

Matthew Zidar
Assignment 2: Project Proposal
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VM: sysadmin@csc415@server20.hpc.tcnj.edu. Located in /webapp/MusicApp. Will be moved over to student1 temporarily.

GitHub Repository: <https://github.com/mattzidar/MusicalStudentsGroup>

Social issue being addressed:

The social issue I am attempting to address is education. The quality of instruction as well as resources available in a school district are largely dependent on the culture and values of school administrators, teachers, and parents. The level of wealth from families in the district and town in general also directly impacts the amount of funds received by the school, but even then it is often distributed unevenly. As an example, some schools will focus more on funding extracurricular sports instead of other activities such as music or the arts. I am attempting to address education as a social issue by making an app to supplement and improve the music programs in schools. Music is an important part of education because it has been proven through studies that singing or playing an instrument on a regular basis has a couple of benefits including increased IQ or cognitive abilities. It can also be used for therapy and to reduce stress. These combination of benefits along with the educational value in music and learning to play and read it is the reason why addressing music in education is important.

Project name:
MusicalStudentsGroup (subject to change)

Option 1 or option 2 with rationale:

I chose option 2 instead of option 1. Since education is such a broad social issue to cover with different areas that could be improved upon inside and outside of the school and relating to different subjects, there are many different applications and projects that can be worked on and implemented that can slowly help fix this issue of education. Personally, I am very passionate about music and have played an instrument in school for 11 years, even now. It has had a great impact on my educational career and being able to help improve music education in schools where it is lacking is important to me. Improving the amount of opportunities or quality of education in music programs is not one of the option 1 topics, so I decided to choose option 2 and work on it myself.

Web-based / mobile application? Languages and frameworks used:

I am going to be making a web-based application. As specified in the instructions, I will be using Ruby with the Ruby on Rails framework in order to develop the project. In order to manage the data of

users, I will be using PostgreSQL. As the project is being developed, it will be hosted on my virtual machine. I also am going to be using gems for specific purposes, for example I will attempt to use Devise as a method of creating user accounts. Not sure if this is going to work for my specific project, however it's worth a try.

Project Idea:

Supplemental application to be used by school districts with underfunded music programs in order for students to receive new instruments for free or for a discounted price, get private and group lessons, form musical groups based on their interests that are not offered in school, as well as provide an opportunity for older students to gain volunteer experience while improving their skills as music educators and musicians.

How the project is innovative and how it addresses the social issue:

Underfunded music programs around the country often have multiple issues that need to be addressed. Without proper funding, there are often more students involved in bands and orchestras than there are available instruments, meaning students sometimes are unable to play or have to share instruments. Having a limited amount of instruments available has a couple issues: If there are more of a certain type of instrument available than others (either because the instrument is cheaper or because of less demand), some students are required to switch to that instrument if they want to play on a more consistent basis during rehearsal, despite the student possibly wanting to play something different. Also, having to share during rehearsal limits the amount of time each individual student has to improve their abilities and play in the group, which is important. Additionally, if multiple students want to practice at home on a certain day of the week and there are not enough instruments available, some students will be unable to practice. The application will have a database where older students who no longer play or graduated / members of the community can donate old instruments or sell them at a discounted price compared to music stores or other online sites. This provides an opportunity for younger students in need of instruments to receive one. With this, students can play on a more consistent basis at home or during rehearsals since they will not have to share, which will help improve individual skill and the skill of the group.

Another issue faced by these underfunded school districts is lack of quality instruction. School districts with more funding often have more teachers available, so students are able to receive private or group instruction with teachers in order to improve their abilities. This is often not the case with underfunded schools. The application will provide a platform for younger students to request individual or group instruction from older more experienced students or adults with experience in music. This is beneficial for the students in a number of ways. Younger students will be able to improve their playing abilities with the individual or group practice provided, while older students have an opportunity to gain volunteer experience, solidify their knowledge of the basics of their instrument or skill through instruction, as well as help them improve their abilities to educate students in music especially if they are interested in music school or becoming a teacher. This individualized program for students will help

improve the quality of the music program as a whole, without requiring more high quality teachers to be hired.

