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COURSE TITLE : INTEGRATIVE PROGRAMMING AND TECHNOLOGIES 1
INSTRUCTOR : MARK KENNETH R. LIMJOCO

1. INTRODUCTION TO XML

❖ Key Concept

XML (Extensible Markup Language) is a flexible markup language that defines and structures data in a readable way. It enables users to construct unique markup tags to represent data items, making it extremely versatile for a variety of applications. XML is intended to be both human- and machine-readable, allowing for data transmission between various systems and platforms. Unlike HTML, which is primarily used to display data in web browsers, XML is designed to store and transfer data, making it appropriate for a broad range of applications, including configuration files, data storage, online services, and document interchange formats such as RSS and Atom. XML documents are hierarchical, made up of nested components structured in a tree-like structure, each carrying data or other elements. In addition, XML documents can have attributes linked with elements that provide extra information or metadata. XML's flexibility, clarity, and extensibility make it a popular choice for encoding structured data across a wide range of fields.

❖ Learning Task : Activity 1

| | |
|--|--|
| Integrative Programming and Technologies 1 > Activity1.xml | |
| 1 <book_list> | 46 |
| 2 <book> | 47 |
| 3 <title>Cloudstreet</title> | 48 |
| 4 <author>Tim Winton</author> | 49 |
| 5 <publisher>McPhee Gribble</publisher> | 50 |
| 6 <language>English</language> | 51 |
| 7 <pages>426</pages> | 52 |
| 8 </book> | 53 |
| 9 <book> | 54 |
| 10 <title>Big Little Lies</title> | 55 |
| 11 <author>Liane Moriarty</author> | 56 |
| 12 <publisher>Penguin Group</publisher> | 57 |
| 13 <language>English</language> | 58 |
| 14 <pages>460</pages> | 59 |
| 15 </book> | 60 |
| 16 <book> | 61 |
| 17 <title>Oscar and Lucinda</title> | 62 |
| 18 <author>Peter Carey</author> | 63 |
| 19 <publisher>University of Queensland Press</publisher> | 64 |
| 20 <language>English</language> | 65 |
| 21 <pages>512</pages> | 66 |
| 22 </book> | 67 |
| 23 <book> | 68 |
| 24 <title>The Slap</title> | 69 |
| 25 <author>Christos Tsiolkas</author> | 70 |
| 26 <publisher>Allen and Row</publisher> | 71 |
| 27 <language>English</language> | 72 |
| 28 <pages>484</pages> | 73 |
| 29 </book> | 74 |
| 30 <book> | 75 |
| 31 <title>The Thorn Birds</title> | 76 |
| 32 <author>Marcus Zusak</author> | 77 |
| 33 <publisher>Harper and Row</publisher> | 78 |
| 34 <language>English</language> | 79 |
| 35 <pages>692</pages> | 80 |
| 36 </book> | 81 |
| 37 <book> | 82 |
| 38 <title>The Book Thief</title> | 83 |
| 39 <author>Richard Flanagan</author> | 84 |
| 40 <publisher>Picador</publisher> | 85 |
| 41 <language>English</language> | 86 |
| 42 <pages>552</pages> | 87 |
| 43 </book> | 88 |
| 44 <book> | 89 |
| 45 <title>The Narrow Road to the Deep North</title> | |
| 46 <author>Hannah Kent</author> | |
| | <author>Hannah Kent</author> |
| | <publisher>Knopf</publisher> |
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| | <pages>464</pages> |
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| | <author>Hannah Kent</author> |
| | <publisher>Little, Brown and Company</publisher> |
| | <language>English</language> |
| | <pages>336</pages> |
| | </book> |
| | <book> |
| | <title>Remembering Babylon</title> |
| | <author>David Malouf</author> |
| | <publisher>Chatto and Windus</publisher> |
| | <language>English</language> |
| | <pages>213</pages> |
| | </book> |
| | <book> |
| | <title>March</title> |
| | <author>Geraldine Brooks</author> |
| | <publisher>Viking</publisher> |
| | <language>English</language> |
| | <pages>280</pages> |
| | </book> |
| | <book> |
| | <title>Patrick White: A Life</title> |
| | <author>David Marr</author> |
| | <publisher>Random House</publisher> |
| | <language>English</language> |
| | <pages>736</pages> |
| | </book> |
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| | <title>The Yield</title> |
| | <author>Tara June Winch</author> |
| | <publisher>Hamish Hamilton</publisher> |
| | <language>English</language> |
| | <pages>352</pages> |
| | </book> |
| | <book> |
| | <title>The Secret River</title> |
| | <author>Kate Grenville</author> |
| | <publisher>Canongate Books</publisher> |

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89     <publisher>Canongate Books</publisher>
90     <language>English</language>
91     <pages>334</pages>
92 </book>
93 <book>
94     <title>Picnic at Hanging Rock</title>
95     <author>Joan Lindsay</author>
96     <publisher>Cheshire Publishing</publisher>
97     <language>English</language>
98     <pages>212</pages>
99 </book>
100 <book>
101     <title>Schindler's Ark</title>
102     <author>Thomas Keneally</author>
103     <publisher>Hoddler and Stoughton</publisher>
104     <language>English</language>
105     <pages>400</pages>
106 </book>
107
108 </book_list>

```

Output

This XML file does not appear to have any style information associated with it. The document tree is shown below.

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<?xml version="1.0"?>
<book_list>
  <book>
    <title>Cloudstreet</title>
    <author>Tim Winton</author>
    <publisher>McPhee Gribble</publisher>
    <language>English</language>
    <pages>426</pages>
  </book>
  <book>
    <title>Big Little Lies</title>
    <author>Liane Moriarty</author>
    <publisher>Penguin Group</publisher>
    <language>English</language>
    <pages>460</pages>
  </book>
  <book>
    <title>Oscar and Lucinda</title>
    <author>Peter Carey</author>
    <publisher>University of Queensland Press</publisher>
    <language>English</language>
    <pages>512</pages>
  </book>
  <book>
    <title>The Slaps</title>
    <author>Christos Tsiolkas</author>
    <publisher>Allen and Row</publisher>
    <language>English</language>
    <pages>484</pages>
  </book>
  <book>
    <title>The Thorn Birds</title>
    <author>Marcus Zusak</author>
    <publisher>Harper and Row</publisher>
    <language>English</language>
    <pages>692</pages>
  </book>
  <book>
    <title>The Book Thief</title>
    <author>Richard Flanagan</author>
    <publisher>Picador</publisher>
    <language>English</language>
    <pages>552</pages>
  </book>
  <book>
    <title>The Narrow Road to the Deep North</title>
    <author>Hannah Kent</author>
    <publisher>Knopf Doubleday</publisher>
  </book>
</book_list>

