

# UNIVERSITY OF **South Carolina** Music Learning Application

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Software Requirements Specification



CSCE 247: Software Engineering

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## **The Seat Hermits:**

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# 1. Introduction

## Purpose

Many people would want to know how to play an instrument, but they may struggle with understanding how to play or even don't know where to start when it comes to learning. In a survey of 3,000 people, 326 have self-taught themselves how to play either the electric guitar, bass, and piano, along with drums. On the other hand, 112 have done lessons to learn these instruments. With our system, we will be able to allow people to learn more on their own accord. But also, we will allow teachers to provide an easier method to being able to teach students how to read and play music.

## Scope

The system is an application that allows the user to use an instrument and play songs that can help with learning how to play that instrument. The application shall, also, have a mode where the user may create songs themselves and will see a visual input of each key. Our plan is to ultimately solve the issue when it comes to teaching or learning an easier way to read, understand, and play music.

Source: [Younger Americans are increasingly exposed to playing music and a wider range of instruments](#)

# 2. Stakeholders

- Schools
  - Elementary Schools
  - Middle Schools
  - High Schools
  - Students
  - Teachers
- Homes
  - Children
  - Parents
- Individual Instrument Instructors
- Aspiring Musicians

## Personas



**Age:** 15  
**Occupation:** N/A  
**Location:** Fort Mill, NC  
**Salary:** N/A  
**Education:** High School

### Personality



### Motivations



## Jack Warden

### Bio:

Jack Warden is a sophomore in high school at Fort Mill High School. His favorite subject is English and he does no extracurricular activities. Warden enjoys spending time at home with his brother, parents, and two dogs. He is typically home alone on week days for 2-3 hours. He enjoys listening to music during times when he's completing his homework or when he's alone.

### Technological Proficiency:

Warden has access to a phone and knows the ins and outs. He knows how to change most of the settings on his TV for the best watching experience. Sometimes Warden will play on his laptop but still has to look stuff up in order to configure the settings on his computer.

### Musical Experience:

Warden had only previously used an instrument during his music class in 2nd grade at Fort Mill Elementary. He was taught how to play the recorder, but had since forgotten. Warden's family has never learned and instruments.

**Goals:** Warden's goal during high school and moving forward is to learn the piano. He wants to first learn how to play the Halloween theme or even the Jaws theme to surprise his dad.

**Needs:** Warden needs access to an application that would allow him to learn how to read sheet music will still learning the basics on how to play a piano. He has no access to an actual piano.

**Hobbies:** Warden enjoys watching older movies with his dad; his favorite movie being Halloween. He, also, enjoys reading and has a slight interest in older books with difficult writing styles.

**Frustrations:** Warden doesn't like not having something to do and wants to keep his brain occupied. Most of his free time comes during the week when his brother is doing sports and his parents are still at work.



**Age:** 72

**Occupation:** Retired

**Location:** Albany, NY

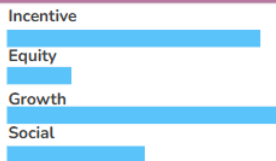
**Salary:** \$55,700

**Education:** Bachelor's Degree

### Personality



### Motivations



# Louis Taylor

## Bio:

Louis is a retired high-school math teacher recently diagnosed with Alzheimer's. He was told learning an instrument can be a good way of maintaining memory so he wants to try learning piano. He just doesn't know quite where to start.

## Technological Proficiency:

Has enough experience to pay for bills online and do other life stuff but not much technical knowledge outside of that.

## Musical Experience:

Has been listening to music for most of his life but has never previously tried to learn an instrument. Doesn't know how to read music either.

