

**ENHANCED IMAGEMAP 2.0: WEB DESIGN ADVANTAGES  
CONFERED BY PARAMETERIZATION**

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**Stern #IS-95-10**

# Enhanced Imagemap 2.0: Web Design Advantages Conferred by Parameterization

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## Abstract

This paper discusses the shortcomings of unparameterizable image maps and presents a solution to the problem through the use of `PATH_INFO` and textual substitution in the mapping configuration file. After some discussion on why this scheme was chosen instead of the alternatives, two examples of actual use are given: passing parameters to the mapping file (1) as a path and (2) as arguments to a CGI script. Both techniques offer convenience and ease of design to the website administrator and we explore these advantages.

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# 1 Introduction

During our work we were faced with the following problem: to put a clickable map on a large number of home pages with links to the corresponding person's contact information, research, etc. Making a separate directory for each home page and using relative paths in the mapping file did not work since the paths were considered relative to the clickable map, not relative to the original home page. On the other hand, giving absolute paths would make links from all home pages point to the same place, although they are supposed to be different. It was clear that we needed either to make a separate mapping file for each page (very cumbersome) or find some way of parameterizing mapping files.

## 2 Genesis of Enhanced Imagemap 2.0

The *Relationship Management Design Methodology* (RMM) [ISB95] was used in our design of the Stern Information System Department faculty home pages. RMM calls for the generation of a large set of HTML pages with a consistent design, and our web site, <http://is-2.stern.nyu.edu/> was constructed using this approach. The map in the upper-right corner, as shown in Fig. 1 serves as a navigation device, that is consistently used for all personal homepages.

Since the same GIF file is shared among all homepages, it made sense to try to reuse the same GIF image as a navigation device. This would enforce a high level of consistency while facilitating design updates (only one program would have to be changed). However, such a *parametric* imagemap must be able to behave differently depending on where it is used. For example, a click on Professor Isakowitz's *biosketch* square should lead to his biosketch, whereas the same selection on another person, say Tuzhilin, should lead to that person's biosketch and not Isakowitz's. Such functionality is not supported by the current version of imagemap, since only the *x* and *y* coordinates are passed. Using the current imagemap in this case requires a slightly different mapping file for each individual homepage. The problem is exacerbated as the site grows.

## 3 Technical details

An important shortcoming of the current clickable map interface is that it is nonparameterizable. Giving a query after a question sign, like

```
http://host/cgi-bin/imagemap/path/foo.map?bar,
```

does not work since the query is replaced by the coordinates of the click, i.e., the server receives a request similar to

```
http://host/cgi-bin/imagemap/path/foo.map?53,72.
```

Giving additional path elements after the name of the mapping file, like in

```
http://host/cgi-bin/imagemap/path/path/foo.map/bar,
```

will cause imagemap to say that it cannot find the map `/path/foo.map/bar`.

Thus it was necessary to modify imagemap to retain the parameters and somehow pass them to the mapping file. Query string (i.e., an argument after a question sign) would not work since it would not even get to the client. Using a custom delimiter, such as #, did not seem like a good idea since it is better to use an existing syntax. Finally, we decided to give one or more arguments as the elements of the path following the mapping file. The mapping file would get the parameter through textual substitution.

Victor Boyko designed and implemented these ideas in the new version of the imagemap program.<sup>1</sup> Parameters are given as the last component of the path. For example, in the URL

```
http://host/cgi-bin/imagemap/path/path/mapfile.map/arg1/arg2,
```

`arg1/arg2` is the parameter. The new imagemap program scans the URL from right to left and determines, using the `PATH_TRANSLATED` environmental variable, the mapping file `mapfile.map`. The parameter is then the string to the right of the mapping file and is passed to `mapfile.map` as follows. It is determined in which region the coordinates of the click are located. In the URL corresponding to the region any occurrence of the character sequence `%s` (chosen

<sup>1</sup>The latest version before our modification was version 1.8, released on March 7, 1995, by Carlos Varela, [cvarela@ncsa.uiuc.edu](mailto:cvarela@ncsa.uiuc.edu). Versions 1.5 and later allow the users to specify their own mapping files as `PATH_INFO[Tea95]`.

for similarity to the C function `printf`) is replaced by the parameter. For example, if the parameter was `foo` and the URL in the mapping file was `http://host/%s/`, then the resulting URL will be `http://host/foo/`. The parameter `%s` can be in any place of the URL, but it is probably most useful as a part of the path or after a question sign, as a query string, passed to a CGI script. Examples of both types of usages will be given.

