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Benchmarking: a tool for Web site evaluation and improvement

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Keywords

Benchmarking, WWW, Information systems

Abstract

Although benchmarking has touched many areas of an organization, including information systems, very few examples are available on how this powerful methodology can be used to specifically address one of the fastest growing elements within information systems – the World Wide Web. This paper presents a case study on how benchmarking was used to determine how one organization's Web site compared to Web sites of related schools and professional organizations. The results of the benchmarking study provided a measure of how our Web site compares to the sites of related organizations, ideas on how we may further enhance our site, and also a way to regularly evaluate our site.

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Since Robert Camp's text on benchmarking appeared in 1989, benchmarking has enjoyed increasing popularity and found its way into a variety of organizations. Companies are using benchmarking to improve many areas including human resources, information systems, customer processes, quality management, purchasing, and supplier management (Elmuti, 1998).

The overall goal of benchmarking is to discover the "best practices" of other organizations and to find ways to integrate these practices into one's own operations. The obvious advantage of this approach is the relative ease and speed with which improvements can be identified and adopted (Cox and Thompson, 1998).

Although benchmarking has touched many areas of an organization, including information systems, very little information is available on how this powerful methodology can be used to specifically address one of the fastest growing elements within information systems – the World Wide Web. Today's Web sites are much more than simple graphically-oriented hyper-text and are becoming key entry points for customers and clients of an organization. Webmasters and information systems managers charged with administering a Web site need to know how an organization's Web site compares to other sites and also what new functionality and features are needed to maintain an edge.

In order to value Web sites, measurement approaches and devices beyond traditional methods have been explored because merely counting "hits" on a page is not an accurate measure of quality or success of a Web site (Murray, 1997). Site tracking software offers one means to go beyond simply counting visitors to tracking and evaluating who your visitors are and how they are using your site. Data collected from monitoring logs can help identify most frequently accessed pages and what are the peak usage times and days (Abramson, 1998). To truly value a Web site, however, measurable objectives need to be defined, which are tied to an organization's business objectives, and then these need to be accurately assessed (Ligos, 1998).

Based on the strong track record of benchmarking, its connection to and use of an organization's objectives, and the growing need

to evaluate Web sites from a strategic perspective, a Web benchmarking study was undertaken. The purposes of this study were to evaluate the appropriateness of benchmarking within this context as well as to discover the “best practices” of organizations related to this study’s sponsor.

Background information

In 1995, the College of Business at Northern Illinois University (NIU) launched its initial Web site. The goal of the initial site was simply to provide an easy-to-access and centralized resource to share general information about the college and its academic programs. Since that time, the college’s Web site has grown significantly and by 1998 had expanded to a point where practically every facet of the college’s environment was touched and/or supported by a Web page.

The growth and expansion of the Web occurred both due to a strong push by the information systems group to expand the Web in any direction that offered the least resistance as well as in response to those departments, offices, programs, or people who demonstrated the strongest interest and commitment to using the Web. Although not the most organized approach, the manner in which the college’s Web site expanded provided a means to expand quickly and also made use of pockets of support that interested and committed departments and offices could offer.

By 1998, with the majority of the college represented on the Web and the college’s internal and external audience more or less committed to the Web as a major entry point to obtaining and disseminating information about the college, the information systems group initiated the benchmarking study described here.

Methodology

As mentioned previously, one of the driving forces behind this benchmarking study was to research new ideas for methods, practices, and processes that could be implemented to improve the college’s own Web site. The college’s strategic planning process had identified the Web as a key area of technology to advance

communications in the College of Business. The benchmarking process would help develop metrics and practices related to the College of Business’ Web site.

The simplified benchmarking process that was followed had four main parts:

- (1) identification of Web sites against which to benchmark;
- (2) development of metrics;
- (3) application of metrics; and
- (4) development and implementation of new processes and practices.

Each of these parts will be explained in greater detail in the following sections.

Identification of Web sites

Following a “functional benchmarking” approach (Cox and Thompson, 1998), target Web sites of other colleges and universities were identified based on a relationship or connection to the College of Business at NIU. Unlike competitive benchmarking, where sites of direct competitors are used, functional benchmarking considers organizations that have something in common with one’s own organization. These organizations may be competitors, but they also could be organizations in totally different industries but which have some connection to the organization being benchmarked. This functional approach does not preclude using competitors, but overall considers a broader range of organizations. In the case of this study, both schools and organizations were identified which had some commonality with the College of Business and/or NIU.