```

❖ Takeaways

- The XML structure represents a list of books, each enclosed within `<book>` tags.
- Each `<book>` element contains child elements such as `<title>`, `<author>`, `<publisher>`, `<language>`, and `<pages>` to provide detailed information about each book.
- The data for each book, such as title, author, publisher, language, and number of pages, is encapsulated within their respective XML tags.
- The `<book_list>` element serves as the root element, encapsulating all the `<book>` elements.
- The XML is well-structured and follows a hierarchical format, making it easy to read and understand.
- This XML document could be used to store and exchange information about a collection of books in a standardized format.
- The `<language>` element indicates that all the books are written in English, suggesting a common attribute among the listed books.
- Each `<book>` entry provides comprehensive information about a particular book, facilitating easy retrieval and processing of data.

2. INTRODUCTION TO XML: CDATA section, Special Character, Element Attributes

❖ Key Concept

XML documents can include CDATA sections, special characters, and element attributes to handle various data requirements. CDATA sections allow inclusion of unescaped character data, useful for embedding content like URLs, scripts, or other markup within an XML document without needing to escape special characters. Special characters, such as "<", ">", "&", are represented using entities like "<", ">", "&", respectively, to avoid confusion with XML syntax. Element attributes provide additional metadata or information about XML elements, enhancing their usability and functionality.

❖ Learning Task : Activity 2

```
Integrative Programming ad Technologies 1 > Activity2.xml
1 <?xml version="1.0"?>
2 <book_list>
3   <book>
4     <title author="Tim Minton">Cloudstreet</title>
5     <ebook><![CDATA[https://www.goodreads.com/book/show/343881.Cloudstreet]]></ebook>
6     <publisher>McPhee Gribble</publisher>
7     <language>English</language>
8     <pages>426</pages>
9   </book>
10  <book>
11    <title author="Liane Moriarty">Big Little Lies</title>
12    <ebook><![CDATA[https://www.goodreads.com/book/show/19486412-big-little-lies]]></ebook>
13    <publisher>Penguin Group</publisher>
14    <language>English</language>
15    <pages>460</pages>
16  </book>
17  <book>
18    <title author="Peter Carey">Oscar and Lucinda</title>
19    <ebook><![CDATA[https://www.goodreads.com/book/show/187518.Oscar_and_Lucinda]]></ebook>
20    <publisher>University of Queensland Press</publisher>
21    <language>English</language>
22    <pages>512</pages>
23  </book>
24  <book>
25    <title author="Christos Tsiolkas">The Slap</title>
26    <ebook><![CDATA[https://www.goodreads.com/book/show/5396496-the-slap?from_search=true&from_srp=true&qid=54b033a3&rank=1]]></ebook>
27    <publisher>Allen Lane</publisher>
28    <language>English</language>
29    <pages>484</pages>
30  </book>
31  <book>
32    <title author="Marcus Zusak">The Thorn Birds</title>
33    <ebook><![CDATA[https://www.goodreads.com/book/show/830.The_Thorn_Birds]]></ebook>
34    <publisher>Harper and Row</publisher>
35    <language>English</language>
36    <pages>692</pages>
37  </book>
38  <book>
39    <title author="Richard Flanagan">The Book Thief</title>
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41    <publisher>Picador</publisher>
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43    <pages>552</pages>
44  </book>
45  <book>
46    <title author="Hannah Kent">The Narrow Road to the Deep North</title>
47    <ebook><![CDATA[https://www.goodreads.com/book/show/1713323-the-narrow-road-to-the-deep-north]]></ebook>
48    <publisher>Knopf</publisher>
49    <language>English</language>
50    <pages>464</pages>
51  </book>
52  <book>
53    <title author="Hannah Kent">Burial Rites</title>
54    <ebook><![CDATA[https://www.goodreads.com/book/show/1827332-burial-rites]]></ebook>
55    <publisher>Little, Brown and Company</publisher>
56    <language>English</language>
57    <pages>336</pages>
58  </book>
59  <book>
60    <title author="David Malouf">Remembering Babylon</title>
61    <ebook><![CDATA[https://www.goodreads.com/book/show/46161.Remembering_Babylon]]></ebook>
62    <publisher>Chatto and Windus</publisher>
63    <language>English</language>
64    <pages>213</pages>
65  </book>
66  <book>
67    <title author="Geraldine Brooks">March</title>
68    <ebook><![CDATA[https://www.goodreads.com/book/show/6365.March]]></ebook>
69    <publisher>Viking</publisher>
70    <language>English</language>
71    <pages>280</pages>
72  </book>
73  <book>
74    <title author="David Mare">Patrick White: A Life</title>
75    <ebook><![CDATA[https://www.goodreads.com/book/show/19976.Patrick_White]]></ebook>
76    <publisher>Random House</publisher>
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79  </book>
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93    <language>English</language>
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96  <book>
97    <title author="Thomas Keneally">Schindler's Ark</title>
98    <ebook><![CDATA[https://www.goodreads.com/book/show/268302.Schindler_s_Ark?from_search=true&from_srp=true&qid=54b033a3&rank=1]]></ebook>
99    <publisher>Hodder Lane, Stoughton</publisher>
100   <language>English</language>
101   <pages>400</pages>
102 </book>
103 </book_list>
```

Output

This XML file does not appear to have any style information associated with it. The document tree is shown below.

