IMPLEMENTING XFORMS USING INTERACTIVE XSLT 3.0

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INTRODUCTION

SAXON-FORMS

- New partial XForms implementation for browsers
- Implemented using Saxon-JS technologies: XSLT 3.0 and interactive XSLT
- More than just another XForms implementation: **Expands the capabilities of XForms by integration with application logic**

WHY ANOTHER XFORMS IMPLEMENTATION?

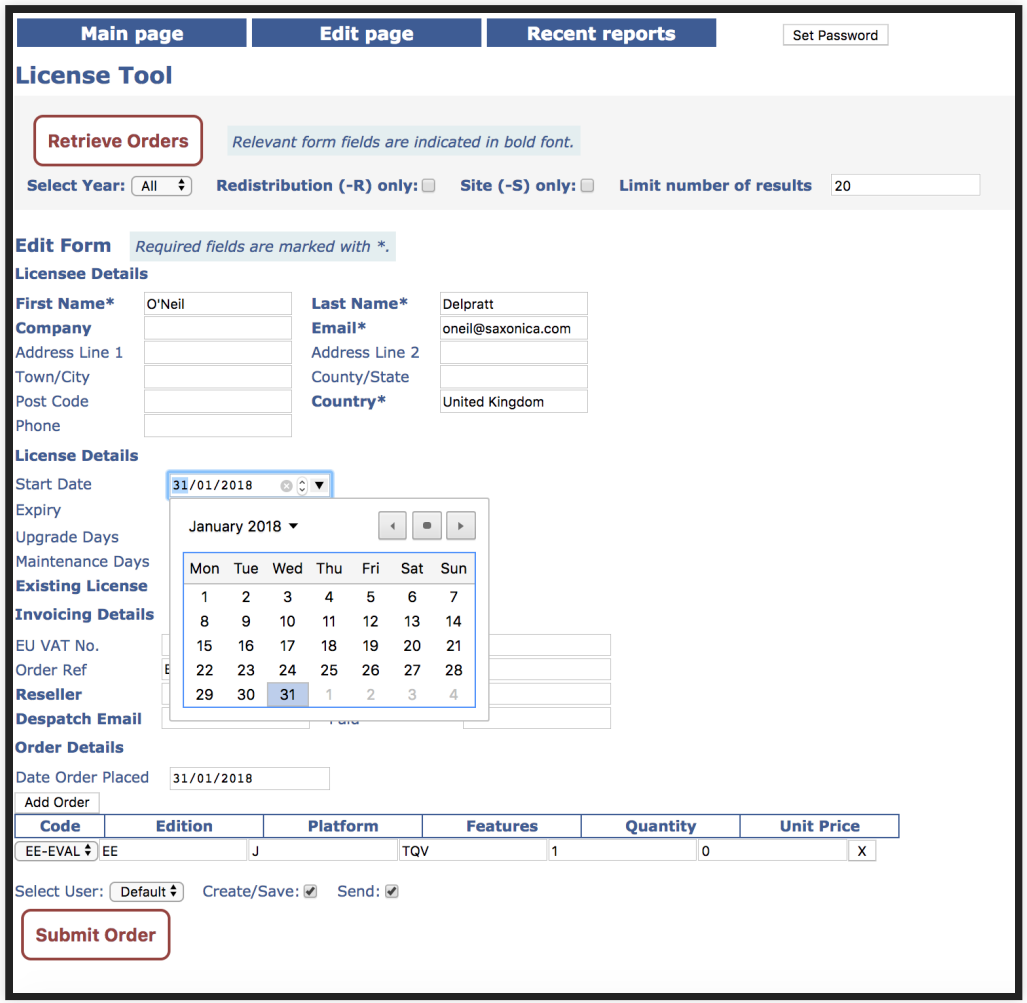
- Motivation: project to improve in-house form-based application, by using Saxon-JS
- Discover what enhancements are needed to improve capability of Saxon-JS for real-world applications
- Rather than using existing implementations, a new implementation which runs in Saxon-JS allows for better integration within application

IN THIS TALK...

