

WWW.EDUCATION.UNESCO.ORG

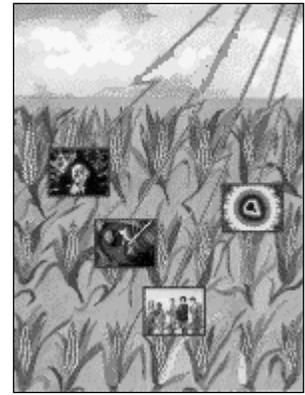
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Introductory note

There are greater goals in information technology than just making information available, even when it comes to Web site. We share with you our role in a project that in with a rare combination of the technical and the cultural challenges the significance of a *worldwide web*.

The making of history

Fifty years ago while Allied armies in Europe were fighting their way up the Rhine, diplomats at Dumbarton Oaks in Washington were struggling to form a compact that was to become the Charter of the United Nations. The Charter was signed on 26 June 1945 and four months later on 24 October 1945, 51 nations with the mission "to end the scourge of war" formed the United Nations (UN).

That mission has yet to be accomplished, and today 191 members still focus on peace keeping. Through a host of specialized agencies the UN links the nations of the world together in ways that have become essential to their health and economic well being. Some have called the UN the glue that binds disparate nations together to form the planet earth. But today, the world is also linked together by means of effective use of communications and information technology; communications reach out to all the people of the world, and information to understand the people of the world, to educate.

As these technologies continue to reach further and deeper into our world, a new charter will be implicitly defined to focus more on the activities of peace building than on the activity of peace keeping. Information is the glue that now binds our human diversity and forms a *World Wide Web* (WWW or Web). The International Telecommunications Union, the World Health Organization, the Food and Agriculture Organization, and the United Nations Educational Scientific and Cultural Organization (UNESCO) have acquired a new tool to target their mission: they now have *Home Pages*.

A new perspective on the world

We are on threshold of a new era, in which the collective legacy of human knowledge and the information of the world, our global heritage, is finally being preserved and shared by all. The Web is a silent force of powerful impact. The power of information will create opportunities to better understand the world we all live in, to build on our unevenness, to respect, and then, learn from each other, perhaps to foster peace. Seizing this opportunity for change, and to accelerate

the process, the current worldwide focus on education is clearly reflected on the pages of the UNESCO education home page.

UNESCO has always played a major role in reshaping the world. For fifty years UNESCO has been the guardian of knowledge about education from more than 180 countries. Believing that teachers are the people who can and are most actively working on behalf of world democracy, and that the future caretakers of this earth are our children, UNESCO works for all the teachers and all the children, with no exceptions. If the task of preserving the world's cultural heritage appears daunting, the task of sharing educational resources with equity appears unreachable. That is where this technology comes in.

Help from the heart

The solution chosen by UNESCO is as intriguing as the problem at hand. Technology reaches where even the fundamental needs of life are scarce. But, with a focus on developing nations, the Internet, scarcer than food in developing nations, was chosen as the agent of change. Furthermore, the home of an UNESCO education home page is far from Paris Headquarters where UNESCO manages its mission, and far from the geographic sites that it wishes to serve the most. From the heartland of America an IBM S/390 steadily supplies the world with food for thought. At the University of Nebraska a very large-scale web server quietly does its work and grows, as far and strong as the cornfields near by.

With a growth rate of 15% a month, the UNESCO education home page is one of the busiest in the world. With a user population, first commercial, then educational, the US is the indisputable high user of the resource, alone almost matching the rest of the world's use. Even so, each month more than one hundred different countries are known to access the site. The University of Nebraska not only hosts a site for UNESCO, but also keeps close tabs on usage. Statistical information is forwarded on a monthly basis back to Paris Headquarters where through an Intranet the numbers are studied by UNESCO colleagues in the Education Sector and can be publicly obtained from the its Web site. Usage statistics indicate that the Web site continues to grow at the rate of nearly doubling hits every four months. For usage statistics from the UNESCO education home page see [1].

What makes a Web site popular?

