

A Proposed Extension to HTML : Client-Side Image Maps

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Abstract

The markup language known as "HTML/2.0" provides for image maps. Image maps are document elements which allow clicking different areas of an image to reference different network resources, as specified by Uniform Identifier (URIs). The image map capability in HTML/2.0 is limited in several ways, such as the restriction that it only works with documents served via the "HTTP" protocol, and the lack of a viable fallback for users of text-only browsers. This document specifies an extension to the HTML language, referred to as "Client-Side Image Maps," which resolves these limitations.

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1. Introduction

1.1 Purpose

Image maps are an important feature of the point-and-click interface which makes the World Wide Web so popular. The most common use of image maps is to allow users to access different documents by clicking different areas in an image.

There are several limitations of the current image map implementation as it applies to this use. First, it only works over the HTTP protocol, making it unusable for reading local files or files accessed via alternate protocols. Second, a server transaction is required merely to determine where the link is directed. This can degrade performance noticeably when accessing distant sites. Third, unlike for normal links, there is no way for a browser to provide visual feedback to the user showing where a portion of an image map leads before the user actually clicks it. Lastly, the method for specifying the active regions of image maps is server-dependent, compromising portability of documents. This extension to support client-side image maps addresses these issues.

It is proposed that this extension be included in a future revision of the HTML specification.

1.2 Overall Operation

Client-side image maps work by placing a complete representation of the active areas of an image, including their shape, size, and destination (URI), into an SGML-compliant textual form. This markup may also optionally include a textual description for each area for display on non-textual browsers. This representation, or "map," is given a name to identify it.

When an image is included in an HTML document, it may include an attribute specifying a map to use. The map may be contained in the same file which references the image, but this is not required. If the map is in a different file, a URI to that file must be provided.

The browser will parse the map and remember the contents. When the user clicks the map, the browser will match up the location with the specified destination for that location and access that URI. In the case of a non-graphical browser, the browser could display the textual descriptions for each area instead of the image. Clicking a given textual description would then go to the associated destination.

2. Client-Side Image Map Extension

2.1 Syntax

Adding a USEMAP attribute to an IMG element indicates that it is a client-side image map. The USEMAP attribute can be used with the ISMAP attribute to indicate that the image can be processed as either a client-side or server-side image map. The argument to USEMAP specifies which map to use with the image, by specifying the URI for the file containing the map, followed by a '#', followed by the name

of the map. If the argument to USEMAP starts with a '#', the map is assumed to be in the same document as the IMG tag. The presence of a USEMAP attribute overrides the effect of an enclosing anchor (A) element.

The different regions of the image are described using a MAP element. The map describes each region in the image and indicates where it links to. The basic format for the MAP element is as follows:

```
<MAP NAME="name">
<AREA [SHAPE="shape"] COORDS="x,y,..." [HREF="reference"]
      [NOHREF] [ALT="alt"]>
</MAP>
```

The NAME attribute specifies the name of the map so that it can be referenced by an IMG element. Each AREA element contained inside the map element specifies a single clickable area of the image. The SHAPE attribute gives the shape of this area. Possible shapes are "RECT", "CIRCLE", and "POLYGON", which specify rectangular, circular, and polygonal regions respectively. If the SHAPE tag is omitted, SHAPE="RECT" is assumed.

The COORDS tag describes the position of an area, using image pixels as the units with the origin at the upper-left corner of the image. For a rectangle, the coordinates are given as "left,top,right,bottom". The rectangular region defined includes the lower-right corner specified, i.e. to specify the entire area of a 100x100 image, the coordinates would be "0,0,99,99".

For a circular region, the coordinates are given as "center_x,center_y,radius", specifying the center and radius of the circle. All points up to and including those at a distance of "radius" points from the center are included. For example, the coordinates "4,4,2" would specify a circle which included the coordinates (2,4) (6,4) (4,2) and (4,6).

For a polygonal region, the coordinates specify successive vertices of the region in the format "x1,y1,x2,y2,...,xn,yn". If the first and last coordinates are not the same then a segment is inferred to close the polygon. The region includes the boundary lines of the polygon. For example, "20,20,30,40,10,40" would specify a triangle with vertices at (20,20) (30,40) and (10,40). No explicit limit is placed on the number of vertices, but a practical limit is imposed by the fact that HTML limits an attribute value to 1024 characters.

The NOHREF attribute indicates that clicks in this region should perform no action. An HREF attribute specifies where a click in that area should lead. A relative anchor specification will be expanded

using the URI of the map description as a base, rather than using the URI of the document from which the map description is referenced. If a BASE tag is present in the document containing the map description, that URI will be used as the base.