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<book_list>
  <book>
    <title author="Tim Winton">Cloudstreet</title>
    <book>
      <![CDATA[ https://www.goodreads.com/book/show/343881.Cloudstreet ]]>
    </book>
    <publisher>McPhee Gribble</publisher>
    <language>English</language>
    <pages>426</pages>
  </book>
  <book>
    <title author="Liane Moriarty">Big Little Lies</title>
    <book>
      <![CDATA[ https://www.goodreads.com/book/show/19486412-big-little-lies ]]>
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    <publisher>Penguin Group</publisher>
    <language>English</language>
    <pages>468</pages>
  </book>
  <book>
    <title author="Peter Carey">Oscar and Lucinda</title>
    <book>
      <![CDATA[ https://www.goodreads.com/book/show/187518.Oscar_and_Lucinda ]]>
    </book>
    <publisher>University of Queensland Press</publisher>
    <language>English</language>
    <pages>512</pages>
  </book>
  <book>
    <title author="Christos Tsiolkas">The Slap</title>
    <book>
      <![CDATA[ https://www.goodreads.com/book/show/5396496-the-slap?from_search=true&from_srp=true&qid=HqB0rdbXu&rank=1 ]]>
    </book>
    <publisher>Allen & Row</publisher>
    <language>English</language>
    <pages>484</pages>
  </book>
  <book>
    <title author="Marcus Zusak">The Thorn Birds</title>
    <book>
      <![CDATA[ https://www.goodreads.com/book/show/830.The_Thorn_Birds ]]>
    </book>
    <publisher>Harper and Row</publisher>
    <language>English</language>
  </book>
</book_list>
```

❖ Takeaways

- CDATA sections allow inclusion of content that may contain characters that would otherwise need to be escaped in XML, such as URLs, scripts, or other markup.
- Special characters in XML, such as "<", ">", "&", are represented using entities to prevent misinterpretation by XML parsers.
- Element attributes provide additional metadata or information about XML elements, enhancing their functionality and providing a way to associate additional data with elements.
- Proper handling of CDATA sections, special characters, and element attributes is crucial for ensuring accurate representation and processing of data within XML documents.

3. DOCUMENT TYPE DEFINITION

❖ Key Concept

Document Type Definition (DTD) is a way to formally describe the structure and constraints of XML documents. DTDs define the rules for the elements, attributes, and their relationships within an XML document. They allow for validation of XML documents to ensure they conform to a specific structure and content model.

❖ Learning Task : Activity 3

```
Integrative Programming ad Technologies 1 > Activity3.xml
1 <?xml version="1.0"?>
2 <!DOCTYPE book_list [
3   <ELEMENT book_list (book)*>
4   <ELEMENT book (title,ebook,publisher,language,pages)>
5   <ELEMENT title (#PCDATA)>
6   <ELEMENT ebook (#PCDATA)>
7   <ELEMENT publisher (#PCDATA)>
8   <ELEMENT language (#PCDATA)>
9   <ELEMENT pages (#PCDATA)>
10  <!ATTLIST title author CDATA "1">
11 ]>
12
13 <book_list>
14 <book>
15   <title author="Tim Winton">Cloudstreet</title>
16   <ebook><![CDATA[https://www.goodreads.com/book/show/343881.Cloudstreet]]></ebook>
17   <publisher>McPhee Gribble</publisher>
18   <language>English</language>
19   <pages>426</pages>
20 </book>
21 <book>
22   <title author="Liane Moriarty">Big Little Lies</title>
23   <ebook><![CDATA[https://www.goodreads.com/book/show/19486412-big-little-lies]]></ebook>
24   <publisher>Penguin Group</publisher>
25   <language>English</language>
26   <pages>460</pages>
27 </book>
28 <book>
29   <title author="Peter Carey">Oscar and Lucinda</title>
30   <ebook><![CDATA[https://www.goodreads.com/book/show/187518.Oscar_and_Lucinda]]></ebook>
31   <publisher>University of Queensland Press</publisher>
32   <language>English</language>
33   <pages>512</pages>
34 </book>
35 <book>
36   <title author="Christos Tsiolkas">The Slap</title>
37   <ebook><![CDATA[https://www.goodreads.com/book/show/5396496-the-slap?from_search=true&from_srp=true&qid=4680r&rank=1]]></ebook>
38   <publisher>Allen Lane</publisher>
39   <language>English</language>
40   <pages>484</pages>
41 </book>
42 <book>
43   <title author="Marcus Zusak">The Thorn Birds</title>
44   <ebook><![CDATA[https://www.goodreads.com/book/show/838.The_Thorn_Birds]]></ebook>
45   <publisher>Harper and Row</publisher>
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47   <pages>692</pages>
48 </book>
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50   <title author="Richard Flanagan">The Book Thief</title>
51   <ebook><![CDATA[https://www.goodreads.com/book/show/19863.The_Book_Thief]]></ebook>
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54   <pages>552</pages>
55 </book>
56 <book>
57   <title author="Hannah Kent">The Narrow Road to the Deep North</title>
58   <ebook><![CDATA[https://www.goodreads.com/book/show/17333223-the-narrow-road-to-the-deep-north]]></ebook>
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61   <pages>464</pages>
62 </book>
63 <book>
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65   <ebook><![CDATA[https://www.goodreads.com/book/show/18273332-burial-rites]]></ebook>
66   <publisher>Little, Brown and Company</publisher>
67   <language>English</language>
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71   <title author="David Malouf">Remembering Babylon</title>
72   <ebook><![CDATA[https://www.goodreads.com/book/show/46161.Remembering_Babylon]]></ebook>
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86   <language>English</language>
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90   <title author="Tara June Winch">The Yield</title>
91   <ebook><![CDATA[https://www.goodreads.com/book/show/40220035-the-yield]]></ebook>
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94   <pages>352</pages>
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97   <title author="Kate Grenville">The Secret River</title>
98   <ebook><![CDATA[https://www.goodreads.com/book/show/13987.The_Secret_River]]></ebook>
99   <publisher>Canongate Books</publisher>
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103 <book>
104   <title author="Joan Lindsay">Picnic at Hanging Rock</title>
105   <ebook><![CDATA[https://www.goodreads.com/book/show/291587.Picnic_at_Hanging_Rock]]></ebook>
106   <publisher>Cheshire Pub Publishing</publisher>
107   <language>English</language>
108   <pages>212</pages>
109 </book>
110 <book>
111   <title author="Thomas Kennedy">Schindler's Ark</title>
112   <ebook><![CDATA[https://www.goodreads.com/book/show/268302.Schindler_s_Ark?from_search=true&from_srp=true&qid=5ab5d313at&rank=1]]></ebook>
113   <publisher>Hodder Lane</publisher>
114   <language>English</language>
115   <pages>408</pages>
116 </book>
117 </book_list>
118
119 </book_list>
```

Output

This XML file does not appear to have any style information associated with it. The document tree is shown below.

