



Active Tags: an XML System for Native XML Programming

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Active Tags

an XML System
for Native XML Programming



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- A set of specifications (language/platform independant)
- A general-purpose framework
- Batch, Web applications, embedded in an application
- Looks like XSLT/XQuery/Jelly/ASP/PHP/JSP/JSTL/Ant...
- Use XML tags as actions to perform
- XPath-centric
- Can query various data sources (RDBMS, LDAP, XML native databases)
- Several libraries (modules) can be used

<http://disc.inria.fr/perso/philippe.poulard/xml/active-tags/>

Specifications :

<http://reflex.gforge.inria.fr>

Implementation :

The
Active Tags
engine, in Java
RefleX

Unix : everything is a file

OOP : everything is object

Active Tags : everything is XML

→ A powerful and complete system based upon XML technologies

Cohabitation of several tag libraries

Features are not overlapping each others

→ Chosen by INRIA

Used in production

→ Concise/powerful

Modular/extensible/maintainable

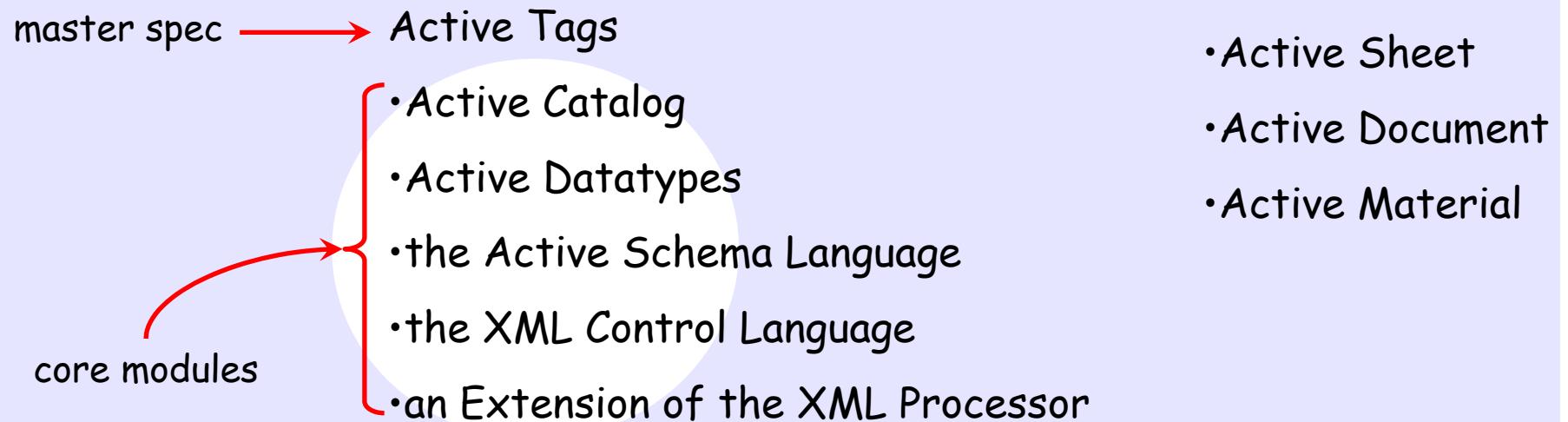
Easy to use (if you know XML/XPath ☺)

→ High-level API

General purpose

Mask details (DOM,SAX)

Connexions with the environment (SYSTEM, I/O, SQL, Web...)



Standard modules

- I/O module
- SYSTEM module
- Web module
- RDBMS module

Application

- the XUnit framework

Some examples...

- A simple example → the basics
- Handling XML documents → mask DOM and SAX differences
- Pipelines → filtering a SAX stream with XPath patterns
- Combining modules → module cohabitation
- A Web application → introduction of X-Operable Objects
- Modularization → macro creation
- XUnit → testing XML

a convenient root

instruction
that creates
the property
named « myDoc »

with XCL : the XML Control Language

```
<?xml version="1.0" encoding="iso-8859-1"?>
<xcl:active-sheet
    xmlns:xcl="http://www.inria.fr/xml/active-tags/xcl">
    <xcl:parse name="myDoc"
        source="file:///path/to/document.xml"/>
    <xcl:parse-stylesheet name="myXslt"
        source="file:///path/to/stylesheet.xsl"/>
    <xcl:transform source="{ $myDoc }"
        stylesheet="{ $myXslt }"
        output="file:///path/to/output.html"/>
</xcl:active-sheet>
```

XPath expression

Like « AVT » in XSLT
but :

- can occur in text content
- is not cast to string
- can refer to objects

Shell-fashioned references

Comparison with Ant/Jelly/JSTL...

```
<document time="${now}">
    Welcome ${user.name} to Jelly!
</document>
```

Can't extend to path expressions ☹ → \${now/@year}

Can't compute expressions ☹, can only refer to values

→ \${price * discount}

the engine "knows" which tag is an action and which tag is a literal
 → an Active Catalog is plugged to the engine

compatible
 XML catalog : map URI → URIs
 Active Catalog : map URI + selector → resources
 (URI, module, schema, catalog, active-sheet...)
 resource management facilities (caching policy)

How is it resolved ?

