

IMPLEMENTING ECMA SCRIPT ON SCALABLE VECTOR GRAPHICS TO PERFORM SELECTION SORT ALGORITHM

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ABSTRACT

The Scalable Vector Graphics has emerged a new standard in presenting graphics and animation using the http protocols. By adding some script, we can create animation in a high quality picture. We can then present an SVG document into interactive and dynamic one. It's possible that technologies such as SVG with its implementation will attract in increasing attention and serious consideration of its possible role as a high quality alternative for many Web presentations that are currently dominated by (X)HTML and CSS

Keywords: SVG, ECMA Script, XML, Sorting

1. INTRODUCTION

The use of eXtensible Markup Language (XML) to describe how data is structured is growing in use, it is a topic that so popular in web development. The use of XML in the development of web based information system is growing. Jones (2000) as in Haney (2002) states "The advent of eXtensible Markup Language (XML) has created the potential for dramatic changes in programming languages, although widespread changes haven't happened yet." Srikanth (2002) as in Haney (2002) also says that , "The next generation of browsers are all going to support XML, software multinationals like Microsoft, IBM, and Netscape are backing it and releasing wide range of XML compatible products, so you know that it is going to be 'big!'". XML has caused a revolution in the IT world; XML is being applied in a great many fields and for various purposes: electronic archive, and contents management, web publishing, interchange of electronic documents, internal format tools, software, e-commerce, education, and more fields says Sanchez-Fernandez (2002).

Because XML is extensible, it can be targeted at specific uses. There are standardized XML definitions for financial data, mathematics in the Mathematical Markup Language (MathML), Multimedia (SMIL), Graphics in the Vector Markup Language (VML) or Scalable Vector Graphics (SVG), Hypertext (HTML), as well as lower-level standards like, resource linking (XPointer and XLink), and style sheets (XSL).

SVG as one of the XML definitions is now widely used to perform in creating graphics and animations on Web. In this paper, we will create a visualization of selection sort algorithm using SVG using the ECMA Script.

2. XML

XML is a document that lets us separate data from presentation. By using XML we can create rich, self-describing data documents that are easily transferred from one place to another. XML is a standard for exchanging structured data between components, application, and systems says Litwin (2002).

To make an XML document, we have to obey rules that called XML Namespaces (xmlns), so the XML document can be read and parsed by browser or other systems. Some of the rules are:

- a. Elements are case sensitive
- b. All tags must be closed
- c. Attribute values must be enclosed in quotes
- d. Elements must be appropriately nested

Figure 1 shows us an example of XML document that conform a well-formed document.

```
<?xml version="1.0"?>
<?xml:stylesheet type="text/xsl" href="AccessoriesXSL.xsl" ?>
<accessories>
  <accessory>
    <name>Auxiliary Seats</name>
    <price>$395.00</price>
    <description>New seat design.</description>
  </accessory>

  <accessory>
    <name>Monsoon Premium Audio</name>
    <price>200.00</price>
    <description>Kick Ass Audio System</description>
  </accessory>
</accessories>
```

Figure 1. Example of XML document

2.1 SVG

Current Web browser technologies are routinely based around HTML/XHTML markup language. For enhanced Web page styling, there is the option to use the Cascading Style Sheets (CSS). From the outset, Web browser have supported only simple formats for graphical material, such as GIF, JPEG, and PNG, despite the fact that raster files in these formats are large and the resulting bitmap graphics are resolution dependent says Mong(2003). The World Wide Web consortium (W3C) aware of the need for a flexible vector graphics format for the Web, called Scalable Vector Graphics (SVG).

SVG is a language for describing the two dimensional graphics in XML format as described in Adobe (2004). SVG allows for three types of graphic objects: vector graphic shapes (e.g., paths consisting of straight lines and curves), images and text. Graphical objects can be grouped, styled, transformed and composited into previously rendered objects. These types of graphics objects can also be combined to create simple diagrams. The feature set includes nested transformations, clipping paths, alpha masks, filter effects and template objects as described in W3C (2003). For more sophisticated design, operations are available for specifying an individual object's fill rule, color space, transformation matrix, etc.

