# VALIDATION

**Continue to**

**Avoid the Danger that has not yet come**

# Data Validation is Fundamental

“The Data Warehousing Institute (DWI) estimates the cost of bad or ‘dirty' data exceeds $600 billion annually”

--- Data Cleaning & Validation

Estimates show dirty data is a big problem for the U.S. economy. How big? About 2x the national deficit.

-- Dirty Data costs U.S. $3 Trillion

Retail company found over 1m records contained home telephone number of “000000000” and addresses containing flight numbers

Healthcare company found 9 different values in gender field

Et cetera, et cetera, et cetera…

## Approaches to Validation

- **Front-end validation**
  - Essentially user input validation
  - Manual form validation
  - Transfer “secure” data to persistence layer
  - Complexity grows as variety of front ends increase
- **Back-end validation**
  - Database handles validation
  - Constraints are enforced in the database
    - e.g., Insert 50 character  string into a VARCHAR(20) column
  - Significant Performance cost
- **JSR 303/349 Validation:**
  - “End-agnostic” -  you can use it anywhere
  - Scaleable
  - Supports data driven approach
  - DRY

## JSR 303 - 349

- Java **Bean Validation** Framework
- Defines a metadata model [ Java Annotations]

- **Raison d'etre**

  Data Validation occurs throughout an application

  presentation layer thru persistence layer

  Same validation logic is often duplicated in each layer

  time consuming and error-prone.

**Hibernate Validator** is the reference implementation for JSR 303

## Spring Core Technology
## Data Validation

- Validation should not be tied to the web tier,
  should be easy to localize
  should be possible to plug in any validator available.

- Spring Validation uses a Validator interface that is basic and usable in every layer of an application.

- **An application can choose to enable Bean Validation (JSR-303) and the corresponding annotations for all validation needs.**

- Additionally an application can use the Spring Validator directly without the use of annotations.

# Validation Property Annotations [JSR-303]

| Constraint | Description | Example |
|---|---|---|
| **@AssertFalse** | The value of the field or property must be false. | @AssertFalse<br>boolean isUnsupported; |
| **@AssertTrue** | The value of the field or property must be true. | @AssertTrue<br>boolean isActive; |
| **@DecimalMax** | The value of the field or property must be a decimal <= the value. | @DecimalMax("30.00")<br>BigDecimal discount; |
| **@DecimalMin** | The value of the field or property must be a decimal >= the value. | @DecimalMin("5.00")<br>BigDecimal discount; |
| **@Digits** | The value of the field or property must be a number within a specified range. | @Digits(integer=6, fraction=2)<br>BigDecimal price; |
| **@Future** | The value of the field or property must be a date in the future. | @Future<br>Date eventDate; |
| **@Max** | The value of the field or property must be an integer >= the value. | @Max(10)<br>int quantity; |
| **@Min** | The value of the field or property must be an integer <= the value. | @Min(5)<br>int quantity; |
| **@NotNull** | The value of the field or property must not be null. | @NotNull<br>String username; |
| **@Null** | The value of the field or property must be null. | @Null<br>String unusedString; |
| **@Past** | The value of the field or property must be a date in the past. | @Past<br>Date birthday; |
| **@Pattern** | The value of the field or property must match the regular expression defined in the regexp element. | @Pattern(regexp="\\(\\d{3}\\)\\d{3}-\\d{4}")<br>String phoneNumber; |
| **@Size** | The size of the field or property is evaluated and must match the specified boundaries. Can pertain to String, Collection, Map… | @Size(min=2, max=240)<br>String briefMessage; |

Hibernate JSR 303  Annotations

It's for Strings and collections.

