SWT32051-Partical for Servise oriented web application

Day(2025.09.15)

LabSheet Url : https://drive.google.com/drive/folders/11Vz9K6chlePcFU2_mTcVuQng9cAHBz1t

🔷 Understanding XML Parser

An **XML Parser** is a software component that reads XML documents and provides access to their content and structure.

Types of XML Parsers:

1. **DOM (Document Object Model) Parser**
   - Loads the entire XML document into memory as a tree structure.
   - Allows for traversal and modification.
   - Suitable for small to medium XML documents.
2. **SAX (Simple API for XML)**
   - Event-driven.
   - Parses XML document sequentially and triggers events (e.g., startElement, endElement).
   - Faster and more memory-efficient.
   - Read-only and forward-only.
3. **StAX (Streaming API for XML)**
   - Pull-based parser.
   - You write code to pull events when needed.
   - Combines flexibility of DOM and efficiency of SAX.

🔷 Getting Knowledge of XML DOM (Document Object Model)

The **XML DOM** is a programming interface for XML documents. It represents the document as a **tree structure**, where each element is an object.

DOM Tree Structure:

```
<book>
  <title>XML Guide</title>
  <author>John Smith</author>
</book>
```

Tree:

```
Document
 └── <book>
       ├── <title>XML Guide</title>
       └── <author>John Smith</author>
```

Core Concepts:

- **Document** – Root of the tree
- **Element** – Tags like `<book>`, `<title>`
- **Text** – Content inside elements
- **Attributes** – e.g., `<book id="101">`

🔷 Syntax, Rules, and Structure of XML DOM

XML Syntax Rules:

1. XML must have a single **root element**.
2. Tags must be properly **nested** and **closed**.
3. XML is **case-sensitive**.
4. Attribute values must be **quoted**.
5. Special characters like `<`, `>`, `&` must be escaped.

XML DOM Structure:

- **Elements**: Nodes that can contain attributes, other elements, or text.
- **Attributes**: Metadata inside tags.
- **Text Nodes**: Actual data between the tags.
- **Comments**: `<!-- This is a comment -->`

🔷 Implementation of XML DOM (Example in Python)

Using **Python** and `xml.dom.minidom`:

Example XML (`books.xml`):

```
<library>
  <book>
    <title>XML Basics</title>
    <author>Jane Doe</author>
  </book>
</library>
```

Python Code to Parse:

```
from xml.dom.minidom import parse

# Load and parse the XML file
dom = parse("books.xml")

# Get root element
library = dom.documentElement

# Get all book elements
books = library.getElementsByTagName("book")

for book in books:
    title = book.getElementsByTagName("title")[0].firstChild.nodeValue
    author = book.getElementsByTagName("author")[0].firstChild.nodeValue
    print(f"Title: {title}, Author: {author}")
```

Output:

```
Title: XML Basics, Author: Jane Doe
```

✓ Summary

Concept	Description
XML Parser	Software to read and process XML
DOM Parser	Loads full XML as a tree structure
XML DOM	API to navigate and manipulate XML
Syntax Rules	Case-sensitive, well-formed, nested tags
Implementation	Available in languages like Python, Java, JavaScript, etc.

XML Parser

- The XML DOM (Document Object Model) defines the properties and methods for
- accessing and editing XML.
- However, to do the tasks, the XML file must be loaded to the XML DOM object.
- XML Parser is used to load the respective XML file to the XML DOM object.
- All major browsers have a built-in XML parser.

◈ Code:

```
<html>
<body>
<p id = "txtNotice"></p>
<script>
var text, parser, xmlDoc;
```

```
text = "<bookstore><book>" +
"<title>Everyday Italian</title>" +
"<author>Giada De Laurentiis</author>" +
"<year>2005</year>" +
"</book></bookstore>";
parser = new DOMParser();
xmlDoc = parser.parseFromString(text, "text/xml");
</script>
</body>
</html>
```

✅ Explanation (line by line):

`<html> <body>`

- This starts the HTML document and the body section where content appears.

