



Delphi® XE2
The fastest way to build native
Windows, Mac and iOS applications

Windows Mac iOS Cloud 64-bit FireMonkey Database




Delphi and XML

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XML: eXtensible Markup Language

- Set of rules for encoding documents electronically.
 - Textual data format
 - Strong multi language support via Unicode
- Defined as the open and free XML 1.0 Specification
- Design goals:
 - Simplicity
 - Generality
 - Usability over the Internet
- Aim of use:
 - Mainly as transport
 - Very little as storage



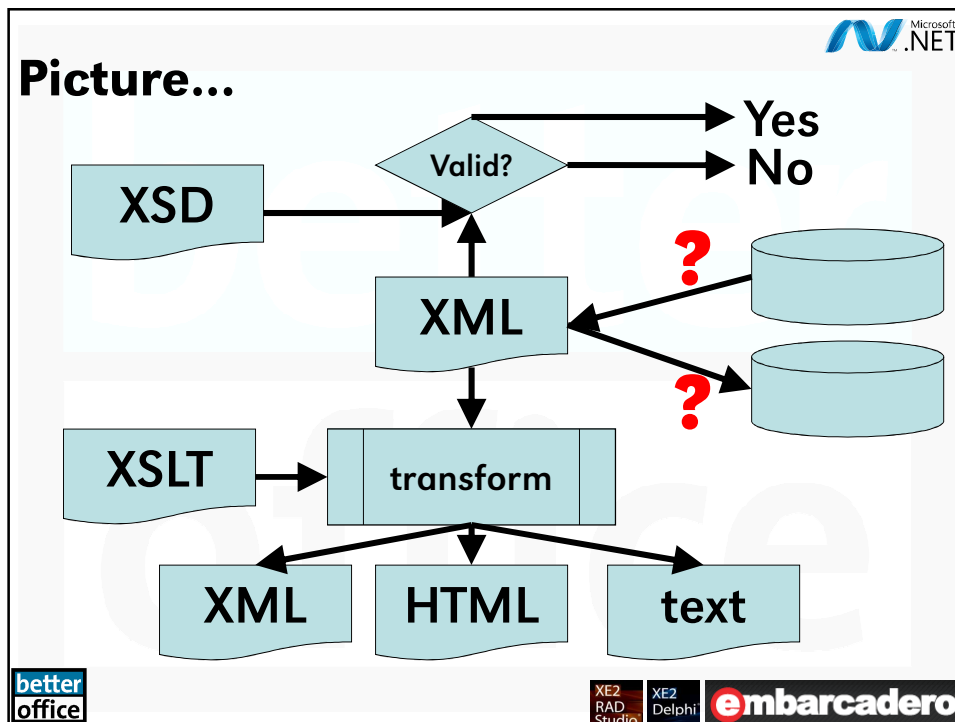
XML

- **Issues**

- XML is hierarchical, most DB's are relational
- Both parties need to agree about the sub-format
 - Definition of the format
 - Checks based on the format
- Some environment offer under-par XML support
 - Support for encoding or character sets
 - Support at all
- Watch your XML size
- Which path does XML follow to/from your data

A's

- **XML – eXtensible Markup Language**
 - CSV++
 - Hierarchical, case sensitive, elements en attributes, CDATA
 - Defines “well formed”
- **XSD – Xml Schema Definition**
 - Can be stored as XML
 - Defines how an XML will be “valid”
- **XSL – eXtensible Stylesheet Language**
 - Consists of XSLT, XSL-FO and XPath
- **XSLT – XSL Transformations**
 - Like how CSS can be applied to HTML for presentation, XSLT can be applied to XML for textual output (XML, HTML, Text, ...)
 - Is stored in XML
- **XPath – XML Path Language**
 - Language like “SQL” to query parts of an XML document



Focus of this session

- XML
- XSD
- Validation
- Wrapper objects around your XML
- XSLT is a 3 day course 😊
 - A short overview will be in my 'nightschool' session at 20:30

Logos: better office, XE2 RAD Studio, XE2 Delphi, embarcadero

Example: xokum

- Fictional village to test the Dutch 008 software
(411 is the American equivalent to 008)
 - <http://nl.wikipedia.org/wiki/Xokum>
 - <http://www.hacktic.nl/magazine/0948.htm>
- Nice test case, because the table
 - Appears to be simple
 - But contains some nice “exceptions”

