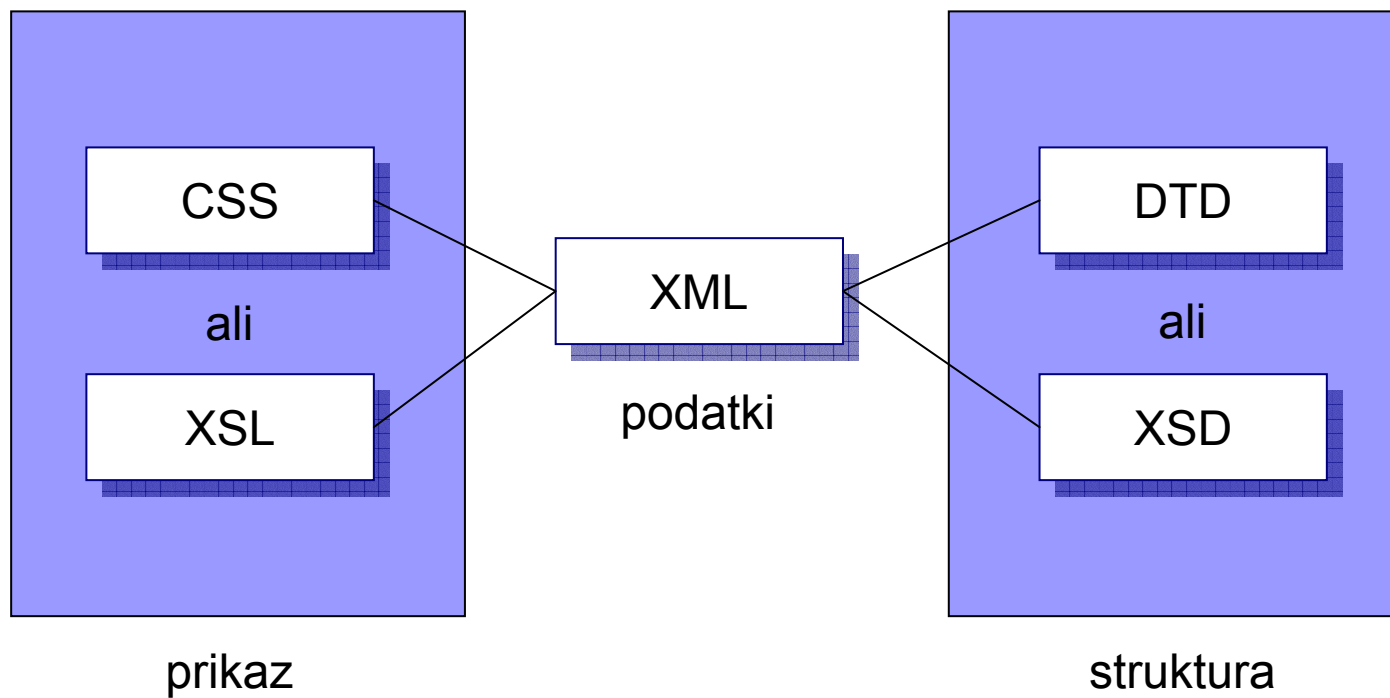




# XML

struktura, primeri, uporaba

# Datoteke





# DTD – document type definition

# Definicija strukture podatkov znotraj XML

**<!DOCTYPE korenski-element [najave-elementov]>**

## Primer

```
<?xml version="1.0"?>
<!DOCTYPE note [
  <!ELEMENT note (to,from,heading,body)>
  <!ELEMENT to (#PCDATA)>
  <!ELEMENT from (#PCDATA)>
  <!ELEMENT heading (#PCDATA)>
  <!ELEMENT body (#PCDATA)>
]>
<note>
  <to>Tove</to>
  <from>Jani</from>
  <heading>Reminder</heading>
  <body>Don't forget me this weekend</body>
</note>
```

