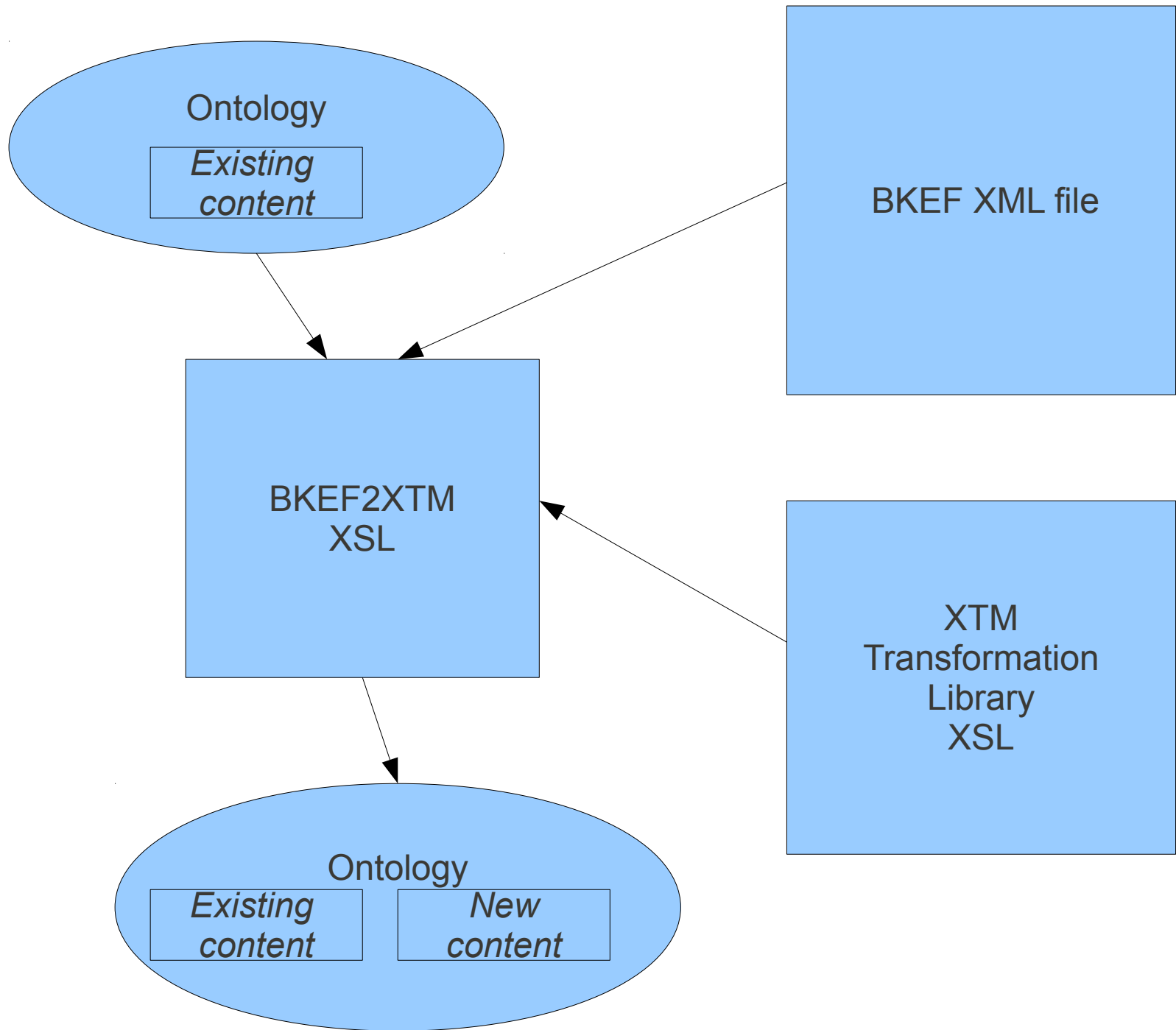


Transforming BKEF XML Files to Association Rule Ontology with XSLT

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BKEF fragment

```
<BKEF xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xmlns="http://keg.vse.cz/bkef"
  version="1.0" xsi:schemaLocation="http://keg.vse.cz/bkef bkef.xsd">
  <Header/>
  <MetaAttributes>
    <MetaAttribute name="Fyzikální vyšetření" id="1" level="1">
      <Variability>Stable</Variability>
      <Annotation>
        <Text/>
        <Author>Marie Tomečková</Author>
      </Annotation>
    </MetaAttribute>
    <MetaAttribute name="hmotnost" id="2" level="0">
      <Variability>Stable</Variability>
      <Annotation>
        <Text/>
        <Author>Marie Tomečková</Author>
      </Annotation>
      <Formats>
        <Format name="kg">
          <Author>Marie Tomečková</Author>
          <DataType>Float</DataType>
          <ValueType>Cardinal</ValueType>
          <AllowedRange>
            <Interval>
              <LeftBound type="closed" value="40"/>
              <RightBound type="closed" value="400"/>
            </Interval>
          </AllowedRange>
        </Format>
      </Formats>
    </MetaAttribute>
  </MetaAttributes>
</BKEF>
```

Resulting BKEF fragment

```
<topicMap xmlns="http://www.topicmaps.org/xtm/1.0/" xmlns:bkef="http://keg.vse.cz/bkef"
  xmlns:xm="http://www.topicmaps.org/xtm/1.0/"
  xmlns:xlink="http://www.w3.org/1999/xlink"
  id="reified-id370">
  <topic id="d2e8">
    <instanceOf>
      <topicRef xlink:href="#id540"/>
    </instanceOf>
    <baseName>
      <baseNameString>Fyzikální vyšetření</baseNameString>
    </baseName>
  </topic>
  <association>
    <instanceOf>
      <topicRef xlink:href="#id361"/>
    </instanceOf>
    <member>
      <roleSpec>
        <topicRef xlink:href="#id1604"/>
      </roleSpec>
      <topicRef xlink:href="#" />
    </member>
    <member>
      <roleSpec>
        <topicRef xlink:href="#id540"/>
      </roleSpec>
      <topicRef xlink:href="#d2e8"/>
    </member>
  </association>
```

Need to locate topic in a topic map

