Introduction to Markup Languages

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WHAT'S COVERED

In this lesson, you will learn about markup languages and their purpose. Additionally, you will examine examples of different markup languages.

Specifically, this lesson will cover the following:

1. Introduction to Markup Languages

Markup languages are a type of computer language designed to provide additional meaning to or to annotate text as well as provide structure to a document. Markup languages are typically used in web development, document processing, and data presentation. These languages use tags or codes to surround text and provide additional meaning to the content.

IN CONTEXT

If you have ever used multiple colors of ink or highlighter when making notes and applied meaning to those colors for yourself (e.g., yellow highlighter is important, red ink is a definition) then you have already practiced document markup. You are providing additional layers of information along with the written text, in this case, visual cues about the purpose of the written information.

Markup languages were designed to provide separation of the content data from the presentation and format of data. This separation provides flexibility because the same content can be reused with other markup to provide different presentation or formatting styles. Markup languages focus on describing the structure and semantics of the content.

TERM TO KNOW

Markup Languages
A text-encoding system consisting of symbols inserted into a text document to control its structure, formatting, and relationship between the different parts.

2. Types of Markup Languages

The most widely known markup language is HTML, which serves as the primary language of the World Wide Web. However, there are a number of different markup languages built for various purposes. Let's take a look at some other markup languages and how they relate to web development.

2a. Extensible Markup Language (XML)

In a previous lesson, you learned that XML (Extensible Markup Language) is a human and machine-readable language used for marking up and describing simple and complex data structures. XML was introduced in 1998 as a means of **serializing** data structures to be transmitted between different systems, particularly incompatible systems.

EXAMPLE XML is a markup language in that it surrounds data with tags to describe the meaning of the data.

```
<?xml version="1.0" encoding="UTF-8"?>
<library>
    <book>
        <title>To Kill a Mockingbird</title>
        <author>Harper Lee</author>
```

```
        <publisher>J. B. Lippincott & Co.</publisher>
        <genre>Southern Gothic</genre>
    </book>
    <book>
        <title>Raisins in the Sun</title>
        <author>Lorraine Hansberry</author>
        <publisher>Random House</publisher>
        <genre>Domestic Drama</genre>
    </book>
</library>
```

KEY CONCEPT

The tags themselves can be structured in ways that can describe a collection of complex objects in detail. XML cannot perform any operations.

TERM TO KNOW

Serializing
The process of converting data from one format to another for storage or transmission.

2b. JavaScript Object Notation (JSON)

JavaScript Object Notation (JSON) is a markup language with a similar purpose as XML—to serialize data and objects into a human- and machine-readable format for transmission between different systems.

EXAMPLE JSON uses key-value formatting that consists of a key and a value separated by a colon (:).

```
"key": "value"
```

EXAMPLE Additionally, JSON organizes comma-separated lists of key:value pairs using object notation.

```
{
        "fname": "John",
        "lname": "Doe",
        "birthYear": 1987
}
```

Multiple objects or individual key:value pairs can be grouped together as an array.

EXAMPLE Comma separated list of book data:

```
{
    "library":
    [
        {
            "title": "To Kill a Mockingbird",
            "author": "Harper Lee",
            "publisher": "J. B. Lippincott & Co.",
            "genre": "Southern Gothic"
        },
        {
            "title": "Raisins in the Sun",
            "author": "Lorraine Hansberry",
            "publisher": "Random House",
            "genre": "Domestic Drama"
        }
    ]
}
```

JSON was developed in the early 2000s and became a standard in 2013 as ECMA-404. One benefit of JSON over XML is that since JSON is based on the JavaScript language, programming data and instructions can also be transmitted via JSON. For example, programming objects that contain data attributes as well as functional methods that perform operations can all be serialized into JSON and transmitted. The object can then be deserialized back into a programming object and used in the application or website.

HINT

Note that while it is helpful to know how to write your own JSON data, JSON can be used as a method of saving your regular program data. In fact, most of the time you will be using the JSON library object to convert a program's object data into JSON data for persistent storage and then parsing the data back out using the JSON library.

LEARN MORE

This introductory course briefly covers JSON. If you are interested in learning about JSON formatting, check out the **JSON tutorial** located in W3School.com.

Additionally, Tapas Adhikary also wrote a very helpful **introduction to JSON**.