```
<?xml version="1.0"?>
<book_list>
  <book>
    <title author="Tim Winton">Cloudstreet</title>
    <ebook>
      <![CDATA[ https://www.goodreads.com/book/show/343881.Cloudstreet ]]>
    </ebook>
    <publisher>McPhee Gribble</publisher>
    <language>English</language>
    <pages>426</pages>
  </book>
  <book>
    <title author="Liane Moriarty">Big Little Lies</title>
    <ebook>
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    <title author="Peter Carey">Oscar and Lucinda</title>
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    </ebook>
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    <language>English</language>
    <pages>512</pages>
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    <publisher>Allen & Row</publisher>
    <language>English</language>
    <pages>484</pages>
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  <book>
    <title author="Marcus Zusak">The Thorn Birds</title>
    <ebook>
      <![CDATA[ https://www.goodreads.com/book/show/830.The_Thorn_Birds ]]>
    </ebook>
    <publisher>Harper and Row</publisher>
    <language>English</language>
  </book>
</book_list>
```

❖ Takeaways

- The Document Type Definition (DTD) defines the structure of the XML document, including the elements and their relationships.
- In this DTD, it specifies that the root element <book_list> must contain one or more <book> elements.
- Each <book> element must contain child elements <title>, <ebook>, <publisher>, <language>, and <pages> in that order.
- The content model for each of these elements is specified using the "#PCDATA" keyword, which indicates that they can contain parsed character data.
- Additionally, the DTD includes an attribute declaration for the <title> element, specifying that it can have an "author" attribute of type CDATA with a default value of "1".
- Using DTDs allows for validation of XML documents against a predefined structure, ensuring data consistency and integrity.
- DTDs are an older method of validation and have limitations compared to newer schema languages like XML Schema (XSD) or RelaxNG, but they are still widely used in various contexts.

4. XML SCHEMA DEFINITION

❖ Key Concept

XML Schema Definition (XSD) is a standard that specifies the structure and restrictions of XML documents. XSD is a more advanced and flexible technique to verify XML documents than Document Type Definition (DTD). XSD enables for more explicit specification of element and attribute datatypes, cardinality, and inter-element connections. XSD schemas are expressed in XML syntax and may be used to check XML documents to ensure they comply with the established schema. They support namespaces, complicated and simple types, inheritance, and data constraints. XSD schemas are widely used in online services, data transfer protocols, and other applications which require strict validation of XML documents.

❖ Learning Task : Activity 4

XML File

