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April 12th, 2018

Quality and Refactoring Review for Team DCC's Software Solution

The purpose of this document is to review Team DCC's Minimum Viable Product for HELL's software provision process. This analysis has been performed by Team Dancing to Zebras, another group tasked with developing a solution to this process. The group would like to thank Team DCC for their cooperation throughout the review period. Without the credentials and explanations provided by this team, it would be much harder to produce a thorough analysis.

Analysis of the project began by exploring the team's GitHub repository. While browsing this repository, it was noted that separate directories exist for each of the previous milestones. This implementation improves the ability to identify the deliverables produced through the project. Unfortunately, not all of the expected documents are present within these directories. For example, the repository does not contain explicit files for the project's idea sheets, user stories and acceptance test documentation. Although most of this information can be found within the respective PowerPoint presentations, it is believed that including these source files in the repository would improve the readability and maintainability of the project.

Several other potential opportunities for improvement were identified while analyzing the team's GitHub repository. The first recommendation is to utilize more descriptive commit messages. As shown in Figure 1 below, several commits within the project's development do not clearly indicate what changes were made. By clearly identifying these modifications, it would become easier to understand when and why certain modifications were made to the system.

The second recommendation is to reduce the amount of duplicated code presented within the three source folders shown below in Figure 2. Since the variations between the code contained in these source folders is minor, it is believed that a more effective solution than using three directories is possible.

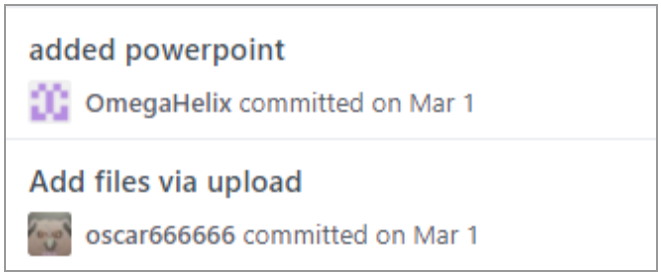

Figure 1: *Commit Messages*

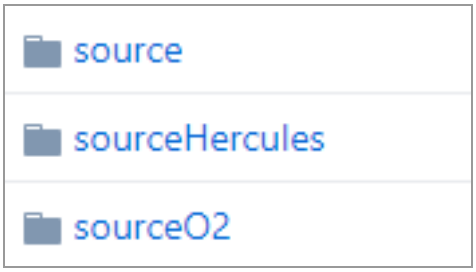

Figure 2: *Duplicated Source Code Directories*

Analysis continued by exploring Team DCC's completed website. While browsing this website, an appreciation was formed for the group's minimalist aesthetic design. Both the concise colour scheme and absence of unnecessarily distracting information are believed to improve the overall quality of the website.

The figures below display some design decisions that could potentially have a negative impact on the user's experience. Within Figure 3, one can see that the password entered into the login form is displayed in plaintext. It is believed that hiding the text entered into this field would improve the user's sense of security. Another inconvenience is displayed within the pop-up message of Figure 4. Upon successfully logging into or out of the system, the user is forced to dismiss the popup in order for the website to progress. In order to improve usability for the client, it is suggested that this feature is replaced with a format that does not explicitly require user input to progress, such as a temporary notification bar within the associated page.

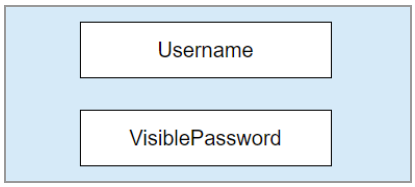

Figure 3: *Plaintext Password*

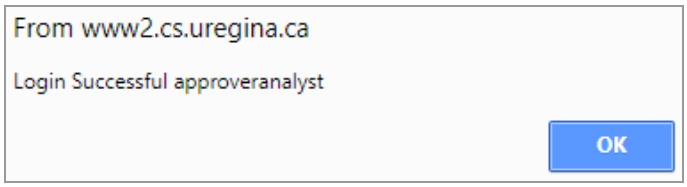

Figure 4: *Unnecessary Popup Message*

Additionally, the "Cancel Request" button in "My Requests" is not currently functioning as expected. Rather than being deleted, the status of the request is simply modified, as shown in Figure 5, and is still displayed on the page. As shown within the code of Figure 6, this behaviour prevents the user from ever submitting another request for that tool.

```
$query = "UPDATE requests SET status = 'Canceled' WHERE id = '$requestid' AND status !='Provisioned'";
```

Figure 5: *Existing Query for Cancelling a Request*

```
$query = "SELECT * FROM requests WHERE userid = '$userid' AND softwareid = '$softwareid'";
if($query = mysqli_query($conn, $query))
        if($query->num_rows > 0){
            header( "refresh:0;url=../softwareuser/requestlist.php");
```

Figure 6: *Existing Method for Submitting a Request*

Furthermore, a fairly major usability bug was identified by the reviewers. In particular circumstances, the reviewers were unable to submit a request after filling out the request form and clicking the "Submit Request" button. This behaviour was observed within the Google Chrome and Safari browsers across operating systems. This issue was not experienced when using Firefox. Although the reviewers were unable to determine the reason for this sporadic issue, requests were eventually able to be successfully submitted on each of these browsers during further testing without any changes in testing method or environment.

Other minor concerns were brought forward during review. Depending on browser width, text within several elements is cut off. This limitation negatively impacts usability for mobile users. Another potential concern was identified as the duplicated behaviour of the "HELL" and "Create Request" navigation buttons. However, these concerns are relatively minor, do not have a large impact on the overall product and could be easily improved upon if desired.

Analysis of Team DCC's project concluded by observing the source code for their developed solution. The goal of analyzing the underlying website code is to understand the reasoning behind implemented design patterns and suggest possible areas for refactoring.

Team DCC specified their use of the decorator pattern in the design of their website. After review, it is clear that this design pattern has been utilized in the implementation of the navigation bar. This pattern is a great candidate for this functionality as it reduces the code duplication that would arise from developing all possible navigation bars. This reduction of code is further supported by the fact that the navigation bar code is stored in a separate file and included using a single line on appropriate pages.

Another pattern specified by Team DCC was the notification pattern. The pattern involves notifying a user of the system's status and when the system's status has changed. Although the area of usage is not explicitly displayed in Team DCC's presentation, it is believed that this pattern corresponds to the numbers presented to users within the various buttons of the navigation bar. This functionality is extremely useful as it helps aid the user in identifying where their attention may be required. However, it is believed that this system could be further improved upon by utilizing an observer pattern to update these notification numbers in real time. Currently, the user is required to manually refresh the page to receive these updates.

One code smell identified within the developed solution is the presence of dispensables. The removal of these unnecessary regions of code would improve the readability of the overall program. For instance, it was discovered and confirmed that several regions of the "login.css" styling sheet are not actually used anywhere in the website. Furthermore, there are several files within the codebase that do not contain any actual code. Such files can be extremely distracting for users attempting to understand the underlying backbone of the website and should be removed. A clear example of such a file is presented within Figure 7 below.

```
<?
/**
 *
 * The purpose of this document is to provide data generation for the request list for software users.
 * given it's own file as it's a common request, and should be simple to access.
 *
 */
?>
```

Figure 7: *userrequestlist.php File Contents*

No other major code smells were discovered within the project. Analysis of the code provided no major indications of bloating that would impact future development. Additionally, there appeared to be no major indication of unnecessarily coupled code, abuse of object-oriented development principles or code that prevents easy modification of the system.

The reviewers would like to thank Team DCC for the opportunity to review their project. It is hoped that this analysis provides value both to the current project and future endeavours.