`<p id = "txtNotice"></p>`

- This is an empty paragraph (`<p>`) with an ID.
- You can use JavaScript to show text inside this later using the ID `txtNotice`.

`<script>`

- This starts the JavaScript block. The code inside runs when the page loads.

`var text, parser, xmlDoc;`

- This line declares **three variables**:
    - `text`: to hold the XML data as a string.
    - `parser`: to hold the XML parser object.
    - `xmlDoc`: to hold the parsed XML document (as a DOM object).

`text = "<bookstore><book>" + ... + "</book></bookstore>";`

- This creates a **string** that looks like an XML file.
- It describes a `bookstore` with one `book`.

- The book has a:
    - `<title>`: Everyday Italian
    - `<author>`: Giada De Laurentiis
    - `<year>`: 2005

`parser = new DOMParser();`

- This creates a **new XML parser** object using JavaScript's built-in `DOMParser` class.
- This object can read (parse) XML strings.

`xmlDoc = parser.parseFromString(text, "text/xml");`

- This line **parses** the XML string stored in `text`.
- It converts the text into an **XML DOM object**.
- `"text/xml"` tells the parser that the input is XML format.
- The result is saved in `xmlDoc`.

`</script> </body> </html>`

- Closes the script, body, and HTML tags.

🧠 What does this code do?

- It creates XML data inside JavaScript (in a string).
- Then it uses `DOMParser` to convert the string into a real XML DOM object.
- Now, you can **read or access the XML data** using JavaScript (e.g., get the title or author).

✅ This code **only loads the XML into memory** — it doesn't display anything on the page yet. If you want to display the title or other info, you'd need to add extra code using `innerHTML` or similar.

XML DOM (Document Object Model)

- DOM stands for Document Object Model.
- The XML DOM defines a standard way for accessing and manipulating XML
- documents.
- It presents an XML document as a tree-structure.
- Saying conveniently, XML DOM is a standard for how to get, change, add or delete
- XML elements.
- The XML DOM views an XML document as a tree-structure. The tree structure is called
- a node-tree.
- The tree content can be modified or deleted, and new elements can be created.
- All XML elements can be accessed through the XML DOM.
- XML DOM is a standard programming interface for XML.
- XML DOM is a platform and language independent.

Summary

- **DOM** stands for **Document Object Model**.
- It provides a **standard way to access and manipulate** XML documents.
- XML is represented as a **tree structure** called a **node-tree**.
- You can **get, change, add, or delete** XML elements using the DOM.
- Every part of the XML document (elements, attributes, text) is a **node** in the tree.
- The DOM allows **modifying, deleting, or creating** elements.
- It is a **standard programming interface** for working with XML.
- XML DOM is **platform and language independent**, meaning it can be used in any programming environment.

1. Get the value of an XML elements

The following code retrieves the text value of the first <title> element in an XML element.

```
xmlDoc.getElementsByTagName("title")[0].childNodes[0].nodeValue;
```

2. Loading an XML String

The following program loads a text string into an XML DOM object and extracts the info

from it with JavaScript programming.

```
<html>

        <body>

        <p id = "txtNotice"></p>

                <script>
        var text, parser, xmlDoc;

        text = "<bookstore><book>" +

            "<title>Everyday Italian</title>" +

            "<author>Giada De Laurentiis</author>" +

            "<year>2005</year>" +

            "</book></bookstore>";

            parser = new DOMParser();

            xmlDoc = parser.parseFromString(text, "text/xml");

            document.getElementById("txtNotice").innerHTML =

            xmlDoc.getElementsByTagName("title")[0].childNodes[0].nodeValue;

        </script>

    </body>

    </html>
```

Exercise - 01

Use the above code and insert another book element to the XML file (In the text variable). Display all two book details in a html table. The Structure is given below.