Xokum.xsd

```
<?xml version="1.0" standalone="yes"?>
<xs:schema id="xokum" xmlns="" xmlns:xs="http://www.w3.org/2001/XMLSchema" xmlns:msdata="urn:schemas-microsoft-com:xml-msdata">
  <xs:simpleType name="non-empty-string">
    <xs:restriction base="xs:string">
      <xs:minLength value="1"/>
    </xs:restriction>
  </xs:simpleType>
  <xs:element name="xokum" msdata:isDataSet="true" msdata:Locale="en-US">
    <xs:complexType>
      <xs:choice minOccurs="0" maxOccurs="unbounded">
        <xs:element name="record">
          <xs:complexType>
            <xs:sequence>
              <xs:element name="achternaam" type="non-empty-string" minOccurs="1" maxOccurs="1" />
              <xs:element name="voorletters" type="xs:string" minOccurs="0" maxOccurs="1" />
              <xs:element name="straat" type="non-empty-string" minOccurs="1" maxOccurs="1" />
              <xs:element name="nummer" type="xs:integer" minOccurs="0" maxOccurs="1" />
              <xs:element name="abonneenummer" type="xs:integer" minOccurs="1" maxOccurs="1" />
              <xs:element name="plaats" type="non-empty-string" minOccurs="1" maxOccurs="1" />
              <xs:element name="netnummer" type="xs:integer" minOccurs="1" maxOccurs="1" />
            </xs:sequence>
          </xs:complexType>
        </xs:element>
      </xs:choice>
    </xs:complexType>
  </xs:element>
</xs:schema>
```

Xokum.xml



```
<?xml version="1.0" standalone="yes"?>
<xokum>
  <record>
    <achternaam>administratiekantoor bolte & amp; vd klink</achternaam>
    <voorletters></voorletters>
    <straat>hoofdwg</straat>
    <nummer>21</nummer>
    <abonneenummer>139</abonneenummer>
    <plaats>xokum</plaats>
    <netnummer>2889</netnummer>
  </record>
  <record>
    <achternaam>bombeke</achternaam>
    <voorletters>e</voorletters>
    <straat>hoofdwg</straat>
    <nummer>4</nummer>
    <abonneenummer>112</abonneenummer>
    <plaats>xokum</plaats>
    <netnummer>2889</netnummer>
  </record>
  <record>
    <achternaam>gemeente en gem instellingen</achternaam>
    <voorletters></voorletters>
    <straat>idem</straat>
    <abonneenummer>138</abonneenummer>
    <plaats>xokum</plaats>
    <netnummer>2889</netnummer>
  </record>
</xokum>
```



Delphi parts supporting XML



- TXMLDocument
 - Reads and writes XML files to/from memory
 - The demos use the MSXML DOM, but you can use other DOMs
- ClientDataSet
 - Can store and retrieve data to/from a specific XML format designed to store CDS data
- File -> New ->
 - XML Data Binding Wizard
 - Convert XML/XSD files to pascal code-framework
- Tools -> XML Mapper
 - Convert ClientDataSets from/to XML



Some samples at bo.codeplex.com

- **DumpXml**
 - Uses TXmlDocument to dump an XML file
- **ValidateXmlWithXsd**
 - Validates an XML with an XSD using MSXML
- **XokumXmlDataBindingProject**
 - Data binding wizard import of the Xokum.xml using the Xokum.xsd definition
- **XokumXmlMapperProject**
 - ClientDataSet mapping from/to the Xokum.xml
- **XPathTester**
 - Demo of XPath expressions
- **CdsXsdTest**
 - Test of the XSD I wrote for the ClientDataSet XML format
- **XMLEOSErrorTest**
 - <http://stackoverflow.com/questions/4346060/msxml6-error-loading-valid-windows-1252-document-system-error-2146697210/4356136#4356136>

Delphi – TXMLDocument

- Reads and writes XML files
- Complete XML document is in memory
- Depends on your LCID (localisation ID)
- By default, uses MSXML
 - MSXML versions <= 4.0 are buggy
 - Recent MSXML (6.x) are stable
- Uses COM: hex-based 'error messages'

