

Pigeon-Honed Press (PHPress)

by

Joe Brodar, Terence Chambers, and Courtney Dang

Submitted to
the Faculty of the School of Information Technology
in Partial Fulfillment of the Requirements for
the Degree of Bachelor of Science
in Information Technology

© Copyright 2017, Joe Brodar, Terence Chambers, and Courtney Dang

The author grants to the School of Information Technology permission to reproduce and distribute copies of this document in whole or in part.

 _____ Joe Brodar	4.17.17 _____ Date
 _____ Terence Chambers	4/17/17 _____ Date
 _____ Courtney Dang	4/17/17 _____ Date
 _____ Faculty Advisor: Bogdan Vykhovanyuk	4/17/17 _____ Date

University of Cincinnati
College of
Education, Criminal Justice, and Human Services

April 2017



Table of Contents

Abstract	1
1. Problem Statement	1-1
1.1 Introduction	1-1
1.2 Project Description	1-1
1.3 Problem	1-2
1.4 User Profile	1-3
1.4.1 Potential Users	1-3
1.4.2 Software & Interface Experience	1-3
1.4.3 Experience with Similar Applications	1-3
1.4.4 Task Experience	1-3
1.4.5 Frequency of Use	1-3
1.4.6 Key Interface Design Requirements that the Profile Suggests	1-3
2. Project Management	2-1
2.1 Deliverables	2-1
2.2 Budget	2-2
2.2.1 Initial Costs	2-2
2.2.2 Continuing Costs (Monthly)	2-2
3. Infrastructure	3-1
3.1 RaspberryPi Servers	3-1
3.2 Virtualization Substitution	3-1
4. Application	4-1
4.1 Design & Branding Standards	4-1
4.1.1 Colors	4-1
4.1.2 Tiled Layout	4-1
4.2 User Case Diagram	4-1
4.3 Guided Walkthrough Software	4-2
4.3.1 Welcome Page	4-2
4.3.2 Create User Page	4-3
4.3.3 Add Business Information Page	4-3
4.3.4 Tell Us About Your Business Page	4-3
4.3.5 Add Team Members Page	4-3
4.3.6 Add Products Page	4-3
4.3.7 Add Homepage Content Page	4-3
4.3.8 Choose Theme Page	4-4
4.3.9 Add Initial Images Page	4-4
4.4 Content Management Software	4-4
4.4.1 Login Page	4-4
4.4.2 Dashboard & User Bar	4-4
4.4.3 Manage Site Page	4-5
4.4.4 Business Information Page & SEO Panel	4-5
4.4.5 Team Members Page	4-6



Table of Contents (continued)

4.4.6 <i>Manage Team Member Page</i>	4-7
4.4.7 <i>Products Page</i>	4-7
4.4.8 <i>Manage Product Page</i>	4-7
4.4.9 <i>Content Page</i>	4-7
4.4.10 <i>Manage Content Page</i>	4-8
4.4.11 <i>Media Library Page</i>	4-9
4.4.12 <i>Manage Media Page</i>	4-9
4.5 Client Websites & Themes	4-9
4.6 Database Design	4-9
5. Testing	5-1
5.1 Preliminary Test Plan	5-1
5.1.1 <i>Overview</i>	5-1
5.1.2 <i>Scope</i>	5-1
5.1.3 <i>Objective</i>	5-1
5.1.4 <i>Login, Dashboard, Logout Functionality</i>	5-1
5.1.5 <i>Test/Report</i>	5-2
5.1.6 <i>Testing Procedures</i>	5-2
5.1.7 <i>Tests Performed</i>	5-2
5.1.7.1 <i>Stability</i>	5-2
5.1.7.2 <i>User Interface</i>	5-2
5.1.7.3 <i>Functionality</i>	5-2
5.1.8 <i>Pass/Fail Conditions</i>	5-2
5.1.9 <i>Testing Schedule</i>	5-3
5.1.10 <i>Risks</i>	5-3
5.1.10 <i>Security Testing</i>	5-3
6. Conclusion	6-1
6.1 Fall 2016 Conclusions	6-1
6.2 Spring 2017 Projections	6-1
Bibliography	a
Appendix A: Full CMS Mockups & Screenshots	b

Tables

Table 1. User Profile table.	1-3
Table 2. List of deliverables and due dates.	2-1
Table 3. List and summation of initial costs involved with this project.	2-2
Table 4. List and summation of continuing monthly costs involved with this project.	2-2
Table 5. List of brand colors, hex values, and uses for each color.	4-1
Table 6. List of the items to test for the Login, Admin, and Logout features.	5-1
Table 7. Testing schedule by team member.	5-3



Figures

Figure 1. Application Process Diagram	1-1
Figure 2. Gantt Chart of deliverables.	2-1
Figure 3. PHPress user case diagram.	4-2
Figure 4. Screenshot of dashboard page.	4-5
Figure 5. Screenshot of business information page.	4-6
Figure 6. Screenshot of team members overview page.	4-7
Figure 7. Screenshot of team members overview page.	4-8
Figure 8. Screenshot of manage content page.	4-9
Figure 9. PHPress relational database diagram.	4-10



Abstract

With the availability of information over the Internet, potential customers are using online search tools to decide where they will go and how they will spend their money. Small local businesses have traditionally lagged behind with their online presence because it can be expensive to hire a company to build a business website, and it will cost even more to have it optimized properly so that the website appears in search results. With these two issues in mind, we have created a holistic solution for local business websites, making it simple and cost-effective for small companies who cannot invest hundreds or thousands of dollars into their online presence. Each website is hosted on a dedicated RaspberryPi server outfitted with custom Content Management Software, which guides the user from the start to a completed live website, including Search Engine Optimization features.

1. Problem Statement

1.1 Introduction

Many potential customers for any business are searching online to decide where they will spend their money, so it is important for all businesses to have a strong online presence, or they will lose out on these customers. Having a website is only a small piece of the puzzle, and one of the most important pieces, Search Engine Optimization, is often the most neglected. Without this key feature, a website will not show up in front of searchers, and it will not get much traffic.

1.2 Project Description

We will set up a managed web hosting service with a basic content management system that walks the client through setting up their small business website, but with the added functionality of guiding them through adding some simple Search Engine Optimization features, such as JSON markup, proper title and meta tags, and local signals. The final product will be an environment comprised of cost-effective server units, where the small business user would be guided through the initial setup of their site, from content, to layout, to market targeting. They could then either “set it and forget it” or they can continue to update their site with content, which would also be guided for optimization. The user’s process from start, at the guided walkthrough, to finish, with a fully configured, live, and optimized website for their local business, is depicted in Figure 1 below.

