MCIS 5413: Web Programming

Instructor: Dr. Satish Penmatsa

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PROJECT REPORT

The Classics.COM

Team Members:

David Blackburn

Carter Jones

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I. INTRODUCTION

Web applications are a critical component of both modern business and modern life – scarcely can we go even a single day without using at least one web application in our daily routine of both work and leisure. Yet their ubiquity does not lend one to immediate understanding, in the same way that the ubiquity of the chemical, physical, and biological processes that make possible life itself are still poorly understood by most, and even to the most erudite of scholars there remain dimensions of chemistry, physics, and biology filled with mystery and conjecture. Fortunately, web applications are themselves fashioned by other humans, and thus lend themselves to more accessibility in understanding, and it is to that end that we write this report.

What, then, is a web application? To define it simply, a web application is a software application that that depends on the client-server model of computing; that is to say, a web application is a software application hosted on a server which is accessed and consumed by a user via client software, such as a browser. Web applications make possible all sorts of modern phenomena, such as e-commerce, social media, cloud computing, and so on. E-commerce is a particularly beneficial use of web applications in the business world. The advent of e-commerce has caused a rapid evolution in the business landscape of today, arguably causing the death or decline of many traditional business models and an increase in commercial democracy or hegemony – depending on one's point of view. While some sectors (like groceries, for example) have not been so profoundly impacted, others (such as book and music retailers) have been almost completely supplanted by e-commerce (Dennis 2018). E-commerce allows businesses to put their inventories at their customers' fingertips. No longer is there any need to make time-consuming trips into town (especially for those living in rural places away from metropolitan

centers), no longer is there any need to go from store to store seeking the best prices. A few minutes of leisurely browsing from the comfort of one's own home, and suddenly the cheapest and best products are available. With the click of a button and the entry of some payment information, and suddenly these things are right on their way to one's home. It is the pinnacle of consumer convenience – and that's very good news to the businesses who are exploiting these technologies. No longer are businesses limited to customers in their hometown, or even in their own country. No longer are businesses confined to storefront hours – instead their wares and services are perpetually on display for any and all comers. What would have required a staff of many thousands to run in the past can now be run by an exponentially smaller team of developers and managers, thus increasing sales and profits while cutting the financial overhead of thousands of retail staff to the bone, if not removing it entirely.

One of the most preeminent and widely used e-commerce web applications today is Amazon, a platform for buying and selling books, furniture, décor, hardware, appliances, technologies, and all other manner of commercial goods. The economic power of Amazon cannot be understated – their efforts in the e-commerce space have threatened traditional "brick-and-mortar" retailers, driving many book stores and other smaller Mom-and-Pop retail stores completely out of business in a way that even corporate giants like Walmart haven't been able to in the past. One simply cannot beat the convenience of shopping online and having goods shipped directly to one's house. To that end, even companies like Walmart have felt a bit of pain in their struggle against the economic colossus of Amazon, redoubling their own efforts to build a substantive e-commerce platform and streamline the shopping process for customers.

Technologies for developing web applications have exploded in recent years, and there always seems to be a new framework, a new library, a new programming language cropping up

every few months. Nevertheless, some technologies have remained stable and are more widely used than others. Foremost among these technologies are HyperText Markup Language (HTML), Cascading Style Sheets (CSS), and JavaScript, the almost universal trifecta of front-end (or client-side) web development that govern how the user interacts with the web application. These can be built up from scratch, or can be used by tapping into powerful frameworks like Twitter's Bootstrap, which uses a number of pre-defined CSS classes to style a page simply and efficiently, allowing the developer to write HTML without the burden of writing (at times voluminous) CSS files to style a page and make it visually appealing for potential users. Less technology-savvy web application builders also have access to a wide range of WYSIWYG site builders, such as the desktop Adobe Dreamweaver application or the web-based Wix, Shopify, and SquareSpace content management systems (CMSs) and site-building utilities.