# Definicija strukture v ločenem DTD dokumentu

**<!DOCTYPE korenski-element SYSTEM "filename">**

## Primer

```
<?xml version="1.0"?>
<!DOCTYPE note SYSTEM "note.dtd">
<note>
<to>Tove</to>
<from>Jani</from>
<heading>Reminder</heading>
<body>Don't forget me this weekend!</body>
</note>
```

```
<!ELEMENT note (to,from,heading,body)>
<!ELEMENT to (#PCDATA)>
<!ELEMENT from (#PCDATA)>
<!ELEMENT heading (#PCDATA)>
<!ELEMENT body (#PCDATA)>
```

# Kje uporabljamo DTD?

- Z vključitvijo DTD lahko vsaka XML datoteka nosi opis lastnega formata podatkov.
- S pomočjo DTD se lahko dogovorimo za skupno strukturo za izmenjavo podatkov med različnimi uporabniki.
- Naš program lahko uporablja DTD za preverjanje ob uvozu tujih podatkov, če so le-ti pravilno strukturirani.
- DTD lahko uporabljamo tudi za preverjanje lastnih podatkov.

# Osnovne enote DTD dokumentov

- elementi: body, table,...
- oznake: <body>, </body>, ...
- atributi: src, width, height...
- entitete - spremenljivke, ki določajo nekatere znake: &quot; je dvojni narekovaj
- PCDATA (parsed character data) – besedilo, ki se bo prevedlo
- CDATA (character data) – besedilo, ki se ne bo prevedlo

# Najave elementov

<!ELEMENT ime-elementa kategorija>

ali

<!ELEMENT ime-elementa (vsebina-elementa)>

## Prazni elementi

<!ELEMENT ime-elementa EMPTY>

## Primer - DTD

<!ELEMENT br EMPTY>

## Primer - XML

<br />



# Najave elementov

## Elementi z vsebino, ki je besedilo

<!ELEMENT ime-elementa (#PCDATA)>

### Primer – DTD

<!ELEMENT from (#PCDATA)>

## Elementi s poljubno vsebino

<!ELEMENT ime-elementa ANY>

### Primer – DTD

<!ELEMENT note ANY>

# Najave elementov

## Elementi s podelementi

`<!ELEMENT ime-elementa (ime-podelementa)>`

ali

`<!ELEMENT ime-elementa (ime-podelementa, ime-podelementa,.....)>`

## Primer - DTD

`<!ELEMENT note (to,from,heading,body)>`

Pri zaporedju podelementov v DTD morajo podelementi nastopati v istem zaporedju tudi v XML datoteki. Vse podelemente moramo posebej najaviti.

# Najave elementov

## Najava enkratne pojavitve istega elementa

<!ELEMENT ime-elementa (ime-podelementa)>

### Primer

<!ELEMENT note (message)>

## Najava najmanj ene pojavitve istega elementa

<!ELEMENT ime-elementa (ime-podelementa<sup>+</sup>)>

### Primer

<!ELEMENT note (message<sup>+</sup>)>

# Najave elementov

## Najava nič ali več pojavitev istega elementa

<!ELEMENT ime-elementa (ime-podelementa<sup>\*</sup>)>

### Primer

<!ELEMENT note (message<sup>\*</sup>)>

## Najava nič ali ene pojavitve istega elementa

<!ELEMENT ime-elementa (ime-podelementa<sup>?</sup>)>

### Primer

<!ELEMENT note (message<sup>?</sup>)>

# Najave elementov

## Najava enega ali drugega elementa

### Primer

<!ELEMENT note (to,from,header,(message|body))>

## Najava mešane vsebine

### Primer

<!ELEMENT note (#PCDATA|to|from|header|message)\*>

# Najave atributov

**<!ATTLIST ime-elementa ime-atributa tip-atributa privzeta-vrednost>**

## **DTD primer**

`<!ATTLIST payment type CDATA "check">`

## **XML primer**

`<payment type="check" />`

# Tipi atributov

- **CDATA** – besedilo
- **(en1|en2|..)** – oštevilčen seznam
- **ID** – neponovljiva identifikacijska oznaka
- **IDREF** – ID drugega elementa
- **IDREF** – seznam ID drugih elementov
- **NMTOKEN** – veljavno XML ime
- **NMTOKENS** – seznam veljavnih XML imen
- **ENTITY** – entiteta