The school sites included in this benchmarking study were selected because they were considered schools against which the College of Business is frequently compared, sometimes competes against, or because they were schools from where business faculty received their degrees. Specifically, the schools were identified using the following criteria:

- alma maters of College of Business graduate teaching faculty;
- 1994-1997 GMAT score recipient when NIU was also specified;
- 1997-1998 AACSB salary survey report of schools comparable to NIU.

A total of 45 school Web sites were identified based on the above criteria and are listed in Table I.

Table I School Web sites

School	Web site address
Arizona State University	www.asu.edu
Aurora University	www.aurora.edu
DePaul University	www.depaul.edu
Dominican University	www.rosary.edu
Eastern Illinois University	www.eiu.edu
Florida State University	www.fsu.edu
Georgia State University	www.gsu.edu
Illinois Benedictine College	www.ben.edu
Illinois Institute of Technology	www.iit.edu
Illinois State University	www.ilstate.edu
Indiana University	www.indiana.edu
Iowa State University	www.iastate.edu
Keller Graduate School of Mgt.	www.keller.edu
Kent State University	www.kent.edu
Lake Forest Graduate School of Mgt.	www.lfgsm.edu
Lewis University	www.lewisu.edu
Loyola University	www.luc.edu
North Central College	www.noctrl.edu
Northeastern Illinois University	www.neiu.edu
Northwestern University (Evanston)	www.nwu.edu
Ohio State University	www.ohio-state.edu
Pennsylvania State	www.psu.edu
Purdue University (West LaFayette)	www.purdue.edu
Roosevelt University	www.roosevelt.edu
Southern Illinois University	www.siu.edu
Stanford University	www.stanford.edu
State University of NY (Binghamton)	www.usb.edu
Syracuse University	www.syr.edu
Texas Tech University	www.texastech.edu
University of Chicago	www.uchicago.edu
University of Florida	www.ufl.edu
University of Illinois	www.uiuc.edu
University of Illinois (Chicago)	www.uic.edu
University of Iowa	www.uiowa.edu
University of Kansas	www.ukans.edu
University of Kentucky	www.uky.edu
University of Missouri	www.missouri.edu
University of Nebraska	www.uneb.edu
University of North Dakota	www.und.edu
University of North Texas	www.unt.edu
University of South Carolina	www.uscs.edu
University of Texas	www.utexas.edu
University of Wisconsin	www.wisc.edu
Virginia Polytechnic Institute	www.vt.edu
Western Illinois University	www.wui.edu

In addition to schools, organization Web sites were identified for all members of the College of Business' Board of Executive Advisors. Members of the board serve as industry contacts and consultants to the college and often are called upon to provide input on strategic issues related to the college. Thirty-four organizational Web sites were selected by identifying the Web site affiliated with Board of Executive Advisory members' companies. Table II lists the organizations included in the study.

Table II Organization Web sites

Organization	Web site address
3M Logistics	www.3m.com
Allstate	www.allstate.com
Aon Risk Serv. Of Illinois	www.aon.com
Applied Power Inc.	www.appliedpower.com
Arthur Anderson LLP	www.arthuranderson.com
CNA Financial Insurance Group	www.cna.com
Consumer Television Prod. Co.	www.sony.com
DeKalb Genetics Corporation	www.dekalb.com
Deloitte & Touche	www.deloitte.com
Destiny Enterprises	www.destny.com
DSC Logistics	www.dsclogistics.com
DuKane Corporation	www.dukane.com
Ernst & Young LLP	www.ey.com
Edward Jones & Co.	www.edwardjones.com
Elco Textron	www.elcotextron.com
Eldean Shipyard & Yacht Sales	www.eldean.com
Greenbrier & Russel	www.gr.com
Greenlee Textron, Inc.	www.greelee.textron.com
Hewlett-Packard Co.	www.hp.com
Hinz Lithographing	www.hinzlitho.com
Ideal Industries, Inc.	www.ideal.com
KPMG Peat Marwick	www.kpmg.com
Micro Switch Honeywell Inc.	www.honeywell.com
Motorola, Inc.	www.mot.com
Nalco Chemical Company	www.nalco.com
Northern Illinois Gas (NICOR)	www.nicor.com
Safety-Kleen	www.safetykleen.com
Sara Lee Corporation	www.saralee.com
Square D Company	www.squared.com
Sundstrand Corporation	www.sundstrand.com
TechForce, Inc.	www.techforce.com
The ServiceMaster Company	www.servicemaster.com
Thomas & Betts European Centre	www.thomasbetts.com
Uarco Incorporated	www.uarco.com
Walgreen Co.	www.walgreens.com
Wallace	www.wallace.com