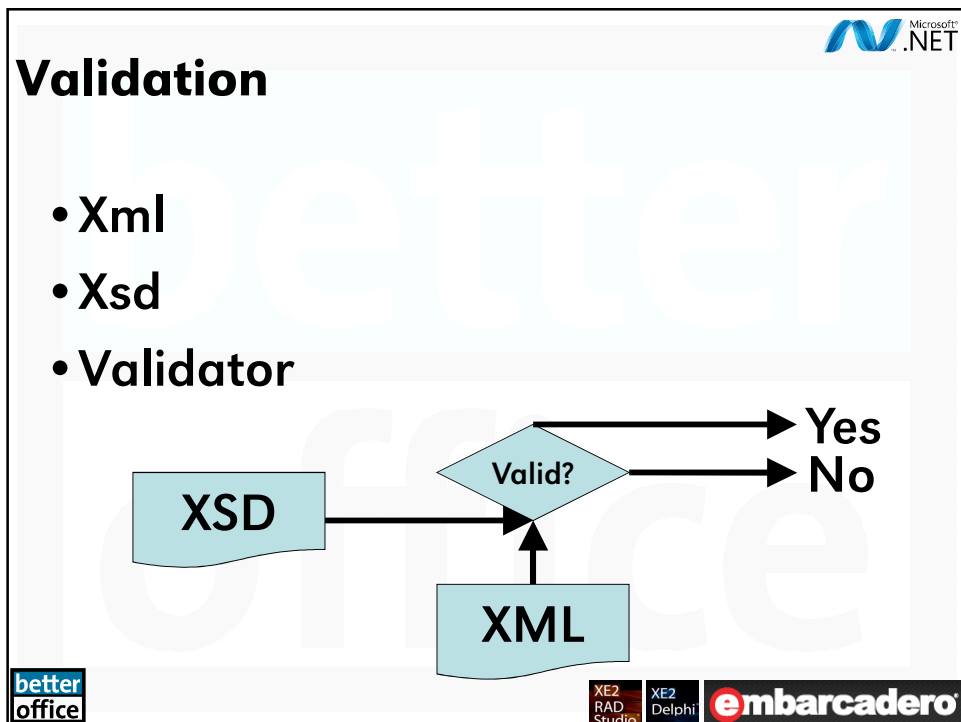
Delphi – XMLDataBinding

- Based on TXMLDocument
 - Watch memory consumption!
- Generates a Delphi unit from these files types
 - Xml (xml)
 - Schema (dtd xsd xdr biz xdb)
- Schema example:
 - Xokum.xsd
 - Assure a field is non-null:
 - minOccurs="1" maxOccurs="1"
 - http://www.w3schools.com/Schema/schema_howto.asp

Data binding watch for NULLs!

```

procedure TXokumDataBindingForm.LogXokum(xokum: IXMLXokum);
var
  xokumRecord: IXMLRecord_;
  xokumCount: Integer;
  xokumIndex: Integer;
begin
  xokumCount := xokum.Count;
  Logger.Log('xokum.Count', xokumCount);
  for xokumIndex := 0 to XokumCount - 1 do
  begin
    xokumRecord := xokum[xokumIndex];
    Logger.Log('');
    Logger.Log('Achternaam', xokumIndex, xokumRecord.Achternaam);
    Logger.Log('Voorletters', xokumIndex, xokumRecord.Voorletters);
    Logger.Log('Straat', xokumIndex, xokumRecord.Straat);
    if not VarIsNull(xokumRecord.ChildNodes['nummer'].NodeValue) then
      Logger.Log('Nummer', xokumIndex, xokumRecord.Nummer);
    Logger.Log('Abonneenummer', xokumIndex, xokumRecord.Abbonneenummer);
    Logger.Log('Plaats', xokumIndex, xokumRecord.Plaats);
    Logger.Log('Netnummer', xokumIndex, xokumRecord.Netnummer);
  end;
  Logger.Log('');
end;
  
```



Validation

- Is not built into Delphi
- But you can build it using MSXML COM objects
- Example...

