

Web Basics - XML

Lesson 1: Introduction to XML

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Lesson Objectives

➤ **In this lesson, you will learn about:**

- Evolution of XML
- Role of XML in Web Applications
- Different members of XML family
- Introduction to Namespace



1.1: Introduction to SGML and HTML

The Basics of Markup Language

➤ What do we mean by “Markup Language”?

- The term “markup” is used to identify anything put within a document which either adds or provides special meaning (for example, italicized text)
- A markup language is the set of rules
- It also provides a description of document layout and logical structure

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The Basics of Markup Language:

There exist three types of markup:

- Stylistic: It determines how a document is presented (for example, the HTML tags <I> for italics, for bold, and <U> for underline).
- Structural: It determines how the document is to be structured (for example, the HTML tags <P> for paragraph, for creating ad hoc styles in a document, and <DIV> for grouping structures that are aligned in the same way.
- Semantic: It tells about the content of the data (for example, the HTML tags <TITLE> for page title, <HEAD> for page header information, and <SCRIPT> to indicate a JavaScript in a page.)

In XML, the only type of markup that we are concerned with is structural.

SGML

➤ SGML stands for Standard Generalized Markup Language

- SGML was conceptualized in 1974 and adopted as international standard in 1986
- SGML was born out of the basic need to make the data storage-independent
- SGML also does not have any specific document structure, and usage of tag set is not limited
- It does not constrain the potential of creating new document standards

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SGML:

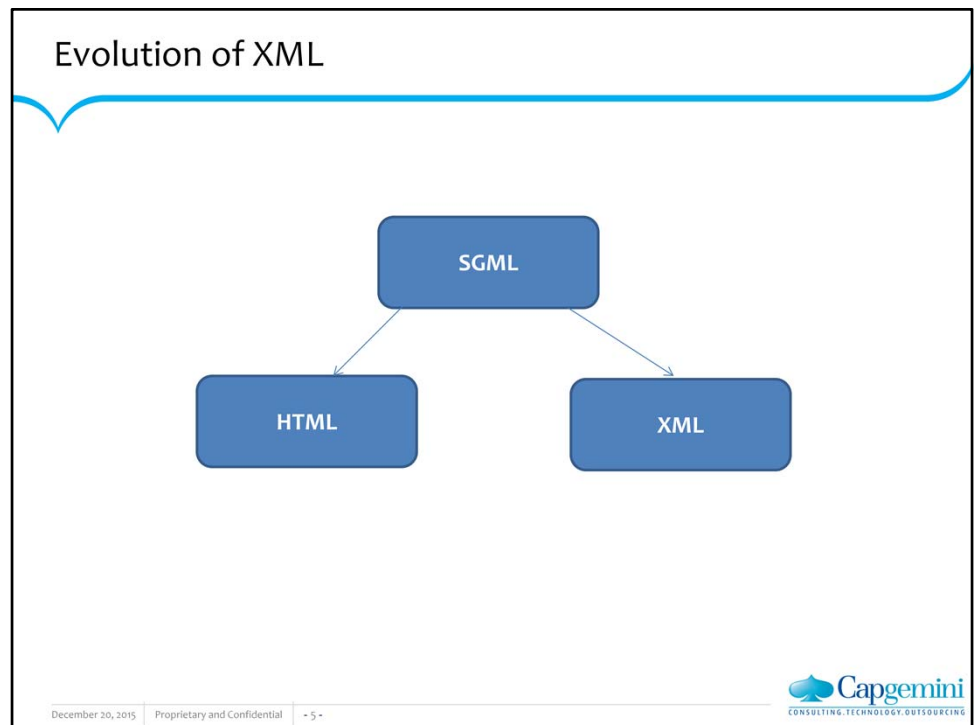
The **Standard Generalized Markup Language (SGML)**, from which XML is derived, has been around in various forms for quite some time now.

SGML may be best described by *what it is not*, as follows:

- SGML does not promote a specific document structure.
- There is not a limited tag set that must be used.
- SGML will not constrain the potential of creating new document standards.

SGML provides the common framework necessary to describe documents and to create new measures of conformance.