# Vrednosti atributov

- **privzeta vrednost**
- **#REQUIRED – obvezen atribut**
- **#IMPLIED – neobvezen atribut**
- **#FIXED – vrednost se ne spreminja**



# Privzeta vrednost

## DTD:

```
<!ELEMENT square EMPTY>
```

```
<!ATTLIST square width CDATA "0">
```

## Veljaven XML:

```
<square width="100" />
```

# #IMPLIED

<!ATTLIST element-name attribute-name  
attribute-type #IMPLIED>

## DTD:

<!ATTLIST contact fax CDATA #IMPLIED>

## Valid XML:

<contact fax="555-667788" />

## Valid XML:

<contact />

# #REQUIRED

<!ATTLIST element-name attribute\_name  
attribute-type #REQUIRED>

## **DTD:**

<!ATTLIST person number CDATA #REQUIRED>

## **Valid XML:**

<person number="5677" />

## **Invalid XML:**

<person />

# #FIXED

<!ATTLIST element-name attribute-name  
attribute-type #FIXED "value">

## DTD:

<!ATTLIST sender company CDATA #FIXED "Microsoft">

## Valid XML:

<sender company="Microsoft" />

## Invalid XML:

<sender company="W3Schools" />

# Oštevilčene vrednosti atributov

<!ATTLIST element-name attribute-name (en1|en2|..) default-value>

## DTD primer:

<!ATTLIST payment type (check|cash) "cash">

## XML prime:

<payment type="check" />

## ali

<payment type="cash" />

# Notranja najava entitet

<!ENTITY entity-name "entity-value">

## **DTD primer:**

<!ENTITY writer "Donald Duck.">

<!ENTITY copyright "Copyright W3Schools.">

## **XML primer:**

<author>&writer;&copyright;</author>

# Zunanja najava entitet

```
<!ENTITY entity-name SYSTEM "URI/URL">
```

## **DTD primer:**

```
<!ENTITY writer  
  SYSTEM "http://www.w3schools.com/dtd/entities.dtd">  
<!ENTITY copyright  
  SYSTEM "http://www.w3schools.com/dtd/entities.dtd">
```

## **XML primer:**

```
<author>&writer;&copyright;</author>
```

# Primer 1: TV spored

```
<!ELEMENT TVSCHEDULE (CHANNEL+)>
<!ELEMENT CHANNEL (BANNER,DAY+)>
<!ELEMENT BANNER (#PCDATA)>
<!ELEMENT DAY (DATE,(HOLIDAY|PROGRAMSLOT+)+)>
<!ELEMENT HOLIDAY (#PCDATA)>
<!ELEMENT DATE (#PCDATA)>
<!ELEMENT PROGRAMSLOT (TIME,TITLE,DESCRIPTION?)>
<!ELEMENT TIME (#PCDATA)>
<!ELEMENT TITLE (#PCDATA)>
<!ELEMENT DESCRIPTION (#PCDATA)>

<!ATTLIST TVSCHEDULE NAME CDATA #REQUIRED>
<!ATTLIST CHANNEL CHAN CDATA #REQUIRED>
<!ATTLIST PROGRAMSLOT VTR CDATA #IMPLIED>
<!ATTLIST TITLE RATING CDATA #IMPLIED>
<!ATTLIST TITLE LANGUAGE CDATA #IMPLIED>
```



