CHORDSCALE APP

Software Development Capstone

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Problem Description

The Gap

In the world of music, there are many different devices, programs, and applications that musicians have used and developed in order to make practicing consistent and convenient. We have developed and refined the metronome to the point where there are free apps available in abundance. One of the first websites I ever bookmarked was an online metronome! There exists a gap, however in what is available to musicians in order to hone their craft. Metronomes only focus on rhythm – it is an essential tool, but very one-dimensional as far as music is concerned. Practicing with a metronome works by setting the tempo and playing along with the beat. By hearing it and physically playing it, we internalize these tempos and the rhythms we practice. The goal of practicing anything, music aside, is internalization – a deep understanding and knowledge of something. Metronomes allow us to do this with tempo and rhythm by evenly dividing time – but what about scales, chords, arpeggios, the *rest* of music?

The Idea

The Suzuki Method of teaching music involves reading the notes on the page, having them hear the song, and play along with the song. This synchronicity between the muscle-memory that physically controls your instrument and the sound of the music in your head strengthens the understanding of that music and how to make that music speak through your instrument. It is highly effective in developing musical understanding among people of any age, although the Suzuki Method is mainly geared towards younger children who will go on to pursue a career in classical music. That being said, the theory behind it can be applied to a broader audience if that audience is given the proper tools. The ways that we listen to scales, arpeggios, and other ear-training exercises are archaic compared to what we have developed with metronomes – that is, if we ever *do* listen to them. While you can watch YouTube videos, read etude books, transcribe solos, practice alongside a piano, or even plug midi notes into a Digital Audio Workstation, these methods are cumbersome in their own ways and don't offer all of the information needed to internalize the notes themselves. Metronomes are the easiest to make in terms of technology needed to make even beats (essentially "time-dividers"), which would explain why we have spent so much time developing them and improving them, making them cheaper and more portable - accessible to the point where they're free for anyone to download. We are now at a point where we can make a tool that covers the other side of music; harmony and melody. While you don't need all three to make music, we should all have the ability to practice all aspects of music if the technology is available. At this point, I believe it is. The ChordScale App will enable people to gain the synchronicity needed to internalize the fundamentals of harmony and melody, not only providing them with quick, easy access to a powerful ear-training tool, but also a library of midi-files users can use to create their own music and expand their musical vocabulary. It will be the world's **FIRST** living Music Dictionary and Thesaurus.

User Interaction

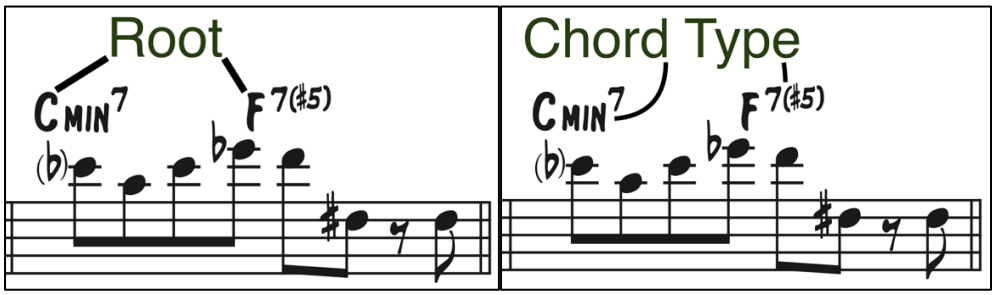
The users of this application would be anyone who wants to learn more about music – educators, professionals, and hobbyists alike. After developing the chord-decryption program in Python, the professor of that class I made it for even said that he would be playing with it as he is trying to learn more about music theory! For many people, access to proper resources for music theory is expensive, hard to come-by, or not customizable enough to give anyone real agency in being fluent in their instrument. You can learn a few basic things, but then what? What do I do with those notes? This disconnect between having the notes in your fingers but not in your head (or vice versa) prevents most people from reaching true synchronicity with scales, patterns, chords, etc. – myself included. Using my application to choose a chord or a scale, hear it, and play along with it, users will be able to develop the same synchronicity that you can achieve with expensive courses or what has been achieved by metronomes for rhythm.

Not only will users be able to use this as a powerful practicing tool, users will also be able to discover new sounds and tonalities, and begin to integrate those sounds into their own music by being able to search through the database for scales and chords that contain specific notes, as well as download the midi-files for each particular scale. A future function of this application will be an online community where users can share exercises they have made, as well as a continuously updated library of scales, chords, arpeggios, etudes, and other exercises. Another aspect of this community that I will include in the future will be a short series on the basics of modern music theory that users can have access to, as well as experiments using the app's functions, and tips on what to do with the midi-files the users have actively chosen. An "Info/How-To" tab will include clear instructions on how to use and interact with the app and show users how to use and interact with outside of the core functionality of the application itself. All of this will provide users with a unique experience that will enhance not only their practicing sessions, but their musical life as a whole.

