programmatic constraint definition”](#) shows how the API can be used.

Example 7.1. Programmatic constraint definition

```
ConstraintMapping mapping = new ConstraintMapping();
mapping.type( Car.class )
    .property( "manufacturer", FIELD )
        .constraint( NotNullDef.class )
    .property( "licensePlate", FIELD )
        .constraint( NotNullDef.class )
        .constraint( SizeDef.class )
            .min( 2 )
            .max( 14 )
    .property( "seatCount", FIELD )
        .constraint( MinDef.class )
            .value ( 2 )
.type( RentalCar.class )
    .property( "rentalStation", METHOD )
        .constraint( NotNullDef.class );
```

As you can see you can configure constraints on multiple classes and properties using method chaining. The constraint definition classes `NotNullDef`, `SizeDef` and `MinDef` are helper classes which allow to configure constraint parameters in a type-safe fashion. Definition classes exist for all built-in constraints in the `org.hibernate.validator.cfg.defs` package. For a custom constraint you can either create your own definition class extending `ConstraintDef` or you can use `GenericConstraintDef` as seen in [Example 7.2, “Programmatic constraint definition using GenericConstraintDef”](#).

Example 7.2. Programmatic constraint definition using `GenericConstraintDef`

```
ConstraintMapping mapping = new ConstraintMapping();
```

```
mapping.type( Car.class )
    .property( "licensePlate", FIELD )
    .constraint( GenericConstraintDef.class )
    .constraintType( CheckCase.class )
    .param( "value", CaseMode.UPPER );
```

Last but not least, you can also define cascading constraints as well as the default group sequence of an entity.

Example 7.3. Cascading constraints and group redefinition

```
ConstraintMapping mapping = new ConstraintMapping();
mapping.type( Car.class )
    .valid( "driver", FIELD )
.type( RentalCar.class )
    .defaultGroupSequence( RentalCar.class, CarChecks.class );
```

Once you have your `ConstraintMapping` you will have to pass it to the configuration. Since the programmatic configuration is not part of the official Bean Validation specification you will have to get hold of the Hibernate Validator specific configuration instance. See [Example 7.4, “Creating a Hibernate Validator specific configuration”](#).

Example 7.4. Creating a Hibernate Validator specific configuration

```
ConstraintMapping mapping = new ConstraintMapping();
// configure mapping instance

HibernateValidatorConfiguration config =
    Validation.byProvider( HibernateValidator.class ).configure();
config.addMapping( mapping );
ValidatorFactory factory = config.buildValidatorFactory();
Validator validator = factory.getValidator();
```

Annotation Processor

(EXPERIMENTAL)

Have you ever caught yourself by unintentionally doing things like

- annotating Strings with `@Min` to specify a minimum length (instead of using `@Size`)
- annotating the setter of a JavaBean property (instead of the getter method)
- annotating static fields/methods with constraint annotations (which is not supported)?

Then the Hibernate Validator Annotation Processor is the right thing for you. It helps preventing such mistakes by plugging into the build process and raising compilation errors whenever constraint annotations are incorrectly used.



Warning

A first version of the Hibernate Validator Annotation Processor is part of Hibernate Validator since release 4.1. It is currently still under development and should therefore be considered as an experimental feature. Some *known issues* can be found at the end of this chapter. In case any problems arise when using the processor feel free to ask for help at the *forum* [<https://forum.hibernate.org/viewforum.php?f=9>] or create an issue within *JIRA* [<http://opensource.atlassian.com/projects/hibernate/browse/HV/component/10356>].

8.1. Prerequisites

The Hibernate Validator Annotation Processor is based on the "Pluggable Annotation Processing API" as defined by *JSR 269* [<http://jcp.org/en/jsr/detail?id=269>]. This API is part of the Java Platform since Java 6. So be sure to use this or a later version.

