Web Courses - prototype of Internet connectivity in Reactor Lab

Richard K. Herz, www.ReactorLab.net

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

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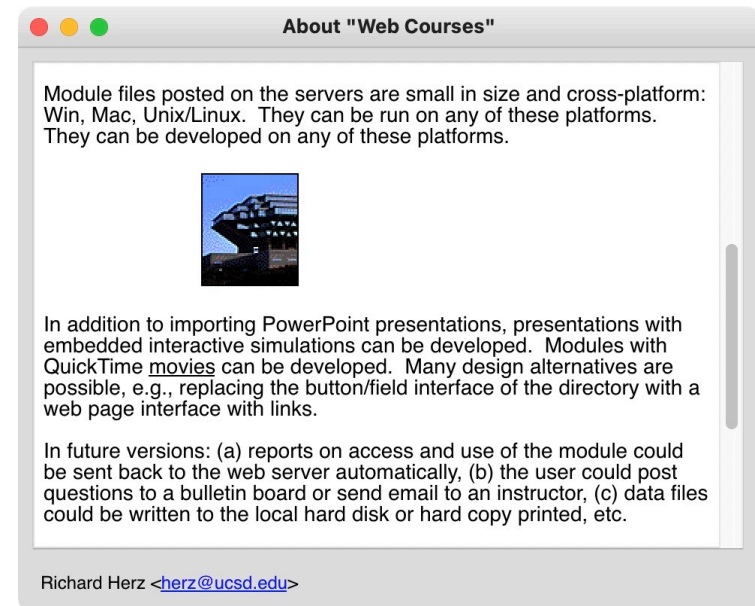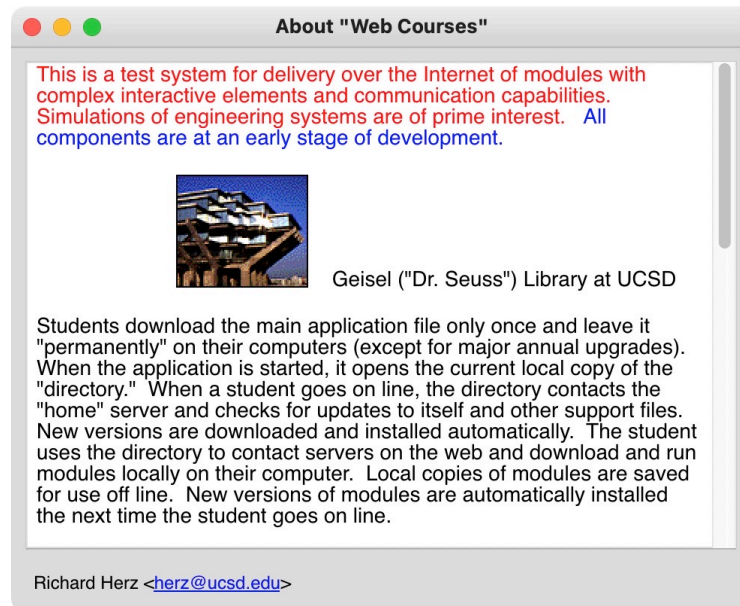
The window below on the left was opened by the main file from the support/scripts/erc_directory.rev file.
The lab has opened in the off line state. The user selected the server San Diego and clicked on the module About Web Courses.