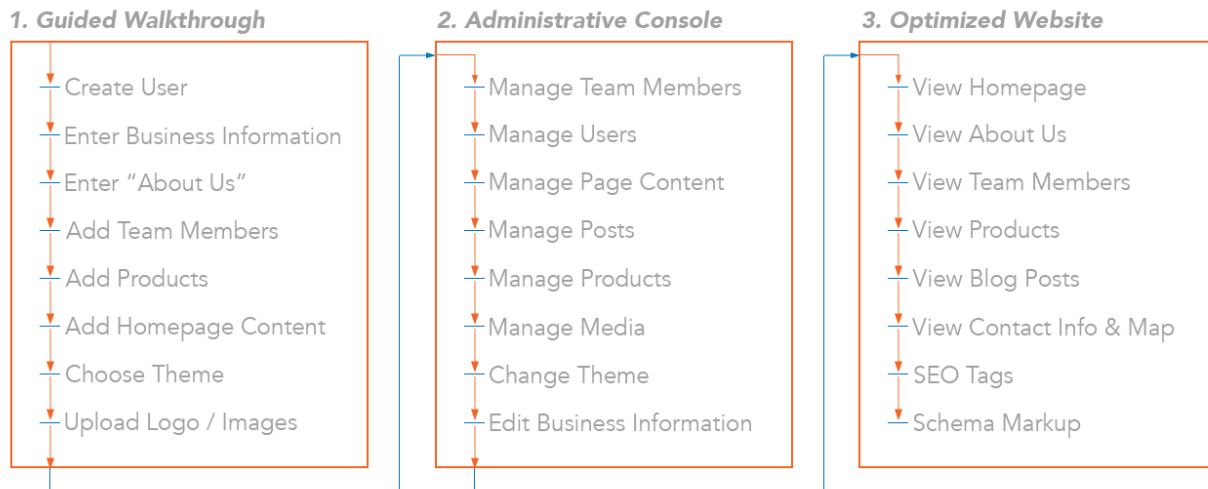


Figure 1. System Process Diagram

As new developments in the SEO field pop up, updates would be made to the CMS and all existing users would be asked to walk through the new features to ensure that their site is kept up to date with the newest best practices.

1.3 Problem

The standards and rules of online optimization for search engines are constantly changing and being updated by major companies that run the search engines, which makes it difficult for a casual Internet user to keep up. Although this is the case, there is not a tool out there currently for small businesses to create and optimize their own site. There are plenty of build-your-own-website applications, but none of them include optimization, and none of them make it easy to optimize yourself. There are plenty of companies a business can hire to do this for them, but they are very expensive, and most likely will charge a high continuing fee to host and manage the website. Because of these factors, there is not a budget-friendly way for small local businesses to build and optimize a website that will actually show up in search results for potential customers.

1.4 User Profile

Table 1 below shows the user profile for PHPress.

<p><i>1.4.1 Project:</i> PHPress; guided local business website building, search engine optimization, and hosting.</p>
<p><i>1.4.2 Potential Users:</i> Small local business owners or managers.</p>
<p><i>1.4.3 Software & Interface Experience:</i> The software that the end users will be interacting with will be completely new, so they will not have any direct experience with this software. It will be designed to be as simple as possible to account for this, and much of it will be guided, so it will be very similar to taking an online survey.</p>
<p><i>1.4.4 Experience with Similar Applications:</i> Some end users may have experience with similar applications such as Wix or WordPress, but many will not, as the bulk of end users will not have any existing online presence.</p>
<p><i>1.4.5 Task Experience:</i> Local business owners may have experience with some online marketing techniques, but will most likely not have any experience with search engine optimization.</p>
<p><i>1.4.6 Use Frequency:</i> This product can be used in two ways: either once as a set-it-and-forget-it application that is not updated after the initial creation of the site, or it can be used as a local business site with a blog that is updated after the initial creation of the site.</p>
<p><i>1.4.7 Key Interface Design Requirements that the Profile Suggests:</i> Because our target end user will have little to no experience with online marketing and optimization, the interface needs to be very simple, providing guidance wherever possible. It will serve not only as a Content Management System, but also as an educational tool, teaching local business owners how to build an online presence that will help bring new customers to their business, and provide relevant information to the community. With that aspiration, we need to make sure that all of the features of the software are up to date with the most current online trends and rules, and that the end users' sites are designed with modern UI/UX principles.</p>

Table 1. User Profile table.



2. Project Management

2.1 Deliverables

Table 2 shows all of our project deliverables with their assigned due date for completion.

Due Date	Deliverable
October 2	Develop Set of Firewall Rules for Install Units
October 2	Develop Database Standards
October 9	Develop Set of Firewall Rules for Management Server
October 9	Develop MySQL Query Standards
October 9	Setup RaspberryPi Units (LAMP) for each "Install"
October 16	Implement Firewall Rules
October 16	Setup RaspberryPi Management Server
October 23	Define Network Configuration & Configure Network
October 23	Create Database for CMS
October 30	Create Database for Management
October 30	Mockups for CMS Admin Pages
November 6	Develop List of Features to be Included
November 13	Build CMS Admin Pages
November 20	Storyboarding for Guided Sections
November 27	Create Test Cases / User Stories - Admin Pages
December 18	Implement Query Standards
December 18	Build Guided Walkthrough Pages
December 18	Implement SEO Features in Guided Sections
January 8	Mockups for Client Site Themes
January 8	Create Test Cases / User Stories - Walkthrough
January 15	Mobile-Responsive Design of Client Themes
January 22	Create Security Penetration Test Cases
February 12	Build Theme Files
May 5	Carry Out Test Cases & Implement Any Fixes
May 5	Carry Out Security Testing & Implement Any Fixes

Table 2. List of deliverables and due dates.

Figure 2 below shows the deliverables in a Gantt Chart, broken down by team member.

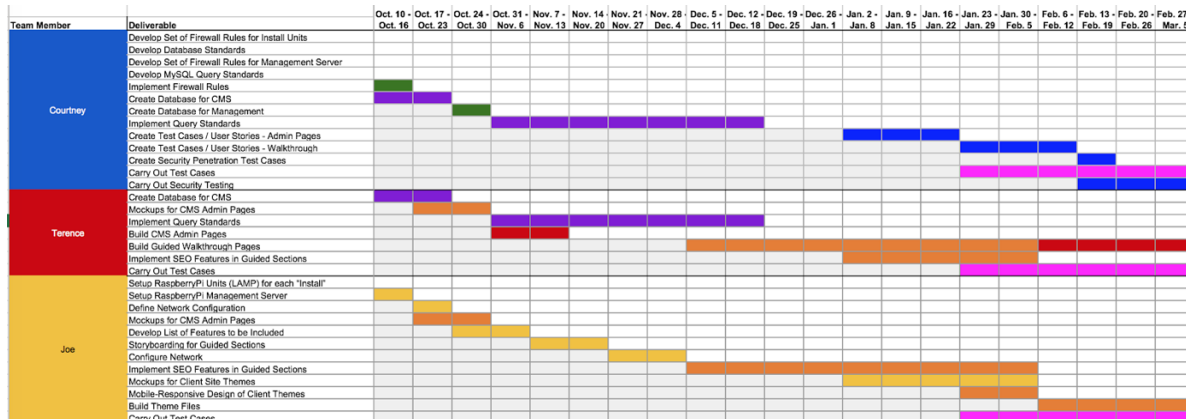


Figure 2. Gantt Chart of deliverables.



2.2 Budget

Tables 3 and 4 below show the costs associated with initial project requirements, as well as the continuing monthly costs of operating this project.

2.2.1 Initial Costs

Item	Unit Price	# Units	Total Price
Hardware			
Management Server	\$45	1	\$45
Site Install Server	\$45	10	\$450
Labor Hours (Setup)	\$75	5	\$375
Network Provider Setup	\$150	1	\$150
Software			
Labor Hours	\$75	50	\$3,750
SEO Integration			
Labor Hours	\$75	15	\$1,125
Total			\$5,895

Table 3. List and summation of initial costs involved with this project.

2.2.2 Continuing Costs (Monthly)

Item	Unit Price	# Units	Total Price
Hardware			
Site Install Servers	\$45	5*	\$225
Network Connection (30x30 Fiber)	\$200	1	\$200
Power Consumption per Server	\$0.0623**	15***	\$0.93
Software Updates			
Labor Hours	\$75	20	\$1,500
SEO Integration Updates			
Labor Hours	\$75	10	\$750
Total			\$2,650.93

Table 4. List and summation of continuing monthly costs involved with operating this project.

* Estimated new customer additions per month.

