

Software Engineering Music Application

University of South Carolina

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Software Requirements Specification

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1. Introduction

Purpose:

Music is largely considered one of the *universal languages* of the world. However, like any good skill, it takes a large amount of practice and study to learn, especially when it comes to playing an instrument. This can be a long, tedious, and even painful experience for both students and teachers. We want to change this and create a fun and engaging platform for music teachers to build and develop lessons for their students. With a simple interface the application is equipped with **composing** and **learning** modes. Users will be able to learn from a pre-built library or songs from lessons that teachers create and assign to students. We hope to mix both learning and a game-like sense of play into a single app.

Scope:

This document will cover:


- A basic outline of the project
- Personas of potential users & stakeholders
- Constraints
- Business use cases
- Functional and nonfunctional requirements
- Analysis of similar, competing apps

2. Stakeholders

- Anyone who wants to learn music (end user)
 - Beginner, intermediate, and experienced students
 - Students who wish to compose songs
- Anyone who wants to teach music (end user)
 - Composing songs
 - Assigning lessons to students
- Administrators of the app (owners)
 - Updating music
- Developers of the app (owners)
 - App enhancements
 - New in-app game development
 - New instruments

Persona 1

Ella



AGE	27
EDUCATION	Masters in Business
OCCUPATION	Sales Manager
LOCATION	Columbia, SC
MUSIC SKILL	Novice

Personality

Introvert

Thinker

Spender

Tech-savy

Bio

Ella is a 27-year-old music enthusiast looking to enhance her skills as a beginner guitarist. She is passionate about music but struggles to find the right resources that cater to her learning pace. She has tried free online tutorials and purchased a few books, but they leave her feeling confused and unmotivated. Ella is searching for a solution that can provide her with structured lessons and techniques.








Goal

- Ella wants to become a confident guitarist who can play her favorite songs. She aims to develop her skills through structured lessons that adapt to her pace, ultimately leading her to play in front of friends and family.



Frustrations

- Feeling lost among countless free resources and tutorials that don't provide a clear path.
- Frustration when attempting to learn but not seeing improvement making her question her abilities.
- Wasting money on materials that don't meet her needs or enhance her skills.

Brands





Payment medium



Cash/Cheque

Digital Payment

Platform




Website

Mobile App

Persona 2

Liam



AGE	29
EDUCATION	Some College
OCCUPATION	Independent Musician
LOCATION	Austin, TX
MUSIC SKILL	Advanced

Personality

Creative

Extrovert

Thrifty

Tech-savy

Bio

Liam is a passionate musician in his late 20s who has dedicated years to honing his craft. He is ready to take the next step in his music career by submitting his original tracks but feels overwhelmed by the complexities of managing submissions and navigating platforms. Despite having advanced skills, he struggles with translating his artistry into successful submissions.





Goal

- Liam wants to successfully submit his music to the right platforms so he can build an audience and connect with industry professionals. His ultimate aim is to get his tracks featured and promoted widely, turning his passion into a viable career.



Frustrations

- Feeling frustrated by the lack of clear guidelines on music submission processes.
- Wasting time submitting to the wrong platforms without getting feedback or results.
- Anxiety about his music not being heard or appreciated due to poor submission strategies.

Brands





Payment medium



Cash/Cheque

Digital Payment

Platform




Website

Mobile App

Persona 3

Emily



AGE	16
EDUCATION	High School
OCCUPATION	Student
LOCATION	Seattle, WA
MUSIC SKILL	Intermediate

Personality

Creative

Extrovert

Thrifty

Tech-savy

Bio

Emily is a 16-year-old high school student who dreams of forming a band with fellow musicians. She feels isolated in her musical aspirations as none of her friends share the same passion for creating music. She often experiments alone, using her music app to learn songs and practice, but finds it challenging to connect with other budding musicians who share her enthusiasm.






Goal

- Emily wants to connect with other musicians who are equally passionate about creating music. She envisions forming a band, collaborating on original songs, and performing at local venues, turning her dream into reality.