# Domain object annotations

```
@NotEmpty @Size(min=4, max=50, message="{Size.name.validation}")
• private String firstName;
• @NotEmpty(message="Enter the last name")
• private String lastName;
• @NotNull
• private Date birthDate;
• @Valid
• private Address address;
              ADDRESS:
• @NotEmpty(message="String.empty")
• private String street;
• @Size(min=2, max=2, message="Size.state")
• private String state;
• @Pattern(regexp="^\\d{5}(-\\d{4})?$",message="{Pattern.zipcode}")
•  private String zipCode;
```

use for Objects

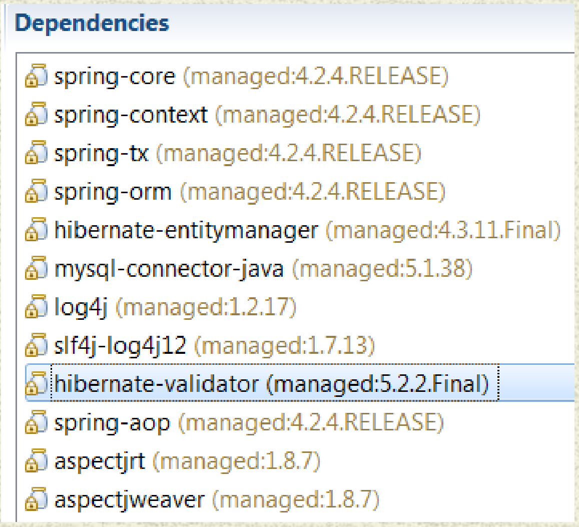
Note: Curly {} brackets ensure that the text will be used as a property file lookup

## Error message externalized in .properties file

```
typeMismatch.id= Id is not valid . Please enter a number
NotEmpty= {0} field must have a value
String.empty = {0} must have value
Size.state = State must have two  characters
Size.name.validation= Size of the {0} must be between {2} and {1}
typeMismatch.java.util.Date={0} is an invalid date. Use format
MM-DD-YYYY.
Pattern.zipcode= {0} is incorrect. Use format nnnnn-nnnn
```

- **NOTE:**
- *"placeholders" are in alphabetical order. @Size(min=1,max=5), field name as {0} , the max value as {1} , and the min value as {2}*

# Spring Validation Config



Dependencies

- spring-core (managed:4.2.4.RELEASE)
- spring-context (managed:4.2.4.RELEASE)
- spring-tx (managed:4.2.4.RELEASE)
- spring-orm (managed:4.2.4.RELEASE)
- hibernate-entitymanager (managed:4.3.11.Final)
- mysql-connector-java (managed:5.1.38)
- log4j (managed:1.2.17)
- slf4j-log4j12 (managed:1.7.13)
- hibernate-validator (managed:5.2.2.Final)
- spring-aop (managed:4.2.4.RELEASE)
- aspectjrt (managed:1.8.7)
- aspectjweaver (managed:1.8.7)

- **Maven Dependency**

```
<bean id="messageSource"
  class=
  "org.springframework.context.support.ReloadableResourceBundleMessageSource">
        <property name="basename" value="classpath:errorMessages" />
</bean>
<bean id="messageAccessor"
          class="org.springframework.context.support.MessageSourceAccessor">
                <constructor-arg  ref="messageSource"/>
</bean>
<bean id="validator"
     class=
     "org.springframework.validation.beanvalidation.LocalValidatorFactoryBean">
          <property name="validationMessageSource" ref="messageSource" />
</bean>
```

## Data Validation Application

- **Presentation**
  - simple input validation
  - do not proceed if the input is in the wrong format
  - "gate" client requests to the server to reduce round-trips, for ***better usability and reduced bandwidth/time***
- **Service**
  - business logic and **authorization**
  - don't let users do things they aren't allowed to do
  - handle "derived" properties and state here (things that would be denormalized in the database)
- **Persistence**
  - the essential data integrity layer
  - **ABSOLUTELY REFUSE** to store any junk

## Main Point

- Validation checks the correctness of data against business rules. This prevents problems in the business model from arising.

