http://www.sqlservercentral.com/articles/XML/61462/
Printed 2007/12/20 05:59PM

XML Workshop XIII - XSD And Variable Content Containers

By Jacob Sebastian, 2007/11/01

Introduction

In the past few sessions of *XML Workshop*, we had a good discussion about schema validation. We saw that, by defining a *SCHEMA*, we could strictly validate the data being assigned to an XML column or variable. When a schema is bound to a column or variable, the *XML* value should *EXACTLY* match the schema definition. This is what we need almost always.

There are times when we need to allow data with different *XML* structures. Let us take an example. Assume that we are working on a billing application and we need to store the payment details. Our application supports the following payment methods: *Check*, *Cash* and *Credit Card*. Based on the payment method, we will have to store additional information into the tables. If it is *Check*, then we need to store the *Bank Name, Branch* and *Check Number*. If the payment method is *Cash* then we need to store the *Currency* and the *denomination*. If the payment is made by *Credit Card*, then we need to store *Card Type, Number, Expiry date* etc.

The *XML* that our application should support are the following.

Cash Payment

```xml
<PaymentDetails>
  <Type>Cash</Type>
  <CashDetails>
    <Currency>USD</Currency>
    <Denomination>
      <Hundreds>5</Hundreds>
      <Tens>3</Tens>
      <Ones>2</Ones>
    </Denomination>
  </CashDetails>
</PaymentDetails>
```

Payment By Check

```xml
<PaymentDetails>
  <Type>Check</Type>
  <CheckDetails>
    <BankName>HSBC</BankName>
    <Branch>NY City</Branch>
    <CheckNumber>445908</CheckNumber>
  </CheckDetails>
</PaymentDetails>
```

Payment By Credit Card

```xml
<PaymentDetails>
  <Type>CreditCard</Type>
  <CreditCardDetails>
    <CardType>Visa</CardType>
    <CardNumber>xxxx xxxx xxxx 9090</CardNumber>
    <VerificationCode>896</VerificationCode>
    <ExpiryDate>0911</ExpiryDate>
  </CreditCardDetails>
</PaymentDetails>
```

How do we define a schema which supports all these different *XML* structures? Well, there are many ways to do it. The easiest way is to use the *xsd:choice* sequence indicator.

Step 1 - Define the Payment Method

Let us start defining the schema. The first step is to create the *Payment Method* enumeration.

```
<xsd:simpleType name="PaymentMethod">
  <xsd:restriction base ="xsd:string">
    <xsd:enumeration value="Cash"/>
    <xsd:enumeration value="Check" />
    <xsd:enumeration value="CreditCard" />
  </xsd:restriction>
</xsd:simpleType>
```

Step 2 - Define Cash Details

Now let us define the schema for the cash payment details.

```
<xsd:complexType name="CashPayment">
  <xsd:all>
    <xsd:element name="Currency" type="xsd:string"/>
    <xsd:element name="Denomination">
      <xsd:complexType>
        <xsd:all>
          <xsd:element name="Hundreds" type="xsd:integer"/>
          <xsd:element name="Tens" type="xsd:integer" />
          <xsd:element name ="Ones" type="xsd:integer" />
        </xsd:all>
      </xsd:complexType>
    </xsd:element>
  </xsd:all>
</xsd:complexType>
```

Step 3 - Define Check Details

Here is the schema for the *Check Details*

```
<xsd:complexType name="CheckPayment">
  <xsd:all>
    <xsd:element name="BankName" type="xsd:string" />
    <xsd:element name="Branch" type="xsd:string" />
    <xsd:element name="CheckNumber" type="xsd:string" />
  </xsd:all>
</xsd:complexType>
```

Step 4 - Define Credit Card Details

And finally, let us define the schema for *Credit Card Details*

```
<xsd:complexType name="CreditCardPayment">
  <xsd:all>
    <xsd:element name="CardType" type="xsd:string"/>
    <xsd:element name="CardNumber" type="xsd:string" />
    <xsd:element name="VerificationCode" type="xsd:string"/>
    <xsd:element name="ExpiryDate" type="xsd:string" />
  </xsd:all>
</xsd:complexType>
```