```
Integrative Programming ad Technologies 1 > Activity 4 > JudahPauloVinas_4.xml
1 <?xml version="1.0"?>
2
3 <book_list xmlns="https://www.java4eff.ca/"
4           xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
5           xsi:schemaLocation="JudahPauloVinas_book_list.xsd">
6
7   <book>
8     <title author="Tim Winton">Cloudstreet</title>
9     <ebook><![CDATA[https://www.goodreads.com/book/show/343881.Cloudstreet]]></ebook>
10    <publisher>McPhee Gribble</publisher>
11    <language>English</language>
12    <pages>426</pages>
13  </book>
14  <book>
15    <title author="Christos Tsiolkas">The Slap</title>
16    <ebook><![CDATA[https://www.goodreads.com/book/show/5396496-the-slap?from_search=true&from_srp=true&qid=4b0c0db&rank=1]]></ebook>
17    <publisher>Allen &amp; Row</publisher>
18    <language>English</language>
19    <pages>484</pages>
20  </book>
21  <book>
22    <title author="Thomas Keneally">Schindler's Ark</title>
23    <ebook><![CDATA[https://www.goodreads.com/book/show/268302.Schindler_s_Ark?from_search=true&from_srp=true&qid=5a65b313at&rank=1]]></ebook>
24    <publisher>Hodder & Stoughton</publisher>
25    <language>English</language>
26    <pages>400</pages>
27  </book>
28  <book>
29    <title author="Liane Moriarty">Big Little Lies</title>
30    <ebook><![CDATA[https://www.goodreads.com/book/show/19486412-big-little-lies]]></ebook>
31    <publisher>Penguin Group</publisher>
32    <language>English</language>
33    <pages>468</pages>
34  </book>
35  <book>
36    <title author="Peter Carey">Oscar and Lucinda</title>
37    <ebook><![CDATA[https://www.goodreads.com/book/show/187518.Oscar_and_Lucinda]]></ebook>
38    <publisher>University of Queensland Press</publisher>
39    <language>English</language>
40    <pages>512</pages>
41  </book>
42  <book>
43    <title author="Marcus Zusak">The Thorn Birds</title>
44    <ebook><![CDATA[https://www.goodreads.com/book/show/838.The_Thorn_Birds]]></ebook>
45    <publisher>Harper and Row</publisher>
46    <language>English</language>
47    <pages>692</pages>
48  </book>
49  <book>
50    <title author="Richard Flanagan">The Book Thief</title>
51    <ebook><![CDATA[https://www.goodreads.com/book/show/19863.The_Book_Thief]]></ebook>
52    <publisher>Picador</publisher>
53    <language>English</language>
54    <pages>552</pages>
55  </book>
56  <book>
57    <title author="Hannah Kent">The Narrow Road to the Deep North</title>
58    <ebook><![CDATA[https://www.goodreads.com/book/show/17333223-the-narrow-road-to-the-deep-north]]></ebook>
59    <publisher>Knopf</publisher>
60    <language>English</language>
61    <pages>464</pages>
62  </book>
63  <book>
64    <title author="Hannah Kent">Burial Rites</title>
65    <ebook><![CDATA[https://www.goodreads.com/book/show/38273332-burial-rites]]></ebook>
66    <publisher>Little, Brown and Company</publisher>
67    <language>English</language>
68    <pages>336</pages>
69  </book>
70  <book>
71    <title author="David Malouf">Remembering Babylon</title>
72    <ebook><![CDATA[https://www.goodreads.com/book/show/46161.Remembering_Babylon]]></ebook>
73    <publisher>Chatto and Windus</publisher>
74    <language>English</language>
75    <pages>213</pages>
76  </book>
77  <book>
78    <title author="Geraldine Brooks">March</title>
79    <ebook><![CDATA[https://www.goodreads.com/book/show/6365.March]]></ebook>
80    <publisher>Viking</publisher>
81    <language>English</language>
82    <pages>280</pages>
83  </book>
84  <book>
85    <title author="David Marr">Patrick White: A Life</title>
86    <ebook><![CDATA[https://www.goodreads.com/book/show/19976.Patrick_White]]></ebook>
87    <publisher>Random House</publisher>
88    <language>English</language>
89  </book>
```



```

88     <language>English</language>
89     <pages>736</pages>
90   </book>
91 </book_list>
92 <book>
93   <title author="Tara June Winch">The Yield</title>
94   <ebooks><![CDATA[https://www.goodreads.com/book/show/40220035-the-yield]]></ebooks>
95   <publisher>Hamish Hamilton</publisher>
96   <language>English</language>
97   <pages>352</pages>
98 </book>
99 <book>
100   <title author="Kate Grenville">The Secret River</title>
101   <ebooks><![CDATA[https://www.goodreads.com/book/show/13907-The_Secret_River]]></ebooks>
102   <publisher>Canongate Books</publisher>
103   <language>English</language>
104   <pages>334</pages>
105 </book>
106 <book>
107   <title author="Joan Lindsay">Picnic at Hanging Rock</title>
108   <ebooks><![CDATA[https://www.goodreads.com/book/show/291507-Picnic_at_Hanging_Rock]]></ebooks>
109   <publisher>Cheshire Publishing</publisher>
110   <language>English</language>
111   <pages>212</pages>
112 </book>
113 </book_list>

```

XSD File

```

1 <?xml version="1.0"?>
2 <xs:schema xmlns:xs="http://www.w3.org/2001/XMLSchema" >
3   <xs:element name="book_list">
4     <xs:complexType>
5       <xs:sequence>
6         <xs:element name="book" maxOccurs="unbounded"/>
7       </xs:sequence>
8     </xs:complexType>
9   </xs:element>
10
11   <xs:element name="book">
12     <xs:complexType>
13       <xs:sequence>
14         <xs:element name="title" type="xs:string"/>
15         <xs:element name="ebooks" type="xs:string"/>
16         <xs:element name="publisher" type="xs:string"/>
17         <xs:element name="language" type="xs:string"/>
18         <xs:element name="pages" type="xs:integer"/>
19       </xs:sequence>
20       <xs:attribute name="author" type="xs:string"/>
21     </xs:complexType>
22   </xs:element>
23
24 </xs:schema>

```

Output of XML

This XML file does not appear to have any style information associated with it. The document tree is shown below.

```

<?xml version="1.0"?>
<book_list xmlns="https://www.java4eff.ca/" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xsi:schemaLocation="https://www.java4eff.ca/book_list.xsd">
  <book>
    <title author="Tim Winton">Cloudstreet</title>
    <ebooks>
      <![CDATA[https://www.goodreads.com/book/show/343881-Cloudstreet]]>
    </ebooks>
    <publisher>McPhee Gribble</publisher>
    <language>English</language>
    <pages>426</pages>
  </book>
  <book>
    <title author="Christos Tsiolkas">The Slap</title>
    <ebooks>
      <![CDATA[https://www.goodreads.com/book/show/5396496-the-slap?from_search=true&from_srp=true&qid=8f080f8d&rank=1]]>
    </ebooks>
    <publisher>Allen & Row</publisher>
    <language>English</language>
    <pages>484</pages>
  </book>
  <book>
    <title author="Thomas Keneally">Schindler's Ark</title>
    <ebooks>
      <![CDATA[https://www.goodreads.com/book/show/268302-Schindler_s_Ark?from_search=true&from_srp=true&qid=5a06b131&rank=1]]>
    </ebooks>
    <publisher>Hodder & Stoughton</publisher>
    <language>English</language>
    <pages>400</pages>
  </book>
  <book>
    <title author="Liane Moriarty">Big Little Lies</title>
    <ebooks>
      <![CDATA[https://www.goodreads.com/book/show/19486412-big-little-lies]]>
    </ebooks>
    <publisher>Penguin Group</publisher>
    <language>English</language>
    <pages>460</pages>
  </book>
  <book>
    <title author="Peter Carey">Oscar and Lucinda</title>
    <ebooks>
      <![CDATA[https://www.goodreads.com/book/show/187518-Oscar_and_Lucinda]]>
    </ebooks>
  </book>
</book_list>

```

Validation

XSD Validation

Validate XML data against an XSD (XML Schema Definition) to ensure it follows the correct structure and rules.

XML Code

