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ABSTRACT
                This paper describes the planning and implementation
of a school-wide home page at California Lutheran University (CLU)
(Thousand Oaks, California). A working team created a balanced web
site which represents all areas of the CLU community. The Internet
Task Force implemented general computing policies, standardized
University home page design, selected and installed hardware and
software, developed web publishing policies for community members,
and provided training design and delivery. The main goals of CLUnet
are to enhance the on-campus learning, research and communication
environment at the University, and to present CLU in a favorable
light for world-wide marketing purposes. The web server has changed
the way users do research, learn about campus events and activities,
review the undergraduate and graduate catalogs, and communicate with
each other. Careful attention to design and implementation have
contributed to CLUnet's success. (Author/SWC)

Untangling the Web

Cooperative Web Development and Maintenance

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ED 403 893

Abstract

The process of writing this paper on cooperative web development gave us an opportunity to review where we have been and where we plan to go with the University's web server. Just as our energy waxed and waned in the process of writing our proposal for this session and the final paper, we have seen a similar pattern in tending our web site. The synergy of team development pulled us through both projects. Just as a writer has some vision for what she or he hopes to communicate, so too must a web development team.

The shared goals and vision for our web site came to us in various forms including a meticulous planning process for the University's campus wide network (CLUnet) project. Many people and much hard work laid the foundation for the Board of Regents to approve the CLUnet project in February, 1994. With Internet access limited to the computers in the Library and three modems for dial-in users, life changed dramatically in August, 1994 when every office, classroom and dorm room gained a connection point to CLUnet.

The Internet Task Force has interpreted the CLUnet Project's goals and the vision for technology, and its role in the curriculum and daily lives of the campus community, into the nuts and bolts of implementing: general computing policies, University home page design, hardware and software selection and installation, Web publishing policies for community members, and training design and delivery. The University's web server has evolved into a central component of CLUnet. Our web server has changed the way our clients: do research; learn about campus events and activities; review the undergraduate and graduate catalogues; and communicate with each other. Careful attention to design and implementation along with vision have contributed to CLUnet's success .

Paper

California Lutheran University
Vision 2001
The mission of the University is to educate leaders for a global society who are strong in character and judgment, confident in their identity and vocations, and committed to service and justice.

"By 2001, California Lutheran University will be widely known and highly regarded throughout California and the Pacific and southwestern regions for its strong liberal arts and professional programs, for providing an education rooted in religious and social values, and for graduating students who are prepared for rewarding personal lives and careers of distinction."
-- from California Lutheran University's Strategic Plan

If, as California Lutheran University's (CLU) mission statement proclaims, we are educating students to become "...confident in their identity and vocation" we need to prepare them thoroughly for the technological requirements of their vocations. The integration of technology into the teaching and learning process is now a major academic objective in the University's Strategic Plan which proposes that we infuse technology into the curriculum content, pedagogical methods, and student proficiency standards. The University's mission "to educate leaders for a global society..." has been met by CLU's campus wide network (CLUnet) implementation in several ways, most notably through offering Internet access and providing easy, organized access to quality electronic resources.

Any student, faculty or staff at CLU has access to the Internet and the WWW. But access does not guarantee successful results. Training on how to use a web browser helps but does not ensure successful information retrieval. Web users need to have information literacy training and access to well-organized sites pointing to quality electronic resources. For that reason, CLU's approach to web design and maintenance involves a cooperative, decentralized approach with a clear understanding of what we hope to accomplish with our web site.

Marketing Inside Out

Designers often say that "a camel is a horse designed by committee." CLU is an exception to that axiom. CLUnet, CLU's campus wide network, has proven to be an effective tool for advisement, research, learning, advertising and information dissemination. A working team created a balanced web site which represents all areas of the CLU community. The Internet Task Force includes representatives from the faculty and administration (see attachment A).

When the committee first discussed the CLUnet world wide web home page we concluded that the primary goal was to enhance the on-campus learning, research and communication environment. A secondary goal was to present California Lutheran University in the best possible light to web surfers world-wide with its implicit marketing potential. The belief is held that if we provide the CLU community with a web site of substance, that supports the goals of the University and needs of our local users the world can watch and learn about CLU's commitment to "strong liberal arts and professional programs, and providing an education rooted in religious and social values." This is marketing from the inside out.

