Online Workspaces for Annotation and Discussion of Documents

Toshiyuki Takeda
Center for Information and Media Studies
Kwansei Gakuin University
Uegahara 1-1-155
Nishinomiya, Hyogo, 6628501, JAPAN
takeda@kwansei.ac.jp

Daniel Suthers
Laboratory for Interactive Learning Technologies
Department of Information and Computer Sciences
University of Hawai`i at Manoa
1680 East West Road, POST 309
Honolulu, HI 96822, USA
1-808-956-3890
suthers@hawaii.edu

Abstract

Pink is a system that supports threaded discussions about artifacts (such as source code or security bulletins) by making it easy for users to refer to and annotate parts of the artifacts. This system is implemented as server-side scripts for a WWW server and operates with any standard browser.

Keywords

applications, web-based collaboration, document annotation, discussion tools

1. Introduction

With the expansion of the Internet, system administrators cannot keep up with the new viruses and security vulnerability information. As Code Red and the Nimda Worm spread globally in 2001, the understanding of how to prevent such viruses was not sufficiently disseminated from system administrators to users. Although companies like Microsoft and CERT published security information, many users did not take action. Myriad security advisories confused many users because the system environments they covered differed from those of the users. Here, the issue of context sharing comes into play, as many users cannot identify the context of the messages they read, or identify the portions of the messages that are relevant for their own context.

Popular tools such as Email, Netnews and the WWW were created to facilitate the sharing of knowledge. However, these tools are sometimes less effective because they don't facilitate context sharing.

Artifact-Centered Discourse

We call the type of discussion and argumentation that should be supported in the applications just described *Artifact Centered Discourse* [1]. Others refer to these applications as *Anchored Discourse* [2] or *Contextualized Discussion* [3]. The fundamental requirement in these applications is that the connection between messages and their contexual artifacts be maintained.

Users need online tools that support discussions about artifacts by making it easy to refer to and annotate parts of the artifacts. This paper describes the software system *Pink*, which was created to support Artifact Centered Discourse. Pink supports the understanding and creation of artifacts that reflect intellectual discussions among participants. Since Pink is client server software, it requires only a WWW browser for use.

2. Related Work

Previous research has shown that annotating text online enables participators to find relevant information more easily. The *Annotation Engine* [4] , ComMentor [5], *CoNote* [6], *CritLink* Mediator [7], The *Journal of Interactive Media in Education* [8] are web based online discussion system with similar approach. *Kukakuka* [9] is under development in the same laboratory as Pink and has many of the same objectives. A collection of Java servlets associates web pages with NNTP discussion groups and threads, presenting these together in a web client using frames.

Many of the systems described above support only annotations to web pages, whereas Pink supports not only web page annotation but also embedded annotation to documents, such as WikiWiki[10] documents, created within the system.

3. A Sample User Scenario

The next two sections show how users read and write in the workspace.

Reading and Annotating Artifacts

A user can begin either by reading a document artifact or by reading topic threads of interest. References are displayed as links in both directions. When the user is reading a document and encounters an annotation, the user can click on the annotation's reference number in the artifact to read the related discussion. Conversely, a user who is reading a discussion can click on the numbered references (e.g., "[1]" in Figure 1) to view the referenced artifact. (The referenced artifact may be the document itself, or a link or citation to the artifact in the case of external documents, respectively.)

A user creates a reference to a portion of a plain text or WikiWiki artifact as follows. The user shifts to a page for inserting a special tag when the user clicks a button in the artifact browsing page. The user then inserts tags to indicate the extent of the reference, and clicks submit. A reference is then created in the repository and threaded discussion menu page.

Once a reference has been created, it shows up as a new thread in the discussion thread view. The user then adds a Note to the Reference by clicking on "[Write Comment]," which loads a simple form for entering the Note.

Reading and Writing a Comment

The subject of the created Note is displayed in the discussion view and users can reply to the Notes as in a normal threaded discussion.

