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Real Estate Paperwork Utility

by

Nicholas Anthony Diliberti

**An Honors Capstone
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Abstract

The advertisement of real estate and the sale of real estate are tasks which involve a large set of interconnected data. Sellers and realtors require a platform on which to advertise their properties, and those same parties will then require legal documents which formalize the sale of their listings. Wedding these two needs, while still allowing each component to act without relying on the other, results in a single system that programmatically passes information from one component to the other, saves sellers and realtors time, and presents the entirety of the functionality via a single, consistent user interface.

For my honors capstone project, I created a open-source utility that prepares paperwork for real estate agents. By coupling this system with my senior design project, a website that allows realtors to advertise properties to interested customers, I enabled the system to pull information from the project's database, automatically populating known fields and folding the system's interface into the website's flow of control. Additionally, system accommodates any amount of information supplied to it by the database, creates placeholder fields for unentered data, and provides users with a responsive and user-friendly web-based interface. Finally, the entire project is open-source, allowing for free consumption, modification, and redistribution by any interested party.

Chapter 1: Importance and Originality

The Real Estate Paperwork Utility derives its value from both its open-source hosting and its adaptable structure.

As an open-source project available on GitHub, the utility is available for any interested party to download. Its entire implementation, from its hosting platform to the software interpreting the code, is free for any member of the public to download, alter, and employ as they see fit. This project might serve as the groundwork upon which another project is founded, a source of examples for newcomers to the programming environment, or the tool by which a start-up company manages its first customers. In addition, freedom to adapt the project means that those same project leaders, programmers, and business owners can alter the program to suit their specific needs, adding and removing features without worry over copyright or trademark. By hosting this project publically, it becomes a contribution to the wider world of programming, able to provide services in many more ways than as a set of functional code.

Furthermore, the utility can be run both as a packaged entity with the Real Estate project or on its own, divorced from any database. The Utility's code is structured such that any information pulled from a database is optional, can be inserted manually, and can be corrected by hand in case a particular user's adaptation of the project causes a misalignment between the code's expectations and the information delivered by the database. This relationship works in the other direction, as well; the Real Estate project can be run without the Paperwork Utility, requiring a single line of code to be removed from the project in order to separate the two subsystems from one another.

In conclusion, the Real Estate Paperwork Utility carries within it the benefits of the information era -- it is adaptive, modifiable, and freely sharable.

Chapter 2: Summary of Process

The Real Estate Paperwork Utility began as a removed requirement from a Senior Design team's statement of work. As part of Project 1 -- Real Estate Utility in Spring 2017's CS 499 session, team members were required to build a web-based interface for both realtors and potential buyers to use, the former listing and managing properties while the other searching for properties and contacting the associated agents. At the end of the statement of work was a requirement to build a paperwork-generating subsystem that would fetch information from the project's database and use it to populate three forms -- an Estimated Closing Costs statement, a Sales Contract, and a Request for Repairs statement. Adviser Richard Coleman was to provide the team with examples of these forms from his recent real-estate involvements. In the end, Dr. Coleman removed the requirement due to the complexity associated with implementing the subsystem. The utility became my Honor's Capstone shortly after, and Dr. Coleman became my adviser along the way.

For the utility to leverage the project's database, the remainder of the system needed to be near completion. As the project began to introduce methods by which realtors could enter, edit, and delete data, I worked closely with my other three team members in order to ensure that the information required for the utility would be present in our databases. The team's server runs on a Linux machine hosting a Whamp64 session, which hosts the MySQL database used to store the data and the Apache PHP interpreter used to retrieve it. Several of the team's software components, such as PHP database wrappers, Bootstrap site layout, and jQuery UI formatting, were brought into the Paperwork Utility as ways to enhance both the system's functionality and its user experience.

