

NIEM 301 Exercise Solutions

Exercise 1: Using Inheritance

XML Schema

```
<xsd:complexType name="nc:PassportNumberIdentification">
  <xsd:complexContent>
    <xsd:extension base="nc:IdentificationType">
      <xsd:sequence>
        <xsd:element ref="nc:IdentificationID"/>
        <xsd:element ref="nc:IdentificationEffectiveDate"/>
      </xsd:sequence>
    </xsd:extension>
  </xsd:complexContent>
</xsd:complexType>

<xsd:element name="PassportNumberIdentification"
  type="nc:IdentificationType" nillable="true"/>
<xsd:element name="IdentificationID" type="niem-xsd:string"
  nillable="true"/>
<xsd:element name="IdentificationEffectiveDate" type="nc:DateType"
  nillable="true"/>
```

XML Instance

```
<nc:PassportNumberIdentification>
  <nc:IdentificationID>905521084</nc:IdentificationID>
  <nc:IdentificationEffectiveDate>2007-05-
02</nc:IdentificationEffectiveDate>
</nc:PassportNumberIdentification>
```

Exercise 2: Identifying Substitution Groups

- nc:DateRepresentation must be substituted by one of these:
 - nc:Date (A full date)
 - nc:DateTime (A full date and time)
 - nc:Year (A year)
 - nc:YearMonth (A year and month)

Exercise 3: Using Substitution Groups

Situation 1: Explicit Substitution

XML Schema

```
<xsd:complexType name="PersonType">
  <xsd:complexContent>
    <xsd:extension base="s:ComplexObjectType">
      <xsd:sequence>
        <xsd:element ref="nc:PersonSex"/>
      </xsd:sequence>
    </xsd:extension>
  </xsd:complexContent>

  <xsd:element name="PersonSex" abstract="true"/>
  <xsd:element substitutionGroup="nc:PersonSex" name="PersonSexCode"
type="fbi:SEXCodeType"/>
  <xsd:element substitutionGroup="nc:PersonSex" name="PersonSexText"
type="nc:TextType"/>

```

XML Instance

```
<nc:Person>
  <nc:PersonSexCode>
    F
  </nc:PersonSexCode>
</nc:Person>

<!-- OR -->

<nc:Person>
  <nc:PersonSexText>
    Female
  </nc:PersonSexText>
</nc:Person>

```

Situation 2: Implied Substitution

XML Schema

```
<xsd:complexType name="ContactInformationType">
  <xsd:complexContent>
    <xsd:extension base="s:ComplexObjectType">
      <xsd:sequence>
        <xsd:element ref="nc:ContactMeans" minOccurs="0"

```

```

maxOccurs="unbounded"/>
    </xsd:sequence>
</xsd:extension>
</xsd:complexContent>
</xsd:complexType>

<xsd:element name="ContactMeans" abstract="true"/>
<xsd:element substitutionGroup="nc:ContactMeans"
name="ContactTelephoneNumber" type="nc:TelephoneNumberType"/>
<xsd:element substitutionGroup="nc:ContactTelephoneNumber"
name="ContactFaxNumber" type="nc:TelephoneNumberType"/>
<xsd:element substitutionGroup="nc:ContactTelephoneNumber"
name="ContactMobileTelephoneNumber" type="nc:TelephoneNumberType"/>
<xsd:element substitutionGroup="nc:ContactTelephoneNumber"
name="ContactPagerNumber" type="nc:TelephoneNumberType"/>

```

XML Instance

```

<ContactTelephoneNumber>
  <nc:FullTelephoneNumber>
    383-393-3337
  </nc:FullTelephoneNumber>
</ContactTelephoneNumber>
<!--OR-->
<ContactFaxNumber>
  <nc:FullTelephoneNumber>
    383-393-3557
  </nc:FullTelephoneNumber>
</ContactFaxNumber>
<!--OR-->
<ContactMobileTelephoneNumber>
  <nc:FullTelephoneNumber>
    383-393-3928
  </nc:FullTelephoneNumber>
</ContactMobileTelephoneNumber>

```

Exercise 4: Identifying Code Lists

- The word "United States" appears in the following code lists:
 - fbi:LISCodeSimpleType
 - fbi:LSTACodeSimpleType
 - fbi:POBCodeSimpleType
 - fbi:RESCodeSimpleType
 - fips_10-4:InternationalStateCodeSimpleType
 - iso_3166:CountryAlpha2CodeSimpleType

