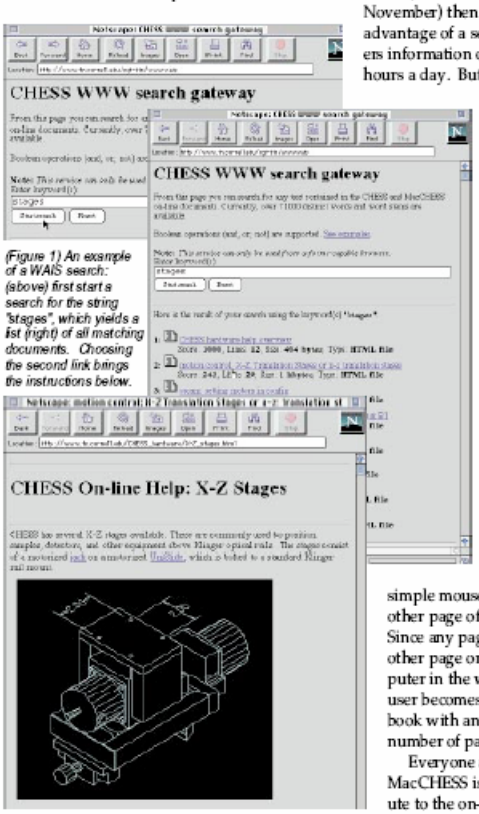
Connect with CHESS at "http://www.chess.cornell.edu/"

Ernie Fontes

November 1994 marked the beginning of a CHESS experiment with the World-Wide Web (WWW). The experiment was both technical and social. We needed to explore the technical capabilities of the Web and assess its utility to CHESS. On the social level, we had to ask whether the staff was willing to explore new ways to convey information to CHESS and MacCHESS users, if needed, and were they also willing to spend the effort needed to learn yet another computer document format (HTML, the hypertext markup language).

In retrospect, we couldn't have picked a better time to start. At that time, the software needed to setup and maintain a fully equipped server was sufficiently developed (and no cost) that starting was relatively straightforward, and the new capabilities being developed and discovered daily made it an especially exciting time. Concurrently, the popular media became saturated with the idea that Internet would become a major commercial frontier, so much so that articles about the WWW appeared weekly in even small town newspapers. Thus the personal (and personnel) motivation to participate in our experiment was forthcoming. No-one wanted to "miss the boat."

But what a boat it is! If the Web could only deliver a facsimile of plain paper documents (which is all I knew prior to November) then we would see little advantage of a server. Sure it delivers information on-demand, 24 hours a day. But the labor required to keep that information correct and current seemed an unnecessary bureaucratic burden.



(Figure 1) An example of a WAIS search: (above) first start a search for the string "stages", which yields a list (right) of all matching documents. Choosing the second link brings the instructions below.

Much more than that, the Web provides a means for your computer to retrieve information from anywhere in the world using a highly intuitive graphical interface called a "browser". The browser is a computer program that displays a page of text and/or images on a video screen. If part of the text or image is a highlighted "link", a simple mouse click jumps to another page of text and images. Since any page can link to any other page on any other computer in the world, the computer user becomes a "browser" in a book with an (almost) infinite number of pages.

Everyone at CHESS and MacCHESS is invited to contribute to the on-line information. Staff with particular responsibilities include Jim Laluppa, who keeps the server software running, and creates and maintains the on-line documentation, Marian Szebenyi, who is responsible for the MacCHESS content, including their specific documentation, and Ernie Fontes, who is responsible for the CHESS content and overall organizational bureaucracy. Each staff scientist maintains pages describing their own initiatives and scientific interests.

In contrast to a paper document, the information on the server can be easily changed and improved. Therefore, we invite users of CHESS and MacCHESS to explore the facilities described below and respond to us with comments or further needs.

Use #1: searchable, on-line documentation and help. Noticing the buttons on the control panel of the new station computers (see the next article), we first imagined that the server could provide, with the click of a button, a graphical browser interface that provided the CHESS user with on-line documentation and experimental assistance. Distributing information this way saves time by avoiding the labor necessary to keep paper documents up-to-date at each of the eleven experimental stations. Although some time must be spent translating existing documentation into hypertext, one immediate benefit is that topics can be related using links. For example, instead of reading a manual page that ends with "See also...," the hypertext page contains a link that jumps instantly to related pages.