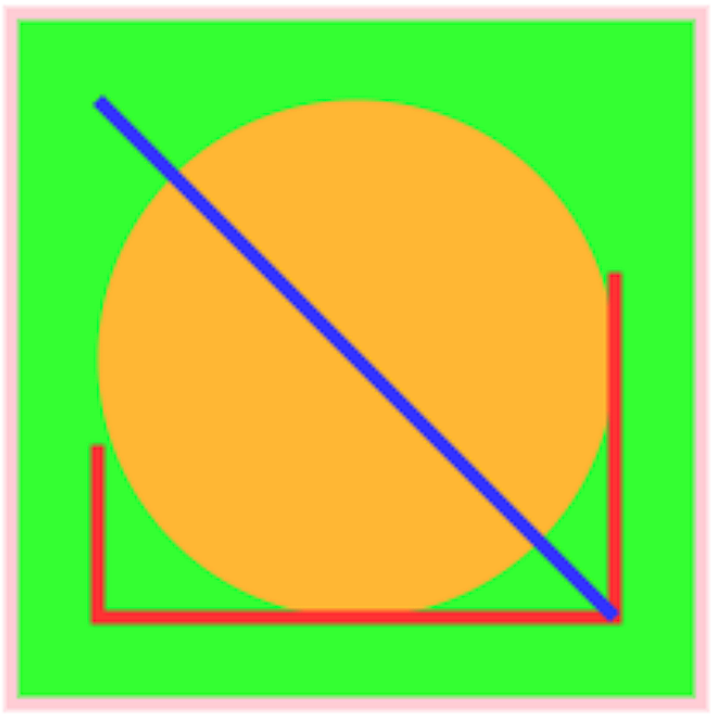
TERM TO KNOW

JavaScript Object Notation (JSON)
An open standard language and file format that uses human-readable text to store and transmit data using the JavaScript syntax for describing objects.

2c. Scalable Vector Graphic (SVG)

Scalable Vector Graphic (SVG) is a different kind of markup language in that its main purpose is to define an image using a coordinate system and special functions for creating different visual elements. Some of the tags used to create different graphical elements include <rect> for rectangles, <circle>, <line>, and <polyline>. By providing these functions with various parameters, such as origin coordinate, radius, stroke thickness, colors, etc. the visual element will be drawn onto the image. SVG is considered a markup language because it is built on XML.

EXAMPLE The following image is produced by the SVG markup code provided below:



```
<?xml version="1.0" encoding="UTF-8" standalone="no"?>
<!DOCTYPE svg PUBLIC "-//W3C//DTD SVG 1.1//EN" "http://www.w3.org/Graphics/SVG/1.1/DTD/svg11.dtd">
```

```
<svg width="391" height="391" viewBox="-70.5 -70.5 391 391" xmlns="http://www.w3.org/2000/svg" xmlns:xlink="http://www.w3.org/1999/xlink">
<rect fill="#fff" stroke="#000" x="-70" y="-70" width="390" height="390"/>
<g opacity="0.8">
       <rect x="25" y="25" width="200" height="200" fill="lime" stroke-width="4" stroke="pink" />
       <circle cx="125" cy="125" r="75" fill="orange" />
       <polyline points="50,150 50,200 200,200 200,100" stroke="red" stroke-width="4" fill="none" />
       <line x1="50" y1="50" x2="200" y2="200" stroke="blue" stroke-width="4" />
</g>
</svg>
```

TERM TO KNOW

Scalable Vector Graphic (SVG)
An XML-based language for defining vector graphics designed for the web.

2d. Markdown

Markdown is a simplified version of HTML used for documentation formatting, online forums, collaboration software, and readme files. While markdown does not include all of the capabilities of HTML, some capabilities such as links, images, lists, headings, and other basic text formatting are available. The primary benefit of markdown is that the source code is more human-readable than HTML, so it is easier for nonprogrammers to use. Markdown is commonly used for the documentation and readme files of a programming project.

EXAMPLE Readme files are often opened using basic text editors, code editors, or IDEs, and a raw markdown file is much more readable than a raw HTML file.

Markdown Sample:

```
# Groceries List
## Don't forget dog food.
1. Produce
        * apples
        * banana
2. Meats
        * pork chops
        * ground beef
```

Renders as:

Groceries List

Don't forget dog food.

1. Produce
    - apples
    - banana
2. Meats
    - pork chops
    - ground beef

WATCH

The following video has more information on getting started with markdown.

TERM TO KNOW

Markdown
A lightweight markup language for creating formatted text using a plain-text editor.

SUMMARY

In this lesson, you were **introduced to markup languages** and how they are used to provide meaning and structure to content. You learned that markup languages were designed to function separately from the content, allowing the content to be reused with other markup. Additionally, we examined several **example markup** languages and saw their code and the results produced.

Source: This Tutorial has been adapted from "The Missing Link: An Introduction to Web Development and Programming " by Michael Mendez. Access for free at https://open.umn.edu/opentextbooks/textbooks/the-missing-link-an-introduction-to-web-development-and-programming. License: Creative Commons attribution: CC BY-NC-SA.

TERMS TO KNOW

JavaScript Object Notation (JSON)
An open standard language and file format that uses human readable text to store and transmit data using the JavaScript syntax for describing objects.

Markdown
A lightweight markup language for creating formatted text using a plain-text editor.

Markup Languages
A text-encoding system consisting of symbols inserted into a text document to control its structure, formatting, and relationship between the different parts.

Scalable Vector Graphic (SVG)
An XML-based language for defining vector graphics designed for the web.

Serializing
The process of converting data from one format to another for storage or transmission.