## Primer 2: Časopisni članek

```
<!ELEMENT NEWSPAPER (ARTICLE+)>
<!ELEMENT ARTICLE (HEADLINE,BYLINE,LEAD,BODY,NOTES)>
<!ELEMENT HEADLINE (#PCDATA)>
<!ELEMENT BYLINE (#PCDATA)>
<!ELEMENT LEAD (#PCDATA)>
<!ELEMENT BODY (#PCDATA)>
<!ELEMENT NOTES (#PCDATA)>
<!ATTLIST ARTICLE AUTHOR CDATA #REQUIRED>
<!ATTLIST ARTICLE EDITOR CDATA #IMPLIED>
<!ATTLIST ARTICLE DATE CDATA #IMPLIED>
<!ATTLIST ARTICLE EDITION CDATA #IMPLIED>
<!ENTITY NEWSPAPER "Vervet Logic Times">
<!ENTITY PUBLISHER "Vervet Logic Press">
<!ENTITY COPYRIGHT "Copyright 1998 Vervet Logic Press">
```

# Primer 3: Katalog izdelkov (1)

<!ENTITY AUTHOR "John Doe">

<!ENTITY COMPANY "JD Power Tools, Inc.">

<!ENTITY EMAIL "jd@jd-tools.com">

<!ELEMENT CATALOG (PRODUCT+)>

<!ELEMENT PRODUCT

(SPECIFICATIONS+,OPTIONS?,PRICE+,NOTES?)>

<!ATTLIST PRODUCT

NAME CDATA #IMPLIED

CATEGORY (HandTool|Table|Shop-Professional) "HandTool"

PARTNUM CDATA #IMPLIED

PLANT (Pittsburgh|Milwaukee|Chicago) "Chicago"

INVENTORY (InStock|Backordered|Discontinued) "InStock">

## Primer 3: Katalog izdelkov (2)

<!ELEMENT SPECIFICATIONS (#PCDATA)>

<!ATTLIST SPECIFICATIONS

WEIGHT CDATA #IMPLIED

POWER CDATA #IMPLIED>

<!ELEMENT OPTIONS (#PCDATA)>

<!ATTLIST OPTIONS

FINISH (Metal|Polished|Matte) "Matte"

ADAPTER (Included|Optional|NotApplicable) "Included"

CASE (HardShell|Soft|NotApplicable) "HardShell">

<!ELEMENT PRICE (#PCDATA)>

<!ATTLIST PRICE

MSRP CDATA #IMPLIED

WHOLESALE CDATA #IMPLIED

STREET CDATA #IMPLIED

SHIPPING CDATA #IMPLIED>

<!ELEMENT NOTES (#PCDATA)>



# XSD – XML shema

# **Prednosti uporabe XML sheme**

- **Podpira podatkovne tipe**
- **Omogoča razširitev**
- **Je napisana v XML jeziku**

# Struktura XML sheme

```
<?xml version="1.0"?>
```

```
<xs:schema>
```

```
...
```

```
...
```

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

# Struktura XML sheme z atributi

```
<?xml version="1.0"?>
```

```
<xs:schema xmlns:xs="http://www.w3.org/2001/XMLSchema"
targetNamespace="http://www.w3schools.com"
xmlns="http://www.w3schools.com"
elementFormDefault="qualified">
```

```
...
```

```
...
```

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

# Sklic na shemo v XML dokumentu

```
<?xml version="1.0"?>
<note xmlns="http://www.w3schools.com"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="http://www.w3schools.com note.xsd">
  <to>Tove</to>
  <from>Jani</from>
  <heading>Reminder</heading>
  <body>Don't forget me this weekend!</body>
</note>
```