*In Cosmic Consciousness,  life is  lived stress- free; problem-free*

# Constraint Composition "Convenience" Feature

- **USE CASE Example:**
- `@NotEmpty`
- `Size(min=5, max = 9, message= "{EmptyOrSize}")`
- `private String lastName;`

- **`For lastName = ""`**
- **`2 messages:`**

  Last name is a required field

  Last name must be between 5 and 9 characters

**Composition Alternative:**

- `@EmptyOrSize(min=5, max = 9, message= "{EmptyOrSize}")`
- **`1 message:`**
- `Last Name must be between 5 & 9 characters`

## Annotation Implementation

```
@NotEmpty( )
@Size
@Target( { ElementType.METHOD, ElementType.FIELD })
@Retention(RetentionPolicy.RUNTIME)
@Constraint(validatedBy = {})
@ReportAsSingleViolation
@Documented
public @interface EmptyOrSize {
String message() default “Must be a value and the right size.";
Class<?>[] groups() default {};
Class<? extends Payload>[] payload() default {  };

@OverridesAttribute(constraint=Size.class, name="min")
    int min() default 10;
    @OverridesAttribute(constraint=Size.class, name="max")
    int max() default 15;
```

**SEE DEMO Validation**

# JSR 303 GROUPS

- **Constraints may be added to one or more groups**
- **Groups allow you to restrict the set of constraints applied during validation.**

- **USE CASE Scenario:**
- **Overnight batch job** loads new products with INVALID Status

  If product "passes" default validation — Default group

  product is set to BASIC status

  & assigned to an Admin [Sean or Bill]

- **Admin** "fixes" product

  If product "passes" details validation — Details group

  product is set to DETAILS status

  & assigned to the Admin's Supervisor [Paul or Pete]

**Supervisor** "fixes" product

If product "passes" production validation — Production group

product is set to PRODUCTION status

# Hibernate Groups Example

- A Group is an interface
- A group can extend another group
- When  validator evaluates a specific group's constraints it also evaluates all of its super groups (interfaces) constraints.

```
public interface Details extends Default {}
public interface Production extends Details {}
```

Default group

```
@EmptyOrSize(min=5, max = 32, message= "{EmptyOrSize}")
private String name;

@EmptyOrSize(min=20,max=2000,message="{EmptyOrSize}",groups={Details.class})
private String description;

@NullMinNumber(value=6,message="{NullMinNumber}",groups={Production.class})
private Integer quantity;
```

## Demo
## Business Process Management [BPM]

- BPM is  designing processes, executing them across people and systems, managing tasks, and continually optimizing it all.

- Workflow  Management -  is  automation tool for directing tasks to the responsible users in a business process for further actions.

- Workflow is a component of BPM, but it is more about task management and how repeatable, less complex individual processes get accomplished.

