Course 150

Engineer Role:

KOCOS Test Bench to PNPSCADA interface

2015-10-22

Recommendation:

- **It would be beneficial to know LaTeX (https://LaTeX-project.org/) and Velocity (http://velocity.apache.org/) in order to use the full functionality presented**

Gives you the power to:

- **Calibrate more kinds of meters with your test bench system**
- **Automatically create, post and publish Calibration Certificates to your documentation system**
- **Automatically add modems and meter entities to PNPSCADA as they are calibrated**

Once you are done with this Course, you should be able to:

- Add a Test Bench entity
- Understand how to set up automatic Calibration Certificates
- How to configure the sending of calibration certificates om meters that does not exist on PNPSCADA, for example some prepaid meters

HOWTO Add a Calibration Test Bench Entity in PNPSCADA

Prerequisites

First you need to buy and commission a Calibration Test Bench system from KOCOS (http://www.kocos.co.za/)

Secondly the test bench computer static TCP/IP address must be addressable from the PNPSCADA server, and you must know what it is.

Thirdly you need to create a Login on PNPSCADA for the test bench. Everything the test bench 'does' on PNPSCADA would be done by this 'person'.

HOWTO Add a Calibration Test Bench Entity in PNPSCADA

Howto

Log in; Go to the Overview Screen (Home); Push the Add New button

Select Servers

Select Test Bench

Choose the Login account to represent the Test Bench for permissions; Push the Next button

Enter a Name (something unique that identifies the Test Bench instance to you), as well as the static IP address of the Test Bench server. (this IP address will be used to identify the test bench); Push the Finish button

The Test Bench Entity should now exist.

HOWTO Set up a Test Bench to generate Calibration Certificates

Log in; Go to the Overview Screen (Home); Select the Test Bench entity

Select Edit → Test Bench Setup

In this screen, upload your LaTeX template file for generating the Calibration Certificate as a `*.tex.t1` file, and all its dependencies, e.g. all images referenced from the template.

This template is in the form of a Velocity Template of a LaTeX file (.tex)

When the Test Bench wants to generate a Calibration Certificate, it will post an XML file in a very specific format to PNPSCADA (at /insertCalibrationEvent.jsp), with all the data. All this data then gets inserted via Velocity into the template (.t1) to generate a .tex file, and this file then gets parsed with LaTeX to generate the .pdf file, which is the Calibration Certificate file, which gets posted against the meter event log - if the meter exists on PNPSCADA – and gets posted to SAP PSRM, if so configured.

Partial Example of an XML file:

```
<certdata>
  <meters>
    <meter>
      <username>steve</username>
      <lab>Calibration</lab>
      <procedure>CPR 002</procedure>
      <serial>000F93028E57</serial>
 ....
```

There is only one meter element in the XML posted. The tag names in the meter element are addressable via the level 1 Velocity variables, e.g. $username for "steve" in the above example.

If it is a second level value that should be inserted, the meter-level element is a Hashtable, so it can be referred as follows:
$refstd.get("make")
That would refer to the "Applied Precision" value in the following XML:

```
<certdata>
 <meters>
  <meter>
. . . .
    <refstd>
     <serial>C49241</serial>
     <make>Applied Precision</make>
     <model>RS 2330A</model>
     <class>0.05</class>
     <caldate>2013-03-23</caldate>
    </refstd>
. . . .
```

There can be a case where multiple elements of the same name exists in an element, e.g.

```
<certdata>
 <meters>
  <meter>
. . . .
    <plots>
     <limits>
      <pos>
       <point>
        <current>0.05</current>
        <error>0.5</error>
       </point>
       <point>
        <current>0.1</current>
        <error>0.5</error>
       </point>
       <point>
        <current>1</current>
        <error>0.5</error>
       </point>
. . . .
```

In which case the data would be resolved as a Vector, e.g. in the template it would be referred to as follows:

```
#set($limits = $plots.get("limits"))
#set($pos = $limits.get("pos"))
#foreach($p in $pos)
($p.get("current"),$p.get("error"))
#end
```

