Lesson 6. Creating and Editing MIDI

Lesson Files Time Goals

Logic Pro X Files > Lessons > 06 Rock Drums

Logic Pro X Files > Media > Additional Media > Lead Synth.mid

This lesson takes approximately 90 minutes to complete.

Create and edit MIDI notes in the Piano Roll Editor

Paint notes with the Brush tool

Define custom brush patterns

Time-stretch notes with the time handles

Time quantize and scale quantize individual notes

Import MIDI files

Select and delete continuous controller events in the Event List

Create continuous controller automation in the MIDI Draw area

When you work with MIDI sequences, the flexibility of separating the performance data from a specific instrument gives you total control over the performance data, even after it is recorded. You can open the MIDI region in a MIDI editor to precisely fine-tune each note's position, pitch, velocity, and length. You can edit or add MIDI controller events to automate the instrument's volume, panning, pitch, and many other parameters. You can also write music from scratch, creating notes in MIDI editors using only your mouse, similar to the way you write music on staff paper.

Writing music in MIDI editors is also called *programming MIDI sequences*. Logic includes several MIDI editors for this purpose, and though they all display the same MIDI events, each does so in its own way. For example, the Score Editor shows you musical notes on a staff, and the Piano Roll Editor shows you notes as beams on a grid.

In this lesson, you will program and edit MIDI events using the Logic MIDI editors. You will write a bass line, import and edit a MIDI file triggering a synth patch, and program MIDI control automation to breathe life into your MIDI sequences.

Creating MIDI Notes in the Piano Roll Editor

The Piano Roll Editor is the most straightforward MIDI editor in Logic. Its name is inspired by the perforated paper roll used by mechanical player pianos, in which the position and length of those perforations determined the pitches and durations of notes.

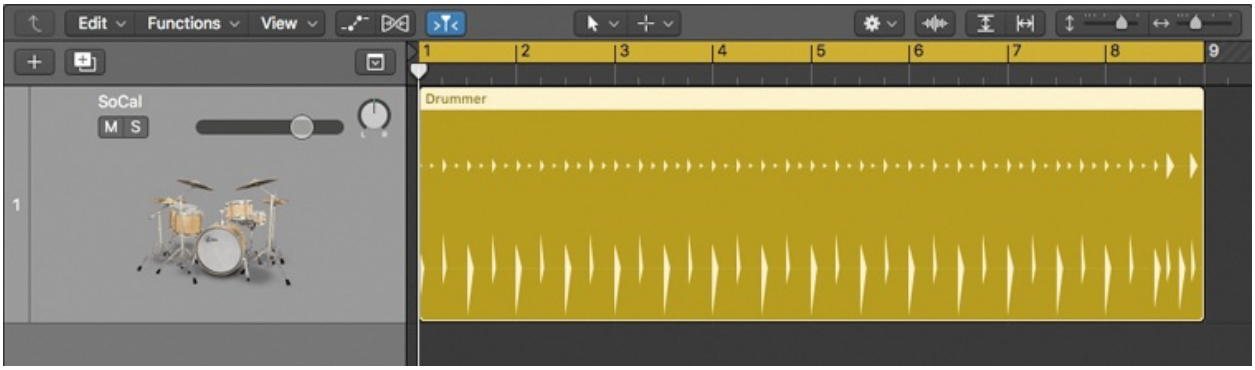
In Logic, the Piano Roll Editor represents MIDI notes as beams on a grid, positioned below a bar ruler, much like the workspace displays regions on a grid below a bar ruler. In fact, most of the techniques for editing regions in the workspace also apply to notes in the Piano Roll Editor.

Creating and Resizing Notes

In the Piano Roll Editor, you create notes by clicking in the grid with the Pencil tool. As you write your musical part using the Pencil tool, you can also use the Pencil tool to resize, move, copy, or delete notes.

You will open a new project that has a basic rock drum track, create a new bass track, and use the Pencil tool to program a simple bass line in the Piano Roll.

1 Open Logic Pro X Files > Lessons > **06 Rock Drums**.



The project contains a single Drummer track cycling around for eight bars. Listen to the drums. They play a straightforward rock drum pattern with a simple fill at the end of the eight-bar pattern.

2 Choose Track > New Software Instrument Track (or press Command-Option-S).

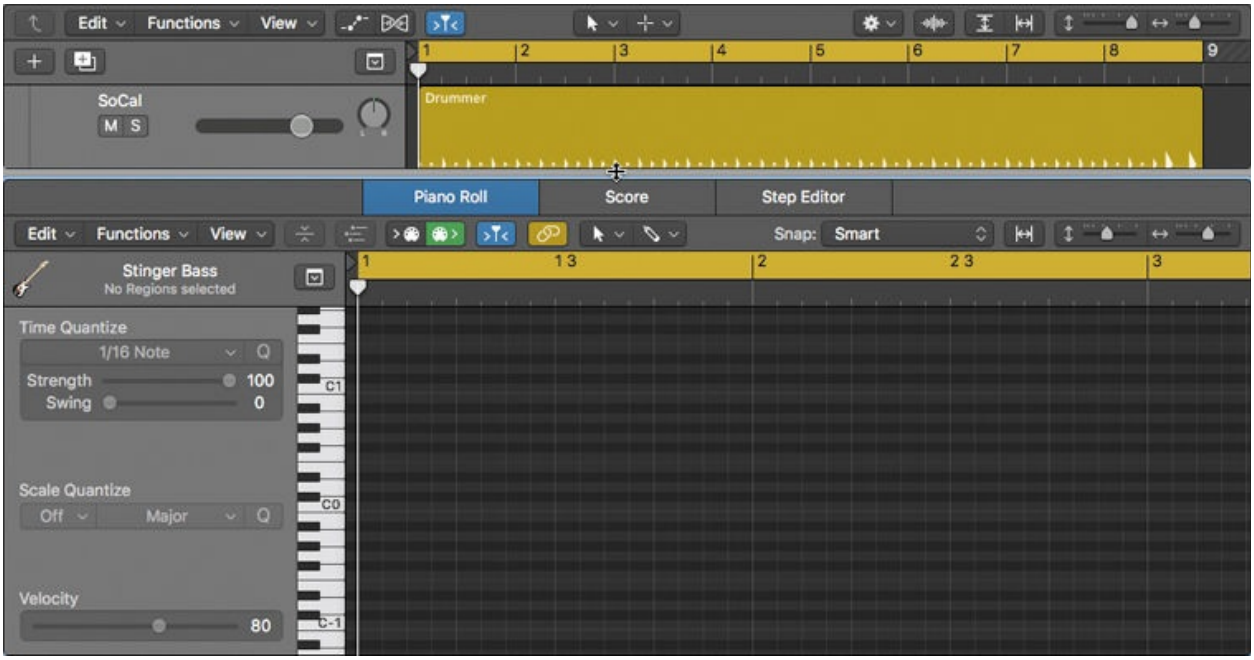
3 In the control bar, click the Library button (or press Y).

4 In the Library, choose Bass > Stinger Bass.

5 In the control bar, click the Editors button. At the top of the Editors pane, ensure that Piano Roll is selected (or press P).

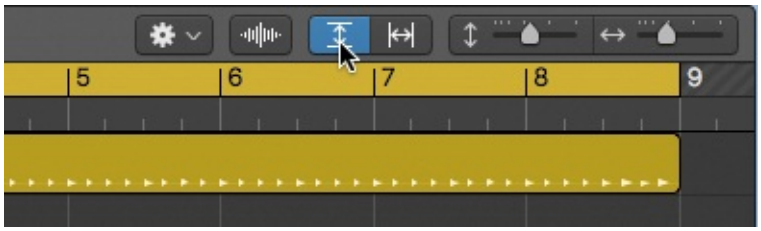
Let’s make the Piano Roll taller.

6 Place the mouse pointer between the Piano Roll and the Tracks area, and drag the resize pointer up.



As you resize the Piano Roll, you may hide some of the tracks in the Tracks area. You can use Vertical Auto Zoom to maximize the track heights while keeping all tracks visible.

7 In the Tracks area menu bar, click the Vertical Auto Zoom button.

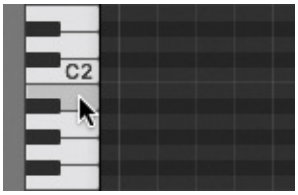


The tracks are automatically zoomed to fit vertically in the Tracks area.

8 Try resizing the Piano Roll to a comfortable size.

As you drag the resize pointer to adjust the height of the Piano Roll, the tracks automatically update their vertical zoom to fit the Tracks area.