Logos at the bottom: better office, XE2 RAD Studio, XE2 Delphi, embarcadero, Microsoft .NET

Validation Result

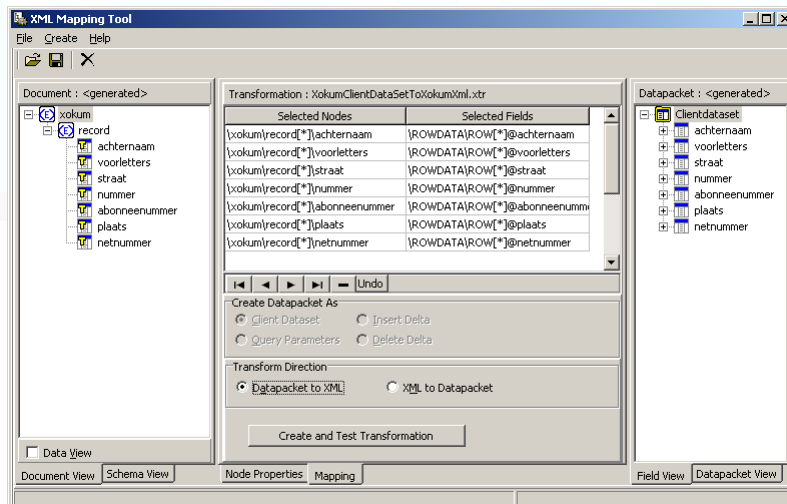
- Either “OK.” or a list of errors like this:

```
Error: The 'number' element is invalid - The value 'NUMBER' is invalid according to
its datatype 'http://www.w3.org/2001/XMLSchema:integer' - The string 'NUMBER' is
not a valid Integer value.
NUMBER
</number>
Error: The 'abonneenumber' element is invalid - The value 'ABONUMMER' is invalid
according to its datatype 'http://www.w3.org/2001/XMLSchema:integer' - The string
'ABONUMMER' is not a valid Integer value.
ABONUMMER
</abonneenumber>
Error: The 'netnumber' element is invalid - The value 'NETNUMBER' is invalid according
to its datatype 'http://www.w3.org/2001/XMLSchema:integer' - The string 'NETNUMBER'
is not a valid Integer value.
NETNUMBER
</netnumber>
Error: The 'number' element is invalid - The value '' is invalid according to its
datatype 'http://www.w3.org/2001/XMLSchema:integer' - The string '' is not a valid
Integer value.
<number>
</number>
Error: The 'number' element is invalid - The value '' is invalid according to its
datatype 'http://www.w3.org/2001/XMLSchema:integer' - The string '' is not a valid
Integer value.
<number>
</number>
```

Delphi – XML Mapper

- Map between xml/xsd and ClientDataSet
- Generates ClientDataSet from xml/xsd
- Generates xml/xsd from ClientDataSet
- Creates two .XTR files based on the transformations:
 - ToXml.xtr (from CDS to XML)
 - ToDp.xtr (from XML to CDS, DP == datasnap DataPacket)
- Examples
 - Xokum.xml/xsd en XokumClientDataSet
 - Creates XTR files:
 - ToXml.xtr -> XokumClientDataSetToXokumXml.xtr
 - ToDp.xtr -> XokumXmlToXokumClientDataSet.xtr
 - Chromalloy
 - C:\develop.old\Chromalloy\4321\Dp

Delphi – XML Mapper



Delphi – TXMLTransformProvider

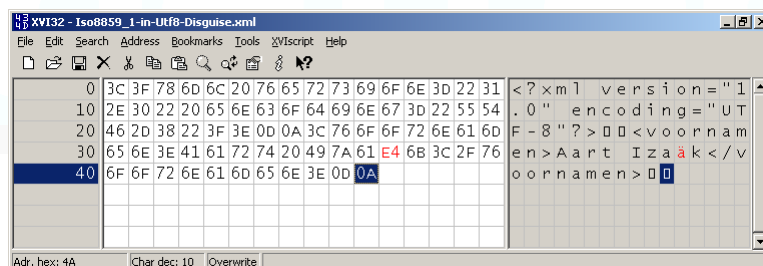
- This class performs the real mapping:
- XokumXMLTransformProvider
 - TransformRead.TransformationFile=
 - .. \data \XokumXmlToXokumClientDataSet.xtr
 - was ToDp.xtr: Xml to DataPacket
 - TransformWriteTransformationFile=
 - .. \data \XokumClientDataSetToXokumXml.xtr
 - was ToXml.xtr: DataPacket to Xml
 - XMLDataFile=
 - .. \data \xokum.edit.xml
 - XokumClientDataSet
 - ProviderName=
 XokumXMLTransformProvider