## Demo
## “home grown” workflow/business process

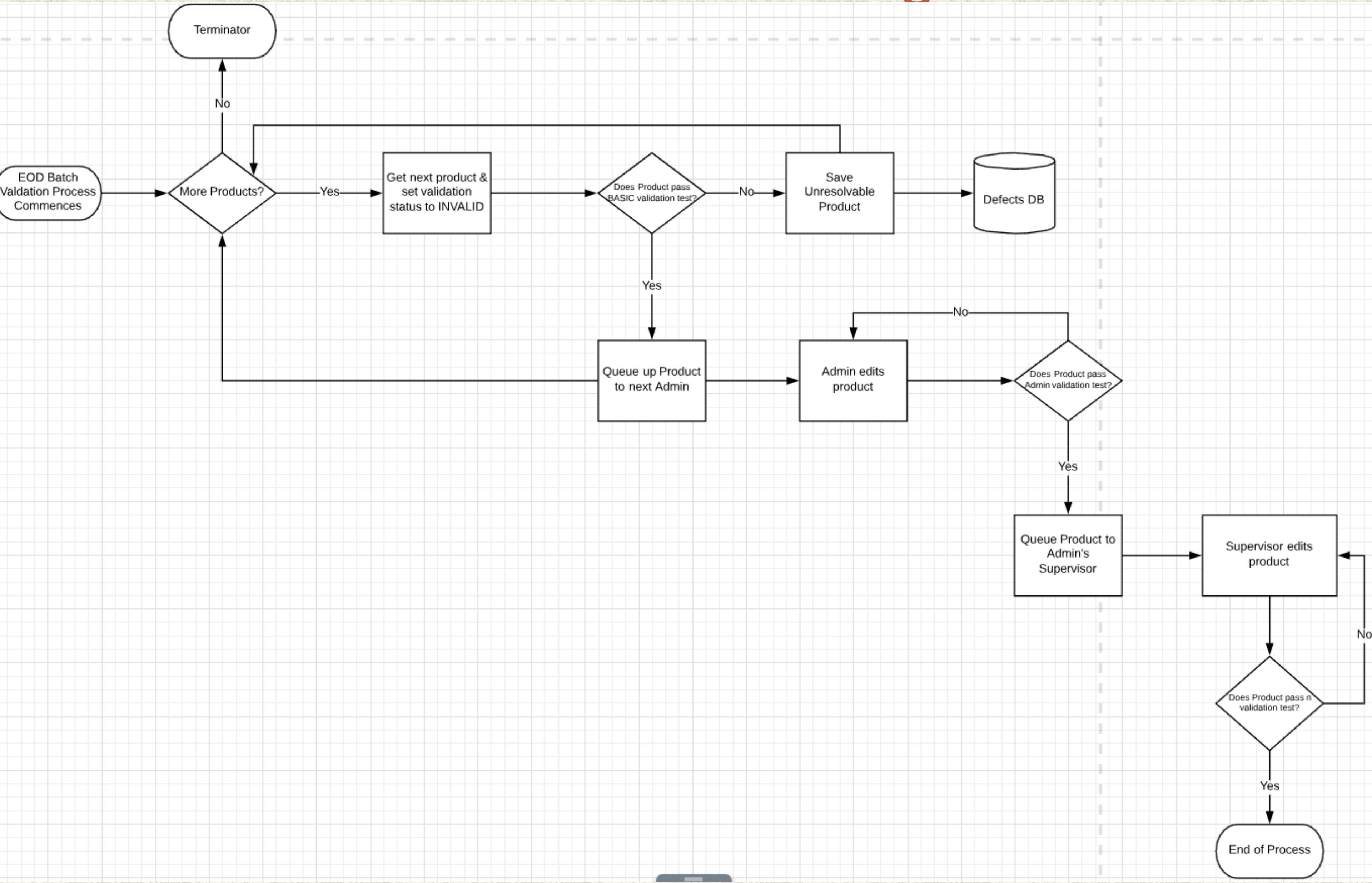
**EOD Batch job Loads the products**

Status set **INVALID**

- If product "passes" default validation
- product is set to **BASIC** status

  & assigned to an Admin [Sean or Bill]
- **Admin "fixes" product**
- If product "passes" details validation
- product is set to **DETAILS** status & assigned to the Admin's Supervisor
- **Supervisor "fixes" product**
- product is set to **PRODUCTION** status

## Demo Workflow Diagram


Terminator
No
EOD Batch Valdation Process Commences
More Products?
Yes
Get next product & set validation status to INVALID
Does Product pass BASIC validation test?
No
Save Unresolvable Product
Defects DB
Yes
No
Queue up Product to next Admin
Admin edits product
Does Product pass Admin validation test?
Yes
Queue Product to Admin's Supervisor
Supervisor edits product
No
Does Product pass n validation test?
Yes
End of Process

## Hibernate Validator

- Built in to Hibernate [***DIFFERENT from Spring Validator***]

**Last line of Defense**

Entities are verified before inserts, updates or deletes are made by Hibernate.

- On constraint violation – throws ConstraintViolationException

  contains a set of ConstraintViolations describing each failure.

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

- **Demo Uses Hibernate Validator**

  ***BECAUSE*** Spring no longer supports calling Spring Validator with Group !!!
- **Hibernate Validator**
- Properties file defaults to ValidationMessages…