** $.002kW \times 732hours \times \0.0426 (CIN Commercial Rate)¹

*** Dependent upon number of servers; Use $\$1.64 \times (10 + 5n)$, where n is months after start, assuming +5 customers per month, to find power consumption for specific month.

3. Infrastructure

3.1 Raspberry Pi Servers

The hardware for this managed hosting environment will be Raspberry Pi servers to keep costs low, while still meeting the resource demands for the clients' websites. Because a typical local small business website does not have huge amounts of traffic, the included hardware with these prebuilt units is a good option to host one website per machine. Each machine will be outfitted with the Linux, Apache, MySQL, & PHP (LAMP) architecture as the framework and our custom Guided and Content Management software.

3.2 Virtualization Substitution

Due to the difficulties of not having a dedicated space and network to host this project, we are replicating the environment in a virtual form using the CECH Sandbox; once we had proven a Phase I success with the product, we would then move into a physical environment if we continued to work on the project past this course.

4. Application

4.1 Design & Branding Standards

4.1.1 Colors

All components of the software that are developed for this project adhere to the following standards and guidelines. First, the main colors for this brand are blue and orange, which can be seen with their hex-code values and all secondary colors in Table 4 below. To separate the portions of the software that are focused on Search Engine Optimization from the normal content of the website, the regular content will be accented with blue, and the SEO sections will be accented with orange features.




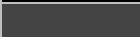


Color	Hex Value	Sample	Uses
Blue	#5B9BD5		Logo Elements, User Bar Elements, Buttons, Icons
Orange	#EF941C		User Bar Elements, Buttons, Icons, SEO Features
Black	#000000		Text, Accents
Dark Grey	#444444		Backgrounds, Borders
Light Grey	#CECECE		Backgrounds, Borders
White	#FFFFFF		Text, Accents

Table 5. List of brand colors, hex values, and uses for each color.

4.1.2 Tiled Layout

To maintain a consistent feeling, overview pages will use a tiled layout, with all tiles, excluding the media library page, having an icon or image above a few lines of descriptive text.

4.2 User Case Diagram

Figure 3 below shows the two user types and three interaction points for the users. On the left side, the PHPress user interacts with both the Guided Walkthrough Software, which contains all of the initial set up actions, as well as the Content Management Software, which is the hub for maintenance and making any changes or updates to the website. On the right side, the Internet user who lands on the website should be able to see several key pieces of information about the business and interact with the website.

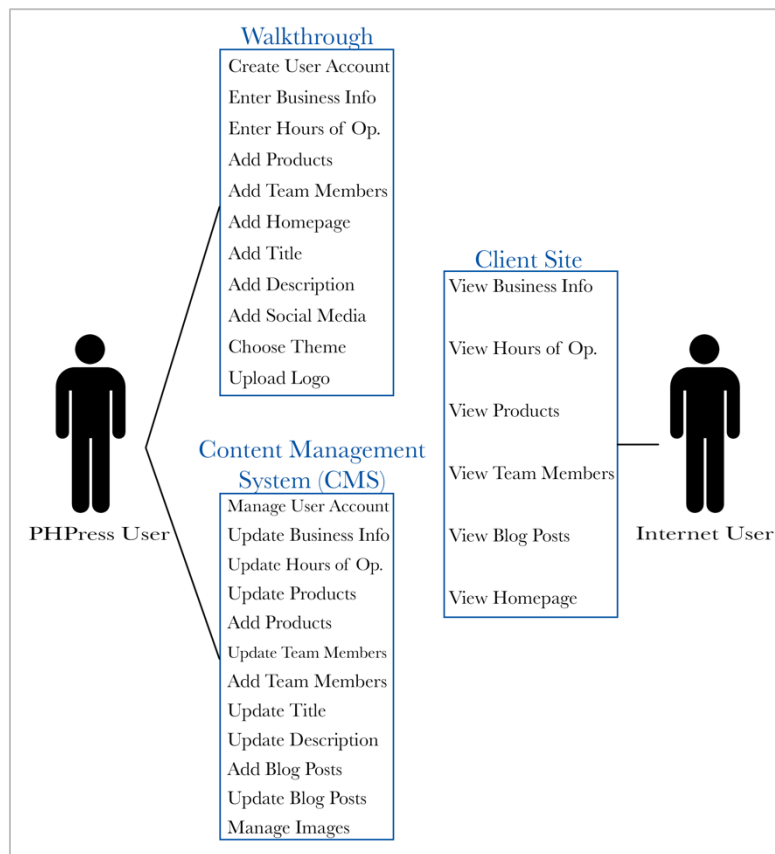


Figure 3. PHPress user case diagram.

4.3 Guided Walkthrough Software

The first piece of software that the end user will interact with is a guided walkthrough that prompts them for specific pieces of information, such as business address, team members, and target audience. It includes a Search Engine Optimization tip with each step, and instructs the user on why they are entering each piece of information. Should the user choose to update their site at a later date, there will be smaller walkthroughs to ensure that all new content is correctly entered with optimization.

4.3.1 Welcome Page

The welcome page will be the first page the user is presented with when setting up their new website with PHPress. It will have a small introduction and will prompt the user for confirmation to begin the walkthrough.

4.3.2 Create User Page

This page will allow the user to set up their team member account, entering their name, contact information, and selecting a password. This user will become the default site administrator and the primary contact.

4.3.3 Add Business Information Page

The third page in this section will prompt the user for information about their business such as name, address, and hours operation. It will also provide an explanation to the user as to why that information is being collected, where it will be located on their website, and how it will be used for optimization.

4.3.4 Tell Us About Your Business Page

This page will be used to collect information that will be used for the “About Us” page on the final website.

4.3.5 Add Team Members Page

This is the first page in the guided process which can be skipped. This page will allow the user to add any number of team members, specifying whether or not to display them on the final website’s “Team” page and whether or not to create a PHPPress user login.

4.3.6 Add Products Page

This is the only other page which can be skipped. This page will allow the user to add any number of products or services that they offer and their attributes, such as price, category, and a product description.

4.3.7 Add Homepage Content Page

This page will prompt the user to enter a tagline for their business, as well as some content to display on the homepage of the final website. Much of the homepage content will be derived from other pieces of the site, so this section will capture any pieces that are not covered under other sections.

4.3.8 Choose Theme Page

This step in the walkthrough will prompt the user to select which theme they would like to use for their website, as well as select their primary and secondary colors. There will be two to three default themes to choose from at this point in the process.

4.3.9 Add Initial Images Page

The final page in the guided walkthrough will ask the user to upload a business logo, as well as any images that are required for the theme that they have selected. Each image upload prompt will be accompanied by the exact dimensions the image should be, and will prompt the user to enter an image description. The description is often overlooked, but is a key SEO signal that is used by search engines to determine value of a page.

4.4 Content Management Software

The information that is collected with the guided section is used by the Content Management System (CMS), which organizes the content into a final website. It employs a user-selected theme, and controls a live website that is properly optimized for search engines. All mockup sketches and screenshots of the CMS pages are included in Appendix A.

4.4.1 Login Page

The login page will be used to access the PHPress CMS pages, and provides an option to reset a forgotten password.

4.4.2 Dashboard & User Bar

The dashboard is the default landing page after the user logs in, and provides them with the options to control their website. As seen in Figure 4, the five regions of the page labelled “Business Information,” “Team Members,” “Products,” “Content,” and “Media” are links which guide the use to different pages, allowing the user to control the information, assets, and user accounts for their website.

The persistent bar at the bottom of the page contains four actions: the PHPess logo which will return the user to the admin dashboard, “View Site” which will open their live website in a new tab, a button labelled with their name and providing user management options, and “Manage Site” which will take the user to a page where they can control the basic information about their installation.