Service and Support

Since 1990, plans for the network have included campus-wide access to the library holdings and to the Internet. Internet access was made possible in the fall of 1992 through a grant from the National Science Foundation. Although access was limited to the Library's network and a small 3-port modem pool, a group of early adopters subsequently provided the synergy necessary to realize CLUnet's installation.

Because CLUnet, the Internet and especially the world wide web were foreign to most members of the campus nity, we knew that we needed to seduce them with tools that would be immediately useful. We also wanted to

provide a template with which the academic departments could easily build their home pages. It was essential that academic departments get involved in designing departmental home pages and begin integrating research over the Internet into their curriculum. We also needed to serve students by providing simple tools for planning their academic career, giving easy access to library resources and becoming involved with CLUnet through our web site.

Providing easy access to library resources became the responsibility of the librarians on the ITF. Since these staff members have been on the front line in providing research assistance, they know what types of questions and problems our students need to answer. The librarians have also held responsibility for identifying quality reference print materials, so the librarians could perform the same screening and standard setting for materials presented from the library's section of the University's home page.

Reference staff reviewed many other college and university library home pages. CLUnet's virtual library has two main organizing components: CLU-provided resources and Internet resources. The CLU-provided resources accessible with web browsing tools include: CLU Library holdings (books, government documents, and serials holdings and periodicals (http://oaks2.callutheran.edu/LIBINFO.HTML)); and ABI/Inform, ERIC, Periodicals Abstracts II, and Cambridge Scientific Abstracts via DRAWeb (http://oaks2.callutheran.edu/DBCHOICE.HTML). CLU participated in beta testing the DRA web interface and has successfully catalogued electronic resources that may be accessed from CLU's virtual library. The Web Resources database (http://oaks2.callutheran.edu/WEBRES.HTML) is a work in progress. We have about a dozen records which point to: books online which you can choose to read on screen or download to your own computer; other web pages; and graphic files. The bibliographic database for cataloguing electronic Internet resources is accessible through the DRAWeb search engine with URLs in the 856 field. These links point a resource back to the originating site. The Library also provides a web interface to *Encyclopedia Britannica* and *Books in Print*.

The Selected Internet Resources include:

CLUnet Gopher/Selected Gopher Resources;
Internet Search Tools;
Quick Reference Information such as dictionaries, directories, encyclopedias, etc.;
Resources by Subject Area;
Electronic Publications; and
Other Internet Resources, such as university home pages and other libraries and servers.

Our reference staff wanted to identify quality electronic information sources for their use in responding to questions. They also want to direct students, staff, and faculty to reputable Internet resources. The resources on this page are a beginning point for our users and are being supplemented by additional specific resources identified by department home pages. Our goal is to merge these resources into the Pearson Library WEBRES(ource) database.

Supporting the development of departmental home pages is an important goal for our web site. We created the first one or two directory levels to aid in navigating CLUnet. We also needed to create a CLUnet "look" that would unify all of the CLUnet pages in order to make it clear that the user was still in CLUnet regardless of the level they were visiting.

The Design Process

In May, 1995 the home page committee established an electronic discussion group and began to work on the structure of the home page. The task force compiled a rough list of items to be considered for inclusion on our home page. The list included items we already had online and items found on other university home pages. We grouped similar items together using the following categories:

about CLU [University Profile]
news & events [General Information]
current information [Campus Information]
virtual tour
campus map

campus directory
hotline
jobs

college catalog [Academic Programs]
courses [Course Listing]
class schedules
handbooks
courses, catalogs, handbooks [from Middlebury home page]
academic departments [Faculty]
course-related projects using Internet

administrative departments [Governance]
admissions
university publications
CLU Magazine

radio station/KCLU

student services [student life]
student publications
student organizations

library & information resources [Information Services]
Internet resources
computer services
help desk

After a month of editing, we agreed on the final list:

Campus and Curriculum
    Campus Tour
    Academic Catalogs
    Campus Services - <Note: these link to the Catalog>
    Student Info - <Note: these link to the Catalog>
    Admission Information
    Class Schedules

Academic Departments
    Departmental Home Pages
    Faculty by Major/Department - <Note: these link to the Catalog bios>

Information Resources (Virtual Library)
    Pearson Library
    Selected Internet Resources
    Computer Services

News & Events
    Announcements
    Event Calendars
    News
    CLU Magazine
    KCLU Radio

The Publications Office created an imagemap and hypertext directories based on the list. They linked the pages that already developed and several "under construction" links too. By June 21 the CLUnet's first home page went

online. Since then we have made several modifications, most notably buttons for:

"What's New." (we soon discovered how fast the web can change and grow)

"Departmental Home Pages" -- The added prominence was given to make these pages easier to find and to encourage departments to develop home pages.