## Goals:

- To prevent memory loss
- To be able to playing songs for family
- Always looking to expand his repertoire

## Needs:

- To be kept on a steady schedule
- To achieve piano proficiency
- Something to keep his mind busy, since he doesn't have a job

## Hobbies:

- Gardening
- Listening to music
- Painting with his kids

## Frustrations:

- He might not have the money to afford a piano and a teacher regularly
- His family has ever less time to spend with him
- Deteriorating vision

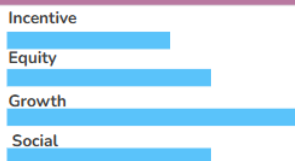


**Age:** 17  
**Occupation:** Student  
**Location:** Lansing, MI  
**Salary:** \$0  
**Education:** High School

### Personality



### Motivations



# Jess Holford

## Bio:

Jess is has been obsessed with music from a very young age. She is a longtime pianist currently applying to a college music program. In addition to implementing music into almost all of her everyday activities, she wants to try branching out to some new ones.

## Technological Proficiency:

Is well used to using phone in daily life. Is digitally literate but doesn't know a PC inside and out. Average high school student's proficiency.

## Musical Experience:

Been playing piano since the age of four. High competency but not quite mastery. Already knows how to read notes and scales etc.

## Goals:

- Learn 3 new instruments
- Strengthen piano abilities
- Gain connections in the musical space

## Needs:

- Access to music to listen to while doing assignments
- Something that will correct her when making mistakes
- Regular performance benchmarks

## Hobbies:

- Listening to/playing music
- Drawing
- Reading books

## Frustrations:

- Schoolwork leaving no time for hobbies
- Frequent encouragement to get a job
- Can't afford any new instruments



**Age:** 39

**Occupation:** Middle School Music Teacher

**Location:** Philadelphia, PA

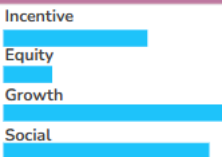
**Salary:** \$70,000

**Education:** Bachelor's in Music Education

### Personality



### Motivations



# Lauren Rhodes

## Bio:

Lauren is a music teacher at Lincoln Middle School. She fell in love with classical music as a young teen and jazz not long after. While she loved the community she found around music, she noticed it was dwindling and not taken very seriously from the outside. She became a teacher in hopes of changing this.

## Technological Proficiency:

Lauren regularly uses sheet music software to transpose and write music. She uses Windows and knows how to navigate folders, extract .zip files, etc.

## Musical Experience:

Lauren has extensive musical experience, from arranging pieces and performing in string quartets to teaching the basics to her students. She is proficient in several instruments, but her favorite is the cello.

## Goals:

- Spreading enthusiasm for playing and performing music
- Teaching a range from very easy to intermediate melodies

## Needs:

- Skills learned from the software to transfer to real instruments
- Students to be able to continue using the software on their own
- Software to be free for her students

## Hobbies:

- Music Composition
- Landscape Photography
- Baking

## Frustrations:

- Music being seen as unnecessary in education
- Traffic
- People saying nuclear as "noocular"

### 3. Constraints

The constraints on our project are categorized as time, monetary, and software constraints.