Minimum Viable Product

Project Scope

In the scope of the next few sprints, I intend to continue refining the UI/UX of the app and debug as necessary. As of now, instructions on how to use the app are accessible from anywhere in the app to assist users and the user can select the root of the chord and then the type of chord (shown below):



The application takes this information and presents the user with several scales, important "chord tones" (anchor points in a scale that always sound good), and notes to avoid when possible. With each chord and scale, the app plays the selected scale/arpeggio/chord. Each chord and chord type have different types/amounts of scales to choose from.

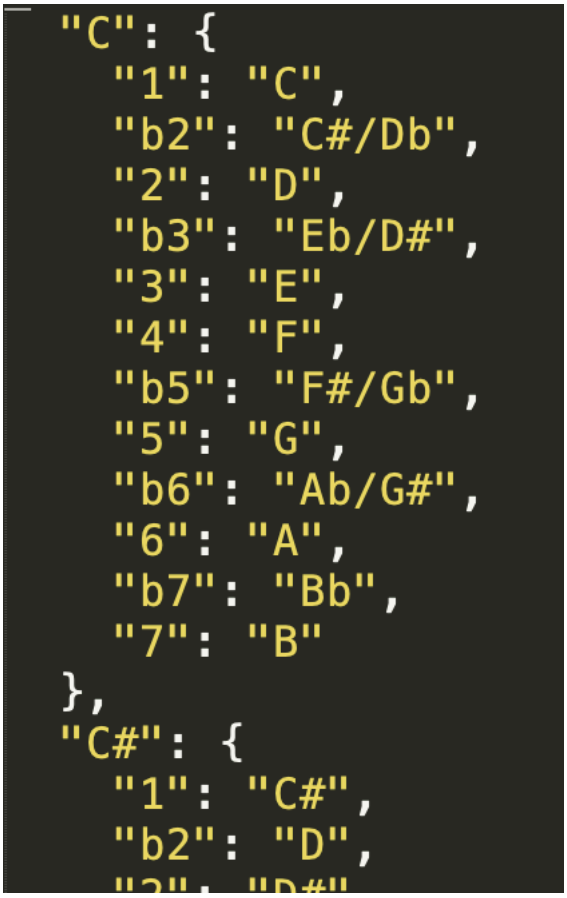
User Experience

The user experience flow will go as follows:

1. User opens ChordScale and searches through available options.
    a. If user is inexperienced, the user will go to the "Info/How To" page to get more information about how to operate the app.
    b. If the user is experienced, they will already be onto Step 2.
2. User selects the chord root and type they need to learn about.
3. User submits their choice and is served the results of their submission.
4. User chooses a chord/scale/arpeggio provided and the application plays it.
    a. The user will play along with their selection, as you would with a music teacher or a recording – keeping in the tradition of strengthening your ears, connecting these sounds to your knowledge and muscle memory.
    b. Depending on the user's practice session, they will go back to Steps 2-4 to choose different scales to practice.

Code & Data

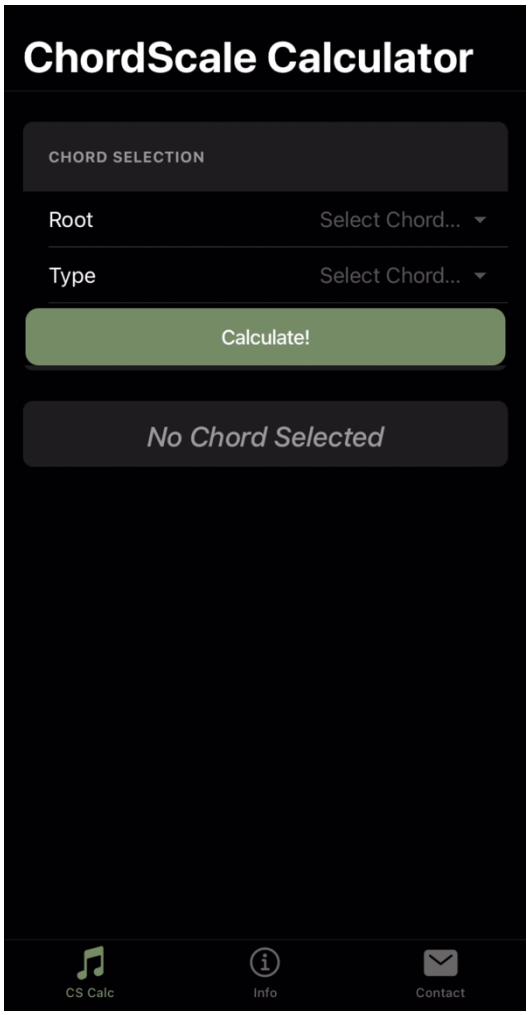
The heart of the original Python program I developed at the beginning of my graduate program is based on utilizing Nested-Dictionaries to "decrypt" a certain chord to show the appropriate scales and notes that will work over the chord the user has entered. I've since developed this original code into a service layer (TypeScript formulas) and a JSON file that contains all 12 notes for each Root Note (portion of dictionary shown below):