- iso_3166:CountryAlpha3CodeSimpleType
- iso_3166:CountryNumericCodeSimpleType

Exercise 5: Using Roles

XML Schema

```
<xsd:complexType name="AlienType">
  <xsd:complexContent>
    <xsd:extension base="s:ComplexObjectType">
      <xsd:sequence>
        <xsd:element ref="nc:RoleOfPersonReference"/>
        <xsd:element ref="im:AlienIDDetails"/>
      </xsd:sequence>
    </xsd:extension>
  </xsd:complexContent>
</xsd:complexType>

<xsd:element name="Alien" type="im:AlienType" nillable="true"/>
<xsd:element name="AlienIDDetails" type="im:AlienIDDetailsType"
nillable="true"/>

<!-- nc:RoleofPersonReference is defined in the niem core subset
schema -->
```

XML Instance

```
<nc:Person s:id="id0000077">
  <nc:PersonName>
    <nc:PersonFullName>Louella Parson</nc:PersonFullName>
  </nc:PersonName>
</nc:Person>

<im:Alien>
  <nc:RoleOfPersonReference s:ref="id0000077"/>
  <im:AlienIDDetails>
    <im:AlienNumber>
      <nc:IdentificationID>39227463</nc:IdentificationID>
      <nc:IdentificationEffectiveDate>2008-04-
04</nc:IdentificationEffectiveDate>
    </im:AlienNumber>
  </im:AlienIDDetails>
</im:Alien>
```

Exercise 6: Using Association Types

XML Schema

```
<xsd:complexType name="PersonContactInformationAssociationType">
  <xsd:complexContent>
    <xsd:extension base="nc:AssociationType">
      <xsd:sequence>
        <xsd:element ref="nc:PersonReference"/>
        <xsd:element ref="nc:ContactInformationReference"/>
        <xsd:element ref="nc:ContactInformationIsPrimaryIndicator"/>
        <xsd:element ref="nc:ContactInformationIsHomeIndicator"/>
        <xsd:element ref="nc:ContactInformationIsWorkIndicator"/>
        <xsd:element
ref="nc:ContactInformationIsEmergencyIndicator"/>
      </xsd:sequence>
    </xsd:extension>
  </xsd:complexContent>
</xsd:complexType>

<!-- NIEM Core elements and types are defined in the NIEM Core subset
schema -->

<!-- nc:PersonReference is defined in the niem core subset schema -->
<!-- nc:LocationReference is defined in the niem core subset schema-->
<!-- nc:AssociationType is defined in the niem core subset schema -->
```

XML Instance

```
<nc:Person s:id="id000777">
  <nc:PersonName>
    <nc:PersonGivenName>Andrew</nc:PersonGivenName>
    <nc:PersonSurName>Brown</nc:PersonSurName>
  </nc:PersonName>
</nc:Person>
<nc:ContactInformation s:id="id008816">
  <nc:ContactEmailID>Andrew.Brown@sample.com</nc:ContactEmailID>
  <nc:ContactTelephoneNumber>
    <nc:FullTelephoneNumber>2025552222</nc:FullTelephoneNumber>
  </nc:ContactTelephoneNumber>
</nc:ContactInformation>
<nc:PersonContactInformationAssociationType>
  <nc:PersonReference s:ref="id000777"/>
  <nc:ContactInformationReference s:ref="id008816"/>
</nc:PersonContactInformationAssociationType>
```

Exercise 7: Using Metadata Types

XML Schema

```
<xsd:complexType name="PassportMetadataType">
  <xsd:complexContent>
    <xsd:extension base="s:MetadataType">
      <xsd:sequence>
        <xsd:element ref="nc:SourceText"/>
        <xsd:element ref="nc:ReportedDate"/>
        <xsd:element ref="local-
ns:PassportRelationship"/>
      </xsd:sequence>
    </xsd:extension>
  </xsd:complexContent>
</xsd:complexType>
<xsd:element name="PassportMetadata" type="local-
ns:PassportMetadataType"/>
<xsd:element name="PassportRelationship" type="xsd:string"/>

<!-- nc:SourceText is defined in the niem core namespace -->
<!-- nc:ReportedDate is defined in the niem core namespace -->
```

