XSD Indicators

We can control HOW elements are to be used in documents with indicators.

Indicators

There are seven indicators:

Order indicators:

* All
* Choice
* Sequence

Occurrence indicators:

* maxOccurs
* minOccurs

Group indicators:

* Group name
* attributeGroup name

Order Indicators

Order indicators are used to define the order of the elements.

All Indicator

The <all> indicator specifies that the child elements can appear in any order, and that each child element must occur only once:

<xs:element name="person">  
  <xs:complexType>  
    <xs:all>  
      <xs:element name="firstname" type="xs:string"/>  
      <xs:element name="lastname" type="xs:string"/>  
    </xs:all>  
  </xs:complexType>  
</xs:element>

**Note:** When using the <all> indicator you can set the <minOccurs> indicator to 1 and the <maxOccurs> indicator can only be set to 1 (the <minOccurs> and <maxOccurs> are described later).

Choice Indicator

The <choice> indicator specifies that either one child element or another can occur:

<xs:element name="person">  
  <xs:complexType>  
    <xs:choice>  
      <xs:element name="employee" type="employee"/>  
      <xs:element name="member" type="member"/>  
    </xs:choice>  
  </xs:complexType>  
</xs:element>

Sequence Indicator

The <sequence> indicator specifies that the child elements must appear in a specific order:

<xs:element name="person">  
   <xs:complexType>  
    <xs:sequence>  
      <xs:element name="firstname" type="xs:string"/>  
      <xs:element name="lastname" type="xs:string"/>  
    </xs:sequence>  
  </xs:complexType>  
</xs:element>

Occurrence Indicators

Occurrence indicators are used to define how often an element can occur.

**Note:**For all "Order" and "Group" indicators (any, all, choice, sequence, group name, and group reference) the default value for maxOccurs and minOccurs is 1.

maxOccurs Indicator

The <maxOccurs> indicator specifies the maximum number of times an element can occur:

<xs:element name="person">  
  <xs:complexType>  
    <xs:sequence>  
      <xs:element name="full\_name" type="xs:string"/>  
      <xs:element name="child\_name" type="xs:string"maxOccurs="10"/>  
    </xs:sequence>  
  </xs:complexType>  
</xs:element>

The example above indicates that the "child\_name" element can occur a minimum of one time (the default value for minOccurs is 1) and a maximum of ten times in the "person" element.

minOccurs Indicator

The <minOccurs> indicator specifies the minimum number of times an element can occur:

<xs:element name="person">  
  <xs:complexType>  
    <xs:sequence>  
      <xs:element name="full\_name" type="xs:string"/>  
      <xs:element name="child\_name" type="xs:string"  
      maxOccurs="10" minOccurs="0"/>  
    </xs:sequence>  
  </xs:complexType>  
</xs:element>

The example above indicates that the "child\_name" element can occur a minimum of zero times and a maximum of ten times in the "person" element.

**Tip:** To allow an element to appear an unlimited number of times, use the maxOccurs="unbounded" statement:

**A working example:**

An XML file called "Myfamily.xml":

<?xml version="1.0" encoding="UTF-8"?>  
  
<persons xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"  
xsi:noNamespaceSchemaLocation="family.xsd">  
  
<person>  
  <full\_name>Hege Refsnes</full\_name>  
  <child\_name>Cecilie</child\_name>  
</person>  
  
<person>  
  <full\_name>Tove Refsnes</full\_name>  
  <child\_name>Hege</child\_name>  
  <child\_name>Stale</child\_name>  
  <child\_name>Jim</child\_name>  
  <child\_name>Borge</child\_name>  
</person>  
  
<person>  
  <full\_name>Stale Refsnes</full\_name>  
</person>  
  
</persons>

The XML file above contains a root element named "persons". Inside this root element we have defined three "person" elements. Each "person" element must contain a "full\_name" element and it can contain up to five "child\_name" elements.

Here is the schema file "family.xsd":

<?xml version="1.0" encoding="UTF-8"?>  
<xs:schema xmlns:xs="http://www.w3.org/2001/XMLSchema"  
elementFormDefault="qualified">  
  
<xs:element name="persons">  
  <xs:complexType>  
    <xs:sequence>  
      <xs:element name="person" maxOccurs="unbounded">  
        <xs:complexType>  
          <xs:sequence>  
            <xs:element name="full\_name" type="xs:string"/>  
            <xs:element name="child\_name" type="xs:string"  
            minOccurs="0" maxOccurs="5"/>  
          </xs:sequence>  
        </xs:complexType>  
      </xs:element>  
    </xs:sequence>  
  </xs:complexType>  
</xs:element>  
  
</xs:schema>

Group Indicators

Group indicators are used to define related sets of elements.

Element Groups

Element groups are defined with the group declaration, like this:

<xs:group name="groupname">  
...  
</xs:group>

You must define an all, choice, or sequence element inside the group declaration. The following example defines a group named "persongroup", that defines a group of elements that must occur in an exact sequence:

<xs:group name="persongroup">  
  <xs:sequence>  
    <xs:element name="firstname" type="xs:string"/>  
    <xs:element name="lastname" type="xs:string"/>  
    <xs:element name="birthday" type="xs:date"/>  
  </xs:sequence>  
</xs:group>

After you have defined a group, you can reference it in another definition, like this:

<xs:group name="persongroup">  
  <xs:sequence>  
    <xs:element name="firstname" type="xs:string"/>  
    <xs:element name="lastname" type="xs:string"/>  
    <xs:element name="birthday" type="xs:date"/>  
  </xs:sequence>  
</xs:group>  
  
<xs:element name="person" type="personinfo"/>  
  
<xs:complexType name="personinfo">  
  <xs:sequence>  
    <xs:group ref="persongroup"/>  
    <xs:element name="country" type="xs:string"/>  
  </xs:sequence>  
</xs:complexType>

Attribute Groups

Attribute groups are defined with the attributeGroup declaration, like this:

<xs:attributeGroup name="groupname">  
...  
</xs:attributeGroup>

The following example defines an attribute group named "personattrgroup":

<xs:attributeGroup name="personattrgroup">  
  <xs:attribute name="firstname" type="xs:string"/>  
  <xs:attribute name="lastname" type="xs:string"/>  
  <xs:attribute name="birthday" type="xs:date"/>  
</xs:attributeGroup>

After you have defined an attribute group, you can reference it in another definition, like this:

<xs:attributeGroup name="personattrgroup">  
  <xs:attribute name="firstname" type="xs:string"/>  
  <xs:attribute name="lastname" type="xs:string"/>  
  <xs:attribute name="birthday" type="xs:date"/>  
</xs:attributeGroup>  
  
<xs:element name="person">  
  <xs:complexType>  
    <xs:attributeGroup ref="personattrgroup"/>  
  </xs:complexType>  
</xs:element>