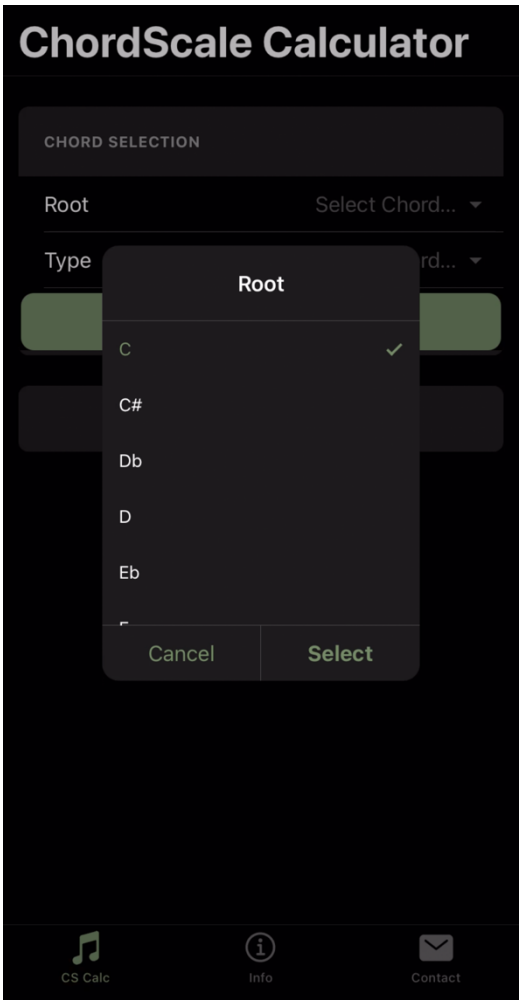


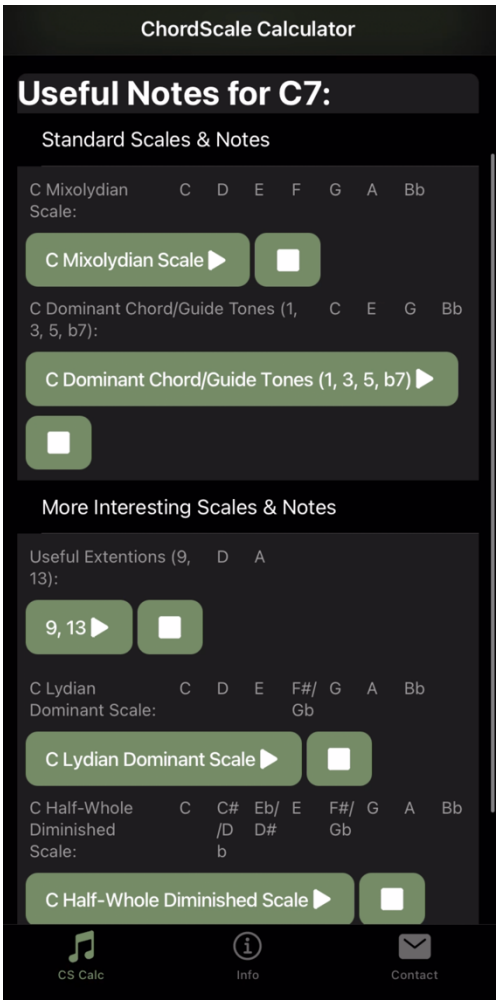
The "key" of the key-value pair in each nested-dictionary represents Scale Degrees - each scale uses different combinations/alterations of these scale degrees. The service layer that contains all of the formulas for each chord and scale uses the JSON file to correctly serve all of the notes for the particular chord data that was submitted ("Chord Root" points to the correct nested-dictionary, "Chord Type" points to the specific group of formulas that process the data within the nested-dictionary). The MVP utilizes this dictionary in order to generate the appropriate data to serve to the users. The MVP also utilizes a database to store the JSON Dictionary, as well as the audio-files necessary for the app's main purpose (real-world practice aid). The names of all audio files are specifically formatted in order to properly function with the TypeScript file containing the formulas (the names are generated by the algorithm and must match the names of the files in the database exactly).