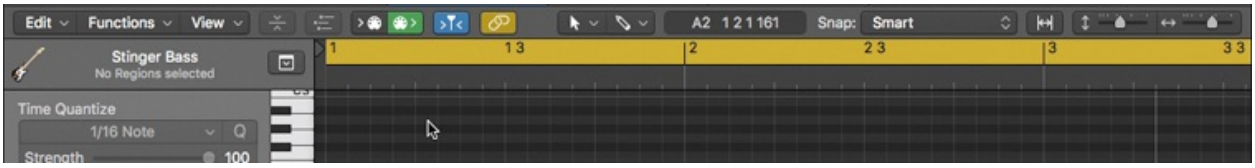
9 In the Piano Roll, click the keys on the piano keyboard.



The keys trigger the bass instrument, and you can hear the bass notes.

As you position the mouse pointer over the grid, look at the info display at

As you position the mouse pointer over the grid, look at the info display at the top of the Piano Roll. Scroll down to find A1, two white keys below C2. On the grid, light gray lanes correspond to the white keys on the piano keyboard, whereas dark gray lanes correspond to the black keys.



Note

If you cannot see the info display, try making the main window wider or close side panes such as inspectors and browsers.

You will now use the Pencil tool, your current Command-click tool, to create notes.

10 Command-click the light gray lane at 1 1 1 1 next to the A1 key.

Clicking the grid with the Pencil tool inserts a note on the closest grid line to the left. For example, clicking at 1 1 1 181 inserts a note at 1 1 1 1.

Note

The color of the note indicates its velocity. You will adjust note velocities later in this lesson.

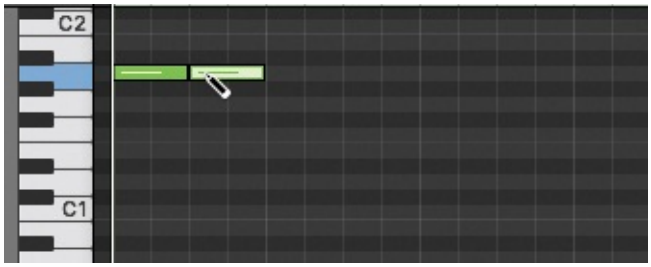
By default, Logic creates a sixteenth note. In the Tracks area, a MIDI region named *Stinger Bass* is created on the bass track that contains that note. You will resize the note to an eighth note.

11 Position the pointer over the right edge of the note until it changes to a Resize tool.

12 Drag the Resize tool to the right to lengthen the note to an eighth note.

The help tag shows the note length as 0 0 2 0, which indicates that the length is 0 bars, 0 beats, 2 divisions, and 0 ticks. By default, the division is set to 1/16, so two divisions make an eighth note.

13 Command-click after the existing eighth note to create a new note at 1 1 3 1.

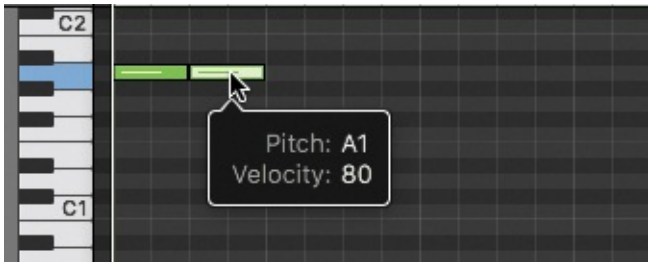


A new note is created with the same length as the previous eighth note.

Note

When creating a note, the new note has the same length as the note you most recently created or selected.

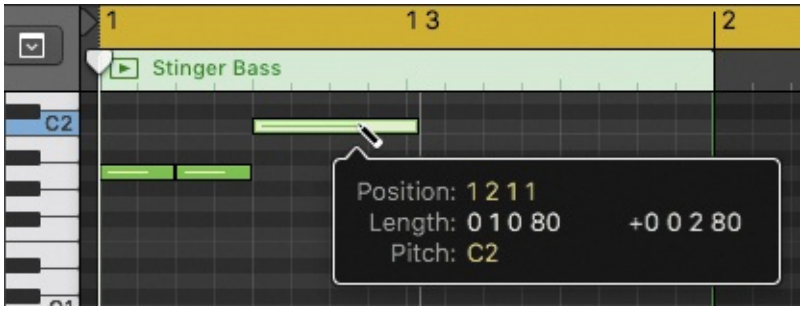
You can check the pitch and velocity of a note by placing the pointer over the note. After a pause, a help tag appears with the information.



To check the position, length, and pitch of a note, you can click and hold the note.

This time you will create and resize a note in a single operation.

14 Using the Pencil tool, hold down the mouse button to create a C2 after the last note (at 1 2 1 1), and drag to the right to lengthen the note to a quarter note (0 1 0 0).



You now understand the basic tools for creating notes on the grid and how to adjust their lengths. In the next exercise, you will continue the musical motif using characteristics of the existing notes to create new notes.

Defining Note Length with Existing Notes

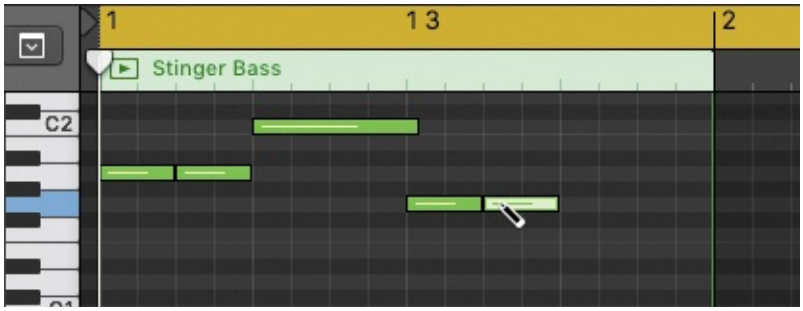
To finish this first bar, you will repeat the same rhythmic motif (two eighth notes followed by a quarter note) on new pitches. You'll select existing notes to create notes of the same length and velocity.

1 Click one of the two eighth notes at the beginning of the bar to select it.

From now on, clicking with the Pencil tool will create eighth notes.

2 Command-click to create a G1 at 1 3 1 1.

3 Command-click to create another G1 at 1 3 3 1.

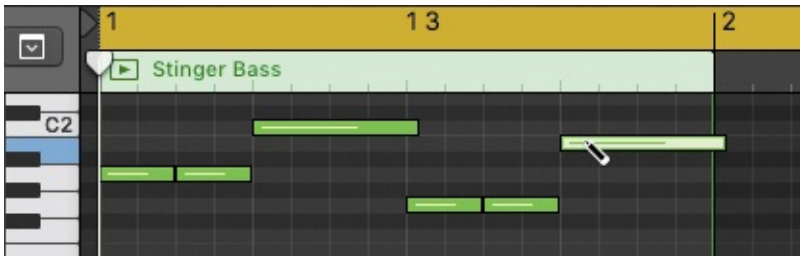


Now enter the quarter note.

4 Click the quarter note on C2 to select it.

The next note you create will be a quarter note.

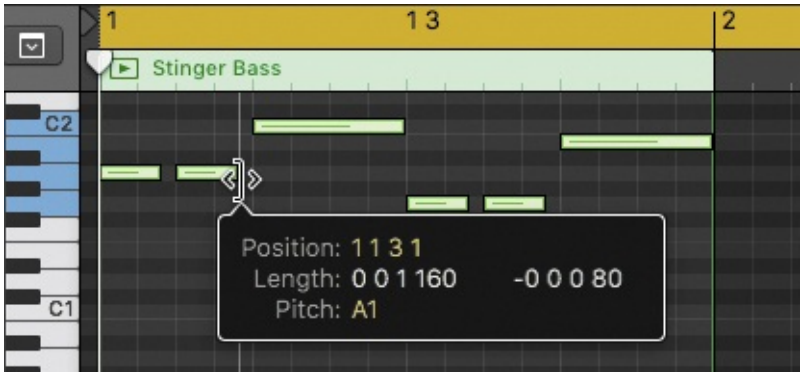
5 Create a B1 quarter note at 1 4 1 1.