On the back-end (or server-side), several technologies have gained prominence, PHP being first among them. PHP is a server-side scripting language that allows developers to exploit the web server's data processing capabilities, pushing information from the server to the user and pulling information from the user into the server, as well as interfacing with any number of database technologies used for managing inventory and user accounts. PHP is not alone in fulfilling this role, of course – in recent years there has been a push to use JavaScript on both the front- and back-end, using frameworks and libraries such as Angular and Node.JS. For database management, Structured Query Language (SQL) in any one of its various flavors is king, although other database technologies and languages exist, such as Python's MongoDB library. For the server itself, Apache is a common option.

Both the client-side and the server-side must exist in conjunction for a web application to be of any use to the end user, regardless of the technologies used for constructing them. The user must be able to interact with the web application (through the client-side), generally through a browser, and the server must be in place to listen for and answer requests. The bulk of the business logic will necessarily be housed in the server, as well as important database information pertinent to users and inventory.

Now that we have become familiar with web applications, their benefits, and some of the technologies used to build them, we will continue to discuss our own web application, an e-commerce platform for classic literature that we have named, aptly, The Classics.COM.

II. PROBLEM DESCRIPTION

The Classics.COM is a traditional e-commerce platform used for the niche purpose of selling classic and/or rare works of literature, usually in collections or special leather-bound editions. It provides a simple mechanism by which to purchase such tomes by adding them to a shopping cart, verifying the quantity desired, and checking out at the end by requesting customer shipping and payment information.

In building our web application, we have opted not use any CMS, but rather to build everything from the ground up ourselves in order maximize the insight gained from the building of such a system. The only concession to ease that we have made is to use the Bootstrap framework in lieu of writing our own CSS files in order to produce a visually-appealing website while spending a minimum of time concerned with issues of web design. With that being said, some in-line CSS styling was used in conjunction with the Google

Fonts API in order to generate a header for our web-site that we felt was aesthetically superior to the sort of basic styling provided in the default BootStrap implementation.

On the server-side, we opted to use PHP as our scripting language of choice. It is a well-documented, common language, and it provided the functionalities we required for the implementation of TheClassics.COM. PHP has the distinction of being widely-used in the world of web application development, and it is more stable than some other trendy libraries and frameworks. The stability and thorough documentation of PHP would make long-term maintenance of TheClassics.COM substantially easier than other languages or technologies, for which support could lapse in the future. In lieu of a database system to hold inventory and user information, we have opted to use a simple .txt file to house our inventory, and to not store user information at all between sessions.

III. DESIGN AND IMPLEMENTATION

Below are some screenshots of TheClassics.COM in action:

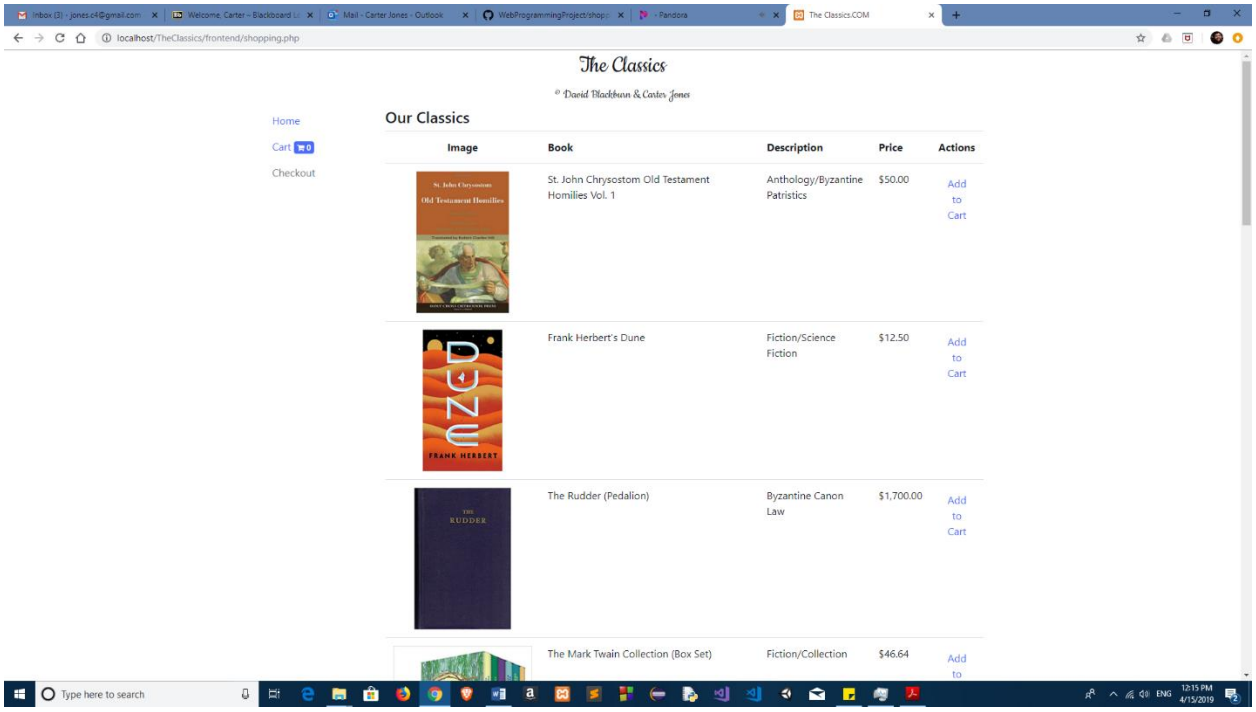

Figure 1. The Home Page, displaying inventory for purchase

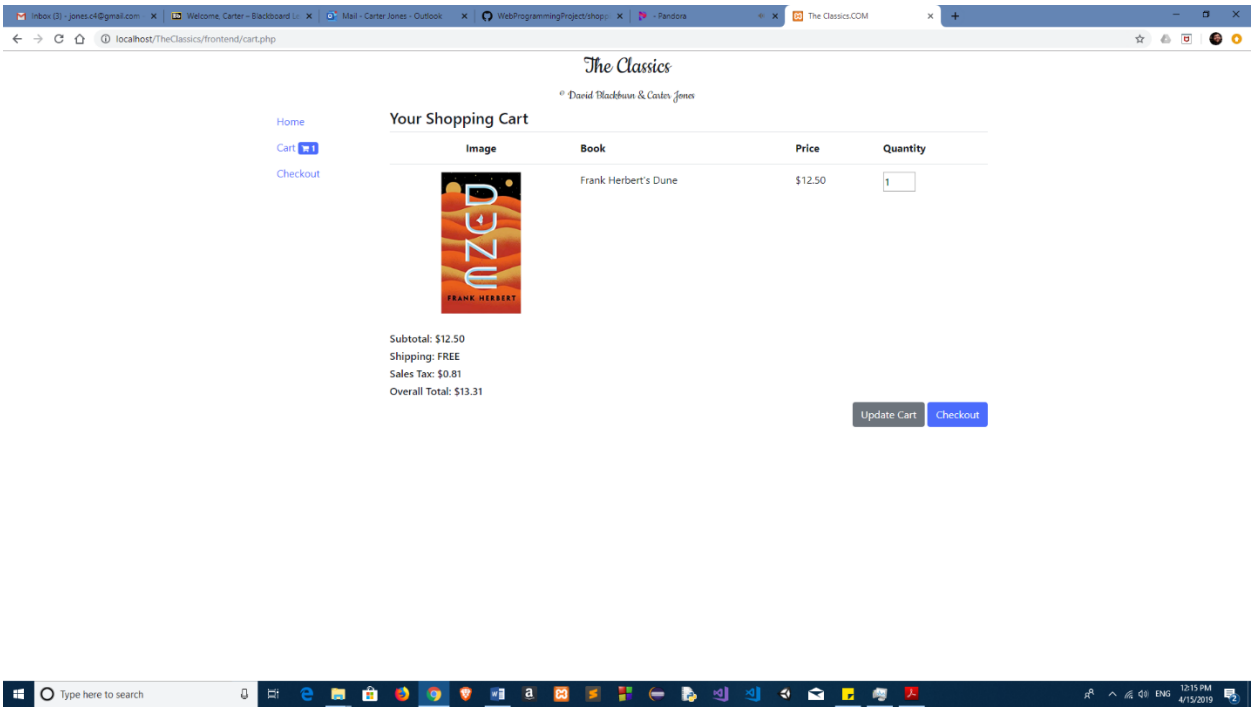

Figure 2. The Shopping Cart Page with a selection ready for purchase.