The Reference is shown as an anchor in the document with the number of the reference. When a user clicks this part, the corresponding part in the threaded discussion is shown and a user can read notes attached to the annotation point. Conversely, if a user clicks the number of a reference on a discussion thread page, the part of the artifact that includes the annotation point is shown.
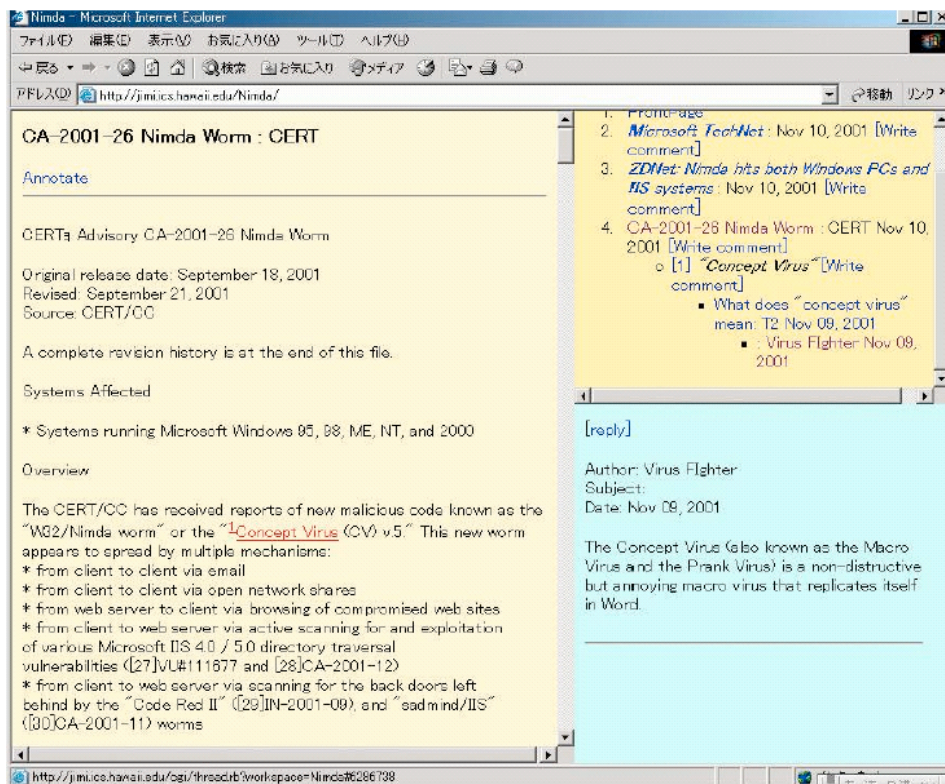