```

<?xml version="1.0"?>
<book_list>
  <book>
    <title author="Tim Winton">Cloudstreet</title>
    <ebooks><![CDATA[https://www.goodreads.com/book/show/343881-Cloudstreet]]></ebooks>
    <publisher>McPhee Gribble</publisher>
    <language>English</language>
    <pages>426</pages>
  </book>
  <book>
    <title author="Christos Tsiolkas">The Slap</title>
    <ebooks><![CDATA[https://www.goodreads.com/book/show/5396496-the-slap?from_search=true&from_srp=true&qid=8f080f8d&rank=1]]></ebooks>
    <publisher>Allen & Row</publisher>
    <language>English</language>
    <pages>484</pages>
  </book>
  <book>
    <title author="Thomas Keneally">Schindler's Ark</title>
    <ebooks><![CDATA[https://www.goodreads.com/book/show/268302-Schindler_s_Ark?from_search=true&from_srp=true&qid=5a06b131&rank=1]]></ebooks>
    <publisher>Hodder & Stoughton</publisher>
    <language>English</language>
    <pages>400</pages>
  </book>
  <book>
    <title author="Liane Moriarty">Big Little Lies</title>
    <ebooks><![CDATA[https://www.goodreads.com/book/show/19486412-big-little-lies]]></ebooks>
    <publisher>Penguin Group</publisher>
    <language>English</language>
    <pages>460</pages>
  </book>
  <book>
    <title author="Peter Carey">Oscar and Lucinda</title>
    <ebooks><![CDATA[https://www.goodreads.com/book/show/187518-Oscar_and_Lucinda]]></ebooks>
  </book>
</book_list>

```

XSD Code

```

<xs:element name="book">
  <xs:complexType>
    <xs:sequence>
      <xs:element name="title" type="xs:string"/>
      <xs:element name="ebooks" type="xs:string"/>
      <xs:element name="publisher" type="xs:string"/>
      <xs:element name="language" type="xs:string"/>
      <xs:element name="pages" type="xs:integer"/>
    </xs:sequence>
      <xs:attribute name="author" type="xs:string"/>
    </xs:complexType>
  </xs:element>
</xs:schema>

```

Submit

Result

- Document is valid

❖ Takeaways

- XML Schema Definition (XSD) provides a powerful way to define the structure and constraints of XML documents.
- XSD schemas are written in XML syntax and allow for precise specification of element datatypes, cardinality, and relationships.
- XSD schemas are commonly used for validation of XML documents to ensure they conform to a specified structure and content model.
- The use of XSD schemas improves interoperability and data integrity by enforcing consistent data structures and formats across different systems and applications.

5. PARSING XML DOCUMENT USING JAVA

❖ Key Concept

Parsing XML documents using Java involves several steps, typically using a parser like DOM (Document Object Model) or SAX (Simple API for XML). DOM provides a tree-like representation of the XML document in memory, allowing easy traversal and manipulation of the document structure.

❖ Learning Task : Activity 5

XML File