6 Play your bass line. The melody is nice, but the bass is played too legato.

7 Drag a rectangle around all the notes (or press Command-A) to select them.

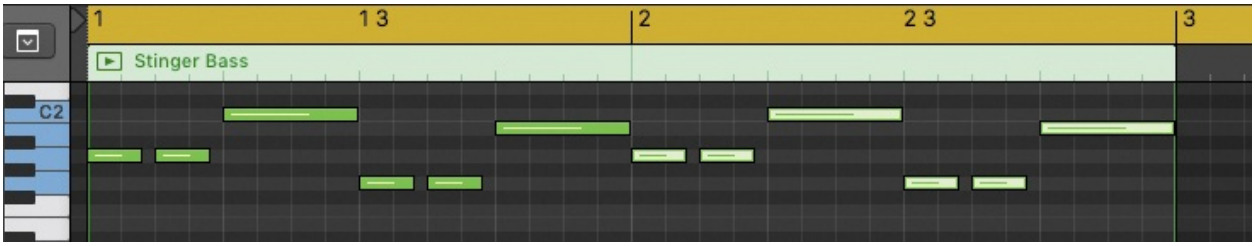
8 Drag the right edge of one of the selected notes toward the left to shorten it slightly. After you start dragging, you can hold down Control to adjust the length with more precision.



9 Listen to the bass line. You can hear the individual notes with more distinction now.

You now have a one-bar pattern. You could continue writing the bass line with the Pencil tool, but to go faster you'll repeat the pattern with small modifications to add variation.

10 Ensure that all the notes are selected, and choose Edit > Repeat (or press Command-R).

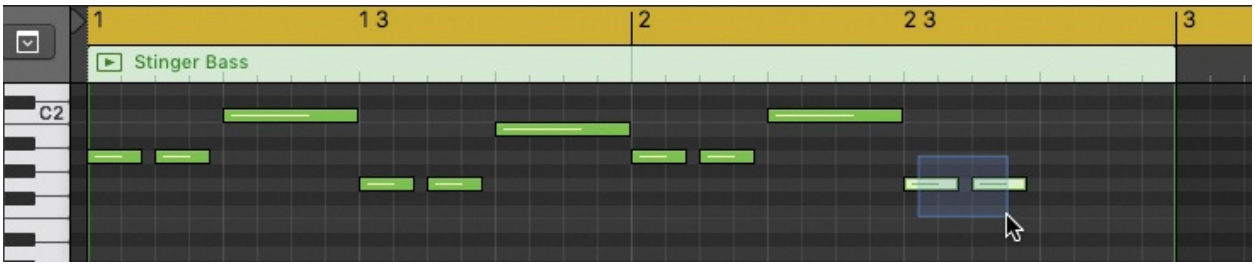


The pattern in bar 1 is repeated in bar 2, thereby extending the region by one bar. You will now replace the last quarter note of bar 2 with two eighth notes.

11 Click the background of the Piano Roll to deselect all the notes.

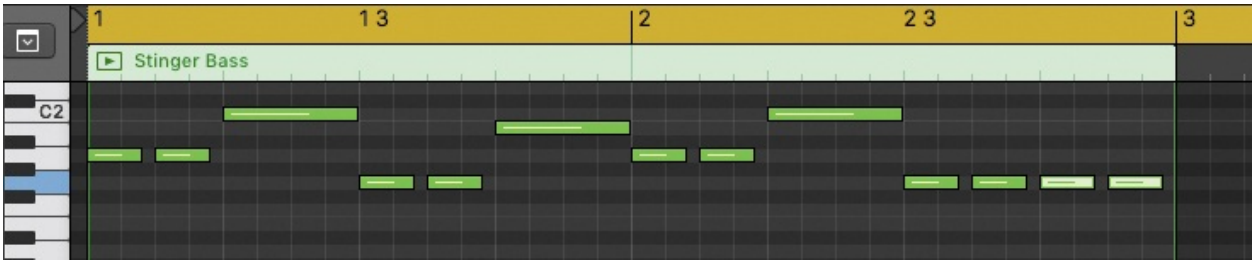
12 Select the last quarter note in bar 2 and press Delete.

13 Drag to select the two last eighth notes in bar 2.

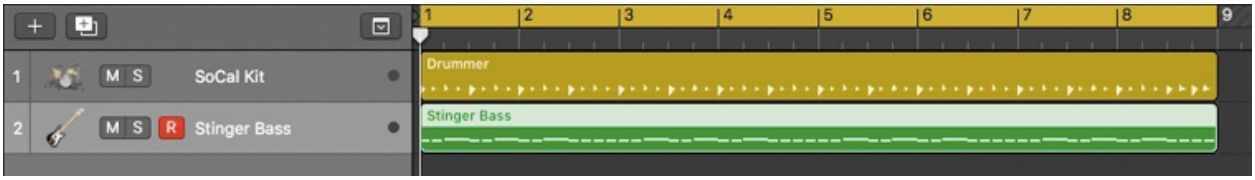


14 Choose Edit > Repeat (or press Command-R).

Two new eighth notes fill the last beat of bar 2. You will now repeat this two-bar pattern throughout the remaining six bars of the cycle area.

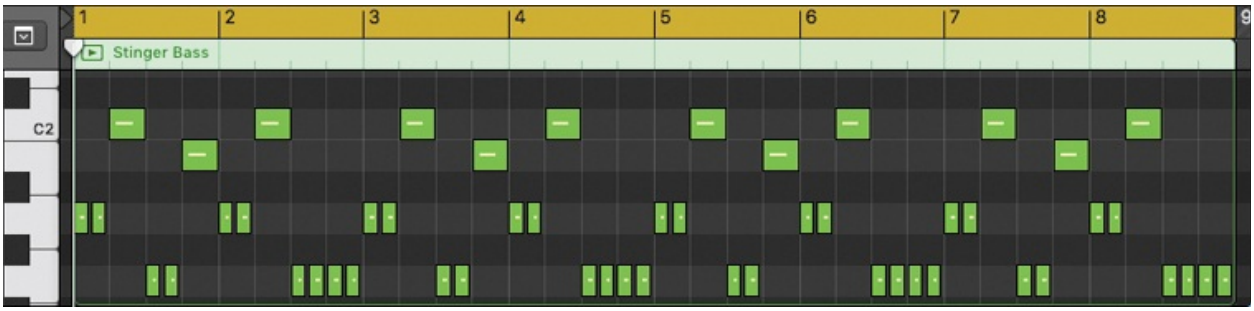


15 Press Command-A to select all the notes, and then press Command-R three times.



In the Tracks area, the *Stinger Bass* MIDI region extends to fill the eight bars of the cycle area.

16 Click the background of the Piano Roll, and press Z.



You can see your entire eight-bar bass line.

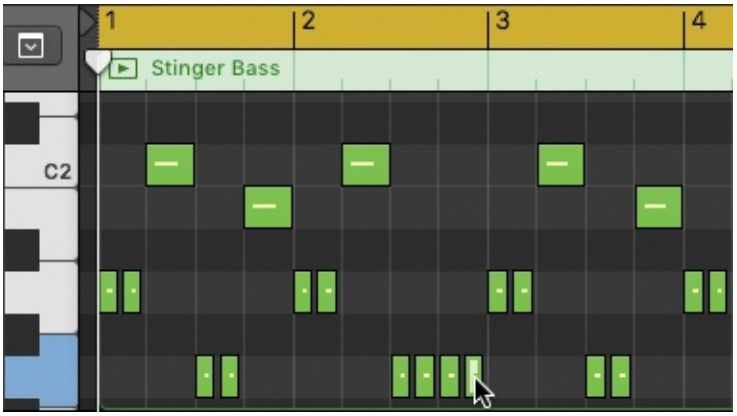
You used the Pencil tool to create notes, resize them, and define the length and velocity of new notes. Then you used the Repeat key command to quickly fill up an eight-bar region with your two-bar pattern. Right now the bass line is rather repetitive, but you'll add small variations in the next exercise to make it more exciting.

Editing Note Pitch Using Key Commands

Creating notes with the Pencil tool is fine when you have a clear idea of the pitches you want. But sometimes you may want to experiment with different pitches while listening to the result.

In this exercise, you will use key commands to select some of the eighth notes at the end of every two-bar section and change their pitches.

1 Click the last eighth note of bar 2 to select it.



From now on, make sure the Piano Roll always has key focus. You will use the following key commands to select and transpose notes: ▸ Left/Right Arrow—Selects previous/next note

▸ Option-Up/Down Arrow—Transposes up/down one semitone ▸ Shift-Option-Up/Down Arrow—Transposes up/down one octave

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Note

If you happen to press Up Arrow by mistake, the Drummer track is selected and the Drummer Editor opens, replacing the Piano Roll. To resume working on the bass, press Down Arrow to reselect the bass track and to reopen the Piano Roll.

