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Using Netscape as a Presentation Manager

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Abstract:

With helper applications and plug-ins, a web browser such as Netscape Navigator or Microsoft Explorer can present a wide range of multimedia material. This includes animations, video clips, images, spreadsheets, molecular structures, Mathcad documents and many other resources useful for teaching chemistry. The browser can load this material from a hard drive, a CD-ROM, a local network, or the World Wide Web. During a lecture, any type of multimedia file from any location can be accessed without changing programs and opening files. In addition, students can access these files to review the multimedia material after class.

Introduction:

For the past year I have used a web browser as a presentation manager for lectures and seminars. With plug-ins and helper applications, a browser will display any type of multimedia file. This provides tremendous flexibility for selecting lecture materials. In addition to displaying any type of file, a browser can access files from the web, a local network, a hard drive, or a CD-ROM. This flexibility simplifies the logistics of complex multimedia presentations. By placing multimedia presentations on the web, students have access to the material outside of class.

When I began developing multimedia presentations, I was overwhelmed by the number of software applications required. In lecture, I use animations (quicktime, mpeg, and flc), images (gif, jpeg, and bitmap), audio (wav and realaudio), spreadsheets (Lotus 123 and Excel), Mathcad documents (mcd), spectra (jcamp and NUTS), HTML, Macromedia Director (dir) and Java. Learning the names for all these file types is a challenge; loading the applications and locating files during a lecture is a big challenge. For multimedia to be effective, the presentation must be easy to run.

I have tried several presentation managers but they are primarily designed for slideshows. Although they do this quite well, a slideshow does not take advantage of the computer's potential. The content of these presentations is usually similar to presentations with a chalkboard or an overhead projector. For multimedia to have a significant impact on teaching, it needs to do more than traditional presentations. The ability to calculate, display realistic 3D graphics, run animations, and graph data is very useful for teaching chemistry.

Because browsers are designed to use all the file formats available on the Web, they are ideal for multimedia presentations. With plug-ins or helper applications it is possible to display almost any type of file. This flexibility is possible because when an HTTP server sends a file, the type of application required is specified by the MIME type. For example, if you download a file and the server specifies that the MIME type is video/quicktime, this tells the browser that the file is a quicktime video. The browser checks for an installed plug-in or helper application that will display this file type. If a plug-in is used, the browser loads the plug-in and displays the file in a browser window. If a helper application is required, the browser starts the application and opens the file in the application. This is done as quickly as the program will load, without the user hunting for the application and then trying to find the correct file. Since this is all controled by the browser, it is also much easier to run. A helper application can be any program on the computer.

Plug-ins and helper applications can be used to display almost any file format.

In addition to displaying any type of file, a web browser can load that file from almost any location. A web browser is typically used for files on the World Wide Web, but it can also load multimedia material from a CD-ROM, a hard drive, or a local network.

Using a web browser to manage presentations also allows students to review the material after a lecture. Passively watching an animation in class is different from seeing it several times outside class. In addition, students need to play with the interactive components of multimedia material to get the most benefit. I provide students access to this by linking the course web page to the lecture presentation. This link is placed in a course outline that includes lecture topics, reading assignments, homework assignments, solutions, links to other web sites, and links to the lecture notes. I have experimented with several different methods for organizing this material. For an example of the current layout, see the Chemistry 145 Home Page. Because students have seen how useful this material is and because it is easy to access, they use it.

Although preparing a web based multimedia presentation is time consuming, it simplifies the logistics of running a complex presentation. The presentation is developed, organized, tested, and loaded on a web server from a faculty office. When it is time for class, just walk into the room, turn on the computer, and load the browser. This is a substantial benefit when using large multimedia files and classrooms that are always booked. As the tools for developing web resources continue to improve it is easier to create and organize web based multimedia presentations.

Finally, placing lectures and presentations on the Web allows faculty to share teaching ideas. This has opened a new form of communication that benefits our students. Teaching material on the Web, is a freely available source of ideas and content for teaching chemistry.

Example Lectures.

This section presents some examples of how I have used a web browser as a presentation manager for lectures and seminars. It contains a variety of materials, some of which require plug-ins or helper applications. Most of these applications are freely distributed, but I have included some material that requires commercial software. Even if you cannot view everything in this section, you can get an idea of how this works. Information about the software required and installation help is included in Appendix A, *Using Plug-ins and Helper Applications*. Details about HTML codes for these documents are included in Appendix B, *Writing HTML for Presentations*.

