

Music Assistant Mobile Application

Software Requirements Specification

CSCE 247: Software Engineering

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Status 201

February 2, 2025

Version 1.1

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1. Introduction

Purpose

Many people want to learn to play an instrument, but the process can be intimidating, time-consuming, and inaccessible due to a lack of affordable resources or structured guidance. For this reason, we want to develop a music learning application that makes learning to play an instrument easier and more enjoyable for those who want to become musicians. Our app will give users an interactive platform where they can learn to play instruments like the piano, guitar, and ukulele. It will have visual guides for playing the instrument, scrolling sheet music, and a library of songs that they can customize. With its user-friendly interface and engaging experience, it will be an accessible, affordable, and enjoyable solution for users of all skill levels.

Scope

This document concerns the following:

1. the profiles of the stakeholders and possible users of this project.
2. any limitations that will be applied throughout the application's development.
3. a thorough explanation of the app's features, business use cases, and application.
4. both the application's functional and non-functional requirements.
5. a competitive comparison of similar apps to showcase the value and uniqueness of this product.

2. Stakeholders

- Learning users
 - Novice players
 - Intermediate players
 - Variety-seeking players
- Expert players
- Artists
 - Songwriters
 - Advertisers
 - Music labels

Personas

Figure A



Paul is a full-time college student looking for a hobby to relieve stress. He is extremely frugal and is wary of uninformed upfront costs and microtransactions. He wants to try learning his favorite songs on his trumpet and other borrowed instruments without relying on in-person lessons. He wants an app to easily pick up and play during his free time.

Priorities

- Ease of use
- Free access
- Tutorials
- Difficulty variety

Experience



Instrument Variety



Time Budget



Price Budget



PAUL

Occupation
 University Student

Musical Experience
 Novice Instrumentalist

Age
 22 Years Old

Location
 Lexington, KY

Figure B



Lyn works her full-time job and comes home to relax by practicing on her piano. She took piano lessons as a child and has continued to hone her skills into adulthood. She seeks new and exciting venues to exercise and maintain her high skill level. She has little interest in investing time into learning other instruments.

Priorities

- Complex songs
- Great song variety
- Catering to niche interest
- Ability to replay

Experience



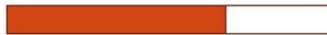
Instrument Variety



Time Budget



Price Budget



LYN

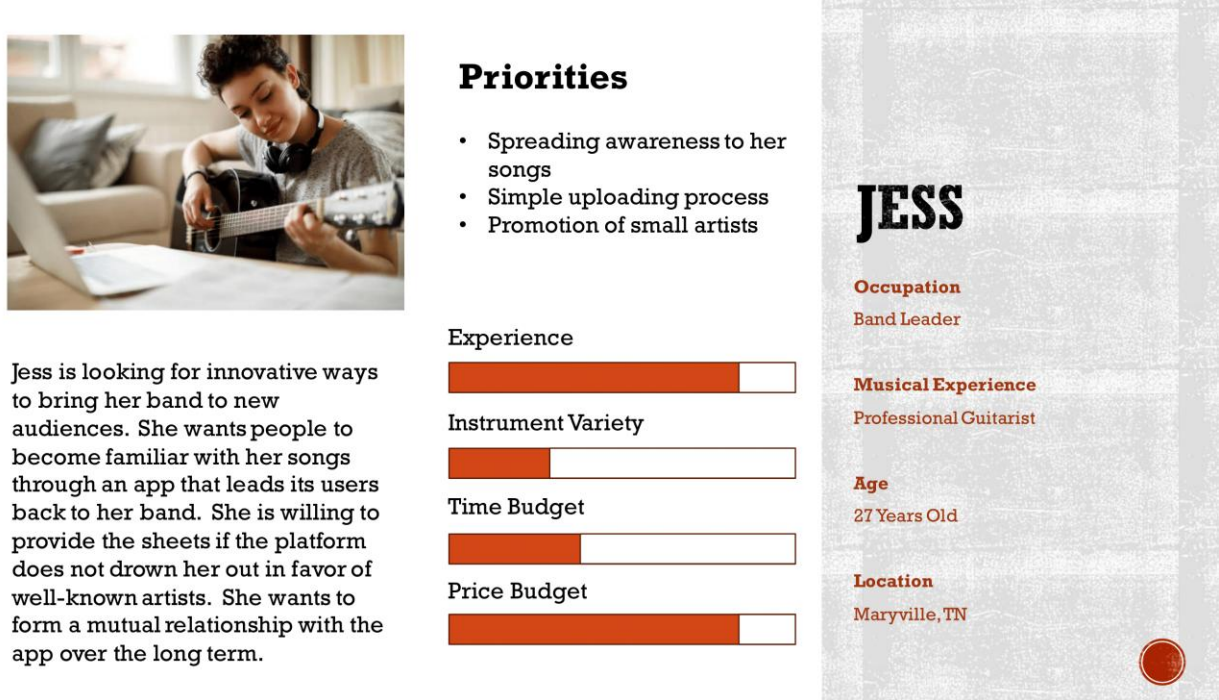
Occupation
 Business Analyst

Musical Experience
 Experienced Pianist

Age
 31 Years Old

Location
 Philadelphia, PA

Figure C



3. Constraints

Workplace Environment Constraints

- The app must be operated fully remotely, requiring team collaboration on online platforms such as GitHub.