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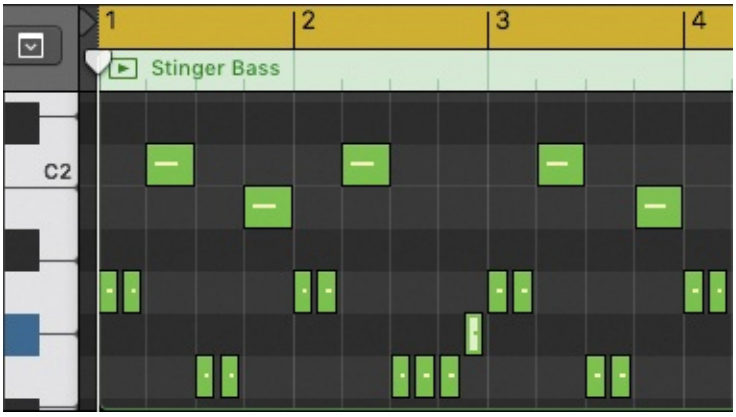
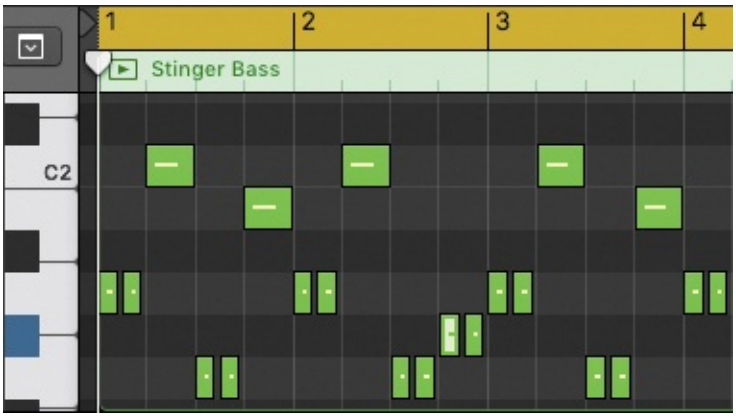
2 Press Option-Up Arrow.



The note is transposed up one semitone (from a G1 to a G#1).

3 Press Left Arrow to select the previous note.

4 Press Option-Up Arrow.



This note is also transposed up one semitone.

5 Press the Spacebar to listen to this new bass fill.

It renews interest at the end of the first two bars. The G# leads smoothly into the A at the beginning of the pattern in bar 3.

6 Keep the song playing for the next few steps; you will continue editing note pitches while listening to the song.

7 Press Right Arrow a few times.

Each time you press Right Arrow, the next note to the right is selected, and its sound is played. This can be distracting when you’re trying to focus on

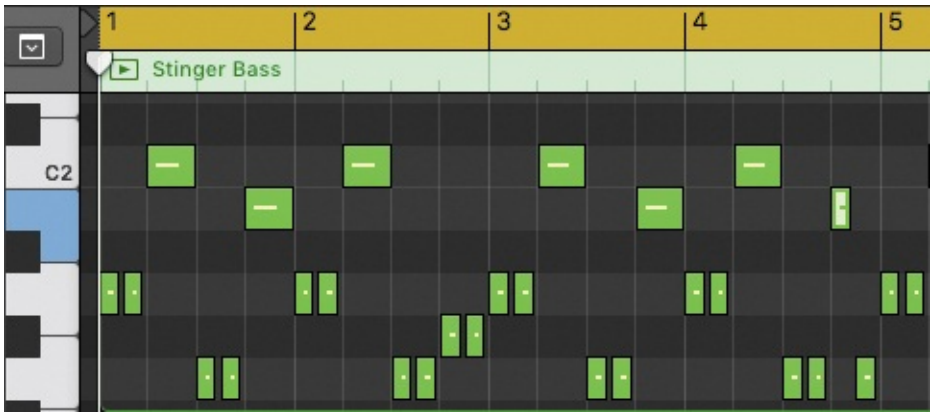
the result of your edits.

8 At the top of the Piano Roll, click the MIDI Out button to turn off MIDI Out.

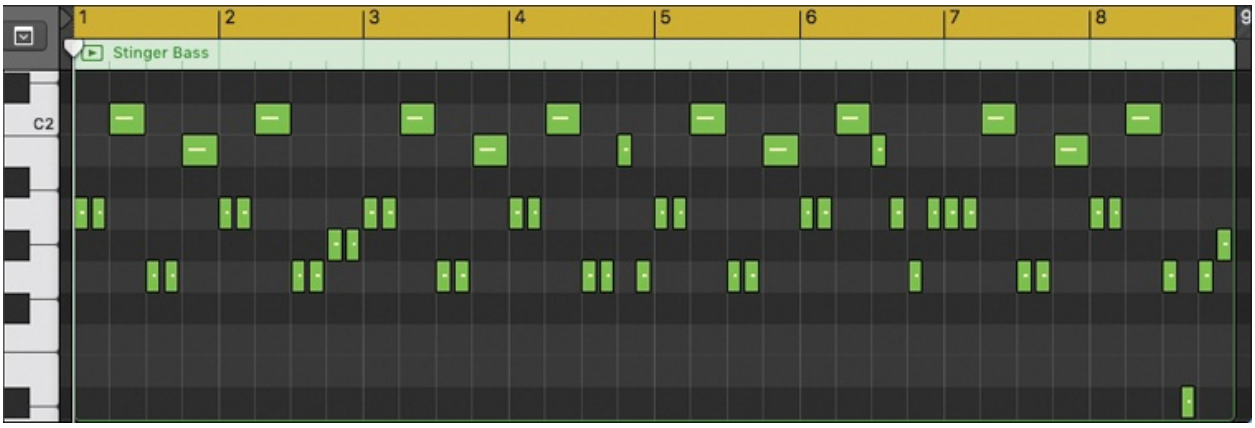
9 Press Right Arrow a few more times to select the next to last eighth note in bar 4.

With MIDI Out turned off, no sound is triggered as you select different notes, which makes hearing the song easier.

10 Press Option-Up Arrow four times to transpose the note four semitones higher (from a G1 to a B1).



Continue using these key commands to edit the bass fills at the ends of bar 6 and bar 8, choosing pitches that sound good to you.



11 Stop playback.

You now have a bass line that repeats the same one-bar pattern for eight bars, with just enough variation in every other bar to keep things sounding fresh.

Editing Note Velocity

Editing Note Velocity

When you play a MIDI keyboard, you want to control how loud each note is played. To judge how hard you press the keys, MIDI keyboards measure the speed at which each key is depressed. That speed is called *velocity*. When you press a key, the MIDI keyboard sends a note on MIDI event that contains the key number and velocity value of that note.

Higher velocities usually result in louder notes. Depending on the patch or program you're using, higher velocities may also trigger different sounds or different samples, as they do in the sampler instrument you're using in the Stinger Bass track. Higher-velocity notes trigger samples of a bass string that was actually plucked harder, allowing you to program accents or dynamic variations that sound realistic.

In this exercise, you will use different techniques to change the velocities of notes in the bass line, thereby changing their volumes and timbres, and making your MIDI programming sound closer to a live performance.

1 At the top of the Piano Roll, click the MIDI Out button to enable MIDI Out.

2 Control-Option-drag to zoom in on the first three notes.

3 In the Left-click Tool menu at the top of the Piano Roll, choose the Velocity tool (or press T, and then press V).

Tip

You can also hold down Control-Command to temporarily turn the Pointer tool into the Velocity tool.

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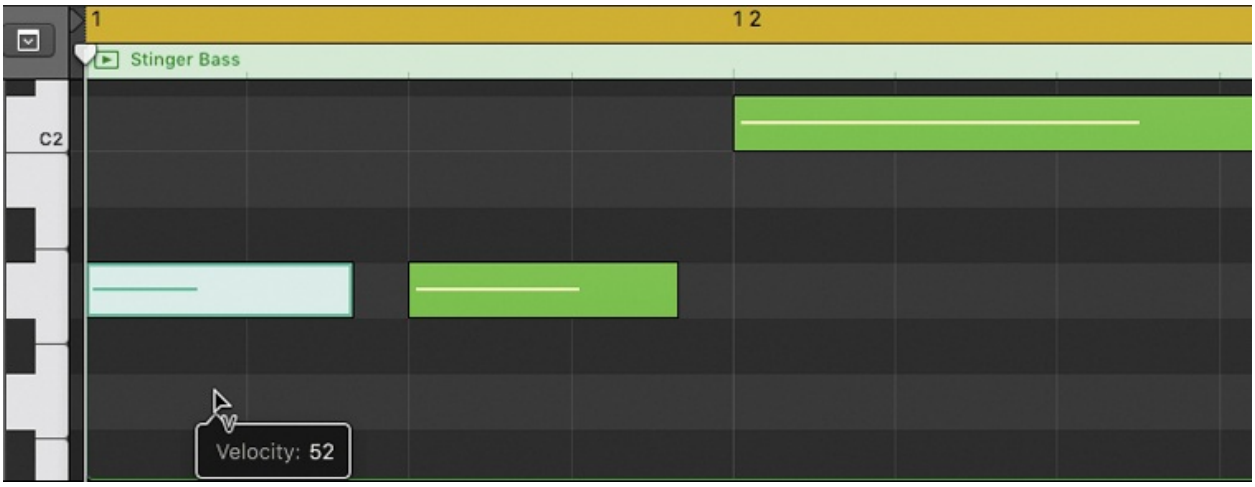
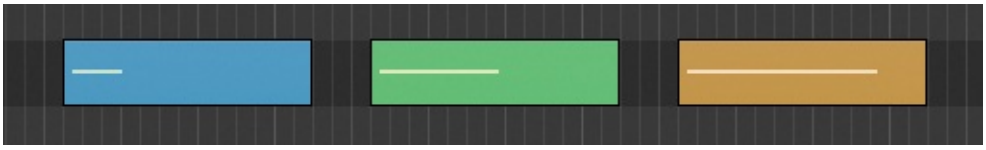
4 Using the Velocity tool, drag the first note up or down.