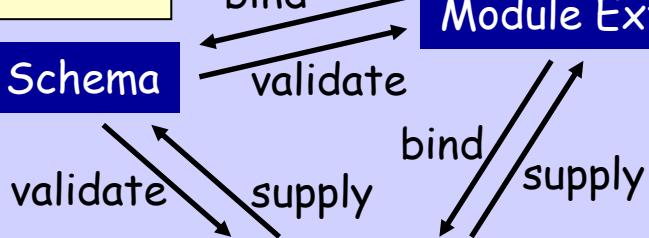
Active tag → <xcl:parse>

```
<asl:schema target="xcl">
  <asl:element name="xcl:parse" ...>
```

```
<exp:module target="xcl">
  <exp:element name="xcl:parse" ...>
```

Active Schema

Module Extensibility



<cat:catalog>
<exp:module>
<asl:schema>

are resolved in
the same manner

```
<cat:catalog>
  <cat:uri name="http://www.inria.fr...">
```

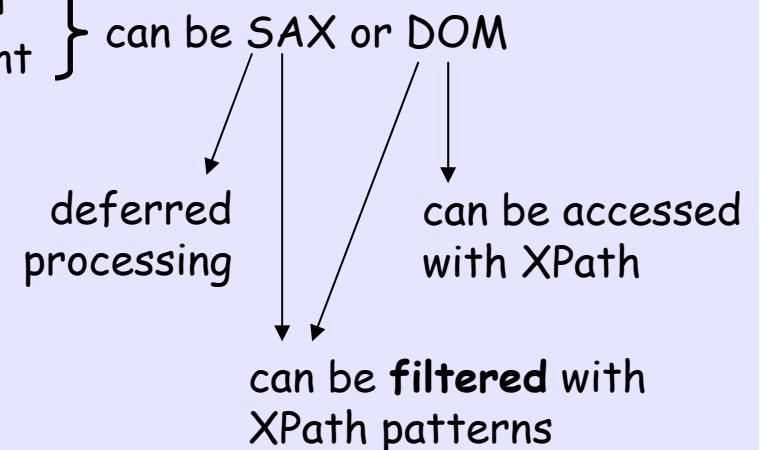
<xcl:parse> parse an XML document or fragment
<xcl:document> create an XML document or fragment

- SAX to DOM
- DOM to SAX

```

<xcl:parse name="myDom" type="DOM" />
<xcl:document name="mySax" type="SAX">
  <wrapper>
    { $myDom }
  </wrapper>
</xcl:document>

```



```

<xcl:parse-stylesheet name="myXslt" source="file:///path/to/stylesheet.xsl"/>
<xcl:parse-filter name="xinclude" source="http://www.w3.org/2001/XInclude"/>

<xcl:parse name="myDoc" type="SAX" source="file:///path/to/document.xml"/>
<xcl:filter name="included" source="{ $myDoc }" filter="{ $xinclude }"/>
<xcl:transform source="{ $included }" stylesheet="{ $myXslt }"
  output="file:///path/to/output.html"/>

```

Active Tags

Custom filters : XCL filters

- a subset of tags for XPath-based filters
- can process extra-large documents with SAX

<xcl:parse-filter>

<xcl:filter>

<xcl:rule> ← XPath pattern

<xcl:forward> ← can specify several "channels"