## 4 Examples of usage

### 4.1 Imagemap parameters passed as a path

As mentioned, the new `imagemap` was originally developed in order to provide a way of navigating through the users' home pages on the Information Systems Department server. Each user has a separate directory with the following files in it: `index.html`, `biosketch.html`, `research-interests.html`, `teaching-interests.html`, `publications.html`, `cv.html`, and `contact.html`. The URL of each directory is

```
http://is-2.stern.nyu.edu/isweb/testsite/database/teachers/username/.
```

The goal was to put a navigation map in the upper right corner of each of the pages which would allow to go to any other page for that user, as well as the Departmental home page, the list of faculty, etc.

For example, at URL `http://is-2.stern.nyu.edu/isweb/testsite/database/teachers/tisakowi/` we have the home page of Tomas Isakowitz, as seen in Fig. 1. If the user clicks on the **Research** section of the `imagemap` shown in the upper right, Fig. 2 is the result. `index.html` contains the lines

```
<A HREF="http://is-2.stern.nyu.edu/cgi-bin/imagemap/faculty-nav/tisakowi">
<IMG ALIGN=RIGHT SRC="/isweb/testsite/database/teachers/faculty-home.gif"
ALT="PICTURE" ISMAP>
</A>
```

`research-interests.html` contains the lines

```
<A HREF="http://is-2.stern.nyu.edu/cgi-bin/imagemap/faculty-nav/tisakowi">
<IMG ALIGN=RIGHT
SRC="/isweb/testsite/database/teachers/faculty-res.gif"
ALT="PICTURE" ISMAP>
</A>
```

`faculty-home.gif` and `faculty-res.gif` are basically the same image with different rectangles shaded.

`faculty-nav.map` is an image map that takes parameters. Here is its contents:

```
default /isweb/testsite/database/teachers/%s/index.html
rect /isweb/testsite/database/teachers/%s/index.html 6,6 190,34
rect /isweb/testsite/database/teachers/%s/biosketch.html 6,36 94,63
rect /isweb/testsite/database/teachers/%s/research-interests.html 105,37 192,63
rect /isweb/testsite/database/teachers/%s/teaching-interests.html 6,66 94,92
rect /isweb/testsite/database/teachers/%s/publications.html 104,67 192,93
rect /isweb/testsite/database/teachers/%s/cv.html 6,95 94,123
rect /isweb/testsite/database/teachers/%s/contact.html 104,96 193,123
rect / 6,126 193,155
rect /cgi-bin/course-database.pl?request=teachers 6,158 193,183
rect /cgi-bin/course-database.pl?request=courses 6,186 193,213
```

Suppose, for example, that a user viewing the document from Fig. 1 clicked at coordinates 130,50. These coordinates correspond to the line with the URL

```
/isweb/testsite/database/teachers/%s/research-interests.html.
```

`%s` will be substituted for the argument, `tisakowi`, and the resulting URL will become

```
/isweb/testsite/database/teachers/tisakowi/research-interests.html,
```


which is the document shown in Fig. 2. This works similarly for other faculty members. The site is thus managed conveniently; a Perl script creates the HTML links to the parameterized image map and hence one global mapfile is shared successfully.