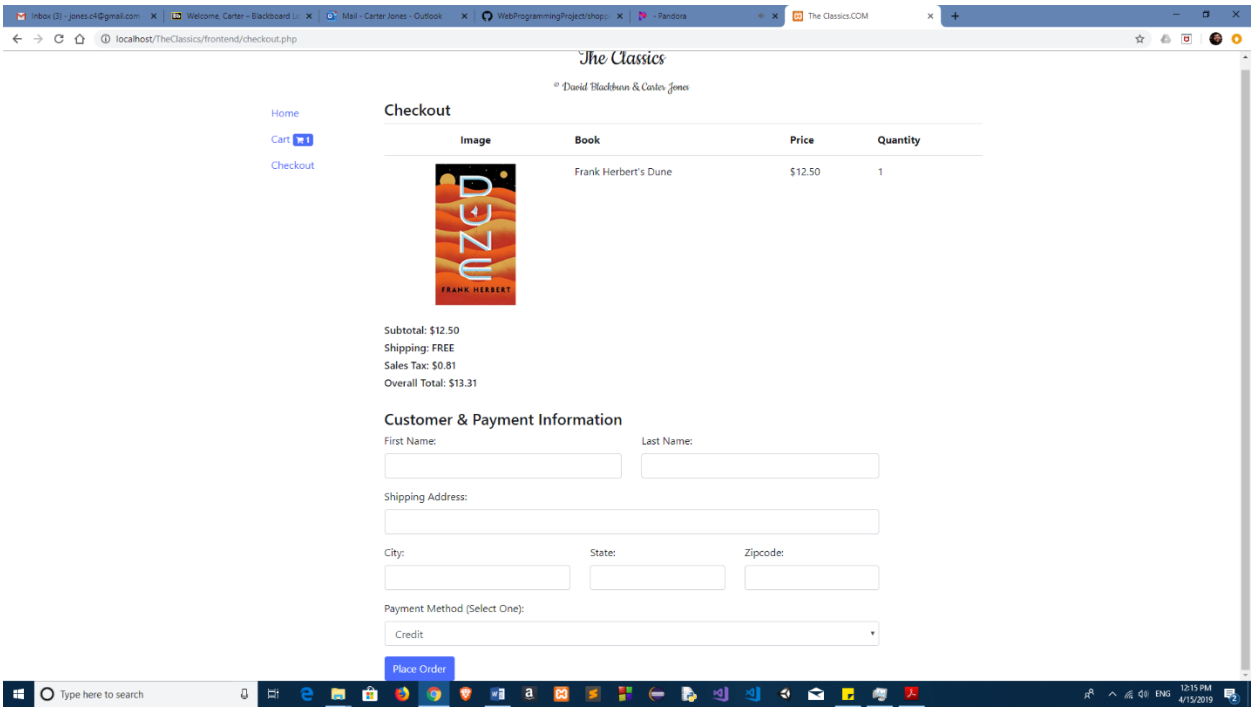

Figure 3. The Checkout Page ready to receive customer information.

