

Music and Computers: A Digital Marriage of Necessity

An Interactive Qualifying Project Report

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## TABLE OF CONTENTS

	Page
1. ABSTRACT	3
2. ORGANIZING	3
2.1 Cleaning up	3
2.2 Brainstorming	4
3. MUSIC AND COMPUTERS	5
3.1 First Impressions	5
3.2 Problems	6
4. Fixing the Machine	8
4.1 Efficiency and Utility	8
4.2 Period and Selection	11
5. SUGGESTION	11
5.1 Changes	11

## **Abstract**

Interdisciplinary Qualifying Project is a staple and necessity of one's time here at WPI. For some it is a trip abroad, for others a cultural experience at home, and for others, such as myself and my partner, it was a chance right here at WPI to bridge the gap between science and society (music specifically).

Our project began with a simple assignment. Our advisor assigned us the task of organizing the entire WPI Women's Chorale Library, defining a digital system for its further maintenance, and producing long-term solutions for the entire WPI music library online.

## **Organizing**

### *Cleaning up*

First, we went to visit the WPI Women's Library in the basement of Alden Hall. The closet, and the library itself, were in a state of what would do the word disarray justice. Music was unorganized, there was no rhyme or reason to any of the cataloguing, some of the catalogued music was unreadable (or had been photocopied, which had no place in the library). Original copies had not been separated, and one could not see through the layer of dust or various obstructions in the way. The task ahead was to be a long one.

We first started by quite simply cleaning the closet. We moved aside the stereo, music stands, and boxes of unsorted and unnamed music, and gave the floor a quick vacuuming and the shelves a quick dusting and organizing; no work was going to be done for the future of the library until it was in a state to be assessed. After the music had all

been turned to face one direction, and we could actually read the old filing system, the task of beginning to sort the closet began.

### *Brainstorming*

Brainstorming the best possible ideas was next. We had been told that no photocopied copies of music were to be left in the closet (which at first glance was almost all that could be seen strewn across the shelves), but we had been given no other real specific instruction. The idea of sorting the closet by composer or by date came up, but that would be a task as arduous as it would be tedious, and was quickly decided against, despite the potential for efficiency. We quickly decided that the best system would be to break the library down in terms of the varying types of music and collections that were in it.

First, we set aside all the photocopied music to be destroyed or reviewed for resubmission into the library by Professor Delorey. This cleared a massive amount of room and left space for immediate rearrangement. We decided to leave all the music that had been previously catalogued (and consequently boxed and labeled) on the shelves, for easier access, and merely put them in the numerical order they had originally been intended for. With a strong and already approved system in place, we saw no reason to change the groundwork that had already been laid.

### *Putting it all Together*

This now left us with the task of sorting the boxes upon boxes of loose and semi categorized music. We then decided on some ground rules for sorting with the help of Professor Delorey. First, no music would be saved that had less than 10 original copies (to accurately be considered a collection). We immediately began sorting through the

loose music, and set aside any remaining photocopies. This left us with a rather large stack of music (with sometimes up to 5 pieces being identical), countless single copies of music, and one pile of music waiting to be neatly filed. This technique was repeated until all the loose boxes had been separated into the 2 new piles.

The right side of the closet was dedicated to all new music collections (being songs that we had 10 original copies of that were previously uncategorized). They were filed alphabetically, neatly, and in plain sight with a note denoting their place and purpose for future library users.

This still left us with a rather large stack of what was now deemed to be unusable or unwanted music. We decided to neatly box these pieces, giving each its own folder and label, and sorting them again by composer. The boxes were placed on the lower left side of the closet, again with a note denoting their place and purpose. With the library finally sorted, and showing small semblances of order, we then took to the real task of our project, updating and assessing the WPI Music Library online.

Around this time we were introduced to our Sufficiency helper, Paul. Paul was a senior, and was tasked with entering 100 (of the about 150 songs), taking the most tedious part of the project out of our hands, or so we thought. As it is the purpose of this project and paper to assess the WPI Music Library online, I will preface what is to follow by saying we had problems every step of the way.

## **Music and Computers**

### *First Impressions*

First, we were introduced to the system. In theory, it is an offshoot of the WPI Music Library, put up as template for another student's IQP. At a first glance, the system

is flawless. It has a very friendly GUI (graphical user interface), clear labeling for all expected data peripherals, and the ability to sort the entire library by any of the peripherals it requests upon entry. Login was simple, access was easy, and being supported on the WPI backbone meant we had permanent backups and no fail entry, or so we thought.