Annotated Lecture Notes:

The following applications are used to view the files used for this lecture.

- Acrobat Reader - To view the solutions to the lecture problems.
- Lotus 123 v4 or Excel 7.0 - To view the gas law spreadsheet.
- Saunders General Chemistry CD-ROM - To view animations, load the CD-ROM and select the appropriate drive letter.
- Quicktime player - To view animations.
- Chime or RasMol - To view protein data bank (pdb) molecular coordinate files.

After configuring your browser, the links in the lecture notes will load the multimedia material used for this presentation. Annotated lecture notes are an easy way to add multimedia material to a presentation. The HTML document for this lecture was prepared by adding hypertext links to a lecture outline. This gives students an outline during the lecture, helps coordinate multimedia files during the lecture, and provides students access to the material for review.

Introduction to Gas Laws. This lecture is presented in a large room with a computer and ceiling mounted projection system. The room is designed to use the computer and the blackboard simultaneously. For this lecture, most of the presentation is done at the board and the computer provides supplemental material. After introducing the properties of a gas and the behavior of an ideal gas, the CD-ROM animations reinforce this model. The spreadsheet is used to graph various pressure, temperature, and volume relationships during class. At the end of the class period students work on a more complex problem that combines many ideas developed in class. Although there is not enough time to finish this exercise, students can check the solutions on the Web. These solutions are prepared in Mathcad, which is ideal for developing very clearly worked out mathematical solutions, and saved as an electronic document for students to view. All this is easy to put together, and to use in lecture. With access to the lecture material from the course web page, students can use it for review after class.

Molecular Shape and VSEPR. This is another example of an annotated lecture outline. In addition to balloons, molecular models and Lewis dot structures, I use the browser to present images of space filling models and three-dimensional structures. This provides two additional models to help students understand molecular geometry. The lecture page also provides links to other resources on the Web. By integrating these links into the lecture outline, it is easy for students to find and use additional resources.

Special Topic Web Pages:

Chime or RasMol is required to view the pdb files for these lectures.

For most presentations, I use annotated lecture notes. Certain topics, however, are suited to more elaborate presentations. I prepare a more typical web page for these lectures, but it is designed specifically to help coordinate the lecture and for students to use for review. Molecular and atomic structure is an excellent example because many different file formats are available for presenting structural information. Each of these formats has advantages and with available plug-ins and helper applications a web browser can display any of these files.

Hydrocarbon Molecules. This document is part of a series of web pages designed to accompany lectures on molecular geometry. They include Lewis dot structures, space filling models, and molecular coordinate files. Lewis dot structures were prepared in a chemical structure drawing program and saved as gif images. The images were generated with Hyperchem (Hypercube inc) and saved as graphics files (gif and jpeg). The molecular coordinates from Hyperchem were saved as Brookhaven Protein Databank (pdb) files. A web browser can display all these files, so it is easy to switch between formats. In class, I only have time to discuss and show some of these structures. After class, students can review the material from class, view additional structures and follow links to other web sites. For these lectures I also use quicktime movies that show three dimensional rendering of atomic orbitals, animations of molecular vibrations (to remind students that molecules are not static), and Macromedia Director files from the atomic orbitals CD-ROM to show the connection between molecular geometry and the model of atomic orbitals.

NMR Interpretation of Ethanal. This page was developed for introducing NMR interpretation. It includes different types of NMR spectra, the molecular structure, and a brief description of the interpretation. The HTML document is interactive so that selecting a peak, highlights the structure and updates the text field. This document uses javascript and image mapping. The ideas were developed using templates from an article by Thomas Gardner in The Chemical Educator Volume 1, Issue 6, 2.18.1997 .

Slideshow Manager:

A web browser can also provide some of the effects used by presentation managers. Doing this effectively takes some experience with HTML, but with some examples to use as a template, it is not difficult. This section presents spectroscopic information using JCAMP and NUTS files. The associated applications are

necessary to view the spectra, or you can view the gif images that I have added.

Isobutanol NMR, A Simple Molecule. This page is from a seminar on NMR interpretation. The web browser loads the spectra into the appropriate application. By using these programs instead of an image, it is possible to zoom in and examine the spectra in detail. For advanced courses it is easy to include data processing as part of the lecture. These features provide much more flexibility than a set of images. After the browser is configured it is easy to add new spectra. The ability to load a file through the network is important for this presentation because some of the files are very large.