Frustrations

- Feeling lonely in her passion for music
- Missing out on opportunities to collaborate and grow musically
- Worrying that she will never achieve her dream of being in a band

Brands





Payment medium



Cash/Cheque Digital Payment

Platform



Website Mobile App

3. Constraints

Resources:

- **Budget:** Project budget of \$0.
- **Licenses:** No funding available for paid licenses, resources must be free or open source.
- **Team:** Development team only consists of 4 members:

Project Manager: Terdoo Achu

Designer: Allan Paiz

Developer: Edwin Wood

Musician: Jay Chubb

- **Time:** This project must be completed no later than *April 27th 2025, 11:59 PM.*
- **Workspace:** The development team has no dedicated workspace.

Technology:

- **Language:** The codebase will be written in Java.
- **Accessibility:** The application must compile and run on laptops & PCs.
- **Source Control:** The team must use Git and GitHub for source control.

External:

- **Team:** Development team has other commitments, e.g. school, work, home, limiting the overall work hours available.
- **Knowledge:** Development team consists of university students, constraining complexity and client deliverables.

4. Overall Description

Our music application is designed to provide an accessible platform for users to compose, play, and learn music. Built with cross-platform compatibility the application will function on commonly used hardware and software systems. The application will function on both laptops and PCs, supporting a broad range of devices accessible to the majority of users. It is developed in Java, ensuring maximum performance across various operating systems, including Windows, macOS, and Linux. Git and GitHub will be used during development, facilitating efficient collaboration and version control within the team. The system's architecture will ensure a scalable and efficient operation, meeting the demands of a dynamic user base.

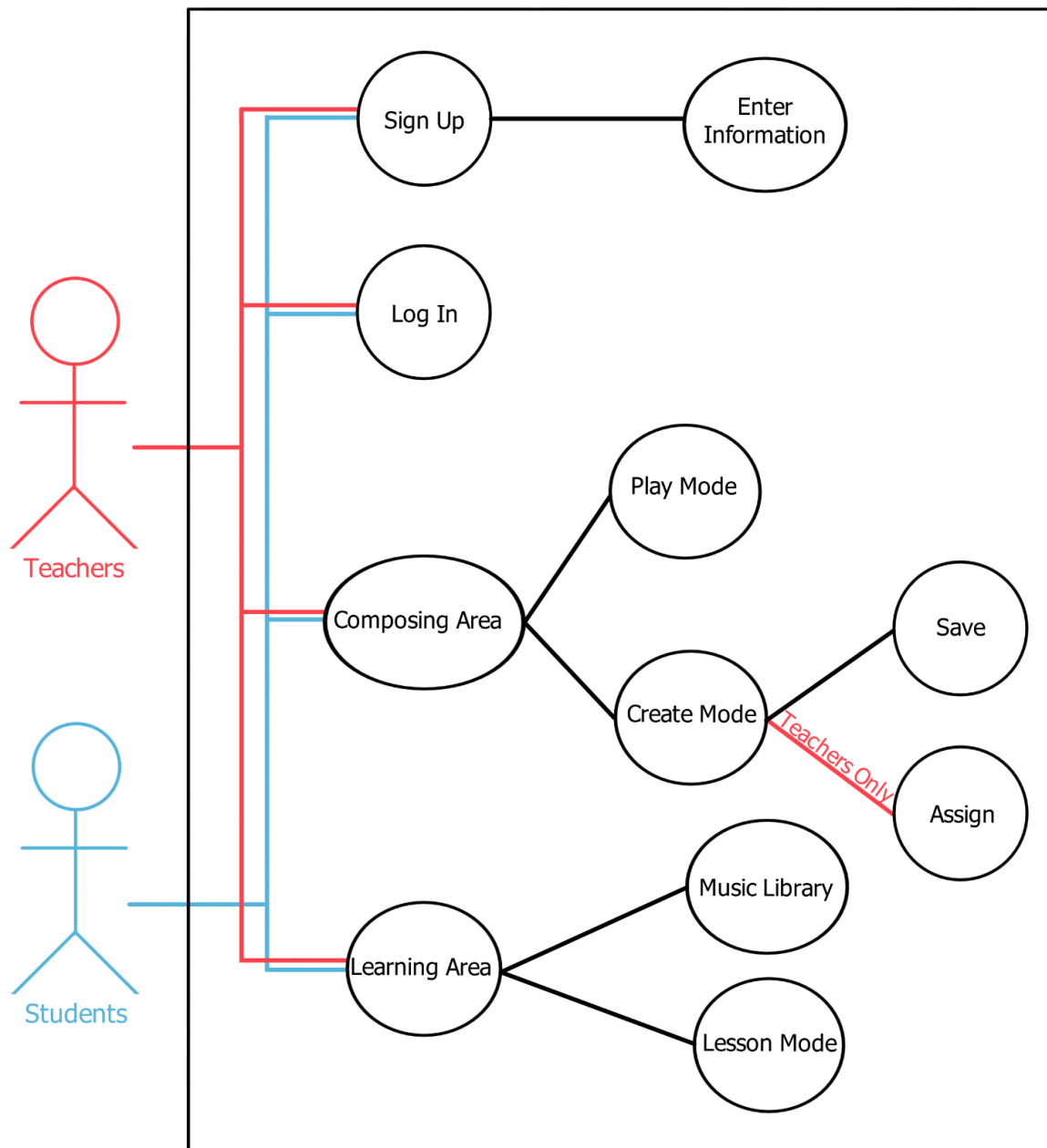
The system will have distinct account creation processes for students and teachers, personalized profiles, and progress tracking. The system and all users will have access to all songs, default library, and both composing and learning modes. Students and teachers will have distinct functionalities within the application, including class management, lesson assignments, and structured learning paths.