- Almost all languages that have been created to manipulate documents can trace at least a portion of their roots back to SGML.
- SGML itself is used by many large organizations, such as the United States Department of Defense, to handle complex electronic document exchanges. Avoiding the presentation features common to other document formats like PDF or even MS Word, SGML concentrates on the structure of the information.
- It does not promote one specific structure. However, it allows for the customized containment of data.



Why Not Go Back To SGML?

- SGML is an incredibly rich meta language
- SGML is completely configurable
 - For example:
 - You can change the symbols for tagging from angle brackets (<tag>) to curly braces ({tag})
 - You can change the tag name lengths from 8 characters to 88 characters
- There is no style mechanism in SGML
- It is generic, just for generating customized language



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Why Not Go Back to SGML?

If HTML is limiting and SGML provides a means of describing document structures, why not simply go back to SGML?

SGML is a language for creating languages. With SGML, you can create tag sets.

Example 1: The Air Transport Association used SGML to create a tag set for aircraft maintenance documentation.

Example 2: The Society of Automotive Engineers used SGML to create a tag set for automotive service manuals.

SGML is an incredibly rich Meta language. It is completely configurable.

Example 1: You can change the symbols for tagging from angle brackets (<tag>) to curly braces ({tag}).

Example 2: You can change the tag name lengths from 8 characters to 88

characters. All this flexibility takes up computing power on the part of tools that interact with SGML. However, for the web, you need **lightweight tools** and processes. As a subset of SGML, in many ways XML serves as a lightweight, web-compatible version of SGML.

Also SGML has some more limitations

- No mainstream browser support
- No support for styles
- Not much support for datatype
- Security limitations

HTML (Hypertext Markup Language)

- HTML which is an application of SGML, contains predefined set of tags and it is based on SGML manual
- HTML is a markup languages for web pages
- Similar to SGML
 - most tags describe meaning, not formatting
 - uses angled bracket convention (<tag></tag>)
 - based on a simple, widely compatible text format
- Different from SGML
 - HTML incorporates only one (standard document representation)

HTML:

The **Hyper Text Markup Language (HTML)**, which is an Application from SGML, contains predefined set of tags. HTML is designed for web publishing intended to describe structure of text.

However, HTML is **inflexible** in that it cannot allow domain-specific tag sets to be created and used without formally introducing them into the HTML DTDs.

Limitations of HTML

Browser specific commands for e.g Netscape-specific tags (e.g., <blink>), Microsoft IE tags (e.g., <marquee>)

Limited no of tags.

Some formatting commands not separating content and presentation e.g CENTER

HTML authors code to the browser's standards, not the W3C standards, therefore

Pages look different in different browsers & HTML validation is difficult

HTML talks of how and not what

Introduction of CSS to separate the look of the document to some extent

Introduction of XHTML to ensure standardization

Introduction to XML

- What is needed a light-weight form of SGML which can provide well defined syntax for representing and processing document content over the web
- The answer is:
 - XML, the eXtensible Markup Language, is described as a means of structuring data
 - XML provides rules for placing text and other media into structures and allows you to manage and manipulate the results
 - XML standard is a subset of the SGML, developed in 1996 by the SGML working group

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Introduction to SGML and HTML:

XML, the eXtensible Markup Language, is best described as a means of structuring data.

XML provides rules for placing text and other media into structures and allows you to manage and manipulate the results.

The XML standard is a subset of the **Standard Generalized Markup Language (SGML)**, and was developed in 1996 by the **SGML Editorial Review Board** under the auspices of **World Wide Web Consortium (W3C)**.

XML is designed for that express purpose. XML provides a mechanism for the interchange of structured information on the web. This sort of data is required to transform the web from a publishing media to an application processing environment

XML Design Goals

- **The usage of XML was aimed at:-**
 - Should be usable over the Internet
 - Should support a wide variety of applications
 - Should be compatible with SGML and XML documents should be easy to create
- **Also XML can be used for**
 - Data Exchange
 - Store and Retrieve Data

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XML Design Goals:

The design goals for XML were proposed by the World Wide Web Consortium (W3C), and published in January 1998.

The focus of XML is:

To carry the power of SGML through its ability to create user defined information about data, its ability to adapt to specific user needs, and the ability to maintain document changes.