The screenshot shows the 'Metaatributte' topic page in the Ontopoly editor. The page title is 'Metaatributte' and the URL is 'http://mlp.vse.cz:8080/ontopoly/instance/ar-ontology.xtm/1058/?ontology=true'. The page is in 'Editing Association Rule Ontology' mode. The main content area is divided into several sections: 'Name' (Metaatributte), 'Subject identifier' (http://keg.vse.cz/bko/metaatributte), 'Description' (empty), 'Abstract' (unchecked), 'Superclass' (Background Knowledge), and 'Subclass' (Choose One). A 'Fields' section lists various relationships like 'has met', 'has parent', 'has child', 'is contained in', and 'has variability'. On the right, there are 'Views' (Default, Advanced), 'View instances of this type' (Metaatributte), 'View instances of same type' (Topic type), 'Edit the type of this instance' (Topic type), 'New instance:' (empty), 'Create new Topic type' (Create, Copy), 'Change the topic type' (Choose One), 'Delete this topic' (Delete), 'Browse this topic in Omnigator' (Omnigator), and 'View this topic in Vizigator' (Vizigator). The footer shows 'Version 5.0.2 Copyright © 2006-2009 Ontopia AS. Ontopoly, Ontopia's Topic Maps Editor, built using Ontopia.'

The screenshot shows the 'Background Knowledge' topic page in the Ontopoly editor. The page title is 'Background Knowledge' and the URL is 'http://mlp.vse.cz:8080/ontopoly/instance/ar-ontology.xtm/2133/?ontology=true'. The page is in 'Editing Association Rule Ontology' mode. The main content area is divided into several sections: 'Name' (Background Knowledge), 'Subject identifier' (http://keg.vse.cz/bko/backgroundknowledge), 'Description' (empty), 'Abstract' (checked), 'Superclass' (Choose One), and 'Subclass' (Background Rule Cedent, Collation, Knowledge Validity, Metaatributte, Metaatributte Relation Constituent, Metafield, Metafield Content, Mutual Influence, Pattern, Preprocessing Hint, Variability). A 'Fields' section lists various relationships like 'has met', 'has parent', 'has child', 'is contained in', and 'has variability'. On the right, there are 'Views' (Default, Advanced), 'View instances of this type' (Background Knowledge), 'View instances of same type' (Topic type), 'Edit the type of this instance' (Topic type), 'Create new Topic type' (Create, Copy), 'Change the topic type' (Choose One), 'Delete this topic' (Delete), 'Browse this topic in Omnigator' (Omnigator), and 'View this topic in Vizigator' (Vizigator). The footer shows 'Version 5.0.2 Copyright © 2006-2009 Ontopia AS. Ontopoly, Ontopia's Topic Maps Editor, built using Ontopia.'

