

Database Re-design for STEM Academy

Technology Review

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Abstract

This document looks at the different pieces involved with the project back end, and analyzes several options for managing each piece. The identified pieces of the back end are database management system, standard report generation and report storage.

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1 DATABASE MANAGEMENT SYSTEM

1.1 Overview

We need a functioning database that can collect all the survey information in one place. There needs to be appropriate relational tables for data which are dependent on each other. Changes in one table should automatically change the table which refers to the original.

1.2 Criteria

We need to look for a database software that is open source and free to use for our clients. The database administrator will be the primary user of the database. The administrator should easily be able to view and make changes to the database. The following section lists some positively reviewed free database software that we may consider for our project.

1.3 Potential Options

1.3.1 Current System

The current database system being used is phpMyAdmin, which accesses a web server hosted by Oregon State University. The php files in this server can connect to and edit the database. However, this is a sophisticated method which makes it difficult for our clients to manipulate the database. The php files set up by last years capstone team are faulty and will need to be fixed. Our clients are paying 20 dollars monthly for a system which is not fully functional. We could try to fix the system and make it easier for our clients to work with the database directly, or we could use one of the following databases which are free for use. These databases can store data obtained from survey software and are potentially more convenient for our clients to work with directly.

1.3.2 CUBRID

The surveys for this project are made from php files, and we might decide on using a more efficient web based survey software, such as Qualtrics. Either way, CUBRID would be a great open source option to collect the data and would be especially useful for this project, since it is designed specifically for web applications. The database solution is written in C, and is capable of processing large amounts of data.

1.3.3 Firebird

Firebird is a relational database and should be very helpful in creating well-defined relationship between database tables. The database system features many SQL standards and should be relatively easy to work with. Firebird is capable of running on Linux, Windows and a variety of Unix platforms. This software can potentially be tested by importing a csv file of collected survey data.

1.3.4 MariaDB

MariaDB is created by the original developers of MySQL and is used by tech giants like Wikipedia, Facebook and Google. The database server provides most of the functionalities from the previously mentioned database systems including drop-in replacement, and should be compatible with our project. MariaDB developers prioritize security, and enhance and merge all of MySQL's security patches.

1.4 Discussion and Recommendation

All of the listed options are free and viable for use in our project. Once we have access to the survey php files, we will test their capability of working with each database system. If we choose to use an alternate survey software, we will test how well the collected data can be integrated into each system.

1.5 Conclusion

Once we test each database system, we will as a team decide which option will be the best for our project. As of this moment, CUBRID seems to be the most viable option as it specializes in working with complex web services.

2 REPORT GENERATION

2.1 Overview

The survey data needs to be displayed in standard reports with visual aid to help interpret the data. We will look for free and open source report generation tools, as we aim to minimize funds in every aspect of our project.

2.2 Criteria

Besides integrating the collected data into a database, we need to generate standard reports that illustrate the data with graphics. These reports should be well defined and look finished enough to share directly with potential funders of the program. There are many report generation tools that include nice features and are useful for people with little to no

technical skills. However, they require a monthly payment and are not suitable for this project. The following section lists a few alternate options which are free and easy to use, and will get the job done for our clients.

2.3 Potential Options

2.3.1 R Studio

I have used this software for my Statistics course to generate plots from data. It can import a csv file containing survey data, and with simple commands it can generate various plots of the data. Our clients can generate boxplots, bar graphs, histograms, pie charts, etc. to compare target variables in the csv. However, this will require our clients to write specific lines of code into the R Studio terminal which may not be convenient for them.

2.3.2 Qualtrics

In addition to generating surveys, Qualtrics provides a Reports tab, where we can view answer summaries and create custom pages to visualize and manage aggregate results. There are three elements to the results section: Visualization (Presentation of data in a table or graph), Page (One or more visualizations and/or notes are displayed) and Report (A collection of filters, pages, and visualizations). We can create as many visualizations, pages, and reports as we want for analyzing our data. We can add a filter to a report, export it, or edit options that apply to all its visualizations. The report selection dropdown menu lets us switch between reports or create new reports. The selected report will be the only one affected by subsequent edits we make.

2.4 Discussion and Recommendation

Our determination of the best report generation tool will depend on which tool lets us look up previous reports, or are most compatible with report storage software. We will also need to consider which tool our clients are most comfortable with.

2.5 Conclusion

From our research so far, Qualtrics seems to be the best option for our clients. It has three visualization options (chart, simple table, statistics table). Although this is limited compared to other report generation tools, it has a great user interface and will be convenient to use for our clients. This is especially helpful if we use Qualtrics for survey generation, as it lets our clients manipulate the survey questions and reports all in one place. However, we still need to test how well Qualtrics can keep records of these reports as compared to other tools, or if we can use a storage software to store reports generated by Qualtrics.

3 REPORT STORAGE

3.1 Overview

Our clients should be able to search for reports from specific camps. If our chosen report generation tool is not adequate for keeping records in the long run, we will need a storage software that can store these reports for future reference.

3.2 Criteria

Storage systems designed specifically for report management are expensive, includes unnecessary features and are not preferable for this project. We need a free and simple cloud storage software that can help us store and locate reports of various file formats.

3.3 Potential Options

3.3.1 Google Drive

Everyone is free to sign up for Google Drive, which provides 15 GB of free and expandable cloud storage. It is compatible with most file formats and provides filter options to help us locate specific files. It includes online office tools that can be collaborated on with others, and it is easy to share files with others. This can be useful for sharing specific reports directly with other organizations to apply for funding.

3.3.2 Microsoft OneDrive

OneDrive includes most functionalities of Google Drive. Although free users only get 5 GB of space, it is relatively inexpensive to expand this to 50 GB.

3.4 Discussion and Recommendation

The need for a storage system for the reports will depend on our report generation tool. If the tool lets us keep records of and look up specific reports, we may not require a storage system. Otherwise, we will choose the most convenient storage option for our clients.

3.5 Conclusion

Google Drive is the most preferable cloud storage system for storing the reports. It provides 15 GB of space at no cost, which is plenty for storing simple reports.

4 REFERENCES

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