"Admission Materials" -- A very successful addition where prospective students can request additional information for all of CLU's academic programs and Undergraduate Applications can be downloaded or filled out online.

"Guest book" -- This has given us valuable feedback on how the server is working, and what users are looking for.

Simultaneous to the development of the home page, Publications created an online version of the Undergraduate Catalog. The highly interactive catalog provides links for all departmental home pages. Thus, departments link to the catalog for course, admission and faculty information allowing the departments to concentrate on creating discipline specific pages for pedagogical use.

Encouragement Through Accommodation

The Publications Office maintains the first level of the home page using the advice and consent of the home page committee for major alterations. The Publications Office is also responsible for the maintenance of all pages representing official university policies, course offerings and degree requirements, and cost information. All other pages are created and maintained by the individual departments within the guidelines of the CLUnet Computer Use Policy and the Departmental Home Page Policy (see attachments B and C). The Publications Office and the Office of Information Systems and Services (ISS) encourage departments to create and maintain home pages through training and support. ISS offers workshops on Netscape and HTML. Publications provides a set of graphic images and creates special graphics when needed. Headers, standard buttons, and backgrounds are created by the Publications Office.

To maintain design unity the departments are encouraged to use an existing departmental home page as a template. The Philosophy home page, the first departmental home page to be created after the CLUnet Web Site officially went online, is often used as a template. Graphic elements are linked to a central directory to ensure consistency and maximum efficiency in file storage.

First time departmental home pages are submitted to the Publications Office for design advice including placement of graphics, busyness, and visual effectiveness before placement on the CLUnet. The Publications Office reviews the page and checks the links and graphic elements. The Publications Office makes minor corrections or returns the home page to the department for major repairs. Once the home page is ready, the Publications Office places it on the server, links it to the CLUnet home page, and enters it on the "What's New" page. Updates are generally handled in the same manner.

The ISS and Publications Offices also teach departmental web developers how to maintain their own home pages. Once the publications staff is confident that a department will properly maintain their page, the system administrator creates a directory with access privileges allowing the department to maintain their own home page without further assistance.

Although there is no systematic review procedure practiced by the Internet Task Force or Home Page Committee, pages are checked periodically and comments from the CLUnet are monitored and forwarded to the appropriate department. If policy issues arise, the chair of the Internet task force is charged with enforcement. The director of publications is responsible for graphic or university image concerns.

Design Considerations: Keep It Simple

developing a home page on 110 megahertz Power Macintosh with a T-1 link, and a browser loaded with

plug-ins, it is easy to forget the difficulty the average user with a 14,400 modem link might have. Although band widths are increasing and new browser s support Java, frames and other exciting features, we try to design the CLUnet page with the lower end user in mind. This means keeping it simple.

Buttons over image maps -- Except for the Home Page where the graphics of an image map sets a tone for the University's Web Site, and of course, a campus tour imagemap.

Small graphic over large -- Four or five small graphics can load faster than a single large graphic.

Text alternative directories -- Some visitors still use telnet and Lynx

Reducing the Color palette -- More color equals slower download.

Minimal use of frames. -- The catalog index might be one of the few logical uses of frames

Java and Shockwave -- We are still experimenting. Drama, Music and KCLU radio are ideal sites for these applications. Educational multimedia applications are also ideal a good match.

Direct questions or comments about this page to webmaster@library.ucsb.edu .

| Search "Untangling" Papers | "Untangling the Web" Home | InfoSurf Home |

This is an official University of California, Santa Barbara Library web page.

Untangling the Web

Untangling the Web: Cooperative Development and Maintenance

(continued)

Michael Adams, Julius Bianchi, and Carole Thompson

Life Backstage

Choosing a web server for your hardware is more complex than a few years ago, because of the expansion of variety of possibilities. It was once simple to find what would run on your operating system, download both, and run whichever was easiest to configure. Once running, they served hyperlinked text and small simple graphics. Now, we: serve forms, imagemaps, and search engines; require security and encryption; operate around the clock; worry a great deal more about unauthorized access and keeping ahead of the users, and have plans for the future.