The app will have access to an interactive composing environment. Users will have a methodical approach to music composition by using a structure of notes and measures. Users will have the ability to arrange notes, adjust pitch, and change the timing to build full compositions. The app will interface with text files for importing and exporting user composed songs.

The app will also include a dedicated learning area, where students can access lessons, by exploring assigned songs or pre-loaded libraries. Teachers will have the ability to create classes, assign songs, and review students' progress.

By integrating these core components, our music application will provide a dynamic and user-friendly ecosystem for students, teachers, and music enthusiasts alike, reinforcing their musical journey through interactive learning and creative composition.

5. Business Use Cases



6. Functional Requirements

Requirements Document

- [Functional Requirements](#)

7. Non-Functional Requirements

Look and Feel Requirements

- The User interface of the system shall be simple, intuitive and visually appealing ensuring a positive user interface

Usability Requirements

- The system shall be accessible to users with varying levels of technical expertise, from novice to advanced musicians.

Performance Requirements

- The system shall be able to run smoothly on laptops and PCs, with minimal latency during music playback, high quality audio and recording.

Maintainability and Support Requirements

- The system shall be developed in Java, ensuring compatibility across Windows, macOS, and Linux operating systems.

Security Requirements

- Secure storage of user data, compliance with data protection laws, and secure login mechanisms.

Cultural Requirements

- The app shall be culturally inclusive, supporting a wide range of musical genres and styles to appeal to a diverse user base.

Legal Requirements

- The app shall comply with all state, local, and international laws regarding music licensing, copyright, and intellectual property.

9. Competitive Analysis

APP 1:

Site: [Ultimate Guitar](#)

Audience/Focus:

Online website that publishes user and official tabs of popular songs. There are courses, songbooks, and forums, but the main focus is the access to the song tabs. The target audience is anyone that wants to learn how to play a popular song or learn how to play an instrument through their courses.

Strengths:

The website has quick access to hundreds of songs, providing a wide range of genre and song popularities. The public versions have a simple template, so you know where to look for the information you are after. When you find a song you want to practice you can see the song chords, strumming patterns, bpm, lyrics, etc. Users can submit and develop their own rendition of songs, and the community can help refine the songs through the comment section. There are different options for instruments like Ukulele, Guitar, and Piano.

Weaknesses:

Without a paid subscription/membership, free users are limited as to what they can access, for instance you cannot see the 'Official Versions' as a free user. Also, free users only see the basic information, they do not have access to the video play alongs or the back track audio. All users must have some basic guitar knowledge, the website can be overwhelming for complete beginners. The chords are displayed at the top of the page, there is a mouse hover feature, but you must move your mouse to each chord, this is not helpful for a user that has not memorized the chords.