Full example of an XML file posted by the Test Bench system:

```
<certdata>
 <meters>
  <meter>
   <username>disaacs5</username>
   <lab>Calibration</lab>
   <procedure>CPR 002</procedure>
   <serial>000F93028E57</serial>
   <pos>5</pos>
   <make>Landis + Gyr</make>
   <type>ZMK405CE</type>
   <class>0.5</class>
   <phase>3</phase>
   <classreact>2</classreact>
   <certno>000F93028E57-201509071701</certno>
   <caldate>2015-09-07</caldate>
   <ibtestid>13</ibtestid>
   <ib>1</ib>
   <iberror>+0.0127794168776507</iberror>
   <passfail>passed</passfail>
   <station>
    <serial>2762033386</serial>
    <certno>2762033386-201410311449</certno>
    <ib>1</ib>
    <iberror>+0.00333352223203761</iberror>
    <caldate>2014-10-31</caldate>
   </station>
   <refstd>
    <serial>C49241</serial>
    <make>Applied Precision</make>
    <model>RS 2330A</model>
    <class>0.05</class>
    <caldate>2013-03-23</caldate>
   </refstd>
   <transferstd>
    <serial>C49618</serial>
    <make>Applied Precision</make>
    <model>RS 2330S</model>
    <class>0.01</class>
    <caldate>2013-02-23</caldate>
   </transferstd>
   <tests>
    <test>
     <id>5</id>
     <name>5% Ib, UPF</name>
     <limit1>0.5</limit1>
     <limit2>-0.5</limit2>
     <value>-0.0161080284163753</value>
     <stdev>0.0085501796543912</stdev>
     <status>1</status>
     <loadpoint>
      <Va>63.5</Va>
      <Vb>63.5</Vb>
      <Vc>63.5</Vc>
      <Ia>0.05</Ia>
      <Ib>0.05</Ib>
      <Ic>0.05</Ic>
      <PF>1</PF>
     </loadpoint>
    </test>
    <test>
```

```
  <id>6</id>
  <name>10% Ib, UPF</name>
  <limit1>0.5</limit1>
  <limit2>-0.5</limit2>
  <value>-0.0533044048752631</value>
  <stdev>0.00865059156255734</stdev>
  <status>1</status>
  <loadpoint>
    <Va>63.5</Va>
    <Vb>63.5</Vb>
    <Vc>63.5</Vc>
    <Ia>0.1</Ia>
    <Ib>0.1</Ib>
    <Ic>0.1</Ic>
    <PF>1</PF>
  </loadpoint>
</test>
<test>
  <id>7</id>
  <name>100% Ib, UPF</name>
  <limit1>0.5</limit1>
  <limit2>-0.5</limit2>
  <value>0.00888987049693133</value>
  <stdev>0.00535868425942583</stdev>
  <status>1</status>
  <loadpoint>
    <Va>63.5</Va>
    <Vb>63.5</Vb>
    <Vc>63.5</Vc>
    <Ia>1</Ia>
    <Ib>1</Ib>
    <Ic>1</Ic>
    <PF>1</PF>
  </loadpoint>
</test>
<test>
  <id>8</id>
  <name>100% Ib, 0.5LAG</name>
  <limit1>0.5</limit1>
  <limit2>-0.5</limit2>
  <value>-0.107661736191404</value>
  <stdev>0.000960184941478159</stdev>
  <status>1</status>
  <loadpoint>
    <Va>63.5</Va>
    <Vb>63.5</Vb>
    <Vc>63.5</Vc>
    <Ia>1</Ia>
    <Ib>1</Ib>
    <Ic>1</Ic>
    <PF>0.5</PF>
  </loadpoint>
</test>
<test>
  <id>9</id>
  <name>100% Ib, 0.8LEAD</name>
  <limit1>0.5</limit1>
  <limit2>-0.5</limit2>
  <value>0.0578114827750027</value>
  <stdev>0.00674328105854936</stdev>
  <status>1</status>
```

```
  <loadpoint>
    <Va>63.5</Va>
    <Vb>63.5</Vb>
    <Vc>63.5</Vc>
    <Ia>1</Ia>
    <Ib>1</Ib>
    <Ic>1</Ic>
    <PF>0.8</PF>
  </loadpoint>
</test>
<test>
  <id>10</id>
  <name>100% Ib L1, UPF</name>
  <limit1>0.5</limit1>
  <limit2>-0.5</limit2>
  <value>-0.101563281294797</value>
  <stdev>0.00440072722855841</stdev>
  <status>1</status>
  <loadpoint>
    <Va>63.5</Va>
    <Vb>0</Vb>
    <Vc>0</Vc>
    <Ia>1</Ia>
    <Ib>0</Ib>
    <Ic>0</Ic>
    <PF>1</PF>
  </loadpoint>
</test>
<test>
  <id>11</id>
  <name>100% Ib L2, UPF</name>
  <limit1>0.5</limit1>
  <limit2>-0.5</limit2>
  <value>-0.24440099641411</value>
  <stdev>0.0057455072180124</stdev>
  <status>1</status>
  <loadpoint>
    <Va>0</Va>
    <Vb>63.5</Vb>
    <Vc>0</Vc>
    <Ia>0</Ia>
    <Ib>1</Ib>
    <Ic>0</Ic>
    <PF>1</PF>
  </loadpoint>
</test>
<test>
  <id>12</id>
  <name>100% Ib L3, UPF</name>
  <limit1>0.5</limit1>
  <limit2>-0.5</limit2>
  <value>-0.102117828947982</value>
  <stdev>0.000960280864049684</stdev>
  <status>1</status>
  <loadpoint>
    <Va>0</Va>
    <Vb>0</Vb>