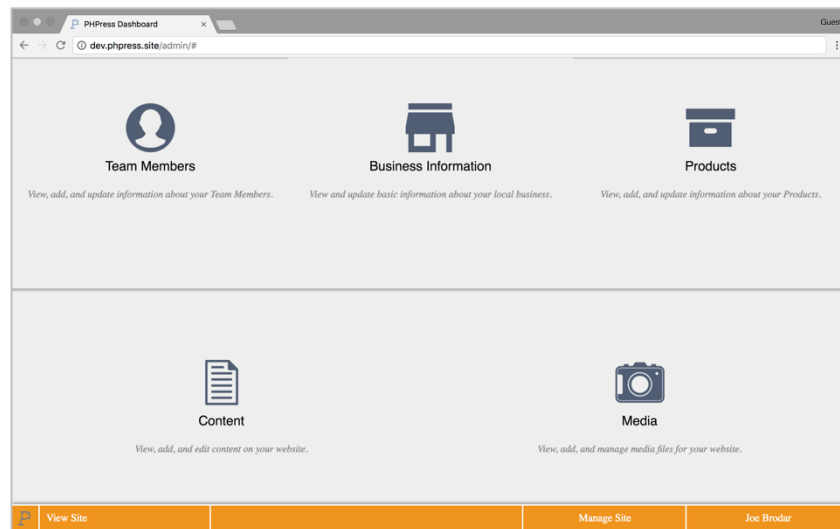


Figure 4. Screenshot of admin dashboard page.

4.4.3 Manage Site Page

Clicking on the “Manage Site” button on the user bar will open a page that allows the user to control information about their website. The key information points of this page are the site title, site description, site domain, what percentage of the website has been completed, and if the site should be indexed by search engines (this is checked automatically when the guided portion is completed). See Appendix A: Full CMS Mockup for a view of this page.

4.4.4 Business Information Page & SEO Panel

The first tile on the dashboard page opens the business information page, which provides inputs for information such as name, address, contact information, and hours of operation.

The right pane, as seen in Figure 5 below, is the SEO Panel, which will describe for the user how the information they are entering will be used on the final site, and how it is used to optimize the

website. This panel is present on management pages, and will always include a static explanation of the optimization features, as well as sometimes including inputs for SEO features.

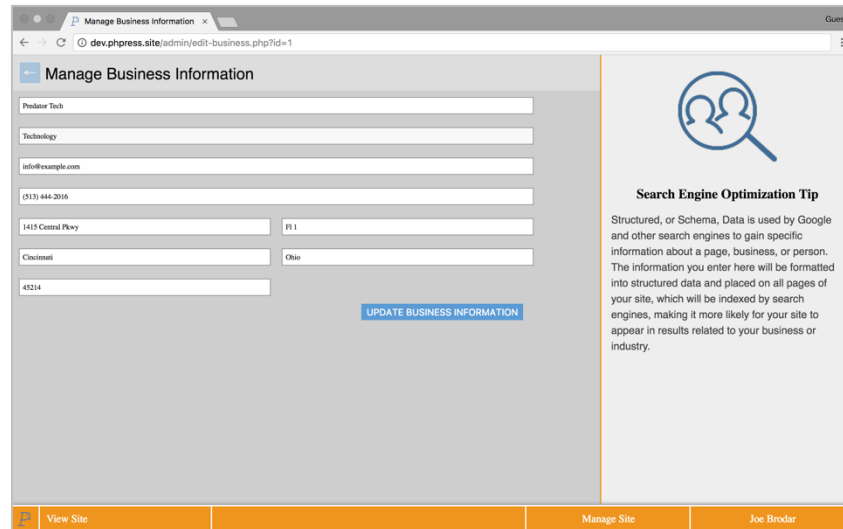


Figure 5. Screenshot of the business information page.

4.4.5 Team Members Page

The second tile on the dashboard page leads to the team members overview page, which is the first page which uses the tiled layout. Seen in Figure 6, the user can view all team members that exist on the site, along with basic information, such as name and job title. Accompanying each tile will be three icons to indicate whether that team member is a site admin, whether their profile is displayed on the site, and whether or not they have PHPress login details.

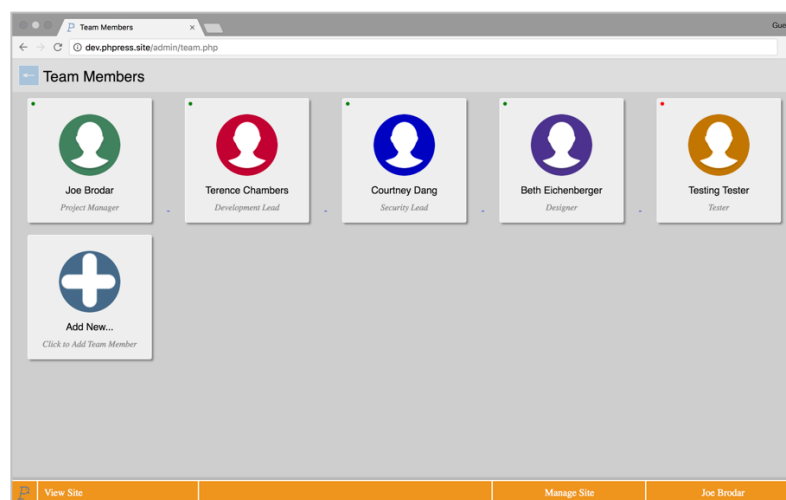


Figure 6. Screenshot of team members overview page.

4.4.6 Manage Team Member Page

Clicking on a team member tile from the overview page opens a new page on which the user can edit information about a specific team member, such as their name, contact information, photo, and whether or not to display them on the website. The user can also access their own page by clicking on their name in the user bar; if the user is viewing their own page, they will have the option to reset their password.

4.4.7 Products Page

Similar to the team member overview page, the products overview page also follows the tiled layout, with an image and basic information displayed on each tile. On this page, each tile is accompanied by one icon to indicate whether or not this product is displayed on the website.

4.4.8 Manage Product Page

Selecting a tile on the product overview page will open a page on which the user can manage information about a product, such as the name, description, price, and image. The user can also create and assign product categories from this page.

4.4.9 Content Page

The content overview page follows the tiled layout standard for overview pages, but it is divided into the two sections shown in Figure 7. The first is the “Site Pages” section which houses pages that are automatically created during the guided walkthrough, and include pages such as “Home” and “About Us.” The lower section is the “Blog Post” section, which houses all of the user-created pages that can be viewed on their blog page.

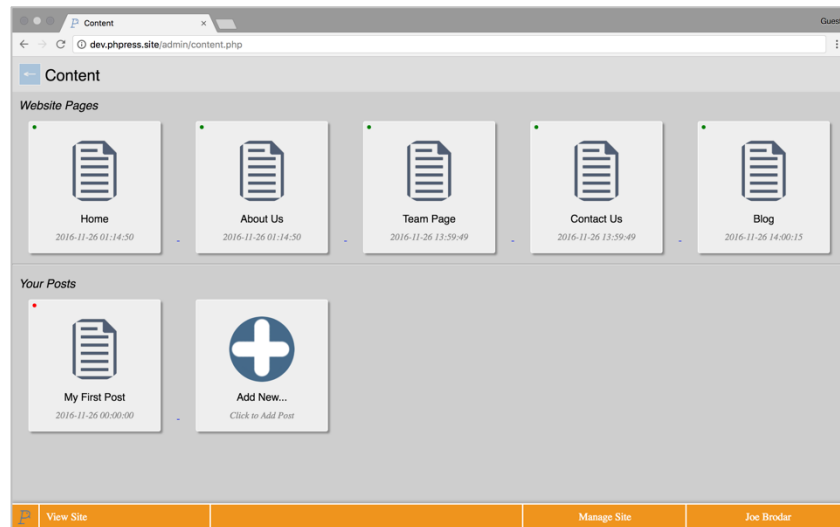


Figure 7. Screenshot of content overview page.