Figure 1. Sample Screen Shot

4. Software Design

Architecture

Pink has a 3-tier architecture (Figure 2) consisting of Presentation, Model and Repository.
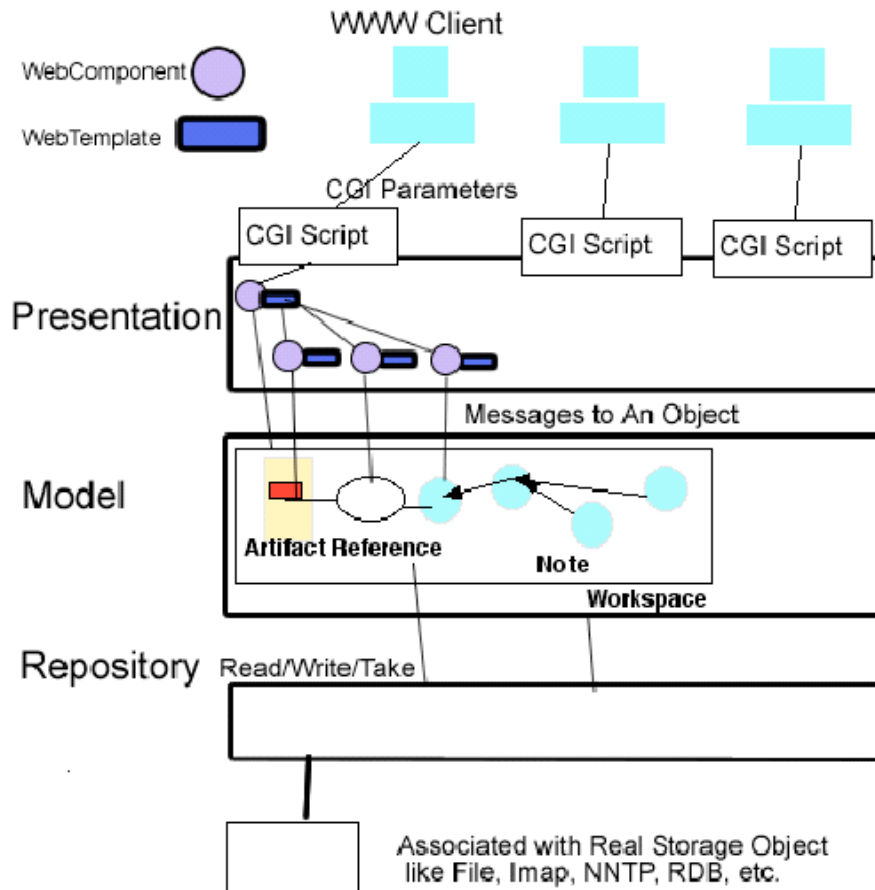

Figure 2. 3-tier architecture in Pink System

Presentation

The Presentation layer generates html using objects in the model layer and parameters from a user. It uses two important objects: WebComponent to wrap model objects and WebTemplate for a template to generate html.

Repository

The Repository is a persistent database in which to store objects. It is designed to use simple interfaces like a space-based repository, TupleSpace. [11]. so that it is easy to implement a Repository in many ways.

Model

 A Model consists of a Workspace and Artifact, Note and Reference objects derived from the Workspace. There are also objects related to users and access control.

Workspace

The Workspace is a place to share and exchange knowledge by setting an annotation on an artifact and writing a note to a threaded discussion. A user can add or create an artifact, annotate it, and write a comment about the annotated part of an artifact.

Artifact

The Artifact object is used for representing a text document, web page, a book or journal article, etc. There are two kinds of Artifacts: structured and unstructured. The structured Artifact is composed of parts like W3C DOM[12] and an annotation point can be set on each part of an Artifact.(See Figure 3)
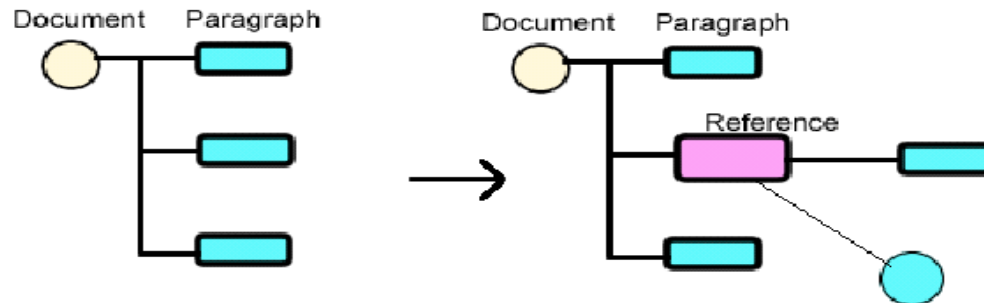

Figure 3. Reference Insertion

Reference is a pointer object that refers to either a part or whole of an artifact object and is often a root point of a discussion thread.

A Note object includes a user's writings about something in a workspace and usually has a pointer to either a reference object or another note object.

5. Conclusions

The significance of Pink and similar work by others goes beyond its potential for improving artifact-centered discourse in online communities. It also represents a better approach to the design of web based tools for collaboration, in which the design is driven by an understanding of the interactions to be supported.

The present implementation is currently under experimental use in our laboratory (including use in preparation of this paper), and will undergo full scale testing in early 2002.

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