XML Instance

```
<nc:PassportMetadata s:id="id000001">
  <nc:ExpirationDate>
    <nc:Date>2012-05-05</nc:Date>
  </nc:ExpirationDate>
  <nc:CommentText>Selected for additional
screening</nc:CommentText>
  <nc:ReportedDate>
    <nc:Date>2010-02-02</nc:Date>
  </nc:ReportedDate>
</nc:PassportMetadata>

<nc:Passport s:metadata="id000001">
  <nc:PassportNumberIdentification>
    <nc:IdentificationID>904325584</nc:IdentificationID>
  </nc:PassportNumberIdentification>
</nc:Passport>
```

Exercise 8: Using Type Augmentation

XML Schema

```
<xsd:complexType name="PersonAugmentationType">
  <xsd:complexContent>
    <xsd:extension base="s:AugmentationType">
      <xsd:sequence>
        <xsd:element ref="intel:AgencySubjectInterest" />
        <xsd:element ref="intel:PersonCitizenshipDetails"/>
        <xsd:element ref="intel:PersonContactDetails"/>
        <xsd:element ref="intel:PersonEducationDetails" />
        <xsd:element ref="intel:PersonSystemIdentifier"/>
        <xsd:element ref="nc:Aircraft" />
      </xsd:sequence>
    </xsd:extension>
  </xsd:complexContent>
</xsd:complexType>
<xsd:element name="PersonAugmentation"
  type="intel:PersonAugmentationType"
  substitutionGroup="s:Augmentation"/>
```

XML Instance

```
<intel:PersonAugmentation:>
  <intel:PersonEducationDetails>
    <nc:PersonEducationLevelText>Bachelors
Degree</nc:PersonEducationLevelText>
    <intel:PersonEducationDegreeCode>
      Bachelors of Science
    </intel:PersonEducationDegreeCode>
  </intel:PersonEducationDetails>
  <intel:PersonSystemIdentifier>
    <nc:IdentificationID>903384721</nc:IdentificationID>
  </intel:PersonSystemIdentifier>
  <nc:Aircraft>
    <nc:AircraftTailID>7084</nc:AircraftTailID>
    <nc:AircraftMakeCode>102</nc:AircraftMakeCode>
    <nc:AircraftModelCode>05</nc:AircraftModelCode>
    <nc:AircraftStyleCode>G</nc:AircraftStyleCode>
  </nc:Aircraft>
</intel:PersonAugmentation:>
```

Exercise 9: Coding a Subset Schema and Wantlist

Subset Schema

XML Schema

```
<xsd:schema>
  <xsd:complexType name="PersonNameType">
    <xsd:complexContent>
      <xsd:extension base="s:ComplexObjectType">
        <xsd:sequence>
          <xsd:element ref="nc:PersonGivenName"/>
          <xsd:element ref="nc:PersonMiddleName"/>
          <xsd:element ref="nc:PersonSurName"/>
        </xsd:sequence>
      </xsd:extension>
    </xsd:complexContent>
  </xsd:complexType>

  <xsd:element name="PersonName" type="nc:PersonNameType"
    nillable="true"/>
  <xsd:element name="PersonGivenName" type="nc:PersonNameTextType"
    nillable="true"/>
  <xsd:element name="PersonMiddleName" type="nc:PersonNameTextType"
    nillable="true"/>
  <xsd:element name="PersonSurName" type="nc:PersonNameTextType"
    nillable="true"/>
</xsd:schema>
```

Wantlist

XML Schema

```
<?xml version="1.0" encoding="UTF-8"?>
<w:WantList w:release="2.1" w:product="NIEM"
  xmlns:nc="http://niem.gov/niem/niem-core/2.0"
  xmlns:w="http://niem.gov/niem/wantlist/2">
  <w:Element w:name="nc:PersonGivenName" w:isReference="false" />
  <w:Element w:name="nc:PersonMiddleName" w:isReference="false"
/>
  <w:Element w:name="nc:PersonSurName" w:isReference="false" />
</w:WantList>
```


Exercise 10: Coding a Constraint Schema

Subset Schema Copy Updated with Constraints

```
<xsd:schema>
  <xsd:complexType name="PersonNameType">
    <xsd:complexContent>
      <xsd:extension base="s:ComplexObjectType">
        <xsd:sequence>
          <xsd:element ref="nc:PersonGivenName"
minOccurs="0" maxOccurs="9"/>
          <xsd:element ref="nc:PersonMiddleName"/>
          <xsd:element ref="nc:PersonSurName"/>
        </xsd:sequence>
      </xsd:extension>
    </xsd:complexContent>
  </xsd:complexType>
  <xsd:element name="PersonName" type="nc:PersonNameType"
nillable="true"/>
  <xsd:element name="PersonGivenName" type="nc:PersonNameTextType"
nillable="true"/>
  <xsd:element name="PersonMiddleName" type="nc:PersonNameTextType"
nillable="true"/>
  <xsd:element name="PersonSurName" type="nc:PersonNameTextType"
nillable="true"/>
</xsd:schema>
```

