XML валидация чрез DTD

Цели на упражнението:

1. Валидация на XML документ с вътрешно и външно DTD
2. Използване на entity (общо, параметризирано, вложено, рекурсивно)
3. Използване на нотации
4. Упражняване на основните елементи на DTD - ID, IDREF, #REQUIRED, #IMPLIED и т.н.

Средства за XML валидация чрез DTD:

За реализация на това упражнения могат да бъдат използвани някои от следните инструменти:

XML validator
W3 XML validator
XML/DTD валидатора наличен в Eclipse

Задача 1: Свържете и валидирайте дадения по-долу XML документ с дадената DTD граматика по следните 2 начина:

- С вътрешно DTD
- С външно DTD

```
<?xml version="1.0"?>
<shiporder orderid="889923">
  <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>
```

```
<?xml version="1.0"?>
<!DOCTYPE shiporder[
<!ELEMENT shiporder (orderperson,shipto,item+)>
<!ATTLIST shiporder orderid CDATA #REQUIRED>
<!ELEMENT orderperson (#PCDATA)>
<!ELEMENT shipto (name,address,city,country)>
<!ELEMENT name (#PCDATA)>
<!ELEMENT address (#PCDATA)>
<!ELEMENT city (#PCDATA)>
<!ELEMENT country (#PCDATA)>
<!ELEMENT item (title,note?,quantity,price)>
<!ELEMENT title (#PCDATA)>
<!ELEMENT note (#PCDATA)>
<!ELEMENT quantity (#PCDATA)>
<!ELEMENT price (#PCDATA)>
]>
```

Упътване

Решение

А) XML с вътрешно dtd:

```
<?xml version="1.0"?>
<!DOCTYPE shiporder[
<!ELEMENT shiporder (orderperson,shipto,item+)>
<!ATTLIST shiporder orderid CDATA #REQUIRED>
<!ELEMENT orderperson (#PCDATA)>
<!ELEMENT shipto (name,address,city,country)>
<!ELEMENT name (#PCDATA)>
<!ELEMENT address (#PCDATA)>
<!ELEMENT city (#PCDATA)>
<!ELEMENT country (#PCDATA)>
<!ELEMENT item (title,note?,quantity,price)>
<!ELEMENT title (#PCDATA)>
<!ELEMENT note (#PCDATA)>
<!ELEMENT quantity (#PCDATA)>
<!ELEMENT price (#PCDATA)>
]>
<shiporder orderid="889923">
  <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 Edi/on </note>
     <quantity> 1 </quantity>
     <price> 10.90 </price>
  </item>
  <item>
     <title> Hide your heart</title>
     <quantity>1</quantity>
     <price>9.90</price>
  </item>
</shiporder>
```

Б) XML с външно dtd:

```
<?xml version="1.0"?>
<!DOCTYPE shiporder SYSTEM "shiporder.dtd">
<shiporder orderid="889923">
  <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 Edi/on </note>
     <quantity> 1 </quantity>
     <price> 10.90 </price>
  </item>
  <item>
     <title> Hide your heart</title>
     <quantity>1</quantity>
     <price>9.90</price>
  </item>
```

---

shiporder.dtd:

```
<!ELEMENT shiporder (orderperson,shipto,item+)>
<!ATTLIST shiporder orderid CDATA #REQUIRED>
<!ELEMENT orderperson (#PCDATA)>
<!ELEMENT shipto (name,address,city,country)>
<!ELEMENT name (#PCDATA)>
<!ELEMENT address (#PCDATA)>
<!ELEMENT city (#PCDATA)>
<!ELEMENT country (#PCDATA)>
<!ELEMENT item (title,note?,quantity,price)>
```

```
<!ELEMENT title (#PCDATA)>
<!ELEMENT note (#PCDATA)>
<!ELEMENT quantity (#PCDATA)>
<!ELEMENT price (#PCDATA)>
```

Задача 2: За дадения по-долу XML документ създайте DTD граматика и го валидирайте спрямо нея.

```
<?xml version="1.0"?>
<games>
  <game score="1-1">
      <home-team>Roma</home-team>
      <ex-team>Lazio</ex-team>
      <scores>
        <score me="15">
        <player>Klose</player>
        </score>
        <score me="85" type="penalty">
        <player>Tox</player>
        </score>
      </scores>
    <yellows>
      <player>Tox</player>
      <player>Hernanes</player>
    </yellows>
    <reds>
      <player>Kjaer</player>
    </reds>
  </game>
</games>
```