While links are useful for short searches, rapid full text searching can only be done by computer. Towards this end we added a WAIS search mechanism (Wide-Area Information Server, again freely available software) along with a WWW form that allows information requests to be submitted from the browser (see Figure 1). Processing the WAIS search requires the server to handle CGI, the Common Gateway Interface protocol, which allows browser information to be passed to a computer program, which in turn creates an HTML response. The task of creating a comprehensive searchable index is left to a computer program

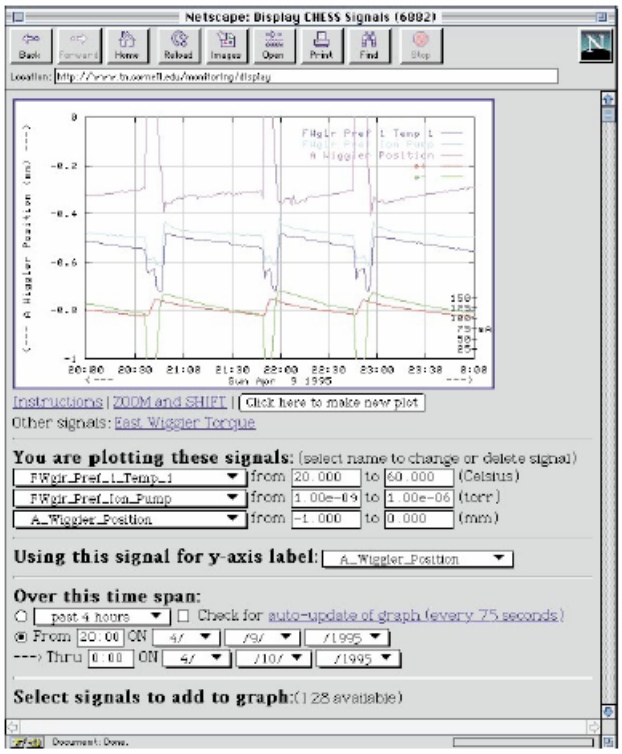
that runs automatically once each day. Any document that is added or modified will have its entire text in the searchable index within 24 hours.

Use #2: multi-user, multi-platform graphical user interface. While the most popular use of the WWW is to request and receive existing documents, the capabilities provided by CGI are far more complex and powerful. Since the CGI program processes information submitted via the browser, the remote user can receive an individually tailored server response. And, since browser programs are able to display graphic images, it is possible to write a CGI that searches through data files, selecting, sorting, analyzing, and creating a plot image or returning data to a remote user.

We've used this combination of CGI server and browser to create a graphical user interface for use by our Technical Operations staff. As part of our record keeping, we monitor (and archive) signals that are important to CESR and CHESS: temperatures, vacuum levels, voltages, beam currents and beam position signals are recorded to a computer file once per minute. A CGI display program is used to extract and plot signals, as shown in Figure 2. Analogous to the function of an electronic strip-chart recorder, the program plots signals (i.e. CESR currents) and returns a form that allows the plot to be altered, either by adding signals, changing the time span of the data, changing the limits of the graph, etc.

Use #3: Administrative aide: proposal forms distributed and automatic E-mail. Along with being able to read about our facilities, browsers can request information and add themselves to our mailing list. This function is built into another CGI program (again free) that extracts information from fill-out form and originates an E-mail letter to the CHESS Proposal Administrator. For a more immediate response, the request form includes a number of links that let the browser download a viewable and printable facsimile document. Since CHESS has proposal and safety related documents going out and coming in incessantly, this method of electronic transfer could save a substantial amount of time.

In order to send exact replicas of CHESS proposal forms (i.e. forms that can be read and printed, but not altered), our server supports sending a file format called "PDF". The Portable Document Format is easiest described as a type of "display Postscript", and was invented by the same company (Adobe) that created the universal laser printer language "Postscript". The utility of PDF is that pages maintain their format and print in high-resolution, and that any program on any computer that prints to a Postscript laser printer can create a PDF file (i.e., there is no need to learn or be limited by HTML).



(Figure 2) The signal display program uses the WWW browser as a graphical user interface, presenting a fill-out form with options needed to choose and display signals extracted from the CHESS archive. The archive is updated once per minute. In addition, the torque used to open and close the CHESS wigglers is also available under the link to "Other signals."

Use #4: publicity and facility information. The CHESS Newsletters and Facility Descriptions are presently available in PDF. Given all the improvements to CHESS planned for the near future (new optics and station hardware), the CHESS Facility Description will become a paper document that's out-of-date a week or two after being printed. Having this document in electronic form provides for remote access as well as immediate editing capabilities.

Looking ahead. Even if it is true at present that the majority of CHESS and MacCHESS users do not use a WWW browser daily, we envision that as browser programs become more universal, incorporating more features like full E-mail capabilities and becoming a native part of future operating system distributions, more and more scientists will find themselves using software that provides immediate access to CHESS information. It only seems natural then that the CHESS server should grow to satisfy the staff need to disseminate information and the user need to obtain it rapidly.