To carry HTML's ease of use by the ability to link, its simplicity in the use of user defined tags, and its portability among different platforms.

Some more design goals are as follows:

It shall be easy to write programs which process XML documents.

The number of optional features in XML should be kept to the absolute minimum, ideally zero.

XML documents should be human-legible and reasonably clear.

The XML design should be prepared quickly.

The design of XML shall be formal and concise.

XML Today

- **The primary functional purpose of XML is to transfer structured text and data among systems in multiple organizations**
- **XML, unlike HTML, does not have a fixed format**
 - There are no pre-defined tags; you create your own
- **Like HTML, XML uses tags. Tags are always enclosed within angled-brackets (< >)**
 - XML tags define the meta information and are distributed throughout the document
- **XML 1.0 is the most widely used version**

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About XML:

XML versus HTML:

Both are based on SGML – the International Standard for structured information.

In HTML:

In XML:

<p>P200 Laptop </p>

Friendly Computer Shop

<model>P200

Laptop</model>

\$1438

<dealer>Friendly Computer Shop</dealer>

<price>\$1438</price>

</product>

Both XML and HTML may appear the same in your browser.

However, the XML data is smart data. HTML tells how the data should look, but XML tells you what it means.

With XML, your browser knows there is a product, and it knows the model, dealer, and price. From a group of these, it can show you the cheapest product or closest dealer without going back to the server.

Unlike HTML, with XML you create your own tags, so they describe exactly what you need to know. As a result, your client-side applications can access data sources anywhere on the Web, and in any format. New “middle-tier” servers sit between the data sources and the client, translating everything into your own task-specific XML.

XML versus HTML

➤ **<table>**
 <tr>
 <td>Apples</td>
 <td>Bananas</td>
 </tr>
 </table>

<table> tag in HTML
is predefined & used
for creating tabular
display

➤ **<table>**
 <name>African Coffee Table</name>
 <width>80</width>
 <length>120</length>
 </table>

<table> tag in XML
could mean anything
e.g its a coffee table
which is a furniture


1.2: The Role of XML

XML and the Web

➤ **XML deals with what the data is about and how to specify the data structure**

- XML represents data formats on web for the following:
 - Books
 - Financial transactions (EDI)
 - Technical manuals
 - Chemical formulae
 - Medical records
 - Museum catalog records
 - Chess games
 - Encyclopedia entries

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The Role of XML:

XML will be most interesting to people and organizations who have:

- Information resources that do not fit into the HTML mold, and
- Resources that they want to make available over the web

XML was created to structure, store, and transport information. It is just plain text. Software that can handle plain text can also handle XML. However, XML-aware applications can specially handle the XML tags. The functional meaning of the tags depends on the nature of the application.

XML is as important for the web, as HTML was to the foundation of the web.

XML is everywhere. It is the most common tool for data transmissions between all sorts of applications, and is popular in the area of storing and describing information.

Some examples:


- Books
- Financial transactions (EDI)
- Technical manuals
- Chemical formulae
- Medical records
- Museum catalog records
- Chess games
- Encyclopedia entries

1.3: Introducing XML and Its Relatives

A Family of Standards

- **XML is a group of technologies**
- **It consists of the following specifications:**
 - Extensible Style Language (XSL)
 - XML Linking Language (including Xpath, Xlink, and Xpointer)
 - XML Namespaces

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Introducing XML and its Relatives:

XML is a group of technologies.

It consists of the following specifications:

eXtensible Style Language: XSL works with the XML data in a way similar to the manner in which CSS works with HTML.

XML Linking: XML linking and addressing mechanisms are specified in three W3C Working Draft documents:

XML Path Language (Xpath): The primary purpose of Xpath is to do the actual addressing of parts rather than the whole XML document.

XML Linking Language (Xlink): It uses XML syntax to create structures to describe both “simple unidirectional links” of today’s HTML as well as more “sophisticated multidirectional links”. The important part of Xlink is that it defines the relationship between two or more data objects (or portion of objects) as opposed to a whole document.

XML Pointer Language (Xpointer): Xpointer builds on Xpath to support addressing into the internal structures of XML documents. Thus you can use the XML markup to link to specific parts of another document without supplying an ID reference.