Решение

```
<!ELEMENT games (game)*>
<!ELEMENT game (home-team, ex-team, scores, yellows, reds)>
<!ELEMENT home-team (#PCDATA)>
<!ELEMENT ex-team (#PCDATA)>
<!ELEMENT scores (score)*>
<!ELEMENT yellows (player)*>
<!ELEMENT reds (player)*>
<!ELEMENT score (player)*>
<!ELEMENT player (#PCDATA)>
<!ATTLIST game score CDATA #REQUIRED>
<!ATTLIST score me CDATA #REQUIRED>
<!ATTLIST score type (field|penalty) #IMPLIED>
```

Задача 3: За дадената по-долу DTD граматика създайте XML документ и го валидирайте спрямо нея.

```
<?xml version="1.0" encoding="UTF-8"?>
<!ELEMENT Chair (Professor)>
<!ELEMENT Title (#PCDATA)>
<!ELEMENT Course (Title, Description?, Instructors, Prerequisites?)>
<!ATTLIST Course
Number (CS106A | CS106B | CS107 | CS109 | CS124 | CS143 | CS145 | CS221 | CS228 | CS229 | EE108A | EE108B | LING180) #REQUIRED
Enrollment (1070 | 110 | 130 | 180 | 280 | 320 | 500 | 60 | 620 | 90) #IMPLIED
>
<!ELEMENT Prereq (#PCDATA)>
<!ELEMENT Lecturer (First_Name, Middle_Initial?, Last_Name)>
<!ELEMENT Last_Name (#PCDATA)>
<!ELEMENT Professor (First_Name, Middle_Initial?, Last_Name)>
<!ELEMENT Department (Title, Chair, Course+)>
<!ATTLIST Department Code (CS | EE | LING) #REQUIRED>
<!ELEMENT First_Name (#PCDATA)>
<!ELEMENT Description (#PCDATA)>
<!ELEMENT Instructors ((Lecturer, Professor*) | (Professor+, Lecturer?))>
<!ELEMENT Prerequisites (Prereq+)>
<!ELEMENT Course_Catalog (Department+)>
<!ELEMENT Middle_Initial (#PCDATA)>
```

Решение

```
<?xml version="1.0"?>
<!DOCTYPE Course_Catalog SYSTEM "courseCatalog.dtd">
```

<Course_Catalog>
<Department Code="CS">
<Title>Computer Science</Title>
<Chair>
<Professor>
<First_Name>Jennifer</First_Name>
<Last_Name>Widom</Last_Name>
</Professor>
</Chair>
<Course Number="CS106A" Enrollment="1070">
<Title>Programming Methodology</Title>
<Description>Introduction to the engineering of computer applications emphasizing modern software engineering principles.</Description>
<Instructors>
<Lecturer>
<First_Name>Jerry</First_Name>
<Middle_Initial>R.</Middle_Initial>
<Last_Name>Cain</Last_Name>
</Lecturer>
<Professor>
<First_Name>Eric</First_Name>
<Last_Name>Roberts</Last_Name>
</Professor>
<Professor>
<First_Name>Mehran</First_Name>
<Last_Name>Sahami</Last_Name>
</Professor>
</Instructors>
</Course>
<Course Number="CS106B" Enrollment="620">
<Title>Programming Abstractions</Title>
<Description>Abstraction and its relation to programming.</Description>
<Instructors>
<Professor>
<First_Name>Eric</First_Name>
<Last_Name>Roberts</Last_Name>
</Professor>
<Lecturer>
<First_Name>Jerry</First_Name>
<Middle_Initial>R.</Middle_Initial>
<Last_Name>Cain</Last_Name>
</Lecturer>
</Instructors>
<Prerequisites>
<Prereq>CS106A</Prereq>
</Prerequisites>
</Course>
<Course Number="CS107" Enrollment="500">
<Title>Computer Organization and Systems</Title>
<Description>Introduction to the fundamental concepts of computer systems.</Description>
<Instructors>
<Lecturer>
<First_Name>Julie</First_Name>
<Last_Name>Zelenski</Last_Name>
</Lecturer>
</Instructors>
<Prerequisites>
<Prereq>CS106B</Prereq>
</Prerequisites>
</Course>
<Course Number="CS109" Enrollment="280">
<Title>Introduction to Probability for Computer Scientists</Title>
<Instructors>
<Professor>
<First_Name>Mehran</First_Name>
<Last_Name>Sahami</Last_Name>
</Professor>
</Instructors>
<Prerequisites>
<Prereq>CS106B</Prereq>
</Prerequisites>
</Course>
<Course Number="CS124" Enrollment="60">
<Title>From Languages to Information</Title>
<Description>Natural language processing. Cross-listed as LING180.</Description>