4.4.10 Manage Content Page

Clicking on a tile from the content overview page opens a new page on which the user can edit the content and manage its attributes. As seen in Figure 8, the SEO Panel is present on this page, and it is the first example of SEO feature inputs in the right pane. It will have inputs for the SEO title and SEO description, along with the explanation of how that information is used, and recommendations on how to write them.

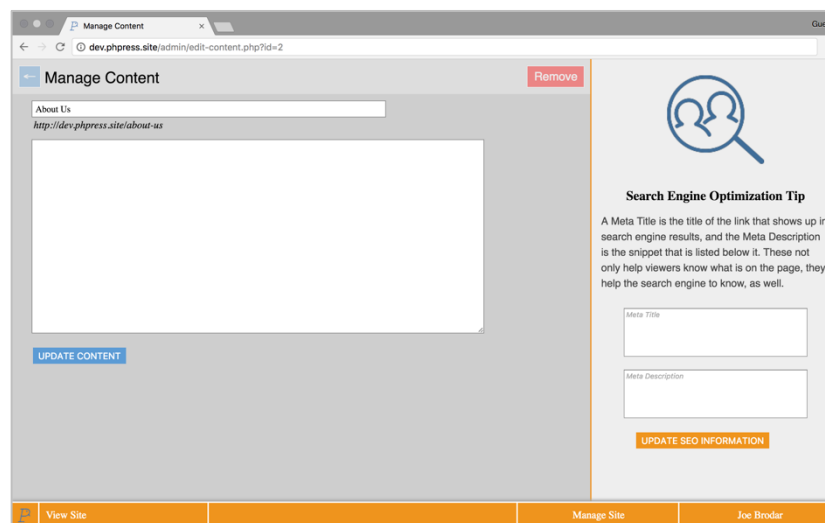


Figure 8. Screenshot of the manage content page.

4.4.11 Media Library Page

The final overview page is the media library page, which also follows the tiled layout, but unlike the previous overview pages, the tiles are thumbnails of the media items, no information is displayed. This will allow for the best user experience when looking for a particular image.

4.4.12 Manage Media Page

When the user selects an image from the media library, it will take them to a page on which they can view a larger version of the media, edit the title for the media, and see its location and resolution. In the SEO Panel, the user can set the alt text, or description, for the media and an explanation of the feature will be displayed.

4.5 Client Websites & Themes

To begin, we will create two default themes that the user can select to stylize their final website, and they will be able to make color selections within those themes to personalize them. Each theme will include some basic pages on the website including “Contact Us,” “About Us,” “Home,” and “Products” and elements, such as menus, headers, footers, a sidebar and contact forms.

4.6 Database Design

The PHPress database will drive all components of the application, from the guided walkthrough, to the final website. Figure 9 below shows the relational database diagram for the application.

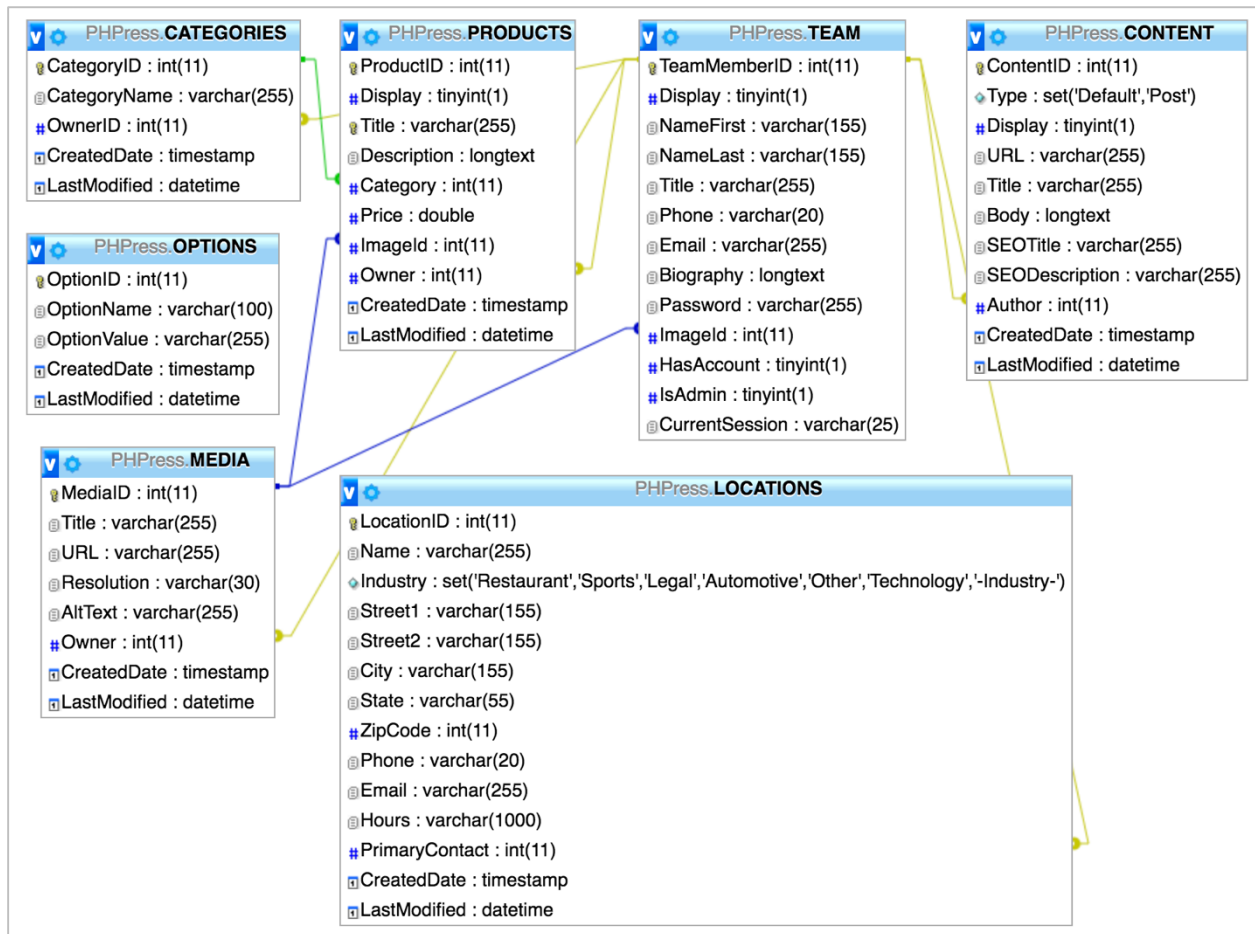


Figure 9. PHPPress relational database diagram.

5. Testing

5.1 Test Plan

5.1.1 Overview

This section will explain the testing methodology for our PHPress application. All team members, developers, and project manager should participate throughout the process in testing the overall unit.

5.1.2 Scope

The scope of testing is to test the functionality of the PHPress application on different different devices with different platforms such as computers and smartphones (iOS/Android).

5.1.3 Objective

The objective of these tests is to ensure that all requirements are organized based on what the application needs and that all features are working properly as planned as well as the user interface appeal. For security testing, our security lead will be doing most of the testing and will close out any ports not being used.