Atmospheric Chemistry Cycles. This set of images shows how to produce a set of overlays. The individual images were prepared in a drawing program and saved as gif files. Each image in the overlay is a link that retrieves the next overlay. To go to the next slide, click anywhere on the image. To return to a previous image, use the back button for the browser (or use the right mouse button). When you are designing images like this it is important to scale the image size for the display that you will be using.

Technical Details:

Hardware requirements.

For large classes and seminars, I use a multimedia classroom. This has a 100 MHz Pentium computer with 16 MB RAM, 4x CD-ROM, Ethernet connection, and a ceiling mounted video projector. For smaller classes I use a laptop computer and a projection panel. Because the projection panel is old it is not very bright, the resolution is only 640x480, and the display is only 16 color. This requires a dark room and with only 16 colors 3D rendering is not effective. I strongly recommend using a projection system that displays a minimum of 256 colors. For small classes I also use a computer with a 21" monitor on a cart. Although the image is not as large as the projection panel, it is very bright, supports 1024x768 resolution and 16 bit color. This works well for animations and video clips in classes of up to twenty students. For text, graphs and formulas it is only useful for classes of up to five students. We have just acquired an LCD projector. This is much brighter than the projection panel, displays 256 colors, 640x480 resolution, and is much easier to see than the monitor.

Display. Changing some default browser settings makes more effective use of the display. The commands here are for the Netscape Navigator browser. To improve the contrast and brightness so text is easier to read, increase the default font size (Options | General Preferences | Fonts | Choose Fonts) and change the colors to black text on a white background (Options | General Preferences | Colors | Always Use My Colors, Overriding Document). This is important for projecting a large image, since projection displays are usually not very bright. You can increase the browser window size by turning off the directory buttons (Options | Show Directory Buttons), the location bar (Options | Show Location), and the toolbar (Options | Show Toolbar). Alternatively, change the toolbar to display text only (Options | General Preferences | Appearance | Toolbars). When you design the page layout for a document, it is important to consider the display dimensions of the projection system. Most projectors have a resolution of 640x480 and can display 256 colors. Many animations and multimedia materials are designed for these display settings. If you develop a presentation on a desktop computer with higher resolution and more colors, you may be disappointed by the quality of the display in the classroom or have your images larger than the Window.

Network. A web browser can be used for presentation in a classroom without a network connection. The exact details depend upon the hardware available and the type of multimedia material. For resources developed locally, load the files onto the hard drive and take the computer to class. With relative, rather than absolute, HTML links the entire presentation can run from the hard drive without any network connection. Another technique is to store the presentation in the disk cache. Run the presentation with the computer connected to the network. This loads the HTML, gif, and jpeg files into the cache. Then switch the browser to always use the disk cache (Options| Network Preferences | Verify Documents | Never). With this setting Netscape Navigator only uses the network if a file is not available in the cache. Since the entire

presentation is loaded in the cache, no network connection is required in the classroom. You should test the presentation first, because this does not always work as expected.

Internet Speed. Although local networks can have very large bandwidths, loading a 10 MB animation from England for a 2:00 lecture in Philadelphia will not work. Downloading this file during class could take hours. Even high resolution images download very slowly at times. The disk cache can solve this problem, but it only works for certain file types. Another option is to download the file to the hard drive before class. Then modify the URL to load this file from the hard drive. If possible, I request permission from the original author and load the file on our web server. This provides fast downloads for lecture and for student access. Many authors are comfortable with this arrangement. I include a link to the original file, acknowledge the author, and restrict access to these files so they are not available outside the campus network. The ability and the methods for restricting file access depend upon your HTML server. Additional information is available from NCSA or check with your system administrator for details.

Student Access. The student labs on campus are configured with the plug-ins and helper applications that I use in class. This takes planning and careful coordination with the academic computing network managers. I place the CD-ROMs on reserve in the library. Students can check these out and use them on computers with CD-ROM drives. The web page allows me to organize the material on the CD-ROM and highlight features I believe are most useful. This reduces the "activation energy" required by students and increases the probability that they will use this resource. The counter on each lecture page shows that approximately two thirds of the students look at each lecture. Course evaluations show that many students find this is a valuable resource.

Appendix A. Using Plug-ins and Helper Applications

Appendix B. Writing HTML for Presentations.

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