



COLORADO SCHOOL OF MINES
EARTH • ENERGY • ENVIRONMENT

CSCI 370 Final Report

Rocky Mountain Lab Rescue

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Prof. Kathleen Kelly

Table 1: Revision history

Revision	Date	Comments
New	8-24-2023	<ul style="list-style-type: none">- Added non-functional requirements- Added risks- Added definition of done
Rev – 2	8-23-2023	<ul style="list-style-type: none">- Added introduction/high-level overview- Added functional requirements
Rev – 3	10-18-2023	<ul style="list-style-type: none">- Added Testing and Quality section- Added Ethical Consideration section
Rev – 4	11-9-2023	<ul style="list-style-type: none">- Added Results Section
Rev – 5	12-4-2023	<ul style="list-style-type: none">- Update before handing off to another team
Rev – 6	12-9-2023	<ul style="list-style-type: none">- Final changes based on team feedback

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I. Introduction

The Rocky Mountain Lab Rescue (RMLR) is a nonprofit rescue organization operating within the Golden area. RMLR currently has a website used for selling their merchandise online; this website connects to their inventory tracking system and updates their merchandise inventory as users purchase items through said website. However, RMLR also sells merchandise during in-person events, where customers may pay with cash or through Square. Currently, RMLR has no way of updating their inventory in a timely manner during these in-person events. To solve this problem, RMLR is looking for a mobile solution that the volunteers may easily use to track inventory at these events.

II. Functional Requirements

The project will allow volunteers and workers at the Rocky Mountain Lab Rescue to easily keep track of and modify the inventory of merchandise.

Specific functionality includes:

1. Integrate with the existing WordPress and WooCommerce website.
2. Provide a mobile solution for volunteers to use in the field.
3. Be intuitive for non-technical users.
4. Provide functionality for volunteers to manage merchandise inventory.
5. Ensure there is no disconnect between the physical and online inventory.
6. Require authentication and authorization to access inventory management.

III. Non-Functional Requirements

1. Be inexpensive as RMLR is a non-profit organization.
 2. Require access to the RMLR Google Suite.
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IV. Risks

These are the risks expected to arise throughout the semester:

1. Unauthorized users being able to change the inventory.
2. Physical and online inventory becoming unaligned.
3. No experience with WordPress or WooCommerce.
4. No experience interacting with the G-Suite on a programmatic level.

V. Definition of Done

The following is our definition of done:

- Develop a working website that:
 - is mobile accessible.
 - can connect merchandise sales with inventory tracking.
- Creates a streamlined process for tracking sales over the existing website.

The following are stretch goals:

- Develop a way to track non merchandise inventory such as kennels and dog collars.
 - Develop a way to track trends in merchandise sales.
 - Create integration with payment platforms such as Square and PayPal on our website.
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VI. System Architecture

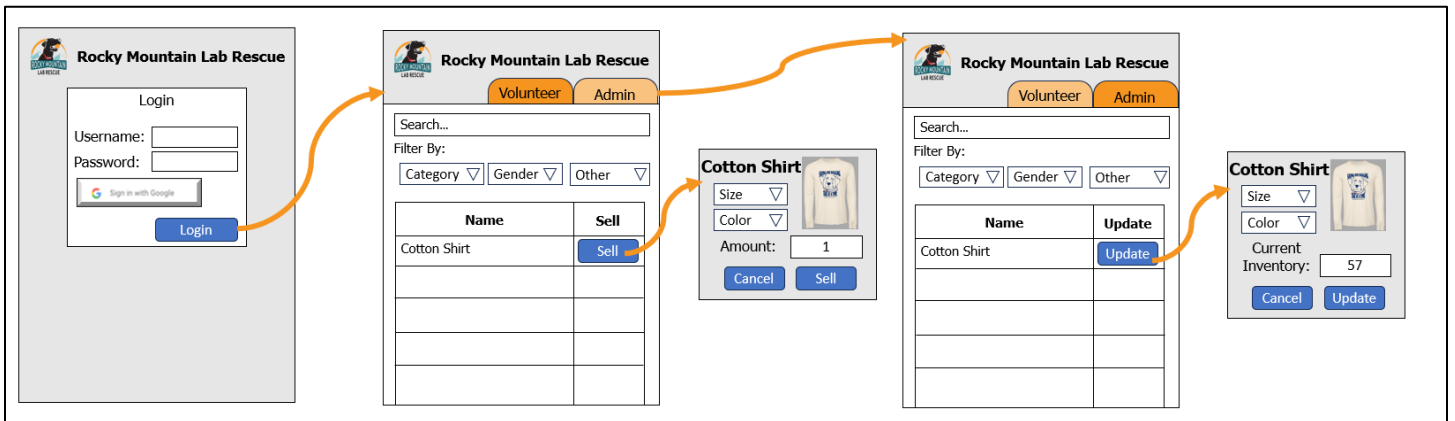


Figure 1: Website Flow

The graphical user interface consists of two main pages: 1) The user login page and 2) The inventory volunteer page.

