

Distance Learning

"Distance Learning" is a rather strange-sounding phrase that has come to stand for education carried out by electronic means when spatial distances separate participants. Thus, distance learning is often characterized by high-bandwidth transmission of text, image, audio, and video signals. Clearly, many of the techniques discussed in this Tutorial could be used in distance learning.

Web technologies are one means by which a curriculum can be delivered to a much broader audience than in traditional teaching. The interactive aspects of a Web syllabus are of particular interest for distance learning.

Web Examples

We may divide distance learning into two broad categories: those projects that provide learning at a distance but do not attempt to give formal credit for that learning (this Tutorial, for example), and distance learning as part of a formal curriculum that assigns correspondence course credit for completing the distance learning program. The requisite technology is similar in the two categories, except for the added administrative burden in the latter case of ascertaining that the "learner at a distance" has completed the required work in a satisfactory manner.

In addition, the technologies used in distance learning are more diverse than the Web-based ones of concern to us. Indeed, traditional distance learning developed before the Web, driven primarily by televideo technologies like satellite and cable transmission links. Our concern will be only with a few examples of Web technology applicable to distance learning.

Web-Based University Curricula

Here are two examples of university-level curriculum available in a completely Web-based electronic format:

- Web-Based [The Solar System](#)
- [Violence in the Cosmos](#)

Interactive Examples

Here are two examples of tutorial quizzes delivered by means of

the Web: the first in intermediate-school science, the second associated with the astronomy course cited above. These emphasize the strongly interactive capability of these technologies.

- Galileo Mission to Jupiter [Tutorial Quiz](#) developed by fifth graders
- Astronomy [Tutorial Quiz](#)

As you see the technology implemented can readily be adapted to K-12 applications.



Going Further

Clearly, many of the techniques discussed in this Tutorial could be used in distance learning (though the technologies used in distance learning are more diverse than just the Web-based ones discussed here). Indeed, this Tutorial itself, if you are accessing it over the Web, is an example of distance learning. Here are some further links related to distance learning:

- [Distance Learning FAQ](#)
- [The World Lecture Hall](#) (List of Electronic Courses)
- [List of Electronic Courses](#)
- alt.education.distance (Newsgroup)

Distance learning is only peripherally related to this Tutorial because its most common implementations involve education beyond the K-12 level. However, we include it for completeness because many of the technologies that we discuss are directly relevant to distance learning, and because there are aspects of distance learning that are relevant to K-12 environments.

For example, a partnering of smaller schools having less breadth in their faculties with larger schools having greater faculty depth through distance learning technologies could broaden the curriculum available at the smaller schools. Cable modems and related high band-width technology could provide the data transmission rates required to implement such a program.



Multimedia

This section of webTeacher covers the topics listed below. Click one of these links to go to the first page of the corresponding chapter.

[Images](#)

[Sounds](#)

[Movies](#)

Image Files

A central reason for the exploding popularity of the World Wide Web was the development of browsers that allowed graphics to be included in documents instead of just text. Images are the first step beyond plain text in producing informative and attractive Web pages.

If you are interested in creating Web pages that contain graphics, there are several aspects of dealing with images to consider.

Image Formats

Browsers generally display images in two different ways: (1) in-line, using the browser itself, and (2) externally, in a separate window, sometimes with the aid of a "Helper Application". The adjacent figure is an example of an in-line image; here is an example of an [external image](#).



Image files come in a variety of formats, but most Web browsers support only two or three of the formats for in-line images. Thus, you may often need the capability to convert easily among the various formats.

Displaying In-Line Images

The popular browsers support only a limited number of graphics file formats for in-line images, with the most common being GIF and JPEG. For graphics created on a PC, files can often be saved in a BMP format, but sometimes the software will not let you save the work as GIF or JPEG. (This restriction was more common a few years ago than it is today.) You don't need to worry about the technical differences between BMP and JPEG and GIF formats; you only need to know that there are programs available that will convert from the BMP format to either GIF or JPEG.

Displaying External Images

Web browsers are more flexible in the formats they can display as external images because these are often displayed using separate "Helper Applications" that can be tailored to deal with a particular format. Provided a program exists (and runs on your

computer) that can display the format, it is likely that the browser can be configured to display that format by launching the helper application.

For example, it is very common in scientific and technical settings to encounter images written in *Postscript* format. (Postscript files commonly have a .ps or .eps extension in their names.) A browser like Explorer cannot display Postscript directly, but it can be configured such that when it encounters a Postscript file it launches a helper application that displays the file in a separate window.

Common Helper Applications for Image Files

The following Table lists some image file types and the helper application that is commonly used to view it with Netscape on the Macintosh. (See the Appendix on [configuring your system](#) for a more complete list.)

Image Helper Applications

MIME TYPE	APPLICATION	ACTION	EXTENSIONS
image/gif	JPEGView	Internal	gif
image/jpeg	JPEGView	Internal	jpg, jpeg, jpe
image/pict	SimpleText	Launch	pict, pic
image/tiff	JPEGView	Launch	tif, tiff
application/postscript	Mac GSview	Launch	ps, eps

In this table, the "Mime Type" is a document classification, "Internal" for the action means the display is in-line and "Launch" means that an external window is launched. "Extensions" are the file extensions that the browser will recognize as indicating a file of this type. Thus this browser, upon encountering a file *image.pict*, would assume it to be a PICT image file and automatically launch SimpleText as an external viewer to display it.

Technical Issues

We shall concentrate in this Tutorial on giving a basic introduction to the use of images on the Web. This will be sufficient for putting simple images on your pages. If you are serious about optimizing the quality of your Web images, you may wish to consult more technical discussions of image processing.