<Instructors>
<Professor>
<First_Name>Dan</First_Name>
<Last_Name>Jurafsky</Last_Name>
</Professor>
</Instructors>
<Prerequisites>
<Prereq>CS107</Prereq>
<Prereq>CS109</Prereq>
</Prerequisites>
</Course>
<Course Number="CS143" Enrollment="90">
<Title>Compilers</Title>
<Description>Principles and practices for design and implementation of compilers and interpreters.</Description>
<Instructors>
<Professor>
<First_Name>Alex</First_Name>
<Middle_Initial>S.</Middle_Initial>
<Last_Name>Aiken</Last_Name>
</Professor>
</Instructors>
<Prerequisites>
<Prereq>CS107</Prereq>
</Prerequisites>
</Course>
<Course Number="CS145" Enrollment="130">
<Title>Introduction to Databases</Title>
<Description>Database design and use of database management systems for applications.</Description>
<Instructors>
<Professor>
<First_Name>Jennifer</First_Name>
<Last_Name>Widom</Last_Name>
</Professor>
</Instructors>
<Prerequisites>
<Prereq>CS107</Prereq>
</Prerequisites>
</Course>
<Course Number="CS221" Enrollment="180">
<Title>Artificial Intelligence: Principles and Techniques</Title>
<Instructors>
<Professor>
<First_Name>Andrew</First_Name>
<Last_Name>Ng</Last_Name>
</Professor>
<Professor>
<First_Name>Sebastian</First_Name>
<Last_Name>Thrun</Last_Name>
</Professor>
</Instructors>
</Course>
<Course Number="CS228" Enrollment="110">
<Title>Structured Probabilistic Models: Principles and Techniques</Title>
<Description>Using probabilistic modeling languages to represent complex domains.</Description>
<Instructors>
<Professor>
<First_Name>Daphne</First_Name>
<Last_Name>Koller</Last_Name>
</Professor>
</Instructors>
</Course>
<Course Number="CS229" Enrollment="320">
<Title>Machine Learning</Title>
<Description>A broad introduction to machine learning and statistical pattern recognition.</Description>
<Instructors>
<Professor>
<First_Name>Andrew</First_Name>
<Last_Name>Ng</Last_Name>
</Professor>
</Instructors>
</Course>
</Department>
<Department Code="EE">
<Title>Electrical Engineering</Title>

```
<Chair>
<Professor>
<First_Name>Mark</First_Name>
<Middle_Initial>A.</Middle_Initial>
<Last_Name>Horowitz</Last_Name>
</Professor>
</Chair>
<Course Number="EE108A">
<Title>Digital Systems I</Title>
<Description>Digital circuit, logic, and system design.</Description>
<Instructors>
<Professor>
<First_Name>Subhasish</First_Name>
<Last_Name>Mitra</Last_Name>
</Professor>
</Instructors>
</Course>
<Course Number="EE108B">
<Title>Digital Systems II</Title>
<Description>The design of processor-based digital systems.</Description>
<Instructors>
<Professor>
<First_Name>William</First_Name>
<Middle_Initial>J.</Middle_Initial>
<Last_Name>Dally</Last_Name>
</Professor>
<Professor>
<First_Name>Oyekunle</First_Name>
<Last_Name>Olukotun</Last_Name>
</Professor>
</Instructors>
<Prerequisites>
<Prereq>EE108A</Prereq>
<Prereq>CS106B</Prereq>
</Prerequisites>
</Course>
</Department>
<Department Code="LING">
<Title>Linguistics</Title>
<Chair>
<Professor>
<First_Name>Beth</First_Name>
<Last_Name>Levin</Last_Name>
</Professor>
</Chair>
<Course Number="LING180" Enrollment="60">
<Title>From Languages to Information</Title>
<Description>Natural language processing. Cross-listed as CS124.</Description>
<Instructors>
<Professor>
<First_Name>Dan</First_Name>
<Last_Name>Jurafsky</Last_Name>
</Professor>
</Instructors>
<Prerequisites>
<Prereq>CS107</Prereq>
<Prereq>CS109</Prereq>
</Prerequisites>
</Course>
</Department>
</Course_Catalog>
```

Задача 4: За DTD граматиката, намираща се на адрес: http://www.w3.org/TR/xhtml1/DTD/xhtml1-transitional.dtd, създайте XML документ. Включете в XML документа дадената DTD граматика като публична и го валидирайте спрямо нея.