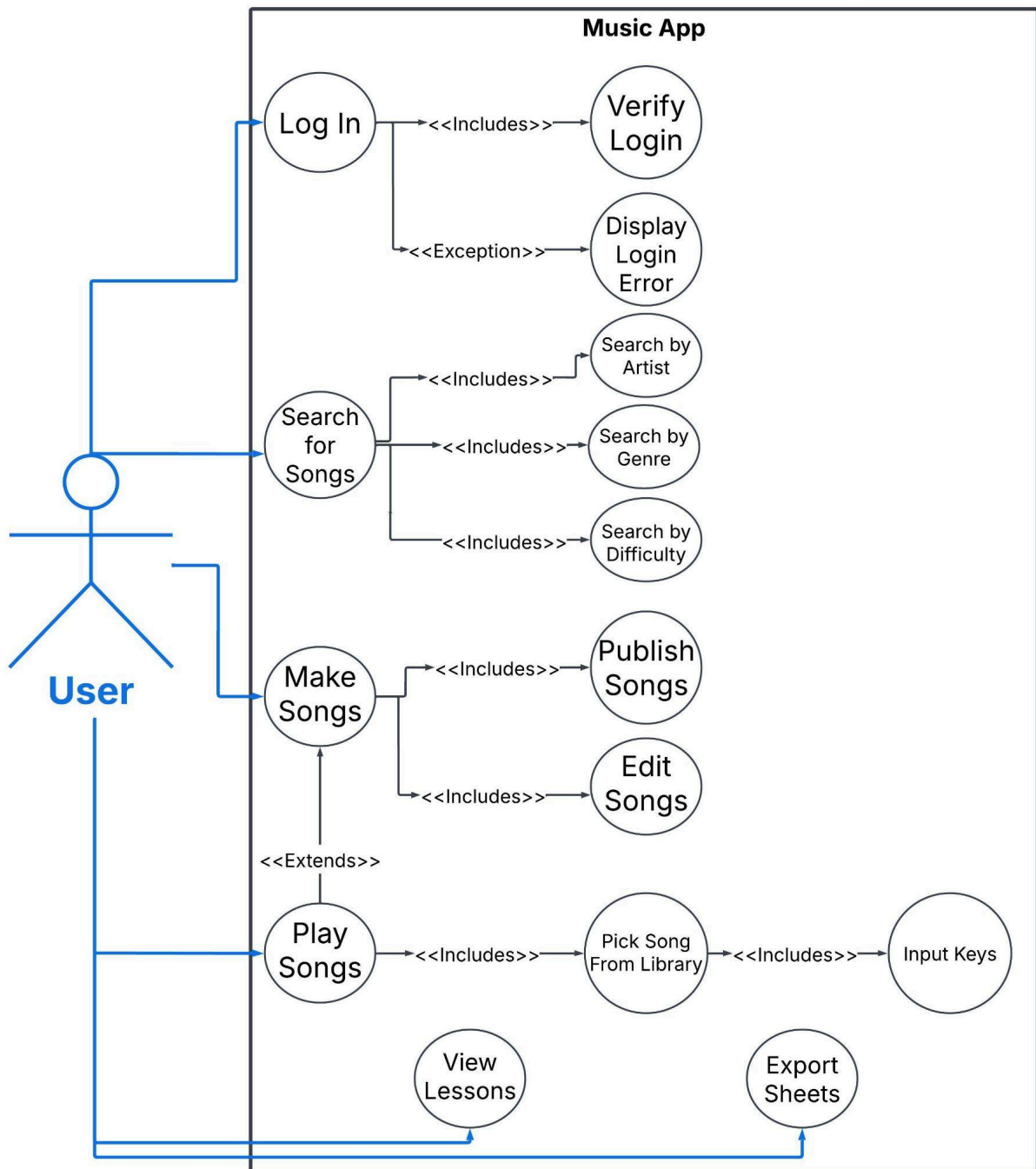
- Time constraint included in this project is the allotted time for the project to be developed in:
  - 2 weeks.
- Monetary constraint included in this project is the allotted budget for the system:
  - \$0.
- Software constraints included in this project is the coding language and the device the system is used on:
  - Must be developed in Java.
  - Must be accessible on computers.

### 4. Overall Description

The application must be accessible from both personal and school computers. The application will collect data to save progress for songs played or the creation of new songs. The user will be able to print sheets of tabs and create new sheets of tabs. The user, also, will be able to play a range of difficulty of songs as to test or refine their skills. The application will allow for there to be visual input for whichever corresponding key is pressed; this can be turned off.



## 5. Business Use Cases



## 6. Functional Requirements

[Functional Requirements Spreadsheet](#)

## 7. Non Functional Requirements

### UI Requirements

- The user shall easily navigate and engage with each mode of the system.

### Usability Requirements

- The system shall offer usability for users with a wide range of musical knowledge.
- The system shall focus primarily on beginner and intermediate concepts.

### Performance Requirements

- The system shall run on computers such as PCs and laptops.

### Maintainability and Support Requirements

- The system shall run on Windows, Mac, and Linux systems.

### Security Requirements

- The user shall toggle their account and each of their songs between private (default) and public.

### Legal Requirements

- The system shall adhere to all applicable laws, including copyright.