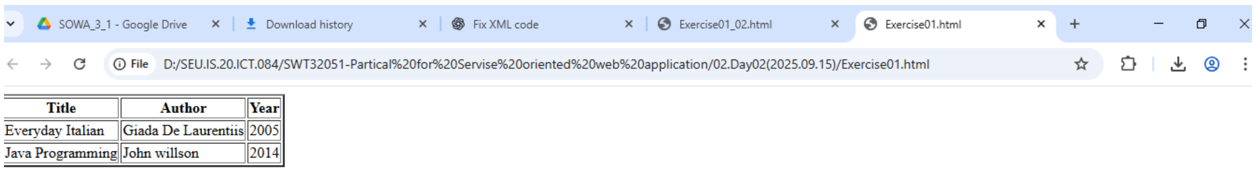
Title	Author	Year
Everyday Italian	Giada De Laurentiis	2005
Java Programming	John Willson	2014

Code

01.

```
 <html>
    <body>
        <div>
            <table border="2">
                <tr>
                    <th>Title</th>
                    <th>Author</th>
                    <th>Year</th>
                </tr>
                <tr>
                    <td id = "book_title1"></td>
                    <td id = "book_author1"></td>
                    <td id = "book_year1"></td>
               </tr>
               <tr>
                    <td id = "book_title2"></td>
                    <td id = "book_author2"></td>
                    <td id = "book_year2"></td>
               </tr>
          </table>
</div>

<script>
          var text, parser, xmlDoc;

          text = "<bookstore>"+
                                   "<book>" +
                                             "<title>Everyday Italian</title>" +
                                             "<author>Giada De Laurentiis</author>" +
                                             "<year>2005</year>" +
                                   "</book>"+
                                   "<book>" +
                                             "<title>Java Programming</title>" +
                                             "<author>John willson</author>" +
                                             "<year>2014</year>" +
                                   "</book>"+
                         "</bookstore>";

          parser = new DOMParser();
          xmlDoc = parser.parseFromString(text, "text/xml");

          document.getElementById("book_title1").innerHTML =
          xmlDoc.getElementsByTagName("title")[0].childNodes[0].nodeValue;

          document.getElementById("book_author1").innerHTML =
          xmlDoc.getElementsByTagName("author")[0].childNodes[0].nodeValue;

          document.getElementById("book_year1").innerHTML =
          xmlDoc.getElementsByTagName("year")[0].childNodes[0].nodeValue;

          document.getElementById("book_title2").innerHTML =
          xmlDoc.getElementsByTagName("title")[1].childNodes[0].nodeValue;

          document.getElementById("book_author2").innerHTML =
          xmlDoc.getElementsByTagName("author")[1].childNodes[0].nodeValue;
```

```
                        document.getElementById("book_year2").innerHTML =
                        xmlDoc.getElementsByTagName("year")[1].childNodes[0].nodeValue;

                </script>

        </body>
 </html>
```



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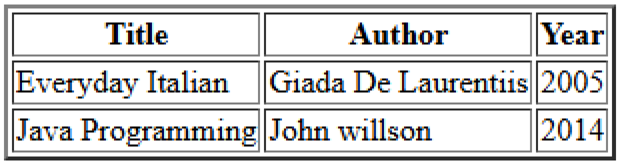
Title	Author	Year
Everyday Italian	Giada De Laurentiis	2005
Java Programming	John willson	2014

02.

```
<html>
  <body>
    <div>
      <table border="2" id="book_table">
        <tr>
          <th>Title</th>
          <th>Author</th>
          <th>Year</th>
        </tr>
        <!-- Rows will be added here -->
      </table>
    </div>

    <script>
      var text, parser, xmlDoc;

      text = "<bookstore>"+
                                    "<book>" +
                                            "<title>Everyday Italian</title>" +
                                            "<author>Giada De Laurentiis</author>" +
                                            "<year>2005</year>" +
                                    "</book>"+
                                    "<book>" +
                                            "<title>Java Programming</title>" +
                                           "<author>John willson</author>" +
                                           "<year>2014</year>" +
                                    "</book>"+
                     "</bookstore>";

   parser = new DOMParser();
   xmlDoc = parser.parseFromString(text, "text/xml");

   var books = xmlDoc.getElementsByTagName("book");
   var table = document.getElementById("book_table");

   for (var i = 0; i < books.length; i++) {
    var title = books[i].getElementsByTagName("title")[0].textContent;
    var author = books[i].getElementsByTagName("author")[0].textContent;
    var year = books[i].getElementsByTagName("year")[0].textContent;

    var row = table.insertRow(-1);

    var cell1 = row.insertCell(0);
    var cell2 = row.insertCell(1);
    var cell3 = row.insertCell(2);

    cell1.innerHTML = title;
    cell2.innerHTML = author;
    cell3.innerHTML = year;
   }
  </script>
 </body>
</html>
```