# Najave enostavnih elementov

**<xs:element name="xxx" type="yyy"/>**

**<lastname>Refsnes</lastname>**

**<age>34</age>**

**<dateborn>1968-03-27</dateborn>**

**<xs:element name="lastname" type="xs:string"/>**

**<xs:element name="age" type="xs:integer"/>**

**<xs:element name="dateborn" type="xs:date"/>**

# Podatkovni tipi

**xs:string**

**xs:decimal**

**xs:integer**

**xs:boolean**

**xs:date**

**xs:time**

# Najava privzete in fiksne vrednosti

**<xs:element name="color" type="xs:string" default="red"/>**

**<xs:element name="color" type="xs:string" fixed="red"/>**

# Najava atributov

**<xs:attribute name="xxx" type="yyy"/>**

**<lastname lang="EN">Smith</lastname>**

**<xs:attribute name="lang" type="xs:string"/>**

## Obvezni in neobvezni atributi

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

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

## Privzeta in fiksna vrednost atributa

**<xs:attribute name="lang" type="xs:string" default="EN"/>**

**<xs:attribute name="lang" type="xs:string" fixed="EN"/>**

# Omejitve vrednosti

```
<xs:element name="age">  
  <xs:simpleType>  
    <xs:restriction base="xs:integer">  
      <xs:minInclusive value="0"/>  
      <xs:maxInclusive value="100"/>  
    </xs:restriction>  
  </xs:simpleType>  
</xs:element>
```

# Omejitve vrednosti

```
<xs:element name="car">  
  <xs:simpleType>  
    <xs:restriction base="xs:string">  
      <xs:enumeration value="Audi"/>  
      <xs:enumeration value="Golf"/>  
      <xs:enumeration value="BMW"/>  
    </xs:restriction>  
  </xs:simpleType>  
</xs:element>
```

# Omejitve vrednosti

```
<xs:element name="letter">  
  <xs:simpleType>  
    <xs:restriction base="xs:string">  
      <xs:pattern value="[a-z]"/>  
    </xs:restriction>  
  </xs:simpleType>  
</xs:element>
```



# Omejitve vrednosti

```
<xs:element name="password">  
  <xs:simpleType>  
    <xs:restriction base="xs:string">  
      <xs:length value="8"/>  
    </xs:restriction>  
  </xs:simpleType>  
</xs:element>
```

# Primeri kompleksnih elementov

**<product pid="1345"/>**

**<employee>**

**<firstname>John</firstname>**

**<lastname>Smith</lastname>**

**</employee>**

**<food type="dessert">Ice cream</food>**

**<description>**

**It happened on <date lang="norwegian">03.03.99</date> ....**

**</description>**

# Najava kompleksnih elementov

```
<employee>
```

```
<firstname>John</firstname>
```

```
<lastname>Smith</lastname>
```

```
</employee>
```

```
<xs:element name="employee">
```

```
<xs:complexType>
```

```
<xs:sequence>
```

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

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

```
</xs:sequence>
```

```
</xs:complexType>
```

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

# **Več elementov istega tipa**

```
<xs:element name="employee" type="personinfo"/>
```

```
<xs:element name="student" type="personinfo"/>
```

```
<xs:element name="member" type="personinfo"/>
```

```
<xs:complexType name="personinfo">
```

```
  <xs:sequence>
```

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

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

```
  </xs:sequence>
```

```
</xs:complexType>
```

# Razširitev tipov

```
<xs:element name="employee" type="fullpersoninfo"/>
<xs:complexType name="personinfo">
  <xs:sequence>
    <xs:element name="firstname" type="xs:string"/>
    <xs:element name="lastname" type="xs:string"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="fullpersoninfo">
  <xs:complexContent>
    <xs:extension base="personinfo">
      <xs:sequence>
        <xs:element name="address" type="xs:string"/>
        <xs:element name="city" type="xs:string"/>
        <xs:element name="country" type="xs:string"/>
      </xs:sequence>
    </xs:extension>
  </xs:complexContent>
</xs:complexType>
```

# Najava tipa za enostavni element

```
<product prodid="1345" />
```

```
<xs:element name="product">
```

```
  <xs:complexType>
```

```
    <xs:attribute name="prodid" type="xs:positiveInteger"/>
```

```
  </xs:complexType>
```

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

ali

```
<xs:element name="product" type="prodtype"/>
```

```
<xs:complexType name="prodtype">
```

```
  <xs:attribute name="prodid" type="xs:positiveInteger"/>
```

```
</xs:complexType>
```