Locate topic type in the ontology by subject identifier

```
<xsl:template match="bkef:MetaAttribute">
  <xsl:call-template name="createTopic">
    <xsl:with-param name="name" select="@name"/>
    <xsl:with-param name="topicTypeURI">
      <xsl:call-template name="getOntologyTopicID">
        <xsl:with-param name="subjectIdentifier"
          >http://keg.vse.cz/bko/metaattribute</xsl:with-param>
      </xsl:call-template>
    </xsl:with-param>
  </xsl:call-template>
</xsl:template>
```

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```
<xsl:template name="getOntologyTopicID">
  <xsl:param name="subjectIdentifier"/>
  <xsl:text>#</xsl:text>
  <xsl:value-of
    select="$ontologyDoc//
xtm:topic[xtm:subjectIdentity/
xtm:subjectIndicatorRef/
@xlink:href=$subjectIdentifier]/@id"
  />
</xsl:template>
```

```
<xsl:template name="createTopic">
  <xsl:param name="name"/>
  <xsl:param name="occurrenceBlock"/>
  <xsl:param name="topicTypeURI"/>
  <topic id="{generate-id(.)}">
    <instanceOf>
      <topicRef xlink:href="{ $topicTypeURI }"/>
    </instanceOf>
    <baseName><baseNameString>
      <xsl:value-of select="$name"/>
    </baseNameString></baseName>
  </topic>
</xsl:template>
```

```
<xsl:template match="bkef:MetaAttribute">
  <!-- creates metaattribute to dictionary relation -->
  <xsl:call-template name="createAssociationInstance">
    <xsl:with-param name="topicTypeURI">
      <xsl:call-template name="getOntologyTopicID">
        <xsl:with-param name="subjectIdentifier"
          >http://keg.vse.cz/bko/containmetaattribute</xsl:with-param>
      </xsl:call-template>
    </xsl:with-param>
    <xsl:with-param name="roleTypeURI1">
      <xsl:call-template name="getOntologyTopicID">
        <xsl:with-param name="subjectIdentifier"
          >http://keg.vse.cz/bko/metaattributedictionary</xsl:with-param>
      </xsl:call-template>
    </xsl:with-param>
    <xsl:with-param name="roleTypeURI2">
      <xsl:call-template name="getOntologyTopicID">
        <xsl:with-param name="subjectIdentifier"
          >http://keg.vse.cz/bko/metaattribute</xsl:with-param>
      </xsl:call-template>
    </xsl:with-param>
    <!-- id of metaattribute -->
    <xsl:with-param name="topicID1" select="generate-id(/BKEF/Header/Title)"/>
    <!-- id of metafield-->
    <xsl:with-param name="topicID2" select="generate-id(.)"/>
  </xsl:call-template>
```

```
<xsl:template name="createAssociationInstance">
```

```
  <!--
```

creates an association between two instances (represented by internal ids)
the type of the association and the role types is defined by subject identifiers