Technical Constraints

- The app's backend must be written in Java.
- The app must provide data security and password protection.
- The app must successfully be loadable from the app store for all mobile devices, PCs, and laptops.
- The system must support real-time collaboration on sheet music across multiple users.
- The system must provide a secure password reset process with email verification.

Budget Constraints

- The development process is on a strict zero-dollar budget policy, fully operating on free-to-use sources.

Scheduling Constraints

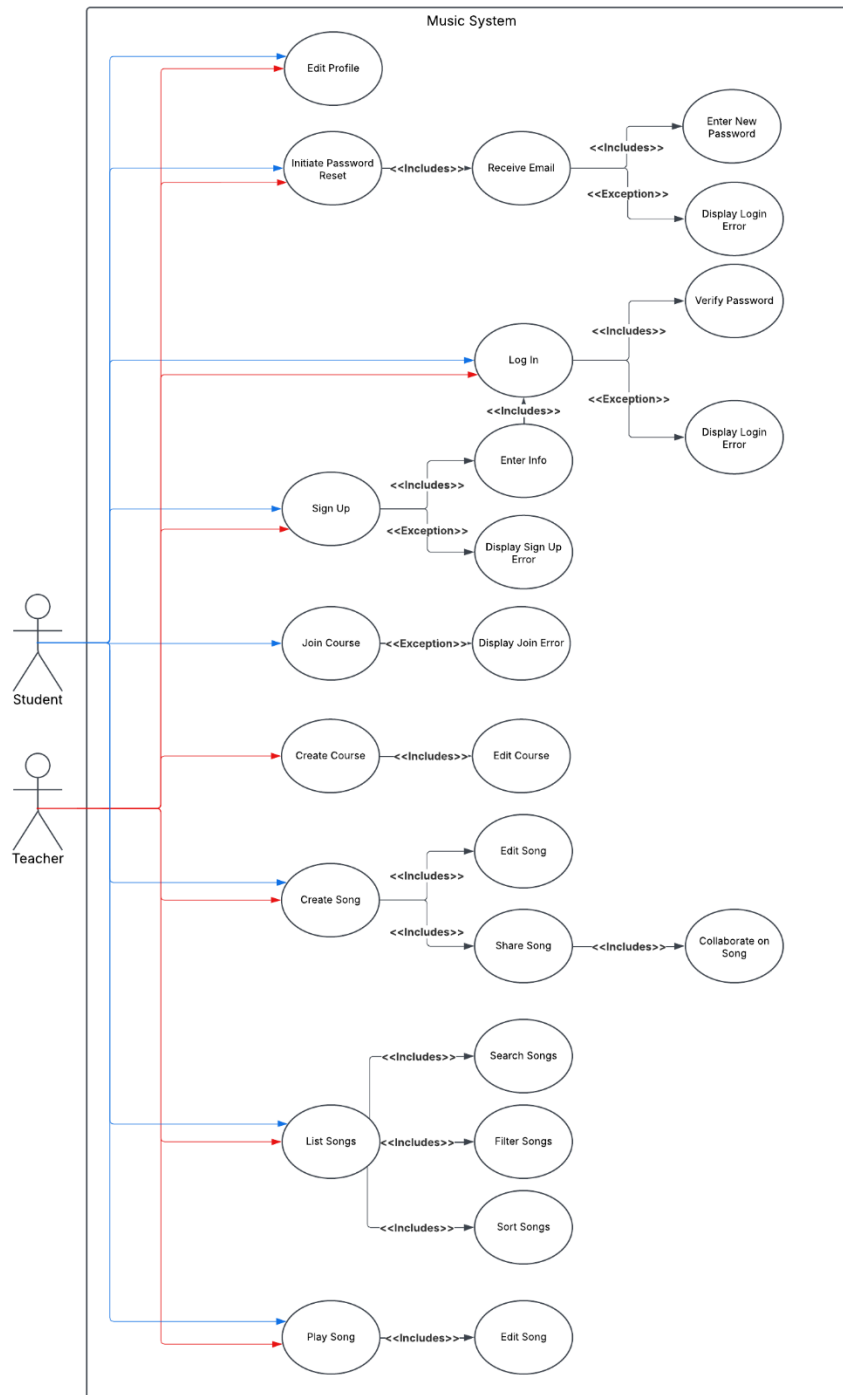
- This project must be fully developed and operating within the timeframe of 3 weeks.
- Leaderboards and social features must be integrated alongside music functionality.