8.2. Features

As of Hibernate Validator 4.1 the Hibernate Validator Annotation Processor checks that:

- constraint annotations are allowed for the type of the annotated element
- JavaBean getter methods are annotated in case of property validation
- only non-static fields or properties are annotated with constraint annotations
- only non-primitive fields or properties are annotated with `@Valid`
- only such annotation types are annotated with constraint annotations which are constraint annotations themselves

8.3. Options

The behavior of the Hibernate Validator Annotation Processor can be controlled using the [processor options](http://java.sun.com/javase/6/docs/technotes/tools/windows/javac.html#options) [http://java.sun.com/javase/6/docs/technotes/tools/windows/javac.html#options] listed in table [Table 8.1](#), “*Hibernate Validator Annotation Processor options*”:

Table 8.1. Hibernate Validator Annotation Processor options

Option	Explanation
<code>diagnosticKind</code>	Controls how constraint problems are reported. Must be the string representation of one of the values from the enum <code>javax.tools.Diagnostic.Kind</code> , e.g. <code>WARNING</code> . A value of <code>ERROR</code> will cause compilation to halt whenever the AP detects a constraint problem. Defaults to <code>ERROR</code> .
<code>verbose</code>	Controls whether detailed processing information shall be displayed or not, useful for debugging purposes. Must be either <code>true</code> or <code>false</code> . Defaults to <code>false</code> .

8.4. Using the Annotation Processor

This section shows in detail how to integrate the Hibernate Validator Annotation Processor into command line builds (javac, Ant, Maven) as well as IDE-based builds (Eclipse, IntelliJ IDEA, NetBeans).

8.4.1. Command line builds

8.4.1.1. javac

When compiling on the command line using [javac](http://java.sun.com/javase/6/docs/technotes/guides/javac/index.html) [http://java.sun.com/javase/6/docs/technotes/guides/javac/index.html], specify the following JARs using the “processorpath” option:

- `validation-api-1.0.0.GA.jar`
- `hibernate-validator-annotation-processor-4.1.0.Final.jar`

The following listing shows an example. The processor will be detected automatically by the compiler and invoked during compilation.

Example 8.1. Using the annotation processor with javac

```
javac src/main/java/org/hibernate/validator/ap/demo/Car.java \
```



```
-cp /path/to/validation-api-1.0.0.GA.jar \
-processorpath /path/to/validation-api-1.0.0.GA.jar:/path/to/hibernate-validator-annotation-processor-4.1.0.Final.jar
```

8.4.1.2. Apache Ant

Similar to directly working with `javac`, the annotation processor can be added as a compiler argument when invoking the [javac task](http://ant.apache.org/manual/CoreTasks/javac.html) [http://ant.apache.org/manual/CoreTasks/javac.html] for [Apache Ant](http://ant.apache.org/) [http://ant.apache.org/]:

Example 8.2. Using the annotation processor with Ant

```
<javac srcdir="src/main"
      destdir="build/classes"
      classpath="/path/to/validation-api-1.0.0.GA.jar">
  <compilerarg value="-processorpath" />
  <compilerarg value="/path/to/validation-api-1.0.0.GA.jar:/path/to/hibernate-validator-annotation-processor-4.1.0.Final.jar" />
</javac>
```

8.4.1.3. Maven

There are several options for integrating the annotation processor with [Apache Maven](http://maven.apache.org/) [http://maven.apache.org/]. Generally it is sufficient to add the Hibernate Validator Annotation Processor as a dependency to your project:

Example 8.3. Adding the HV Annotation Processor as dependency

```
...
<dependency>
  <groupId>org.hibernate</groupId>
  <artifactId>hibernate-validator-annotation-processor</artifactId>
  <version>4.1.0.Final</version>
  <scope>compile</scope>
</dependency>
...
```

The processor will then be executed automatically by the compiler. This basically works, but comes with the disadvantage that in some cases messages from the annotation processor are not displayed (see [MCOMPILER-66](http://jira.codehaus.org/browse/MCOMPILER-66) [http://jira.codehaus.org/browse/MCOMPILER-66]).