<xcl:apply-rules>

Built-in filters

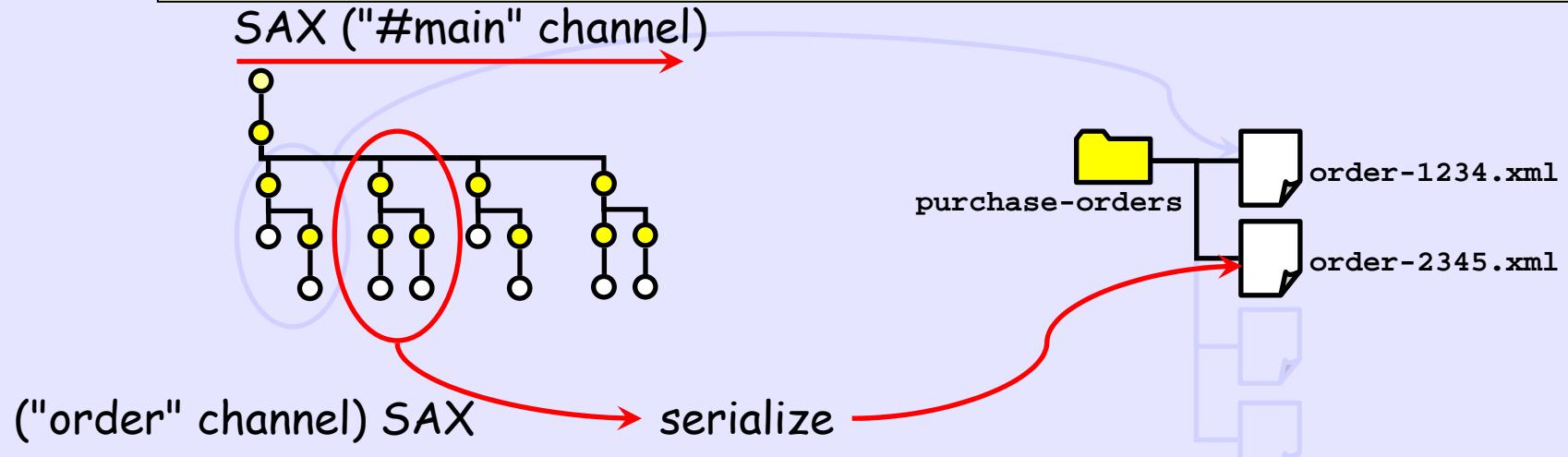
- text to XML
- XInclude filter
 - Line reader
 - Tokenizer

regexp

inline definition

```

<xcl:parse name="allPo"
    source="file:///path/to/purchase-orders.xml" type="SAX" />
<xcl:filter name="poSplitter" source="{ $allPo }">
    <xcl:rule pattern="/purchase-orders/order">
        <xcl:document name="order" type="SAX">
            <xcl:forward channel="order">
                <xcl:apply-rules/>
            </xcl:forward>
        </xcl:document>
        <xcl:transform
            output="file:///path/to/purchase-orders/order-{ @id }.xml"
            source="{ $order }"/>
    </xcl:rule>
</xcl:filter>
<xcl:transform output="{ $sys:null }" source="{ $poSplitter }" />
```



modules URIs

literal

the engine
"knows" which
tag is active
and which tag
is a literal

AVT in content

predefined property
the « SYSTEM » module

```

<?xml version="1.0" encoding="iso-8859-1"?>
<xcl:active-sheet
    xmlns:sys="http://www.inria.fr/xml/active-tags/sys"
    xmlns:io="http://www.inria.fr/xml/active-tags/io"
    xmlns:xcl="http://www.inria.fr/xml/active-tags/xcl">
    <xcl:set name="dir"
        value="{ io:file('file:///path/to/dir/') }">
    <xcl:document name="mergeAll" type="SAX">
        <mergeAll>
            <xcl:for-each name="myFile"
                select="{ $dir//*[@@io:is-file] }">
                <xcl:parse name="myDoc" type="SAX"
                    source="{ $myFile }"/>
            { $myDoc }
        </xcl:for-each>
    </mergeAll>
    </xcl:document>
    <xcl:transform
        source="{ $mergeAll }"
        output="{ $sys:out }"/>
</xcl:active-sheet>

```

No stylesheet = copy

Active tags : <xcl:parse>

XPath functions : io:file()

Predefined properties : \$sys:out

Foreign attributes : @xcl:version ← directives

Data types : io:x-file ← x- for « XML friendly » objects

- Can apply XPath expressions
- Can be X-updated

\$dir//*[@io:is-file]

\$dir/*[@io:is-file][@io:extension='xml']



io:x-file type definition

In the documentation of the I/O module

name()	xs:QName	The name of the file
parent::	io:x-file	The parent directory of this file
child::	adt:list of io:x-file	The files contained in this directory
@io:length	xs:integer	The length of this file
@io:is-file	xs:boolean	Indicates whether or not this is a file.
@io:last-modified	xs:date	The last date when this file was modified

```
<xcl:update referent="{$dir/@io:last-modified}"  
operand="{$newDate}"/>
```