The quality of the publications to which the UNESCO home page continues to provide access is touching and impressive. Yet it is only a fraction of the collections that line the halls in Paris. Over time material will be constantly added to the Web where it will find its way to people all over the world, in perfect celebration of a noble cause. In the meantime two CD-ROMs recently published to celebrate "50 Years of Education" contain more detail on what the world at large has done to educate itself [2 & 3]. These too touch only the surface of the UNESCO collections, and are being as broadly distributed as the home page is.

It is the human element of the UNESCO collections that is so suitable for this kind of worldwide attention. No country is too small, no theme of human interest too obscure for this site to celebrate. Rapidly, information is gathered, made available and consumed. Current events in education are a major part of what the site is all about. Encounters with diversity are common. The word "world" is represented by the first W in WWW, for most Web sites symbolizing only their reach. For the UNESCO education home page that "W" stands for its scope and mission.

Why the University of Nebraska?

Nebraska is no stranger to the cause of education in hard to reach places. Serving a mostly rural state, vastly disperse geographically, the University of Nebraska [4] related exactly to the needs of UNESCO. There was no cultural dissonance or language barrier to overcome. The problem was to reach people, especially teachers, and to provide them with information, and ways to find more information and educational resources. This was the university's mission all along, and in UNESCO it found a partner for accomplishing that mission, with the richness of content that no other source can provide.

Fittingly the Institute of Agriculture and Natural Resources (IANR) of the University of Nebraska accepted the responsibility. And now, the greatest natural resource the world has is finally part of their mission. This is the mission to help teach children around the world by supporting the needs of the educators.

UNESCO, on the other hand, is not unfamiliar with technology. For over 30 years UNESCO has been involved in supporting the implementation of technical projects in education. Longer than any other single organization, corporation or foundation with a global mission. Joining in a broad scope of partnerships with UNESCO, the University of Nebraska was recognized as unique in its ability to provide a world-class information service that can be scaled through the most advanced communications and computing resources available anywhere. This is a partnership of understanding, technical know-how, and above all willingness. But there was another reason.

Why a web server on an S/390?

There are lots of platforms and products that can deliver images, text and business information to the wide variety of browsers that are available today. What would make a university choose to use an S/390 as a web server, and what caused the University of Nebraska to put the UNESCO home page there? After all, isn't the S/390 designed for running BATCH jobs or doing transactions on 3270 Green-Screen devices? With the passage of time, the S/390 evolved as steadily as the world changed [5]. And, when the need arose to provide the world at large with a web server, one was ready, willing and able. Three things really anchored the decision to look to the S/390 for hosting this particular home page.

Performance

First, it has been connected to a very high-speed bandwidth communications backbone, but other factors affect access performance. In the early stage of relocating the server from Europe to the University of Nebraska, Paris headquarters saw an immediate improvement in response time by changing sites. This was not inherently tied to the S/390, but supports the case that a slow network growth or a 'cap' on references will not occur. Maximum size and availability are critical.

Reliability

The second reason for a S/390 decision was the platform itself. The high performance of CMOS, the reduced cost of deployment, the direct network connections for ATM, FIDDI, token ring and Ethernet are all obvious strengths of the platform. Add to this the redundancy of power supplies, battery backup, and backup processors that are all considered part of the basic infrastructure,

not seen on other server platforms. This is further extended by unique support for Internet requirements, such as hardware support for SSL encryption.

Flexibility

The third reason has to do with the astonishing evolution of the operating system itself. For many years, Fortune 500 companies have kept their business running on MVS. In the process, they have also kept two thirds of the world's business data there. The S/390 has known the world. We are used to seeing MVS in banks, from teller terminals. We see the results we expect. But many still see 'old technology'. IBM has made revolutionary change to the MVS system by adding most industry 'open' standards into the system. The system has been repackaged with additional value added support for easier installation and upgrade, now called OS/390. A cornerstone in this evolution is the integration of UNIX (TM) into this platform. This integration has proved an invaluable extension to the system, as it provided the base to move the Internet Connection Server to OS/390.

LotusGO

The latest extension makes IBM's S/390 a leader in the industry for serving Web pages. As MVS was renamed OS/390, so the Internet Connection Server has now been dubbed LotusGO. This name change is consistent across all the platforms that IBM supports, but the S/390 has many unique extensions that make it a superior web server.