An arbitrary number of AREA tags may be specified. If two areas intersect, the one which appears first in the map definition takes precedence in the overlapping region. Multiple areas may share the same destination to create composite shapes. Any portion of an image which is not described by an AREA tag defaults to having no action.

The ALT attribute specifies optional text which describes a given area. A text-only browser can display the textual contents for each area as a substitute for the image.

2.2 Required Changes to HTML/2.0 DTD

The required changes to the HTML/2.0 DTD to support this syntax would be as follows:

Change the IMG element definition to be:

```
<!ELEMENT IMG      - O EMPTY>
<!ATTLIST IMG
    SRC CDATA #REQUIRED
    ALT CDATA #IMPLIED
    ALIGN (top|middle|bottom) #IMPLIED
    ISMAP (ISMAP) #IMPLIED
    USEMAP %URI; #IMPLIED
    %SDAPREF; "<Fig><?SDATrans Img: #AttList>#AttVal(Alt)</Fig>"
>
```

Add the following new definitions:

```
<!ELEMENT MAP      - - +(AREA)>
<!ATTLIST MAP
    NAME %linkName; #REQUIRED
>

<!ELEMENT AREA      - O EMPTY>
<!ATTLIST AREA
    SHAPE (RECT|CIRCLE|POLYGON) RECT #IMPLIED
    COORDS CDATA #REQUIRED
    HREF %URI; #IMPLIED
    NOHREF (NOHREF) #IMPLIED
    ALT CDATA #IMPLIED
>
```

2.3 Backwards Compatibility

This extension is specifically designed to provide a variety of fallback options for browsers which do not support it. These options are based on the assumption that browsers will ignore any attributes or elements which are not present in the HTML/2.0 DTD.

An document can be written so that a client-side image map can have three different fallback behaviors. First, the document can use the server-side image map capability, by specifying the ISMAP attribute as well as USEMAP. In situations where this is possible, the image map will work whether or not the browser supports the client-side extension.

Second, clicking the image can direct the user to a single URI, regardless of where on the image he clicks. This is accomplished by placing the image inside an anchor (A) element. The fallback destination could provide the user with an error or a textual list of destinations.

Lastly, the image can appear to not be a link at all (i.e. missing whatever visual cues a browser provides to indicate a hyperlink). This will be the result if the image element neither contains an ISMAP attribute nor is inside an anchor.

2.4 Examples

The following three examples show markup demonstrating the three fallback mechanisms described in section 2.3:

This image map will work with any graphical browser:

```
<A HREF="/cgi-bin/imagemap/pic1">  
<IMG SRC="pic1.jpg" USEMAP="maps.html#map1" ISMAP></A>
```

Clicking here will take you to a page with an error message if you don't have client-side image map support:

```
<A HREF="no_csim.html">  
<IMG SRC="pic2.jpg" USEMAP="maps.html#map2"></A>
```

You can only click here if your browser supports client-side image maps:

The following example shows the use of a map in the same file as the image:

```
<IMG SRC="picture.jpg" USEMAP="#mymap">
```

The following example defines a simple map which describes an image with a circle in the middle overlapping two large rectangles:

```
<MAP NAME="welcomemap">  
<AREA SHAPE=CIRCLE COORDS="50,50,40" HREF="about_us.html"  
  ALT="About our company">  
<AREA SHAPE=RECT COORDS="0,0,100,50" HREF="products.html"  
  ALT="Our products">  
<AREA SHAPE=RECT COORDS="0,51,100,100 HREF="technology.html"  
  ALT="Technology for the next century">  
</MAP>
```

3. Security Considerations

Clicking a portion of a client-side image map may cause a URI to be dereferenced. In this case, the security considerations related to URLs [5] apply.

4. References

- [1] Berners-Lee, T., and D. Connolly, "HyperText Markup Language Specification - 2.0", RFC 1866, November 1995.
- [2] Seidman, J., "An HTML Extension to Support Client-Side Image Maps", The Second International WWW Conference '94 Advance Proceedings, pp 927-930.
- [3] "Standard Generalized Markup Language" ISO Standard 8879:1986 Information Processing Text and Office Systems.
- [4] Berners-Lee, T., Fielding, R., and H. Frystyk Nielsen, "Hypertext Transfer Protocol -- HTTP/1.0", Work in Progress.
- [5] Berners-Lee, T., Masinter, L., and M. McCahill, "Uniform Resource Locators (URL)", RFC 1738, December 1994.

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