<xcl:update>
<xcl:rename>
<xcl:append>
...etc

incoming URL : `http://www.acme.com/index.xml`

```

<?xml version="1.0" encoding="iso-8859-1"?>
<web:service
    xmlns:web="http://www.inria.fr/xml/active-tags/web"
    xmlns:xcl="http://www.inria.fr/xml/active-tags/xcl">
    <web:mapping match="^/(.+)\.html$">
        mime-type="text/html">
        <xcl:parse name="myDoc" source="web:///{$web:match/node()[1]}.xml"/>
        <xcl:transform
            source="{ $myDoc }"
            stylesheet="web:///WEB-INF/transform.xsl"
            output="{ value( $web:response/@web:output ) }"/>
    </web:mapping>
    <web:mapping match="...">
        <!--other web stuff-->
    </web:mapping>
</web:service>
```

regexp
captured group

type : `io:output`

XML view

```

<web:response
    web:output="[io:output@189c036]"
    web:mime-type="text/html"/>
```

`type : web:x-response`

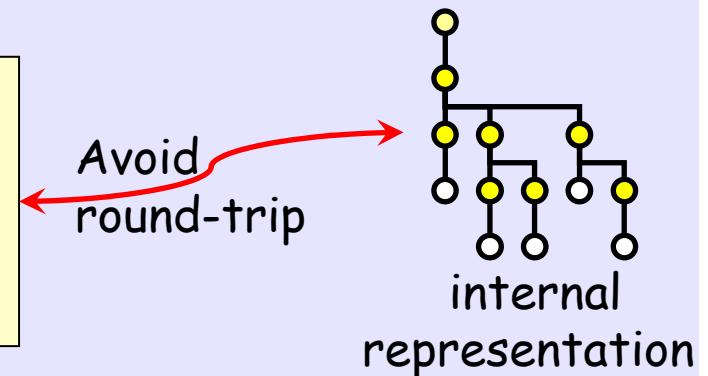
bound to an object

Objects type are identified by QNames like `web:x-response`,
`io:x-file`, `io:output`, `io:input`,
`xs:string`, `xs:integer`, `xml:document`, etc

Active Tags

```
<web:response
    web:output="[io:output@189c036]"
    web:mime-type="text/html">
    <Cache-Control>no-cache</Cache-Control>
    <Date>Tue, 15 Nov 1994 08:12:31 GMT</Date>
</web:response>
```

Not necessary represented with tags



Objects are not necessary representable in XML :

- what would be the XML representation of an instance of `io:input` or `io:output` ?
(I'm not talking about the content, but about the container, as an object)

Big objects, binary object : high-cost for XML encoding/decoding

Incomplete objects : the content is computed only when it is accessed
(late binding)

incoming URL : <http://www.acme.com/user.html?userName=Poulard>

```
<?xml version="1.0" encoding="iso-8859-1"?>
<web:service
    xmlns:web="http://www.inria.fr/xml/active-tags/web"
    xmlns:xcl="http://www.inria.fr/xml/active-tags/xcl">
    <web:mapping match="^/user\.html$">
        <xcl:set name="ldap"
            value="ldap://ldap.acme.org:9009/dc=acme,dc=org
                ??sub?(&(sn~={ $web:request/username })"/>
        <xcl:parse name="dsml" source="{ $ldap }"/>
        <xcl:document name="userDoc"/>
            <user userName="{ $web:request/username }">
                { $dsml }
            </user>
        </xcl:document>
        <xcl:transform
            source="{ $userDoc }"
            stylesheet="web:///WEB-INF/us
                output="{ value( $web:respon
            </web:mapping>
        </web:service>
```

Web application

expose as a single tag
(externalization inside
a custom module)

Batch script

```
<?xml version="1.0" encoding="iso-8859-1"?>
<xcl:active-sheet
    xmlns:sys="http://www.inria.fr/xml/active-tags/sys"
    xmlns:xcl="http://www.inria.fr/xml/active-tags/xcl">
    <xcl:set name="ldap"
        value="ldap://ldap.acme.org:9009/dc=acme,dc=org
            ??sub?(&(sn~={ $sys:env/username })"/>
    <xcl:parse name="dsml" source="{ $ldap }"/>
    <xcl:document name="userDoc"/>
        <user userName="{ $sys:env/username }">
            { $dsml }
        </user>
    </xcl:document>
    <xcl:transform source="{ $userDoc }"
        stylesheet="file:///path/to/userStylesheet.xsl"
        output="{ $sys:out }"/>
</xcl:active-sheet>
```