```
-->
```

```
  <xsl:param name="topicTypeURI"/>
```

```
  <xsl:param name="roleTypeURI1"/>
```

```
  <xsl:param name="topicID1"/>
```

```
  <xsl:param name="roleTypeURI2"/>
```

```
  <xsl:param name="topicID2"/>
```

```
  <association>
```

```
    <instanceOf>
```

```
      <topicRef xlink:href="{ $topicTypeURI }"/>
```

```
    </instanceOf>
```

```
    <member>
```

```
      <roleSpec>
```

```
        <topicRef xlink:href="{ $roleTypeURI1 }"/>
```

```
      </roleSpec>
```

```
      <topicRef xlink:href="#{ $topicID1 }"/>
```

```
    </member>
```

```
    <member>
```

```
      <roleSpec>
```

```
        <topicRef xlink:href="{ $roleTypeURI2 }"/>
```

```
      </roleSpec>
```

```
      <topicRef xlink:href="#{ $topicID2 }"/>
```

```
    </member>
```

```
  </association>
```

```
</xsl:template>
```



```

<xsl:template match="bkef:MetaAttribute">

  <!-- creates metaattribute topic -->
  <xsl:call-template name="createTopic">
    <xsl:with-param name="name" select="@name"/>
    <xsl:with-param name="topicTypeURI">
      <xsl:call-template name="getOntologyTopicID">
        <xsl:with-param name="subjectIdentifier"
          >http://keg.vse.cz/bko/metaattribute</xsl:with-param>
        </xsl:call-template>
      </xsl:with-param>
    </xsl:call-template>
  </xsl:call-template>

  <!-- creates metaattribute to dictionary relation -->
  <xsl:call-template name="createAssociationInstance">
    <xsl:with-param name="topicTypeURI">
      <xsl:call-template name="getOntologyTopicID">
        <xsl:with-param name="subjectIdentifier"
          >http://keg.vse.cz/bko/containmetaattribute</xsl:with-param>
        </xsl:call-template>
      </xsl:with-param>
    <xsl:with-param name="roleTypeURI1">
      <xsl:call-template name="getOntologyTopicID">
        <xsl:with-param name="subjectIdentifier"
          >http://keg.vse.cz/bko/metaattributedictionary</xsl:with-param>
        </xsl:call-template>
      </xsl:with-param>
    <xsl:with-param name="roleTypeURI2">
      <xsl:call-template name="getOntologyTopicID">
        <xsl:with-param name="subjectIdentifier"
          >http://keg.vse.cz/bko/metaattribute</xsl:with-param>
        </xsl:call-template>
      </xsl:with-param>
    <!-- id of metaattribute -->
    <xsl:with-param name="topicID1" select="generate-id(/BKEF/Header/Title)"/>
    <!-- id of metafield -->
    <xsl:with-param name="topicID2" select="generate-id(.)"/>
  </xsl:call-template>
  <xsl:apply-templates select="Variability"></xsl:apply-templates>
  <xsl:apply-templates select="DataType"></xsl:apply-templates>
  <!-- Process all formats -->
  <xsl:apply-templates select="Formats/Format"/>
</xsl:template>

```

```

<topic id="d2e8">
  <instanceOf>
    <topicRef xlink:href="#id540"/>
  </instanceOf>
  <baseName>
    <baseNameString>Fyzikální vyšetření</baseNameString>
  </baseName>
</topic>
<association>
  <instanceOf>
    <topicRef xlink:href="#id361"/>
  </instanceOf>
  <member>
    <roleSpec>
      <topicRef xlink:href="#id1604"/>
    </roleSpec>
    <topicRef xlink:href="#" />
  </member>
  <member>
    <roleSpec>
      <topicRef xlink:href="#id540"/>
    </roleSpec>
    <topicRef xlink:href="#d2e8"/>
  </member>

```

Append to existing populated ontology

```
<xsl:template match="bkef:BKEF">
  <!-- xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="http://www.topicmaps.org/xtm/ xtm2.1.xsd" -->
  <topicMap id="{ $reifiedID }">
    <!-- Creates Metaattribute Dictionary -->
    <xsl:apply-templates select="Header/Title"/>
    <xsl:apply-templates select="MetaAttributes/MetaAttribute"/>
    <xsl:apply-templates select="Patterns/AssociationRules/Influences/Influence"/>
    <xsl:copy-of select="$ontologyDoc/xtm:topicMap/*"/>
  </topicMap>
</xsl:template>
```

Summary

- BKEF to background ontology transformation is completed
- Reusable logic is stored in separate transformation
 - CreateAssociationInstance
 - CreateOccurrence
 - CreateTopic
 - GetOntologyInstanceID
 - GetOntologyTopicID
- Support for XTM 1.0 and XTM 2.0