Development of metrics

The metrics used in this benchmarking study included both absolute and relative measures. The absolute measures were those factors and variables related to a Web site which have more universal importance to people who visit a Web site. For example, how fast does the main page of the Web site load? Does the Web site load and function without the need to download any plug-ins? Does the site provide text-based navigation for users who may have a slow connection or poor graphics ability? All of these are examples of metrics which are pertinent whether the visitor to a Web site might be a current student, a faculty member, or a company considering recruiting at a school. Web site assessment tools often focus on these types of measures (Evans and King, 1999).

The relative measures consider the target audience when applying the metric. For example, the ease of finding information on a Web site may be perceived differently by a prospective student compared to a current staff or faculty member. While several groups may have similar perceptions and opinions regarding Web site features, evaluating a Web site from each group's perspective would ensure that subtle differences are not overlooked or ignored. Table III lists the potential users (and perspectives) from which Web sites could be evaluated. This list of potential users was generated based on who the College of Business perceives as stakeholders in their environment. Having just completed rigorous strategic planning sessions, the list reflects those individuals and groups that were identified by the college as groups that are most important in the college's operations and integral to the success of the college's strategic goals. The successful application of benchmarking depends on both the presence of a mission or vision for your organization as well as the recognition of the potential users or target audience (Burch, 1999).

Table IV includes a list of the specific metrics developed and used in this study along with an explanation of each one. Figure 1 is a copy of the evaluation form used that shows how these metrics were translated into items for the site evaluator to use. Generally, the metrics can be broadly divided into three categories:

(1) functional/navigational issues;

Table III Potential users from whose perspective Web sites could be evaluated

Current NIU students (undergraduate, graduate, SAL)
Current COB NIU students (undergraduate, graduate)
Current non-NIU college students (junior college, undergraduate, graduate)
High school students
Past COB students (alumni)
CPA potential candidates
EMBA potential students
CPE companies desiring training
CPE potential students
COB faculty
COB staff
Non-COB NIU faculty
Non-COB NIU staff
Parents of students
Potential employers of COB students
Current employers of COB students
Potential alliances of COB
Other schools
Potential donors to COB

(2) content and style; and

(3) contact information.

The metrics reflect both what are generally considered important components and features of Web sites by typical users (i.e. fast load times, easy navigation) as well as features that visitors to our site have indicated were important (i.e. easy means to locate a faculty member's e-mail address and phone number).

Application of metrics

Using the evaluation form all sites were visited and reviewed between July 1, 1998 and August 4, 1998. All sites were visited by the same person who was both a graduate student and an employee of the College of Business. Her evaluations were done from the perspective of a student although many of the issues transcend the view of the site visitor (i.e. load time). The sites were visited via a dial-up connection to the Internet using a 56K speed modem and a computer. Evaluations were completed throughout the day and week. Figure 2 shows a sample of the College of Business' current page and some of the specific areas of the page which were evaluated.

Table IV Metrics used

	Description
Functional/navigational metrics	
Finding e-mail/phone numbers	Was finding an e-mail or phone number easy to accomplish?
Finding school main page	Was finding the business school's main page easy? OR Was finding a division's main page for a company easy?
Speed of finding main page	Could the business school's main page be found quickly? OR Could a division's main page be found quickly for a company?
Subpage loading speed	How fast did subpages load?
Uniqueness of functionality	How well did the site offer unique functionality?
Ease of overall navigation	How easy was the overall navigation around the site?
Ease of returning to main page	How easy was it to return to the main page?
Content and style metrics	
Counter	Was a counter provided on main page?
Currency	Was the date of last update provided on main page?
Effective use of color	How effectively was color used on the main page?
Effective use of graphics	How effectively were graphics used on the main page?
Color consistency	How well was color consistently used throughout the site?
Style consistency	To what degree did the entire site have a similar look/feel?
Wording	How professional was the wording of text on pages?
Contact information metrics	
E-mail contact	Was an address to e-mail for additional information on main page?
Site maintainer	Was a site maintainer address on main page?
Phone number	Was a phone number provided on main page?
Mailing address	Was a traditional mailing address provided?
Locating people	How easy was a contact person to identify on most pages?

