MUSICA User Guide

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7/7/2021
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Please use Chrome on a Mac or Windows laptop to use the online demo.
https://demo.musicaresearch.org

MUSICA (MUSical Interactive Collaborative Agent) is an interactive online system for creating and playing jazz. Users can create short melodies, arrange them into a larger piece, and then improvise with the aid of a computer-generated band. Unlike most existing music software, MUSICA features a natural language interface to create scores and its generative jazz band can actively listen to the users solos and respond to them in real time. This document provides an overview of MUSICA's features including a list of available chat commands with examples of accepted syntax for each.

Contents

1   MUSICAL LIMITATIONS

As this software is a *work in progress*, there are a number of technical and musical limitations. The most notable musical limitations to be aware of are as follows:

- All music must be in 4/4 (the time signature) and in treble clef.
- Melodies must be monophonic (one note at a time). Overlapping notes and/or notated chords are not permitted.
- Only the melody can be composed/edited. Part writing for harmony/bass/drums is not supported.
- Instruments and their particular sounds cannot be changed.
- Volume cannot be specified. Volumes are varied in computer-generated portions of the performance in the Jam section, but they are not user-controlled.
- Slurs, ties, and dotted durations are not supported. Only whole, half, quarter, and eighth notes are supported.
- Only four types of jazz chords are supported: major, minor, major 7th, and minor 7th. Other chord types like sus chords, sixths, and nineths are not yet available.
- Many commonly available methods of creating/editing digital scores are not available in this demo. We are trying to explore *new* interfaces for creating and making music; MUSICA is not a digital audio workstation (DAW). Our demo's interface does not include many of the standard point-and-click-based music making methods and visualizations that are common within DAWs.

2   SAVING YOUR WORK

When you load demo.musicaresearch.org, you are given a new project with a unique URL. This URL is your way of returning to the project. We recommend that you **BOOKMARK** the URL in your browser right away so that you can return to your work later if you accidentally navigate away from the page or close the browser.

MUSICA is actively under development and we reserve the right to update/change the system and/or clear saved data on the server at any time. This demo is provided for free to you with no guarantees of providing future service or storage or preservation of your work. If you use our publicly available demo to create some music that you want to to retain for your personal use, you must use one of the methods below to make your own copy of it. These methods can only save the lead sheet (score) and do not save full performances using our virtual bands.

Option 1: saving the JSON. You can use the **EXPORT JSON** button to store a representation of your entire project. This is our own format; it is not directly compatible with digital audio workstations. This is also a way to recover a project from a previous state if you corrupt it in some way and have a backup JSON file saved.

Option 2: take a screenshot of the score. If you just want to remember the melody for reference, you may wish to save a screenshot of parts of the project you want for later use. You can take a screenshot of either the individual phrases or the complete score of the piece you arranged.

3 SCREEN 1: GENERATE

On the Generate screen, you will have the ability to create a collection of short phrases, which we call **segments**. You will start with two musical segments by default. You can hover your mouse over the various components of this panel to see what each feature does.
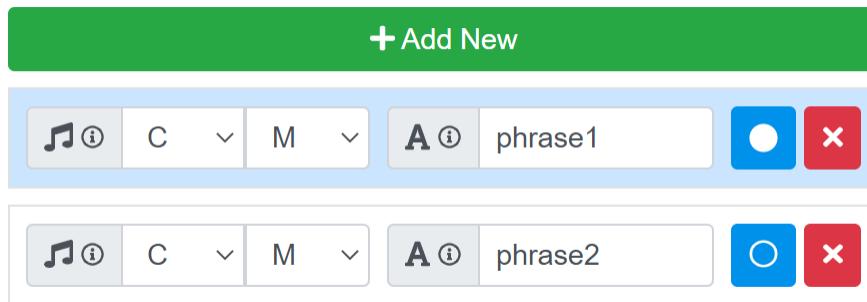
Figure 1. Segment creation and selection panel.

