

A Profile Approach to Using UML Models for Rich Form Generation

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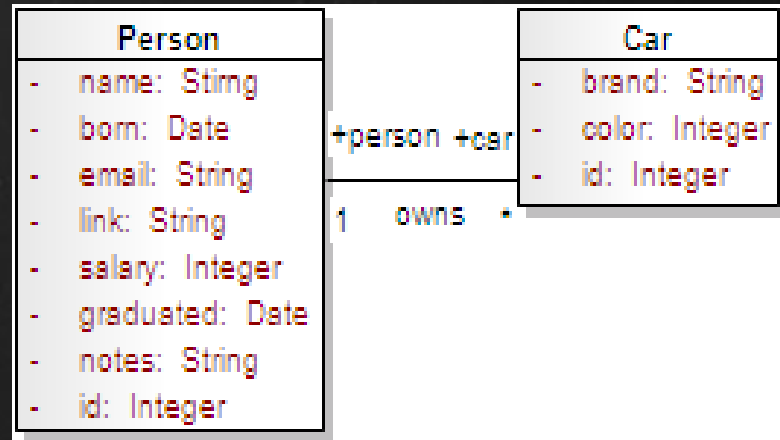
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Introduction








- Model-driven development (MDD)
 - advantages vs. issues
- User Interface
 - Manual vs. MDD
 - Initial development vs. maintenance

Motivation example











Simple class diagram



What can we get

Name:	<input type="text" value="No"/>	
Born:	<input type="text" value="04/30/2010"/> 	
Email:	<input type="text" value="bob"/>	
Link:	<input type="text" value="bob page"/>	
Salary:	<input type="text" value="100"/>  	
Graduated:	<input type="text" value="today"/> 	 date format is wrong
Notes:	<input type="text"/>	
Id:	<input type="text" value="1"/>  	

What we want

Name: *	<input type="text" value="No"/>	 min length: 3
Email: *	<input type="text" value="bob"/>	 email
Salary:	<input type="text" value="100"/>  	 min range: 1000
Link:	<input type="text" value="http://bob page"/> show	 cannot contain spaces
Born: *	<input type="text" value="04/30/2010"/> 	 has to be past
Graduated:	<input type="text" value="today"/> 	 date format is wrong
Notes:	<input type="text"/>	

* required fields

Manual development

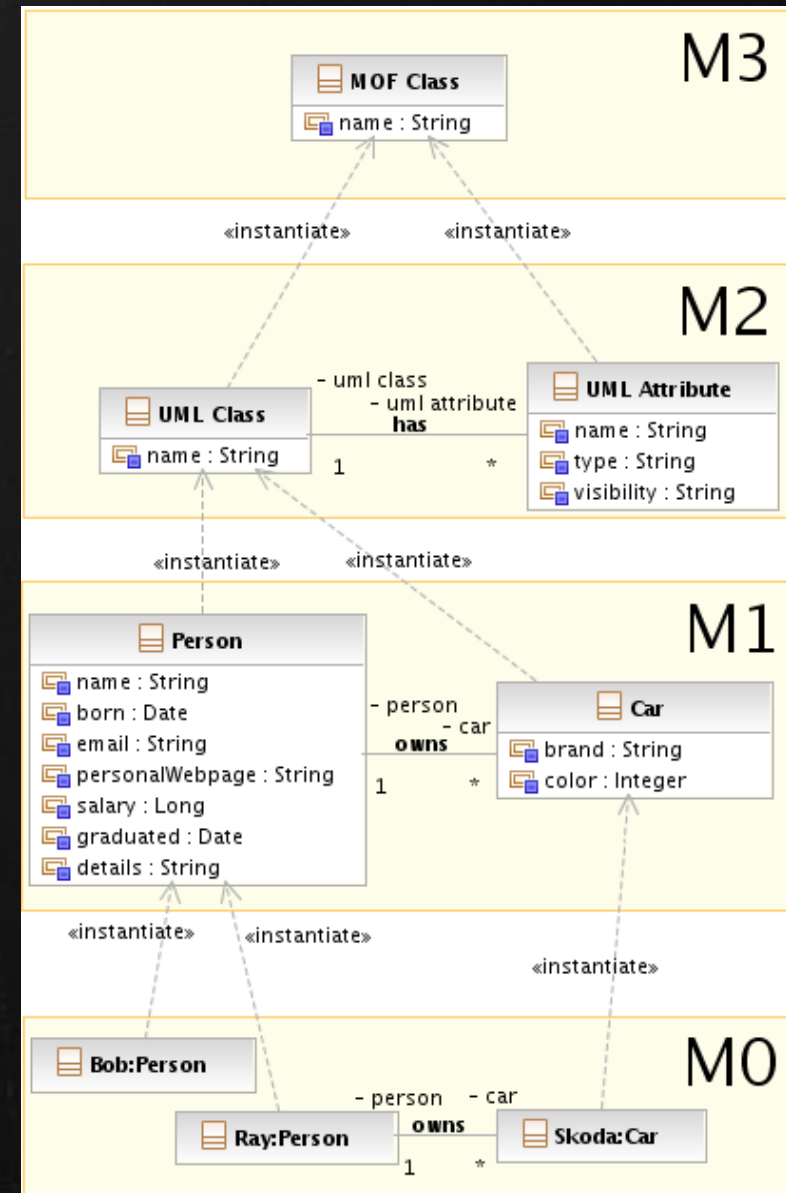
- Adding validation
 - We know just data types
- Field order
- Dates restrictions
- Texts
 - Email
 - HTTP link
 - HTML
 - Long vs. short text
- Hidden fields