- What makes Saxon-Forms interesting
- A look inside the implementation, and how it works
- How Saxon-Forms can be used to better integrate forms in a form-based application

USE CASE: LICENSE TOOL APPLICATION

DEMO


Main page
Edit page
Recent reports
Set Password
License Tool
Retrieve Orders
Relevant form fields are indicated in bold font.
Select Year: All
Redistribution (-R) only:
Site (-S) only:
Limit number of results 20
Edit Form
Required fields are marked with *.
Licensee Details
First Name* O'Neil
Last Name* Delpratt
Company
Email* oneil@saxonica.com
Address Line 1
Address Line 2
Town/City
County/State
Post Code
Country* United Kingdom
Phone
License Details
Start Date 31/01/2018
Expiry
Upgrade Days
Maintenance Days
Existing License
Invoicing Details
EU VAT No.
Order Ref
Reseller
Despatch Email
January 2018
Mon Tue Wed Thu Fri Sat Sun
1 2 3 4 5 6 7
8 9 10 11 12 13 14
15 16 17 18 19 20 21
22 23 24 25 26 27 28
29 30 31 1 2 3 4
Order Details
Date Order Placed 31/01/2018
Add Order
Code
Edition
Platform
Features
Quantity
Unit Price
EE-EVAL EE J TQV 1 0 X
Select User: Default
Create/Save:
Send:
Submit Order

LICENSE TOOL

- In-house tool for generating and managing product licenses
- Form-based application
- 90% of the code written in client-side or server-side XSLT
- Saxon-Forms integrated in the client-side enriched with additional application logic
- XML data end-to-end

SAXON-JS TECHNOLOGIES

SAXON-JS

- XSLT 3.0 runtime processor, in pure JavaScript
- Runs in browser's JavaScript engine
- Executes compiled stylesheet export files (SEFs), generated using Saxon-EE

INTERACTIVE XSLT

Saxon-JS allows interactive web applications to be written directly in XSLT using *interactive XSLT*.

- Extension instructions, functions, modes
- Event handling templates
- Dynamic generation of HTML page content

First introduced with Saxon-CE a few years ago. Further developments with Saxon-JS.

IMPLEMENTING XFORMS

XFORMS INTRODUCTION

- XForms model: instance, bindings
- Section with form controls
- Validation
- Events (Interactive)

WHAT SAXON-FORMS DOES

1. Initialization:
    - Transform the section with form controls into HTML forms elements
    - Behind the scenes: set JavaScript global variables for XForms model and interactive properties (actions, model item properties)
2. Interaction/Event handling:
    - Form data changes, etc.
    - Submission

HTML PAGE STRUCTURE

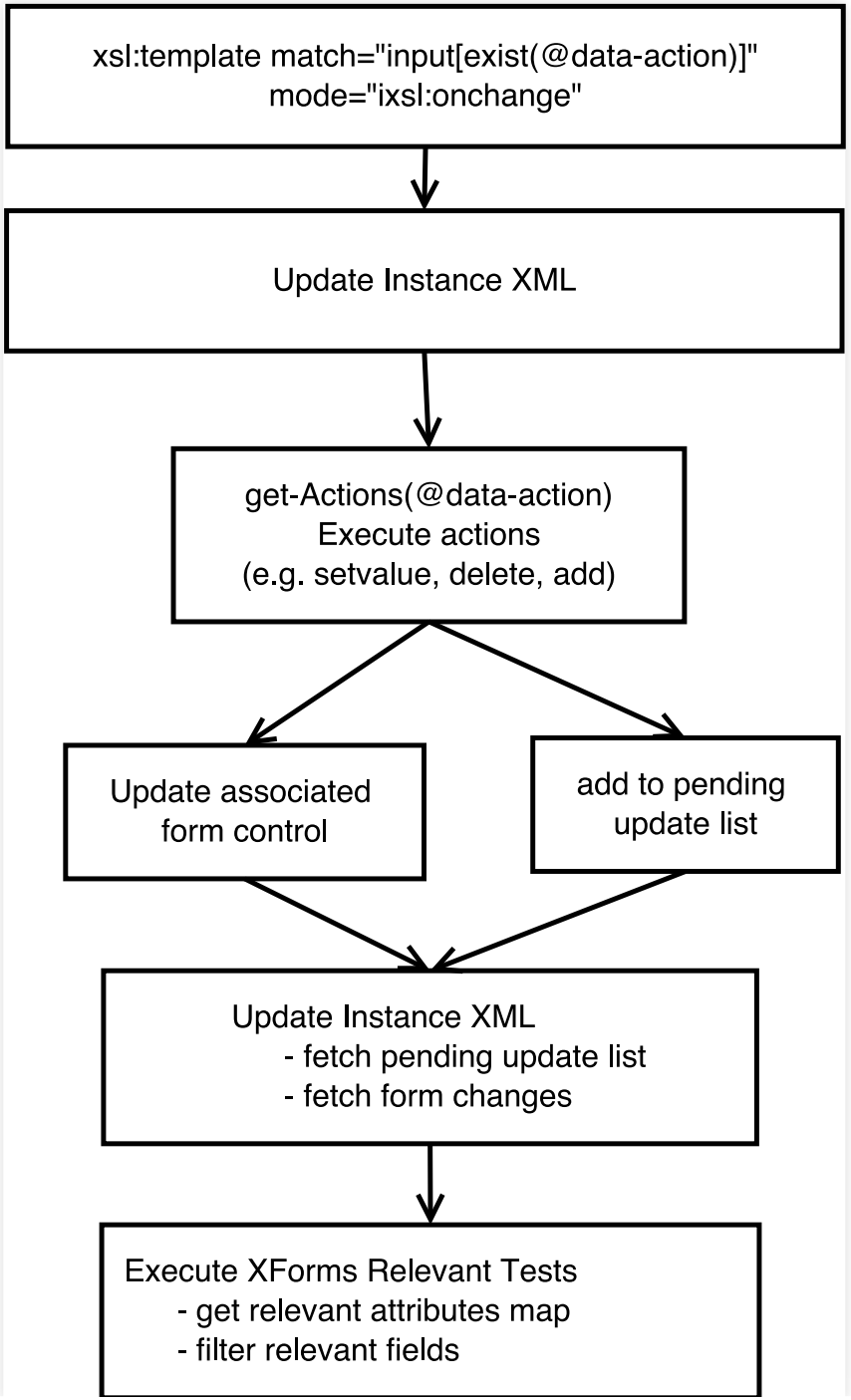
```
<html>
  <head>
    <script id="xforms-cache">
        var XFormsDoc;
        var initialInstanceDoc;
        var instanceDoc;
        var pendingUpdatesMap; /* XPath map*/
        var relevantMap; /* XPath map*/
        var actions;

        /*Getter/Setter Functions */

        var setInstance = function(doc) {
            instanceDoc = doc;
        }
```