File Edit View Go Bookmarks Options Directory Help

Go Back Home Forward Stop Reload Open Print Feed

Location: <http://is-2.stern.nyu.edu:88/teach/testsite/database/teachers/tisak/>

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Figure 1: Example index.html using the new imagemap

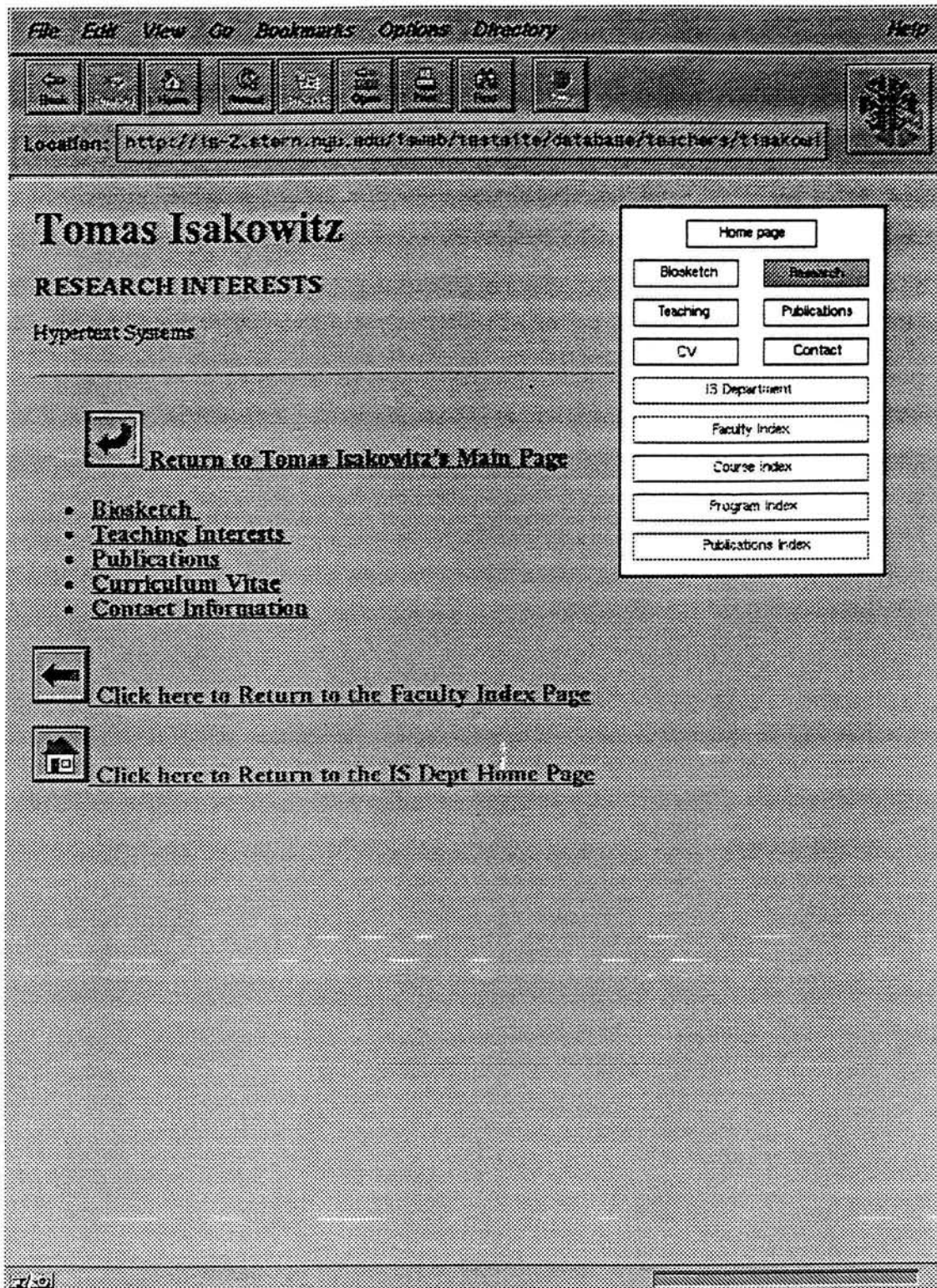


Figure 2: Example research-interests.html using the new imagemap

## 4.2 Imagemap Parameters passed as a query string to a CGI script

Jan Odegard has successfully beta-tested our new version of imagemap at Rice University's Digital Signal Processing (DSP) library web pages, URL <http://www-dsp.rice.edu/splib/>. He created an imagemap toolbar, which appears on every subordinate node of the DSP hierarchical tree. Referring to Fig. 3, we see that the toolbar has navigational functions, e.g. the UP region to ascend one level in the hierarchy, and other utility functions, e.g. the ADD and MAIL functions to suggest a new URL for this library and send comments to the Webmaster, respectively. As the DSP pages say, "The following toolbar will appear on top of every page in the database and is the primary tool used for navigating and communicating with the database."

When the user clicks on the UP region of the toolbar, the result is shown in Fig. 4; note the URL shown at the top of the figure. The full URL of Fig. 4 reads <http://www-dsp.rice.edu/cgi-bin/splib-up?splib/dbases>. In this example, the string `splib/dbases` is the parameter passed to the mapping file (the user's location *before* moving up one level). The mapping file entry corresponding to the UP region invokes a CGI Perl script, `splib-up`, with `splib/dbases` as its `QUERY_STRING` parameters. The Perl script then discards the final path component and outputs a `Location` statement to position the user one level higher in the hierarchy.