After the team had finished creating the Real Estate Utility, I worked alone to create the Paperwork Utility. First, I created a standalone page that used the site's layout and theme to present the user with an interface that would prompt them first for the type of form they wished to populate, then for the data used to populate that form. Then, I created a PHP script that would build the documents item-by-item, inserting and aggregating supplied data while leaving empty slots for missing data that could be filled in by hand. Considerations were made during this step as to how sums and totals should be treated; only when each addend to a sum is supplied by the user is the total inserted programmatically, and in the case where at least one addend is missing, the total is left for the agent and customer to fill. Finally, I wed the utility to the main project by inserting a self-formatting link onto each property's detailed listing page. So long as an agent is logged in, he will be able to navigate from a property's detailed listing page to the Paperwork Utility, with the system auto-filling information from the property by which the agent navigated to the page. Since this information is pulled from the URL used to access the page, an agent may bookmark the utility when it is associated with a specific property in order to quickly and painlessly populate forms involving that property in the future.

Chapter 3: Challenges and Solutions

As this project dealt with the development of legal documents, problems stemmed from both the need for appropriate templates and the focus on the system's flexibility.

Documents and Templates

Chief among the hurdles in this project was finding templates to use for each form. While the statement of work which originated this project claimed that Dr. Coleman would provide templates of the documents, he instead archived his real estate documents and could not deliver them both before the project was due and while keeping privacy to an acceptable level. Instead, each of the four document archetypes was assembled from online sources, forms provided by real estate companies, and templates created from my own real-estate experience in leasing a house.

The first form, the Buyer Estimated Closing Costs statement, was the most difficult form. These forms must adhere to a standard template released in late 2015 by the Consumer Financial Protection Bureau, including at least the information provided by the Bureau's sample form. This form includes both information that must come from the real estate agent and information that must come from the banking service that is offering the purchase's associated loan. To ensure compliance, I first started with the sample form and then re-formatted the arrangement of the information, trying to keep a minimalist, extensible presentation that would improve on the information's arrangement without losing the benefits of the more heavily-annotated architecture sample.

The second form, the Seller's Estimated Closing Costs statement, was much easier. Unlike the buyer-facing forms, the seller-facing forms do not need to conform to a specific

protocol or minimum guidelines. To populate this form, I drew on my experience as a treasurer at Global Surplus Distributors, creating “credit” and “debit” columns that would eventually need to be balanced by a transfer of funds from the buyer to the seller. The information contained in this form is very similar to that required by the buyer-facing form, but I was able to take more liberties with the layout to create a more compact, technically-demanding format.

The third form, the Sales Contract form, was difficult until I received aid from a real-estate company in Denver, Colorado. Upon request, they delivered the contract they use for home purchasing, giving me a clear roadmap on what information to include. I combined this with the formatting, wording, and presentation style of an online Simple Real Estate Contract in order to create a form that combined the best aspects of both documents.

The final form, the Request for Repairs form, posed little challenge. Using the form associated with my current landlord, I was able to quickly create and implement a document that included the necessary information.

Web Pages and Presentation

Beyond problems with the forms, I faced challenges with presentation of both the utility’s interface and the documents themselves. For the utility interface, I wanted to stick as closely as possible to the clean-cut and responsive layout established across the rest of the website. The utility, however, demanded long columns of prompts and inputs, which clashed with the asymmetrical design held by used on the site’s other pages. In the end, I decided to use headings and radio inputs to unbalance the design, while placing each form’s necessary information inside of a different collapsible form so that users only had to see the information relevant to the paperwork they were seeking.

For the paperwork, it was difficult to tell where the line should be drawn between the stark, minimalist layout of newer, more digital contracts and the heavily-annotated, numbered architecture of older, physical contracts. I decided that because one of the utility's strengths was its flexibility, I would wrap the contents of each form in well-defined blocks of HTML while only including the styling required to mimic the appearance of newer contracts. Using this setup, it takes minimal time to introduce complicated formatting, while less technical users can have a robust enough layout to include the things they need.