User Interface

The look of the app itself is simple and straightforward in order to reduce distractions during the user's practice session and reduce the risk of inexperienced users being overwhelmed.



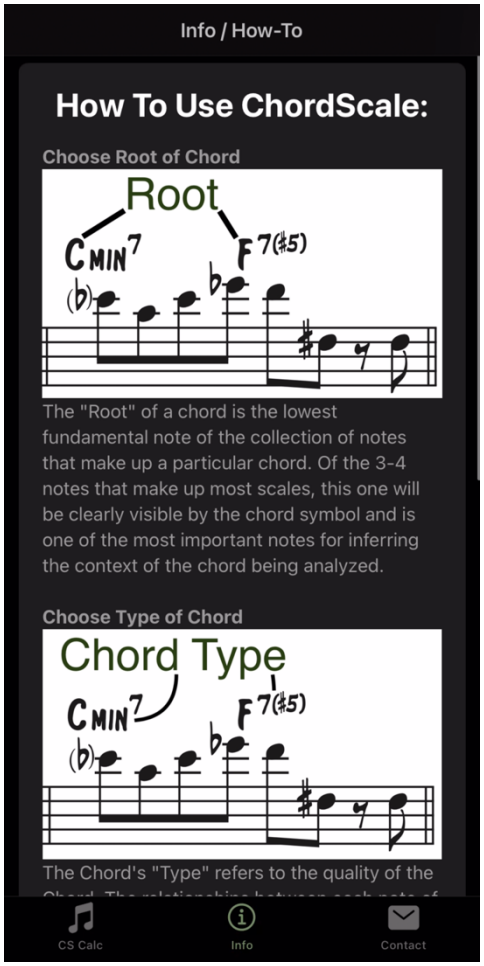


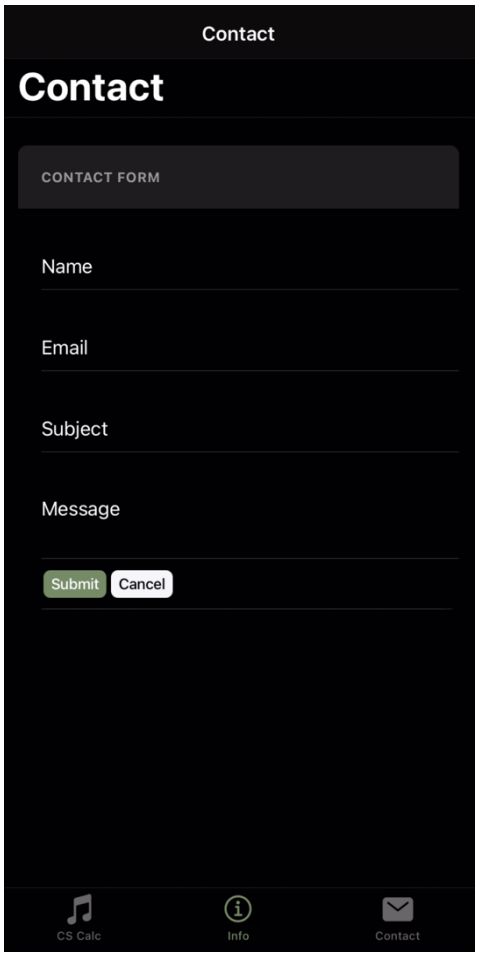


For the root and chord type selection, a pop-up list appears where the user inputs their choice. The results from the user's submission will be displayed appropriately depending on the choice:

- Main Scales(s) [Scales]
- Chord Tones [Chords and Arpeggios]
- Interesting Scales (if any) [Scales]
- Interesting Notes / Extensions (if any) [Chords and Arpeggios]
- Notes to AVOID [Arpeggios]

Within each of these sections, the user is offered all of the appropriate notes to be played over their chord selection, complete with play/stop buttons and an option to download each scale as a midi-file for users to integrate into their own projects. Each play button's label is formatted to display the correct information, dependent on chord choice. If/when the users need to change their chord selection, they simply scroll to the top of the page. Keeping most of the key app functions contained within one tab is vitally important if users are to use this app effectively – again, the aim is to limit distractions during their practice session.





In addition to the main practice area of the app, the users are offered an "info/How-To" tab that gives users the basic information needed to properly utilize the app - what chord-roots are, what chord-types are, what to do with the information served to the user, etc. - as well as a founder bio and a contact form to ask questions / give suggestions / make critiques.