Step 5 - The final schema

Here is the complete schema. [code]

```
<xsd:schema xmlns:xsd="http://www.w3.org/2001/XMLSchema">
  <xsd:element name="PaymentDetails">
    <xsd:complexType>
      <xsd:sequence>
        <xsd:element name="Type" type="PaymentMethod" />
        <xsd:choice>
          <xsd:element name="CashDetails" type="CashPayment" />
          <xsd:element name="CheckDetails" type="CheckPayment" />
          <xsd:element name="CreditCardDetails" type="CreditCardPayment" />
        </xsd:choice>
      </xsd:sequence>
    </xsd:complexType>
  </xsd:element>
  <xsd:simpleType name="PaymentMethod">
    <xsd:restriction base ="xsd:string">
      <xsd:enumeration value="Cash"/>
      <xsd:enumeration value="Check" />
      <xsd:enumeration value="CreditCard" />
    </xsd:restriction>
  </xsd:simpleType>
  <xsd:complexType name="CashPayment">
    <xsd:all>
      <xsd:element name="Currency" type="xsd:string"/>
      <xsd:element name="Denomination">
        <xsd:complexType>
          <xsd:all>
            <xsd:element name="Hundreds" type="xsd:integer"/>
            <xsd:element name="Tens" type="xsd:integer" />
            <xsd:element name ="Ones" type="xsd:integer" />
          </xsd:all>
        </xsd:complexType>
      </xsd:element>
    </xsd:all>
  </xsd:complexType>
  <xsd:complexType name="CreditCardPayment">
    <xsd:all>
      <xsd:element name="CardType" type="xsd:string"/>
      <xsd:element name="CardNumber" type="xsd:string" />
      <xsd:element name="VerificationCode" type="xsd:string"/>
      <xsd:element name="ExpiryDate" type="xsd:string" />
    </xsd:all>
  </xsd:complexType>
  <xsd:complexType name="CheckPayment">
    <xsd:all>
      <xsd:element name="BankName" type="xsd:string" />
      <xsd:element name="Branch" type="xsd:string" />
      <xsd:element name="CheckNumber" type="xsd:string" />
    </xsd:all>
  </xsd:complexType>
</xsd:schema>
```

Creating the Schema Collection

Let us create the schema collection now. [code]

```
CREATE XML SCHEMA COLLECTION PaymentType
AS
'<xsd:schema xmlns:xsd="http://www.w3.org/2001/XMLSchema">
  <xsd:element name="PaymentDetails">
    <xsd:complexType>
      <xsd:sequence>
        <xsd:element name="Type" type="PaymentMethod" />
        <xsd:choice>
          <xsd:element name="CashDetails" type="CashPayment" />
          <xsd:element name="CheckDetails" type="CheckPayment" />
          <xsd:element name="CreditCardDetails" type="CreditCardPayment" />
        </xsd:choice>
      </xsd:sequence>
    </xsd:complexType>
  </xsd:element>
  <xsd:simpleType name="PaymentMethod">
```

```
    <xsd:restriction base ="xsd:string">
      <xsd:enumeration value="Cash"/>
      <xsd:enumeration value="Check" />
      <xsd:enumeration value="CreditCard" />
    </xsd:restriction>
  </xsd:simpleType>
  <xsd:complexType name="CashPayment">
    <xsd:all>
      <xsd:element name="Currency" type="xsd:string"/>
      <xsd:element name="Denomination">
        <xsd:complexType>
          <xsd:all>
            <xsd:element name="Hundreds" type="xsd:integer"/>
            <xsd:element name="Tens" type="xsd:integer" />
            <xsd:element name ="Ones" type="xsd:integer" />
          </xsd:all>
        </xsd:complexType>
      </xsd:element>
    </xsd:all>
  </xsd:complexType>
  <xsd:complexType name="CreditCardPayment">
    <xsd:all>
      <xsd:element name="CardType" type="xsd:string"/>
      <xsd:element name="CardNumber" type="xsd:string" />
      <xsd:element name="VerificationCode" type="xsd:string"/>
      <xsd:element name="ExpiryDate" type="xsd:string" />
    </xsd:all>
  </xsd:complexType>
  <xsd:complexType name="CheckPayment">
    <xsd:all>
      <xsd:element name="BankName" type="xsd:string" />
      <xsd:element name="Branch" type="xsd:string" />
      <xsd:element name="CheckNumber" type="xsd:string" />
    </xsd:all>
  </xsd:complexType>
</xsd:schema>'
```

Testing the schema

We have created the schema that we needed. Now it is time to test it. Let us try to assign the different *XML* data that we discussed earlier and see if *SQL Server 2005* validates them correctly. [1, 2, 3]

```
DECLARE @x XML(PaymentType)
SET @x = '
<PaymentDetails>
  <Type>CreditCard</Type>
  <CreditCardDetails>
    <CardType>Visa</CardType>
    <CardNumber>xxxx xxxx xxxx 9090</CardNumber>
    <VerificationCode>896</VerificationCode>
    <ExpiryDate>0911</ExpiryDate>
  </CreditCardDetails>
</PaymentDetails>
'
```

```
DECLARE @x XML(PaymentType)
SET @x = '
<PaymentDetails>
  <Type>Check</Type>
  <CheckDetails>
    <BankName>HSBC</BankName>
    <Branch>NY City</Branch>
    <CheckNumber>445908</CheckNumber>
  </CheckDetails>
</PaymentDetails>
'
```

```
DECLARE @x XML(PaymentType)
SET @x = '
<PaymentDetails>
```

```
  <Type>Cash</Type>
  <CashDetails>
    <Currency>USD</Currency>
    <Denomination>
      <Hundreds>5</Hundreds>
      <Tens>3</Tens>
      <Ones>2</Ones>
    </Denomination>
  </CashDetails>
</PaymentDetails>
'
```

Conclusions

This session of *XML Workshop* focussed on explaining how to create variable content containers. The schema that we defined in this session, supports 3 different *XML* structures. Based on the payment type, a different *XML* structure can be assigned to the *XML* variable or column bound to the schema that we defined. You can find the other articles in this series here.