Dresden University of Technology
Department of Computer Science
Heinz-Nixdorf Endowed Chair for Multimedia Technology

Eindhoven University of Technology
Department of Computer Science
Section Information Systems

Vrije Universiteit Brussel
Department of Computer Science
WISE

A Generic Transcoding Tool for Making Web Applications Adaptive

Trends

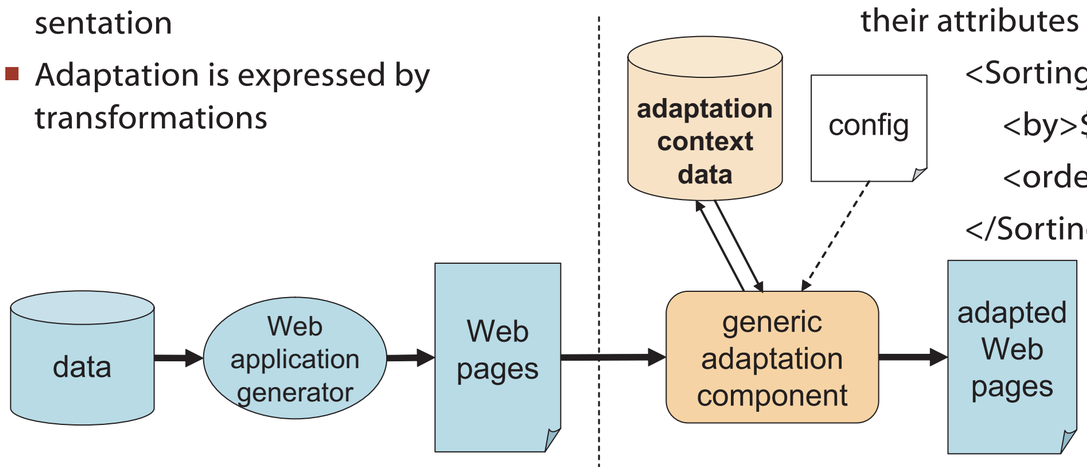
- Growing number of Web users with heterogeneous preferences and (mobile) client devices
- Personalization and device independence become prominent issues of Web development
- Need for Adaptation in Web Information Systems: Adaptive WIS (AWIS)

Problems

- Existing WIS methodologies assume to develop AWISs "from scratch"
- Insufficient support for adding adaptation to an existing WIS
- Current transcoding solutions do not allow for dynamic adaptation (adaptivity)

Generic Adaptation Component (GAC)

- AWISs: based on series of data transformations converting data to a Web presentation
- Goal: Major parts of the adaptation-specific transformations can thus be separated from the presentation
- Adaptation is expressed by transformations



- Input: XML-based Web content
- Configuration: Recipe for the adaptation based on RDF-based rule language
- Adaptation Context Data (ACD) is a description of the user, device and entire usage context

GAC Scenarios

- Transcoding static/dynamic Web pages
- Adaptive front-end of a complex WIS
- Pipeline of GACs for adaptation at different stages of the Web presentation generation process
- Running example: Hera-based hypermedia presentation consisting of set of slice instances

GAC Configuration

- Consists of a set of *Rules*
- A *Rule* is always bound to a *Condition*
- Rules are either *Adaptation Rules* or *Update Rules*
- Rule language is formalized in RDF(S)

Adaptation Rules

- Perform adaptation operations on (parts of) the input content
- *Selector* property for unequivocally identifying these parts

- **Appearance Rule:** conditional inclusion of selected fragments

```
<AppearanceRule selector="//Slice.picture">
   <Condition when="($ImageCapable==yes)"/>
</AppearanceRule>
```

- **Separation Rules** put selected content on separate pages. The original content is replaced by links to the new location.
- **Inclusion Rules** aim at including external content fragments
- **Replacement Rules** substitute specific XML fragments with another fragment

```
<ReplacementRule selector="//H3">
   <with>H1</with>
</ReplacementRule>
```

- **Sorting Rules** order content units according to their attributes

```
<SortingRule selector="//Slice.members">
   <by>$SliceVisited[@ID]</by>
   <order>desc</order>
</SortingRule>
```

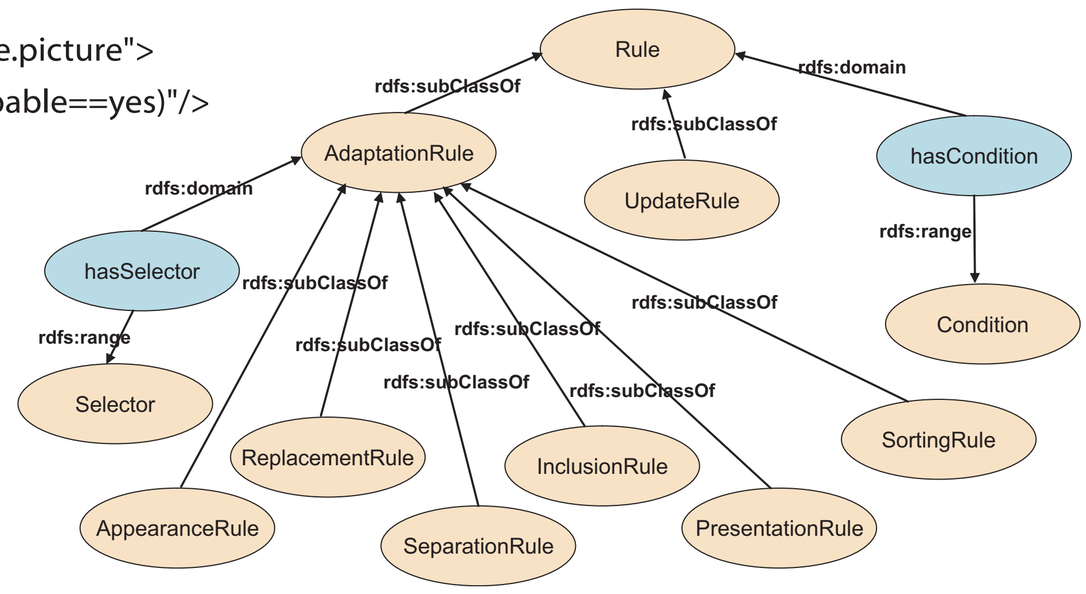
- **Presentation Rules** transform device-independent XML input to a Web implementation format

