

# *Code input alternatives*

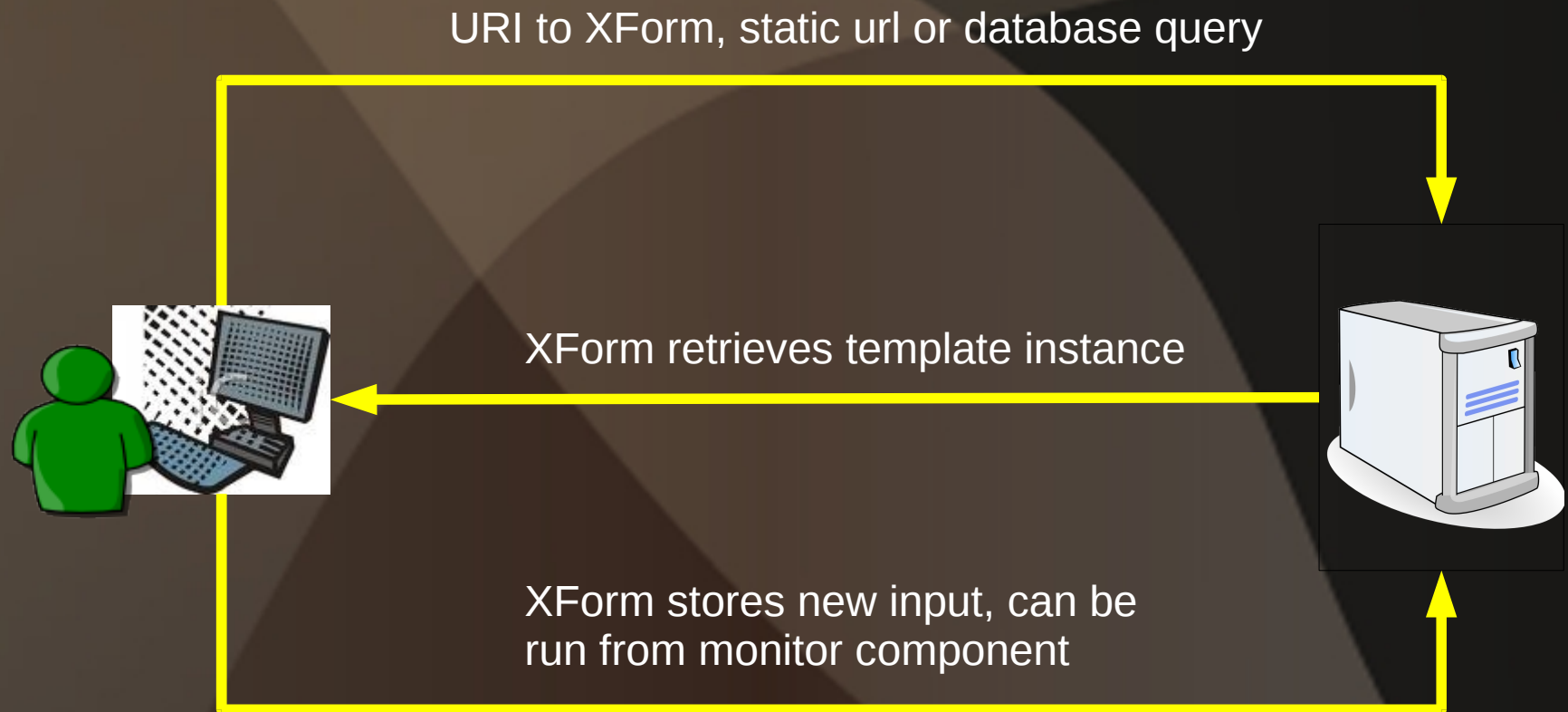
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Extensible markup language (XML) can be used for flexible data representation, gui data input via a browser, input validation, native database storage with read/write search access. A W3C standard that along with HTML/WebDAV gives universal access. Compatible with legacy codes.