Two years ago there was no web site at CLU. The systems manager selected a familiar software--the NCSA http server--for the University's web server. The decision to install NCSA http server pre-dated the Internet Task Force and was made without any consensus. Our needs have changed dramatically since then, and we have now decided to move to the Netscape Commerce Server, to incorporate encryption as our users submit or receive sensitive data over the web. This decision was made differently, having been the suggestion of the Director of Publications to consider another server. He is more involved with a variety of units who are developing the mechanisms we use to deliver information to and receive from users. After review by members of the ITF, the system manager proceeded to contact Netcom and make the arrangements for use of the software, and is now planning the migration.

Server installation and setup involve a variety of elements. When setting up a web server, a site must have a TCP/IP and network connection. Aliases must be added to the DNS (domain name service) for the host server allowing the web server host machine to be referred to as "www" or any other name. In CLU's case, we also registered a domain alias with Internic, so that we are not only www.callutheran.edu, but www.clunet.edu.

Increasingly, security for a server is becoming an issue as data submission through the use of forms becomes common, and as we expand our use of the web for data retrieval of a sensitive nature, as in the case of delivering student data or library "has" or fine lists. Some directories are restricted to our internal domain, in other instances, data retrieval should be restricted to password access. Some of the access restrictions are included in the server software setup and configuration and others become a part of the CGI or perl scripts that must be written for custom applications. The extent to which a site uses scripted routines may prompt a decision about hiring or training someone to program scripts. In time, availability of commercial scripts and other programs will increase allowing users to buy off-the-shelf programs rather

than having to develop custom programs in-house.

Maintenance of the server is largely left to the administrator, although experience is teaching our group that some issues need review by the Task Force, especially when users "push the envelope". Naturally, a site must implement routines so that the software is started up whenever the machine recycles, but checker routines will verify that the server's processes exist in the machine's process table, and alert an administrator if it falls out for any reason.

Performance is becoming a particularly vulnerable issue as our campus increases its use of and dependence on our web server. Better performance as well as the addition of new features is a reason to keep up with upgrades and patches for the server software and is a key issue in development and expansion. Obtaining statistics from the server logs involves obtaining and installing the statistics software, coordinating its use by groups or units on campus, and automating report generation. Logfiles must also be regularly moved off the system, and restarted to keep disk space optimized, and to speed the collection of usage data for statistics. Backups of data are included with the overnight routines, but individuals who painstakingly create and update pages should be encouraged to keep copies of their work. Individual backups are easily made if web authors are editing on local PCs and uploading to the appropriate directory on the central server. Upgrades to existing software are generally low-impact. As the technology changes, migration to a second generation server may occur. Moving to another software is far more complex, particularly when serving several thousand pages every day. Someone always seems to need access to the system.

The development of the subdirectory structure containing documents, graphics, and script and program files needs careful thought so that it will evolve well as the site grows in complexity and volume. CLU has created two principal types of directories, departmental and topical, which reside in a specific file partition dedicated to the campus wide information system. General campus page files are owned by their creators, with group ownership which permits fixes or modifications under urgent circumstances by any member of the team group. Departmental pages are owned by a designated departmental maintainer but again obtain oversight by the core development team by having ownership set to the core team group ID. Symbolic links are added to the designated maintainer's login directory, to facilitate changing directories and eliminating the need to use and remember the rather long and tedious absolute pathname(s). Many users have developed personal pages in the public_html, but none of these are linked to the campus pages.

Another issue is one of decentralization and the extent to which it is encouraged if users have sufficient sophistication. To this point, we have a minimal level of decentralization, although it is an area which begs attention. We have three "official" web servers at CLU: two are run by ISS, one by the Computer Science Department. Unofficially, we have only a handful of known staff and students who have installed server software on PCs. Decentralizing makes hardware issues and software issues more critical, in terms of the workstation equipment hosting the departmental pages. Who maintains them? Who decides what server software? Who is responsible for the backups? Do the advantages outweigh the disadvantages? Do individual machines receive domain name configuration, students as well as departmental machines? These issues will be most appropriately decided by the Internet Task Force.