    <Vc>63.5</Vc>
    <Ia>0</Ia>
    <Ib>0</Ib>
    <Ic>1</Ic>
```

```
      <PF>1</PF>
    </loadpoint>
  </test>
  <test>
    <id>13</id>
    <name>100% Ib, UPF EXPORT</name>
    <limit1>0.5</limit1>
    <limit2>-0.5</limit2>
    <value>0.0127794168776507</value>
    <stdev>0.00096249105644l404</stdev>
    <status>1</status>
    <loadpoint>
      <Va>63.5</Va>
      <Vb>63.5</Vb>
      <Vc>63.5</Vc>
      <Ia>1</Ia>
      <Ib>1</Ib>
      <Ic>1</Ic>
      <PF>-1</PF>
    </loadpoint>
  </test>
  <test>
    <id>14</id>
    <name>Imax, UPF</name>
    <limit1>0.5</limit1>
    <limit2>-0.5</limit2>
    <value>0.00444653711609367</value>
    <stdev>0.0168598657774752</stdev>
    <status>1</status>
    <loadpoint>
      <Va>63.5</Va>
      <Vb>63.5</Vb>
      <Vc>63.5</Vc>
      <Ia>6</Ia>
      <Ib>6</Ib>
      <Ic>6</Ic>
      <PF>1</PF>
    </loadpoint>
  </test>
</tests>
<plots>
  <limits>
    <pos>
      <point>
        <current>0.05</current>
        <error>0.5</error>
      </point>
      <point>
        <current>0.1</current>
        <error>0.5</error>
      </point>
      <point>
        <current>1</current>
        <error>0.5</error>
      </point>
      <point>
        <current>1</current>
        <error>0.5</error>
      </point>
      <point>
        <current>1</current>
```

```
    <error>0.5</error>
  </point>
  <point>
    <current>1</current>
    <error>0.5</error>
  </point>
  <point>
    <current>1</current>
    <error>0.5</error>
  </point>
  <point>
    <current>1</current>
    <error>0.5</error>
  </point>
  <point>
    <current>1</current>
    <error>0.5</error>
  </point>
  <point>
    <current>6</current>
    <error>0.5</error>
  </point>
</pos>
<neg>
  <point>
    <current>0.05</current>
    <error>-0.5</error>
  </point>
  <point>
    <current>0.1</current>
    <error>-0.5</error>
  </point>
  <point>
    <current>1</current>
    <error>-0.5</error>
  </point>
  <point>
    <current>1</current>
    <error>-0.5</error>
  </point>
  <point>
    <current>1</current>
    <error>-0.5</error>
  </point>
  <point>
    <current>1</current>
    <error>-0.5</error>
  </point>
  <point>
    <current>1</current>
    <error>-0.5</error>
  </point>
  <point>
    <current>1</current>
    <error>-0.5</error>
  </point>
  <point>
    <current>1</current>
    <error>-0.5</error>
  </point>
  <point>
```

```
          <current>6</current>
          <error>-0.5</error>
        </point>
      </neg>
    </limits>
    <points>
      <point>
        <marker>o</marker>
        <current>0.05</current>
        <error>-0.0161080284163753</error>
      </point>
      <point>
        <marker>o</marker>
        <current>0.1</current>
        <error>-0.0533044048752631</error>
      </point>
      <point>
        <marker>o</marker>
        <current>1</current>
        <error>0.0088898704969313 3</error>
      </point>
      <point>
        <marker>&lt;</marker>
        <current>1</current>
        <error>-0.107661736191404</error>
      </point>
      <point>
        <marker>&gt;</marker>
        <current>1</current>
        <error>0.0578114827750027</error>
      </point>
      <point>
        <marker>1</marker>
        <current>1</current>
        <error>-0.101563281294797</error>
      </point>
      <point>
        <marker>2</marker>
        <current>1</current>
        <error>-0.24440099641411</error>
      </point>
      <point>
        <marker>3</marker>
        <current>1</current>
        <error>-0.102117828947982</error>
      </point>
      <point>
        <marker>o</marker>
        <current>1</current>
        <error>0.0127794168776507</error>
      </point>
      <point>
        <marker>o</marker>
        <current>6</current>
        <error>0.0044465371160936 7</error>
      </point>
    </points>
  </plots>
 </meter>
</meters>
</certdata>
```