Упътване

Решение

```
<?xml version="1.0" encoding="UTF-8"?>
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Transitional//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-transitional.dtd">
```

```
<html>
  <head>
    <title>text</title>
  </head>
  <body>text</body>
</html>
```

Задача 5: За дадената по-долу схема създайте DTD граматика и XML документ и го валидирайте спрямо нея. DTD граматиката трябва да изпълнява следните условия:

1. Елементът channel има атрибут с име version

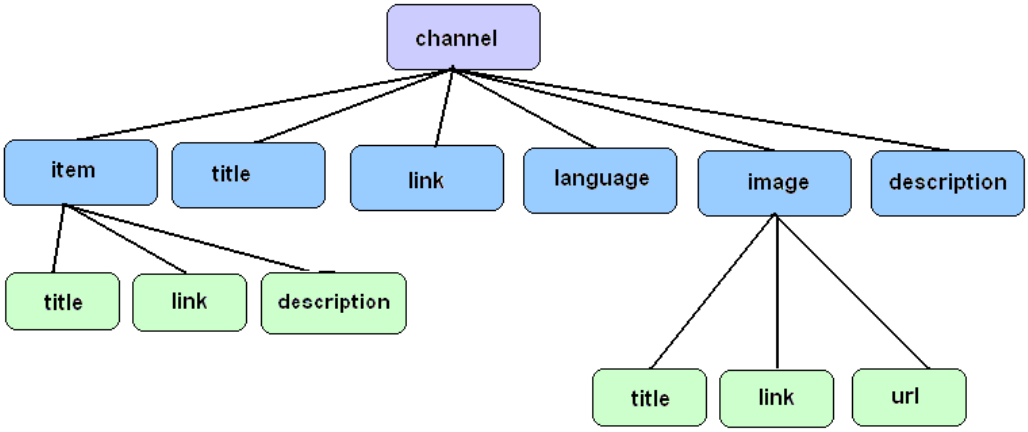
2. Под-елементите на channel имат следния ред на подреждане: item, title, link, image, language и description

3. Под-елементите на channel - item, title, link и description са задължителни, а останалите елементи image и language - не

4. Елементите item и image могат да се срещат много пъти

5. Под-елементите на item (т.е. title, link, description) и image (т.е. title, link, url) нямат определена последователност

6. Под-елементът description на item е незадължителен



Решение

- XML документ:

```
<?xml version="1.0" encoding="UTF-8"?>
<!DOCTYPE channel SYSTEM "channel.dtd">
<channel version="1.0">
  <item>
    <link>https://rss.com/index.html</link>
    <title>RSS</title>
  </item>
  <item>
    <description>RSS specification 2</description>
    <title>RSS2</title>
    <link>https://rss.com/index.html</link>
  </item>
  <item>
    <link>https://rss.com/index.html</link>
    <title>RSS3</title>
    <description>RSS specification 3</description>
  </item>
  <title>Title of the channel</title>
  <link>https://rss.com</link>
  <language>EN</language>
  <image>
    <url>https://rss.com/images/rss.png</url>
    <title>RSS Schema</title>
    <link>Go to our page</link>
  </image>
  <image>
    <url>https://rss.com/images/rss.gif</url>
    <title>RSS Schema</title>
    <link>Go to our page</link>
  </image>
  <description>Description of the channel</description>
```

```
</channel>
```

- DTD граматика:

```
<?xml version="1.0" encoding="UTF-8"?>
<!ELEMENT url (#PCDATA)>
<!ELEMENT item ((title, link, description?) | (description?, title, link) | (description?, link, title) | (title, description?, link) | (link, title, description?) | <(link, description?, title) )>
<!ELEMENT link (#PCDATA)>
<!ELEMENT image (title | link | url)*>
<!ELEMENT title (#PCDATA)>
<!ELEMENT channel (item+, title, link, language?, image*, description)>
<!ATTLIST channel version CDATA "0.0">
<!ELEMENT language (#PCDATA)>
<!ELEMENT description (#PCDATA)>
```

Задача 6: Съставете DTD граматика, която позволява да бъдат представени в XML документ резултатите от футболните мачове и включва следната информация:

1. Футболните отбори участващи в един мач

2. Крайния резултат за всеки мач

3. Играчите отбелязали гол в мача

4. Времето, в което е отбелязан всеки гол

5. Играчите получили наказателни картони (жълти или червени)

