# Active Annotations in the World Wide Web

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## ABSTRACT

The active annotations service for the World Wide Web (WWW) is designed for collaborative work of small groups. Active annotations merge the asynchronous behavior of reading Web pages with a synchronous notification system that informs all viewers of the same page about new annotations.

The active annotations service allows to annotate each word of an arbitrary HTML page, which is under the control of the service. The user interface is integrated in an HTML page that uses Java Applets to communicate with its server.

### Keywords

Web page annotation, notification, awareness, cooperation

## INTRODUCTION

The World Wide Web (WWW) incorporates a huge potential for collaborative working. However, the capabilities for using the Web for cooperation are limited. The information flow on the Web is unidirectional; Web pages are in their current form read-only data presentation. Feedback and discussions about the contents take place outside the Web as in email or Usenet News. This lack of integration leads to a lack of close relation between the Web pages and potential comments. Users in the Web are also not aware about others and thus cannot easily get in touch to share experiences.

Annotations of Web pages may be used for feedback, provide interesting links to other pages inserted by different users and may act as rating mechanism to overcome the information overflow.

In small collaborative work-groups, our approach can be used to improve the quality of documents cooperatively. Active annotations can be taken to discuss the contents of documents, but also to point to related work, or to submit a change proposal to a specific word within the Web page.
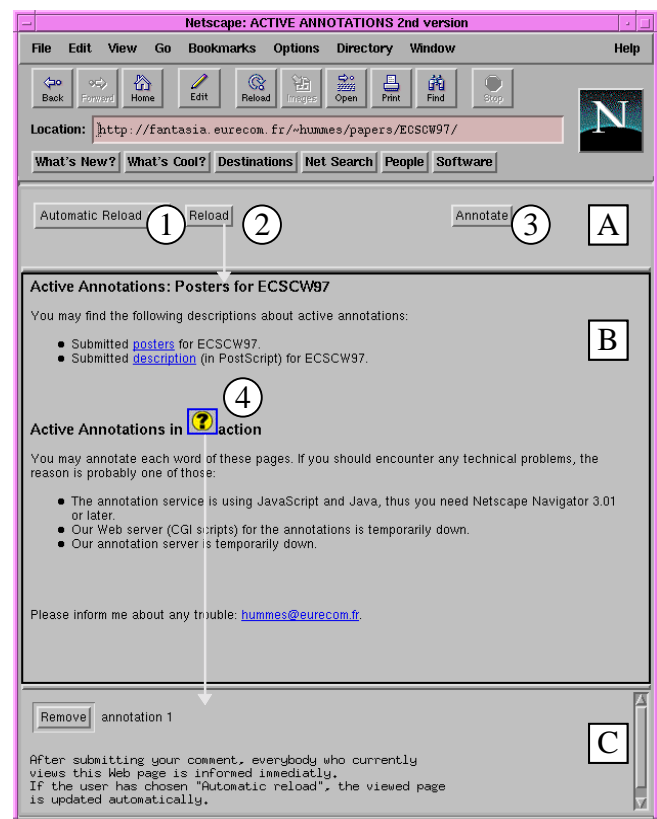
## ACTIVE ANNOTATIONS

Active annotations differ from existing annotation approaches (see [1] for an overview) by including synchronous notification about new annotations within the annotation service. The user may choose that the currently viewed Web page is automatically updated, when a new annotation arrives. Thus the active annotation service forms also an awareness between the currently viewers of the Web page. As example, a small group of collaborative reviewers may see comments of the others immediately.

We combine the strengths of CGI programs to manipulate the documents on the server side, Java applets and applications to offer the awareness service, and JavaScript from Netscape to seamlessly include all components within the browser. The active annotations service allows users to annotate each word of an arbitrary HTML page that is read- and writeable by the server.

**Figure 1: Screenshot of the active annotations service**



## Presentation to the User

To support an intuitive user interface, the browser window is divided in three frames. Figure 1 shows a screenshot of the active annotation service.

Active annotations are included in a control frame (A) on the top, which stays during the visiting of the Web pages

that are displayed in the main frame (B); the annotation frame (C) shows a selected annotation.