As you drag with the Velocity tool, the MIDI note is triggered repeatedly so that you can hear the sound of the note at different velocities. Notice how higher velocities trigger bass sounds that were plucked harder and have more attack.

The help tag displays the value of the velocity, from 1 to 127.

The velocity value is indicated by the color of the note, ranging from cold colors (low velocities) to warm colors (high velocities). Velocity is also represented by the length of the line in the middle of the note beam.



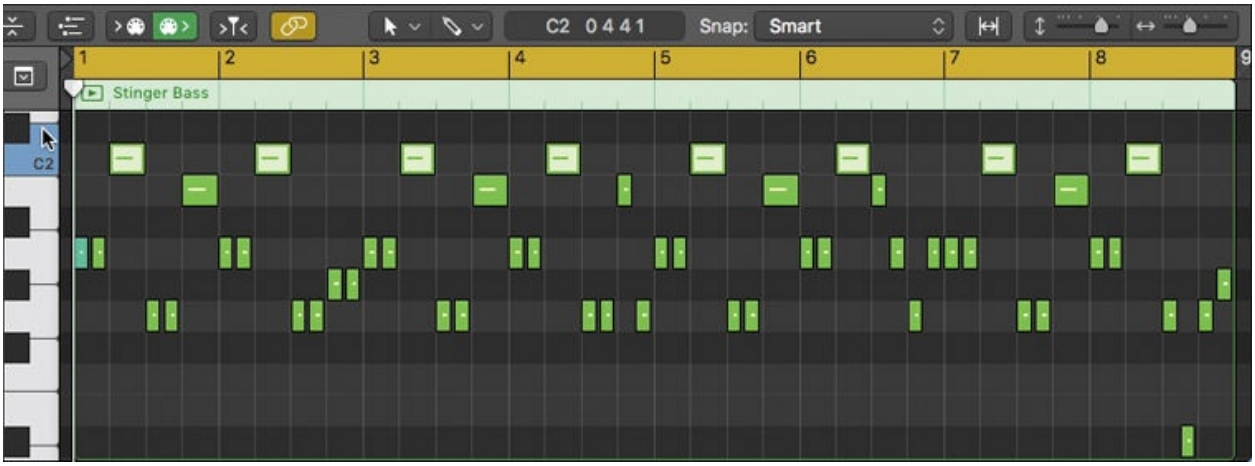
By default, all the notes you previously created have a velocity of 80.

You can add an accent to the first note, settling for, as an example, a velocity of 105. The first bass note is now a little louder.

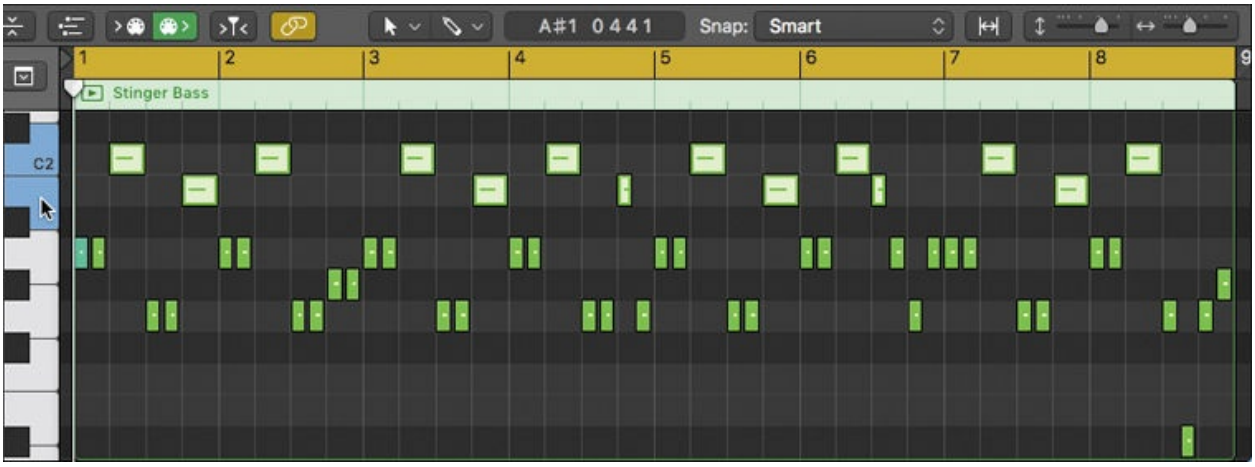
Let’s select all B1 and C2 notes and raise their velocities together.

5 Click the background of the Piano Roll, and press Z to zoom out.

6 On the piano keyboard, click the C2 key to select all C2 notes in the region.



7 Shift-click the B1 key (just below C2) to add all B1 notes to your selection.



8 Using the Velocity tool, drag one of the selected notes to set the velocity of all the selected notes to 100.

Note

When multiple selected notes have different velocities, dragging them with the Velocity tool offsets the velocities of all notes by the same amount, and the differences in velocity between the notes are retained.

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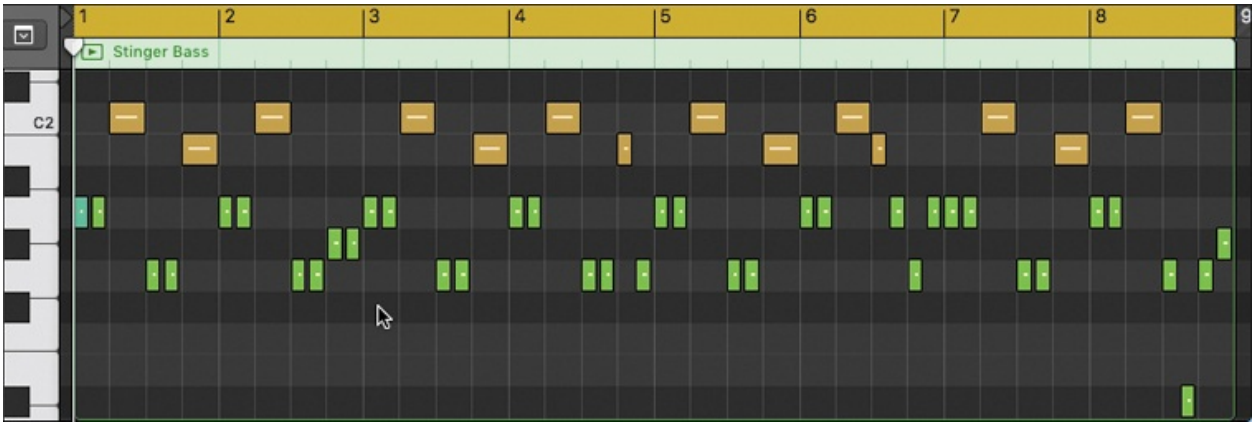
9 Press T twice to change the Left-click tool to the Pointer tool.