In older versions of imagemap, the flexibility of modifying the behavior of mapping file CGI scripts via parameters was impossible to achieve. Now, it is a simple matter for the *location* of the user to affect the behavior of the mapped CGI scripts. This is particularly advantageous if the site administrator, as in the DSP URL library example, wishes to allow users to add resources at many levels in the hierarchy.

It is interesting to note, in passing, that the common toolbar (up, search, suggest, add, help) in the extremely large Yahoo subject-oriented catalog, <http://www.yahoo.com/>, appears to be replaceable by our new imagemap.

## 5 Discussion and Online Resources

### 5.1 Enhanced Imagemap Supports Common 'Look and Feel'

The loosely-coupled characteristics of the WWW platform are a de facto consent to heterogeneity in application design, whereby similar information units can be portrayed in dissimilar ways. Whereas this freedom can be beneficial for some classes of applications, it is undesirable for others. Some sites may want to enforce a common 'look and feel' to all of its WWW pages. Unless the organization keeps a tight, centralized control of its WWW site (in clear opposition to the basic philosophy of the WWW), such consistency is hard to enforce within existing WWW software development environments. The enhanced imagemap that we have presented is a tool that can greatly facilitate a consistent 'look and feel' within a WWW application.

### 5.2 Summary of Enhanced Imagemap Advantages

From the site administrator's point of view, here is the before and after picture illustrating the advantages of the new imagemap.

	Before	After
Number of GIFs	1	1
Number of map files	$n$ for $n$ users	1

Thus, supposing an organization would like a common imagemap gif to enforce 'look and feel' across pages, the convenience afforded by the new imagemap increases as  $n$  grows. Thus, the problem of a large organization presenting a group of similar pages [Qui95] is simplified.

### 5.3 Enhanced Imagemap 2.0 Resource Web Page

The source code for imagemap 2.0, the binary for Sun OS 4.1.3\_U1, and a brief narrative of its usage, can be found at <http://edgar.stern.nyu.edu/lab.html>. We welcome further tests and comments.