5.1.4 Login, Dashboard, Logout Functionality

The items to be tested for the administrative sections of the application are listed in Table 6.

Testing Items
Login
Login Form
Forgot Your Password?
Admin
All Functions Complete and Working
Team Members: Add New
Business Information: Update Information
Products: Add New
Content: Edit Website Pages
Content: Add New Post
Media: Upload New Media
Logout
Logout Button

Table 6. List of the items to test for the Login, Admin, and Logout features.

5.1.5 Test/Report

During testing, if a bug is found, this needs to be documented. Team members will discuss whether the “bug” is an incomplete design or an actual issue. The bug will then be fixed or completed within reasonable time.

5.1.6 Testing Procedures

Provided documents of the following will be needed for testing:

- Prepared test cases & scenarios
- Walkthroughs will consist of prepared steps of what should happen versus what actually happened when performing the test
- Bugs need to be written out in the order of tests performed

5.1.7 Tests Performed

5.1.7.1 Stability

- How stable the application is using OSX versus Windows operating systems?
- How stable the application is using an iPhone or Android?

5.1.7.2 User Interface

- How appealing are the functions to the user?

5.1.7.3 Functionality

- All features/tools are working as expected?

5.1.8 Pass/Fail Conditions

The PHPress application must pass all three categories of testing in order to be ready for the Tech Expo. If for any reason that the application fails a part of the testing, it will be documented and fixed and will need to go through testing until passed.

5.1.9 Testing Schedule

Testing of all three categories should be done in a one-week period & frequency will rotate weekly after each member has completed testing, as laid out in Table 7, below.

Team Member	Time Completed	Frequency
Security Lead	2/6/17 - 2/12/17	Weekly
Project Manager	2/13/17 - 2/19/17	Weekly
Developer	2/27/17 - 3/5/17	Weekly

Table 7. Testing schedule by team member.

5.1.10 Risks

The following items will impact and could delay the testing cycle:

- Bug fixes
- Incomplete functions
- Operating system or device functionality

5.1.11 Security Testing

Using Burp Suite, we were able to determine a few vulnerabilities within the website. Burp Suite is a security testing tool within a Kali virtual machine. In order to perform this test, the proxy was set to the determined proxy of Burp Suite. The security lead was able to determine a couple vulnerabilities from ports that were not being used such as port 123 (NTP), 1433 (MS SQL), and 69 (TFTP). NTP can carry out denial of service attacks, both MS SQL and TFTP can be used to exploit services and application vulnerabilities. The security lead was able to modify our firewall rules to “block/deny all ports except...” the ones we were using such as port 80 (HTTP), 21 (FTP), and 22 (SSH).

6. Conclusion

6.1 Fall 2016 Conclusions

The Fall semester was dominated by research and preparation for this project, and we had only begun to build the application. Our infrastructure was created in the CECH Sandbox, and we set up template machines to build new site installs from. The application implementation got started with the Content Management System admin section completed and Guided Walkthrough slated to be completed early in the Spring semester.

6.1 Spring 2017

The Spring semester's focus for this project has been on testing and implementing fixes and updates, implementing the remaining SEO features that were not completed in the Fall, developing the client themes for the final websites, and putting the finishing touches on the guided sections. The time crunch of the final semester winding down has caused some things to be left on the "want list" instead of being implemented in the final project, as this project turned out to be a much larger endeavor than we estimated at the outset. For instance, the guided sections were combined down to reduce the number of individual pages that needed to be created, and instead used more bulk collection. From the client site side, the initial plan was to develop two starting themes to pick from, however it had to be reduced to only one theme for demo, with the implication that more themes would be available, and user-created themes would be allowed. A security feature also had to be sacrificed due to the short timeline: creating stored procedures for all database interactions, which would have added an additional layer of security on top of the parameterization and sanitization of inputs in the PHP code.

We will not continue with this project post-graduation, as the time and effort necessary to maintain this as a business would be a full-time job.

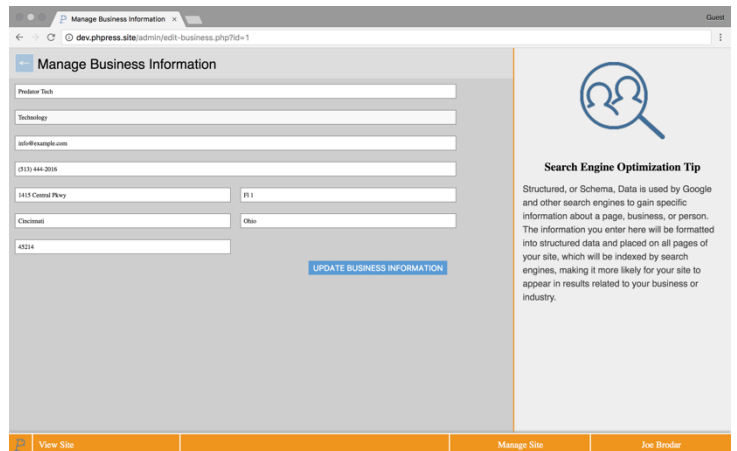
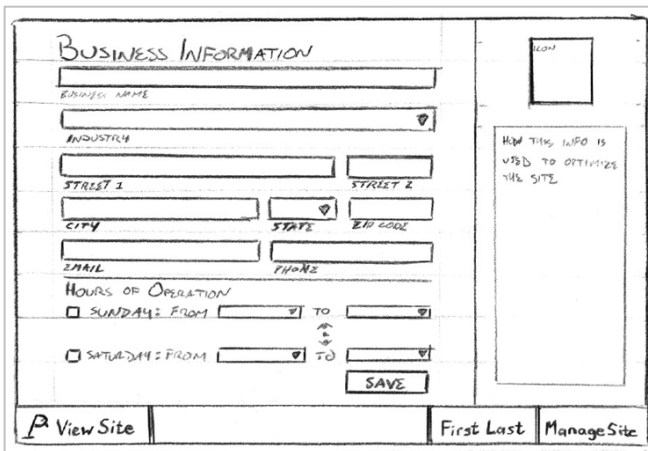
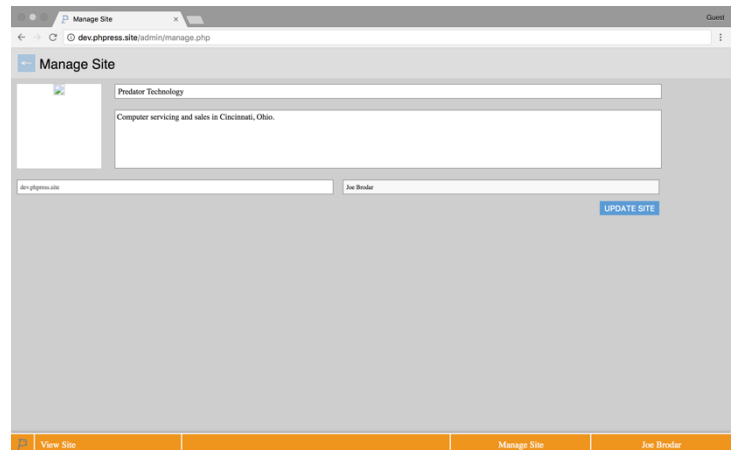
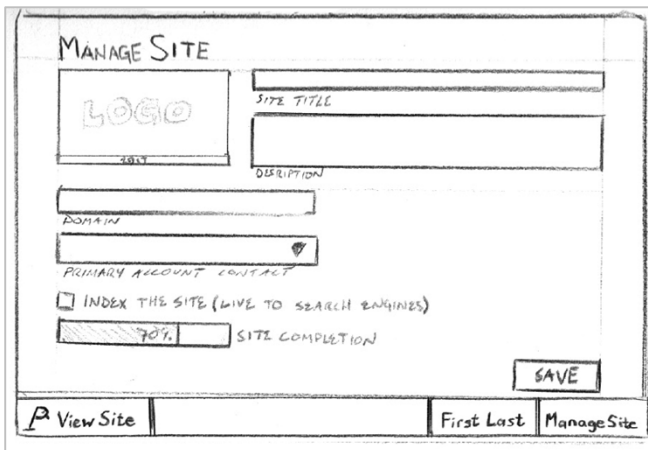
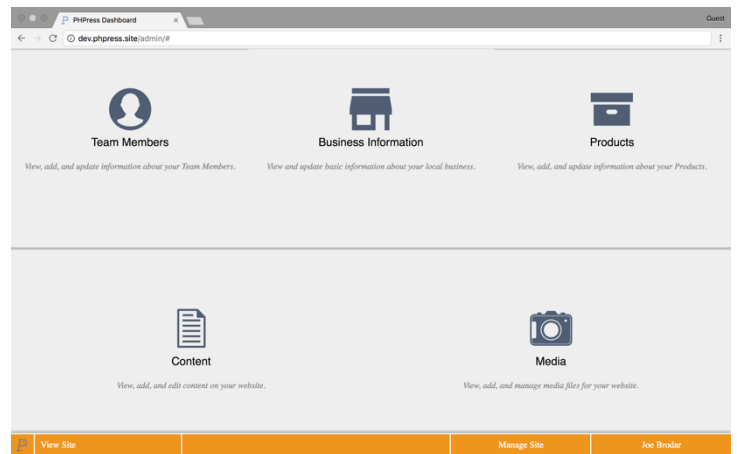
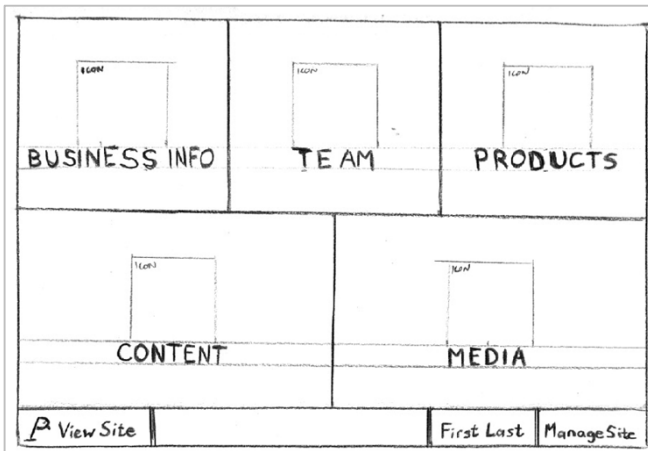