# Najava tipa za element s podelementi

```
<person>
```

```
<firstname>John</firstname>
```

```
<lastname>Smith</lastname>
```

```
</person>
```

```
<xs:element name="person" type="persontype"/>
```

```
<xs:complexType name="persontype">
```

```
  <xs:sequence>
```

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

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

```
  </xs:sequence>
```

```
</xs:complexType>
```

# Najava tipa za element z besedilom

```
<shoesize country="france">35</shoesize>
```

```
<xs:element name="shoesize" type="shoetype"/>
```

```
<xs:complexType name="shoetype">
```

```
  <xs:simpleContent>
```

```
    <xs:extension base="xs:integer">
```

```
      <xs:attribute name="country" type="xs:string" />
```

```
    </xs:extension>
```

```
  </xs:simpleContent>
```

```
</xs:complexType>
```



# Najava tipa za mešani tip elementa

**<letter>**

**Dear Mr.<name>John Smith</name>.**

**Your order <orderid>1032</orderid>**

**will be shipped on <shipdate>2001-07-13</shipdate>.**

**</letter>**

**<xs:element name="letter" type="lettertype"/>**

**<xs:complexType name="lettertype" mixed="true">**

**<xs:sequence>**

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

**<xs:element name="orderid" type="xs:positiveInteger"/>**

**<xs:element name="shipdate" type="xs:date"/>**

**</xs:sequence>**

**</xs:complexType>**

# Indikatorji vrstnega reda

- All - vsi
- Choice - katerikoli
- Sequence – določen vrstni red

```
<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>
```

# Indikatorji pojavnosti

- **maxOccurs**
- **minOccurs**

```
<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>
```

# Primer: myfamily.xml

```
<?xml version="1.0" encoding="ISO-8859-1"?>
<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>
```

# Primer: myfamily.xsd

```
<?xml version="1.0" encoding="ISO-8859-1"?>
<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>
```

# Primer 2: shiporder.xml

```
<?xml version="1.0" encoding="ISO-8859-1"?>
<shiporder orderid="889923"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:noNamespaceSchemaLocation="shiporder.xsd">
  <orderperson>John Smith</orderperson>
  <shipto>
    <name>Ola Nordmann</name>
    <address>Langgt 23</address>
    <city>4000 Stavanger</city>
    <country>Norway</country>
  </shipto>
  <item>
    <title>Empire Burlesque</title>
    <note>Special Edition</note>
    <quantity>1</quantity>
    <price>10.90</price>
  </item>
  <item>
    <title>Hide your heart</title>
    <quantity>1</quantity>
    <price>9.90</price>
  </item>
</shiporder>
```

## Primer 2: shiporder.xsd (1)

```
<?xml version="1.0" encoding="ISO-8859-1" ?>
<xs:schema xmlns:xs="http://www.w3.org/2001/XMLSchema">
<xs:element name="shiporder">
  <xs:complexType>
    <xs:sequence>
      <xs:element name="orderperson" type="xs:string"/>
      <xs:element name="shipto">
        <xs:complexType>
          <xs:sequence>
            <xs:element name="name" type="xs:string"/>
            <xs:element name="address" type="xs:string"/>
            <xs:element name="city" type="xs:string"/>
            <xs:element name="country" type="xs:string"/>
          </xs:sequence>
        </xs:complexType>
      </xs:element>
    ...
```

## Primer 2: shiporder.xsd (2)

....

```
<xs:element name="item" maxOccurs="unbounded">
  <xs:complexType>
    <xs:sequence>
      <xs:element name="title" type="xs:string"/>
      <xs:element name="note" type="xs:string" minOccurs="0"/>
      <xs:element name="quantity" type="xs:positiveInteger"/>
      <xs:element name="price" type="xs:decimal"/>
    </xs:sequence>
  </xs:complexType>
</xs:element>
</xs:sequence>
<xs:attribute name="orderid" type="xs:string" use="required"/>
</xs:complexType>
</xs:element>
</xs:schema>
```



# Viri

- XML Tutorial:

<http://www.w3schools.com/xml> (3.5.2005)