The module hasn't been accessed previously, so the user is notified that it is only available on line.
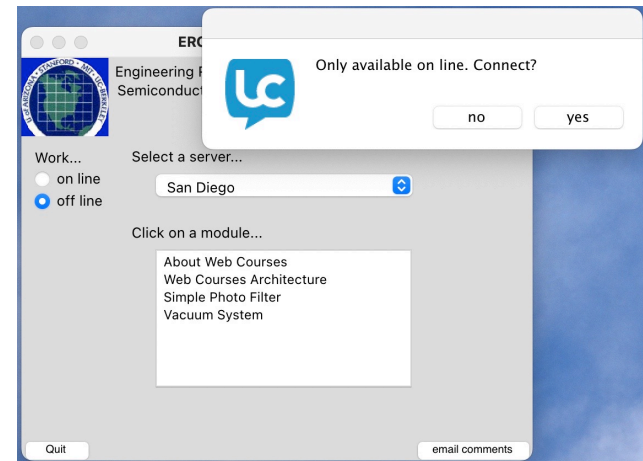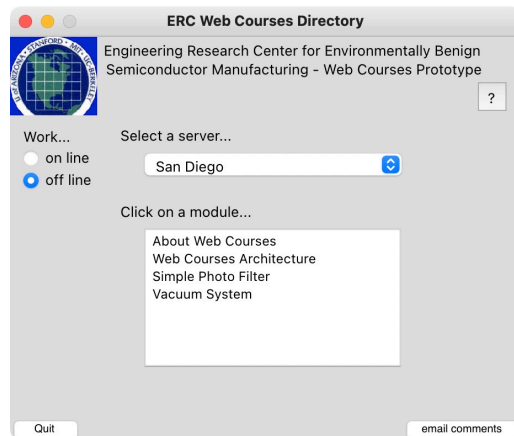
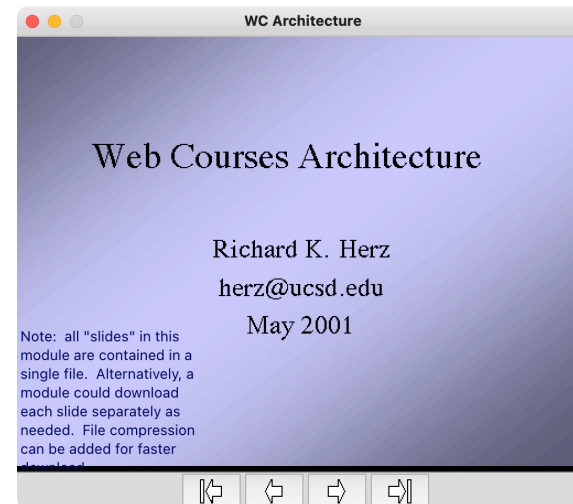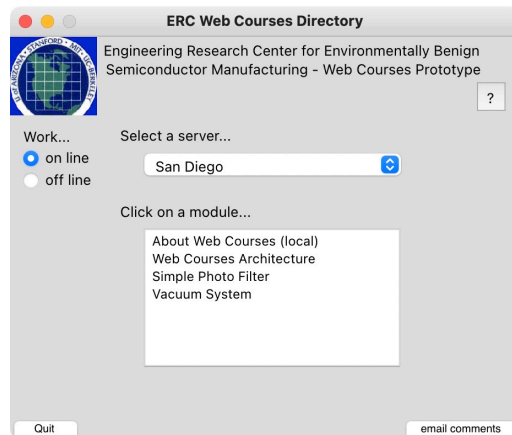# Web Courses - prototype of Internet connectivity in Reactor Lab

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

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.

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. 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.

Richard Herz <herz@ucsd.edu>

About "Web Courses"

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.

In addition to importing PowerPoint presentations, presentations with embedded interactive simulations can be developed. Modules with QuickTime movies 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.