Title	Author	Year
Everyday Italian	Giada De Laurentiis	2005
Java Programming	John willson	2014

03.

increase each price by 10% and **display all book details** (title, author, year, category, updated price), you just need to:

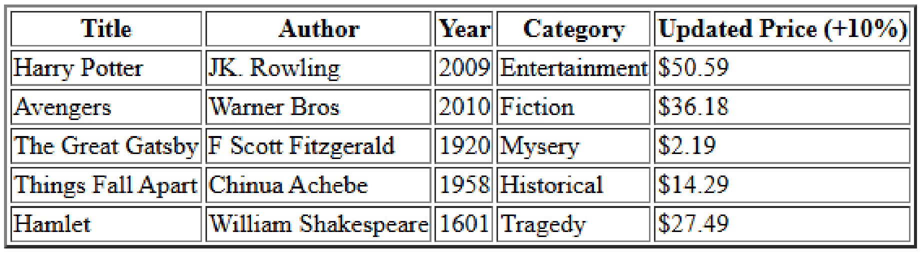
✓ Steps:

1. Parse the XML.
2. Loop through each `<book>`.
3. Extract all needed fields (`category`, `title`, `author`, `year`, `price`).
4. Increase the price by 10%.
5. Format the result in a table row.

Code:

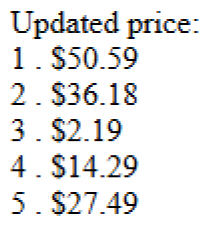
```
<html>
        <body>
                <table border="2">
                        <tr>
                                <th>Title</th>
                                <th>Author</th>
                                <th>Year</th>
                                <th>Category</th>
                                <th>Updated Price (+10%)</th>
                        </tr>
                        <tbody id="update_price"></tbody>
                </table>

                <script>
                        var text, parser, xmlDoc;
                        text = "<bookstore> "+
                                                "<book category='Entertainment'> "+
                                                        "<title lang='En'>Harry Potter</title> "+
                                                        "<Author>JK. Rowling</Author> "+
                                                        "<Year>2009</Year> "+
                                                        "<Price>$45.99</Price>"+
                                                "</book> "+
                                                "<book category='Fiction'> "+
                                                        "<title lang='En'>Avengers</title> "+
                                                        "<Author>Warner Bros</Author> "+
                                                        "<Year>2010</Year> "+
                                                        "<Price>$32.89</Price> "+
                                                "</book>"+
                                                "<book category='Mysery'> "+
                                                        "<title lang='Sp'>The Great Gatsby</title> "+
                                                        "<Author>F Scott Fitzgerald</Author> "+
                                                        "<Year>1920</Year> "+
                                                        "<Price>$1.99</Price> "+
                                                "</book> "+
                                                "<book category='Historical'> "+
                                        "<title lang='Fr'>Things Fall Apart</title> "+
                                        "<Author>Chinua Achebe</Author>"+
                                        "<Year>1958</Year> "+
                                        "<Price>$12.99</Price> "+
                                "</book> "+
                                "<book category='Tragedy'>"+
                                        "<title lang='Es'>Hamlet</title>"+
                                        "<Author>William Shakespeare</Author> "+
                                        "<Year>1601</Year> "+
                                        "<Price>$24.99</Price>"+
                                "</book> "+
                        "</bookstore>";

                parser = new DOMParser();
                xmlDoc = parser.parseFromString(text, "text/xml");

                var books = xmlDoc.getElementsByTagName("book");
                var tableBody = document.getElementById("update_price");
                var rows = "";

                for (var i = 0; i < books.length; i++) {
                        var title =
books[i].getElementsByTagName("title")[0].childNodes[0].nodeValue;
                        var author =
books[i].getElementsByTagName("Author")[0].childNodes[0].nodeValue;
                        var year =
books[i].getElementsByTagName("Year")[0].childNodes[0].nodeValue;
                        var category = books[i].getAttribute("category");
                        var priceStr =
books[i].getElementsByTagName("Price")[0].childNodes[0].nodeValue;

                        // Remove $ sign and convert to number
                        var price = parseFloat(priceStr.replace('$', ''));
                        var updatedPrice = (price * 1.10).toFixed(2); // +10%

                        rows += "<tr>" +
                                        "<td>" + title + "</td>" +
                                        "<td>" + author + "</td>" +
                                        "<td>" + year + "</td>" +
                                        "<td>" + category + "</td>" +
                                        "<td>$" + updatedPrice + "</td>" +
                                "</tr>";
                }
```

```
                        tableBody.innerHTML = rows;
                </script>
        </body>
</html>
```