Since one of the areas studied was the ease with which a site could be found via the main Web search engines, the first step was to perform a search for the desired site. One of the following seven search engines was used to find the Web page:

- (1) AltaVista;
- (2) Excite;
- (3) Infoseek;
- (4) LookSmart;
- (5) Lycos;
- (6) Netscape;
- (7) Yahoo.

The search engine was selected by clicking on SEARCH and using whatever search engine appeared. This approach resulted in a generally even distribution of use among the seven search engines. This approach to selecting a search engine was used since this is most likely way a visitor to a Web site would begin their search for a school or an organization.

The formal/full name of the organization or school was entered as the keyword in the

search. If the target site was listed in the top 50 matches, the specific number of the entry in the list of matches was noted. If a site related to the target site (i.e. academic department, athletics page) was listed in the top 50 matches but the main page of the school or organization was not specifically listed in the top 50, a rank of "≈50" was recorded. The assumption was made that the main page would eventually have made the list of matches despite not being in the top 50 matches. If neither the main page nor any related pages to the organization were found in the top 50, an entry of "NF" (not found) was entered. Eleven of the schools and ten of the organizations were listed in the top 10 matches using the search engine. Once a site was fully loaded, the evaluation form was completed.

Results of study

All sites visited scored fairly well using the metrics defined in this study. The highest and

Figure 1 Audience-independent evaluation form

☐ School ☐ Organization

School/Organization Name _____

Web Site Address: _____

Date: _____ Time: _____ Evaluator: _____

Browser Used: _____ Type of Internet Connection: _____

Type of Computer Used: _____

Search engine used: _____

Main page was number _____ on list of finds or check here if not found ☐

Speed with which main page completely loaded: _____ (secs)

Speed with which main page loaded enough to navigate to another page: _____ (secs)

Contact e-mail for company or school
Add'l information address was on the main page ☐ Yes ☐ No

Site maintainer address was on main page ☐ Yes ☐ No

Phone number provided on main page ☐ Yes ☐ No

Mailing address provided ☐ Yes ☐ No

Counter was provided on the main page ☐ Yes ☐ No

Date of last update provided ☐ Yes ☐ No
If provided, when _____

I could find the e-mail or phone of a
faculty/salesperson easily ☐ Yes ☐ No

I found the school of business main page easily ☐ Yes ☐ No

I got to the school of business main page quickly ☐ Yes ☐ No

	Strongly Agree			Strong Disagree	
Color was used effectively on main page	1	2	3	4	5
Graphics were used effectively on main page	1	2	3	4	5
Color was used consistently throughout site	1	2	3	4	5

(Continued)

Figure 1

The entire site had a similar look and feel to it	1	2	3	4	5
Load time for subpages was fast	1	2	3	4	5
Unique functionality (i.e., mouse over) was used	1	2	3	4	5
Wording on the pages was very professional	1	2	3	4	5
Wording on the pages was very conversational	1	2	3	4	5
A content contact person was easy to identify on most pages	1	2	3	4	5
I could easily find my way around the site	1	2	3	4	5
Returning to main page of site was easy	1	2	3	4	5