LotusGo has built in the standards that are expected in the industry today, the results that users around the world have come to expect. It is the first system to fully support the HTTP 1.1 protocol. This helps all Web users, by supporting enduring session. A major Internet bottleneck has been the time spent connecting to servers, which this protocol eliminates. LotusGo also supports the industry standard for security, called Secure Sockets Layer (SSL). SSL exploits the Public-Key/Private-Key, which was patented by RSA, Inc. It also now supports the Client Certificate, a derivative of the SSL structure. It has built in the Proxy support, so it can act as a gateway between the Intranet and (worldwide) Internet. This has been further extended with PICS support, for limiting access to forbidden sites.

While much of the home page information that is served today is static, the real work will be done with applications that are wired to the web server. Initially, this was processed with a very simple (and sometimes sluggish) interface called the Common Gateway Interface (CGI). For scalability, this needed to be improved with special exits from the web server. IBM first offered a set of exits, called ICAPI. Netscape also defined exits at almost the same time. LotusGo, thus, now supports both sets of interfaces.

On the S/390, some of these things are exclusive to the highly available production system for large customers. The SSL support was built to exploit the underlying hardware facility if available. But, for a scaleable server, this is very important. For similar reasons, the OS/390 security structure had to be, and is considered, extremely strong. The LotusGo server exploits this set of interfaces to authorize access based on common, and defined, user-ids and passwords. The operating system supports RAM disk for caching, so data spaces can be built on Expanded Store for high-speed access of cached information. The basic LotusGo structure has also been changed to start multiple servers, based on the responsiveness of each server

program (called WLM support). This also provides better availability when an ICAP exit brings down a server.

Finally, to access large repositories of data, there are simple and direct connections between the web server and existing databases that frequently need to be presented from LotusGo. Direct support for DB2, CICS, IMS and other OS/390 files systems are available through Net.Connectors. This is further extended with application servers, such as Bookserver to existing bookshelves, and Net.Question for web indexing. In summary, this is a web server that serves the world.

Moving to a S/390 web server

LotusGo is provided as a no-charge product. The homepage information is a simple move of information from another UNIX platform. By inclusion of products, such as the TCP/IP Application Feature, the files can move directly into the UNIX file system. Using the Net.Question, the pages can be easily indexed and information located with a powerful search engine. And, the OS/390 is always highly available, because of the 24 hour a day support structure necessary for business applications. This system can scale as the requests arrive; when there is low traffic the hardware can effectively be used for other purposes.

Plans for the future

Counting on the strength of technology plans for future enhancements of the UNESCO Web site are ambitious. Promoting interactive exchange of information between decision-makers, teachers, trainers and learners by means of forums on the Internet is of paramount importance. This is the first goal being addressed. In order to create a global interactive environment discussion lists and video conferencing facilities over the Internet are being implemented. It is hoped that in addition to the obvious benefits, these cultural exchanges will contribute to convince the education communities about the advantages offered by new information and communications technologies.

To strengthen the "Clearing House" function of UNESCO's information support services in education, relevant existing Web sites will be systematically mapped to the UNESCO home page. To that purpose, surveys are being conducted, and UNESCO's partners for quality are examining content. This effort will become a dependable source of information for the education communities, extending beyond the boundaries of UNESCO content, and will include a *Who is Who in Education*.

Gradually making the UNESCO Education Web multilingual is another goal of major importance. But, many other needs for enhancements are being considered and attempted. To realize them, several new technology partnerships are being formed.

Conclusion

What made this technology partnership a good match for the University of Nebraska, for UNESCO, for the world... wide web?

- ✓ A web server that can be placed on a S/390 without additional hardware. That is exactly what Nebraska did when the world needed an education home page.

- ✓ A web server that can handle the volume.

That is what UNESCO needed. The right kind of content is what the world wants.

People have learned to use home pages, and now its time for learning from home pages. Browsing and surfing are not enough; it is time for learning from electronic information. The UNESCO education home page is as sure a pillar of worldwide education as the symbol, that in electronic bits graces the screens it reaches. But, it is not the symbol, and neither is the technology or connectivity that are of importance. The minds and hearts that are enriched by them will eventually change the world. This is one home page that gives true meaning to the phrase: "*effective use of technology*".

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Artwork: "American Corn" by Joan Musgrave