Before addressing any of the numerous problems we ran into or found in our analysis, a simple analysis of the GUI revealed a number of things that we were not fans of. While the database does not require you to fill in all of the fields, in fact you can fill in as few as you want, some of the information it asks for would almost never, if ever be beneficial to a music library. The two most glaring examples were composer's birthday, and composers "death day". This is the type of information Google was invented for, and has no place in this library. We can't begin to imagine what kind of search would require me to want to know when Beethoven died; we would think that the much more pertinent date of publication would tell us all we would need to know for any timeframe restriction I may be trying to work within.

### *Problems*

The next problem was the way some of the fields, specifically the length of the piece, were asked for. The database asks for the length of the song, however, actual music pieces do not come with a total run time at the top; they come with measures and notes. This means that EVERY single piece must be hand counted for measure, multiplied by the type of the note, and then guesstimated for an approximate value of the piece's length. This is tedious, monotonous, and arbitrary at best when it comes to the value obtained. A much simpler system would be to just count the measures and denote

the type of note. This way, people could sort by measure length, or by note, and get an entirely accurate, and USEFUL piece of information, as opposed to our guesswork and horrible counting.

The next problem we encountered was with accessing the library itself online. First, we had issues even logging in. The system would not accept our username or password. This was quickly remedied by the original programmer, but was just a foreshadowing of problems to come.

The library, stationed on a computer in the tower of Alden Hall, began refusing outside connections. This cut its utility about tenfold, as we now had to march into Alden Hall, up into the tower, and could only view the library from its central computer. Though it was still working, the purpose of the library was that it could be viewed from anyone who had the proper login info. It was of little to no use if anytime we wanted to look up something, because we had to hope that Alden Hall was open and that Professor Delorey's office was open to access the tower.

This problem put a severe hindrance on not only our ability to assess the system, but our ability to complete the project. Our sufficiency partner Paul could not enter music into the system, nor could we assist him. We were forced predominantly to enter the music into a homemade excel file, to be added into the database at a later date. Again, the database was not functioning as it was intended, and while Excel was an effective stopgap, it should not have been necessary, and made us question the usefulness of the database going forward.

## **Fixing the machine**

### *Efficiency and utility*

With problems evident, concerns expressed, and our frustrations mounting, we took to coming up with suggestions on how to deal with the situation. First and most prominent was to just do away with the system as we knew it, and start from square one. The conventional method of thinking told us that we'd had problems with it on three different fronts, at its functionality, its presentation, and its overall accessibility. It seemed logical that no matter what type of new database we might suggest or try maintaining, the problems it would present could not be worse than what we were facing at this moment.

However, starting from square one was not an option, and we took to trying to formulate suggestions for how to "save" as it would be the current database. We first wanted to address its accessibility. If the server couldn't be accessed remotely, it was of no use to anyone: people dissecting the database, or people hoping to find out when Beethoven wrote his 2<sup>nd</sup> symphony. One of the chief ways we thought to do this would be to have the server independent, or at least, hosted secondary, off the campus backbone. As it was going to be used predominantly by people at WPI and on the network, it was of no use to us if the network was down, refusing connections, or even if the wireless was acting up. Hosting it on a second database in someone's basement on a stable internet would give us a secondary avenue to deal with the connectivity and network issues that plague the WPI intranet on a daily basis. This would be quite simple, as the files could literally be copied and pasted from the current database, and just put on another computer

under a different URL, and say, once a week could be synced up to match each other in the even the off campus database was updated in the absence of the on campus library.

Secondly, we wanted to address interface. The way the fields were presented in the database's prompt for data entry were acceptable, but we really thought the utility of the database could be improved by, as we mentioned above, removing some of the more useless fields, such as composers' birth/death dates. This would not only mean less data to store (which means more room for more data in the long term), but would mean less data to be entered per song, speeding up the entire process of cataloguing the library, a definite plus.

With the needless fields gone, we wanted to address the overall look and function of the database. We thought making some of the fields required fields for entry would be a very good idea. These would be the main fields, such as title, composer, and publication date: the bare essentials. This way, every song in the database is guaranteed to have these few fields in common, so a sorting of the database for one of these crucial (and often the field chosen to sort by) data pieces would net us the most efficient and utilizable assortment possible. Another possible field to add would be the approximate number of copies of the pieces in the box. Some had as few as one (which of course were removed) while others had up to thirty. This of course would have to be updated periodically, but may be worth it given the current state of disarray.