Chapter 4: Self-Assessment

Were I to assess this project by the designs I have seen during my time in the workforce, I would give it an average rating -- three out of five stars.

For what went well during the project, I was satisfied with my ability to aggregate data and create document skeletons that incorporated parts from examples of their archetypes. I feel as though my ability to turn requirements and examples into a working product was a good display of workforce-applicable skills such as independent research, synthesis, and adaptation. In addition, my adviser gave the project his approval with the note that his personal friends in real estate would find the system to their liking.

Other parts of the project went neither well nor poorly. First among these aspects was the project's scheduling -- due to the reliance on the rest of the system's components, the Paperwork Utility could not progress in concrete development until near the end of the semester, when the system would be operational, its components tested, and its interfaces re-usable. Given that the Real Estate Utility was created using an Agile Scrum methodology, which stresses iteration on a concrete implementation, the process of creating my Paperwork Utility meshed poorly with the workflow of developing the rest of the system. Secondly, I feel ambivalent towards my use of generality as a safeguard against crippling overspecialization. While I feel it was necessary to keep the system distributable and flexible, the generality present in the Paperwork Utility robs it of the striking presence present in other, older, more specialized forms.

Finally, I was disappointed by the results of some parts of the project. First is the unpalatability of the software with regard to its audience -- when dealing with an area as high-stakes as property management, I feel that a potential customer would feel safer creating his

forms via a program overseen by a legal expert instead of a college student. As a result of the aforementioned generality, the forms generated by the Paperwork Utility do not inspire the same impression of ironclad legality that more specialized, developed forms do. Secondly is the fact that an open-source code repository and a program built to create legal paperwork seem at odds with one another. With the documents' templates free on the Internet for anyone to see, third parties have the ability to quickly and easily find the origin of a company's paperwork if they can identify signs that the company's system was adapted from the Real Estate Utility. In the end, it places the onus on the software adopter to alter the forms to a degree where clients' terms and conditions are sufficiently obscured from prying eyes.

In the end, I feel as though the project turned out well, despite the hiccups that were discovered along the way. The product is neither excellent nor horrible, and my self-evaluation stands firmly at three out of five stars.

Conclusion

The Paperwork Utility was a product that challenged me less as a student of writing code, and more as a worker who must cater to the desires of his customers. Creating the code responsible for running the system was among the easiest task, while planning the documents and researching templates were among the hardest. Though it was born of a dropped requirement, I feel that the utility firmly asserts its value through its open-source hosting, extensible architecture, and well-balanced design.

Appendix

Host URL (Temporary)

<http://207.98.161.214/paperwork.php>

GitHub Repository

<https://github.com/zbotman12/CS499Group1/tree/structure>

Forms Referenced

Consumer Financial Protection Bureau Loan Estimate Template

<https://www.consumerfinance.gov/owning-a-home/loan-estimate/>

Example Seller Closing Cost Estimate

<https://jacksonfuller.com/2010/11/11/your-guide-to-closing-escrow-the-estimated-settlement-stat-ement-explained/>

Example Sale and Purchase Contract:

<http://www.simplerealestatecontract.com/>

Example Sale and Purchase Contract (via Kentwood Real Estate):

https://www.ctmone.com/eContracts/m_eCON/Contracts/Listing_Contracts/Print_SC_CBS1_15.asp?co54gTSE3gd=18296559&ag836fseYerPs2=13473&eYcry=JN847P5I6UYLLTJO42KH

Example Request for Repairs Interface (via ConRex):

<http://rentconrex.com/maintenance-request>

Example Screenshots

GUI

[Home](#) [My Account](#) [My Listings](#) [My Showings](#) [Logout](#)

Paperwork Utility

The following forms will generate paperwork based on the information you give. Leaving a field blank will leave it as a write-in entry in the document.

