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The Web Courses project was developed in 2001-2003 to demonstrate Internet connectivity by desktop apps in order to distribute and update interactive modules. Partial funding for the work was provided by the Engineering Research Center (ERC) on Environmentally Benign Semiconductor Manufacture at the University of Arizona, hence ERC.

The desktop app was developed with the tool Revolution (.rev) which was later renamed LiveCode. Revolution-LiveCode files are called "stacks" after files in their predecessor, Apple's HyperCard.

The main file is termed by Web Courses as the "engine." This file initializes the software and opens subsequent files. All files are cross-platform across a wide variety of operating systems. The screenshots shown here were taken with the files running in the development environment of LiveCode Community 9.6.2. The cross-platform engine file can be built into operating-system specific standalone apps by LiveCode.



Web Courses software is available at our GitHub site https://github.com/RichardHerz

The window below on the left was opened by the main file from the support/scripts/erc\_directory.rev file. The lab has opened in the off line state. The user selected the server San Diego and clicked on the module About Web Courses.

The module hasn't been accessed previously, so the user is notified that it is only available on line.

•••	ERC Web Courses Directory	
	Engineering Research Center for Environmentally Semiconductor Manufacturing - Web Courses Pr	v Benign rototype ?
Work	Select a server	
on line off line	San Diego 📀	
	Click on a module	
	About Web Courses Web Courses Architecture Simple Photo Filter Vacuum System	
Quit	e	mail comments



The user clicked the on line button in order to download the About module. The desktop scripts accessed the module folder on the remote server, downloaded the folder, and opened the main module file to display this window. The field in the window scrolls and can contain graphics.

About "Web Courses"	About "Web Courses"
This is a test system for delivery over the Internet of modules with complex interactive elements and communication capabilities. Simulations of engineering systems are of prime interest. All components are at an early stage of development.	Module files posted on the servers are small in size and cross-platform: Win, Mac, Unix/Linux. They can be run on any of these platforms. They can be developed on any of these platforms.
Geisel ("Dr. Seuss") Library at UCSD	
Students download the main application file only once and leave it "permanently" on their computers (except for major annual upgrades). When the application is started, it opens the current local copy of the "directory." When a student goes on line, the directory contacts the "home" server and checks for updates to itself and other support files.	In addition to importing PowerPoint presentations, presentations with embedded interactive simulations can be developed. Modules with QuickTime <u>movies</u> can be developed. Many design alternatives are possible, e.g., replacing the button/field interface of the directory with a web page interface with links.
New versions are downloaded and installed automatically. The student uses the directory to contact servers on the web and download and run modules locally on their computer. Local copies of modules are saved for use off line. New versions of modules are automatically installed the next time the student goes on line.	In future versions: (a) reports on access and use of the module could be sent back to the web server automatically, (b) the user could post questions to a bulletin board or send email to an instructor, (c) data files could be written to the local hard disk or hard copy printed, etc.
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Next, the user accessed the Web Courses Architecture module.

Screenshots on the following slides show the screens of the Architecture module as the navigation arrow buttons are clicked.











Below are two other modules on the San Diego server. Sliders, radio buttons, check boxes and other controls are changed by the user to update simulation parameters, which dynamically updates the graphics display.





Now the user has selected another remote server, Arizona.

The Photocatalytic Filter module was then selected. This module contains a file that displays the modules visible window as well as other files in the module with computational and data units.



Screenshots below show some of the folder structure in the project. The same folder structure is present on the server.

veb_courses_engine.rev	<pre>[] file structure on server.txt [] labs &gt; [] scripts &gt;</pre>	comm_scripts.rev     erc_directory.rev     eliburl.rev     script_list.txt		
veb_courses_engine.rev	<ul> <li>file structure on server.txt</li> <li>labs</li> <li>scripts</li> </ul>	Arizona	<ul> <li>About</li> <li>module_list.txt</li> <li>Photo_Filter_Simple</li> <li>Vac_System</li> <li>WC_Architecture</li> </ul>	
	ile structure on server.txt labs scripts	Arizona	<ul> <li>About</li> <li>module_list.txt</li> <li>Photo_Filter_Simple</li> <li>Vac_System</li> <li>WC_Architecture</li> </ul>	WC_Architecture.rev

The module\_list.txt file for each server contains, for each module, the module name in the Directory menu, the name of the main module file which must match the name of the module's folder (case insensitive), the date of the latest version, and a (local) notation if the latest version of the module is present on the client and available for off line use.



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