Chord contexts can be defined from the drop down menus on the left. The menu with pitch classes defines the root of the scale and the right drop-down menu is the type of chord. Four chord types are supported:

- M, major
- M7, major 7th
- m, minor
- m7, minor 7th

The 7th versions are sometimes differentiated from plain major/minor chords in certain styles that can be selected from the Jam screen.

3.1 CHAT COMMANDS

MUSICA's chat lets you create new melodies and manipulate their notes. This is the fastest way to get some music going, since you can generate music stochastically. You can also preview a 3-part band performance of the music in bossa nova style (more styles are available on the "Jam" screen).

Tip: check your spelling! While MUSICA's natural language framework has some tolerance for grammatical incorrectness and variation, it doesn't check spelling of individual words. Typos like "mesure" or "nnote" will most likely result in an error message.

Tip for those just wanting to improvise: if all you want to do is explore the improvisational features in Jam, you can just create a blank score and set the chord context for it. You can say "delete everything" to clear all the notes from a segment and/or just use default phrases and disable the melodies in the Organize screen.

3.1.1 Musical Terminology

MUSICA's chat expects some specific kinds of terminology when referring to musical elements. This section provides an overview of accepted musical terms.

Pitches: use pitch class letters (C, D, E, etc.) and the accidentals # (sharp) and b (flat). Octave numbers follow the pitch class. Examples: C, Db, F#4, G3. The staff will always be in standard treble clef.
Capitalization of pitch class letters is important! "A" is a pitch class, while "a" is not.
Also, the words "sharp" and "flat" are not supported. You need to say Eb, not "E flat."
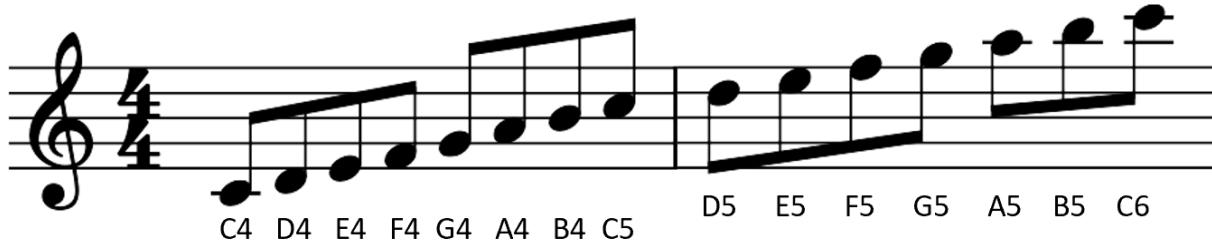

Figure 2. Pitch classes and octave numbers in MUSICA.

Note durations: whole, half, quarter, eighth. Other durations are not currently supported. Examples: whole note, eighth note. Durations can also be abbreviated as wn, hn, qn, and en.
Dotted durations and British musical terms like "quaver" are not currently supported.

Metrical position: measure and beat numbers. Example: beat 2 of measure 1.
Other terms like "upbeat" and "downbeat" are not currently supported, and the term "measure" should be used instead of "bar" for best results.

Note descriptions: refer to notes with a combination of pitch, duration, and metrical placement or ordering. Examples: the second C, the first three notes, the C4qn.

Rest descriptions (*write* command only): rests can be referred to using duration abbreviations followed by "r" (for "rest"). Acceptable values are: wnr, hnr, qnr, and enr for whole, half, quarter, and eighth-note rests respectively.

3.1.2 Commands and Operations

Help – interactive help menu. You can just say 'help' for topic suggestions or 'help [topic]' where topic is a musical term or command. Examples: help transpose, help pitch, help duration.