XSLT CODE TO ADD ACTION TO JSON OBJECT IN JAVASCRIPT SPACE

```
<xsl:variable name='action-map' select='map{
    "@ref": "Document/Shipment/Order/MaintenanceDays",
    "@event": "xforms-value-changed",
    "setvalue": [map{"@value": "if(xs:integer(.) > 0) then ...
        "ref": "../../../Options/MaintenanceDate"},
      map{"value": "true",
        "ref": "../../../Options/Updated"}]
    }' />

<xsl:sequence select='js:addAction("d26aApDhDa", $action-map)'
```

Call JavaScript global function from interactive XSLT by using http://saxonica.com/ns/globalJS namespace

EVENT HANDLING


xsl:template match="input[exist(@data-action)]"
mode="ixsl:onchange"
Update Instance XML
get-Actions(@data-action)
Execute actions
(e.g. setvalue, delete, add)
Update associated
form control
add to pending
update list
Update Instance XML
- fetch pending update list
- fetch form changes
Execute XForms Relevant Tests
- get relevant attributes map
- filter relevant fields

EVENT HANDLING

```
<xsl:template match="input[exists(@data-action)]"
    mode="ixsl:onchange">
    <xsl:variable name="refi" select="@data-ref"/>
    <xsl:variable name="refElement" select="@data-element"/>
    ...

    <xsl:variable name="xforms-value-change"
            select="js:getAction(string(@data-action))"/>

    <xsl:variable name="updatedInstanceXML">
        ...
    </xsl:variable>
    <xsl:sequence
      select="js:setInstance($updatedInstanceXML)"/>
```

```
<xsl:for-each select="$xforms-value-change">
  <xsl:variable name="action-map" select="."/>

  <xsl:variable name="ref"
    select="map:get($action-map, '@ref')"/>

  <!-- if and while clause setup-->
    ...

  <xsl:variable name="instanceXML_Frag" as="node()">
    <xsl:evaluate xpath="$ref"
      context-item="$updatedInstanceXML"/>
  </xsl:variable>
    ...
  <xsl:sequence>
```