Net Results

During the 1995-6 school year, 1,056 students (CLU headcount 2800) received bibliographic and information literacy instruction in 68 sessions taught by the Office of Information Systems and Services. During the fall of 1995, the faculty were surveyed on their instructional uses of CLUnet. Twenty-four faculty responded to the survey. Of this group, fourteen let students respond to a survey designed to measure student perception of educational technology. In the student survey (N=252), over two-thirds of the students reported that Internet resources frequently: (1) supported the content of the course; (2) were easy to

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find and use; (3) allowed them to explore new avenues of information; and (4) provided tangible results.

On a similar set of questions about University-provided electronic information resources, over 50% of the students reported that these resources frequently or always: (1) supported the content of the course; (2) were easy to find and use; (3) allowed them to explore new avenues of information; (4) and provided tangible results (Crowe et al. 1996).

Ten departments link to the University's home page and a variety of other electronic resources have been published. These include on-line syllabi:

- http://www.clunet.edu/~schwarz/afrolit.html
- http://robles.callutheran.edu/~crowe/edcs.html
- http://robles.callutheran.edu/~karayan/503.html
- http://robles.callutheran.edu/~karayan/512.html

connected to the course in the on-line catalogues, electronic text books (http://robles.callutheran.edu/~crowe/tofc.html also connected to the catalogues) and most recently the *Hedda Gabler* page (http://robles.callutheran.edu/~arndt/Hedda/heddam.html) complimenting the Drama Department's spring production of that play. (Theater goers could browse, read, and learn before and after the performance and during intermission. The cast also used the page to learn about the play. Any student, faculty, staff, alumni, or cyber-citizen can also review the *Hedda Gabler* material.)

Since the installation of CLU's home page, we have seen phenomenal changes in the frequency of home page hits. Data from the past three quarters show steady increases in hits to our home page. The Quarter 3 shows dramatic growth since the beginning of t he academic year as noted in Table I.

Table I - Number of Home Page Hits, Sept. - Dec. 1995			
Quarter 1.	**Quarter 2.**	**Quarter 3.**	**Total**
115,524	227,429	296,210	639,163

While the University has only offered CLUnet accounts to currently enrolled students, faculty and staff, the web site has been a means of staying connected or getting re-connected with alumni and friends of the University. Several issues of the *CLU Magazine* (http://robles.callutheran.edu/cgi-bin/imagemap/CLUmap?383,309) have also been electronically published via our web server. We are also promoting the University's Public Radio station (http://robles.callutheran.edu/htdocs/KCLU/KCLUindex.html). Guests from external domains have increased over the past nine months as seen in Figure I.

Figure I: Guests from External Domains to the CLU Home Page

2/24/97 9:09 AM
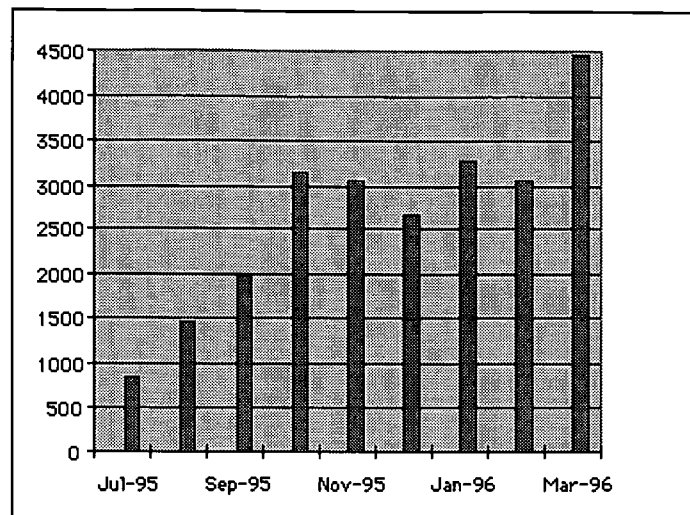
Home Page Evolution

To help the home page committee make recommendations for reorganizing the first level and maybe the second level of the CLUnet directories, we may organize the directories with the user in mind by creating virtual sites like "Student Union," "Library," "Faculty Center," etc.

We have a "Visitor's Center" (http://www.clunet.edu/htdocs/NEWnet/SiteGuide.html) under construction which will contain the Campus Tour, Frequently Asked Questions about CLU and CLUnet, Viewbook, and Cultural Events and Lectures. The "Visitor's Center" will be a promotional site for CLU.