Generate – ask the system to make some new music! You will get a new, stochastically generated phrase of music. You can specify how many measures you want it to be. You can also request slow or fast notes to affect the types of note durations used. Examples:

- Generate 2 measures
- Generate four slow measures
- Generate 3 fast measures

Write – want some very specific notes? You can overwrite the current phrase by listing exactly what you want using complete note and rest abbreviations (this is currently the only command that uses rest references). Notes will be distributed across measures automatically. Examples:

- Write C4wn E4hn G4hn
- Write Ab4en enr G4qn
- Write C4qn G4qn G4qn A4qn G4hn
  (first refrain of Happy Birthday)

Fix – music not sounding good? Try running the *fix* command. It will coerce the current melody to better fit the current chord context. Please note that *fix* doesn't do invasive re-writing of rhythms or melody shape; there can still be bad-sounding melodies that *fix* thinks is fine (in these cases, it may be time to just try generating something new).

Add – creates new notes or add additional measures (does not work with rests). Notes will be added where there is space to do so if no location is specified. If a specific measure and beat is given, notes may "steal" duration from neighbors or you may get an error message. Examples:

- Add A4
- Add a new measure
- Add a new blank measure
- Add a whole note
- Add a C4 half note on beat 2 of measure 3

Delete – removes a note or an entire measure (does not work on rests). Rests will be added to fill locations of deleted notes. If a middle measure is deleted, it is completely removed (not filled with rests). Examples:

- Delete the second Ab
- Delete everything
- Delete all the eighth notes
- Delete measure 2
- Delete everything in measure 2

Change – alter a property of a note, either pitch or duration. Changing to a larger duration may "steal" duration from surrounding notes or result in an error. Changing to a smaller duration may add rests. Examples:

- Change all C to D
- Change the third note to a half note
- Change everything to eighth notes
- Change it to F# (affects the most recently acted upon note)

Swap – exchange the location of two measures (does not work on notes or rests). Example: swap measures 1 and 3.

Reverse – musical retrograde, or playing everything backwards. Reverse only works on whole measures or the whole phrase ('everything'). Examples: reverse everything, reverse measure 2.

Transpose – move notes up or down by an interval. Examples:

- Transpose measure 1 up a perfect fifth
- Move the first three notes down two half steps
  (Bug note: this behaves strangely after a "Reverse everything!")

Invert – flip a melody upside down (musical inversion). Inversion takes place around the first note. You may want to run the *fix* command afterwards. Examples:

- Invert measure 1
- Invert everything
- Invert the first four notes.

Format – a potentially destructive command to be used if things start behaving strangely or if commands that should work stop working for no apparent reason. The *format* operation will inspect things "behind the scenes" for internal inconsistencies and other problems like overfull measures. Notes may be lost as part of this process.

3.2 POINT AND CLICK OPERATIONS

MUICA supports some point-and-click ways of changing the score. Some of these overlap with chat commands, while others are unique. Both rests and notes can be clicked on.

Dragging Notes - to change the order of the notes *within* a measure, click on a note and drag it to the relative location where you want it to appear. Raising the note up or down will change the pitch in addition to changing the note's position.
Notes can only be relocated within a measure, not between measures.
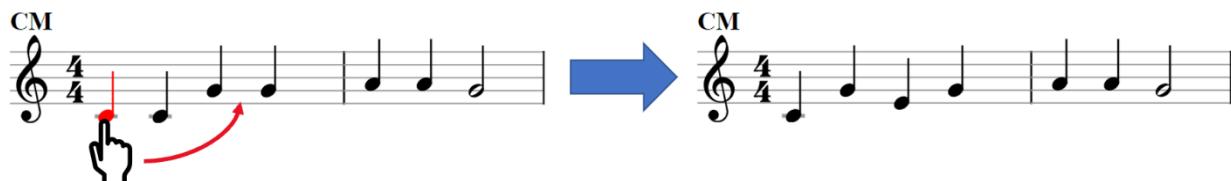
Figure 3. Dragging a C4 quarter note to the right and up. This causes it to be come an E4 placed between the two G4 notes.