Delphi – TClientDataSet

- from the ClientDataSet you can get
 - Data to your underlying DB
 - Data from your underlying DB

XML – reencoding text

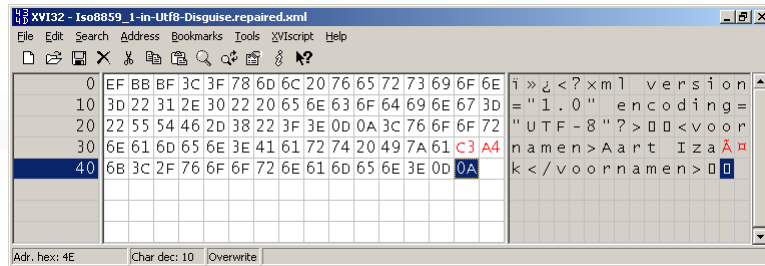
- BAD XML:



- The header says UTF-8
- But the content is ISO 8859-1: 'ä' is E4
- http://en.wikipedia.org/wiki/ISO/IEC_8859-1

XML – reencoded text

- Good XML:

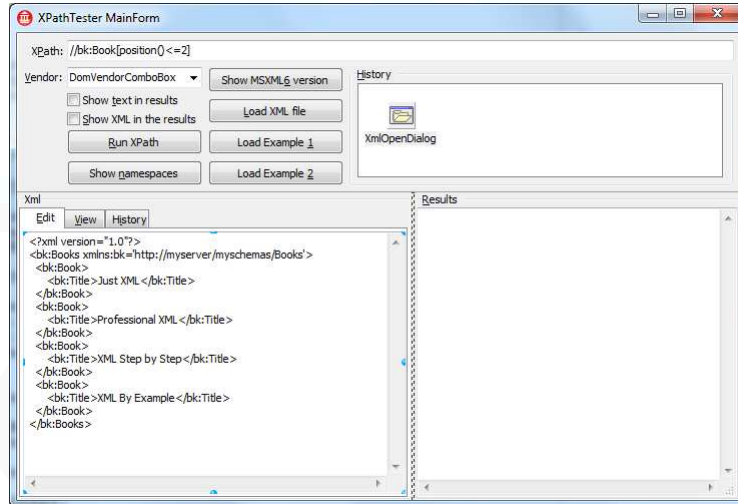


- The header indicates UTF-8, body is proper UTF-8:
- 'ä' is now C3 A4; BOM (Byte Order Mark) is EF BB BF
- <http://www.utf8-chartable.de/unicode-utf8-table.pl>

Reencoding

- Learn to recognize encoding problems
- Writing reencoding is not difficult
 - Both the .NET and VCL framework now support Encoding
 - See my Unicode session for how

XPath



XPath: not all MSXML versions support it



- class function
TmsxmlFactory.GetmsxmlBestFileVersion:
TFileVersion;
 - MSXML versions
 - <http://support.microsoft.com/kb/269238>
 - <http://msdn.microsoft.com/en-us/data/bb291077>
 - avoid MSXML 2, MSXML 4, and MSXML 5
 - prefer MSXML 6 over MSXML 3
 - MSXML 3 defaults to SelectionLanguage=XSLPattern, and does not support namespaces in XPath



XPath things to watch for

- XML often has namespaces
- You need to tell the XPath query about the namespaces you want to use
 - See <http://stackoverflow.com/questions/5511844/delphi-xpath-xml-query/5512912#5512912>
- Getting all namespaces
 - <http://stackoverflow.com/questions/3747049/xslt-how-to-get-a-list-of-all-used-namespaces>

Q & A

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If you have questions after the session, please mail me

Downloads will be on my blog: <http://wiert.wordpress.com>
and our code repository: <http://bo.codeplex.com>

Excel XML

- Create
- Then use
- Make sure
 - Styles
 - Work