Manual development

- Impact of a change in a lower layer?
- Maintenance

MDD

- Models does not provide sufficient information for the code generation



Conventional libraries

- Object-relational mapping (ORM)
 - JPA standard
 - Hibernate, Open JPA, Toplink
- Validation
 - Server vs. client
 - Hibernate validator (HBV)
- Annotations for extending the information for a particular field
 - Still not enough
- View annotations
 - FormBuilder (FB)
 - This is enough

Promotion to MDD

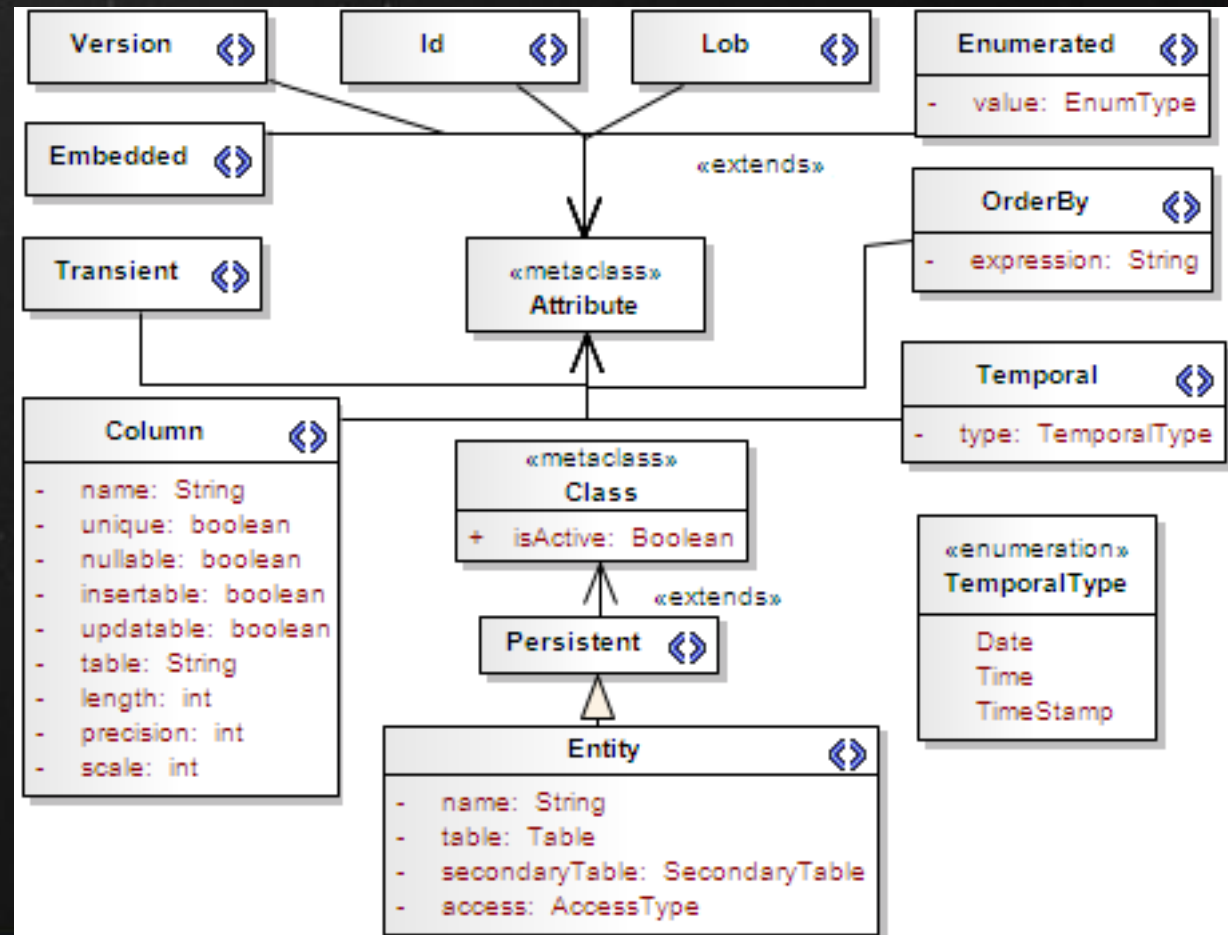
- How do we extend models?
 - Modeling element UML
 - Our own models
 - Stereotypes, tag values for UML
 - UML Profiles
- UML Profiles
 - Advantages?

MD-JPA

UML Profile for (ORM)