The login page identifies if the user logging on is a volunteer for the RMLR team who is looking to keep track of a purchase, or if they are a system administrator who has access to update stock manually for any item.

The inventory page allows the user access as either a volunteer or as an administrator. To identify what role the user is signed in as is signified by the underlined tab at the top of the page either as “volunteer” or as “Admin”. Both tab options have very similar page design as they have a table containing merchandise from the storefront and a filter function for narrowing down the item that is being searched for. The main differences between the two user role options is that 1) the admin is able to view non-merchandise inventory and 2) the admin has the ability to update an item’s inventory by clicking on the item in the table and opening a popup. The volunteer is able to keep track of a sale by clicking on the item in the table and opening a popup that they have access to and record the sale.

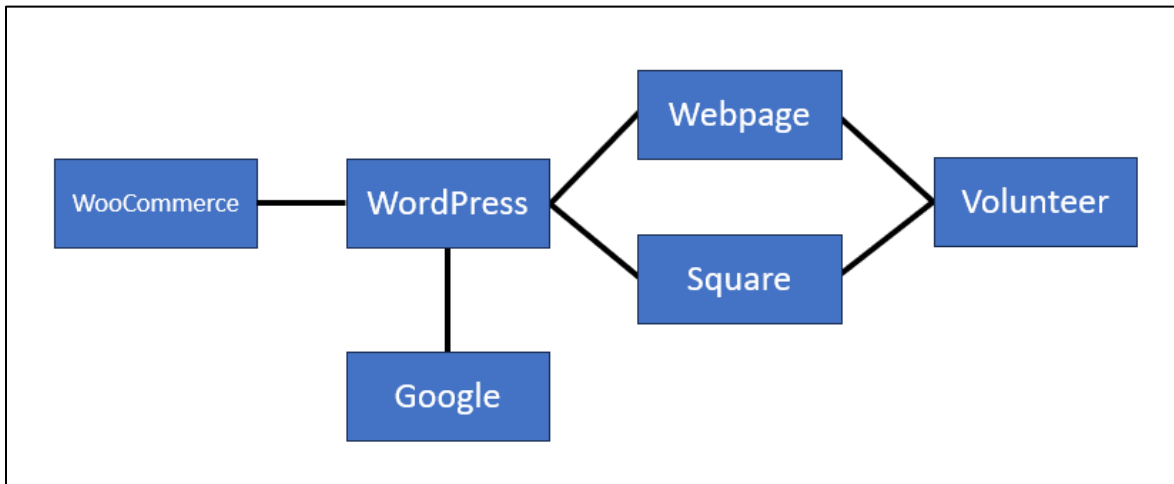


Figure 2: Architecture Flow Diagram

The above figure lays out the basic flow of our design, starting with our volunteer who interacts with the webpage and Square. Using plugins, the webpage and Square can communicate with WordPress which acts as the connecting point for everything. There is a G-Suite plugin through WordPress which allows a degree of authentication before being able to dive into WooCommerce, which houses Rocky Mountain Lab Rescue's merchandise inventory.

List of technical design issues:

1. Linking our WordPress website to RMLR's website.
2. Setting up authentications through G-Suite to prevent non-intended users from accessing merchandise inventory.
3. Getting access to WooCommerce with only read access through RMLR's WordPress website (Could be solved through API key).

VII. Software Test and Quality

	Test Purpose	Test Description	Test Tools	Acceptability Threshold
Integration with existing site	Ensure that the solution may be hosted on the client's existing infrastructure.	We handed the WordPress page we have implemented to the RMLR team and made sure that functionality from our page transferred to their site.	Mobile device with access to our site, WordPress, and WooCommerce.	If, after the integration, all functionality implemented carries over to the existing site.
Mobile accessibility	Ensure that anyone can get access to the site through a mobile device.	We used several different search engines and operating systems to access the site.	Our team will use several different mobile devices (iOS, Android) and search engines (Google Chrome, Safari, etc.)	If our team can access and use all aspects of the site on different platforms.
Intuitive?	Make sure that volunteers and	We handed the site to a few volunteers	A device that has mobile access	If the testers are able to use the site