# *Everything is data*

- The application interfaces (XForms), the class definitions or schema (XSD), input and output processing (XSLT), metadata, input namelists.
- All can be stored in a native XML database (eXist or XML BDB.)
- XForms is a W3C standard.
  - In the process of being implemented.
  - Server side (Orbeon): slower, but don't need plugin.
  - Client side (Mozilla XForms): very fast, most advanced, user has to install.
  - Eventually will be integrated into browsers (eg SVG).

# *User only needs a browser*



# XForms example

## Editing a Fortran namelist

Simulation ID:

Parent ID: 302

Creation Date:

### User:

Institution:

Name:

Address:

Namelist: toricinp	
atm	<input type="text" value="1"/>
Atomic mass array size nspec	<input type="text" value="1"/>
sp_xs1	<input type="text" value="0.0"/>
sp_xs1	<input type="text" value="0.0"/>
isol	<input type="text" value="1"/>
nvr	<input type="text" value="3b"/>
nelm	<input type="text" value="230"/>
ntt	<input type="text" value="512"/>

Done

## Source XML and XSD (not shown)

```
<parameter><name>aconc</name><value type="xsi:float">1.0</value>
  <help>Ion concentration array size nspec</help>
</parameter>
<parameter><name>sp_xs1</name><value>0.0</value>
  <help></help>
</parameter>
<parameter><name>sp_xs1</name><value>0.0</value>
  <help></help>
</parameter>
</namelist>
</namelists>
```

## Source XForm ~100 lines

```
<table xf:repeat-nodeset="instance('namelists')/namelist">
  <thead><tr>
    <th>Namelist: <xf:output ref="@name"/></th>
  </tr></thead>

  <table xf:repeat-nodeset="parameter"><tbody><tr>
    <td><xf:output ref="name">
      <xf:hint ref="../help"/></xf:output></td>
    <td><xf:input ref="value"/></td>
    <td><xf:output ref="units"/></td>
  </tr></tbody></table>
</table>
```

# XSLT: XML->NML

## Advantages of XML with legacy compatibility

namelist.nml

```
&toric_mode
  toricmode=toric
/
&toricinp
  isol=1
  nvr=3
  nel=230
  ntt=512
  nmod=255
  nptvac=-1
  mxmvac=15
  freqcy=80.0E6
  nphi=10
  Antlen=48.0
...
```

namelist.xml

XSLT

```
<xsl:template match="/">
  <html>
    <body>
      <pre><xsl:text>&#xA;</xsl:text>
        <xsl:for-each select="namelists/namelist">
          <xsl:text> &</xsl:text><xsl:value-of
select="@name"/><xsl:text>&#xA;</xsl:text>
          <xsl:for-each select="parameter">
            <xsl:text> </xsl:text><xsl:value-of
select="name"/>=<xsl:value-of select="value"/>
            <xsl:text>&#xA;</xsl:text>
          </xsl:for-each>
          <xsl:text> /&#xA;</xsl:text>
        </xsl:for-each>
      </pre>
    </body>
  </html>
</xsl:template>
```

# *Making it easier*

- As a general principle, users do not want to and should not edit source XML.
- Can use an XForm to generate XML or input from Fortran namelist or a custom flat file to generate initial template that is transformed to XML via XSLT:

```
#First namelist
"""
example_namelist1
"""
#name, #type, #value, #units, #help
idebug, logical, 1, "", "Turn debugging on."
bzero, float, 4.3, "Tesla", "Vacuum toroidal field on geometric axis."
nx, integer, 122, "", "Number of mesh points in x direction."
runmode, string, "diagmode", "", "Running mode. One of solmode, diagmode."
.

#Second namelist
```

# *Summary*

- Use a data-centric model for input creation (code namelists, IPS config file, etc)
- Database provides repository for input templates, interfaces, and conceivably results metadata
- Automatically get some provenance information, queries (XPath or Xquery), other database functions.
- XForms provides through XSD some degree of input validation
- Future: we've dealt with the nodes, what about the edges – semantic relation validation (do my inputs even if in valid ranges actually form a valid consistent set?)