Title	Author	Year	Category	Updated Price (+10%)
Harry Potter	JK. Rowling	2009	Entertainment	$50.59
Avengers	Warner Bros	2010	Fiction	$36.18
The Great Gatsby	F Scott Fitzgerald	1920	Mysery	$2.19
Things Fall Apart	Chinua Achebe	1958	Historical	$14.29
Hamlet	William Shakespeare	1601	Tragedy	$27.49

```
<html>
        <body>
                <div id="content"></div>
                <script>
                        var text, parser, xmlDoc;
                  text ="<bookstore> "+
                                                                "<book category='Entertainment'> "+
                                                                        "<title lang='En'>Harry Potter</title> "+
                                                                        "<Author>JK. Rowling</Author> "+
                                                                        "<Year>2009</Year> "+
                                                                        "<Price>$45.99</Price>"+
                                                                "</book> "+

                                                                "<book category='Fiction'> "+
                                                                        "<title lang='En'>Avengers</title> "+
                                                                        "<Author>Warner Bros</Author> "+
                                                                        "<Year>2010</Year> "+
                                                                        "<Price>$32.89</Price> "+
                                                                "</book>"+

                                                                "<book category='Mysery'> "+
                                                                         "<title lang='Sp'>The Great Gatsby</title> "+
                                                                         "<Author>F Scott Fitzgerald</Author> "+
                                                                         "<Year>1920</Year> "+
                                                                         "<Price>$1.99</Price> "+
                                                                "</book> "+
                                        "<book category='Historical'> "+
                                                "<title lang='Fr'>Things Fall Apart</title> "+
                                                "<Author>Chinua Achebe</Author>"+
                                                "<Year>1958</Year> "+
                                                "<Price>$12.99</Price> "+
                                        "</book> "+

                                        "<book category='Tragedy'>"+
                                                "<title lang='Es'>Hamlet</title>"+
                                                "<Author>William Shakespeare</Author> "+
                                                "<Year>1601</Year> "+
                                                "<Price>$24.99</Price>"+
                                        "</book> "+
                                "</bookstore>";

                        parser = new DOMParser();
                        xmlDoc = parser.parseFromString(text, "text/xml");

                        var x = xmlDoc.getElementsByTagName("book");

                        for (let i = 0; i < x.length; i++){
                                // Fix: Use getElementsByTagName to access Price tag
                                let priceTag = x[i].getElementsByTagName("Price")[0];
                                let oldPrice = parseFloat(priceTag.textContent.replace("$",""));
                                let newPrice = (oldPrice * 1.10).toFixed(2); // Fix: remove extra closing
parenthesis
                                priceTag.textContent = "$" + newPrice;
                        }

                        let result = "Updated price:\n";
                        for(let j = 0; j < x.length; j++){
                                let priceTag = x[j].getElementsByTagName("Price")[0];
                                result += (j + 1) + " . " + priceTag.textContent + "\n";
                        }

                        // Fix: Corrected getElementById (was getElementsById)
                        document.getElementById("content").innerText = result;
                </script>
        </body>
</html>
```



```
Updated price:
1 . $50.59
2 . $36.18
3 . $2.19
4 . $14.29
5 . $27.49
```