SVG drawings can be interactive and dynamic. Animations can be defined and triggered either declaratively (i.e., by embedding SVG animation elements in SVG content) or via scripting. Because of its compatibility and leveraging of the other web standard features like scripting can be done on XHTML and SVG elements simultaneously within the same page. Furthermore, since SVG code is itself text based, it is possible for search engines to easily index and search within any SVG material as described by Mong (2003). A simple SVG code will look like Figure 2 below.

```
<?xml version="1.0" encoding="us-ascii"?>
<svg xmlns="http://www.w3.org/2000/svg" version="1.0">
  <title>Uji coba</title>
  <desc></desc>
  <ellipse stroke="black" fill="none" cy="39px" cx="101px"
    rx="48px"/>
  <rect stroke="black" fill="none" rx="5px" y="137px"
x="158px"
    width="202px" height="73px"/>
  <switch>
    <foreignObject
      requiredExtensions="http://www.w3.org/1999/xhtml"
      width="169px" height="50px" y="146px" x="170px">

      <div xmlns="http://www.w3.org/1999/xhtml" dir="ltr">
        <p>Teks dalam SVG</p>
        <p><a href="http://localhost">Testing tes</a></p>
      </div>
    </foreignObject>
    <text y="146px" x="170px">&lt;html&gt;
    </text>
  </switch>
</svg>
```

Figure 2. A Simple SVG code

2.1.1 Scripting in SVG Document

As mentioned before, we can make an SVG document into an interactive or dynamic document. Animations can be defined and triggered by scripting.

A 'script' element in SVG document, is equivalent to the 'script' element in HTML and thus is the place for scripts, e.g., ECMAScript as in W3C (2003). Any functions defined within any 'script' element have a "global" scope across the entire

current document. Figure 3 shows a simple scripting that is embedded into the SVG code.

```
<script>
<![CDATA[

//variable examples

var SVG_NS = "http://www.w3.org/2000/svg";

var ROWS = 20;
var COLS = 10;

var HPAD = 2; // horizontal padding
var VPAD = 2; // ditto for vertical

]]>
</script>
```

Figure 3. A Simple SVG code with ECMA script

ECMAScript is a standard script language, developed with the cooperation of Netscape and Microsoft and mainly derived from Netscape's JavaScript, the widely-used scripting language that is used in Web pages to affect how they look or behave for the user as described in ECMA(1999). Microsoft states that its latest version of JScript is the first implementation of the ECMAScript standard. The official standard, ECMA-262, was developed under the auspices of the European Computer Manufacturers Association (ECMA). Having the ECMAScript standard will help ensure more consistency between Netscape, Microsoft, and any other Web script implementations.

ECMAScript was originally designed to be a **Web scripting language**, providing a mechanism to enliven Web pages in browsers and to perform server computation as part of a Web-based client-server architecture. ECMAScript can provide core scripting capabilities for a variety of host environments.

ECMAScript is an object-oriented programming language for performing computations and manipulating computational objects within a host environment. ECMAScript as defined here is not intended to be computationally self-sufficient; indeed, there are no provisions in this specification for input of external data or output of computed results. Instead, it is expected that the computational environment of an ECMAScript program will provide not only the objects and other facilities described in this specification but also certain environment-specific *host* objects, whose description and behaviour are beyond the scope of this specification except to indicate that they may provide certain properties that can be accessed and certain functions that can be called from an ECMAScript program.

ECMA(1999) described that ECMAScript is object-oriented and conceived as a core language to which can be added the objects of any specific domain or context such as the idea of a "document." (for example, the World Wide Web Consortium's Document Object Model). ECMAScript together with the Document

Object Model corresponds closely to the current implementations of JavaScript and JScript. Although likely to be used mainly as a standard script language for the World Wide Web, ECMAScript could also be used for any scripted application.

3. IMPLEMENTATION

To view SVG documents, either a Web Browser plug in or a standalone viewer application can be used. We can use Adobe SVG viewer plug in (currently version 3) that relies heavily on the Web browser's CSS-oriented XML rendering mechanism Moong (2003). For example, Internet Explorer will displays general XML documents in an expandable tree form; the Adobe SVG plug in builds on this rendering mechanism with the result that SVG rendering is turned off for any tree branches that are not found as a pure SVG documents. We can also use Corel SVG plug in to view the SVG documents without a different view with Adobe SVG plug in.

3.1 Selection Sort Algorithm

In this paper, we do selection sort by manipulating bars that created by SVG's code and move their position. We will move the bars according to the id on their attributes with the selection sort algorithm.

```
<rect id="p0" x="10" y="0" width="10" height="10"
stroke="blue"
fill="lightblue"/>
```

Figure 4. The bar created with SVG and its attributes

The selection sort algorithm is done by inserting the smaller number to the left of the higher number. In the selection sort algorithm we split the array of number into two groups, which are the sorted number and the unsorted number. The unsorted number is then inserted into the sorted numbers on the right place.

```
for(i = 0; i < .length; i++){
  min = i;
  for (j = i + 1; j < .length; j++){
    if (a[j] < a[min])
      min = j;
  }
  T = a[min];
  a[min] = a[i];
  a[i] = T;
}
```

Figure 5. Selection sort algorithm

3.2 The System

When we run the system, it first randomizes the array that we would like to sort (see Figure 6).