Bibliography

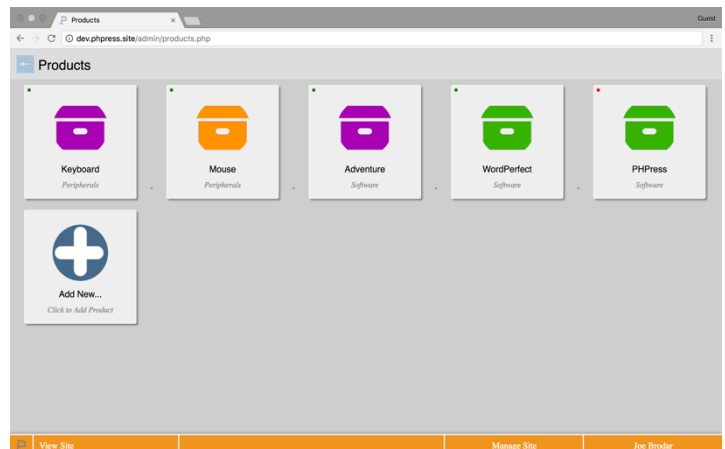
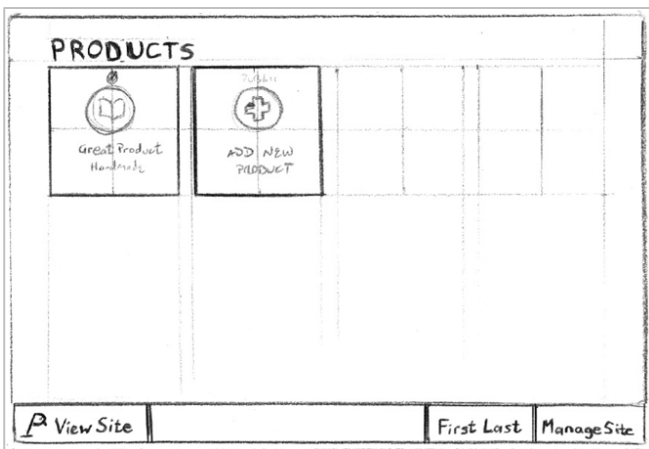
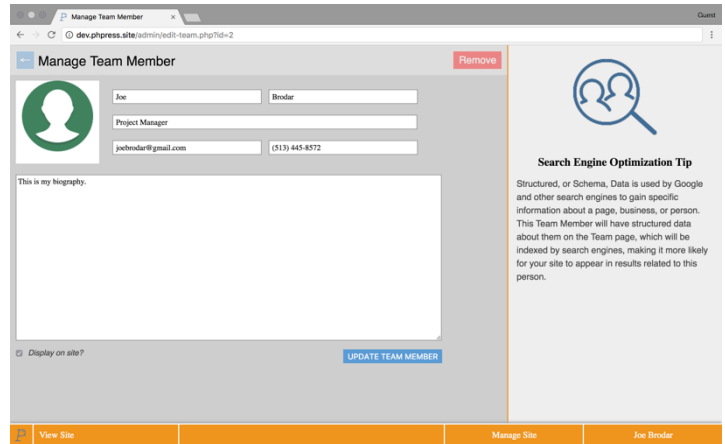
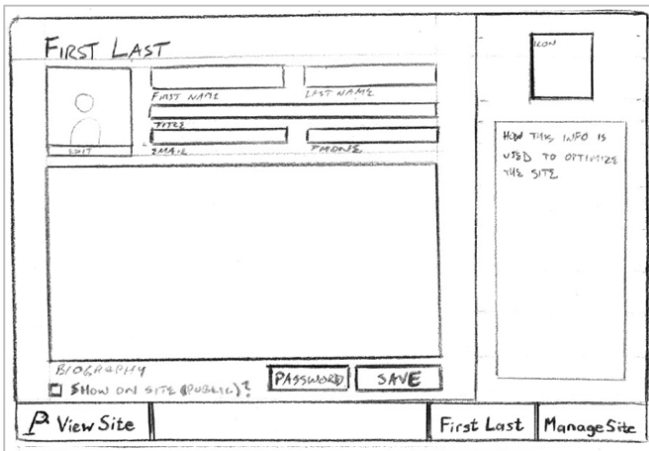
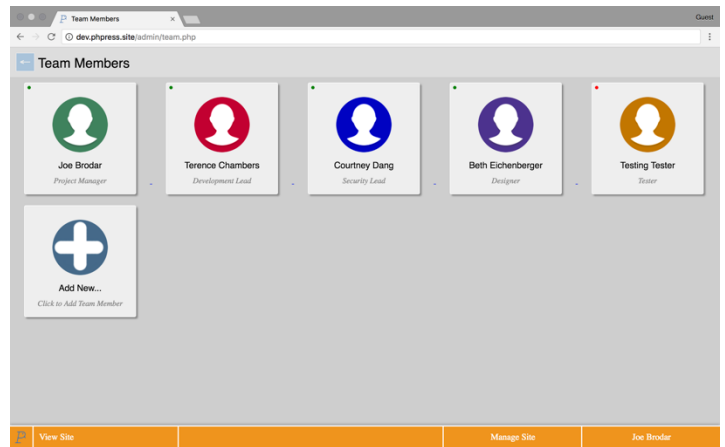
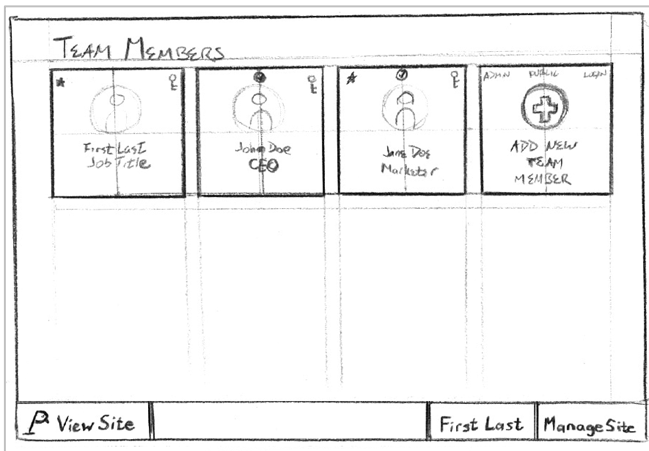
1. "Cincinnati, OH Electricity Rates." Electricity Local. Accessed October 26, 2016.
<http://www.electricitylocal.com/states/ohio/cincinnati/>.