```
1 <?xml version="1.0"?>
2
3 <book_list xmlns="https://www.java9off.ca/"
4           xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
5           xsi:schemaLocation="JedahPauloVinas_book_list.xsd">
6
7   <book>
8     <title>author="Tim Winton">Cloudstreet</title>
9     <book><![CDATA[https://www.goodreads.com/book/show/343881.Cloudstreet]]></book>
10    <publisher>McPhee Gribble</publisher>
11    <language>English</language>
12    <pages>426</pages>
13  </book>
14  <book>
15    <title>author="Christos Tsiolkas">The Slap</title>
16    <book><![CDATA[https://www.goodreads.com/book/show/5396496-the-slap?from_search=true&from_sr=true&id=RpQr0bAduakrank=1]]></book>
17    <publisher>Allen &amp; Row</publisher>
18    <language>English</language>
19    <pages>484</pages>
20  </book>
21  <book>
22    <title>author="Thomas Keneally">Schindler's Ark</title>
23    <book><![CDATA[https://www.goodreads.com/book/show/268302.Schindler_s_Ark?from_search=true&from_sr=true&id=5aWbX13At&rank=1]]></book>
24    <publisher>Hodder & Stoughton</publisher>
25    <language>English</language>
26    <pages>480</pages>
27  </book>
28  <book>
29    <title>author="Liane Moriarty">Big Little Lies</title>
30    <book><![CDATA[https://www.goodreads.com/book/show/19486412-big-little-lies]]></book>
31    <publisher>Penguin Group</publisher>
32    <language>English</language>
33    <pages>468</pages>
34  </book>
35  <book>
36    <title>author="Peter Carey">Oscar and Lucinda</title>
37    <book><![CDATA[https://www.goodreads.com/book/show/187518.Oscar_and_Lucinda]]></book>
38    <publisher>University of Queensland Press</publisher>
39    <language>English</language>
40    <pages>512</pages>
41  </book>
42  <book>
43    <title>author="Marcus Zusak">The Thorn Birds</title>
44    <book><![CDATA[https://www.goodreads.com/book/show/830.The_Thorn_Birds]]></book>
45    <publisher>Harper and Row</publisher>
46    <language>English</language>
47    <pages>692</pages>
48  </book>
49  <book>
50    <title>author="Richard Flanagan">The Book Thief</title>
51    <book><![CDATA[https://www.goodreads.com/book/show/19063.The_Book_Thief]]></book>
52    <publisher>Picador</publisher>
53    <language>English</language>
54    <pages>552</pages>
55  </book>
56  <book>
57    <title>author="Hannah Kent">The Narrow Road to the Deep North</title>
58    <book><![CDATA[https://www.goodreads.com/book/show/1733323-the-narrow-road-to-the-deep-north]]></book>
59    <publisher>Knopf</publisher>
60    <language>English</language>
61    <pages>464</pages>
62  </book>
63  <book>
64    <title>author="Hannah Kent">Burial Rites</title>
65    <book><![CDATA[https://www.goodreads.com/book/show/18273332-burial-rites]]></book>
66    <publisher>Little, Brown and Company</publisher>
67    <language>English</language>
68    <pages>336</pages>
69  </book>
70  <book>
71    <title>author="David Malouf">Remembering Babylon</title>
72    <book><![CDATA[https://www.goodreads.com/book/show/46161.Remembering_Babylon]]></book>
73    <publisher>Chatto and Windus</publisher>
74    <language>English</language>
75    <pages>213</pages>
76  </book>
77  <book>
78    <title>author="Gerardine Brooks">March</title>
79    <book><![CDATA[https://www.goodreads.com/book/show/6365.March]]></book>
80    <publisher>Viking</publisher>
81    <language>English</language>
82    <pages>280</pages>
83  </book>
84  <book>
85    <title>author="David Marr">Patrick White: A Life</title>
86    <book><![CDATA[https://www.goodreads.com/book/show/19976.Patrick_White]]></book>
87    <publisher>Random House</publisher>
88    <language>English</language>
89    <pages>736</pages>
90  </book>
91  <book>
92    <title>author="Tara June Minch">The Yield</title>
93    <book><![CDATA[https://www.goodreads.com/book/show/48228035-the-yield]]></book>
94    <publisher>Hamish Hamilton</publisher>
95    <language>English</language>
96    <pages>352</pages>
97  </book>
98  <book>
99    <title>author="Kate Grenville">The Secret River</title>
100   <book><![CDATA[https://www.goodreads.com/book/show/13987.The_Secret_River]]></book>
101   <publisher>Canongate Books</publisher>
102   <language>English</language>
103   <pages>334</pages>
104  </book>
105  <book>
106    <title>author="Joan Lindsay">Picnic at Hanging Rock</title>
107    <book><![CDATA[https://www.goodreads.com/book/show/291587.Picnic_at_Hanging_Rock]]></book>
108    <publisher>Cheshire Publishing</publisher>
109    <language>English</language>
110    <pages>212</pages>
111  </book>
112 </book_list>
```

Java File

```
Integrative Programming ad Technologies 1 > Activity 5 > J_JudahPauloVinas_5.java > ...
1 import java.io.File;
2 import javax.xml.parsers.DocumentBuilder;
3 import javax.xml.parsers.DocumentBuilderFactory;
4 import org.w3c.dom.Document;
5 import org.w3c.dom.Element;
6 import org.w3c.dom.Node;
7 import org.w3c.dom.NodeList;
8
9 /**
10  * This class is used to parse XML document using DOM parser.
11  * @author javathasae
12  */
13 public class JudahPauloVinas_5 {
14     @SuppressWarnings("unused")
15     public static void main(String args[]){
16         try {
17             //File Path
18             String filePath = "JudahPauloVinas_5.xml";
19
20             //Read XML file.
21             File inputFile = new File(filePath);
22
23             //Create DocumentBuilderFactory object.
24             DocumentBuilderFactory dbFactory
25                 = DocumentBuilderFactory.newInstance();
26
27             //Get DocumentBuilder object.
28             DocumentBuilder dBuilder = dbFactory.newDocumentBuilder();
29
30             //Parse XML file.
31             Document document = dBuilder.parse(inputFile);
32             document.getDocumentElement().normalize();
33
34             //Print root element.
35             System.out.println("Root element:"
36                 + document.getDocumentElement().getNodeName());
37
38             //Get element list.
39             NodeList nodeList = document.getElementsByTagName(tagName:"book");
40
41             //Process element list.
42             for (int temp = 0; temp < nodeList.getLength(); temp++) {
43                 Node nNode = nodeList.item(temp);
44                 System.out.println("\nCurrent Element:"
45                     + nNode.getNodeName());
46                 if (nNode.getNodeType() == Node.ELEMENT_NODE) {
47                     Element eElement = (Element) nNode;
48
49                     System.out.println("Book Title: "
50                         + eElement.getElementsByTagName(name:"title")
51                             .item(0).getTextContent());
52
53                     System.out.println("Author: "
54                         + eElement.getAttribute(name:"author"));
55
56                     System.out.println("Language: "
57                         + eElement.getElementsByTagName(name:"language")
58                             .item(0).getTextContent());
59
60                     System.out.println("Publisher: "
61                         + eElement.getElementsByTagName(name:"publisher")
62                             .item(0).getTextContent());
63
64                     System.out.println("Pages: "
65                         + eElement.getElementsByTagName(name:"pages")
66                             .item(0).getTextContent());
67                 }
68             }
69         } catch (Exception e) {
70             e.printStackTrace();
71         }
72     }
73 }
```

Output of XML File