Another option is using the [Maven Annotation Plugin](http://code.google.com/p/maven-annotation-plugin/) [http://code.google.com/p/maven-annotation-plugin/]. At the time of this writing the plugin is not yet available in any of the well-known repositories. Therefore you have to add the project's own repository to your `settings.xml` or `pom.xml`:

Example 8.4. Adding the Maven Annotation Plugin repository

```
...
<pluginRepositories>
  <pluginRepository>
    <id>maven-annotation-plugin-repo</id>
    <url>http://maven-annotation-plugin.googlecode.com/svn/trunk/mavenrepo</url>
  </pluginRepository>
</pluginRepositories>
...
```

Now disable the standard annotation processing performed by the compiler plugin and configure the annotation plugin by specifying an execution and adding the Hibernate Validator Annotation Processor as plugin dependency (that way the AP is not visible on the project's actual classpath):

Example 8.5. Configuring the Maven Annotation Plugin

```
...
<plugin>
  <artifactId>maven-compiler-plugin</artifactId>
  <configuration>
    <source>1.6</source>
    <target>1.6</target>
    <compilerArgument>-proc:none</compilerArgument>
  </configuration>
</plugin>
<plugin>
  <groupId>org.bsc.maven</groupId>
  <artifactId>maven-processor-plugin</artifactId>
  <version>1.3.4</version>
  <executions>
    <execution>
      <id>process</id>
      <goals>
        <goal>process</goal>
      </goals>
      <phase>process-sources</phase>
    </execution>
  </executions>
  <dependencies>
    <dependency>
      <groupId>org.hibernate</groupId>
      <artifactId>hibernate-validator-annotation-processor</artifactId>
      <version>4.1.0.Final</version>
      <scope>compile</scope>
    </dependency>
  </dependencies>
</plugin>
...
```

