A data mapping specification environment using a concrete business form-based metaphor

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Outline

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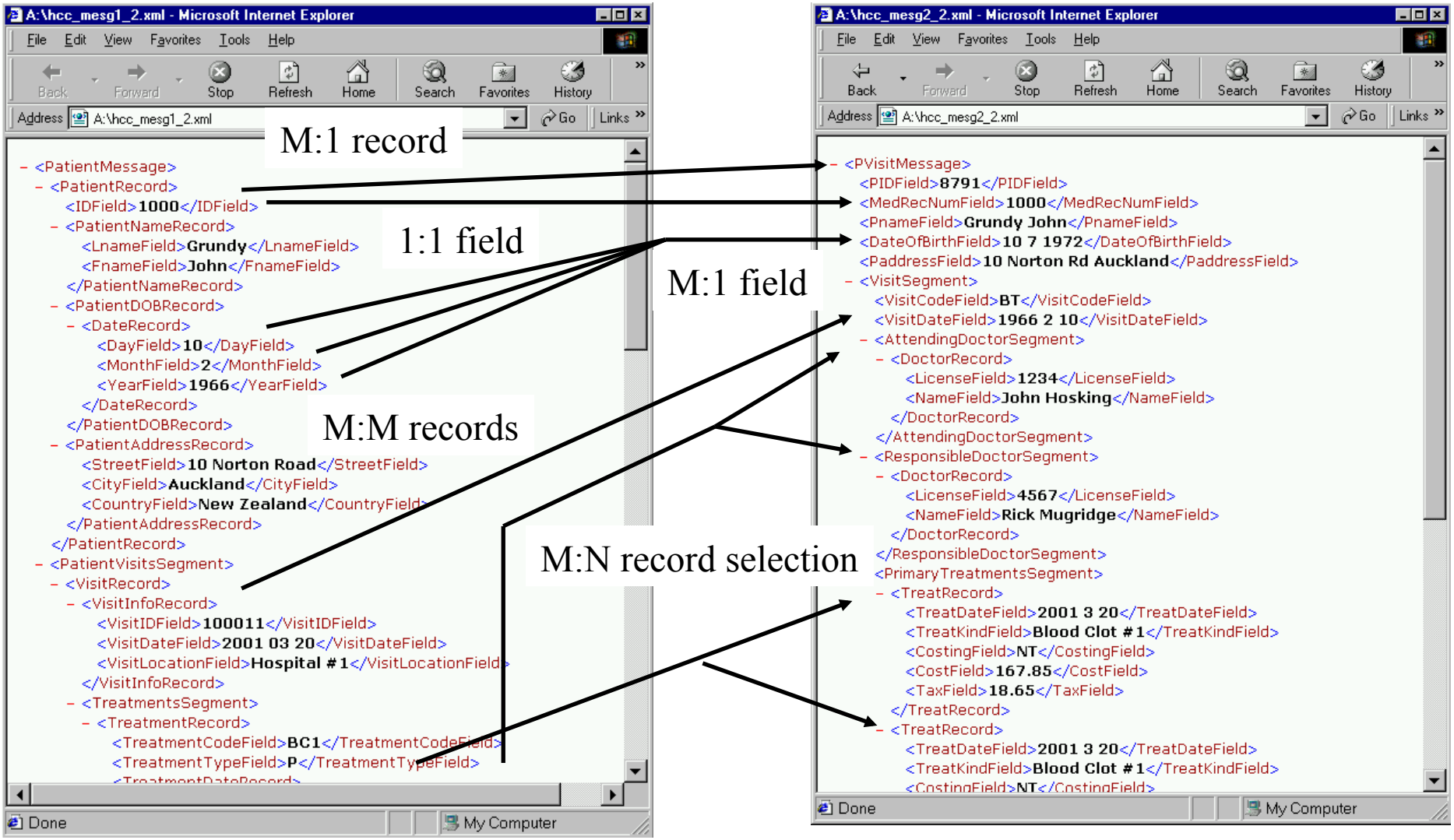
- Motivation for our work
- Need for data mapping systems
- Existing approaches to data mapping
- Our approach: "form-based copying"
- Overview of prototype environment
- Examples of specifying mappings
- Data transformation code generation
- Future work
- Summary