- JPA standard

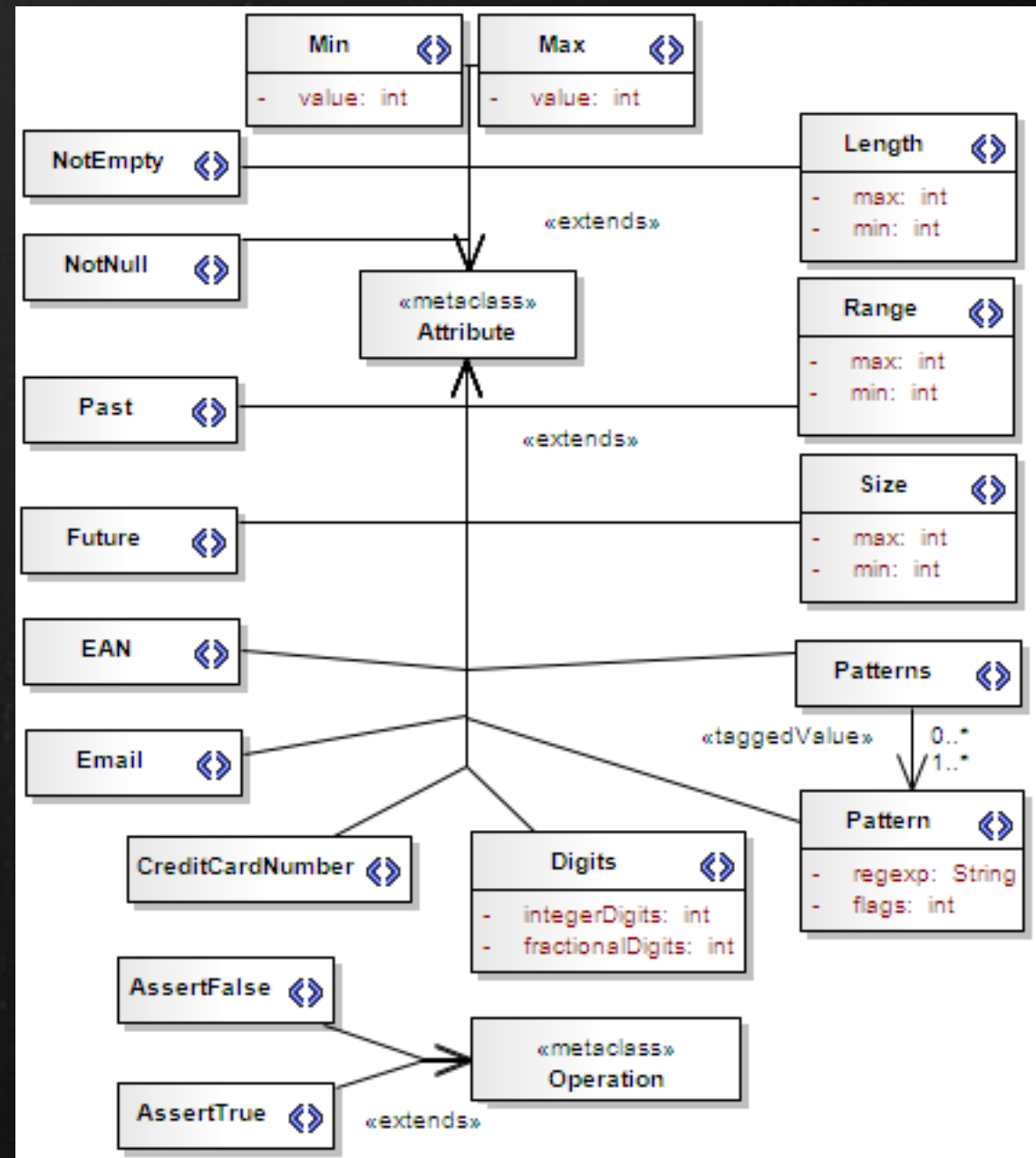
- Towards a UML profile for model-driven object-relational mapping, Alexandre Torres, Renata Galante and Marcelo S. Pimenta, Instituto de