	admins can use the interface without experiencing any blocks or confusion.	and admins, gathering feedback.	which can be used by Rocky Mountain Lab Rescue volunteers.	seamlessly with no complaints.
Inventory management functionality	Ensure the functionality of the site. (Inventory can be managed)	Using our team's testing site, we ensured that the app will be able to increase and decrement WooCommerce inventory.	Device that has access to our site, along with inventory access to see inventory as it changes.	If the calls from our team's sight are read and implemented on the backend, and inventory is accurately changed.
Backend synchronization	Ensures merchandise is synchronized to minimize error	Our team both incremented and decremented inventory values and checked to see whether those changes were reflected on the backend.	Our team will use both desktop and mobile devices to attempt to change the inventory values.	The threshold will be met when changes made on both mobile and desktop devices for both the volunteer and admin roles are synchronized to the backend.

Authentication + Authorization	Maintains organizational security pertaining to both merchandise and non-merchandise	Our team will attempt a volunteer sign-in without admin access to sign in and monitor whether we are able to increment the inventory.	Our team will use both desktop and mobile devices to attempt to sign in and change the inventory values.	The threshold will be met when no volunteer without admin access can sign in and increment inventory values.
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VIII. Project Ethical Considerations

The following are some of the ethical considerations for this project regarding ACM and IEEE standards:

- **ACM 2.1** Strive to achieve high quality in both the processes and products of professional work.
 - The Rocky Mountain Lab Rescue team should be striving to produce high quality code.
 - The website produced by the end of the semester will look professional and shall be easily used by non-technical volunteers.
 - The website should accurately update the inventory on the backend without dropping any data or changing stock without permissions.
 - The team is planning on using Agile software development processes to ensure that processes are professional. The team is using the specific agile practices of a sprint schedule, stand-ups, client meetings, and advisor meetings.

- **IEEE 2.01** Provide service in their areas of competence, being honest and forthright about any limitations of their experience and education.
 - The Rocky Mountain Lab Rescue team should be honest with our client, advisor, and each other.
 - Each member of the team should provide an accurate report of their own personal skills and experiences.
 - If there are any areas of knowledge that a team member lacks, this should be properly communicated to all parties.
 - When working with the client, the team should properly represent our skillset and not promise something that would be impossible or take a very long time to learn.

 - **IEEE 3.02** Ensure proper and achievable goals and objectives for any project on which they work or propose.
 - The Rocky Mountain Lab Rescue team should make sure that we have not promised more that the team can deliver in one semester.
 - The team should know its own limitations and timeframe; the team must take into consideration that everyone is a busy Mines student taking a full load and has a busy life outside of school

 - **IEEE 3.10** Ensure adequate testing, debugging, and review of software and related documents on which they work.
 - The Rocky Mountain Lab Rescue team should give rigorous testing throughout the timeframe of the project.
 - It is crucial that the team carries out in-depth testing in order to deliver on the goals that have been set for the project.
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- It is important to see this testing through so the finished product will pose no foreseeable threats to the customer in the future.
- **IEEE 7.05** Give a fair hearing to the opinions, concerns, or complaints of a colleague.
 - The Rocky Mountain Lab Rescue team should always be considerate and open minded concerning other teammates; when sharing an idea or opinion, all other team members should be respectful and consider all aspects of the idea.
 - If a team member has a complaint about a colleague, this should be shared in a considerate manner that will build up the team.
 - When listening to complaints, all team members should enter the conversation with an open mind.

IX. Project Completion Status

At this point in the project, our team has implemented all the solution's expected inventory management functionality. This includes both main aspects of being able to manage the stocks merchandise and having a level of authentication. However, due to time constraints our team was unable to explore the client's stretch goals which include inventory management of non-merchandise items and monitoring of sales trends.

The team conducted intensive performance testing by way of iterating through the created webpage and altering merchandise inventory from what would be the perspective of an RMLR volunteer, checking if those changes push to the back end of WooCommerce. Results on these tests ended up being excellent. Every change that we have made to this point has been validated by the WooCommerce back-end correlating the changes.

Once the team believed the project was ready for review, it was sent to Rocky Mountain Lab Rescue. The following were comments about what worked well and what needed to be changed:

- Positive feedback:
 - The app was intuitive and easy to use for non-technical users.
 - The app will work well in the field, particularly on a mobile device.
 - The app correctly updates the RMLR WooCommerce backend.
- Negative feedback:
 - The app had conflicting out-of-stock results. (E.g. reporting no stock as “null”)
 - The app did not filter out colors/sizes that are no longer stocked.
 - Some further clarification regarding WooCommerce product settings was needed for our app to function properly. For example, products in WooCommerce need to be configured differently depending on whether they have variations (color, size, etc.)