Motivation

- **Data transformation required in many problem domains:**
  - Message-based systems integration
  - Database integration
  - ERP system integration
  - Document exchange
- **Existing approaches to specifying data mappings:**
  - Programming, scripting (textual)
  - Tree-based visual linking
  - Custom "visual language" (programmatic)

Data Mapping Example



Existing Tool Example

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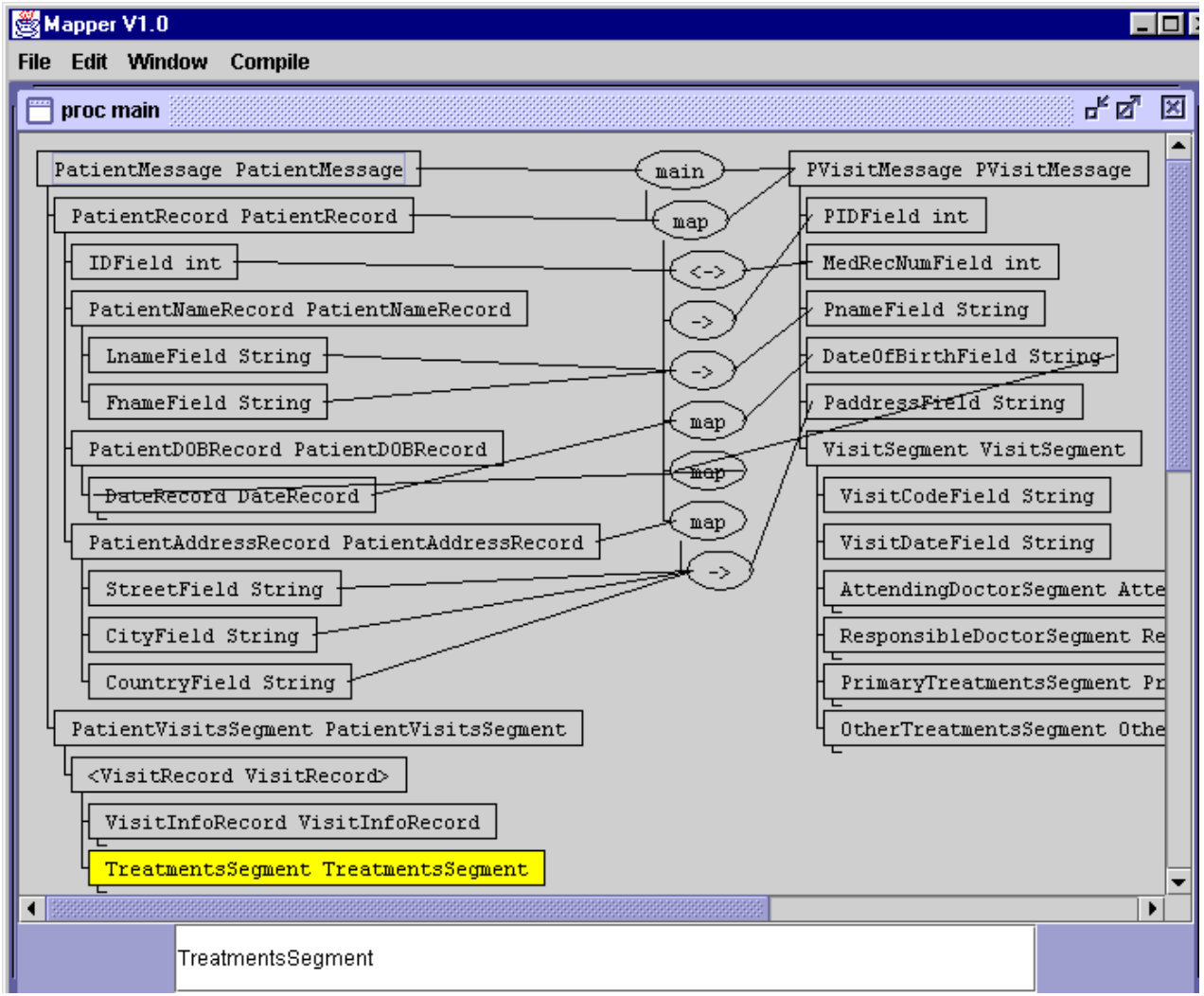