XML Namespaces

Extensible Style Language (XSL)

- **Cascading Style Sheets (CSS)** makes it possible for the same HTML content to be easily formatted in multiple ways
- **Extensible Style Language (XSL)** works with XML data in a way similar to that CSS works with HTML
 - The rules created with the style language – the style sheet – should define how the content will be displayed
 - Formatting should not appear in the content itself

XML Namespaces

- XML Namespaces provide a way of assigning unique names to document constructs so that the software can operate correctly and avoid collisions
- XML Namespaces allow context to be given to the element names
 - This allows them to remain unique and thus process able

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XML Namespaces:

XML Namespaces are a way of assigning “unique names” to document constructs so that software can operate correctly and avoid collisions.

Namespaces allow context to be given to element names, which allow them to remain unique and thus processable.

Summary

➤ **In this lesson, you have learnt that:**

- SGML is the Standard Generalized Markup Language
- HTML is the Hypertext Markup Language and XML is the Extensible Markup Language (meta-markup language)
- XML is not a replacement for HTML
- HTML tags do not say anything about the structure of the information
- HTML lacks in link management, is not reusable, is not Object Oriented, and so on
- Looking at the future of electronic commerce, HTML has limitations
- XML is a project of w3c and its implementation is in the developing stage
- XML uses features of SGML but it is easy compare to it
- Markup Language created using XML are called XML vocabularies or XML applications



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Summary:

Why XML?

Many of the most influential companies in the software industry are promoting XML as the next step in the evolution of the web. How can they be so confident about something so new?

We can all safely bet on XML because the central ideas in this new technology are in fact very old and have been proven correct across several decades and thousands of projects.

Database Publishing:

One particularly popular application of XML will surely be the publishing of databases to the web.

Consider for instance a product database, used by the internal ordering system of a toy manufacturer. The manufacturer might want the database to be available on the web so that potential clients know the toys that are available and their price.

Rather than having someone in the web design department to mark up the data again, they can build a connection between their web server and their database using the features typically built into web servers that allows those sorts of data pipes. The designer can then make the product list beautiful using a style sheet. Pictures of the toys can be supplied by the database. In essence, the web site will be merely a view on the data in the database. As toys get added and removed from the database, they will appear and disappear from the view on the website.



Summary:

Database Publishing (contd.):

XML is also expected to become an important tool for interchange of database information. They are the “documents produced by and for computer software”. Databases have typically interchanged information using simple file formats such as one-record per line with semi-colons between the fields. This is not sufficient for the new object-oriented information being produced by databases. Objects must have internal structure and links between them. XML can represent this using elements and attributes to provide a common format for transferring database records between databases.

Today’s web model is a “client/server” model. Queries from the customer go to the server, and resulting responses are shipped back to the customer for viewing in HTML. Unfortunately, a web server can handle only a limited number of connections at one time.

Today, XML has enabled a new breed of web server software, one that allows the web developer to add a new “middle-tier” server to the web model.

Summary:**Database Publishing (contd.):**

In the old web model, the customer using browser such as IE or Netscape on the client interacted directly with data sources on remote servers. The client maintained its connection throughout the interactive session. Each query was sent a response in HTML, which could be directly viewed by the client browser. Maintaining the connection between the client and server was critical.

In the new three-tier web model, the information that fits the profile of the customer is retrieved at once from the remote databases by software on the middle tier, either as XML documents or through an ODBC or similar database connection. From that point, continued interaction with the remote databases is no longer required. The connection to the remote servers can be, and is, terminated.

Once all information that fits the customer profile has been assembled by software on the middle tier, it is sent in XML to the client. Now the requirement for further interaction between the client and the middle tier server is eliminated as well.

Rich XML data, directly usable by client applications and scripting languages like JavaScript, has been delivered to the client. The connection between the client and the middle tier server can now be terminated. At this point, all computing becomes client-based, resulting in a much more efficient use of the web and a much more satisfying customer experience.

Review Question

- **Question 1: Which of the following is/are true about SGML?**
 - Option 1: makes Data storage independent
 - Option 2: usage of tag set is unlimited
 - Option 3: both the above
- **Question 2: ____ allows to apply style to XML**
- **Question 3: XML namespace provides ____**

