Variability Mechanisms in E-Business Process Families

Arnd Schnieders and Frank Puhlmann

Business Process Technology Group
Hasso-Plattner-Institute
Potsdam, Germany
Outline

• Motivation
• Preliminaries
  • Software Product Lines
  • Process Family Engineering
• Variability Mechanisms
• Example
• Evaluation & Conclusion
Motivation
PESOA Project Goals

• Aims at developing methodologies and techniques for modeling variant-rich processes
• Based on Software Product Lines
• Two domains: E-Business and Automotive
Preliminaries
Software Product Lines

- Derived from industrial product lines:

- Dual life-cycle of software product lines:
  - Domain engineering (for a set of related products)
  - Application engineering (for a certain product)
Software Product Lines

• Derived from industrial product lines:

  C 200 CDI  C 220 CDI  C 270 CDI

• Dual life-cycle of software product lines:
  • Domain engineering (for a set of related products)
  • Application engineering (for a certain product)
Process Family Engineering

• Analysis:
  • Requirements on process family members

• Design:
  • Variant-rich processes containing
    • Variation points
    • Possible resolutions (variants)
    • How to resolve (variability mechanisms)

• Implementation:
  • Process artifacts containing variability
Variability Mechanisms
Variability Mechanism

• *Describes techniques for realizing variability*
• Selection can have substantial impact
• Links design and implementation
### Mechanisms

<table>
<thead>
<tr>
<th>Encapsulation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parameterization</td>
</tr>
<tr>
<td>Extension</td>
</tr>
<tr>
<td>Inheritance</td>
</tr>
<tr>
<td>Design Patterns</td>
</tr>
</tbody>
</table>
### Mechanisms

- Encapsulation
- Parameterization
- Extension
- Inheritance
- Design Patterns

**Examples of Variability**
### Examples of Variability Mechanisms

<table>
<thead>
<tr>
<th>Mechanisms</th>
</tr>
</thead>
<tbody>
<tr>
<td>Encapsulation</td>
</tr>
<tr>
<td>Parameterization</td>
</tr>
<tr>
<td>Extension</td>
</tr>
<tr>
<td>Inheritance</td>
</tr>
<tr>
<td>Design Patterns</td>
</tr>
</tbody>
</table>
Encapsulation
Quality Check

Test Painting

<<Extension>>

Test Painting

<<Optional>>

Extension
Example
Features of an E-Business Shop
Checkout

Acquire Products

<<Abstract>>
CalculateSum

<<Default>>
Calculate Sum

<<Inheritance>>

{feature:Personalized Shopping Cart}

<<Implementation>>
Calculate Sum
Calculate Discount

<<Alternative>>
Debit Credit Card

<<Parameterization>>
Discount=3%

<<Inheritance>>

Create Invoice

Discount=5%
Evaluation & Conclusion
Evaluation

- Case studies at ehotel
- Source of variant-rich processes
- Bachelor project „Magrathea“ (in corporation with ehotel and Delta Software)
- Complete prototype covering domain and application engineering
- Generation of web-based applications based on variant-rich processes
Conclusion

• PESOA researches novel approaches for process family engineering

• We showed how a family of E-Business processes can be modeled using
  • Process Family Architecture
  • Variability Mechanisms
Thank You!

http://pesoa.org