APP 2:

Site: [Piano Tiles](#)

Audience/Focus:

Piano Tiles is a rhythm based mobile game targeting casual gamers and music enthusiasts of all ages. The primary focus is on providing a fast-paced and entertaining experience through music, where users tap black tiles in sync with songs to create a satisfying and rhythmic melody. It targets individuals interested in a fun, rhythm-based challenge rather than skill-building in music. The app appeals to those seeking a quick, fun, and addictive way to engage with music.

Strengths:

- **Simple and Intuitive Gameplay:** The straightforward mechanics make it accessible to users of all ages and skill levels.
- **Addictive Design:** The increasing speed and complexity of levels keep users engaged.
- **Wide Song Library:** Includes a variety of songs, ranging from classical to contemporary music, giving users options for different tastes.
- **Offline Play:** Users can play the game without an internet connection, which increases usability and convenience.
- **Visually Appealing Design:** Clean and vibrant interface enhances user experience.
- **Global Leaderboard:** Competitive elements encourage players to improve their scores and compete with others worldwide.

Weaknesses:

- **Lack of Depth:** The game does not offer advanced or meaningful progression for serious musicians or learners.
- **Limited Learning Opportunities:** While it uses music, it does not teach users how to play real instruments or read music.
- **Monetization Barriers:** Ads and in-app purchases can disrupt the user experience, especially for free tier users.
- **Repetitive Gameplay:** The lack of variation in mechanics may lead to reduced long-term engagement for some users.

APP 3:

Site: [Yousician](#)

Strengths:

- **Audio recognition:** Uses the device's microphone to provide real-time feedback on accuracy and timing
- **Interactive tutorials:** Step-by-step videos that guide users through each lesson
- **Song library:** Includes popular songs from artists like Metallica, Jason Mraz, and Juanes
- **Weekly challenges:** Users can compete with friends and other Yousicians worldwide
- **Goals and progress tracking:** Users can earn rewards and level up their skills

Weaknesses:

- **Rigid Lessons:** Yousician's lessons are structured, so users can't choose which songs or skills to learn, or in what order.
- **High Subscription Costs:** \$30 a month or \$140 a year

Audience/Focus:

Yousician is a music education app that teaches users how to play instruments and sing. It offers lessons, exercises, and videos for guitar, bass, ukulele, piano, and voice. Yousician is suitable for self-learning or as a supplement to learning with a teacher. It's designed for people of all ages and experience levels, from beginners to professionals.

Summary

	Strengths	Weaknesses	Focus
Ultimate Guitar	<ul style="list-style-type: none"> + Large library of popular songs + Lots of information about each song + User interaction to add / refine songs + Multiple instruments available 	<ul style="list-style-type: none"> - Limited without subscription (only basic information, user-made tracks, etc) - High subscription cost - Not beginner friendly 	Learning popular songs or playing an instrument
Piano Tiles	<ul style="list-style-type: none"> + Beginner friendly + Large library of songs + Simple, intuitive gameplay + Offline play + Interaction through a global leaderboard 	<ul style="list-style-type: none"> - Contains ads & in-app purchases - Limited difficulty / progression for advanced musicians - Not for learning music / instruments - Repetitive gameplay 	Interactive gameplay with a musical theme
Yousician	<ul style="list-style-type: none"> + Library of songs from popular artists + Step-by-step tutorials for each lesson + User interaction through weekly challenges + Reward system + Live audio recognition 	<ul style="list-style-type: none"> - High subscription cost - Rigid, structured lessons 	Music education for all experience levels

Looking at similar sites available, we can utilize aspects of each to create our project. Ultimate Guitar and Yousician are both for learning to play a variety of instruments, however they focus on two separate groups: beginner musicians vs experienced ones. We aim to combine both experience levels into a single app through combining both styles of learning. For beginner musicians, there will be flexible lessons similar to Yousician, allowing them to follow tutorials as they learn. For more experienced musicians, however, there will be a larger library with a plethora of information, allowing users to pick and choose at their own interest and comfort level.

We also have a focus on making a fun, engaging experience. Piano Tiles and Yousician integrated this through leaderboards, either between friends or global, and a reward system. These are great ideas to encourage users to continue learning and using the app. We would like to do something similar with the global leaderboard.