  Layout managers: abstract layout descriptors specifying the spatial arrangement of content elements

```
<PresentationRule selector="//Slice.members">
   <layout type="GridLayout">
   <cols>3</cols>
</PresentationRule>
```

Update Rules

- Update the Adaptation Context Data (ACD)
- Change existing ACD parameters or create new ones
- Triggerred for each input document
- Support adaptivity by updating the ACD according to users' navigation history



- Based on the *phase* property Update Rules are executed before (pre) or after (post) the Adaptation Rules

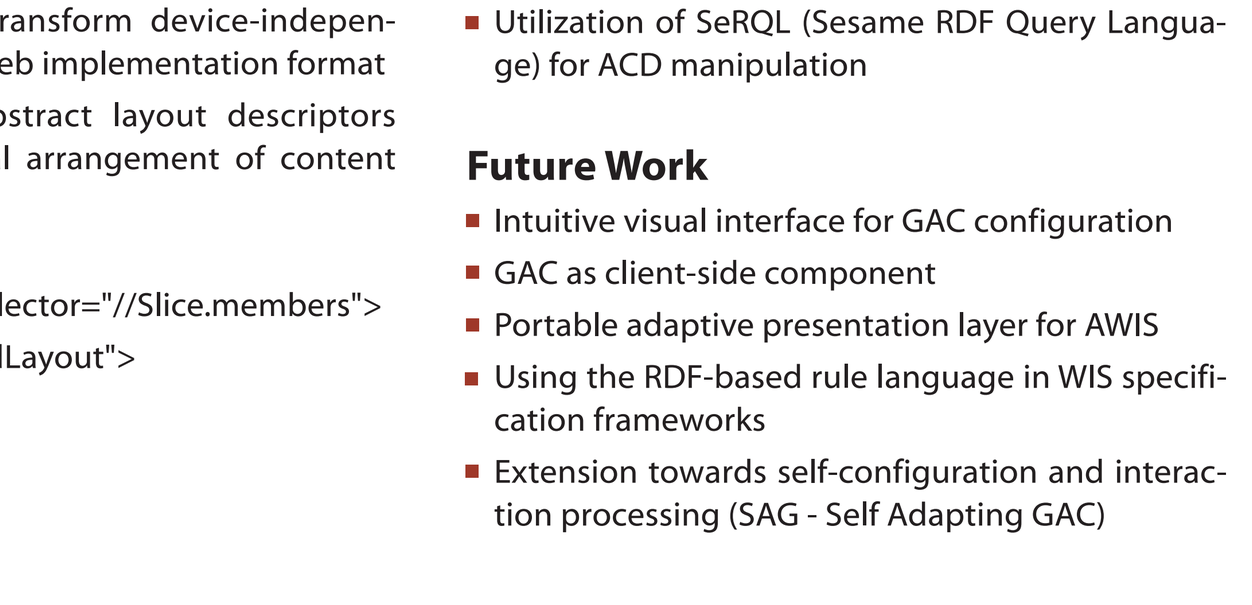
```
<UpdateRule selector="//Slice">
   <do>$SliceSeen[@ID]=true</do>
   <phase>post</phase>
</UpdateRule>
```

Implementation

- Within the AMACONT project's document generation pipeline
- Based on the Cocoon XML publishing framework.
- GAC: custom transformer working on the JDOM view of input documents
- ACD repository based on the open source RDF database Sesame
- Utilization of SeRQL (Sesame RDF Query Language) for ACD manipulation

Future Work

- Intuitive visual interface for GAC configuration
- GAC as client-side component
- Portable adaptive presentation layer for AWIS
- Using the RDF-based rule language in WIS specification frameworks
- Extension towards self-configuration and interaction processing (SAG - Self Adapting GAC)



Technische Universität Dresden

Technische Universiteit Eindhoven

Zoltán Fiala
e-mail: zoltan.fiala@inf.tu-dresden.de

Dresden University of Technology
Department of Computer Science
Heinz-Nixdorf Endowed Chair for Multimedia Technology
D-01062, Germany, +49-351-463-38516

Geert-Jan Houben
e-mail: Geert-Jan.Houben@vub.ac.be

Vrije Universiteit Brussel
Department of Computer Science, WISE

Technische Universiteit Eindhoven
Department of Computer Science, IS