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Using Electronic Commerce Software in an Electronic Commerce Course

ABSTRACT

In this paper, I describe the process of using Electronic Commerce software in the namesake course. I outline three options, point out the pros and cons of each option, then make a recommendation about the best option.

KEYWORDS: Electronic Commerce, E-Commerce, Software

INTRODUCTION

In teaching an Electronic Commerce (E-Commerce) class as part of an Information Systems curriculum, it has become important to provide hands-on experience to E-Commerce software. At one time, having students use such software would have been nearly impossible as it was prohibitively expensive to purchase for in-class use and/or required extensive programming experience to design. In the past few years, though, many open-source and free versions of E-Commerce software that can be run on nearly every computer have become available. Examples include OpenCart, WP eCommerce, and WooCommerce among others. Some, like the latter two, have to be installed on an existing Content Management System (CMS) package like WordPress. OpenCart, on the other hand, is designed to be a standalone installation and, therefore, doesn't require users to learn two different systems.

As an academician-turned-entrepreneur, I have helped small- to mid-sized firms deploy E-Commerce software using the aforementioned and other E-Commerce packages. Increasingly, now, vendors such as GoDaddy, Shopify, eBay, and several others provide pre-configured E-Commerce packages that require few technical skills to get a fully-configured online store up and running. Either way, these packages, at the minimum, include *modules* for accepting credit card payments, calculating shipping costs, keeping inventory, and performing many, many other store management tasks. There is little excuse, therefore, to not provide students some exposure to what creating and running an E-Commerce store entails.

My experience with integrating E-Commerce package in the classroom spans over three years now. In the latest go-around, I taught a 100% online E-Commerce class that was part of a state-wide undergraduate IT program at multiple universities. I had students from three other in-state universities (in addition to the one I work at) taking the class. This paper is about the experience of providing mostly-remote students exposure to an E-Commerce package as part of an E-Commerce class.

PROCESS

OpenCart is an open-source and free E-Commerce software that provides a complete set of tools and features to create, run, and manage an online store where products can be cataloged and sold. It is written in PHP and, therefore, requires PHP to be installed on the computer to run. In addition, it needs MySQL, a database management system (DBMS), and a Web server (Apache preferred but will work on IIS). Other sub-components of PHP and Apache (or IIS) need to be installed. Once everything is installed, the computer is fully configured to install OpenCart.

MySQL is a multi-user, multi-schema, server-based, cross-platform, and free DBMS that is used extensively by organizations for business applications. Multiple users can connect to the DBMS simultaneously and multiple schemas can be created. Each schema can be configured to allow only certain users and applications to have access to the data therein. Thus, every user that connects to and accesses data has be provided unique security credentials and is restricted to only the schema s/he needs to use. Such is the case also for every application that needs access to data stored in the databases. So, before one begins to install OpenCart, one needs to install MySQL (the Community Edition suffices), create a schema, a user, security credentials for the user, and assign permissions to user. Generally, a user (as opposed to an Administrator) is restricted to using the schema s/he has been provided permissions to use, and can perform no administrative functions (such as deleting schema, creating other users, and the like) even on the schema that s/he accesses.

In the Microsoft Windows world, there are two options for Web servers: Internet Information Services – IIS (a Microsoft product) and Apache (an open-source and free-to-use software). IIS is free for personal use, is bundled with Windows (has to be enabled), but cannot be used on other platforms. Apache, on the other hand, is a cross-platform application. For ease of use and management, IIS would be the preferred software on a Windows-based computer.

A Web server has to have a Web address that users can use to access websites stored on the server. A *root* folder is automatically created and configured when one installs the requisite software. Within this folder, a default Web page is created that can be viewed from a browser using URL http://localhost. [In networking terminology, localhost is the computer that the user is using at that moment.] If one wants to create and store additional websites, individual folders with meaningful names will need to be created for each website. These websites can then be accessed from a browser using URL http://localhost/*foldername*. This way, multiple websites can be stored on one computer or Web server.

Finally, PHP is an open-source free-to-use interpreted programming language that works very well with MySQL and Apache. Lately, Microsoft has taken steps to ensure that PHP also works well with IIS. They have been largely successful at doing that.

After making certain that a computer meets requirements for installing OpenCart, first one must create a database schema and associated user, user security credentials, and user permissions. The required OpenCart files then need to be placed in a separate folder (say, opencart) within the *root* folder of the Web server. [Case is not an issue on Windows computers but, on Linux-based computers, one can run into issues if proper case is not used. Generally, one should use lowercase letters for Web folders.] To begin OpenCart configuration, one needs to open a browser and navigate to URL http://localhost/opencart. The installation utility will check a few parameters to see if they meet OpenCart requirements, then will ask for database schema details and user credentials. It will also ask for Administrator security credentials for the user who will manage the OpenCart store, its products, customers, and the like. Once all the correct details are provided, OpenCart is installed and ready to be customized for use.

As with any CMS, and frankly OpenCart is one, there is the *public* side of the website that displays the store and allows users to interact with it. It is also referred to as the *frontend* of the website. Then, there is the *administrative* side of the website that allows store owners to add products, their details, and perform many other functions to keep the *business* running and cash

flowing. It is referred to as the *backend* of the website. It is worth pointing out that customers do not see the backend of the website, just the frontend.