Buyer Estimated Closing Costs

[Expand Form](#)

Seller Estimated Closing Costs

[Expand Form](#)

Sales Contract

[Expand Form](#)

Request for Repairs

[Collapse Form](#)

Landlord's Name	John Doe
Landlord's Address	123 Main Street
Landlord's Residence Telephone	615-555-5555
Landlord's Business Telephone	615-555-5555
Tenant's Name	Bob Smith
Tenant's Address	456 Roman Road, 12345
Tenant's Residence Telephone	615-555-5555
Tenant's Business Telephone	615-555-5555
Date	

[Generate Request](#) [Reset Fields](#)

CS499 Team 1

A screenshot of the utility's UI being used on the website. In this scene, the Tenant's Address field has been populated automatically, while other fields contain placeholder text.

Partially-Filled Form

Estimated Closing Costs

Loan Estimate

Date Issued 05/02/2017
Applicants John Smith
Property 456 Roman Road, 12345
Sale Price \$350,000.00

Loan Term 30 years
Purpose Purchase
Product Fixed Rate
Loan Type Conventional
Loan ID# 123456789
Rate Lock Until April 1st

Loan Terms

Loan Amount \$350,000.00
Interest Rate 6%
Monthly Principal & Interest \$4,000.00
Prepayment Penalty _____
Balloon Payment _____

Projected Payments

Mortgage Insurance _____
Princial & Interest \$1.00
Estimated Escrow \$3.00
Estimated Total Montly Payment _____
Estimated Taxes, Insurance, and Assessments \$200 per month

Additional Loan Considerations

Appraisal	The lender may order an appraisal to determine the property's value and charge the buyer for this appraisal. The lender will promptly give the buyer a copy of any appraisal, even if the loan does not close. The buyer may pay for an additional appraisal at his own cost.
Assumption	If the buyer transfers this property to another person, the lender <input checked="" type="checkbox"/> will allow, under certain conditions, the new buyer to assume this loan on the original terms <input type="checkbox"/> will not allow assumptions of this loan on the original terms
Homewowner's Insurance	This loan requires homeowner's insurance on the property, which the buyer may obtain from a company of his choice that the lender finds acceptable.
Late Payment	_____ _____ _____
Refinancing	Refinancing this loan will depend on the buyer's future financial situation, the property value, and market conditions. The buyer might not be able to refinance this loan.

A screenshot of a generated Estimated Closing Costs form. Note that Payment Penalty and Balloon Payment have been given blank lines due to not being entered in the utility interface.

Unfilled Form

Estimated Closing Costs

Loan Estimate

Date Issued _____
 Applicants _____
 Property 456 Roman Road, 12345
 Sale Price \$350,000.00

Loan Term _____
 Purpose _____
 Product _____
 Loan Type _____
 Loan ID# _____
 Rate Lock _____

Loan Terms

Loan Amount _____
 Interest Rate _____
 Monthly Principal & Interest _____
 Prepayment Penalty _____
 Balloon Payment _____

Projected Payments

Princial & Interest _____
 Mortgage Insurance _____
 Estimated Escrow _____
 Estimated Total Montly Payment _____
 Estimated Taxes, Insurance, and Assessments _____

Additional Loan Considerations

Appraisal	The lender may order an appraisal to determine the property's value and charge the buyer for this appraisal. The lender will promptly give the buyer a copy of any appraisal, even if the loan does not close. The buyer may pay for an additional appraisal at his own cost.
Assumption	If the buyer transfers this property to another person, the lender <input type="checkbox"/> will allow, under certain conditions, the new buyer to assume this loan on the original terms <input type="checkbox"/> will not allow assumptions of this loan on the original terms
Homewowner's Insurance	This loan requires homeowner's insurance on the property, which the buyer may obtain from a company of his choice that the lender finds acceptable.
Late Payment	_____
Refinancing	Refinancing this loan will depend on the buyer's future financial situation, the property value, and market conditions. The buyer might not be able to refinance this loan.

A screenshot of the Estimated Closing Costs form as it appears when no data is entered into the utility interface.