4. Overall Description

The app will be downloaded through the app store and will become fully functional upon signing up with an email and password. Users will gain access to a diverse selection of instruments and songs, tailored to different skill levels ranging from Beginner to Expert. Users will also have the ability to share their songs publicly or keep them private. Additionally, they can invite friends to collaborate on songs in real time. The app provides a guided learning experience, offering step-by-step instructions to help users improve their skills while delivering real-time, constructive feedback. Teachers can create courses with unique course codes. Upon completing a session, users can save their progress and compositions, allowing them to revisit and refine their work at their convenience. This seamless blend of learning and creativity ensures an engaging and rewarding experience for musicians of all levels.

5. Business Use Cases

Figure D



6. Functional Requirements

[Requirements Spreadsheet](#)

7. Non-functional Requirements

Look and Feel Requirements

- The system shall present all information in a manner that does not intimidate new users.

Usability Requirements

- The system shall be used by users of any level of music writing experience.
- The system shall be used by users of any level of experience with apps.

Performance Requirements

- The system shall be able to run in any status of internet connection.

Maintainability and Support Requirements

- The system shall be able to run on Windows, Linux, Mac, iPhone, and Android systems.

Security Requirements

- The system shall store all user information securely.
- The system shall store all song information securely.

Cultural Requirements

- The system shall include songs across a wide range of genres.

Legal Requirements

- The system shall comply with all applicable information privacy laws.
- The system shall comply with all applicable music copyright laws.
- The system shall comply with all applicable software application laws.
- The system shall comply with all terms and conditions of applicable software application distributors.

8. Definitions

Song

- Title
- Artist Name
- Genres
- Sheet Music for Different Instruments

Sheet Music

- Instrument
- Difficulty
- Clef
- Audio Playback Toggle
- List of Measures
- Private Toggle

Measure

- List of chords
- Tempo
- Start and end time
- Repeat open and close

Chord

- Name
- List of notes
- Tie

Note

- Pitch
- Modifier (Sharp/Flat/None)
- Value (Sixteenth – Whole)
- Dot
- Line
- Octave

Course

- Course Title
- Join Code (5+ alphanumeric chars)
- Owner (Teacher)
- Course Members (List of students)

User

- First/Last Name
- Email Address (Unique)
- Password (7+ characters, 1+ number, 1+ symbol)
- Password Reset Process Available
- Account Type (Student/Teacher)
- Enrolled/Created Courses
- List of friends (Users)
- Metronome speed

9. Competitive Analysis

Competitor 1: Simply Piano (<https://www.hellosimply.com/>)

Strengths:

- **Beginner-Friendly Structure:** Simply Piano is designed specifically for users without prior musical experience. Its progressive lessons are conducive to skill acquisition, promoting self-assurance and a sense of accomplishment as learners progress.
- **Gamification:** The application bolsters user engagement by incorporating elements such as achievement badges, progress monitoring, and interactive practice tasks, thereby motivating learners.
- **Compatibility with MIDI and Acoustic Pianos:** In contrast to other applications that require certain setups, Simply Piano operates effectively with both digital and acoustic pianos, enhancing its accessibility.
- **Design:** The application features a streamlined and intuitive interface that emphasizes simplicity, thereby reducing potential obstacles for novices navigating its functionalities.

Weaknesses:

- **Limited Scope:** This application is exclusively devoted to piano instruction, alienating prospective users interested in learning other instruments.
- **Cost Barrier:** Its subscription-based pricing may prove excessively high for casual learners or hobbyists, ultimately constraining its appeal to a broader demographic.
- **No Community Features:** The absence of social or interactive elements may lead to an isolated user experience, which could negatively impact user retention.

Audience/Focus

Simply Piano targets complete beginners who aspire to learn piano through a systematic and autonomous digital framework.

Competitor 2: Yousician (<https://yousician.com/>)

Strengths:

Supports Many Instruments: Yousician works with piano, guitar, ukulele, bass, and even singing.

Instant Feedback: The app uses your device's mic to hear you play and gives feedback on notes, rhythm, and timing, like a real teacher.

Lots of Lessons: It has lessons for all levels, from basic to advanced, to keep users learning for a long time.

Fun and Game-Like: The app uses goals, rewards, and progress to make learning fun and keep users motivated.

Custom Learning: Users can set their own goals and change lessons to match what they need and want.

Weaknesses:

High Price: Like Simply Piano, Yousician's top features cost a lot, which might turn away users on a budget.