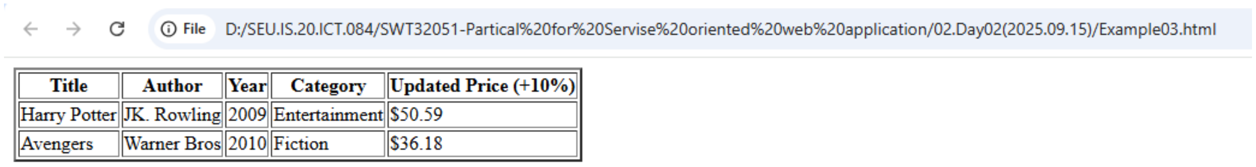
04.display all book data in the table **but exclude any books published before the year 2000**. That's a simple filter — we just need to **skip books with `Year < 2000`** during the loop.

Here's the **modified version** of your code with that change added (and nothing else changed unless necessary):

Code:

```
<html>
    <body>
        <table border="2">
            <tr>
                <th>Title</th>
                <th>Author</th>
                <th>Year</th>
                <th>Category</th>
                <th>Updated Price (+10%)</th>
            </tr>
            <tbody id="update_price"></tbody>
        </table>

        <script>
            var text, parser, xmlDoc;
            text = "<bookstore> "+
                        "<book category='Entertainment'> "+
                            "<title lang='En'>Harry Potter</title> "+
                            "<Author>JK. Rowling</Author> "+
                            "<Year>2009</Year> "+
                            "<Price>$45.99</Price>"+
                        "</book> "+
                        "<book category='Fiction'> "+
                            "<title lang='En'>Avengers</title> "+
                            "<Author>Warner Bros</Author> "+
                            "<Year>2010</Year> "+
                                                            "<Price>$32.89</Price> "+
                                                    "</book>"+
                                                    "<book category='Mysery'> "+
                                                            "<title lang='Sp'>The Great Gatsby</title> "+
                                                            "<Author>F Scott Fitzgerald</Author> "+
                                                            "<Year>1920</Year> "+
                                                            "<Price>$1.99</Price> "+
                                                    "</book> "+
                                                    "<book category='Historical'> "+
                                                            "<title lang='Fr'>Things Fall Apart</title> "+
                                                            "<Author>Chinua Achebe</Author>"+
                                                            "<Year>1958</Year> "+
                                                            "<Price>$12.99</Price> "+
                                                    "</book> "+
                                                    "<book category='Tragedy'>"+
                                                            "<title lang='Es'>Hamlet</title>"+
                                                            "<Author>William Shakespeare</Author> "+
                                                            "<Year>1601</Year> "+
                                                            "<Price>$24.99</Price>"+
                                                    "</book> "+
                                            "</bookstore>";

                            parser = new DOMParser();
                            xmlDoc = parser.parseFromString(text, "text/xml");

                            var books = xmlDoc.getElementsByTagName("book");
                            var tableBody = document.getElementById("update_price");
                            var rows = "";

                            for (var i = 0; i < books.length; i++) {
                                    var year =
parseInt(books[i].getElementsByTagName("Year")[0].childNodes[0].nodeValue);


                                    if (year < 2000) {
                                            continue;
                                    }

                                    var title =
books[i].getElementsByTagName("title")[0].childNodes[0].nodeValue;
                                    var author =
books[i].getElementsByTagName("Author")[0].childNodes[0].nodeValue;
                                    var category = books[i].getAttribute("category");
```

```
                        var priceStr =
books[i].getElementsByTagName("Price")[0].childNodes[0].nodeValue;

                        var price = parseFloat(priceStr.replace('$', ''));
                        var updatedPrice = (price * 1.10).toFixed(2);
                        rows += "<tr>" +
                                    "<td>" + title + "</td>" +
                                    "<td>" + author + "</td>" +
                                    "<td>" + year + "</td>" +
                                    "<td>" + category + "</td>" +
                                    "<td>$" + updatedPrice + "</td>" +
                                "</tr>";
                    }

                    tableBody.innerHTML = rows;
                </script>
        </body>
</html>
```