Schools that have a more solidified music program often have much better opportunities for students who are interested in playing different types of music outside of school. Other types of musical groups such as a jazz band or marching band are most of the time only offered as an extracurricular activity, which requires money in order for teachers to be paid or to travel to competitions and events. Smaller groups such as a jazz quintet or string quartet are often not offered in schools with subpar music programs, as ones that do offer these groups have a system in place for students to group together and play. Schools with a subpar music program often do not have these extracurricular activities or systems in place for students to form their own group. The application will serve as a method for students to input what kind of musical group they are interested in playing in or request someone who plays a certain type of instrument who might also want to join their group. This way, there is a platform for students to form these musical groups even if the school is not directly involved to help out. This provides students with an opportunity to more easily form these groups and expand their musical horizons by playing different types of music that are not offered in school.

If a school district endorses the use of this program, it can greatly improve the quality of their music education program without necessarily needing more funding. Students will be able to receive an instrument which they can use on a more consistent basis, participate in individualized practice and lessons from older students, teachers, or adults, as well as form a musical group not offered in school for students to play different types of music. The conjunction of these functions can help support the music program and allow students who are interested in music to learn a lot more about it by working with others while expanding their musical background. Providing this application can cause music programs all around the country to increase significantly in quality for years to come.

Algorithm(s) implemented:

I am going to be implementing a method for students looking for a specific instrument to search based on specific criteria and be able to return a list of results that match their search, similar to filtering and searching on other websites. I also plan on writing an algorithm so that students can be matched with a random teacher for private or group lessons based on criteria, or so the student can search with that criteria more specifically instead. I also plan on doing something similar for students who are interested in forming or joining a musical group, where the algorithm can place them in a group or help them create one. Similarly to the examples above, a list of potential members can be returned or members can be picked more randomly.

Data structure(s) implemented:

The data structures I am planning on are hashes and arrays. With a nested hash that uses arrays, it will provide me with a structured method to organize data about the students and anyone who has the app. These data structures are also ideal because there can be multiple different data types in a single structure, meaning that all the necessary information needed for a certain task can be stored in

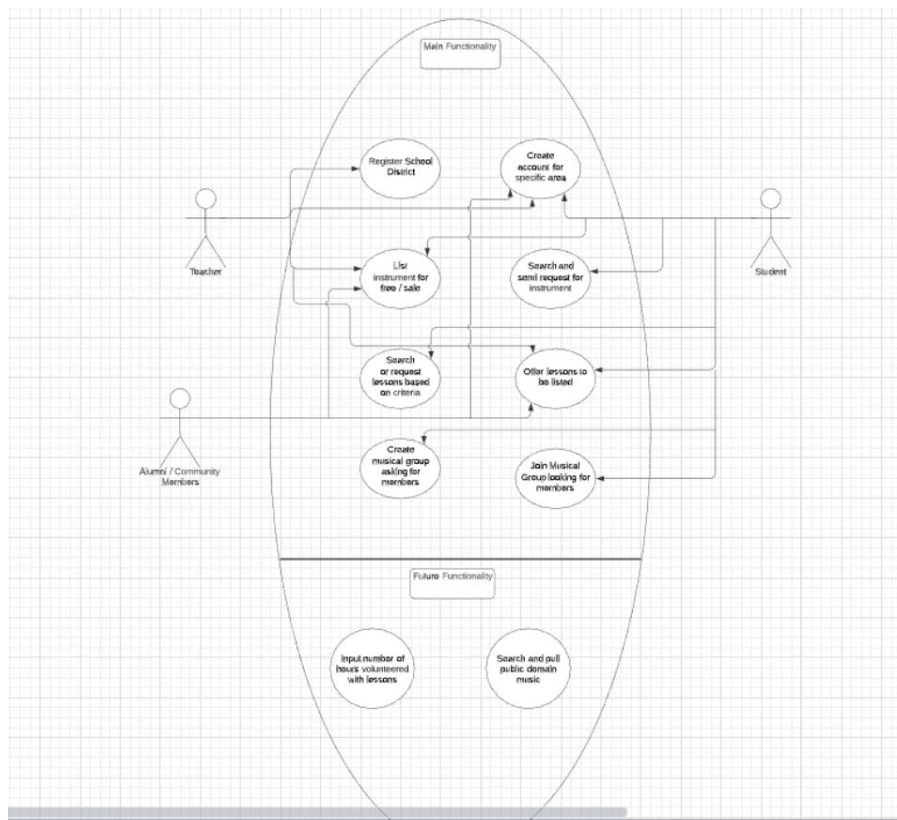
one place instead of being split into multiple data structures. These data structures are dynamic so we do not need to focus on space. Other than that, I will be using PostgreSQL to store user data. It is going to be important to consider making good queries to get the data.