Use/define a custom module

```
<?xml version="1.0" encoding="iso-8
<web:service
    xmlns:acme="http://tags.acme.org/usersInfo"
    xmlns:sys="http://www.inria.fr/xml/active-tags/sys"
    xmlns:xcl="http://www.inria.fr/xml/active-tags/xcl">
        <acme:user-info name="{ $sys:env/userName }"/>
        <xcl:transform source="{ $acme:userInfo }"
                      stylesheet="file:///path/to/userStylesheet.xsl"
                      output="{ $sys:out }"/>
    </xcl:active-sheet>
<web:mapping match="/user\.\.html$">
    <acme:user-info name="{ $web:request/userName }"/>
    <xcl:transform
        source="{ $acme:userInfo }"
        stylesheet="web:///WEB-INF"
        output="{ value( $web:resp ) }"/>
</web:mapping>
</web:service>
```

implementation of the tag
« macro tag »)

XPath functions
and predefined
properties can also
be defined with macros

```
<?xml version="1.0" encoding="iso-8859-1"?>
<xcl:active-sheet
    xmlns:acme="http://tags.acme.org/usersInfo"
    xmlns:sys="http://www.inria.fr/xml/active-tags/sys"
    xmlns:xcl="http://www.inria.fr/xml/active-tags/xcl">
        <acme:user-info name="{ $sys:env/userName }"/>
        <xcl:transform source="{ $acme:userInfo }"
                      stylesheet="file:///path/to/userStylesheet.xsl"
                      output="{ $sys:out }"/>
    </xcl:active-sheet>
```

EXP : Extensible XML Processor

```
<?xml version="1.0" encoding="iso-8859-1"?>
<exp:module target="acme"
    xmlns:acme="http://tags.acme.org/usersInfo"
    xmlns:exp="http://www.inria.fr/xml/active-tags/exp"
    xmlns:xcl="http://www.inria.fr/xml/active-tags/xcl">
    <exp:element name="acme:user-info">
        <xcl:set name="ldap"
            value="ldap://ldap.acme.org:9009/dc=acme,dc=org
                ??sub?(&(sn~={ $exp:params/@name })")"/>
        <xcl:parse name="dsml" source="{ $ldap }"/>
        <xcl:document name="userDoc" />
            <user userName="{ $exp:params/@name }">
                { $dsml }
            </user>
        </xcl:document>
        <exp:exports>
            <exp:export name="acme:userInfo" value="{userDoc}"/>
        </exp:exports>
    </exp:element>
</exp:module>
```

W exported
property

```

<xunit:test-case> ←—— set the boundaries of a test
<xunit:assert-boolean-equals>
<xunit:assert-number-equals>
<xunit:assert-node-equals> } report assertions
<xunit:merge-reports> ←—— merge test-cases report
...etc
  
```

A module made of active tags

Test suites for :

- active sheets
 - individual XSLT templates
 - Java classes (that are dealing with XML datas)
- harness for tests suites

```

<xunit:test-case name="acme-test" label="Acme test">
    <!--stuff to test-->
    <acme:foo bar="do-it-like-this"/>
    <!--check the result-->
    <xcl:parse name="result" source="result.xml"/>
    <xcl:parse name="output-expected"
        source="file:///path/to/output-expected.xml"/>
    <!--check if they are equals-->
    <xunit:assert-node-equals result="{ $result }"
        expected="{ $output-expected/some[1]/result[2] }"/>
</xunit:test-case>
  
```

HTML report :

Acme test	Tests : 82	Errors : 1	Failures : 0
Node expected :	/some[1]/result[2]/foo[3]		
Result node :	/foo[3]		
Attribute existence :	Unexpected attribute bar= "BAR "		

- A systemic consideration of XML technologies
 - each component focus on a well-defined problematic
 - component cooperation
- Allow to handle with ease XML datas
 - text to XML
 - SQL to XML
 - LDAP to XML
 - SAX, DOM, XCL filters and pipelines
- Extensible better than ever
 - Custom modules (macro tags, macro XPath functions)
- Viability
 - Lots of runnable examples and tips in RefleX
 - Already used in production at INRIA
 - Could be closer to XPath2/XQuery data model
 - Some features still experimental or incomplete

To go further :

- read carefully the slides !

<http://disc.inria.fr/perso/philippe.poulard/xml/active-tags.pdf>

- email-me

Philippe.Poulard@sophia.inria.fr

- discuss about Active Tags on the XML-dev list

- download the engine

<http://reflex.gforge.inria.fr>

- try the tutorials

- send me some money ☺

Questions ?