Changing Note Properties – right click a note to open a menu that looks like this.
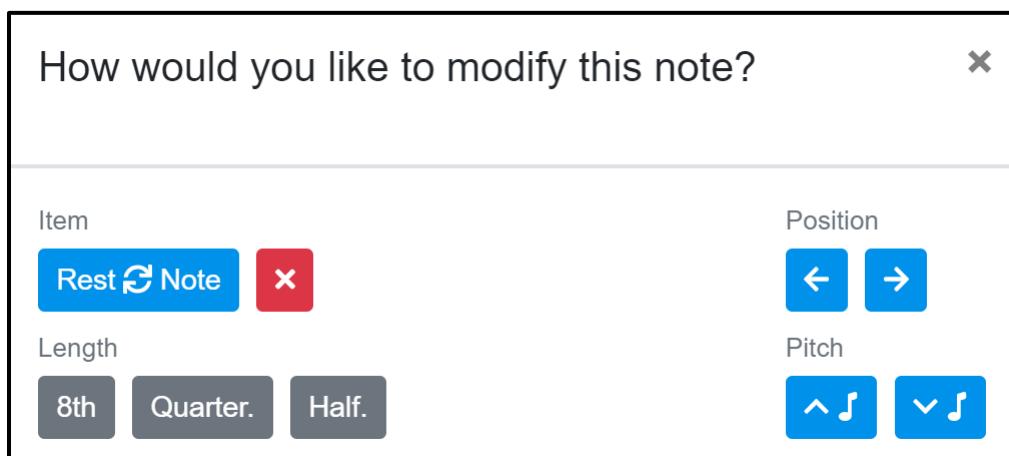

Figure 4. Point-and-click options for changing note properties.

- The Rest/Note button (blue) converts between a rest and a note for the selected symbol.
- The "X" button deletes the note.
- The duration can be changed to one of the options under "Length"
- If you have trouble dragging notes, you can use the left and right position arrows to move the note around within its measure.
- You can use the pitch up/down arrows to incrementally alter the note's pitch.

Undo / Roll Back Changes – use the button that looks like a clock to go back to a previous state. You can use this to undo one or more changes made to the music.

4 SCREEN 2: ORGANIZE SCREEN

The organize screen lets you create a longer piece out of the phrases you made in part 1. You have the option to define improvisational parts here.

MUSICA's pieces or lead sheets consist of some number of phrase/segment **instances** (or copies). This allows for melodies to be repeated easily to create higher-level structures. Each segment instance can also be repurposed for improvisation. This lets you reuse segments for their chord context alone, something that is commonly done in jazz when improvising over the same chord progression that was used to accompany the main refrain. As you add segments, the score will update dynamically.
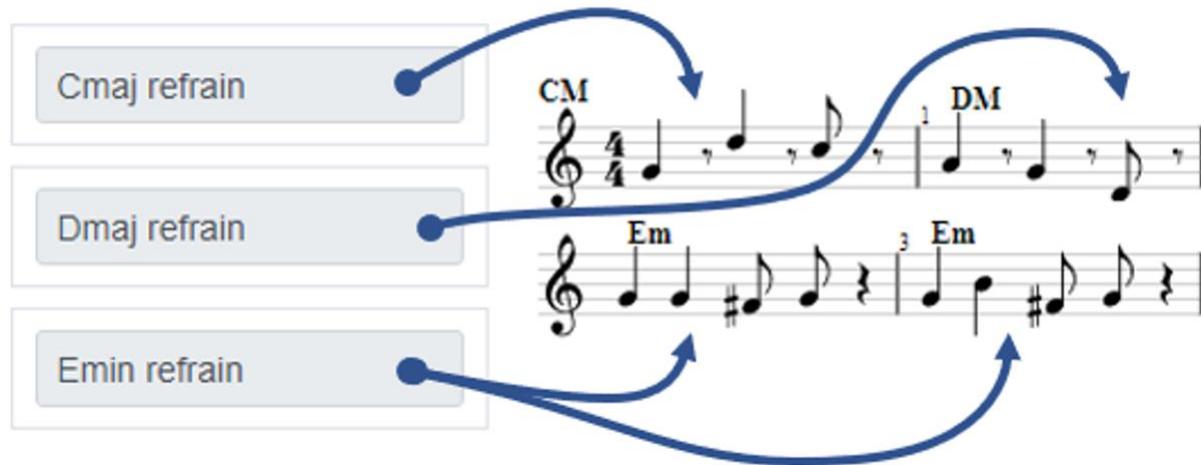
Figure 5. A lead sheet that contains two instances (repeats) of one of its segments.