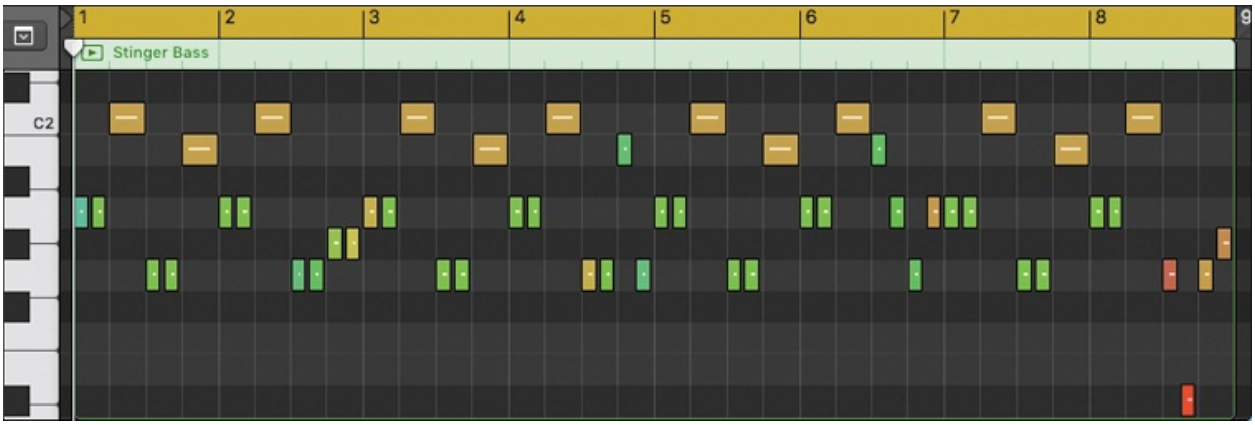
10 Click the background to deselect the notes.



All C2 and B1 notes now have a warmer color because they all have a velocity of 100.

11 Listen to the song. The accents on the quarter notes help make the bass groove better.

Continue adjusting the velocities of individual notes in the bass fills you created in the previous exercise to make them stand out a little, especially at the end of bar 8, during the drum fill on the Drummer track.

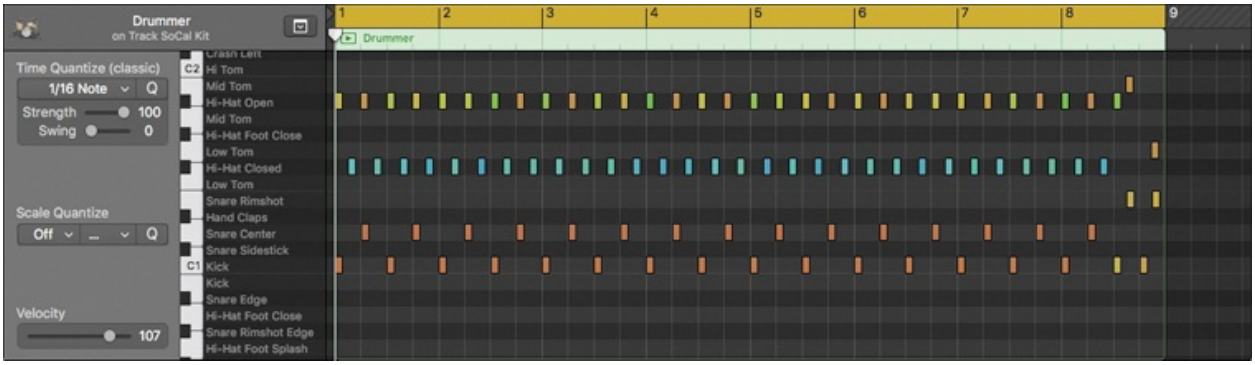


Creating and Drawing Note Patterns

Creating MIDI sequences one note at a time is not always the most efficient method. When a pattern contains repetitive elements, the Brush tool can help you create multiple notes in a single operation.

In this exercise, you will convert the Drummer region into a MIDI region so that you can add a clave pattern. You will paint MIDI notes using the Brush tool and drag the time handles to time-stretch some of the notes.

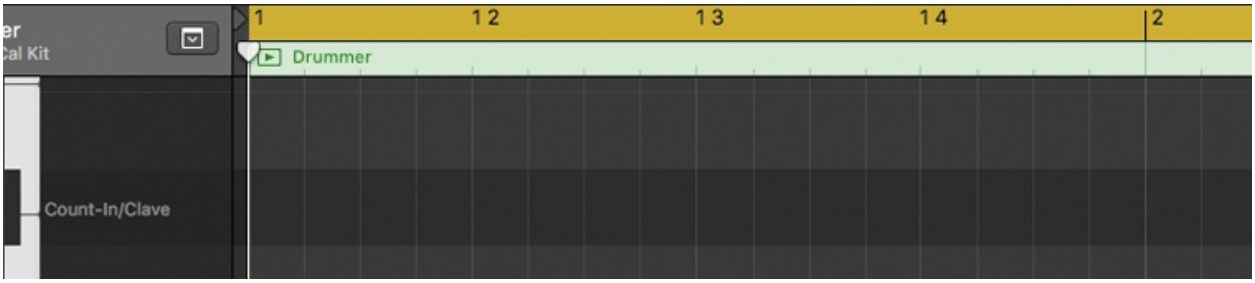
1 On track 1, Control-click the Drummer region, and from the shortcut menu, choose Convert > Convert to MIDI Region.



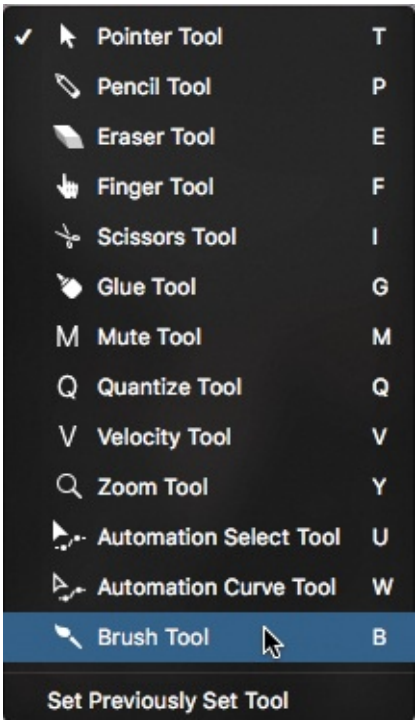
The Piano Roll displays the drum names in the local inspector. If you cannot see the drum names, zoom in vertically in the Piano Roll.

2 Scroll up to see the Count-In/Clave (on D#4).

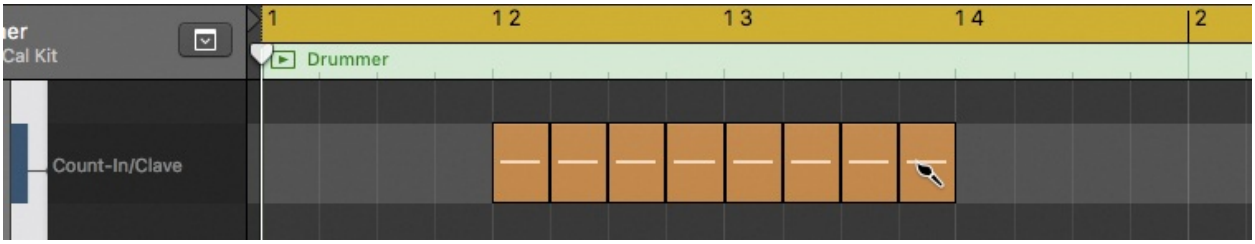
3 Control-Option-drag to zoom in on the first bar.



4 Press T to open the Tool menu, and choose the Brush tool.



5 Drag the Brush tool to paint sixteenth notes in beats 2 and 3.



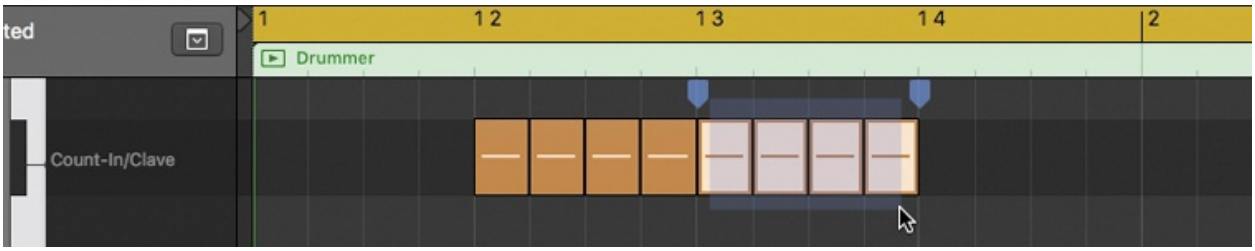
6 Listen to your clave pattern.

Even though all the MIDI notes are identical, Drum Kit Designer plays different samples every time to avoid the “machine gun” effect when a sampler plays a rapid succession of identical samples. Still, the pattern is rather simple so far. Let’s slow down the last four notes.