Exercise 11: Coding an Extension Schema

XML Schema

```
<xsd:schema>
xmlns:xsd="http://www.w3.org/2001/XMLSchema"
xmlns:nc="http://niem.gov/niem/niem-core/2.0"
xmlns:i="http://niem.gov/niem/appinfo/2.0"
xmlns:s="http://niem.gov/niem/structures/2.0"
xmlns:p="http://niem.gov/niem/proxy/xsd/2.0"
targetNamespace="http://www.dhs.gov/extension/1.0"
elementFormDefault="qualified" attributeFormDefault="qualified">

  <xsd:import namespace="http://niem.gov/niem/niem-core/2.0"
schemaLocation="niem/niem-core/2.0/niem-core.xsd"/>
  <xsd:import namespace="http://niem.gov/niem/appinfo/2.0"
schemaLocation="niem/appinfo/2.0/appinfo.xsd"/>
  <xsd:import namespace="http://niem.gov/niem/structures/2.0"
schemaLocation="niem/structures/2.0/structures.xsd"/>
  <xsd:import namespace="http://niem.gov/niem/proxy/xsd/2.0"
```

```

schemaLocation="niem/proxy/xsd/2.0/xsd.xsd"/>

  <xsd:annotation>

    <xsd:documentation/>
    <xsd:appinfo>
      <i:ConformantIndicator>true</i:ConformantIndicator>
    </xsd:appinfo>
  </xsd:annotation>

<xsd:complexType name="IberianPersonNameType">
  <xsd:complexContent>
    <xsd:extension base="nc:PersonNameType">
      <xsd:sequence>
        <xsd:element ref="local-ns:PersonSecondarySurName"
minOccurs="0" maxOccurs="unbounded"/>
      </xsd:sequence>
    </xsd:extension>
  </xsd:complexContent>
</xsd:complexType>

<xsd:element name="IberianPersonName" type="local-
ns:IberianPersonNameType" nillable="true"/>
<xsd:element name="PersonSecondarySurName"
type="nc:PersonNameTextType" nillable="true"/>
</xsd:schema>

```

Exercise 12: Coding an Exchange Schema

XML Schema

```

<xsd:schema xmlns:xsd="http://www.w3.org/2001/XMLSchema"
xmlns:s="http://niem.gov/niem/structures/2.0" xmlns:fld-
ext="http://www.fema.gov/extension/1.0"
xmlns:nc="http://niem.gov/niem/niem-core/2.0"
targetNamespace="http://www.dhs.gov/exchange/1.0" version="1">

  <xsd:import namespace="http://niem.gov/niem/structures/2.0"
schemaLocation="niem/structures/2.0/structures.xsd"/>
  <xsd:import namespace="http://niem.gov/niem/niem-core/2.0"
schemaLocation="niem/niem-core/2.0/niem-core.xsd"/>

  <xsd:complexType name="MessageType">

    <xsd:complexContent>
      <xsd:extension base="s:ComplexObjectType">

```

```

        <xsd:sequence>
            <xsd:element ref="local-ns:Passenger"
minOccurs="0" maxOccurs="unbounded"/>
        </xsd:sequence>
    </xsd:extension>
</xsd:complexContent>
</xsd:complexType>
<xsd:element name="Message" type="local-ns:MessageType"/>
<xsd:element name="Passenger" type="nc:PersonType"/>
</xsd:schema>

```

Exercise 13: Creating Instances

XML Instance

```

<?xml version="1.0" encoding="UTF-8"?>
<local-ns:Message>
    <local-ns:Passenger>
        <local-ns:IberianPersonName>
            <nc:PersonGivenName>Isabelle</nc:PersonGivenName>
            <nc:PersonSurName>Alencar</nc:PersonSurName>
            <local-ns:PersonSecondarySurName>Valmor</local-
ns:PersonSecondarySurName>
        </local-ns:IberianPersonName>
    </local-ns:Passenger>
</local-ns:Message>

```