Given the above, what options are available for installing OpenCart to have student experience E-Commerce concepts and functions? Which ones present the least complications that might occur during installation and configuration? Which OS (Windows, Mac OS, or Linux) is preferable to install OpenCart? What issues would one encounter with installing OpenCart? I now discuss these below.

I considered two options to installing and using OpenCart.

1. On students' computers
2. In a Linux-based Virtual Machine (VM)
3. On the Cloud

On Personal Computer

The easiest option here is to install OpenCart on a Windows computer. Microsoft has a free application – rather, a platform – called Web Platform Installer (WPI) that can be used to install a multitude of Web apps. These apps include content management systems (CMSs) such as WordPress and Drupal, E-Commerce apps such as OpenCart and nopCommerce, databases such as Microsoft's Express version of SQL Server and MySQL Server, and the like.

WPI makes the process of installing OpenCart and other Web apps almost effort-free. Before installing an app, WPI installs all software dependencies needed by the app to run – MySQL DBMS and PHP, and any associated components. Interestingly, WPI installs the Express edition of IIS and requisite components to interact with PHP. IIS Express is a smaller but very capable version of the full IIS software. While IIS runs all the time in the background, thereby using system resources, IIS Express runs only when a Web app is running.

Along with IIS Express, WPI installs WebMatrix, a lightweight but versatile Web development application for both, closed- and open-source applications. [As of the writing of this paper, WebMatrix has been replaced with Microsoft's cross-platform and open-source software, Visual Studio Code (VS Code).] To access the OpenCart website from the browser, WebMatrix [*Portnumber* is a unique 4- or 5-digit number between 1024 and 65535 assigned randomly by IIS Express to identify the OpenCart website. Several numbers are used to identify other services, so IIS Express excludes them.] has to be running in the background, otherwise IIS Express will not run. The URL to access the website is http://localhost:portnumber/opencart.

There were two sets of problems that students ran into while installing OpenCart this way. One set of problems was components that would not install. Here, for example, WPI could not install MySQL Server or one of the required PHP / MySQL components. That would halt the installation of anything else that depended on the needed component, thus causing a failure in installing OpenCart. My past experience with such problems is that they are quite difficult to figure out, especially if one is facing a time crunch. I have, in some cases in the past, been able to reinstall the entire OS, update it, install OpenCart (or other similar app), all in less time than it took to troubleshoot and fix a problem! As a faculty member, one does not have the wherewithal to provide technical support, especially when there may be other students waiting in line!

The other set of problems were post-installation problems with OpenCart. Somehow, OpenCart would not open in the browser, giving an error message. Once again, although Microsoft provides troubleshooting steps on their website, these errors took some time to discover and solve. Overall, though, the good news here was that most students were able to install OpenCart without a hitch, especially those with the most recent version of Windows.

Students with Apple computers could not use WPI. Apple computers come with Apache Web server software already installed and functioning. All a student had to do was to install PHP and MySQL Server, then be able to install OpenCart. Generally speaking, I have found that most students with Macs had difficulty installing these apps and configuring them. Further, Apple restricts which applications can or cannot be installed on their computers. Although packages such as MAMP: My Apache - MySQL – PHP are available, configuring them to install OpenCart is somewhat difficult. Even for those who are able to get the MAMP server environment installed, trying to install OpenCart is a process. Thus, I recommend students use a Windows-based computer to install OpenCart.

Finally, those students with computers that have a Linux-based desktop OS installed (there are a few!) are able to easily do what they want because of their knowledge of Linux. I just had to tell them to install OpenCart (or another CMS / E-Commerce app) and they would do so without difficulty. I never had to help with any student who used a Linux-based computer. In any case, the installation of OpenCart on Linux-based desktop OS is fairly simple. [I used Ubuntu Desktop OS ver. 16.04 LTS.] Apache, PHP, MySQL, and any other related components needed can be installed effortlessly using the GUI. If one is beginning a new installation, the aforementioned can be included there. I will note that, to date, of the many installations I have done, there have been no issues with getting OpenCart to work on Linux OS.

On Linux-Based VM

As noted above, some students had difficulties with the OpenCart installation process. Although I would get onto Skype or Google Hangouts and have them share their screens with me, I soon realized that some of the problems were either unfixable or needed more effort. I felt it was necessary to do something else for these students. In addition, there were some Apple Mac owners for whom the use of Microsoft's WPI was not possible on the Mac OS. I wanted to come-up with a solution that would help students who and Windows PCs and students who had Apple Macs. Further, I wanted to make OpenCart installation and use almost effortless for them.

VirtualBox is a cross-platform Oracle product that allows one to create VMs that can run, without modification, on all OSs. This meant I could create a VM on my PC, export it to a standard disk *image*, upload it somewhere, and let students download and import it into their installation of VirtualBox. Using Microsoft Windows in the VM would have meant providing a license to each student's computer. I needed an OS that had a smaller footprint, had no licensing restrictions, and could be distributed freely. Further, I was trying to create a *black box* such that students did not need to have any knowledge of using the VM OS. Enter Linux again!