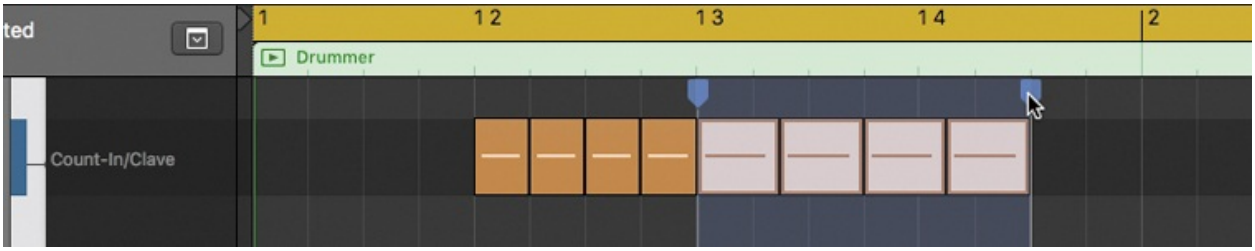
7 From the Piano Roll menu bar, choose Functions > Time Handles.

8 Press T twice to change the Left-click tool to a Pointer tool.

9 Drag around the four notes in beat 3 to select them, with the time handles positioned on beats 3 and 4.



10 Drag the right time handle to the middle of beat 4.



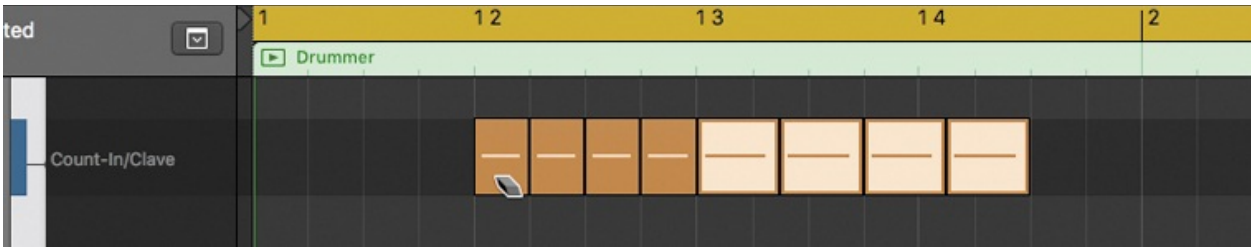
The selected notes are stretched.

11 Listen to the clave pattern.

The last four notes are played slower than the first four notes. You will now create a roll by deleting the first clave note and replacing it with four very fast notes.

12 Choose Functions > Time Handles to deselect the time handles.

13 From the Tool menu, choose the Brush tool, and position it over the first clave note.

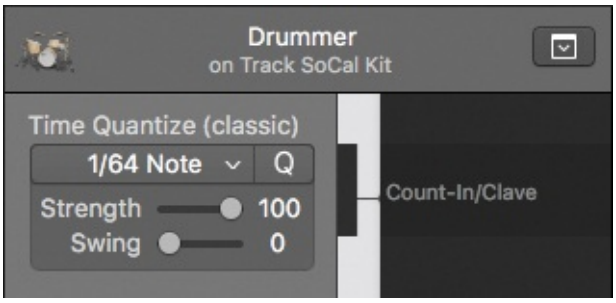


The Brush tool turns into an Eraser tool.

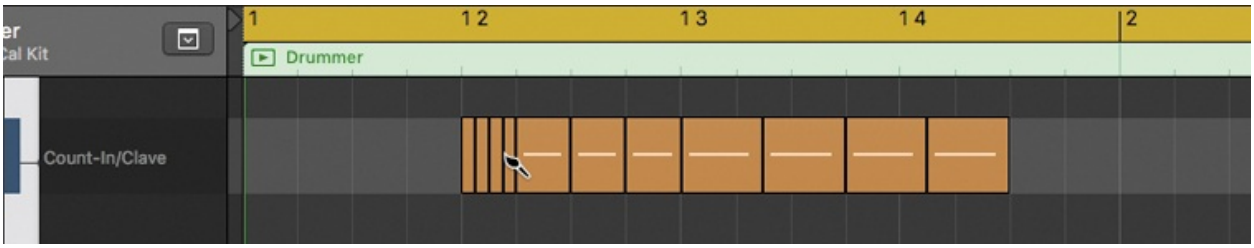
14 Click the note to erase it.

To change the length of the notes that the Brush tool creates, you will change the Time Quantize note value.

15 In the Piano Roll inspector, from the Time Quantize pop-up menu, choose 1/64 Note.



16 Drag the Brush tool to paint four sixty-fourth notes in the empty space at the beginning of the clave pattern.



17 Listen to the clave pattern.

It starts with a fast roll, and then plays three sixteenth notes and slows down for the last four notes. You will now paint that same pattern in different locations in the MIDI region.

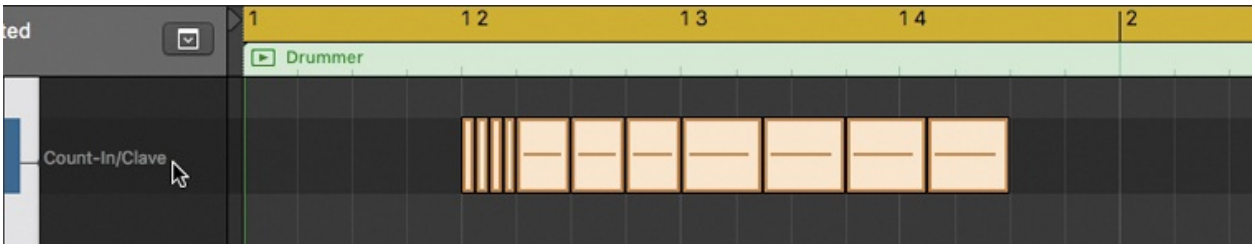
You have used the Brush tool to paint multiple identical notes, and you've defined the note lengths using the Time Quantize note value. The time handles allowed you to time-stretch some of the notes to customize your pattern.

Defining and Painting Custom Note Patterns

The Brush tool has some hidden power. You can select a note pattern you've created and define it as a brush pattern. You then drag the Brush tool to paint

that custom pattern anywhere you'd like in the MIDI region.

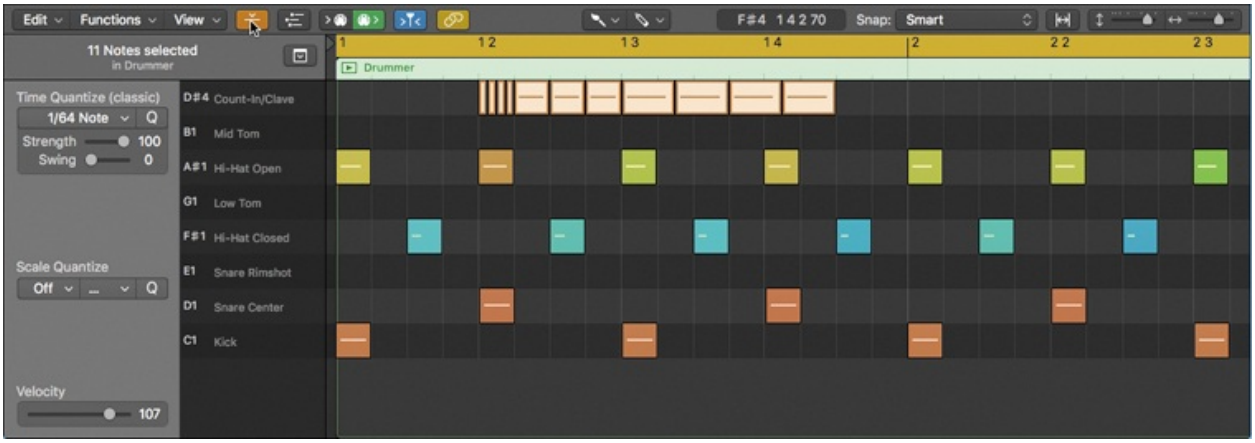
1 In the Piano Roll inspector, click the Count-In/Clave name to select all the clave notes.



2 With the Brush tool, Control-click one of the selected notes, and from the shortcut menu, choose Define Brush Pattern.

Before you paint more notes, it would be nice to be able to see all the notes in your MIDI region. However, zooming out vertically would make the notes very small, and the drum names would disappear. Instead, you will use Collapse mode, which displays lanes only when MIDI notes are present.

3 In the Piano Roll menu bar, click the Collapse Mode button.



The Piano Roll displays only the eight lanes that contain MIDI notes, thereby allowing you to see the whole drum pattern.