- Common approach to specifying mappings
- Tree based schema and mapping functions
- Programmers are users
- Complex mapping language underneath

Context for Our Work

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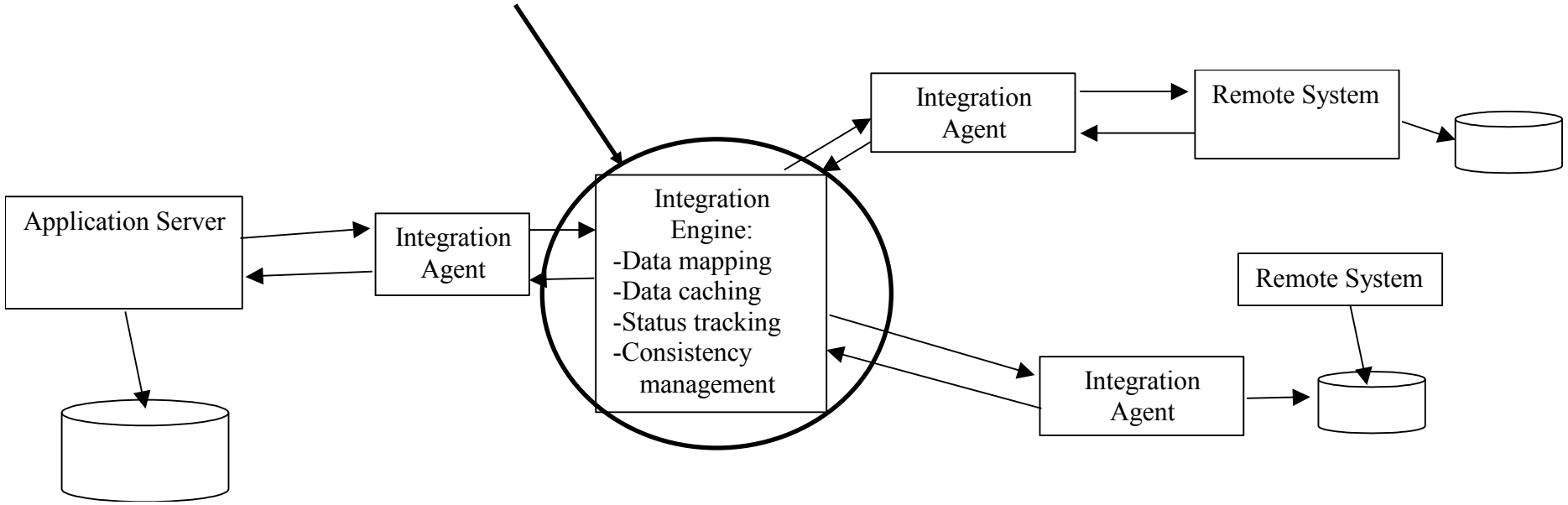
- Enterprise systems integration
- Need to be able to specify complex data transformations
- Want END USERS to be able to specify complex data mappings…



Our Approach

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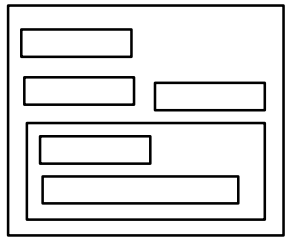
- Aim: to support end-user specification of complex mappings
- Users = "business analysts"
- Want to generate mapping implementations
- Most businesses manually implement such data exchange manually via "copying" from one business form to another (hard-copy or on a computer)
- We wanted to support this "form-copying" metaphor in an end-user oriented mapping specification tool…