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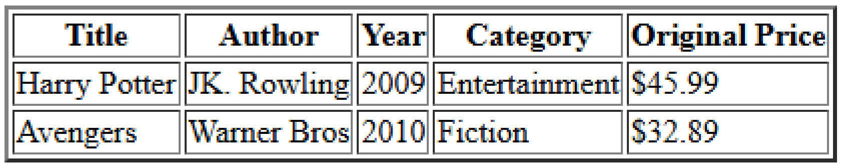
Title	Author	Year	Category	Updated Price (+10%)
Harry Potter	JK. Rowling	2009	Entertainment	$50.59
Avengers	Warner Bros	2010	Fiction	$36.18

ii.

```
<html>
        <body>
                <table border="2">
                        <tr>
                                <th>Title</th>
                                <th>Author</th>
                                <th>Year</th>
                                <th>Category</th>
                                <th>Original Price</th>
                        </tr>
                        <tbody id="update_price"></tbody>
                </table>

                <script>
                        var text, parser, xmlDoc;
                        text = "<bookstore> "+
                                    "<book category='Entertainment'> "+
                                                "<title lang='En'>Harry Potter</title> "+
                                                "<Author>JK. Rowling</Author> "+
                                                "<Year>2009</Year> "+
                                                "<Price>$45.99</Price>"+
                                        "</book> "+
                                        "<book category='Fiction'> "+
                                                "<title lang='En'>Avengers</title> "+
                                                "<Author>Warner Bros</Author> "+
                                                "<Year>2010</Year> "+
                                                "<Price>$32.89</Price> "+
                                        "</book>"+
                                        "<book category='Mysery'> "+
                                                "<title lang='Sp'>The Great Gatsby</title> "+
                                                "<Author>F Scott Fitzgerald</Author> "+
                                                "<Year>1920</Year> "+
                                                "<Price>$1.99</Price> "+
                                        "</book> "+
                                        "<book category='Historical'> "+
                                                "<title lang='Fr'>Things Fall Apart</title> "+
                                                "<Author>Chinua Achebe</Author>"+
                                                "<Year>1958</Year> "+
                                                "<Price>$12.99</Price> "+
                                        "</book> "+
                                        "<book category='Tragedy'>"+
                                                "<title lang='Es'>Hamlet</title>"+
                                                "<Author>William Shakespeare</Author> "+
                                                "<Year>1601</Year> "+
                                                "<Price>$24.99</Price>"+
                                        "</book> "+
                                "</bookstore>";

                parser = new DOMParser();
                xmlDoc = parser.parseFromString(text, "text/xml");

                var books = xmlDoc.getElementsByTagName("book");
                var tableBody = document.getElementById("update_price");
                var rows = "";

                for (var i = 0; i < books.length; i++) {
                        var year =
parseInt(books[i].getElementsByTagName("Year")[0].childNodes[0].nodeValue);
                        if (year < 2000) {
                                continue;
                        }
                var title =
books[i].getElementsByTagName("title")[0].childNodes[0].nodeValue;
                var author =
books[i].getElementsByTagName("Author")[0].childNodes[0].nodeValue;
                var category = books[i].getAttribute("category");
                var priceStr =
books[i].getElementsByTagName("Price")[0].childNodes[0].nodeValue;

                rows += "<tr>" +
                            "<td>" + title + "</td>" +
                            "<td>" + author + "</td>" +
                            "<td>" + year + "</td>" +
                            "<td>" + category + "</td>" +
                            "<td>" + priceStr + "</td>" +
                        "</tr>";
            }

            tableBody.innerHTML = rows;
        </script>
    </body>
</html>
```



Title	Author	Year	Category	Original Price
Harry Potter	JK. Rowling	2009	Entertainment	$45.99
Avengers	Warner Bros	2010	Fiction	$32.89