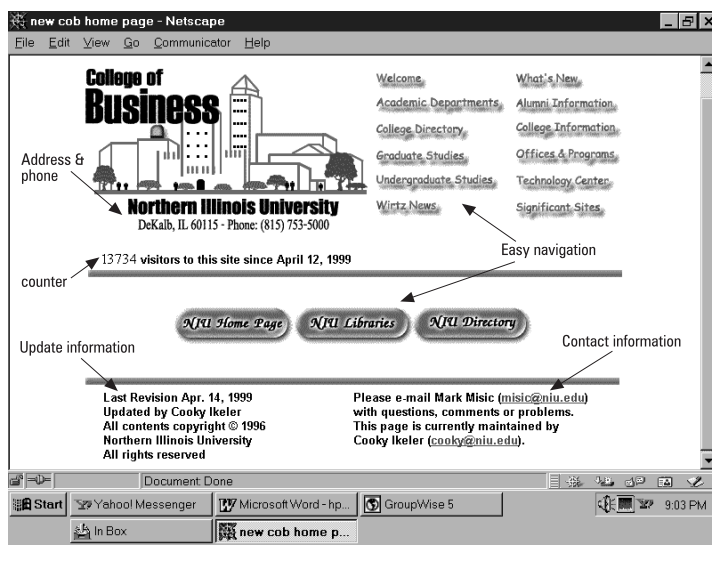
Additional Comments: _____

lowest overall rating differed by a relatively small margin. Since the main purpose of this study was to provide information for the College of Business to use internally in improving their own Web site, detailed listings of the individual school and organization scores are not provided here. One of the strengths of benchmarking is the ability to customize the evaluation to the organization and situation at hand. For example, the metrics used in this study were identified and selected because they fit with what stakeholders of the College of Business at NIU perceive to be important. The most valuable output from this study is not the ability to say that our college ranked the best,

worst, or average, but to see how we compared to related sites and to identify other strong sites whose ideas and practices could be adopted to improve our site even further. In addition, since Web sites evolve (and typically) improve, the overall ranking would only be valid for the period when the evaluations were completed.

Table V presents summary data on the results of the study. Overall results for the schools, organizations, and schools and organizations combined are shown along with the score of Northern Illinois University's and the College of Business' sites. These results are summarized and discussed in the following sections, which correspond to the broad areas previously

Figure 2 Sample main page assessment



identified as: functional/navigational issues; content and style; and contact information.

Functional/navigational issues

The criteria and metrics used in this area revolved around both speed and ease of navigating through a site. The speed with which the main page loaded completely as well as the speed with which the main page loaded enough to allow navigation was assessed. The range of values was from five seconds for the fastest sites to 90 seconds for the slowest school site and 71 seconds for the slowest organization sites. Typically those pages where the whole page loaded quickly were also those sites which were also navigable quickly. The average load time

for all schools was somewhat faster than for organizations (22 seconds versus 31 seconds). NIU's main page loaded faster than the average (20 seconds) but the College of Business site was even better, loading in just 10 seconds.

The load times for subpages were also evaluated more or less as a whole using a subjective rating system. Generally, sites whose main page loaded quickly also had subpages that loaded fast. Besides speed issues, simple navigational quality was assessed. Since the focus of this study was on other colleges of business, the ease with which the business school's main page was identified was one metric used. In addition, an assessment of how easy it was to navigate around the site, how easy it was to return to the main page of the site, and last, how easy it was to navigate the site to find the e-mail of a particular person, were completed. Overall, the navigational quality of the sites was slightly higher for organizations compared to schools, but both were evaluated fairly high. NIU's main page was slightly better than the overall average. The College of Business site was one of the sites that received the highest possible rating in this area.

Content and style

The content and style of each Web site was evaluated in terms of both currency as well as presentation. The date appearing on the main page was used as an indicator of how frequently main pages were updated. For those sites that included a date, two-thirds had updated the main page within the last 45 days. More sites

Table V Summary of results

Measure	Schools (n = 45)	Organisations (n = 34)	Total (n = 79)	NIU	COB
Found w/search engine (top 10) (%)	24	29	27	No	No
E-mail on main page (%)	47	79	61	No	Yes
Phone on main page (%)	38	35	37	Yes	Yes
Mailing address on main (%)	42	24	34	Yes	Yes
Counter on main page (%)	4	3	4	No	Yes
E-mail of faculty/salesperson (%)	76	50	65	Yes	Yes
Internal search engine (%)	76	53	66	No	No
Load time (avg) ^a (sec)	22	31	26	22	10
Graphic design rating (avg) ^a	1.72	1.51	1.63	2.25	1.25
Navigational/functionality (avg) ^a	2.29	2.02	2.15	2.25	1.00
Professional wording (avg)	1.66	1.43	1.56	1.50	1.00

Notes: ^a on a scale from 1 to 5 with 1 being the best/highest

did not include a date on their page than did include one so evaluating currency was difficult. The ease with which people-related information could be found was evaluated and schools scored much higher than organizations in making it easy to find an e-mail address of an individual.