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.
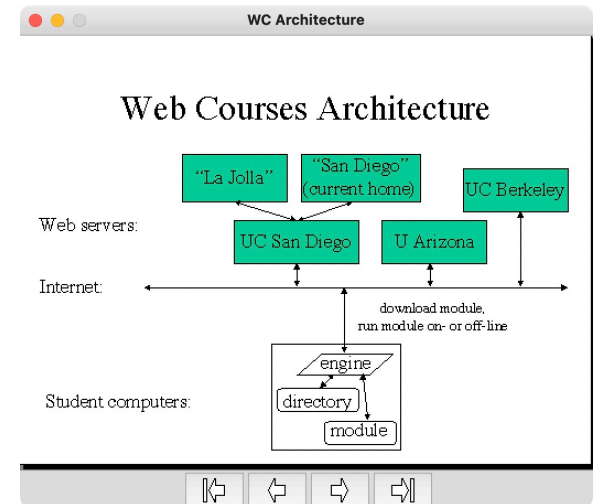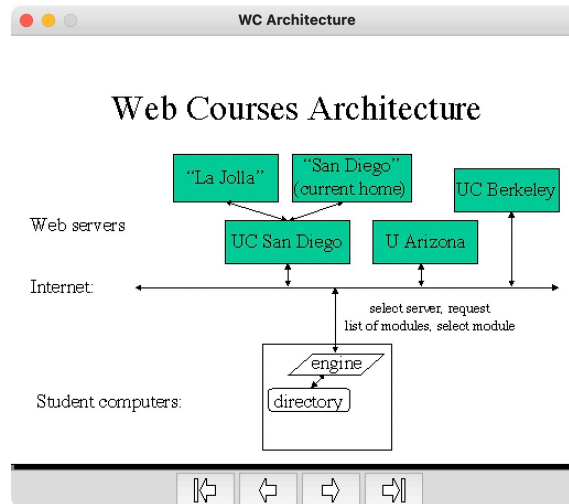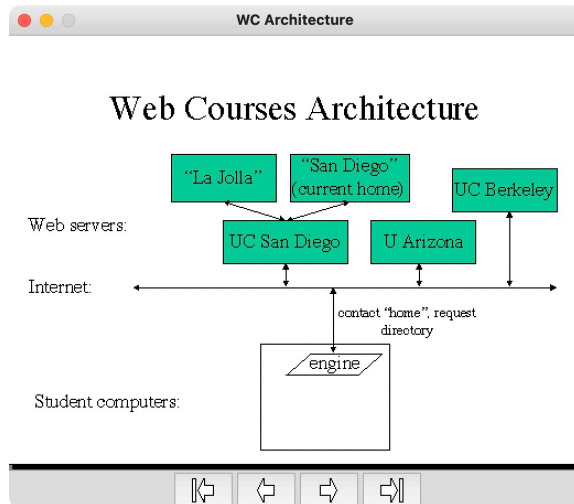
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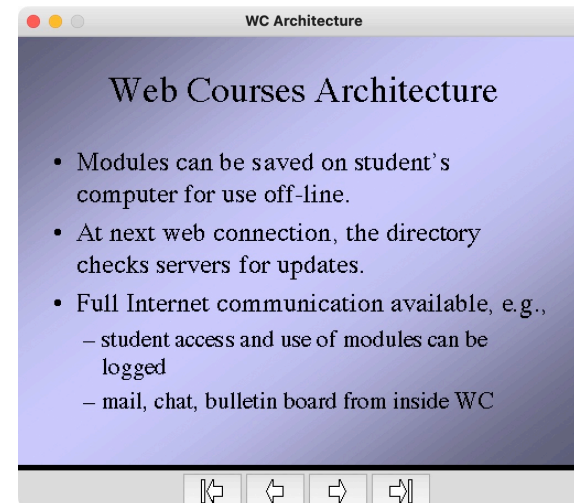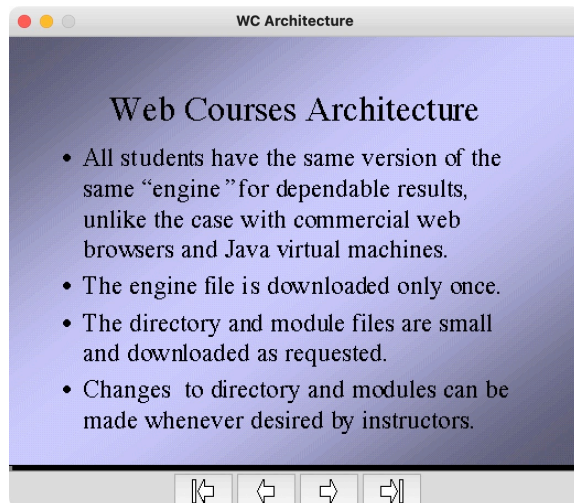Next, the user accessed the Web Courses Architecture module.

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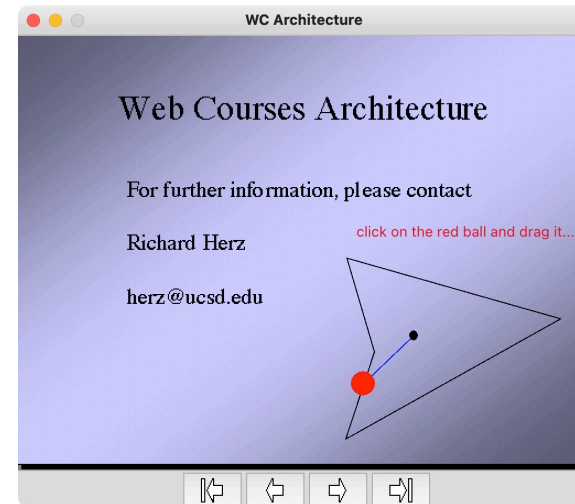
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Web Courses Architecture

- All students have the same version of the same "engine" for dependable results, unlike the case with commercial web browsers and Java virtual machines.
- The engine file is downloaded only once.
- The directory and module files are small and downloaded as requested.
- Changes to directory and modules can be made whenever desired by instructors.