Informatica Universidade Federal do Rio Grande do Sul, Brazil, 2009 XXIII Brazilian Symposium on Software Engineering



MD-HBV

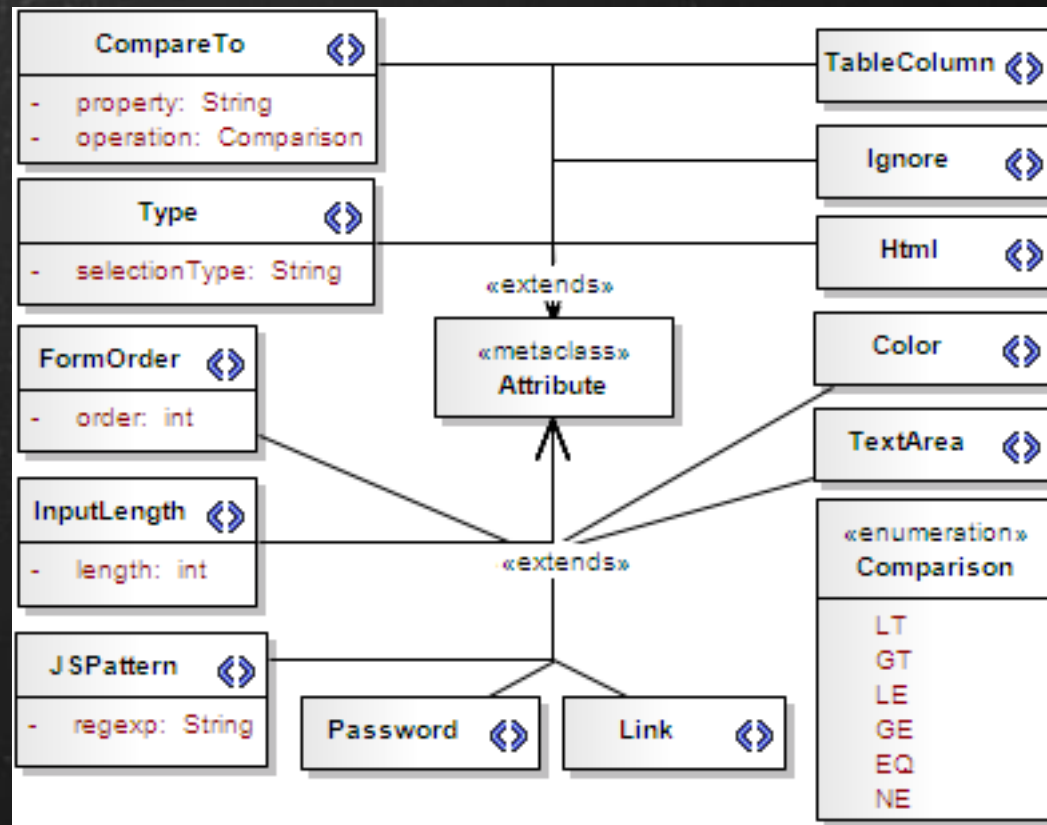
UML Profile for (HBV)