Решение

```
<?xml version="1.0" encoding="UTF-8"?>
<!DOCTYPE games [
<!ELEMENT games (game)*>
<!ELEMENT game (home-team, ex-team, scores, yellows, reds)>
<!ELEMENT home-team (#PCDATA)>
<!ELEMENT ex-team (#PCDATA)>
<!ELEMENT scores (score)*>
<!ELEMENT yellows (player)*>
<!ELEMENT reds (player)*>
<!ELEMENT score (player)*>
<!ELEMENT player (#PCDATA)>
<!ATTLIST game score CDATA #REQUIRED>
<!ATTLIST score time CDATA #REQUIRED>
<!ATTLIST score type (field|penalty) #IMPLIED>
]>
<games>
  <game score="1-1">
    <home-team>Roma</home-team>
    <ex-team>Lazio</ex-team>
    <scores>
      <score time="15">
        <player>Klose</player>
      </score>
      <score time="85" type="penalty">
        <player>Tox</player>
      </score>
    </scores>
    <yellows>
      <player>Tox</player>
      <player>Hernanes</player>
    </yellows>
    <reds>
      <player>Kjaer</player>
    </reds>
  </game>
</games>
```

Задача 7: Да се включи в DTD файла от задача 5 и да се използва в XML файл:

1. Една вътрешна (System) и една външна декларация (Public) на DTD нотация за някои от MIME типовете image/jpeg, image/png или image/gif. След това да се декларира entity използващо тези 2 нотации

2. Общо entity задаващо стойността на елемента link на image

3. Параметризирано entity със стойност "title" и да се използва навсякъде където тази дума се среща в DTD файла

4. Вложено entity в entity

5. Рекурсивно entity

Упътване

Решение

- XML документ:

```
<?xml version="1.0" encoding="UTF-8"?>
<!DOCTYPE channel SYSTEM "channelTask7.dtd">
<channel version="1.0">
  <item>
    <link>https://rss.com/index.html</link>
    <title>RSS</title>
  </item>
  <item>
    <description>RSS specification 2</description>
    <title>RSS2</title>
    <link>https://rss.com/index.html</link>
  </item>
  <item>
    <link>https://rss.com/index.html</link>
    <title>RSS3</title>
    <description>RSS specification 3</description>
  </item>
  <title>Title of the channel</title>
  <link>https://rss.com</link>
  <language>EN</language>
  <image src="xmlJPGAddress">
    <url>https://rss.com/images/rss.png</url>
    <title>RSS Schema</title>
    <link>&goto;</link>
  </image>
  <image src="xmlPNGAddress">
    <url>https://rss.com/images/rss.gif</url>
    <title>RSS Schema</title>
    <link>&goto;</link>
  </image>
  <description>Description of the channel</description>
</channel>
```

- DTD граматика:

```
<?xml version="1.0" encoding="UTF-8"?>
<!ENTITY % titleElementName "title" >
<!ENTITY % channelElements "(item+, %titleElementName;, link, language?, image*, description)" >
<!ELEMENT url (#PCDATA)>
<!ELEMENT item ((%titleElementName;, link, description?) | (description?, %titleElementName;, link) | (description?, link, %titleElementName;) |
(%titleElementName;, description?, link) | (link, %titleElementName;, description?) | (link, description?, %titleElementName;) )>
<!ELEMENT link (#PCDATA)>
<!ELEMENT image (title | link | url)*>
<!ATTLIST image src ENTITY #REQUIRED>
<!ELEMENT %titleElementName; (#PCDATA)>
<!ELEMENT channel %channelElements;>
<!ATTLIST channel version CDATA "0.0">
<!ELEMENT language (#PCDATA)>
<!ELEMENT description (#PCDATA)>
<!NOTATION JPG SYSTEM "image/jpeg">
<!NOTATION GIF PUBLIC "GIF 1.0">
<!NOTATION PNG PUBLIC "PNG 1.0" "image/png">
<!ENTITY xmlJPGAddress SYSTEM "https://eathenasolutions.com/wp-content/uploads/Fotolia_12413408_XS.jpg" NDATA JPG>
<!ENTITY xmlPNGAddress SYSTEM "https://eathenasolutions.com/wp-content/uploads/Fotolia_12413408_XS.jpg" NDATA PNG>
<!ENTITY W3GIFAddress PUBLIC "-//W3C//GIF logo//EN" "https://www.w3.org/2008/site/images/logo-w3c-screen-lg" NDATA GIF>
<!ENTITY goto "Go to our page">
```

Задача 8: За по-долу дадения XML документ и схема да се създаде DTD граматика, в която са налични:

1. ID и IDREF, за атрибутите при които това е необходимо (напр. за InstrID, Code, Instructors)

2. #REQUIRED, за атрибутите при които това е необходимо (напр. за Number)

3. #IMPLIED, за атрибутите при които това е приложимо (напр. за Enrollment)

4. #FIXED, за атрибут по избор

```
<?xml version="1.0" ?>
<Course_Catalog Year="2017-2018">
  <Department Code="CS" Chair="JW">
    <Title>Computer Science</Title>
    <Course Number="CS106A" Instructors="JC ER MS" Enrollment="1070">
      <Title>Programming Methodology</Title>
      <Description>Introduction to the engineering of computer applications emphasizing modern software engineering principles.</Description>
    </Course>
    <Course Number="CS106B" Prerequisites="CS106A" Instructors="JC ER" Enrollment="620">
      <Title>Programming Abstractions</Title>
      <Description>Abstraction and its relation to programming.</Description>
    </Course>
    <Course Number="CS107" Prerequisites="CS106B" Instructors="JZ" Enrollment="500">
      <Title>Computer Organization and Systems</Title>
      <Description>Introduction to the fundamental concepts of computer systems.</Description>
    </Course>
    <Course Number="CS109" Prerequisites="CS106B" Instructors="MS" Enrollment="280">
      <Title>Introduction to Probability for Computer Scientists</Title>
    </Course>
    <Course Number="CS124" Prerequisites="CS107 CS109" Instructors="DJ" Enrollment="60">
      <Title>From Languages to Information</Title>
      <Description>Natural language processing. Cross-listed as <Courseref Number="LING180"/>.</Description>
    </Course>
    <Course Number="CS143" Prerequisites="CS107" Instructors="AA" Enrollment="90">
      <Title>Compilers</Title>
      <Description>Principles and practices for design and implementation of compilers and interpreters.</Description>
    </Course>
    <Course Number="CS145" Prerequisites="CS107" Instructors="JW" Enrollment="130">
      <Title>Introduction to Databases</Title>
      <Description>Database design and use of database management systems for applications.</Description>
    </Course>
    <Course Number="CS221" Prerequisites="CS107" Instructors="AN ST" Enrollment="180">
      <Title>Artificial Intelligence: Principles and Techniques</Title>
    </Course>
    <Course Number="CS228" Instructors="DK" Enrollment="110">
      <Title>Structured Probabilistic Models: Principles and Techniques</Title>
      <Description>Using probabilistic modeling languages to represent complex domains.</Description>
    </Course>
    <Course Number="CS229" Instructors="AN" Enrollment="320">
      <Title>Machine Learning</Title>
      <Description>A broad introduction to machine learning and statistical pattern recognition.</Description>
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      <Last_Name>Aiken</Last_Name>
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      <Last_Name>Roberts</Last_Name>
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    <Professor InstrID="MS">
      <First_Name>Mehran</First_Name>
      <Last_Name>Sahami</Last_Name>
```