We are also exploring the distribution of some inventory pages and "downloadable CLUnet bookmarks," as potentially useful additions to CLUnet in aiding lost users find there way around our tangled web. Specifically we need to refine where we place new information and how to help visitors find it. For example, soon we will have a student employment opportunity page with sub categories for off-campus, on-camp us, internships, etc. Additional future offerings include: an Alumni Page and Class Schedules (Undergraduate Programs), and we will be updating the Undergraduate Catalog.

The number of pages is growing with many interesting and useful additions that are often getting "lost," only to be found on the "What's New" page. While the site needs to be dynamic, the overall design must be consistent over time to ensure that users can find the information that they have viewed in the past. When an item is placed on the "What's New" page, the development team needs to identify where the item will reside and let the user know where that item will reside after it is not so "new." The task force has not identified the appropriate length of time that things remain on the "What's New" page.

The library software (Data Research Associates) will soon provide library users with account information using a "PIN" which will support on-line holds, individual borrower record, and book renewals. The administrative information system (Datatel) will support student queries for degree completion history and academic performance. We also expect to process change of address and course add/drops over the web server and perhaps offer classes over the net. CLUnet's ultimate success will come with more interactive services for students, faculty and staff. A web developer's job is never done.

References

Judith Crowe and Silva Karayan, "Meaningful Support in Smaller Colleges" (Rohnert Park, CA: Syllabus '96, 1996), 4, draft photocopy.

Attachment A

Internet Task Force Membership

Faculty
Micheal Arndt, Associate Professor of Drama
Andrea Huvard, Assistant Professor of Biology and Director of the Center for Instructional Multimedia
Peter Mickelson, Assistant Professor, Office of Information Systems and Services (ISS)
Nathan Tierney, Chair and Associate Professor of Philosophy
Joan Wines, Assistant Professor of English

Administration
Michael Adams, Director of Publications
Julius Bianchi, Director of User Services, ISS
Lynda Fulford, Director of Public Information
Mark Lager, Coordinator of Information Resources, ISS
Lucy Rodriguez, Registrar
Allen Scott, Director of Institutional Research
Carole Thompson, Systems Manager, ISS

Attachment B

California Lutheran University Computer Use Policy

http://www.clunet.edu/htdocs/iss/cup.html

Attachment C

Departmental Home Page Policy

By publishing a departmental page, the author(s) agree to:

- abide by the rules of the CLU Computer Use Policy
- follow the University guidelines for design and interface conventions
- maintain the page (keep it up-to-date)

Departmental pages must use the following interface conventions:

- link to the official catalog information that is maintained by the Publications Office when providing

policy, core requirements, course listings, faculty profiles or any other catalog information;
- link to schedule information published by the registrar or publish only after receiving approval from the registrar;
- use the official template and graphics.

Before being electronically connected to the CLU Home Page, Departmental Pages must be reviewed by the Internet Task Force and where appropriate, University Relations Office.

Once linked to the CLU Home Page**, Departmental Pages will be reviewed periodically by the Internet Task Force and University Relations Office to check that the Departmental Page is still in compliance with University policy.

*The University Relations Office/Publications Office is charged with the responsibility of ensuring that all published material, in any form, printed or electronic, accurately presents the University with a high level of professionalism and reflects the Mission of the University with a high level of professionalism and reflects the Mission of the University. The reality is that neither University Relations nor Publications Offices have the human resources to review every document, however those offices s till maintain the authority to edit, rewrite and redesign material that is determined not to conform with University editorial publication standards.

**PROCEDURE: Once approved, Departmental Pages will be placed in a directory on robles where University Publications Staff and the System Administrator(s) have authority to share the Departmental Pages. Departmental staff will submit updated files to University Publications or ISS for posting.

Faculty/Staff Home Pages

By publishing a faculty/staff home page, the author(s) agree to:

- abide by the rules of the CLU Computer Use Policy
- maintain the page (keep it up-to-date)

Faculty/Staff may place home pages in their robles account.

Student Home Pages

Students can publish home pages through the computer science department. These pages may not be linked to or point to the California Lutheran University home page. The page must follow California Lutheran University Computer Use Policy and be kept up-to-date.

Direct questions or comments about this page to webmaster@library.ucsb.edu.

| Search "Untangling" Papers | "Untangling the Web" Home | InfoSurf Home |

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Office of Educational Research & Improvement (OERI)
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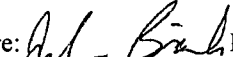and other optical media (Level 1).

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