Software engineering concepts I will learn and reinforce:

Since I will be making a web application with Ruby on Rails, I will gain experience working with Rails so I can effectively use it in the future for other web applications. Since I am still learning Ruby, making this application will also reinforce my and help me learn the language even better. Additionally, since a requirement for the project is to use PostgreSQL, I will gain experience in using and managing databases with Ruby on Rails. Another concept that I will learn and reinforce is the use of gems. For my application, I am planning on using a gem for authentication for user accounts. Learning how to use this gem will be good practice if I want to use different gems in the future.

Apart from these technical skills which I will be learning and reinforcing through the duration of the project, I will also need to pay close attention to make sure that my application is user friendly as well as accessible. If the application does not work as intended or is not easy to use, schools or students within that school district will not feel the need to use it. Making sure that the application is tailored for its users is an important part of software engineering so it is an important task to focus on.

Use case diagram: Arrows will be included in use case diagram to future functionality if it is included



Timeline:

Links used for learning:

<https://www.ruby-lang.org/en/documentation/> For learning more of the syntax and features of Ruby I will need

<https://guides.rubyonrails.org/> Ruby on Rails documentation needed for me to learn Rails and successfully build the web application

<https://www.postgresql.org/docs/> Documentation for learning PostgreSQL

<https://www.ruby-toolbox.com/pages/docs/index> Documentation of Ruby tools and gems, where I can get information on certain gems such as Devise which I may use for my project.

Timeline:

There will be a significant amount of time needed in order for me to learn Ruby on Rails, PostgreSQL as well as gems before I work too much on the application itself. There are almost five weeks before the 26th of March when assignment 3 is due.

In the first two weeks, I plan on doing my elevator pitch to the class and making any changes to my proposal as necessary, as well as begin using websites such as the Ruby on Rails and PostgreSQL documentation to deepen my understanding before I make too many changes to my project.

In the third week, I will investigate using gems with Ruby and using Devise in order to create the login system I might need to use for users who are interested in using the application. I will also look into using PostgreSQL to manage some of the data needed from these users.

In the fourth week, I plan on formatting the application so it is user friendly as well as working on the functionality for logins and entering data required for operations. If time allows, I will begin implementing more of the functionality that is used with this data, such as pairing students for group or individual lessons. I will begin working on the requirements necessary for assignment 3.

In the fifth week, I will finish working on the requirements to go along with my application for the deadline on March 26th of assignment 3. If time allows, I will continue working on the functionality for lessons.

I am unsure of when the next assignment will be due related to the project, so I will list out week by week until the end of the semester. But in the sixth week I will start trying to make each one of the parts of my application fully functional. I will work on finishing up pairing students for lessons.

In the seventh week, I am going to attempt to work on the service for providing instruments to those in need, where people can list instruments they no longer use. This is probably going to take the whole week.

In the eighth week, I will try to finish up the instrument provider service and begin working on the musical group request service, where students can find other students interested in making a specific type of band or orchestra.

In the ninth week, I will finish the music group request service as well as attempt to make the application so far more user friendly and aesthetically pleasing.

In the tenth week, I will begin trying to make the program run better by doing testing and attempting to remove bugs, as well as work on some of the requirements for the next assignment. Time permitting, I will work on extra functionality such as a central place where students can get access to sheet music that is of public domain (from composers who passed away many years ago).

In the eleventh week, I will try to wrap up my project, finish the requirements for the assignment, and submit.