I created a VM on my computer using Ubuntu's Linux-based server OS, ver. 16.04 LTS. The OS does not have a GUI once it is up and running. Everything is done from the Command prompt. Installing the OS on a VM was fairly simple; I included Apache, MySQL, and PHP when

asked during installation. Once that was done, I applied all updates and patches, installed a simple GUI-based server management software, and then, using a browser to connect to the server VM, installed OpenCart.

When one installs OpenCart on a VM, the URL to access OpenCart can no longer be http://localhost:portnumber/opencart. Instead, the VM acts like a Web server (it has Apache!) and has to have a unique *IP address.* One can configure the VM to use one (for e.g., 192.168.56.10) of the many addresses reserved for such purposes. When the VM is exported, the IP address is hard-coded to the VM. When the student obtains the VM, s/he has to make sure that VirtualBox uses that address for the particular VM. The IP address is easily adjusted in case it needs to be. [The reason for such an adjustment would be that OpenCart configuration files include the IP address that the VM uses. If the VM IP address changes, then OpenCart will not work properly unless the IP address changes are made to the configuration files. Therefore, the easier approach here is to configure VM to use the hard-coded IP address.]

Herein lie the advantages of providing a pre-configured VM to other users. Users do NOT have to be aware of what OS the VM uses, how the OS is configured internally, what components have or have not been installed, and the like. The VM acts like a black box that provides a web interface to an OpenCart installation. Users can access the OpenCart backend like they would be able to normally do and don't have to install any OS-related software to get OpenCart to work. All that is done by the VM provider who, in our case, was me.

One point of note here. BIOSs of all computers sold in the last several years have a Virtualization setting that could be disabled. Users have to make sure that this setting is enabled. One symptom that Virtualization is disabled is that VirtualBox will not work and/or provide an error message. Computer manufacturer websites provide instructions on how to enable Virtualization settings.

In the Cloud

The final option is to use one of the many Cloud services provided by Google, Microsoft, or Amazon. Each provides students taking relevant college courses free access to, and use of, VMs, including barebones images of various Linux and Windows OS flavors. The use of these services can be initially daunting, so they are not feasible to be used by users who have never used these services before.

One option, though, that can be exercised by an instructor is to set-up a complete cloud VM, just like one would as described in the previous section, then copy that image to each students' cloud account. That is a very time-consuming process as these images are over 1.5 GB in size for Linux [I have not deployed Windows Server OS in the Cloud but I guess the image size might be about that or a little larger]. I tried this process for some students who had problems running VMs on their computers using Google's Cloud Services. With an upload speed of up to 5 Mbps Internet connection, the image took 35 – 45 minutes to upload for each student! There are also other issues related to this option and the process is much more complex than I just described. The advantage, however, of such a configuration is that I can log-in to the OpenCart backend to help students with any problems they might have.

IN CLOSING

For the long term, if I were to pick an option, it would be the second one . . . using a Linux-based VM. Overall, there is a big plus to using it: since students don't have to deal with the complexities of an OS and other software installs, one might as well use other available E-Commerce packages. In a face-to-face class setting, I have used both WP eCommerce and WooCommerce, and found that they are a lot easier to configure and use. They do require that WordPress be installed first but that is easily done. WordPress is very popular, easy to install, and easy to use. Once installed, Wp eCommerce and WooCommerce are merely installed as *plugins*, again a very simple task. In fact, WordPress is available to be installed through Microsoft's WPI, too.

OpenCart, on the other hand, is somewhat less intuitive relative to the two aforementioned packages. Some settings are not as easy to find as they are with the other two. The question then arises: why did I use OpenCart and not one of the others? My initial decision was to have students use exclusively Windows-based computers and have them install OpenCart through WPI. Soon, problems began cropping-up both during and after the installation. Some students' computers stopped at the installation of MySQL server and the process of OpenCart installation was terminated. In some cases, after the installation, OpenCart would not show-up in the browser. Even if OpenCart showed-up, students and I were unable to upload product pictures to the store because, as per the error message, the upload folder did not exist! That was, of course, not true. Finally, some students owned Apple Macs and I needed to find a solution of that, too! That's when I decided to abandon the WPI method and go to using the VM route. Had I decided to use the VM method right from the beginning, I would have used WooCommerce that, based on the number of active installs, is a more popular plugin. Nevertheless, all E-Commerce packages cited in this paper have many additional plugins (some free, some not) that can be used to extend their functionality. Even without additional plugins, each package has a set of features that can be used to run a complete online store with little configuration changes.

In terms of store frontend design, WordPress allows one to easily change the look-and-feel using what it refers to as *themes*. There are literally thousands of free and paid themes available that one can use to quickly change the store design. Since WooCommerce and WP eCommerce are installed on WordPress, any design changes automatically flow to the online store pages.

Overall, with the available E-Commerce packages, one can provide students with sufficient hands-on experience building, running, and maintaining an online store. The process does take a little effort initially but, in the end, it is worth the effort because students learn how the E-Commerce process works, how money flows, and how one gets the products to customers.