Process

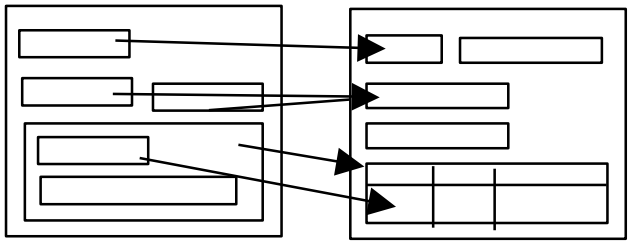
1. Analyst imports meta-data from source and target enterprise systems

Meta-data e.g. XML DTDs

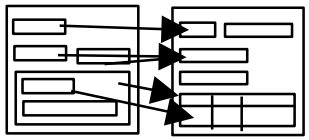
2. Default business form layouts generated. Analyst can rearrange layout to better-reflect actual business forms.



3. Analyst specifies 1:1, 1:n, m:1 group and field correspondences i.e. specifies how to "copy" data from one form to the other

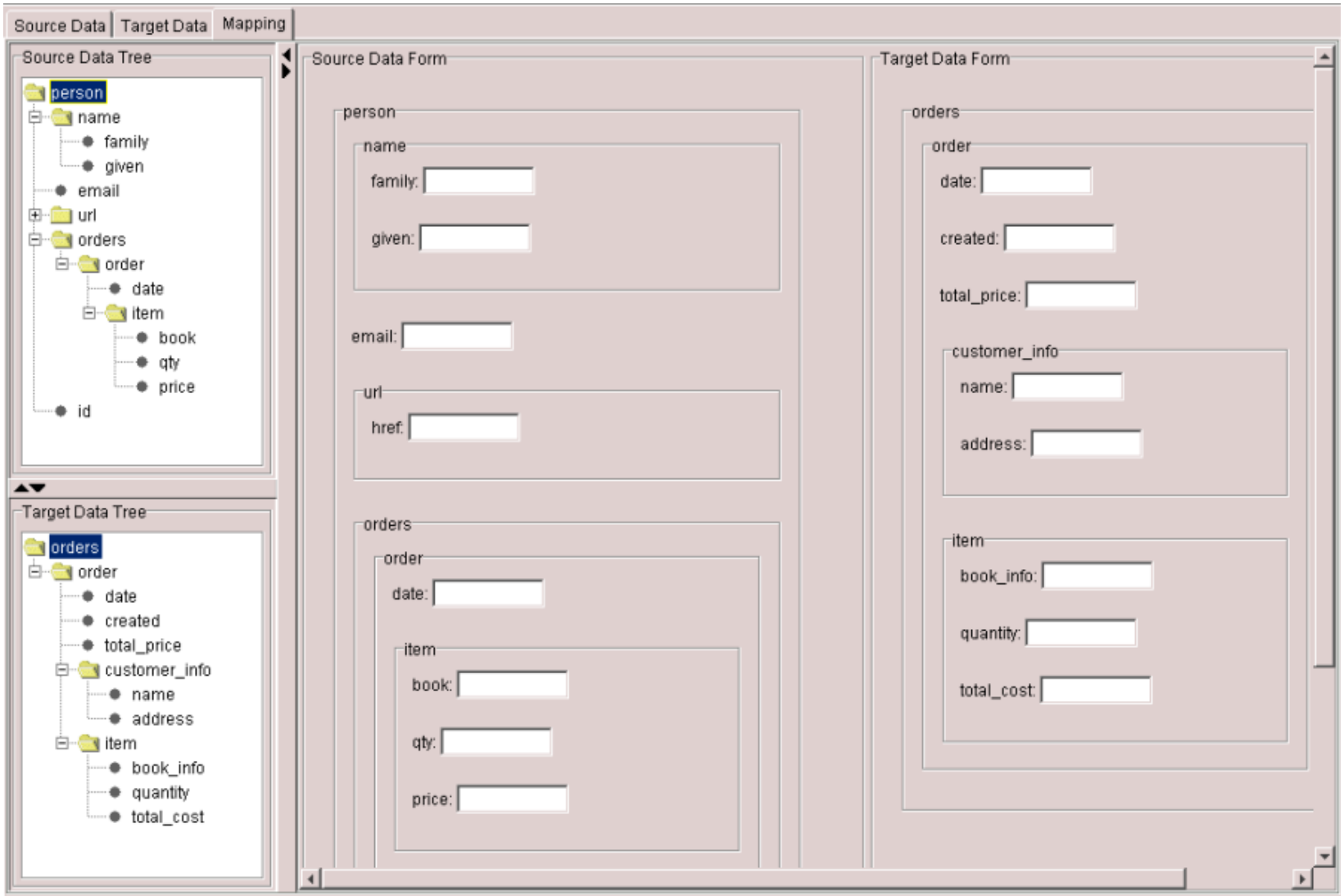


4. Data transformation implementation generated from specification

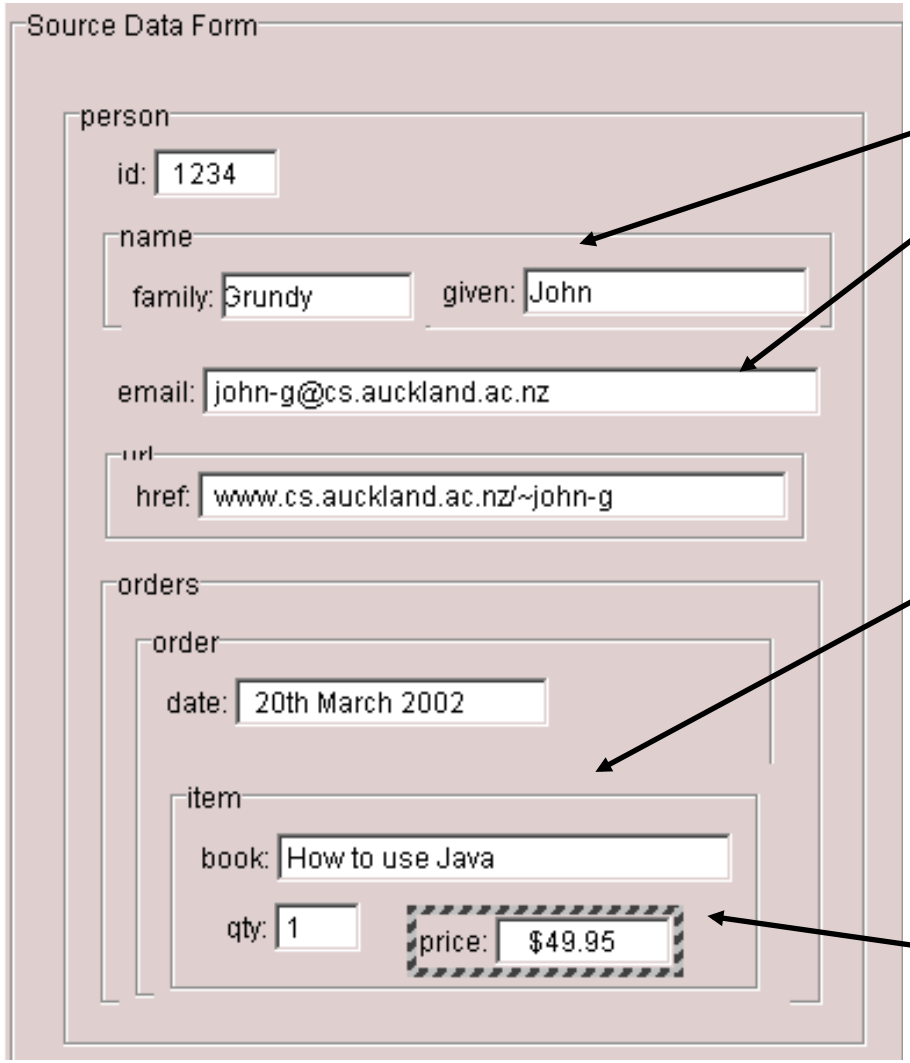


```
<xsl…>
  <xsl:apply-templates…>
…
</xsl:…>
```