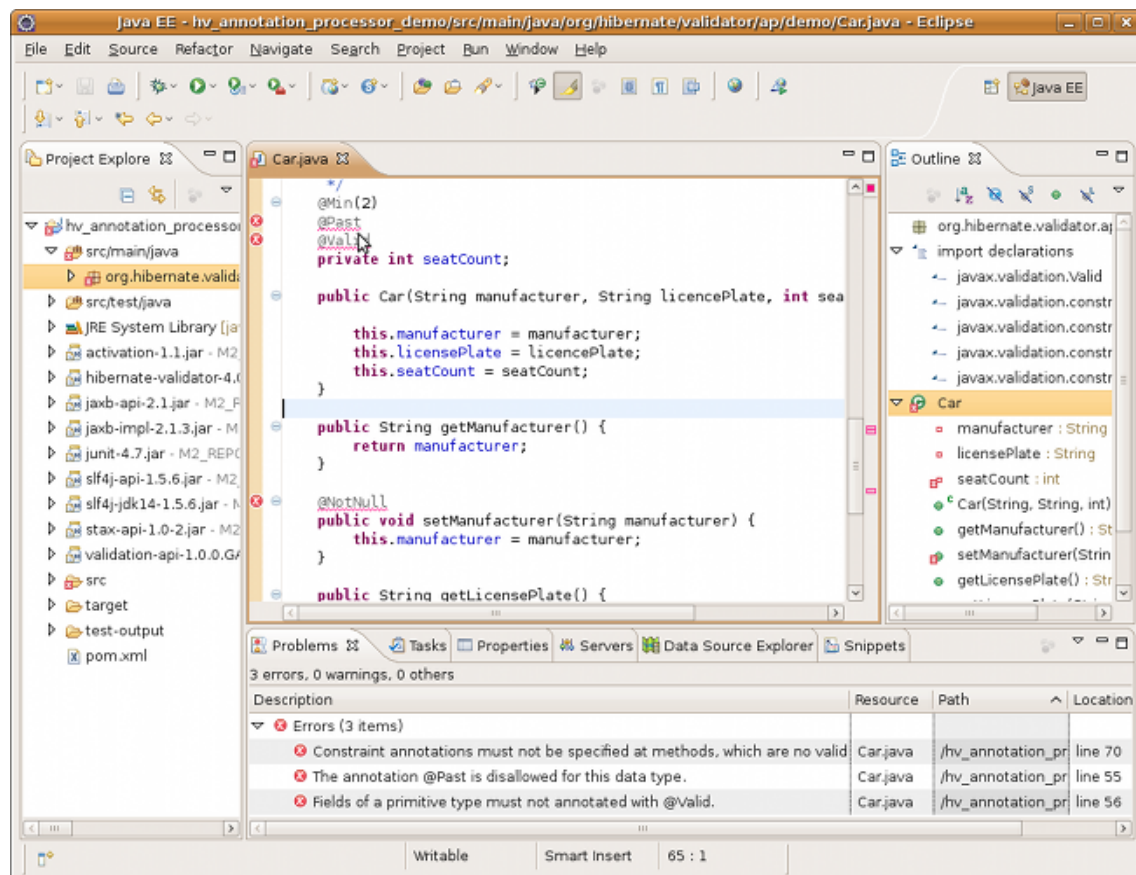
8.4.2. IDE builds

8.4.2.1. Eclipse

Do the following to use the annotation processor within the [Eclipse](http://www.eclipse.org/) [http://www.eclipse.org/] IDE:

- Right-click your project, choose "Properties"
- Go to "Java Compiler" and make sure, that "Compiler compliance level" is set to "1.6". Otherwise the processor won't be activated
- Go to "Java Compiler - Annotation Processing" and choose "Enable annotation processing"
- Go to "Java Compiler - Annotation Processing - Factory Path" and add the following JARs:
 - validation-api-1.0.0.GA.jar
 - hibernate-validator-annotation-processor-4.1.0.Final.jar
- Confirm the workspace rebuild

You now should see any annotation problems as regular error markers within the editor and in the "Problem" view:

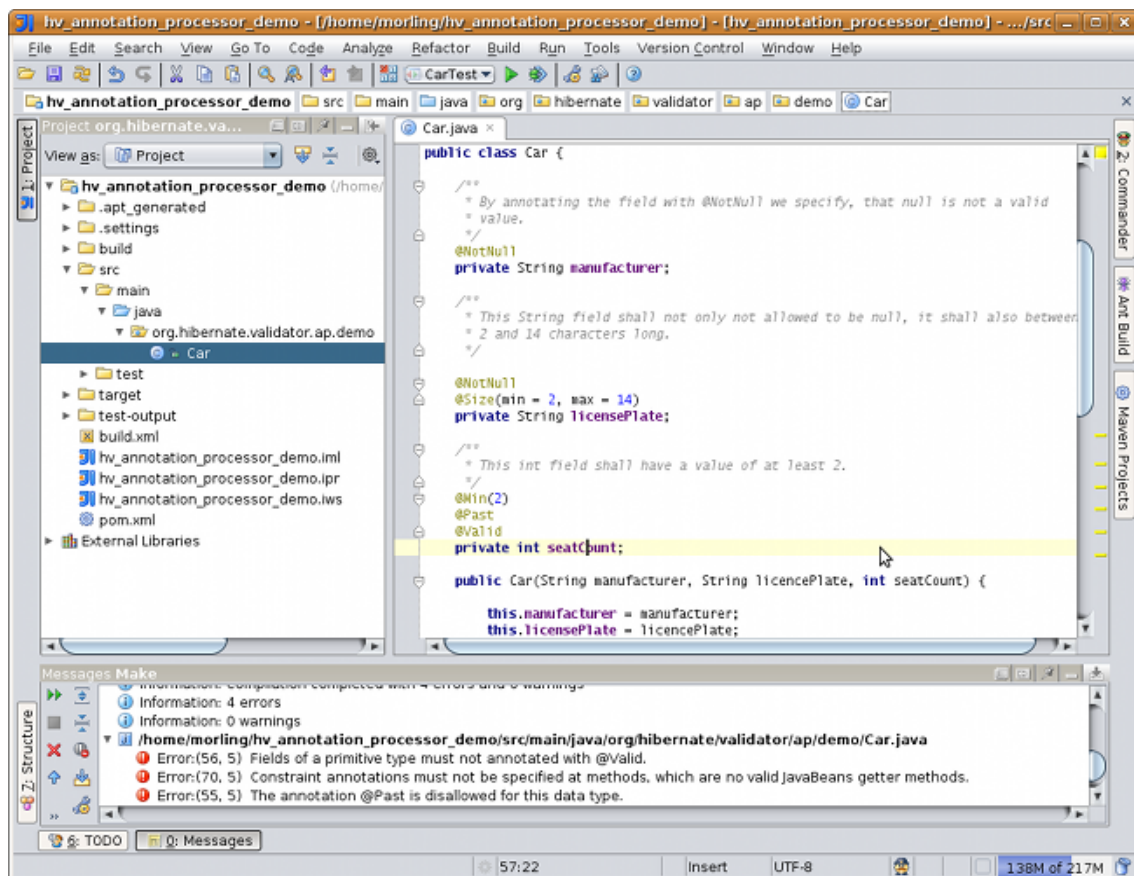


8.4.2.2. IntelliJ IDEA

The following steps must be followed to use the annotation processor within [IntelliJ IDEA](http://www.jetbrains.com/idea/) [http://www.jetbrains.com/idea/] (version 9 and above):

- Go to "File", then "Settings",
- Expand the node "Compiler", then "Annotation Processors"
- Choose "Enable annotation processing" and enter the following as "Processor path": /path/to/validation-api-1.0.0.GA.jar:/path/to/hibernate-validator-annotation-processor-4.1.0.Final.jar
- Add the processor's fully qualified name `org.hibernate.validator.ap.ConstraintValidationProcessor` to the "Annotation Processors" list
- If applicable add you module to the "Processed Modules" list

Rebuilding your project then should show any erroneous constraint annotations:

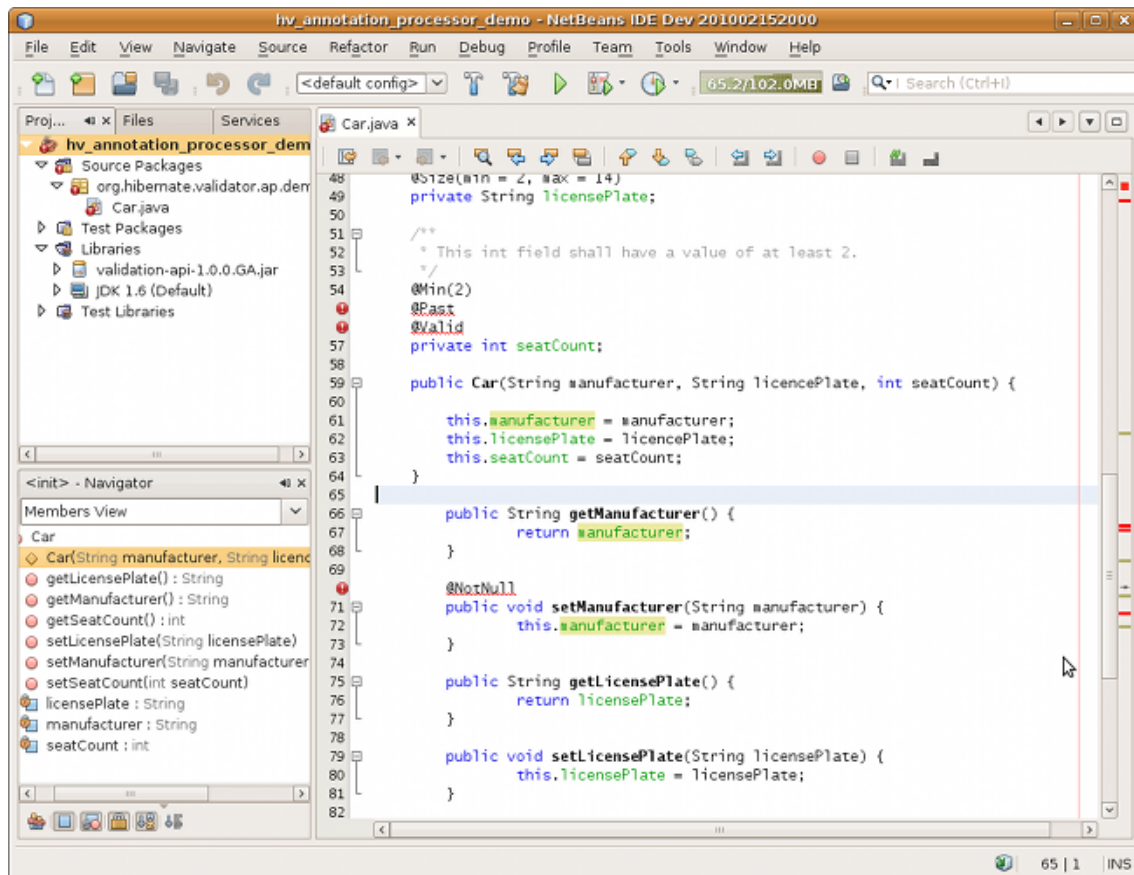


8.4.2.3. NetBeans

Starting with version 6.9, also the [NetBeans](http://www.netbeans.org/) [http://www.netbeans.org/] IDE supports using annotation processors within the IDE build. To do so, do the following:

- Right-click your project, choose "Properties"
- Go to "Libraries", tab "Processor", and add the following two JARs:
 - validation-api-1.0.0.GA.jar
 - hibernate-validator-annotation-processor-4.1.0.Final.jar
- Go to "Build - Compiling", select "Enable Annotation Processing" and "Enable Annotation Processing in Editor". Add the annotation processor by specifying its fully qualified name `org.hibernate.validator.ap.ConstraintValidationProcessor`

Any constraint annotation problems will then be marked directly within the editor:



8.5. Known issues

The following known issues exist as of May 2010:

- [HV-308](http://opensource.atlassian.com/projects/hibernate/browse/HV-308) [<http://opensource.atlassian.com/projects/hibernate/browse/HV-308>]: Additional validators registered for a constraint *using XML* [http://docs.jboss.org/hibernate/stable/validator/reference/en/html_single/#d0e1957] are not evaluated by the annotation processor.
- Sometimes custom constraints can't be *properly evaluated* [<http://opensource.atlassian.com/projects/hibernate/browse/HV-293>] when using the processor within Eclipse. Cleaning the

project can help in these situations. This seems to be an issue with the Eclipse JSR 269 API implementation, but further investigation is required here.

Further reading

Last but not least, a few pointers to further information. A great source for examples is the Bean Validation TCK which can be accessed anonymously in the Hibernate [SVN repository](http://anonsvn.jboss.org/repos/hibernate/validator/trunk) [http://anonsvn.jboss.org/repos/hibernate/validator/trunk]. Alternatively you can view the tests using [Hibernate's fisheye](http://fisheye.jboss.org/browse/Hibernate/beanvalidation/trunk/validation-tck/src/main/java/org/hibernate/jsr303/tck/tests) [http://fisheye.jboss.org/browse/Hibernate/beanvalidation/trunk/validation-tck/src/main/java/org/hibernate/jsr303/tck/tests] installation. [The JSR 303](http://jcp.org/en/jsr/detail?id=303) [http://jcp.org/en/jsr/detail?id=303] specification itself is also a great way to deepen your understanding of Bean Validation resp. Hibernate Validator.

If you have any further questions to Hibernate Validator or want to share some of your use cases have a look at the [Hibernate Validator Wiki](http://community.jboss.org/en/hibernate/validator) [http://community.jboss.org/en/hibernate/validator] and the [Hibernate Validator Forum](https://forum.hibernate.org/viewforum.php?f=9) [https://forum.hibernate.org/viewforum.php?f=9].

In case you would like to report a bug use [Hibernate's Jira](http://opensource.atlassian.com/projects/hibernate/browse/HV) [http://opensource.atlassian.com/projects/hibernate/browse/HV] instance. Feedback is always welcome!

