

7.0 System Coding

This section describes the features of the programming languages, and the special purpose language tools used in developing the system. The coding standards and conventions are also discussed here.

7.1 Programming Language

The main programming languages used to develop the system were PHP Hypertext Preprocessor 5 (PHP 5), Hypertext Markup Language (HTML), Cascading Style Sheets (CSS), and JavaScript, which are also considered to be the main technologies used in developing a web application (Loukas, 2018).

PHP 5 is a server-side language which is commonly used in creating dynamic Web pages. It is flexible enough that it can be accessed by majority of operating systems and servers (Oracle, 2018). Specifically, the system is built on PHP 5.6.30. HTML is used to structure the elements in a Web page and to link them together. CSS is used for additional styling of the HTML elements to format/layout how the user would see a specific element. Although CSS was not the main styling language used in the system, though it still offered wider capabilities and options for the developers to personalize the layout of the Web pages as much as possible. JavaScript is used to manipulate the behavior of the data and elements combined in a Web page.

One of the notable features adapted from PHP 5 is the PHPSpreadsheet library which was used in reading an imported/uploaded excel file which would be used in project creation. The library is also equipped with writing to a spreadsheet, but the developers did not see a need for this functionality to be applied to the system. This library was the main tool in completing the “Import Project” function of the system.

There are numerous JavaScript features used throughout the system. To name a few, the system uses this language specifically for basic user input validation that does not require database query comparison, date inputs, form submissions, and implementation of other plugins used in the system. A JavaScript plugin called chart.js was used for added data visualization for reports.

The aforementioned languages work together smoothly to enable dynamic actions and data displays, which is highly encouraged in system development.

7.2 Special Purpose Language Tools

Accompanying the programming languages used to develop the system, special purpose language tools were used for a more coherent system structure and effective use of existing tools and technology. In terms of system structure, MySQL, CodeIgniter, and Bootstrap interconnects the main aspects of the system with regards to data storage, data processing, and user interface, respectively.

MySQL is open-sourced, a database management system, and uses a Structured Query Language (SQL) (MySQL, n.d.). The developers also used MySQL Workbench as the visual tool to assist in designing, developing, and administering, the system's database (MySQL Workbench, n.d.). The database is a structured collection of data that can be read from and written to by the system.

CodeIgniter is the PHP framework used in developing the system with its Model-View-Controller structure. The model is responsible for all database manipulation which includes, retrieving, inserting, and updating of data tables and/or rows. The view handles the manner of displaying the data for each web page. It also has the ability to handle fragments of a page. Lastly, the controller is the bridge that combines the data from the model to be displayed in the view in order to fulfill a request. The system also makes use of CodeIgniter's built-in methods such as upload, email, and form validation.

An important tool that contributed to the system's data visualization on one of the most important aspects of the project management system is the generation of a RACI Gantt Chart with the help of AnyChart. "AnyChart is a flexible JavaScript (HTML5) based solution that allows developers to embed interactive and great looking charts and dashboards into any web, standalone or mobile project." (AnyChart, n.d.).

7.3 Programming Standards

Coding techniques are used not so to improve the functionality of the system, but for the readability and maintainability of the system. There are three important sections in coding techniques that should be decided upon a group of system developers - Names, Comments, and Format. Aside from these, there are also additional programming techniques and standards that the developers have adapted towards the system.

The naming convention used within the backend of the system is Camel Case for easier readability, when it comes to methods and variables. Camel Case

is the formation of multiple words that capitalizes the first letter of a new word (Example: camelCase). This is used in naming variables, tables, methods, and MySQL variables. The verb-noun routine is also applied in naming methods, following the same convention. Title Case is another naming convention wherein the first letter of each word in a phrase is capitalized (Example: Title Case). This is used mostly for the user end, specifically in page headers, table headers, widget/box headers, and report titles. The naming conventions for the database tables are set to be in all lowercase letters, while the table columns are set to be in all uppercase letters. The columns wherein they have a foreign key with a different table are indicated in the column name divided by an underscore for easier reference (Example: tablename_COLUMNNAME). The abbreviations used in the system are only of “RFC” which stands for “Request For Change”. This term is assumed to be understood by all the employees of the company since the system will be used internally.

Comments in a system may act as internal documentation if written properly. The system’s comments are placed before the first line of a certain method. Method comments simply describe the purpose of the method as the code itself should be readable on its own without detailed explanation. There are also some cases wherein the developers place comments on loops and variables for better comprehension.

There is a wide variety of formatting styles for system development. As for the programming languages used, strict formatting is not required and no matter how the codes are placed, it will still run as if they were formatted. There are specific standards that the developers have set among themselves to sustain readability and maintainability, namely:

- an HTML page’s title should be the same or similar to the corresponding file name,
- PHP chunks of code embedded in the HTML are always wrapped with the full PHP start and end tags,
- control statements are separated with a space before the condition and its opening parenthesis,
- long control statements are separated by its operator into the next line,
- indentation is applied with respect to the code block a line of code is a part of,
- brackets of methods and control structures that wrap the code begin on the next line from the method name/control statement and end on the next line of the last line of code,
- a line of code can have more or less ninety (90) characters,

- each value assignment for an array is separated into one assignment per line, and
- all functions must return a value, whether it may be a single element/value, an array, an object array, a query result, or a boolean.