Web Courses Architecture

- Modules can be saved on student's computer for use off-line.
- At next web connection, the directory checks servers for updates.
- Full Internet communication available, e.g.,
  – student access and use of modules can be logged
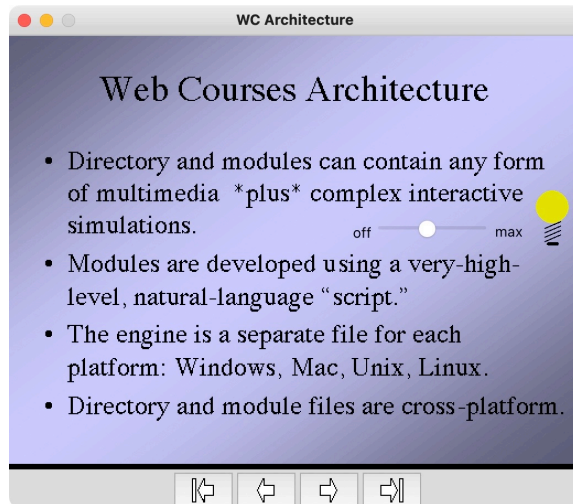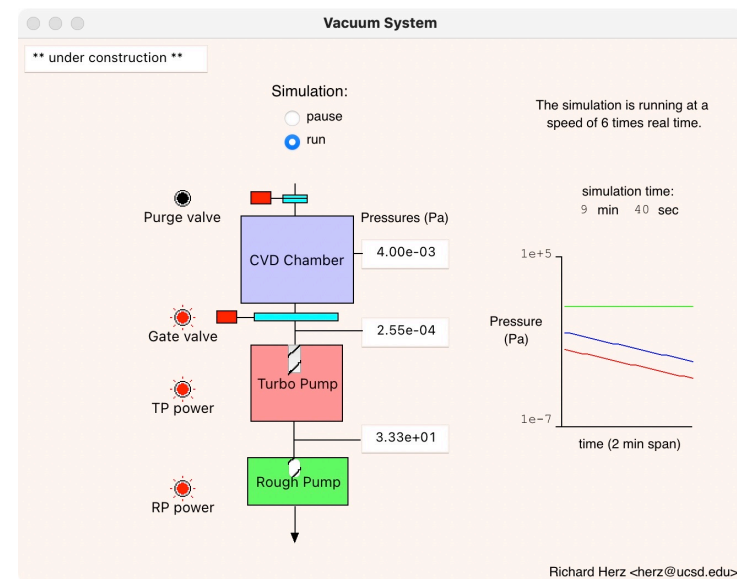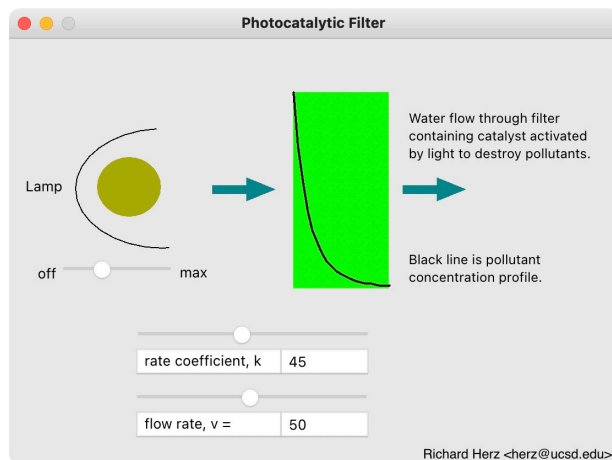 – mail, chat, bulletin board from inside WC

Web Courses - prototype of Internet connectivity in Reactor Lab

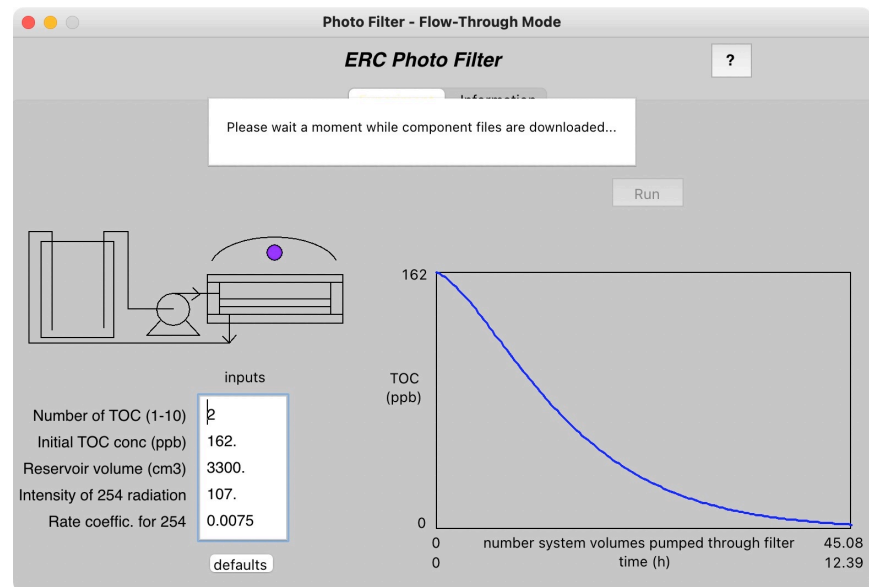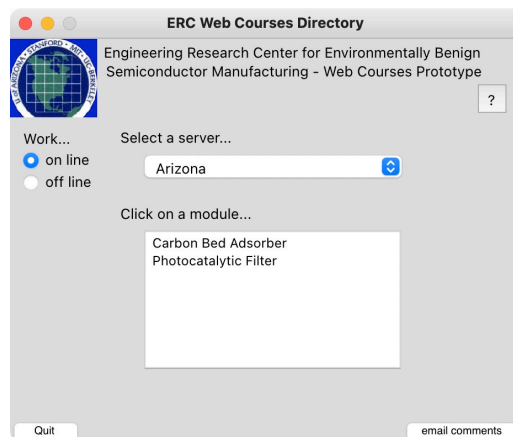# Web Courses - prototype of Internet connectivity in Reactor Lab