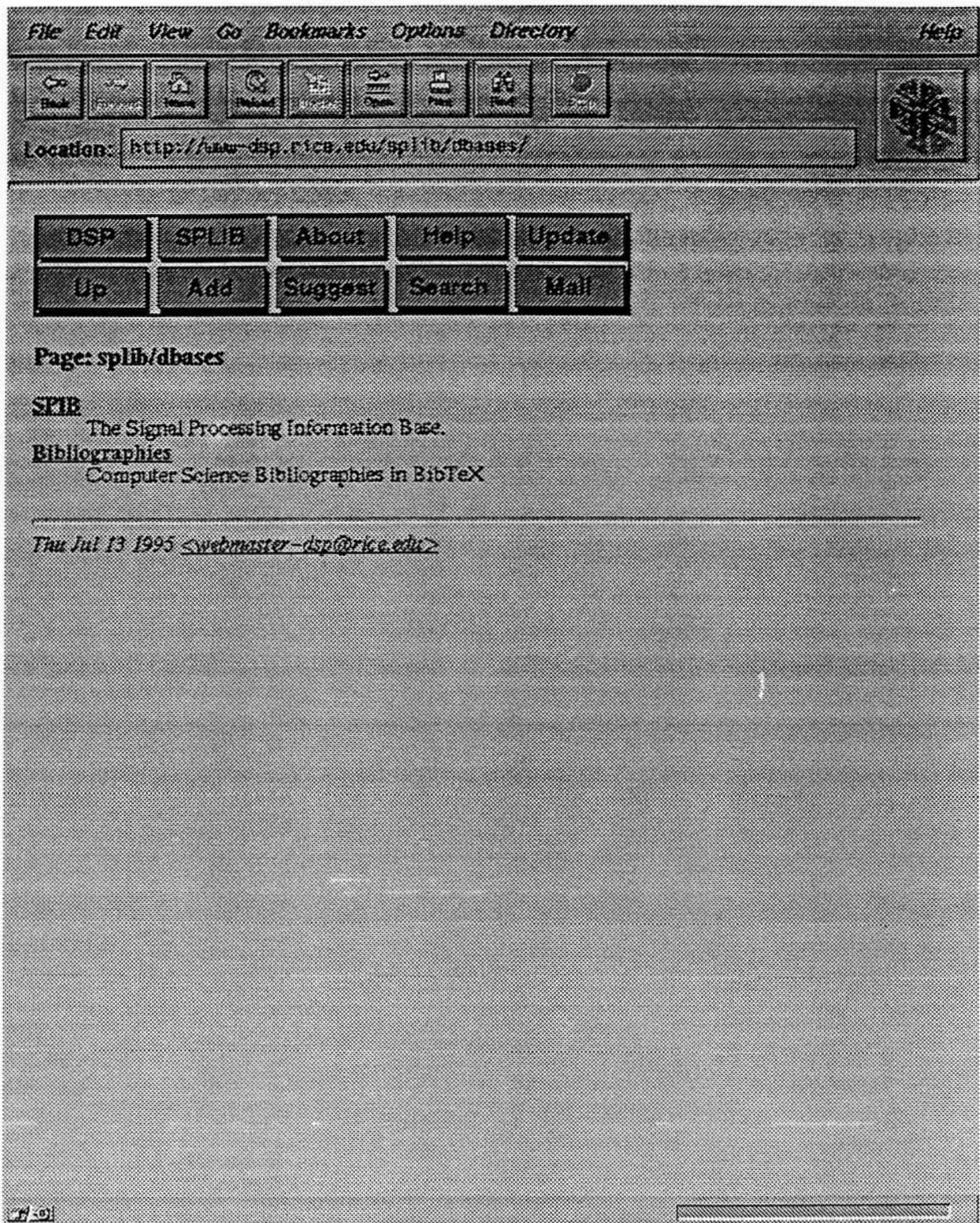


Figure 3: Digital Signal Processing URL Library Toolbar using the new imagemap



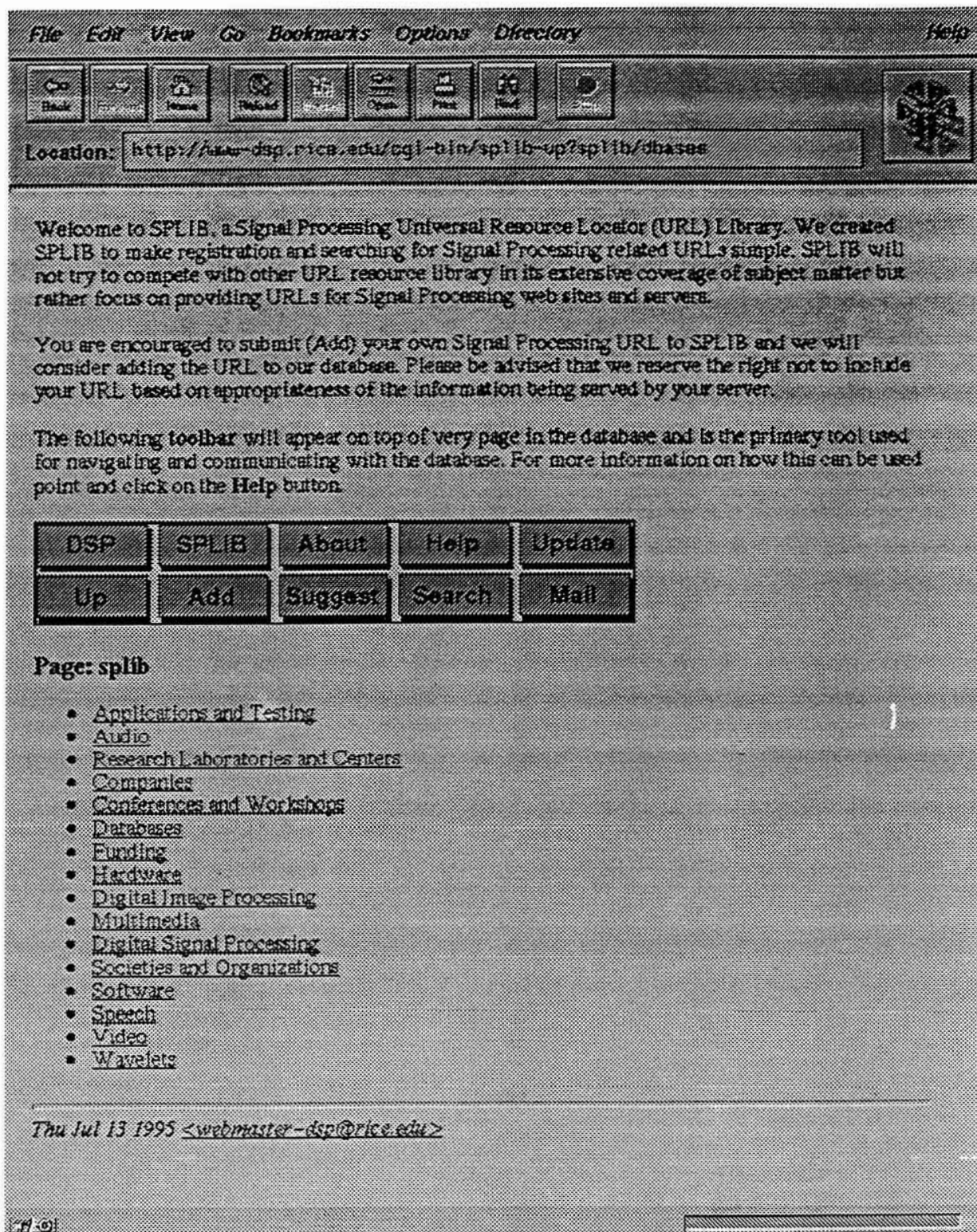


Figure 4: Passing a Parameter to a CGI Script using the new imagemap

## References

- [ISB95] Tomás Isakowitz, E. A. Stohr, and P. Balasubramanian. RMM: A Methodology for Structured Hypermedia Design. *Communications of the ACM*, August 1995.
- [Qui95] Christine Quinn. From grass roots to corporate image - the maturation of the web. <http://eecns.stanford.edu/eecns/www/paper.html>. Technical report, Stanford University, 1995.
- [Tea95] NCSA HTTPd Development Team. Imagemap tutorial. <http://hoohoo.ncsa.uiuc.edu/docs/setup/admin/imagemap.html>. Technical report, NCSA, 1995.