HOWTO Set up a Test Bench to generate Calibration Certificates and post to SAP/PSRM

Log in; Go to the Overview Screen (Home); Select the Test Bench entity

Select Edit → Test Bench Setup

If you have MDUS entities configured on your system (See course 160), you would see a drop box at the bottom of this screen, where you can select the default MDUS entity to post to. Select it and Push the Submit button next to it. This is necessary if you want to post Certificates for meters that does not exist as Meter Entities on PNPSCADA.

On your MDUS setup screen (Tools → Setup MDUS), you must make sure that you have configured the interface called
OaUtilitiesSmartMeterDocumentationPSRMRequest
This is the SOAP transaction used from PNPSCADA to SAP to post the Document. If it does not exist, then no Calibration Certificates would be posted to SAP.

On your MDUS events setup screen (Tools → Setup MDUS Events), you must make sure that you have Enabled the "Calibration Report (Sw)" event under USER events, and that you have specified the correct SAP TypeCode. The SAP CategoryCode only gets used if the OaUtilitiesSmartMeterDocumentationPSRMRequest interface is not defined, in which case a normal event gets sent through to SAP on calibration certificate (if enabled) over the
UtilitiesSmartMeterEventERPBulkCreateRequestIn
interface (if it is defined).

How does it work to create Meters and Modems Automatically from the Test Bench

The Test Bench can add and call in meters via functionality from PNPSCADA at /addQueryMeter.jsp

It can add meters temporarily and read them in through 'Etherpads' (where PNPSCADA connects to the test bench at a specific IP and port), or it can add meters permanently and read them through modems.

However, this functionality must be enabled on the Test Bench Software.

Here is an example of a POST to addQueryMeter.jsp:

```
<session type="local">
  <meters>
    <meter function="startPoll"
      type="Elster A1140"
      serial="75028853"
      pos="1"
      ipaddr="192.168.1.49:51000"
      SIM="12300000000000000123"
      MSISDN="0821234567" >
    </meter>
  </meters>
</session>
```

The result from a read query as above can then be read from PNPSCADA and used for calibration, which means that any meter whose protocol can be understood by PNPSCADA can automatically be calibrated.