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.

Photocatalytic Filter

Lamp

off — max

Water flow through filter containing catalyst activated by light to destroy pollutants.

Black line is pollutant concentration profile.

rate coefficient, k — 45

flow rate, v = — 50

Richard Herz <herz@ucsd.edu>

Vacuum System

** under construction **

Simulation:
- pause
- run

The simulation is running at a speed of 6 times real time.

Purge valve

CVD Chamber

Pressures (Pa)

4.00e-03

Gate valve

2.55e-04

TP power

Turbo Pump

3.33e+01

RP power

Rough Pump

simulation time:
9 min 40 sec

1e+5

Pressure (Pa)

1e-7

time (2 min span)

Richard Herz <herz@ucsd.edu>

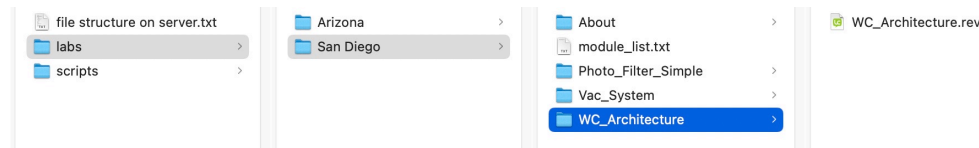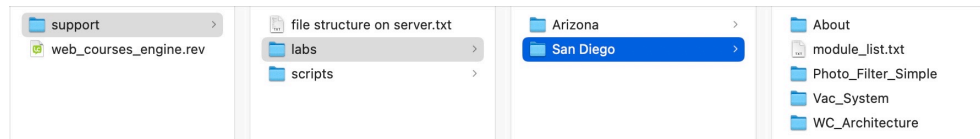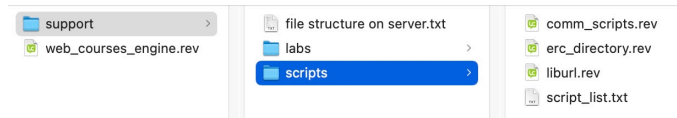# Web Courses - prototype of Internet connectivity in Reactor Lab

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.

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

| 📁 support | › |
| 📄 web_courses_engine.rev | |

📄 file structure on server.txt	
📁 labs	›
📁 scripts	›

| 📄 comm_scripts.rev |
| 📄 erc_directory.rev |
| 📄 liburl.rev |
| 📄 script_list.txt |

| 📁 support | › |
| 📄 web_courses_engine.rev | |

📄 file structure on server.txt	
📁 labs	›
📁 scripts	›

| 📁 Arizona | › |
| 📁 San Diego | › |

| 📁 About |
| 📄 module_list.txt |
| 📁 Photo_Filter_Simple |
| 📁 Vac_System |
| 📁 WC_Architecture |

📄 file structure on server.txt	
📁 labs	›
📁 scripts	›

| 📁 Arizona | › |
| 📁 San Diego | › |

📁 About	›
📄 module_list.txt	
📁 Photo_Filter_Simple	›
📁 Vac_System	›
📁 WC_Architecture	›

| 📄 WC_Architecture.rev |

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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.

support	>		file structure on server.txt		Arizona	>		About
web_courses_engine.rev			labs	>	San Diego	>		module_list.txt
			scripts	>				Photo_Filter_Simple
								Vac_System
								WC_Architecture

module_list.txt

```
About Web Courses $ about.rev $ 20030621 $ (local)
Web Courses Architecture $ WC_Architecture.rev $ 20030526
Simple Photo Filter $ photo_filter_simple.rev $ 20030526
Vacuum System $ Vac_System.rev $ 20030526
```

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