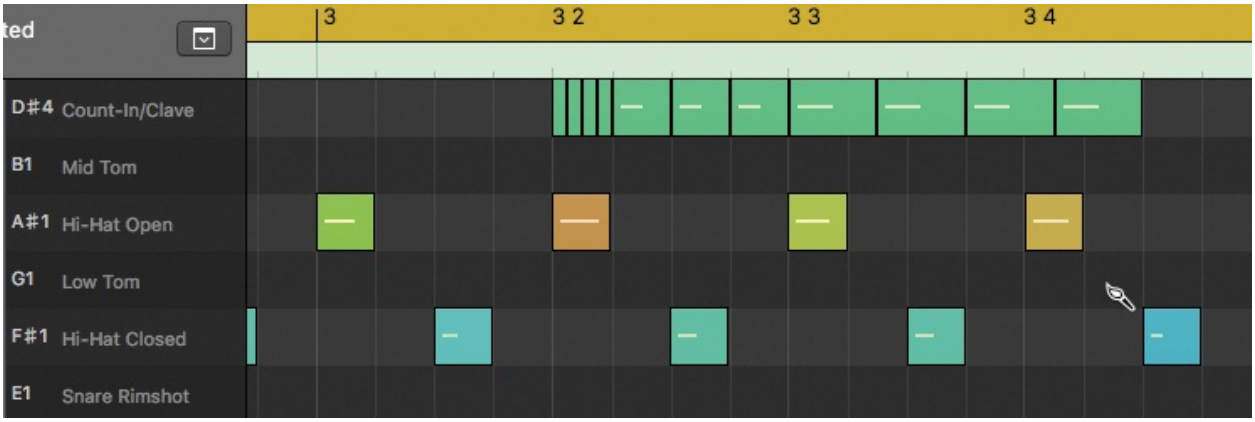
4 Scroll to bar 3.

Dragging the Brush tool anywhere in the MIDI region will now paint that same pattern. If you hold down Shift while you paint a pattern, any vertical mouse movements will affect the velocity of the notes: dragging up will

increase the velocity, and dragging down will decrease it.

Pressing Shift has the added benefit of constraining the notes you're creating to the lane where you started dragging.

5 On beat 2 of bar 3, click and hold the Brush tool, and then hold down Shift and drag the Brush tool toward the bottom right to paint the pattern while lowering the note velocities.



6 Listen to the clave pattern.

The second clave pattern has the same timing as the first pattern, but it is played softer.

7 Click the Collapse Mode button to turn it off.

8 Press T twice to change the Left-click tool to a Pointer tool.

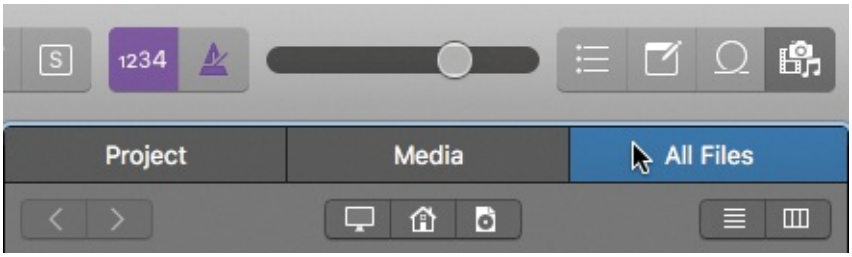
You now know how to define your own custom brush pattern and paint it while varying the velocities of the notes. The Brush tool and the time handles come in handy whenever you're looking for an efficient way to create fast, original note patterns.

Importing a MIDI File

MIDI events recorded by software and hardware MIDI sequencers (including Logic) can be saved in standard MIDI file (SMF) format. Most sequencers can export and import standard MIDI files, which makes it easy to open them in multiple software sequencers or share them with others.

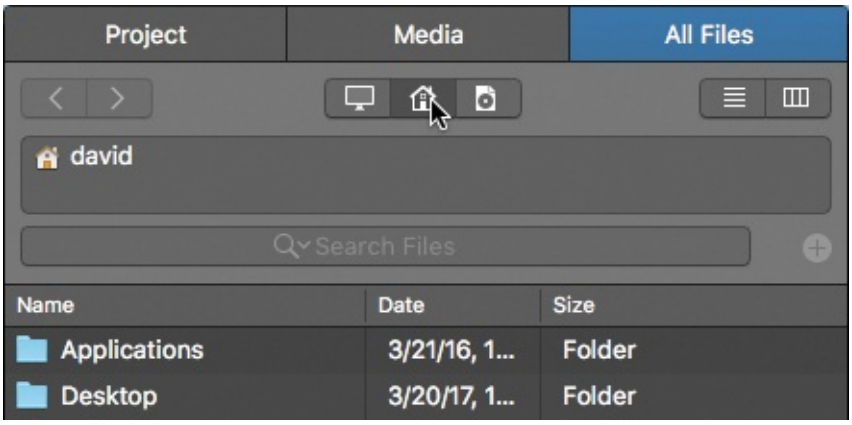
In the following exercise, you will import a MIDI file containing an eight-bar synth performance that you'll edit later in the Event List.

1 In the control bar, click the Browsers button (or press F), and at the top of the Browsers area, click All Files.

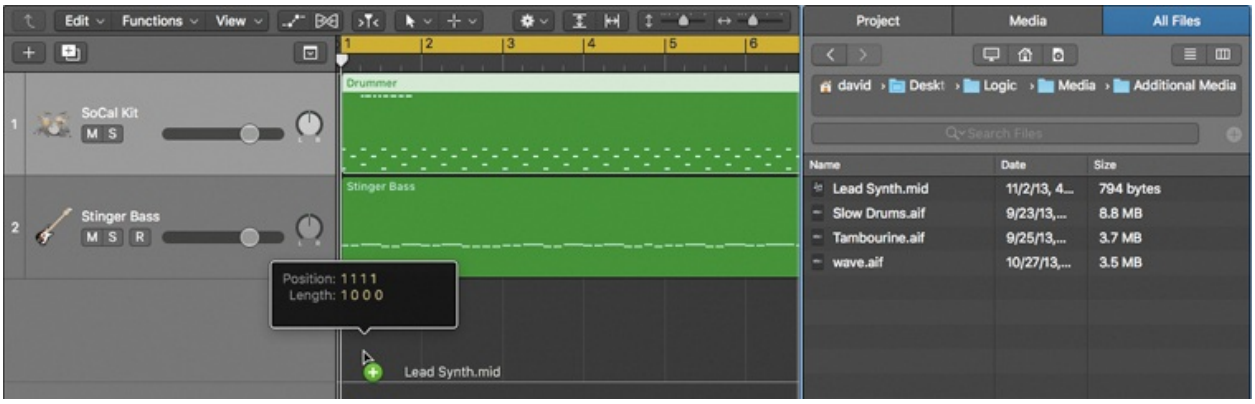


The All Files Browser displays all the files on your hard drive that can be used by Logic: audio files, MIDI files, movie files, and Logic and GarageBand projects.

2 At the top of the All Files Browser, click the Home button to list the contents of your home folder.



3 Navigate to Desktop > Logic Pro X Files > Media > Additional Media, drag **Lead Synth.mid** to bar 1 at the bottom of the workspace, and in the dialog asking if you want to import tempo information, click No.



A new software instrument track is created, and a Steinway Grand Piano patch is loaded by default. An eight-bar region named *Lead Synth* is created on the track. The gray vertical bars in the region represent MIDI control events.

4 Listen to the song.

You can hear a piano, which is the default instrument when you import a MIDI file. However, this sequence should be played by a synth.

5 Select the Steinway Grand Piano track, and in the Library, choose Synthesizer > Lead > Citrus Fuzz. Listen to the song.

The synth plays a lot of fast notes, and then plays a very simple melody. You will breathe new life into the synth performance later in this lesson by inserting your own controller events.

Notice that the synth is panned to the left and a little too low in volume.

6 In the Citrus Fuzz track header, drag the Volume slider up, and drag the Pan knob to the center position.

7 Start playback.

As the playhead jumps to bar 1 (the beginning of the cycle area) and playback starts, the Volume slider and the Pan knob revert to their original positions. MIDI files can contain controller volume and pan events, and when Logic plays those events, it uses them to set the volume and pan of the track. You'll later delete them in the Event List.

8 Stop playback, and press Return to go to the beginning of the song.

Tip

To export a MIDI region(s) as a standard MIDI file, select the region(s) in the workspace and choose File > Export > Selection as MIDI File.

Editing MIDI Data in the Event List

The Event List shows MIDI events as text and numbers. Unlike other MIDI editors—such as the Piano Roll Editor or the Score Editor—that can be more convenient for creative tasks, the Event List displays all the MIDI events in a region, along with the exact numerical values of their attributes (such as MIDI channel, key number, velocity, and so on). Although you probably won't use the Event List to compose, it can be a very powerful troubleshooting tool.

You will now open a MIDI file (that you imported in the previous exercise) in the Event List to locate and delete those MIDI events that are displayed as gray