```
This XML file does not appear to have any style information associated with it. The document tree is shown below.
<?xml version="1.0" encoding="UTF-8" standalone="no" ?>
<book_list xmlns="https://www.javajeff.ca/" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xsi:schemaLocation="JudahPauloVinas_book_list.xsd">
  <book>
    <title>author:"Ia Minton"</title>
    <book>
      <CDATA[ https://www.goodreads.com/book/show/345881.Cloudstreet ]>
      </book>
      <publisher>McPhee Gribble</publisher>
      <language>English</language>
      <pages>426</pages>
    </book>
  </book>
  <book>
    <title>author:"Christos Tsiolkas"</title>
    <book>
      <CDATA[ https://www.goodreads.com/book/show/5396496-the-slap?from_search=true&from_srp=true&qid=Nglt0rdhau&rank=1 ]>
      </book>
      <publisher>Allen & Row</publisher>
      <language>English</language>
      <pages>484</pages>
    </book>
  </book>
  <book>
    <title>author:"Thomas Kennedy"</title>
    <book>
      <CDATA[ https://www.goodreads.com/book/show/268302_Schindler_s_Ark?from_search=true&from_srp=true&qid=5a6dht13&rank=1 ]>
      </book>
      <publisher>Hendler & Stoughton</publisher>
      <language>English</language>
      <pages>400</pages>
    </book>
  </book>
  <book>
    <title>author:"Liane Moriarty"</title>
    <book>
      <CDATA[ https://www.goodreads.com/book/show/19486412-big-little-lies ]>
      </book>
      <publisher>Penguin Group</publisher>
      <language>English</language>
      <pages>448</pages>
    </book>
  </book>
  <book>
    <title>author:"Peter Carey"</title>
    <book>
      <CDATA[ https://www.goodreads.com/book/show/187918.Oscar_and_Lucinda ]>
      </book>
    </book>
  </book>
</book_list>
```

Output of Java File

```
[Running] cd "d:\School\Integrative Programming ad Techno
Root element:book_list

Current Element:book
Book Title: Cloudstreet
Author: Tim Winton
Language: English
Publisher: McPhee Gribble
Pages: 426

Current Element:book
Book Title: The Slap
Author: Christos Tsiolkas
Language: English
Publisher: Allen & Row
Pages: 484

Current Element:book
Book Title: Schindler's Ark
Author: Thomas Keneally
Language: English
Publisher: Hoddler & Stoughton
Pages: 400

Current Element:book
Book Title: Big Little Lies
Author: Liane Moriarty
Language: English
Publisher: Penguin Group
Pages: 460

Current Element:book
Book Title: Oscar and Lucinda
Author: Peter Carey
Language: English
Publisher: University of Queensland Press
Pages: 512

Current Element:book
Book Title: The Thorn Birds
Author: Marcus Zusak
Language: English
Publisher: Harper and Row
Pages: 692

Current Element:book
Book Title: The Book Thief
Author: Richard Flanagan
```

```
Current Element:book
Book Title: The Book Thief
Author: Richard Flanagan
Language: English
Publisher: Picador
Pages: 552

Current Element:book
Book Title: The Narrow Road to the Deep North
Author: Hannah Kent
Language: English
Publisher: Knopf
Pages: 464

Current Element:book
Book Title: Burial Rites
Author: Hannah Kent
Language: English
Publisher: Little, Brown and Company
Pages: 336

Current Element:book
Book Title: Remembering Babylon
Author: David Malouf
Language: English
Publisher: Chatto and Windus
Pages: 213

Current Element:book
Book Title: March
Author: Geraldine Brooks
Language: English
Publisher: Viking
Pages: 280

Current Element:book
Book Title: Patrick White: A Life
Author: David Marr
Language: English
Publisher: Random House
Pages: 736

Current Element:book
Book Title: The Yield
Author: Tara June Winch
Language: English
Publisher: Hamish Hamilton
```

```
Current Element:book
Book Title: The Yield
Author: Tara June Winch
Language: English
Publisher: Hamish Hamilton
Pages: 352

Current Element:book
Book Title: The Secret River
Author: Kate Grenville
Language: English
Publisher: Canongate Books
Pages: 334

Current Element:book
Book Title: Picnic at Hanging Rock
Author: Joan Lindsay
Language: English
Publisher: Oshshire Publishing
Pages: 212

[Done] exited with code=0 in 1.209 seconds
```

❖ Takeaways

- XML documents can be parsed in Java using various parsers like DOM or SAX.
- DOM parser provides a tree-like structure of the XML document in memory.
- The DOM parser allows traversal and manipulation of XML elements and attributes.
- Accessing specific elements and attributes in DOM involves using methods like `getElementsByTagName()` and `getAttribute()`.
- Java's built-in XML parsing capabilities make it easy to work with XML data in Java applications.

OVERALL REFLECTION

Course Impact:

The entire set of lessons, from Introduction to XML to Parsing XML Documents with Java, has had a significant influence on my understanding of XML technological advances and their practical applications. Starting with an introduction to XML fundamentals such as CDATA sections, special characters, and element attributes created a firm foundation, which was reinforced by investigating validation procedures utilizing Document Type Definition (DTD) and XML Schema Definition (XSD). These classes not only explained the complexities of XML document structure and validation but also provided me with the abilities required to properly parse XML documents using Java. Understanding parsing techniques like DOM parsing provides useful insights into reading and manipulating XML data in Java applications.

Overall, this course has broadened my knowledge and perspective in the domain of XML, empowering me to work confidently with XML documents and implement robust XML solutions.

Recommendations:

To enhance the course further, incorporating more interactive exercises and real-world examples would facilitate a deeper understanding of XML concepts and their practical implications. Additionally, expanding the coverage to include advanced topics such as XML namespaces, XPath expressions, and more complex validation scenarios would provide learners with a more comprehensive skill set. Integrating alternative parsing methods like SAX parsing alongside DOM parsing would offer learners a well-rounded understanding of XML parsing techniques in Java. Furthermore, providing guidance on optimizing XML parsing performance and handling large XML files could prepare learners for tackling real-world XML-related challenges more effectively.