**Part I**

* Create an XML file named lab.xml
* Copy and paste the XML data below into lab.xml to represent the ACM club with one member

<?xml version="1.0" encoding="utf-8" ?>

<Club clubId="ACM"

xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"

xsi:noNamespaceSchemaLocation="lab4.xsd">

<Member id="\_1234" clubs="ACM">

<Name>

<FirstName>Scott</FirstName>

<MiddleInitial>H</MiddleInitial>

<LastName>Obert</LastName>

</Name>

</Member>

</Club>

* Create an XSD file named lab.xsd
* Copy and paste the XML data below into lab.xsd

<?xml version="1.0" encoding="utf-8"?>

<xs:schema xmlns:xs="http://www.w3.org/2001/XMLSchema">

<!-- Define the elements that make up a Member's Name -->

<xs:complexType name="NameType" >

<xs:sequence>

<xs:element name="FirstName" type="xs:string" />

<xs:element name="MiddleInitial" type="xs:string" />

<xs:element name="LastName" type="xs:string" />

</xs:sequence>

</xs:complexType>

<!-- Define a Member -->

<xs:element name="Member">

<xs:complexType>

<xs:sequence>

<xs:element name="Name" type="NameType" />

</xs:sequence>

<xs:attribute name="id" type="xs:ID" use="required" />

<xs:attribute name="clubs" use="optional" />

</xs:complexType>

</xs:element>

<!-- Define the Club root element -->

<xs:element name="Club">

<xs:complexType>

<xs:sequence>

<xs:element ref="Member" />

</xs:sequence>

<xs:attribute name="clubId" type="xs:ID" use="required" />

</xs:complexType>

</xs:element>

</xs:schema>

Use the website to validate the XML file against Schema

**Part II**

Modify lab.xsd to

1. Make a member's MiddleInitial optional
2. Allow for an optional Email element after the Name element
3. Allow clubs to consist of **zero or more** members (use "unbounded" to allow for as many members that want to join)
4. Require a Club to begin with a ClubName element that contains a string
   1. Add the club name to "Student Chapter of the ACM" in your XML data file

<?xml version="1.0" encoding="utf-8"?>

<Club clubId="ACM"

xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"

xsi:noNamespaceSchemaLocation=“xsd\_lab.xsd">

<ClubName>Student Chapter of the ACM</ClubName>

<Member id="\_12345" clubs="ACM">

<Name>

<FirstName>Pervez</FirstName>

<LastName>Aslam</LastName>

</Name>

<Email>PervezA@nust.edu</Email>

</Member>

</Club>

Test and debug your XML Schema Definition rules for validation success and errors with

1. Zero, one, and two members in your club.xml data file
2. Missing elements
3. Optional MiddleInitial

**Part III**

Modify your lab.xsd XML Schema Definition file to

* Allow for members to have up to two Address elements: one local and one permanent
* Require at least one address and make it's default type local if the type is not specified
* Addresses can contain one or two Street elements (strings)
* City elements may be any string (no constraints required)
* State elements are 2-letter abbreviation (e.g. WA or OR). ***Invalid*** State elements include Wash. and Oregon. Hint: use a regular expression pattern
* ZipCode elements are 5 digits

<?xml version="1.0" encoding="utf-8"?>

<Club clubId="ACM"

xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"

xsi:noNamespaceSchemaLocation=“xsd\_lab.xsd">

<ClubName>Student Chapter of the ACM</ClubName>

<Member id="\_972134" clubs="ACM">

<Name>

<FirstName>Pervex</FirstName>

<LastName>Aslam</LastName>

</Name>

<Address type="local">

<Street>1808 23rd Street</Street>

<City>Rawalpindi</City>

<State>SN</State>

<ZipCode>98926</ZipCode>

</Address>

</Member>

</Club>

Test and debug your XSD rules for validation success and errors with

1. Missing required elements
2. Invalid Address type, State, and ZipCode contents
3. One or two Street elements
4. One or two Address elements
5. Optional and invalid attribute values

**Solution**

**Part II**

<?xml version="1.0" encoding="utf-8"?>

<xs:schema xmlns:xs="http://www.w3.org/2001/XMLSchema">

<!-- Define the elements that make up a Member's Name -->

<xs:complexType name="NameType" >

<xs:sequence>

<xs:element name="FirstName" type="xs:string" />

<xs:element name="MiddleInitial" type="xs:string" minOccurs="0" maxOccurs="1"/>

<xs:element name="LastName" type="xs:string" />

</xs:sequence>

</xs:complexType>

<!-- Define a Member -->

<xs:element name="Member">

<xs:complexType>

<xs:sequence>

<xs:element name="Name" type="NameType" />

<xs:element name="Email" type="xs:string" minOccurs="0" maxOccurs="1" />

</xs:sequence>

<xs:attribute name="id" type="xs:ID" use="required" />

<xs:attribute name="clubs" use="optional" />

</xs:complexType>

</xs:element>

<!-- Define the Club root element -->

<xs:element name="Club">

<xs:complexType>

<xs:sequence>

<xs:element name="ClubName" type="xs:string" />

<xs:element ref="Member" minOccurs="0" maxOccurs="unbounded" />

</xs:sequence>

<xs:attribute name="clubId" type="xs:ID" use="required" />

</xs:complexType>

</xs:element>

</xs:schema>

**Part III**

<?xml version="1.0" encoding="utf-8"?>

<xs:schema xmlns:xs="http://www.w3.org/2001/XMLSchema">

<!-- Define the elements that make up a Member's Name -->

<xs:complexType name="NameType" >

<xs:sequence>

<xs:element name="FirstName" type="xs:string" />

<xs:element name="MiddleInitial" type="xs:string" minOccurs="0" maxOccurs="1"/>

<xs:element name="LastName" type="xs:string" />

</xs:sequence>

</xs:complexType>

<!-- Define the elements that make up a Member's Address -->

<xs:simpleType name="StateType">

<xs:restriction base="xs:string">

<xs:pattern value="[A-Z]{2}"/>

</xs:restriction>

</xs:simpleType>

<xs:simpleType name="ZipType">

<xs:restriction base="xs:integer">

<xs:pattern value="[0-9]{5}"/>

</xs:restriction>

</xs:simpleType>

<xs:simpleType name="AddType">

<xs:restriction base="xs:string">

<xs:pattern value="local|permanent"/>

</xs:restriction>

</xs:simpleType>

<xs:complexType name="AddressType" >

<xs:sequence>

<xs:element name="Street" type="xs:string" />

<xs:element name="City" type="xs:string" />

<xs:element name="State" type="StateType" />

<xs:element name="ZipCode" type="ZipType" />

</xs:sequence>

<xs:attribute name="type" type="AddType" default="local"/>

</xs:complexType>

<!-- Define a Member -->

<xs:element name="Member">

<xs:complexType>

<xs:sequence>

<xs:element name="Name" type="NameType" />

<xs:element name="Email" type="xs:string" minOccurs="0" maxOccurs="1" />

<xs:element name="Address" type="AddressType" minOccurs="1" maxOccurs="2" />

</xs:sequence>

<xs:attribute name="id" type="xs:ID" use="required" />

<xs:attribute name="clubs" use="optional" />

</xs:complexType>

</xs:element>

<!-- Define the Club root element -->

<xs:element name="Club">

<xs:complexType>

<xs:sequence>

<xs:element name="ClubName" type="xs:string" />

<xs:element ref="Member" minOccurs="0" maxOccurs="unbounded" />

</xs:sequence>

<xs:attribute name="clubId" type="xs:ID" use="required" />

</xs:complexType>

</xs:element>

</xs:schema>