- Successfully used in production


















































MD-FB

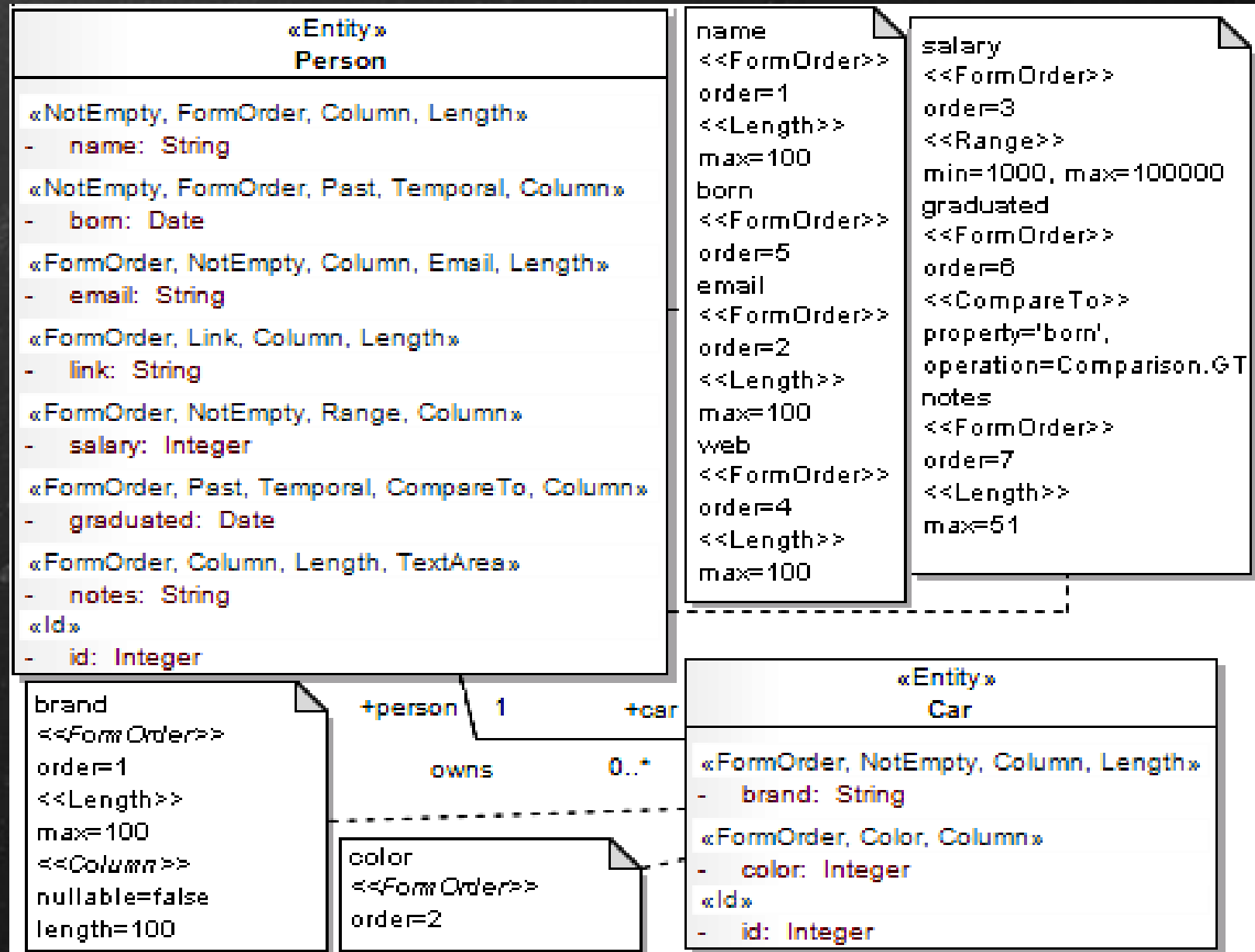
UML Profile for (FB)