Example of Form-based Visualisation of Documents



Rearranging Form Layout

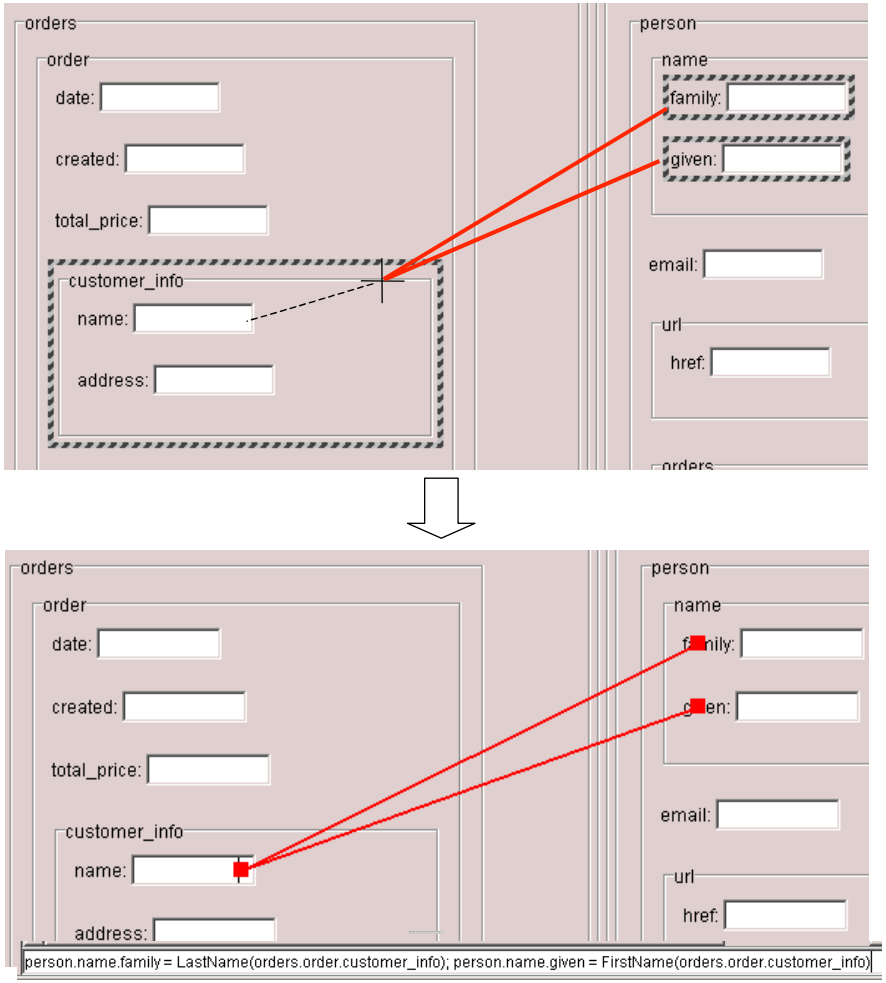


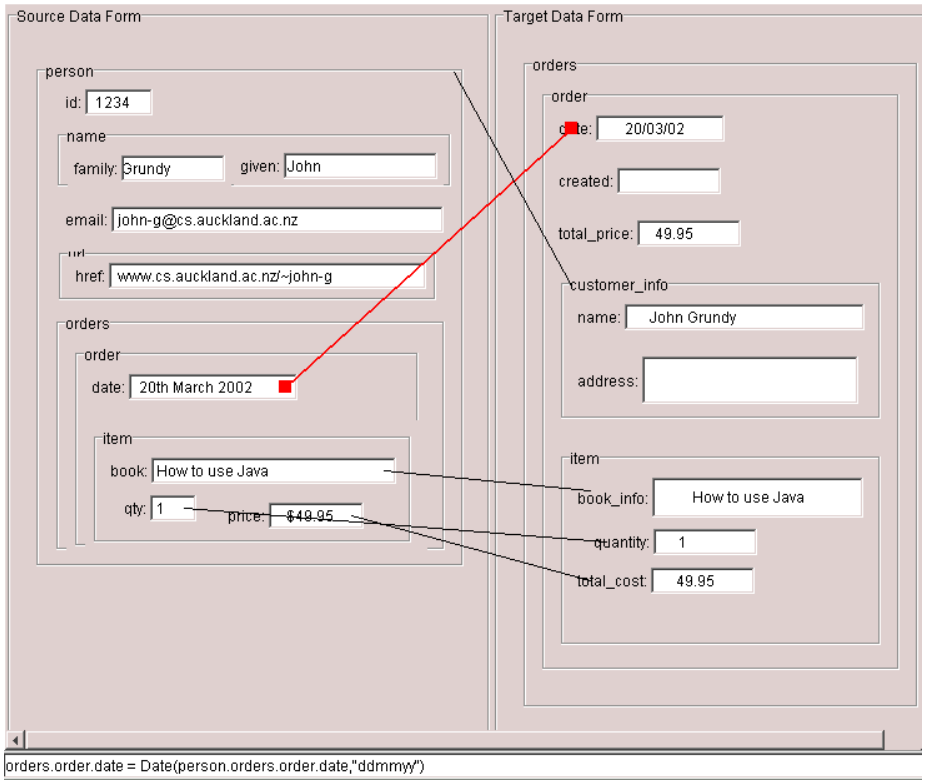
Resize

Add sub-structure

Rearrange layout

Specifying Mappings





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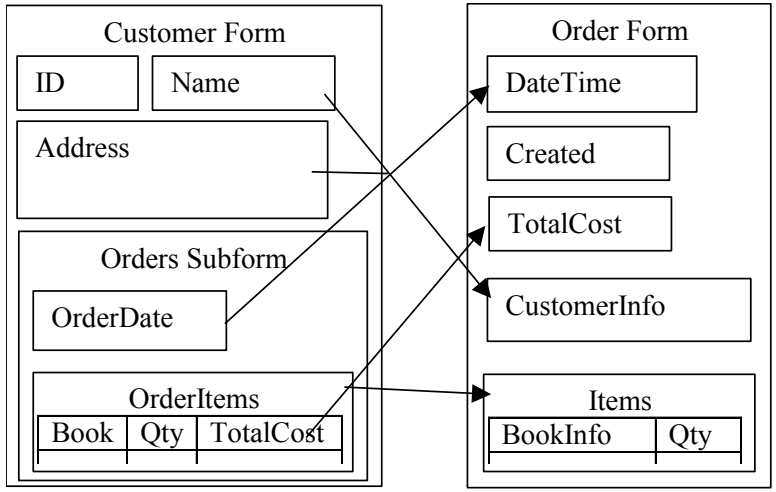
Code Generation…



Order:
1
2
3
4

XSLT transformation script generation

```
<xsl:template match="/">
 <Order>
  <Number>…</Number>
  <DateTime><xsl:value-of select="/Order[1]/Order/Date"/>
    </DateTime>
  <Created>
    <xsl:value-of select="date:to-string(date:new())"/>
  </Created>
  <TotalCost><xsl:value-of
    select="sum(//OrderItem/TotalCost)"/> </TotalCost>
  <xsl:variable name="customer_id" select=
    "/Order/OrderItem[1]/CustomerSID"/>
  <CustomerInfo>
    <xsl:apply-templates select="//Customer [@id =
    $customer_id]"/>
  </CustomerInfo>
  <Items>
   <xsl:apply-templates select="//OrderItem"/>
  </Items>
 </Order>
</xsl:template>
…
```

Future Work

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- **Lots of kinds of mappings – need to distinguish e.g.**
  - Record -> record
  - Field -> multiple fields
  - Fields -> one field
  - Records -> select to one record
  - Multiple records -> multiple records
- **Programming by example specification of these plus field splitting/merging**
- **"Sub-form"-based mappings for "functions"**
- **Visual formulae for target field/record values**

Summary

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- Data mapping systems required in many problem domains
- Current approaches very programmatic
- Want to support business analysts specifying complex data mappings
- Used form-based copying metaphor within a prototype environment to do this
- Automatic mapping code generation
- Extending in various ways to improve usability/visualisation of complex mappings

References

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