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      <First_Name>Sebastian</First_Name>
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      <First_Name>Jennifer</First_Name>
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      <Description>Digital circuit, logic, and system design.</Description>
    </Course>
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      <Description>The design of processor-based digital systems.</Description>
    </Course>
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      <Middle_Initial>J.</Middle_Initial>
      <Last_Name>Dally</Last_Name>
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    <Professor InstrID="MH">
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      <Middle_Initial>A.</Middle_Initial>
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    <Professor InstrID="SM">
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      <Last_Name>Olukotun</Last_Name>
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  <Department Code="LING" Chair="BL">
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      <Description>Natural language processing. Cross-listed as <Courseref Number="CS124"/>.</Description>
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      <Last_Name>Jurafsky</Last_Name>
    </Professor>
    <Professor InstrID="BL">
      <First_Name>Beth</First_Name>
      <Last_Name>Levin</Last_Name>
    </Professor>
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</Course_Catalog>
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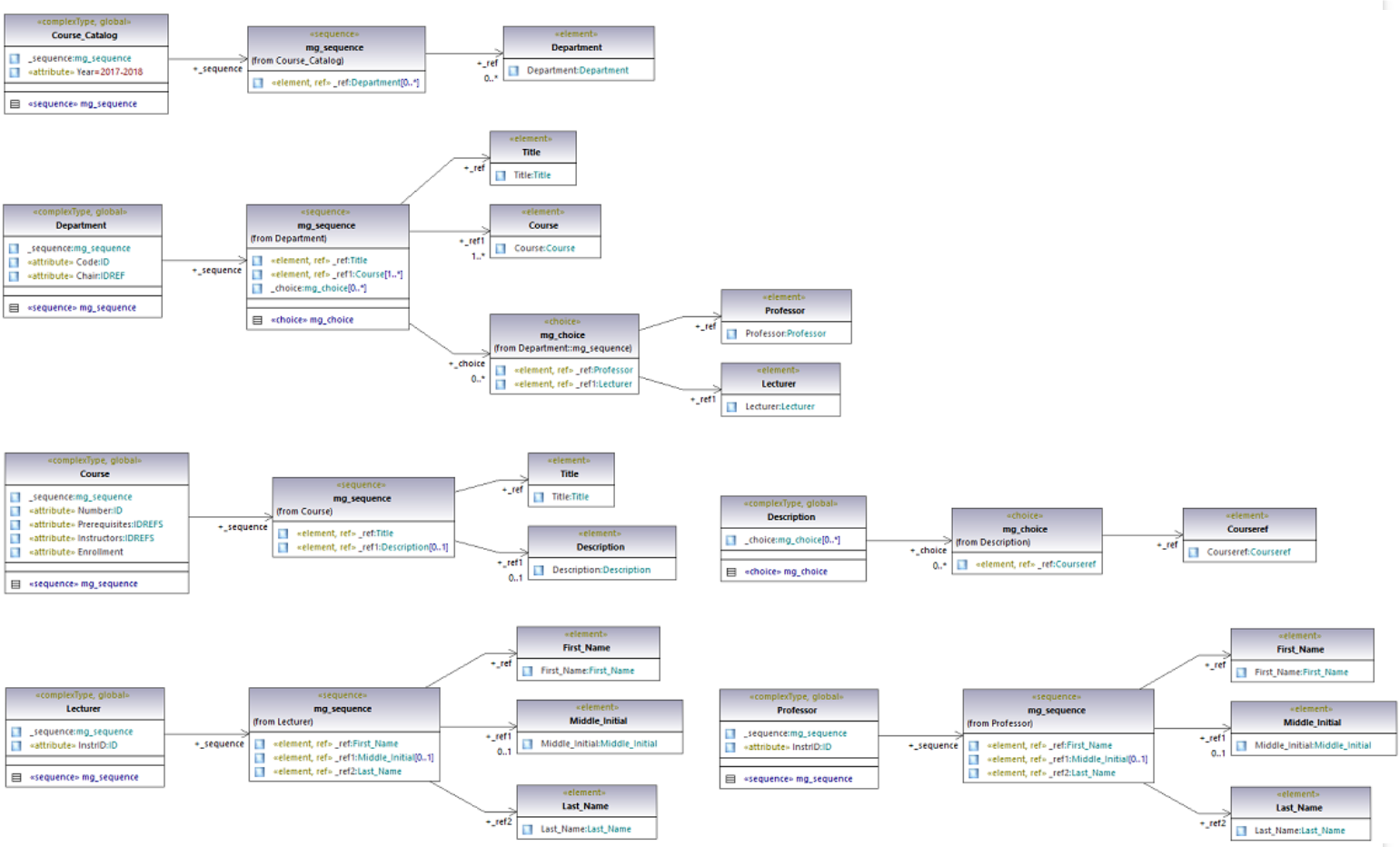