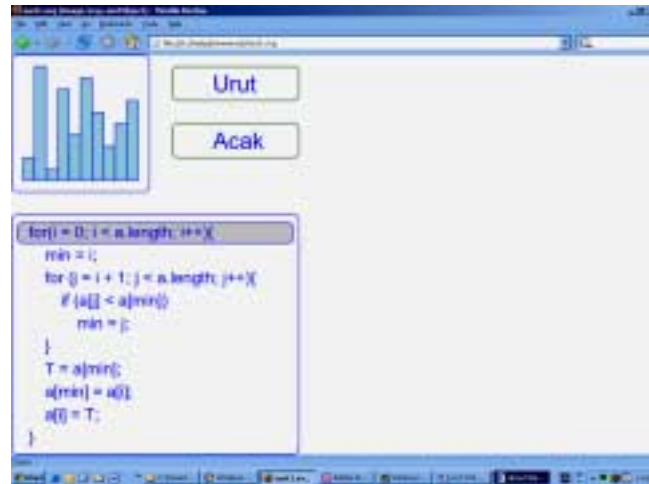


Figure 6. Initial view of selection sort visualization

When user click on the rectangle labeled 'Urut' , the system will call the sorting routine. And then it animates the bars and the rectangle shadow that highlighted the algorithm of the selection sort procedure (Figure 7).

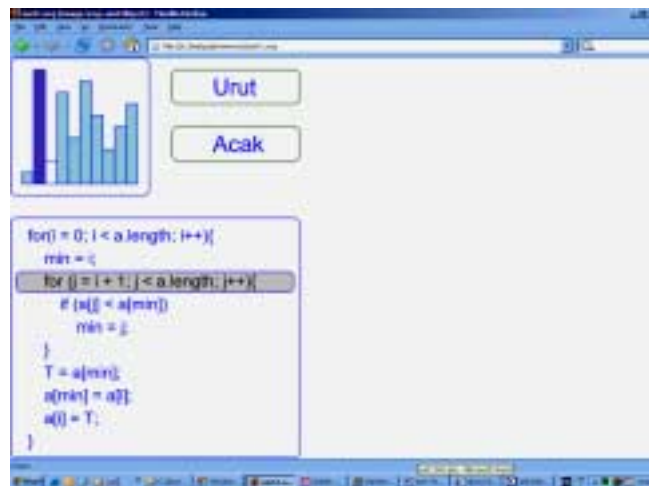


Figure 7. After 'Urut' clicked

The bars which will be exchanged are marked, the big one is marked with a dark blue bar, and the small one is marked with a white bar, then they exchange

place one and another. This process will be repeated until all bars are exchanged and sorted (Figure 8).

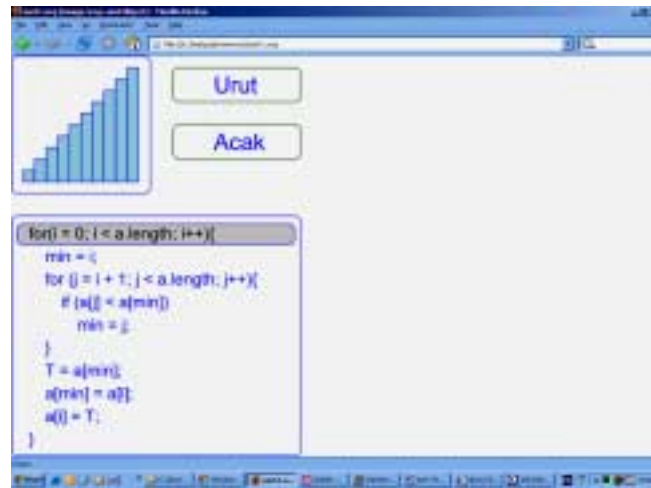


Figure 8. Sorted bars

4. CONCLUSION

By manipulating the graphics created by SVG's code and add the ECMA Script, we can present nice and good animation. It's possible that technologies such as SVG with its implementation will attract in increasing attention and serious consideration of its possible role as a high quality alternative for many Web presentations that are currently dominated by (X)HTML and CSS.

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