column, ". . . in 10 years or so, interactivity is going to be like disco. We'll be wondering why we did it so much." But we doubt it. With the quality and quantity of undergraduate university education perennially under fire, instructional multimedia is likely to continue to be in demand, if only to provide administrators with tangible evidence that they are doing something. And hard-pressed public universities competing for student credit hours will rely more and more on multimedia to expand distance education programs. From our perspective, multimedia has excellent potential to be a viable, revenue-producing service that allows us to apply our expertise in geographic information design in projects that enrich higher education. ❑

Macromedia DIRECTOR 4.0
An Overview

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Macromedia DIRECTOR 4.0 is a multimedia development tool available for the Macintosh and Windows environments. DIRECTOR facilitates the integration of a range of media (graphics, video [QUICKTIME format], sound, etc.) and the construction and "scripting" of interactive "movies." DIRECTOR movies can be created, saved, and played as uneditable "projectors" on both Macintosh or Windows platforms. DIRECTOR projectors can be distributed free of roylaties to Macromedia and do not require DIRECTOR software to play. The overview provided here is meant to give a basic introduction to DIRECTOR and to some of its capabilities.

The DIRECTOR interface is based upon a movie metaphor. A "cast" window collects all the diverse elements used in a movie. These elements include paint objects (bitmapped PICT graphics or images), text objects, QUICKTIME movies, color palettes (2, 4, 8, or 24 bit color), sounds, and scripts (programs written in DIRECTOR's object oriented language "Lingo" that control objects in the movie). Many of these cast elements can be created or edited within DIRECTOR.

Paint objects can be created and edited in DIRECTOR's moderately sophisticated paint window. The paint window contains tools and functions common to most bitmapped paint programs: tools for drawing shapes and lines, creating bitmapped text, color swaps, gradients, object manipulation, etc. Paint objects can also be imported from other software packages. For example, Aldus FREEHAND can be used to create maps and graphs and a screen capture utility can be used to create a PICT file. This can in turn be imported into and modified in the paint window. Text objects can be created and edited; their font, style, color and size modified in the text editing window. Color palettes can be created or customized in the color palette window (eight different modifiable palettes are built into DIRECTOR, including Macintosh and Windows system palettes and NTSC-safe colors). Lingo scripts can be written and modified in a scripting window that has full search and replace capabilities as well as automatic compilation and scripting debugger. Sounds and QUICKTIME movies can be imported, used, and played (but not edited) in DIRECTOR.

The action (an animation, interactive graph, etc.) in a DIRECTOR movie takes place on the "stage"–the screen of your computer monitor. The "score" window organizes the various cast members that appear on the stage as well as their associated effects and Lingo scripting. The temporal dimension of the score window (running left to right) consists of a series of "frames" each representing one (modifiable) unit of time. Each frame column in a DIRECTOR movie (running up/down) contains information concerning timing (tempo in frames-per-second, timed waits, wait for mouse-click, wait for QUICKTIME movie to finish, etc.), color palette used, transition between the current frame and the next frame (52 built-in transitions are available), two sound channels, Lingo scripting for the frame (e.g., pause, wait for the mouse click, then beep and play a QUICKTIME movie), and 48 "channels" for paint, text, and QUICKTIME objects (e.g., you can have up to 48 different objects on the stage in any one frame). To animate a moving circle, for example, you would place a round paint object in the first frame, then place the same object in the second frame offset to the right an inch, then place the same object in the third frame offset another inch, etc. Transitions and timing can be set for each frame. The final frame could have a short Lingo script which tells the movie to go to the beginning of the sequence and play it again, thus creating a movie loop.

While DIRECTOR provides a means for creating animations, its real power is in creating interactive movies via the "Lingo" scripting language. Lingo is a relatively sophisticated object-oriented programming language that is a combination of HyperCard's "HyperTalk" and C++. Lingo scripts can be located in different places in a DIRECTOR movie: in the movie script, in the cast script, in a particular instance of a cast member, and in a frame script. The "movie script" contains various global scripts, such as a command to install a customized

menu upon the start of the movie or a command to change the cursor to a different shape when it is over particular objects on the stage. The movie script also contains lingo subroutines which can be called from anywhere in the movie. For example, a subroutine called "stepForward" contains a short program which tells the movie to advance the next frame when the "stepForward" command is issued. The "stepForward" command can be programmed to issue when the user clicks on a paint object button with a right arrow. Thus it is also possible to program a particular cast member–the "cast script." The right arrow paint object itself contains a Lingo script which issues the command "stepForward" when the object is clicked. The "stepForward" subroutine is then called from the movie script and the movie advances.

Scripting in particular paint or text objects may become problematical if clicking on the same object must result in different actions at different places in the movie. For example, the first right arrow button in a movie many need to "stepForward" but the last one needs to go to and play a different movie. It is possible to have two right arrow cast members each with different cast scripts but it is more efficient to take advantage of DIRECTOR's ability to script a particular instance of a cast member. The coding is removed from the cast member itself and is located in the score window. For example, in the first frame of a movie the right arrow button is selected in the score window and scripted with the "stepForward" command; in the last frame the right arrow button is selected in the score window and scripted with a "playNextMovie" command (a second subroutine located in the movie script). Finally, Lingo scripting can be placed in a particular frame, the "frame script," telling the movie to do something when it arrives at that frame. For example, the frame script could tell DIRECTOR to pause, wait for the click of the mouse anywhere on the stage, then advance to the last frame of the movie.

Taken together, the numerous places for scripting a DIRECTOR movie provide a very flexible and powerful environment for the creation of interactive multimedia products. Using subroutines programmed in Lingo one can create interactive slider bars, graphs, maps, and model simulations which react to the actions of the user. For example, a graph representing a simple two-variable feedback system can be programmed so that a user can drag a point resting at one of the system's equilibrium points to an unstable location and watch the point work its way back to a stable equilibrium. In this case, the changes in the location of the paint object point are calculated by a Lingo subroutine. Each different location on the graph provides a different unstable location and will take a different path (and a different amount of time) to reach equilibrium. Advanced object-oriented programmers, then, will find Lingo flexible and powerful. A major advantage of DIRECTOR is that it provides the means for scripting fully interactive model simulations while remaining easy to learn and use for basic animation and multimedia. In my experience, new users can be creating animations and scripting in DIRECTOR within a few hours.

Macromedia DIRECTOR is available at a substantial educational discount. It is helpful to have a 68040-class Macintosh or 486-class DOS/Windows machine with at least 16 Mb of RAM and two monitors (one for the stage and one for the script and cast windows). Manuals for DIRECTOR 4.0 are extensive and helpful, and online help is available. A DIRECTOR discussion group is available via e-mail, providing access to numerous advanced DIRECTOR users. To subscribe to this discussion group address a note to the following address:

LISTSERV @ UAFSYSB.BITNET

Type the following in the body of the note:

subscribe DIRECT-L
firstname lastname

(where firstname lastname are your first and last name)

Since this group receives over 50 messages each day, the digest option should probably be used. Send a note to the same address after your subscription is accepted, but put the following in the body of the note:

SET DIRECT-L DIGESTS

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LINKWAY LIVE: An Authoring Tool for DOS and Windows

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LINKWAY LIVE is a product developed by IBM corporation for a DOS (and now a Windows) environment. It functions by using folders, fields, pictures, buttons, and media objects to create a multimedia presentations. These basic components (with the exception of media objects) are easily mastered. Teachers have been using LINKWAY for a number of years and with the improvements available in LINKWAY LIVE and LINKWAY