Note that all this negative feedback was addressed in time to hand off the product to the client and helped greatly in the improvement of our product.

X. Future Work

The team completed all requirements as written out in the definition of done, however there are still some action items and stretch goals that the team will not be able to complete before the end of the semester.

One of these was integrating with sales made via Square. As of now, when a sale is made on Square, a volunteer will need to go onto our website to update the merchandise count. A further project would be to integrate these Square sales directly with the WooCommerce backend, so that when a volunteer makes a sale via Square the backend would be automatically updated.

Another stretch goal was to track trends in merchandise sales. This project would implement a system to track which items in the catalog are the most popular and in which season they sell the most. This information would inform the team at Rocky Mountain Lab Rescue about which items would be most strategic to keep in stock and which items do not need to be bought again.

The final goal we did not complete was adding the ability to track non-merchandise such as kennels and dog collars used by the Lab Rescue. This would be an additional feature on the admin side of the site so that the admins could easily track and update the inventory of these items. This would also include adding these items to the WooCommerce backend while making sure they do not show up on the online store.

XI. Lessons Learned

- **Agile Methods:** Our team was able to learn and put into practice the agile methods taught in class. This includes things such as having a scrum leader, doing standups, and breaking larger problems into bite sized pieces. They helped us keep in stride and continue to make progress towards completing our product for our client. It also helped maintain a strong level of communication between our group members so that we could all be on the same page.
 - **REST APIs:** Interaction with the WooCommerce REST API was an integral component of our solution. Our team learned about the intricacies of making JavaScript HTTP requests and authenticating with API keys in order to retrieve and update information in the WooCommerce backend.
 - **HTML + CSS:** HTML and CSS define our solution's entire UI. Although WordPress' block editor allows for visual drag & drop editing, our JavaScript code dynamically generates HTML based on the results it retrieves from the WooCommerce backend. CSS was used to stylize HTML elements and define layouts/positioning.
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- WordPress/WooCommerce: At the start of this project no one from our team had heard of or had worked with WordPress or WooCommerce. This created a large learning opportunity for our team as we not only learned how to work in and with these new environments, but also to create a product that our client would be happy with by implementing it into their current WordPress and WooCommerce environment.
- Client Communication: Throughout the lifecycle of this project our team has learned how to communicate with our client more effectively. In the beginning of the semester, once we finished a meeting with Rocky Mountain Lab Rescue, we would be left with several questions and topics we had hoped to touch on during the meeting. This would lead to an email chain with our client in order to get the rest of those questions answered. Now as a team, we come to the meeting much more prepared to ask questions and get the feedback that we need from our client.

XII. Acknowledgments

The team would like to thank our clients at Rocky Mountain Lab Rescue, especially Janet, Laurie, and Teegan. Thank you for the amazing work you do for labs at the rescue and thank you for being very communicative and responsive throughout the semester. Furthermore, the team would like to thank our advisor, Kathleen. Thank you for making sure the team stayed on track and was supported the entire time.

XIII. Team Profile



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Web Development at Runner's Roost Lakewood

Running, Hunting, Fishing, and anything outdoors



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Beaverton, Oregon

Embedded software engineering internship with Portland Tool & Die

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Software engineering internships at MITRE and ALTEN working on space situational awareness applications and an embedded medical device.

Board Games, Volleyball, Backpacking, Lord of the Rings



Jonah Streichert

Computer Science + Robotics - Senior

Highlands Ranch, Colorado

Software Engineering internship with Lockheed Martin working on GPS Control Segment

Weightlifting, football, bingeing classic tv shows

References

[1] “WooCommerce REST API Documentation,” WooCommerce,

<https://woocommerce.github.io/woocommerce-rest-api-docs/> (accessed Nov. 9, 2023).

- [2] Code Atlantic LLC, “Create Your First Popup,” Popup Maker Documentation, <https://docs.wppopupmaker.com/article/488-create-your-first-popup-summary-guide> (accessed Nov. 9, 2023).

Appendix A – Key Terms

Include descriptions of technical terms, abbreviations, and acronyms

Term	Definition
<i>API</i>	<i>Application Programming Interface</i>
<i>HTML</i>	<i>HyperText Markup Language</i>
<i>CSS</i>	<i>Cascading Styling Sheets (used for styling and alignment of HTML elements)</i>