INTEGRATING XFORMS INTO APPLICATIONS

EXAMPLES OF HOW APPLICATION LOGIC CAN BE USED TO DO MORE WITH XFORMS

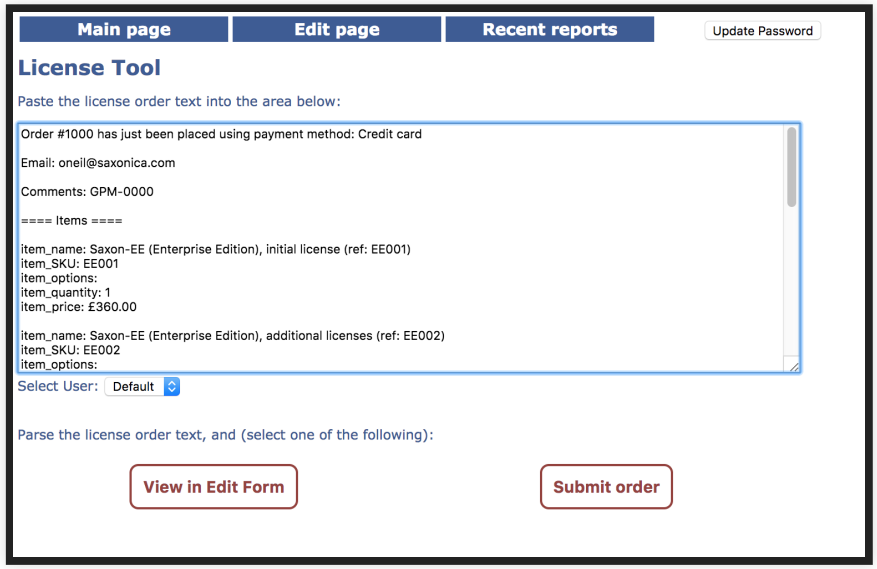
- Parsing structured text from a form input textarea to XML
- Overriding submission
- User defined functions

PARSING STRUCTURED TEXT TO XML

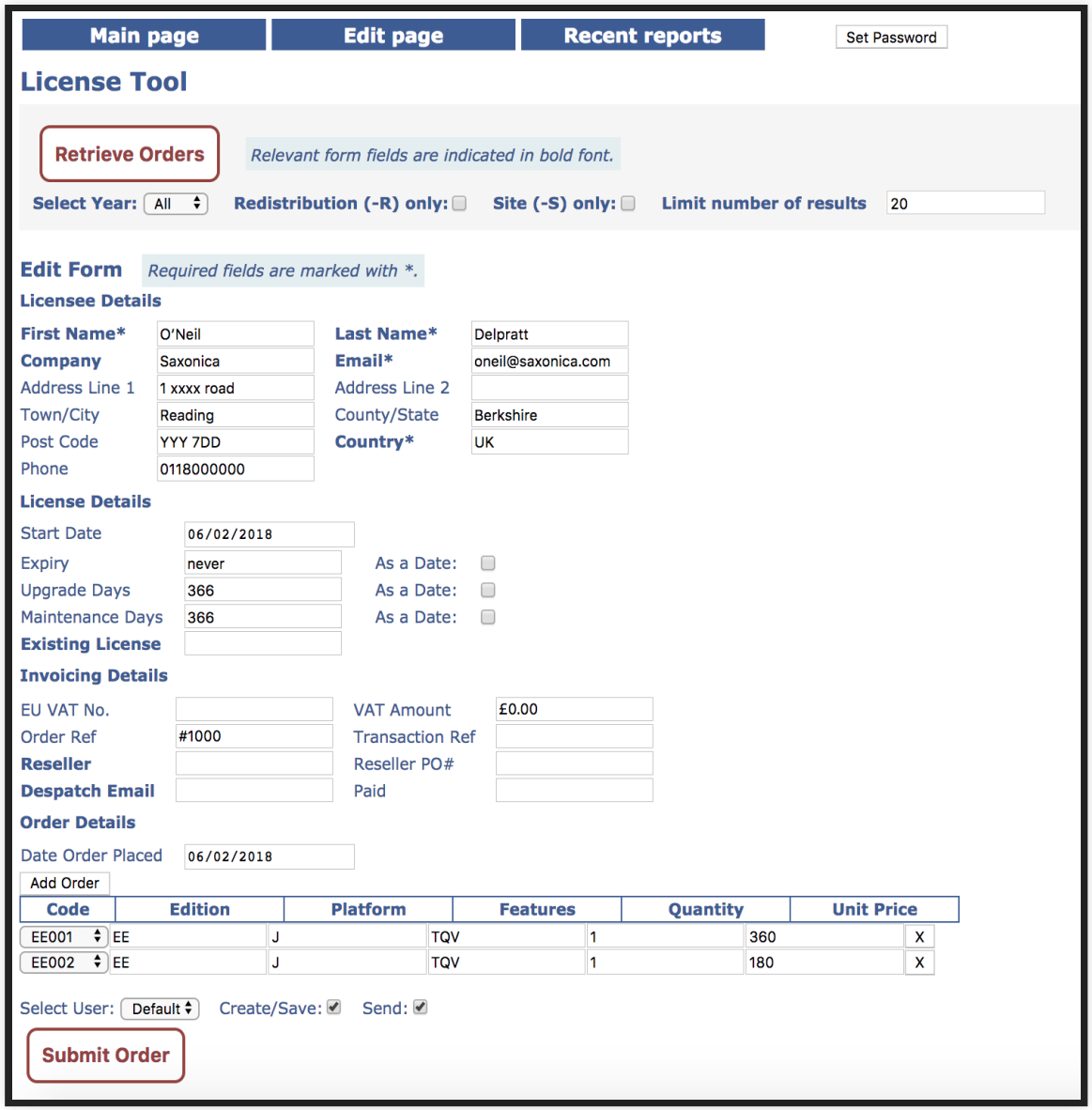
Email Text

```
Order #1000 has just been placed using payment method: Credit card

Email: oneil@saxonica.com

Comments: GPM-0000

==== Items ====

item_name: Saxon-EE (Enterprise Edition), initial license (ref: EE001)
item_SKU: EE001
item_options:
item_quantity: 1
item_price: £360.00

item_name: Saxon-EE (Enterprise Edition), additional licenses (ref: EE002)
item_SKU: EE002
item_options:
item_quantity: 1
item_price: £180.00


==== Order Totals ====

Items: £540.00
Shipping: £0.00
Tax: £0.00
TOTAL: £540.00

-- Payment method --

Credit card

-- Billing address --

company: Saxonica

billing_name: O'Neil Delpratt
billing_street: 1 xxxx road
billing_city: Reading
billing_state: Berkshire
billing_postalCode: YYY 7DD
billing_countryName: UK
billing_phone:0118000000
```