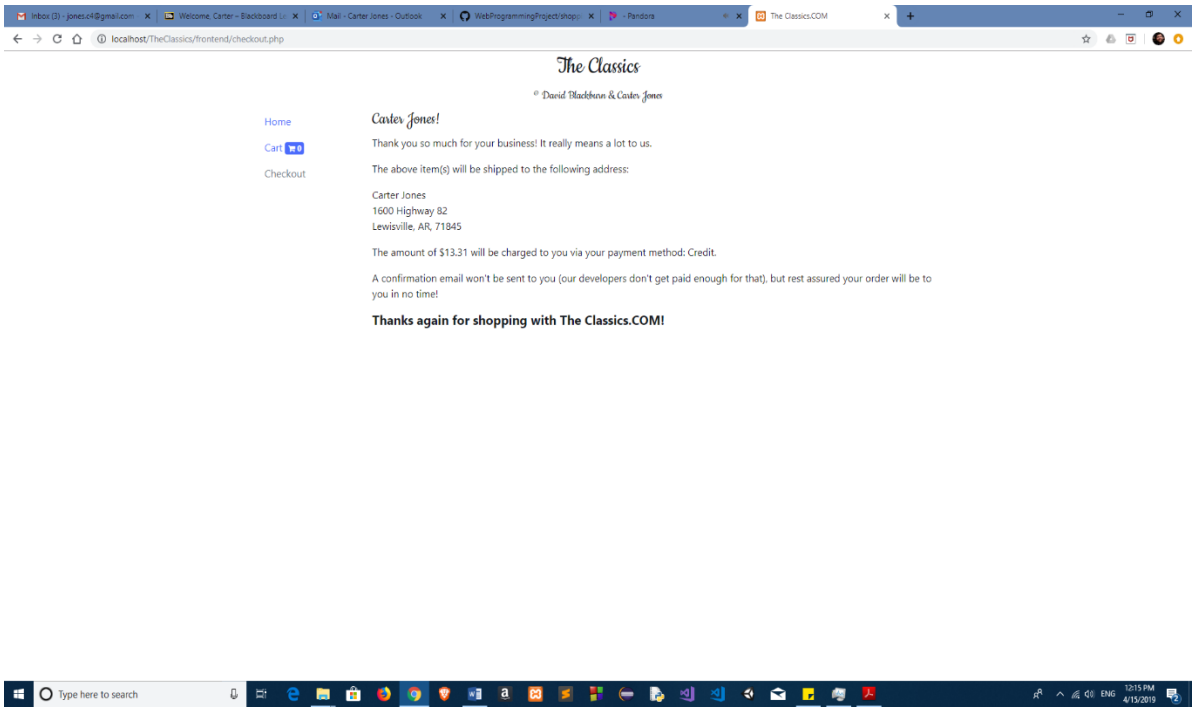

Figure 4. The Checkout page upon submitting information and confirming the order.

Several issues arose in the beginning of the implementation of TheClassics.COM, including difficulties with maintaining session state and problems with displaying properly formatted monetary values. By diving into PHP documentation, we were able to properly set up and tear down sessions after some testing. The issue with displaying monetary values arose because we initially used the money_format() function found in PHP's standard library – the money_format() function exploits other functions on the operating system level, and only works on servers using UNIX-based operating systems, which were used in the original testing of the web application. Later testing was conducted on a Windows machine, and this caused the server-side scripting to break. This problem was resolved by replacing the platform-dependent money_format() function with the platform-independent number_format() function, which

allowed us the same type of number formatting for monetary values while working on servers running any type of operating system.

We also had some difficulty deciding whether or not to accept payment information approximating what one would find in a real-world e-commerce web application (e.g., credit card information and additional details), but we erred on the side of caution in the end and decided to only allow users of TheClassics.COM to choose one of several payment types without any further qualifications. Designing a system for securely accepting and processing debit and credit card payments is beyond the scope of the current project, and we did not want to provide any opportunity for test users to accidentally expose confidential information to potentially malevolent actors (or be open to such accusations ourselves).

IV. CONCLUSION

In summary, our web application does precisely what the project specifications indicate: TheClassics.COM provides an interface through which one can browse an inventory of items, add them to a shopping cart, and complete a transaction, at the end of which the cart is cleared and a new shopping session can begin. It would form a good basis for a “real” e-commerce platform for the selling of literary classics, although to go into production there would need to be a few improvements.

The most immediate improvements (or additions) would be additional web-site copy introducing our business to potential customers, a database system for maintaining inventory and user records, and a more robust and secure checkout form for actual transaction processing. We could also in the future add individual pages for our inventory items which would include more detailed information on the book(s) being sold, along with utilities for customers to rate products

and leave reviews. We would also need to add forms for users to login and logout, create new accounts, review previous purchases, or purchase something as a guest user – this would most likely necessitate the use of cookies to identify anonymous users between sessions, and so forth.

The possibilities for an e-commerce web application like this really are boundless, and the great diversity of approaches to e-commerce is part of the beauty and intrigue of web applications at large. The only limit is the imagination and the drive of the developers who put their hands to the work of creating something truly great.

V. REFERENCES

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