As with the previous screen, you can hover your mouse over the various features to see what they do. You can hear a preview of the full arrangement in Bossa Nova style (other styles are available on the next screen, Jam).

5 SCREEN 3: JAM

The Jam screen lets you hear a looped performance of your piece. You can select from a variety of styles. You have the option to play along with the music or just listen to the computer perform it. Playback will continue until you decide to stop.

Caution about the swing checkbox: swing rhythms don't work well with all styles and can cause some strange stylistic results if used improperly. We recommend using it only with the SimpleWalking, BetterWalking, and SimpleFunky styles.

Caution about connection speed: connections with high latency may have trouble with this aspect of MUSICA. LTE and satellite Internet connections may experience performance issues and visual/playback synchronization issues.

5.1 Input Devices

If you have a USB MIDI controller, you can use it to perform with MUSICA. If your device isn't detected, make sure it is plugged in and then refresh. You may also need to restart your browser if you connected the device before the browser was opened (be sure to bookmark your project first!).

You can also use your computer keyboard like a 1-octave piano. The figure below shows the key mapping and is also available if you scroll down on the Jam screen. Bluetooth keyboards and wireless MIDI devices may experience a higher latency than wired devices (this may or may not be noticeable depending on the particular devices and operating system).
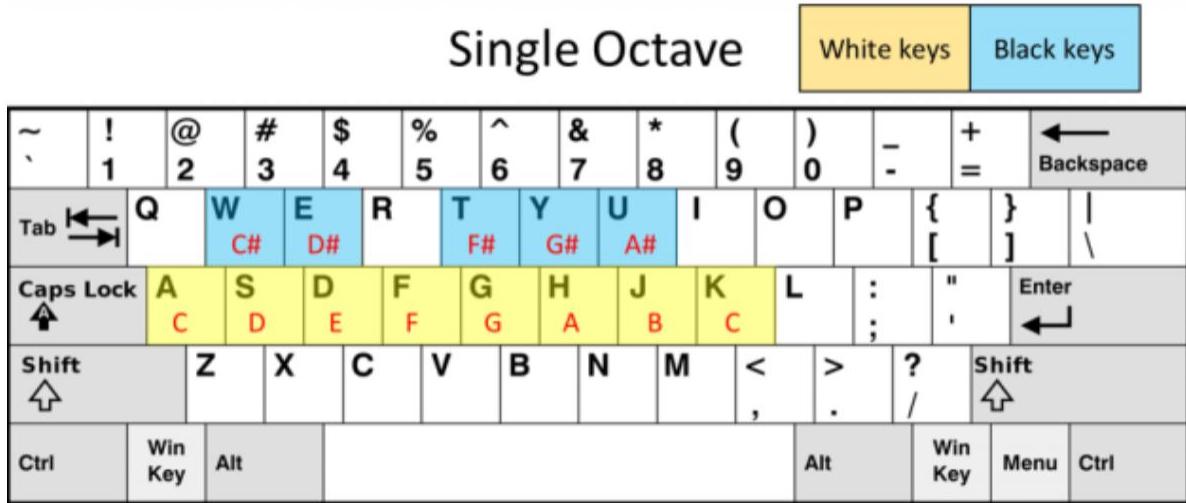
Figure 6. Mapping of computer keyboard keys to pitches. All keys are octave 4 except for the K key, which is octave 5.