Решение

```
<?xml version="1.0" ?>
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<!ATTLIST Course_Catalog Year CDATA #FIXED "2017-2018">
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<!ELEMENT Course (Title, Description?)>
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    <Title>Computer Science</Title>
    <Course Number="CS106A" Instructors="JC ER MS" Enrollment="1070">
      <Title>Programming Methodology</Title>
      <Description>Introduction to the engineering of computer applications emphasizing modern software engineering principles.</Description>
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    <Course Number="CS106B" Prerequisites="CS106A" Instructors="JC ER" Enrollment="620">
      <Title>Programming Abstractions</Title>
      <Description>Abstraction and its relation to programming.</Description>
    </Course>
    <Course Number="CS107" Prerequisites="CS106B" Instructors="JZ" Enrollment="500">
      <Title>Computer Organization and Systems</Title>
      <Description>Introduction to the fundamental concepts of computer systems.</Description>
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    <Course Number="CS109" Prerequisites="CS106B" Instructors="MS" Enrollment="280">
      <Title>Introduction to Probability for Computer Scientists</Title>
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    <Course Number="CS124" Prerequisites="CS107 CS109" Instructors="DJ" Enrollment="60">
      <Title>From Languages to Information</Title>
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    <Description>Natural language processing. Cross-listed as <Courseref Number="LING180"/>.</Description>
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  <Course Number="CS143" Prerequisites="CS107" Instructors="AA" Enrollment="90">
    <Title>Compilers</Title>
    <Description>Principles and practices for design and implementation of compilers and interpreters.</Description>
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  <Course Number="CS145" Prerequisites="CS107" Instructors="JW" Enrollment="130">
    <Title>Introduction to Databases</Title>
    <Description>Database design and use of database management systems for applications.</Description>
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  <Course Number="CS228" Instructors="DK" Enrollment="110">
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  <Course Number="EE108A" Instructors="SM">
    <Title>Digital Systems I</Title>
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    <Professor InstrID="BL">
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```

Задача 9: Използвайки параметрични entity и условни секции, декларирайте по-долу описаните 2 варианта за елемента channel в DTD граматиката от задача 6. Включете/Изключете всеки един от двата варианта и направете съответните промени в XML документа

1. Вариант 1: Елементът channel включва само задължителните под-елементи дефинирани в задача 6 - т.е. item, title, link и description

2. Вариант 2: Елементът channel включва всички под-елементи дефинирани в задача 6 - т.е. item, title, link и description, image и language

Упътване

Решение

- XML документ:
```
<?xml version="1.0" encoding="UTF-8"?>
<!DOCTYPE channel SYSTEM "channelTask7.dtd">
<channel version="1.0">
  <item>
    <link>https://rss.com/index.html</link>
    <title>RSS</title>
  </item>
  <item>
    <description>RSS specification 2</description>
    <title>RSS2</title>
    <link>https://rss.com/index.html</link>
  </item>
  <item>
    <link>https://rss.com/index.html</link>
    <title>RSS3</title>
    <description>RSS specification 3</description>
  </item>
  <title>Title of the channel</title>
  <link>https://rss.com</link>
  <!--It is valid for the variant variantAllElements
  <language>EN</language>
  <image src="xmlJPGAddress">
    <url>https://rss.com/images/rss.png</url>
    <title>RSS Schema</title>
    <link>&goto;</link>
  </image>
  <image src="xmlPNGAddress">
```

```
    <url>https://rss.com/images/rss.gif</url>
    <title>RSS Schema</title>
    <link>&goto;</link>
  </image>
  -->
  <description>Description of the channel</description>
</channel>
```

- DTD граматика:

```
<?xml version="1.0" encoding="UTF-8"?>
<!ENTITY % titleElementName "title" >
<!ENTITY % channelAllElements "(item+, %titleElementName;, link, language?, image*, description)" >
<!ENTITY % channelMandatoryElements "(item+, %titleElementName;, link, description)" >
<!ENTITY % variantAllMandatory "INCLUDE">
<!ENTITY % variantAllElements "IGNORE">
<![%variantAllElements; [<!ELEMENT channel %channelAllElements;>]]>
<![%variantAllMandatory; [<!ELEMENT channel %channelMandatoryElements;>]]>
<!ELEMENT url (#PCDATA)>
<!ELEMENT item ((%titleElementName;, link, description?) | (description?, %titleElementName;, link) | (description?, link, %titleElementName;) |
(%titleElementName;, description?, link) | (link, %titleElementName;, description?) | (link, description?, %titleElementName;) )>
<!ELEMENT link (#PCDATA)>
<!ELEMENT image (title | link | url)*>
<!ATTLIST image src ENTITY #REQUIRED>
<!ELEMENT %titleElementName; (#PCDATA)>
<!ELEMENT channel %channelElements;>
<!ATTLIST channel version CDATA "0.0">
<!ELEMENT language (#PCDATA)>
<!ELEMENT description (#PCDATA)>
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<!NOTATION GIF PUBLIC "GIF 1.0">
<!NOTATION PNG PUBLIC "PNG 1.0" "image/png">
<!ENTITY xmlJPGAddress SYSTEM "https://eathenasolutions.com/wp-content/uploads/Fotolia_12413408_XS.jpg" NDATA JPG>
<!ENTITY xmlPNGAddress SYSTEM "https://eathenasolutions.com/wp-content/uploads/Fotolia_12413408_XS.jpg" NDATA PNG>
<!ENTITY W3GIFAddress PUBLIC "-//W3C//GIF logo//EN" "https://www.w3.org/2008/site/images/logo-w3c-screen-lg" NDATA GIF>
<!ENTITY goto "Go to our page">
```