UML Profiles

«profile» JPA	«profile» HibernateValidator	«profile» FormBuilder
<ul style="list-style-type: none"> + Attribute + Class + Column + Embedded + Entity + Enumerated + Id + Lob + OrderBy + Persistent + Temporal + TemporalType + Transient + Version	<ul style="list-style-type: none"> + AssertFalse + AssertTrue + Attribute + CreditCardNumber + Digits + EAN + Email + Future + Length + Max + Min + NotEmpty + NotNull + Operation + Past + Pattern + Patterns + Range + Size	<ul style="list-style-type: none"> + Attribute + Color + CompareTo + Comparison + FormOrder + Html + Ignore + InputLength + JSPattern + Link + Password + TableColumn + TextArea + Type

Back to our example



Back to our example

```
@Entity
@Table(name = "Person", catalog = "FB")
public class Person implements
        java.io.Serializable {

    private String name;
    private Date born;
    ...
    @Column(name = "name", nullable = false
            , length = 100)

    @NotEmpty
    @Length(max = 100)
    @FormOrder(1)
    public String getName() {return this.name;}
    public void setName(String name) {
        this.name = name;
    }

    @Column(name = "born", nullable = false)
    @Temporal(TemporalType.DATE)
    @NotEmpty
    @Past
    @FormOrder(5)
    public String getBorn() {return this.born;}
    ...
}
```

```
<h:form id="formPerson">
    <util:inputText label="Name"
        edit="{edit}"
        value="{bean.name}"
        required="true"
        size="30"
        minlength="0"
        maxlength="100"
        title="{text[t.person.name]}"
        rendered="{empty nameRender
            ? 'true' : nameRender}"
        id="{prefix}name"/>
    ..
    <util:inputDate label="Born"
        edit="{edit}"
        value="{bean.born}"
        required="true"
        title="{text[t.person.born]}"
        rendered="{empty bornRender
            ? 'true' : bornRender}"
        id="{prefix}born"/>
    ..
</h:form>
```

Advantages of our approach I.

- No manual intervention for code generation
 - Tedious and error-prone
- Maintenance
- User input validation integration
 - Client-side validation
- Usability support (HCI)
 - Knowledge of field meaning
 - Uniform strategy
- Approaches
 - On demand
 - Static pre-generation

Advantages of our approach II.

- Client HTTP, WML, standalone
- Simple integration of role-based security
- UML profiles compatible with UML tools
- Support developers to use MDD

Conclusion

- New approach for rich form generation
- UML Profiles for
 - ORM
 - Validation
 - View form generation
- Tool capable of rich form generation
- Advantages
 - Maintenance
 - Usability
 - Validation