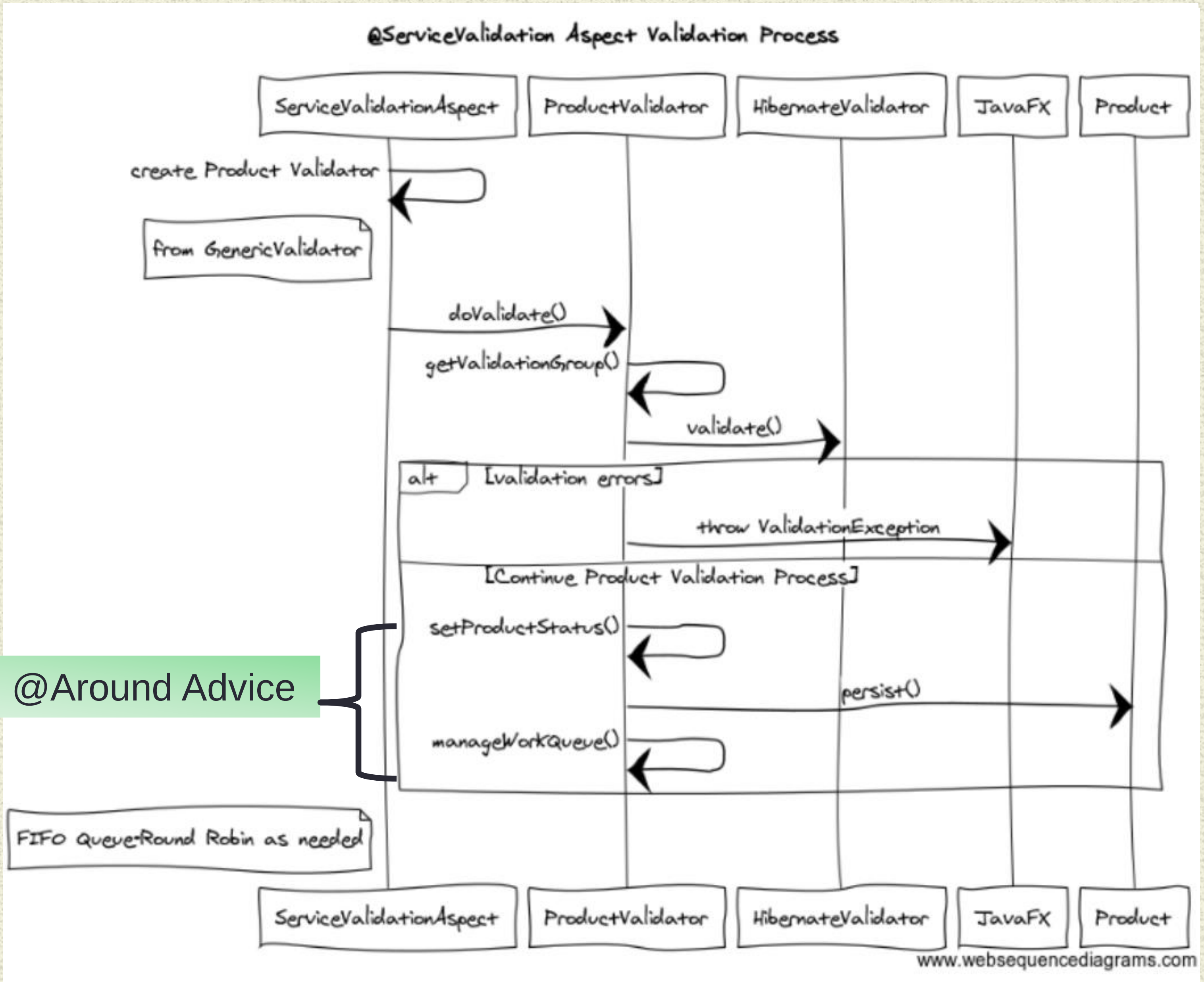
# Demo
# Validation Aspect

- **ServiceValidationAspect.java**
- @Aspect
- @Component
- public class ServiceValidationAspect {

DEMO uses AOP

- //Pass in Object under validation
- @Around("validate() && applicationMethod() && argsMethod(object)")
- public void doValidate( ProceedingJoinPoint joinPoint, Object object)
- **ProductServiceImpl.java**
- @ServiceValidation
-     public void update( Product product) {
-         this.performUpdate(product);
- SEE DEMOs ValidationGroupsBatch && ValidationGroupsDesktop

# Validaton Process



This is @Around Advice

## Main Point

- JSR 303/349 validation allows for handling more complex, extraordinary verification issues with such features as Groups and Constraint Composition. *A quality of Cosmic Consciousness is the ability to know what is true and right in every situation.*