Appendix A: Full CMS Mockups & Screenshots

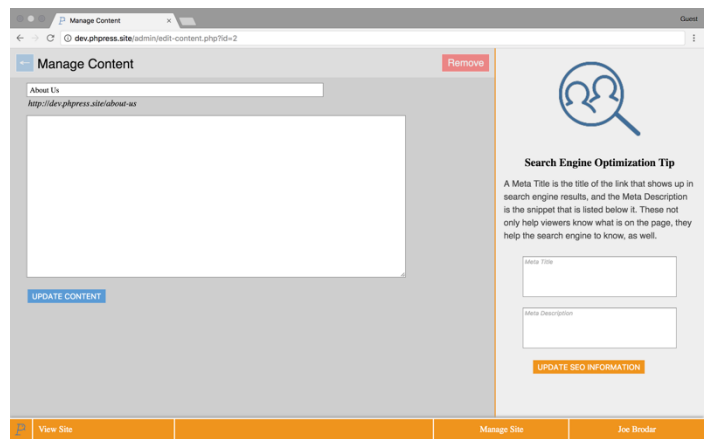
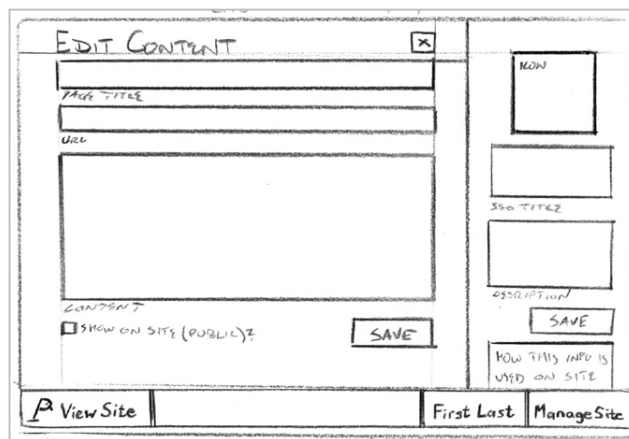
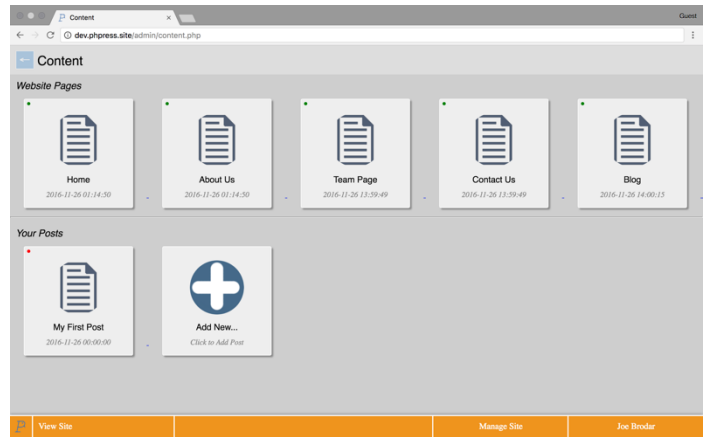
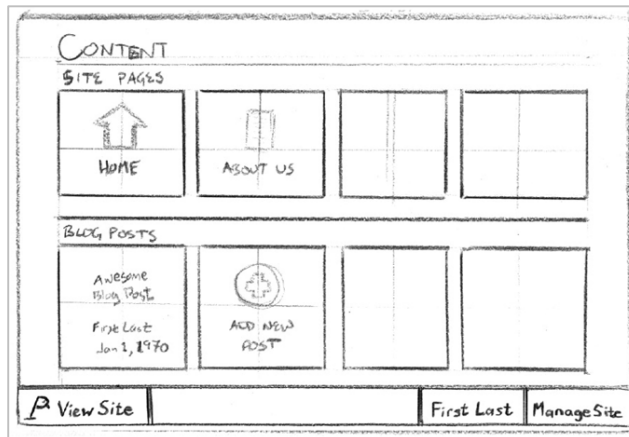
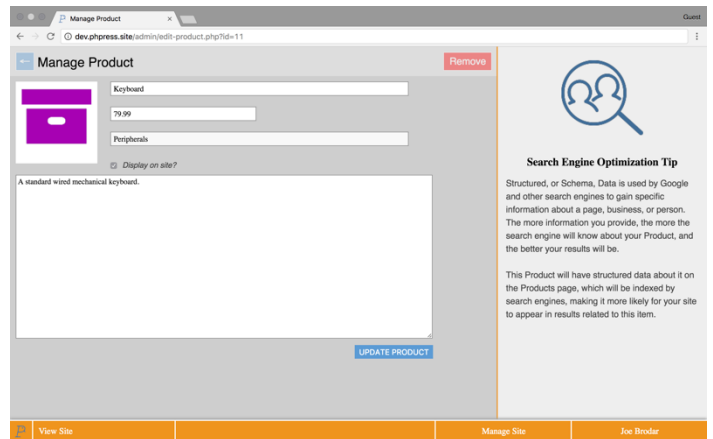
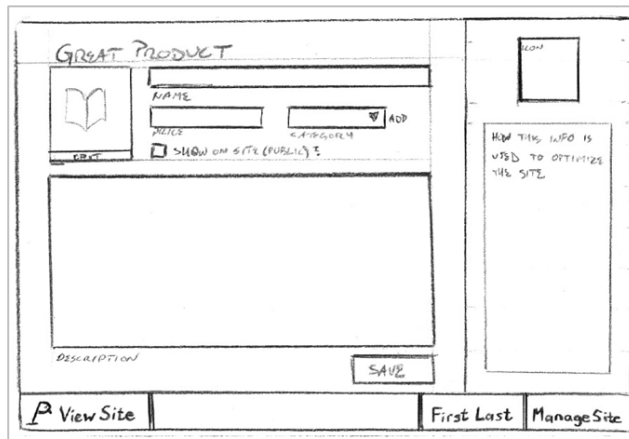


Appendix A: Full CMS Mockups & Screenshots (continued)





Appendix A: Full CMS Mockups & Screenshots (continued)



Appendix A: Full CMS Mockups & Screenshots (continued)

