Enabling Grids for E-science in Europe

www.eu-egee.org

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XML Schema

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Objectives

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- Development background
- xs:schema element
- General structure
  - overall structure
  - Annotations
- Defining elements
- Associating documents with schemas

Development of Schema

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- Originally the tags in a XML document were defined in Document Type Definition (DTD) document.
- This was not itself a XML document.
- DTDs could be inline or separate documents.
- DTDs did not inherently define namespaces
- So schemas were developed which were XML documents, are separate from instances and namespaces were integral.

Reference to a Schema

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```
<?xml version="1.0"?>
<note xmlns="http://www.nesc.ac.uk"
    xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
    xsi:schemaLocation="http://www.nesc.ac.uk note.xsd">

        <to>Tove</to>
        <from>Jani</from>
        <heading>Reminder</heading>
        <body>Don't forget me this weekend!</body>

</note>
```

Simple Schema

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```
<?xml version="1.0"?>
<xs:schema xmlns:xs=http://www.w3.org/2001/XMLSchema
    targetNamespace="http://www.nesc.ac.uk" xmlns="http://www.nesc.ac.uk" >

<xs:element name="note">
        <xs:complexType>
                <xs:sequence>
                        <xs:element name="to" type="xs:string"/>
                        <xs:element name="from" type="xs:string"/>
                        <xs:element name="heading" type="xs:string"/>
                        <xs:element name="body" type="xs:string"/>
                </xs:sequence>
        </xs:complexType>

</xs:element>
</xs:schema>
```

Common Schema data types

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- xs:string
- xs:decimal
- xs:integer
- xs:boolean
- xs:date
- xs:time

Defining Elements

- Elements defined with **element** element
- Name given by **name** attribute
- Content and attributes given in two ways:
  - content of **element** element defines type
  - or **type** attribute refers to type

```
<xs:element name="order">
   <xs:complexType>
      ...
   </xs:complexType>
</xs:element>
```

```
<xs:element name="order"
            type="order" />
<xs:complexType name="order">
   ...
</xs:complexType>
```

Defining Text-Only Elements

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- Text-only elements have simple type
  - basic type is xs:string

```
<xs:element name="surname" type="xs:string" />
```

```
<surname>Poe</surname>
```

  - also do numbers with xs:decimal

```
<xs:element name="price" type="xs:decimal" />
```

```
<price>24.99</price>
```

  - more simple data types later

Defining Empty

- Empty elements have complex type with no content

```
<xs:element name="br">
   <xs:complexType />
</xs:element>
```

```
<br />
```

Open Elements

- Unconstrained elements are of type **xs:anyType**
  - default when no type is specified

```
<xs:element name="description" />
```

```
<description>
   This can contain <emph>any</emph> content at all.
</description>
```

Defining Element Values

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- Apply to Post-Schema-Validation Infoset (PSVI)
  - available to stage after validation
- Values fixed on element definition
  - **default** attribute gives default

```
<xs:element name="surname"
            type="xs:string"
            default="Doe" />
```

```
<surname />
```

Functionally equivalent

```
<surname>Doe</surname>
```

Fixed attribute

fixed attribute gives fixed (or null) value

```
<xs:element name="surname"
            type="xs:string"
            fixed="Doe" />
```

```
<surname />
```
valid

```
<surname>Doe</surname>
```
valid

```
<surname>Smith</surname>
```
invalid

Missing Element Values

- Element still validated even if has no value
  - only allowed if nillable is true
  - xsi:nil="true" used in instance

```
<xs:element name="date-of-birth" type="xs:date"
            nillable="true"/>
```

```
<date-of-birth>1972-05-30</date-of-birth>
```
valid

```
<date-of-birth />
```
invalid

```
<date-of-birth xsi:nil="true"/>
```
valid

Making an attribute optional

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- All attributes are optional by default. To explicitly specify that the attribute is optional, use the "use" attribute:

- `<xs:attribute name="lang" type="xs:string" use="optional" />`

  - To make an attribute required:

- `<xs:attribute name="lang" type="xs:string" use="required" />`