The use of color, graphics, the integration of these two elements of design, and the wording, were evaluated for all sites. Both schools and organizations scored very high with respect to their overall designs and use of graphics, but the organization sites were of a slightly higher quality than the school sites. Similarly, organizations' pages were evaluated as being worded more professionally than schools, but both groups were rated fairly high. NIU's site and the College of Business site were both rated better than the average for all schools and organizations.

Contact information

Since Web sites are often entry points to a school or organization and visitors typically want to know who to contact for more information, the ease with which a visitor could contact someone at the school or organization was evaluated. A contact e-mail address was more often found on an organization main page than on a school page (less than 50 per cent of the schools provided a contact while 75 percent of the organizations did). Both groups scored poorly on providing an alternate means of contacting them (i.e. a telephone number) with only about a one-third of them providing a phone number on the main page. Schools were better when it came to providing a mailing address (42 per cent provided this on main page) while organizations provided this less than 25 per cent of the time. Both NIU and the College of Business main pages included this information.

Top site generalizations

Although there were many stylish and interesting Web sites, there were several sites that could be chosen as "top sites" due to their unique functionality, design, or combination of the two. Some of the characteristics of the top sites included:

- a search engine within the site;
- easy navigation within the site often via a side frame which was present throughout the site;
- a contact e-mail address either for the school/organization or at least for the Webmasters maintaining the site on the main page as well as subpages;
- use of school/organizational colors and/or design throughout the site;
- a text-based option on the main page (for people who are using a browser that does not support graphics or who prefer text-based navigation); and
- graphics which enhanced the site's functionality without overdoing it and detracting from the overall design.

Summary and conclusions

One of the main purposes of this benchmarking study was to determine how the College of Business's Web site compared to Web sites of related schools and professional organizations. In addition, the study sought to identify the features and capabilities of top Web sites of schools and organizations which are affiliated with the College of Business at NIU to generate ideas which could be implemented on the college's own site. The results of this study have shown that the College of Business's Web site scored very well – well above average in many respects. In terms of the functional and navigational metrics studied, the results of the benchmarking analysis showed that our site performed as well as (or better than) those sites of related schools and organizations. Load times were excellent as well as navigation around the site. With respect to the content and style of our site compared to those included in this study, again we found the level of quality of our site to be at least at a level of related sites, often evaluated even better. And last, concerning contact information metrics, our site provided contact information throughout the site and also provided a simple means for visitors to locate people affiliated with our school but not necessarily with a Web presence. Overall, this aspect of the benchmarking study provided us with a measure of how we compared presently, and provides a set of

metrics that can be used periodically to ensure the level of quality is maintained on our site.

If our analysis and application of the results from our benchmarking effort stopped at that point, all the benefits of the benchmarking process would not be realized. Besides providing a means of assessing the current College of Business Web site, the benchmarking process has provided valuable information and ideas on how organizations and schools related to the College of Business have been successfully using the Web. Ideas on how we might improve our site's functionality as well as design approaches will be used as part of the ongoing updating and expansion of the college's Web site. How to effectively incorporate a search engine within our site, how we can enhance navigation through simple additions to existing pages, and ways in which to organize information are all examples of features of top sites that can now be applied to our own site. The benchmarking process pushed us to more closely look at a wide variety of related sites and this review process helped generate new ideas that would have taken much longer to conceive on our own.

The next phase of benchmarking will focus more on the different target users of the college's Web site. In order to complete this phase, representatives of the various stakeholders in our environment would need to complete an evaluation process similar to what has been done here by a student of the college. These additional evaluations would reflect the needs, preferences, and attitudes of the group which the individual was representing.

Although the current benchmarking study has provided valuable information, the process is not complete. A schedule and mechanism for regularly evaluating and updating the College of Business's Web site in light of changing visitor needs and interests is an important continuation of this study. In addition, changes and advances in the Web sites of schools and organizations related to the college need to be monitored in order to keep abreast of their latest best practices.

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