## 9. Competitive Analysis

	Rocksmith
Strengths	<p>Game-ified user interface. The screen while learning or playing a song simultaneously resembles guitar tabs and rhythm game “highways” like those seen in Guitar Hero. This allows for an impressively high amount of information to be communicated with minimal visual clutter. Sheet music is also an option for the piano.</p> <p>Multi platform. The software was released on multiple game systems as well as Windows.</p>

	Multiple instruments. Rocksmith has options to learn and play guitar, bass, and piano.
Weaknesses	<p>Requires a real instrument and specific wiring equipment. While the software did offer bundles with these necessities, such bundles heavily increased the cost and barrier to entry.</p> <p>Difficulty adjusts automatically, simplifying songs to adjust for poor performance. While this is nice to have as a feature, it cannot be turned off as an option and may frustrate users who want to “get it right” even if it means starting out sloppy.</p> <p>Limited “setlist” with no option to add or create additional songs. Though there is a spread of difficulties to choose from, the genres in the software are largely limited to rock.</p>
Demographic	This software is primarily aimed at an audience that lies at an intersection between video game enthusiasts and fans of music, especially rock. There is more of a lean toward the musical side with its emphasis on learning to play real instruments.

	<b>Yousician</b>
Strengths	<p>User statistics are tracked. This allows users to look back at their progress and identify areas that can be improved.</p> <p>Targeted lessons. Yousician provides lessons designed to teach specific techniques, which is especially helpful at a beginner level.</p> <p>Multiple instruments. Lessons are provided for guitar, bass, piano, ukulele, and singing.</p> <p>Available as an app on many mobile devices. This makes the software very accessible as a jumping off point.</p>

Weaknesses	<p>“Freemium” payment plan. Without paying a subscription, the service is heavily restricted to a daily limit on lessons. Accounts can be shared across devices, but individual progress is not tracked. There is a family plan, but it can only include up to 3 non-paying members. While less of an issue for individuals or small families, this severely limits its viability in a classroom setting.</p> <p>Focus restricted to the basics. Some lessons cover more difficult pieces of music, but the majority are intended for beginners and advanced techniques don’t receive much focus.</p> <p>Removal of user generated content. The app used to allow users to create and upload their own songs to share with other users, but years ago this was removed.</p> <p>Real instruments required. This increases the barrier to entry.</p>
Demographic	<p>This software is mainly directed at individuals looking to learn or improve their musical playing fundamentals.</p>

	<b>GarageBand</b>
Strengths	<p>Ability to arrange new music. This can be accomplished with provided synths or recording audio from one’s own instruments.</p> <p>Lessons included on how to play specific songs. These are taught by the musicians that wrote the music. This provides insight into the approach taken to write and perform successful music and can be exciting for fans of the artists featured.</p>

	Files can be shared between users. This allows for collaboration and remixing of others' work as well as potentially seeing how music is put together in the software.
Weaknesses	<p>Very open ended experience. While this can be freeing to more experienced users, there is a lack of guidance for those who might appreciate it.</p> <p>Limited compatibility with MIDI format. This means some electronic instruments will lack full functionality when connected for use with the software.</p> <p>Only available on Apple devices. While such devices are very widely used, not everybody already has them and they are quite expensive, leading to the software being very accessible for some, but highly inaccessible for others.</p>
Demographic	Primarily those interested in creating music or playing around with various synth sounds

## Summary

	Strengths	Weaknesses	Focus
Rocksmith	+solid interface +good difficulty spread	-limited song choice -no focus on creating	Learning to play full songs
Yousician	+very accessible to start +specific focus on lessons to	-restrictive subscription model -no focus on	Learning the basics

	improve	creating	
GarageBand	+shared content +focus on creating	-limited device accessibility -little focus on learning to play	Music composition

Through analysis of the competing softwares shown above, we have been able to narrow our focus on which shortcomings to avoid. Many music education softwares fail to focus both on learning to play instruments and to write and share music; much of the time, attention is paid only to one, and at a specific skill level as well. This makes sense from a perspective of seeking the most utility for a specific situation, but we seek to make our software a good tool for music learning holistically. It may be better supplemented by a teacher or independent learning, but it will hopefully remain useful for many people for a long time as they learn and improve.