The control frame consists of a selection of the reload strategy (1), a button to reload the main frame (2), and the button to actually annotate the HTML page that is currently viewed (3). It holds also the applet that maintains the connection with the active annotation server. This applet triggers the action, which is performed, when a new annotation arrives. Also other actions than those that are currently implemented (as described below) may be included easily by modifying the JavaScript sources of the control frame.

**Creating an Annotation**
To create a new annotation, the user pushes the "Annotate" button (3) in the control frame. This action triggers a CGI script that converts each word of the viewed HTML page in the main frame into a link; this output is displayed in a new browser window. The user chooses a word to annotate by clicking on it. A form handles the input of the new annotation text. By submitting this form, an HTML page containing the annotation is created on the server and an image (4) that is linked to this page is inserted in the original in front of the annotated word. A JavaScript function of the control frame is informed about the new annotation and calls the communication applet to send the information to the active annotation server that broadcasts it to all connected browsers. All users are informed about the arrival of the new a annotation by an applet; the viewed page is updated automatically if the user has selected this strategy in the control frame. The annotation may be viewed by clicking on its icon and is displayed in a separate third frame.

**Figure 2: Architecture of the active annotation service**
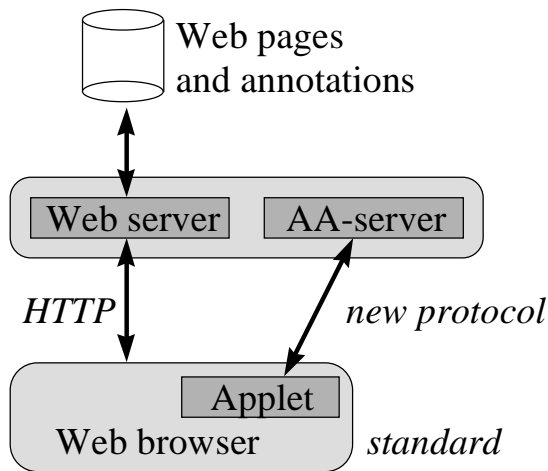


**Architecture and Implementation**
The user may take any browser that supports Java and JavaScript to use the active annotation service. The applet maintaining the connection with the active annotations server is embedded in the HTML page for the control page (see Figure 2). No installation is required for the clients.

An annotation is stored within the original HTML document. So, the active annotation service needs read and write rights for the pages that may be annotated.

The active annotation server implements a broadcast algorithm on top of TCP to communicate with the browsers. Each currently connected browser gets the same information over a primitive protocol; however the action taken can be configured. Figure 3 shows the different action that is performed by the system for user 1, who has chosen to be only notified about new annotations, and user 2, whose page is automatically updated.

**Figure 3: Server broadcasts a new annotation; users have chosen different reloading strategies**
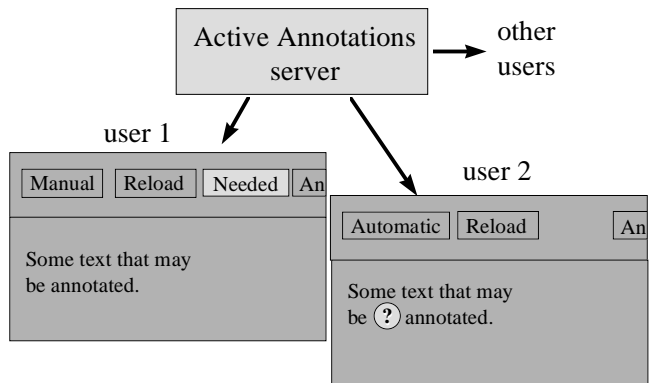


## CONCLUSION AND OUTLOOK
The active annotation service supports viewers with the possibilities to add and view annotations to Web pages. The service supports group-awareness through synchronously notifying all currently viewers, when an annotation has been added or removed.

The service is extensible, since the applet that maintains the connection with the server can be configured to call a JavaScript method to do the action, when a new annotation arrives. Our implementation shows two different notification implementation, which may be chosen by the user.

The communication between the server and the applets uses currently TCP. Since the number of open TCP connections are limited, this solution does not scale well for large groups, however we tested it within groups up to the size of 30 persons successfully. For better performance and scaling we are investigating the use of multicast implementations.

## ACKNOWLEDGEMENTS

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