Difficult for Beginners: Its many tools and complex UI can confuse people who are new to music apps.

Dependent on Internet Access: The app cannot be used offline on devices; this could limit users' access to the app.

Audience/Focus

Yousician appeals to a broad spectrum of learners, from complete beginners to advanced players, who are interested in learning or improving skills across multiple instruments.

Competitor 3: Ultimate Guitar: Chords & Tabs (<https://www.ultimate-guitar.com/>)

Strengths:

Comprehensive Content Library: Ultimate Guitar hosts one of the largest online repositories of chords, tabs, and sheet music, catering to musicians across genres.

Community-Driven Platform: Users can contribute, edit, and rate tabs, creating a collaborative and dynamic ecosystem of music resources.

Integrated Tools: Features such as a tuner, metronome, and playback tools enhance the practice experience.

Interactive Playback: Users can play along with tabs or slow down playback speed to focus on challenging sections, enabling flexible learning.

Advanced Customization: The app allows users to transpose keys, adjust playback settings, and create personal libraries, adding to its versatility.

Weaknesses:

Limited to String Instruments: The app's primary focus is on guitar, bass, and ukulele, making it less relevant for users interested in other instruments.

Learning Path Deficiencies: Unlike Simply Piano or Yousician, Ultimate Guitar does not provide structured lessons or gamified learning, which may deter beginners from seeking guidance.

Subscription Dependency: Many premium features, such as interactive tabs and advanced playback options, are locked behind a subscription paywall.

Audience/Focus

Ultimate Guitar serves guitarists and other string instrument players, especially intermediate and advanced musicians seeking a comprehensive resource for tabs and chords.

Summary Table

App	Strengths	Weaknesses	Audience/Focus
Simply Piano	Beginner-friendly lessons, gamified interface, supports MIDI and acoustic pianos, clean design.	Limited to piano, expensive subscription, no community features.	Piano learners, especially beginners.
Yousician	Multi-instrument support, real-time feedback, diverse content, gamification, user customization.	High cost, overwhelming for beginners, requires internet.	All skill levels, multi-instrument learners.
Ultimate Guitar	Extensive tab library, community-driven content, integrated tools, interactive playback, advanced features.	Limited to string instruments, lacks guided learning paths, subscription dependency.	Guitarists and string instrument players, intermediate to advanced.

Summary

Based on the competitive analysis, we have identified key strengths and weaknesses in current music learning apps that will shape the development of our product. It is clear our app needs to focus on providing an accessible, affordable, and engaging user experience to differentiate itself. Simply Piano demonstrated the importance of a clean, intuitive design and structured lessons, making it beginner-friendly and easy to navigate. However, its limitations, including its focus solely on piano and the absence of social or interactive features, restrict its overall appeal. Similarly, Yousician provides valuable multi-instrument support and real-time feedback, making it versatile for learners at different skill levels. Yet, its high subscription costs, internet dependency, and overwhelming interface for new users present challenges. Ultimate Guitar highlights the benefits of a community-driven platform with its vast library of chords and tabs, but its narrow focus on string instruments and lack of guided learning paths makes it less appealing for beginners or users seeking variety.

To improve upon these shortcomings, our app will combine the best aspects of these competitors while introducing innovative features to create a unique experience. Like Simply Piano, our app will have a straightforward and user-friendly interface, but it will go further by offering multi-instrument support, including piano, guitar, ukulele, and drums. We will incorporate community-based features inspired by Ultimate Guitar, such as allowing users to share, comment on, and rate music. This will create a collaborative environment, making learning more interactive and enjoyable. Additionally, our app will include structured, gamified learning paths tailored to individual skill levels, providing clear guidance for beginners and challenges for advanced users, addressing the lack of structure seen in Ultimate Guitar.

Affordability and accessibility will be core components of our app. By offering a flexible pricing model and offline functionality, we will eliminate the financial and connectivity barriers that exist in other apps, such as Yousician. Overall, our goal is to design a platform that is engaging, inclusive, and easy to use, ensuring that users of all skill levels can grow and develop their musical abilities. By addressing these gaps, our app will create a more effective and enjoyable learning experience, making it a standout choice in the music education market.

10. Appendices

Figure A: The persona labeled “Paul” describes a user who has little experience with music or music-making apps. This user looks for applications that prioritize beginner friendliness and ease of use in addition to a variety of music.

Figure B: The persona labeled “Lyn” describes an experienced musician who seeks to practice their pre-existing skills. This user has very niche interests and the time and monetary budget to build upon those interests.

Figure C: The persona labeled “Jess” describes a musician and songwriter who wants to use the app as a tool to promote their own music. This user provides music for the app in exchange for promoting the music and its creators.

Figure D: A business use cases UML diagram details the many actions different users can take within the system, such as logging in, creating courses, and creating songs.