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Creating Images

There are many excellent commercial products for creating graphics on a Macintosh. They are broadly divided into two groups: (1) painting programs and (2) drawing programs.

Painting Programs and Drawing Programs

Programs in the first category build up an image by assigning a color to every pixel of the screen that falls inside the boundaries of the image. Programs in the second category build up an image by assembling lines, arcs, etc. that are considered by the program to be distinct objects rather than just a set of unrelated pixels. Paint programs are generally easier to learn to use, but drawing programs can give higher quality results for many forms of graphics. Some programs combine both painting and drawing capabilities.

MacPaint belongs to the first category, Freehand and Illustrator are professional graphics level examples of the second.

Native Formats for Saved Images

In many cases the programs save graphics images in their own "native" format that is specific to that one program. It is normally wise to save a version of the file in this format since you may wish to modify it later. However, in many instances, the native format for the graphics program cannot be used directly for images to be displayed by Web browsers.

Exporting Other Image Formats

In addition to saving an image in native format, graphics programs usually also give you the option of saving the image in a format

that can be used in other programs (but such saved files often cannot be further modified by the program you used to create the image). As we noted earlier, many graphics programs on the Macintosh allow you to save an image in PICT format (often by choosing "Save As" from the File menu and selecting PICT format for the saved file, but this depends on the program). Since you are then saving an image for use by another program outside of the one that created the image, the process of saving a file in such a format is often referred to as "exporting" the image. As we will now discuss, PICT format can be converted to the GIF and JPEG formats that are most useful for Web images.

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Changing Format

As we noted earlier, most browsers will not presently display an in-line image in PICT format. Some graphics creation programs may allow you to export images in GIF or JPEG format (e.g., `PhotoShop`). For those that don't yet allow these options you should export the image as PICT (or PICT2 for some programs like `Freehand`) and then use one of the many available conversion programs to convert the PICT into either a GIF or JPEG, which you can then include in your Web document and which browsers like `Netscape` will happily display in-line.

One frequently-used conversion program for Macs is `GIFConverter`. It couldn't be simpler to use. You simply drop the icon for your PICT image onto the icon for `GIFConverter` (if your computer doesn't implement drag-and-drop capabilities, you will have to open the file manually from the program). The program will then try to open the file, and if there is no problem the image will be displayed. You can then use "Save as..." on the "File" menu to save the image in a number of different formats. Among these are GIF and JPEG. (We will soon give a [more detailed example](#) exploiting the capabilities of `GifConverter`.)

Two other Mac programs that are capable of converting among many different image formats are `GraphicConverter`, which is shareware, and `DeBabelizer`, which is a commercial product. These products are also capable of "batch conversions": automatic conversion of whole groups of files from one format to another.

Transparent Backgrounds

Sometimes inline images have more visual impact if the "background is removed". For example, consider the following two inline displays of the same image, the first with the background displayed and the second with it suppressed:



In the second example, the background is not actually removed, but is instead effectively set equal to the color of the browser display, which is equivalent to making it transparent. We now demonstrate how to "remove the background" from a GIF image using a Mac program called `Transparency`. On Unix and PC

systems a related program called `giftrans` can be used to accomplish the same thing, though it is not quite as easy to use as Transparency.

We note that only one color can be removed in this way, and it will be removed for all occurrences in the figure. Therefore, this method is most effective if the background is a single color that appears only in the image background.

Making Backgrounds Transparent



Double-click the Transparency icon to open it. The menu is exceedingly simple, having only one item with the pulldown choices shown in the adjacent image. Choose "Open GIF" and from the resulting dialog box select the .gif file to be processed.



The image will be displayed, as in the example shown to the left. Place the mouse cursor over the color to be removed in the figure and hold the button down. A



popup color map will appear over the figure, as shown in the image to the right, with the cursor over the entry in the color map corresponding to the color that the mouse was over when the button was clicked. This entry will be under the cursor, will be darkened, and will have an "x" in its box. Without moving the cursor off this color, release the mouse button, thus selecting this color for removal when the image is later displayed by a browser.

Next, select from the main menu "Save as Gif89...". and then select "quit". A dialog box will pop up asking whether you want to

save the changes. Choose "Save" (see figure below).



Now, if all has been done properly, the GIF image will display inline with the color removed that was selected in the preceding steps.

Example for Your Homepage

Let's now use the above technique to add an image to your homepage with its background removed. We shall give you a .gif file to download for the example, but feel free to download a different .gif file if you prefer. Go to the following address:

<http://csep10.phys.utk.edu/webcourse/samplegif.html>

hold the mouse over the schoolhouse image at the top of that page, press the button, and save the file to your folder on your local disk with the default name (*school4_logo.gif*). Note that in what follows we assume that the file you just saved and your homepage are in the same folder.

Now carry out the steps outlined above to remove the (gray) background from this image, saving it under the original name in your folder. Then go to your homepage file in the same folder and insert the following text at a convenient place (use the mouse to copy and paste):

```
 Here is an example of some text that should wrap around the preceding figure of the schoolhouse. The align="left" command says to position the figure to the left, and the hspace="15" command says to leave 15 points (there are about 72 points in an inch) horizontal space around the image.
```

Save the changes and reload the homepage in the browser; if all is well, you should then have the schoolhouse icon (or another image if you so chose) positioned left, with text wrapped around it on the right and the background of the image should be transparent.

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Homepage Exercise: Background Tiling

In another exercise we saw how to add a color background to your homepage. If you wish, you may use this [exercise](#) to use an image (in GIF or JPEG format) to "tile" the background of your homepage. By this, we mean that the browser takes an image and uses it to cover the background of a page by repeating the image as many times as required. Any text and images displayed on that page then appear against this tiled background.