Main Form



Edit Form


Main page
Edit page
Recent reports
Set Password
License Tool
Retrieve Orders
Relevant form fields are indicated in bold font.
Select Year: All
Redistribution (-R) only:
Site (-S) only:
Limit number of results 20
Edit Form
Required fields are marked with *.
Licensee Details
First Name* O'Neil
Last Name* Delpratt
Company Saxonica
Email* oneil@saxonica.com
Address Line 1 1 xxxx road
Address Line 2
Town/City Reading
County/State Berkshire
Post Code YYY 7DD
Country* UK
Phone 0118000000
License Details
Start Date 06/02/2018
Expiry never
As a Date:
Upgrade Days 366
As a Date:
Maintenance Days 366
As a Date:
Existing License
Invoicing Details
EU VAT No.
VAT Amount £0.00
Order Ref #1000
Transaction Ref
Reseller
Reseller PO#
Despatch Email
Paid
Order Details
Date Order Placed 06/02/2018
Add Order
Code
Edition
Platform
Features
Quantity
Unit Price
EE001 EE J TQV 1 360 X
EE002 EE J TQV 1 180 X
Select User: Default
Create/Save:
Send:
Submit Order

SUBMISSION

USING HTTP CLIENT IN SAXON-JS

SUBMISSION HANDLING

```
<xsl:template match="button[@id='submitXML']"
  mode="ixsl:onclick" priority="1">
  ...
  <xsl:variable name="requestBody" as="document-node(element(s
    <xsl:document>
      <submit>
        <xsl:sequence select="$updatedInstanceXML/Document"/>
      </submit>
    </xsl:document>
  </xsl:variable>

  <xsl:variable name="HTTPrequest" as="map(*)"
    select="map{'body':$requestBody,
      'method':'POST',
      'href':$receive-orderXML,
```

CONCLUSION

ACHIEVEMENTS OF PROJECT

- Real-world use of Saxon-JS in Saxon-Forms
- Much improved Saxon License Tool Application

SAXON-FORMS ALLOWS YOU TO DO MORE WITH XFORMS

- More than just another XForms implementation
- XForms integrated into declarative client-side applications
- Do more beyond the capabilities of XForms

SAXON-FORMS

- Saxon-Forms is available at https://github.com/Saxonica/Saxon-Forms
- Future goal: Full implementation?
  (With help from the community)

THANK YOU FOR LISTENING

QUESTIONS?

SAXONICA.com
XSLT AND XQUERY PROCESSING