As mentioned above, we'd really like to see fields added to take into account the fact that the music has no start/stop time on it. One possibility would be adding a calculator feature to the song length prompt, where upon clicking on the field, a window prompt is loaded and asks you for the number of measures and type of note. This way, if

the guesswork and number crunching is being done, it's being done by a machine that's accurate to some absurd decimal place number I can't even fathom. This would not only help make the system a little more user friendly, but it would also make sure length was added accurately, and not just skipped altogether (as it was with many of the songs added previously to the database).

The last idea was to actually purchase a working music library. Now, the fact that this is entirely against the purpose of the project, doesn't address any of the problems with the current system, and isn't conducive at all to learning aside, it would be a great idea for us to see what makes a functioning product work. We could essentially beta test the working library, see what we liked and didn't like, what worked and what didn't, and bring it back to our original programmer. This type of feedback would be of the highest value to our programmer, and would help us design a cost effective, and working model for our system.

We worked only with women's music for our project, but our hopes are that it could be continued by another group to include the men's and mixed choral music. Then we would have a complete and efficient system for the whole of the WPI music library. Perhaps even at some point in the future it could be further expanded to include music from the various instrumental groups on campus. This would be quite a feat, to have every single piece of music in Alden Hall categorized and organized, as opposed to the four plus closets filled with random pieces shoved in haphazardly. One can only imagine the ease of use and improvement of the officer position of librarian (which we have to beg people to run for, in all music groups on campus).

### *Period and selection*

The majority of the music entered was four part traditional gospel. A large selection of the pieces were two part traditional gospel. There were a few seasonal (mainly Christmas) pieces, designed for both two and four part choruses. An occasional piece was contemporary for a two or four part chorus. The lengths of the pieces ranged from one minute to seventeen, with the majority falling within the three to five minute range. The time periods from which the pieces were from were widely varied, with some composed as early as 1523 (not original copies of course) and as recently as 1997. Most of them are written in English, with several in Latin, and a sprinkling of other languages such as Spanish and Italian.

It is our suggestion that to the selection of music more modern/contemporary pieces be added to widen the variety. More secular pieces should be added as well, because probably 97% of the library is Christian (which is expected given the history of choral music), but since WPI is not a religiously affiliated school it would be a refreshing change to see more variety. Perhaps even the Major Qualifying Projects of students could be submitted given they are of performance quality.

### **Suggestions**

#### *Changes*

The amount of time it took to enter the music was difficult to measure, especially since we had a student doing his sufficiency working with us (he had to enter 100 pieces of music). It took several hours to enter the selection we had for our project, with most of the time spent calculating the duration of each piece, which as mentioned before was very tedious and time consuming. The biggest “problems” occurred when no measure counts

were given, and we had to count each individual measure, up to six pages, to get the total. It also made it difficult when the count changed partway through the piece from 4/4 to another one. This required that even more time be spent on calculating the duration.

Currently, all the closets containing music are unlocked and everyone has access. It would be beneficial for them to be locked and keys be given only to those who have been properly instructed on the usage of the categorizing system. This would be best to ensure that once it eventually gets organized and catalogued, it stays that way. Plus, it would lessen (and even eliminate) the already slim chance of having expensive works of music go “missing.”

The copying of music also needs to be regulated. There were as many photocopied pieces of music as legitimate ones, if not more. These were just thrown into boxes and on the floor for some poor soul to sort out (us). It is understandable that there are times that there aren't enough copies of music for everyone in the chorus to use—which happens more times than I can count given the growing size of our festival chorus, but the copies shouldn't be just shoved into a corner hoping they will never be needed again. Chances are, if they were used once, they will be needed again. As much as copying music is prohibited, if it has to happen, they copies should at least be organized and have their readability maintained.

Overall this project proved to be quite a unique experience. When the basis of our entire project, the beta testing of the library software, failed to work we were forced to come up with a creative solution. Our solution worked, although it was not the exact outcome we expected. There are still a large number of pieces that have to be entered into the currently non-functional software, but that could be left to another IQP group to

do. We do at least have all of the data necessary to enter in an Excel document, which is a big step ahead of what there was before. There is no longer a huge mess of everything in the closet or pieces with just one or two copies (certainly not enough to be considered a collection) in a box. We feel that we have contributed greatly to the improving of the music library at WPI (or at least the Woman's choral music library), and our hopes are that others will continue to utilize and improve upon the system we helped establish. Upon completing this project we have a newfound respect and awe for those who helped work on libraries, specifically music ones, at places exponentially larger than the small closet in Alden, such as the National Music Library.